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Export-Intensive Industries Pay More on Average: An Update

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Abstract

This article analyzes the weekly earnings in U.S. manufacturing and services industries, based on data for approximately 164,000 workers in 2014. It estimates the earnings premium in export-intensive industries, based on an econometric analysis that combines worker-level data on earnings, education, occupation, and other demographic characteristics from the Current Population Survey with industry-level data on exports and total shipments of manufactures and services. The estimates indicate that export-intensive industries pay more on average and that the export earnings premium is larger for blue collar workers in production and support occupations (they earn a 19.0% premium in export-intensive manufacturing industries and a 17.6% premium in export-intensive services industries) than for white collar workers in management and professional occupations (they earn a 9.9% premium in export-intensive manufacturing industries and a 12.0% premium in export-intensive services industries). Overall, the export earnings premium in 2014 is 16.3% on average in the manufacturing industries and 15.5% on average in the services industries.

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INTRODUCTION

In this article, I analyze worker-level earnings data from the 2014 Current Population Survey (CPS). I use an econometric model to estimate earnings premia in export-intensive industries after controlling for the worker's education, work experience, demographics, and location within the United States. The model divides the 164,000 workers in the CPS sample into two occupation groups (blue collar workers in production and support occupations, white collar workers in management and professional occupations) and two industry groups (manufacturing, services) and calculates a separate export earnings premium for each of the groups.

This note updates similar estimates for the manufacturing sector in Riker (2010) and for the services sector in Riker and Thurner (2011), both based on earlier CPS data for 2006-2008.[2] The updated estimates indicate that export-intensive industries still pay more on average in 2014 and that the export premia are still larger for blue collar workers than for white collar workers. Overall, the export earnings premium in 2014 is 16.3% on average in the manufacturing industries and 15.5% on average in the services industries.

The rest of the note is organized into four parts. Section 2 lists the data sources and provides descriptive statistics on export intensity and average weekly earnings. Section 3 describes the econometric methodology. Section 4 reports the econometric estimates of the export earnings premia by occupation group and industry group. Section 5 offers concluding remarks.

DATA SOURCES AND DESCRIPTIVE STATISTICS

The data on the workers' average earnings are from the Merged Outgoing Rotation Group of the Current Population Survey (CPS-MORG). They include the weekly earnings of approximately 160,000 workers employed in U.S. manufacturing and services industries in 2014. The CPS-MORG also provides data on several worker characteristics that affect earnings, including education, age (as a proxy for work experience), occupation, race, sex, and the state where the worker is located.

The data on U.S. exports of manufactures are official trade statistics from the U.S. Census Bureau. The data on U.S. private services exports are from the International Transactions, International Services, and International Investment Position Tables published by the Bureau of Economic Analysis. The services trade data are based on surveys in which U.S. companies reported the dollar value of their sales of selected services and intangible assets to foreign entities. Finally, the

[2] Riker (2010) estimates that exports contributed an additional eighteen percent to workers' earnings in U.S. manufacturing industries between 2006 and 2008. The export earnings premium for blue collar jobs was one-fifth larger than the export earnings premium for white collar jobs. Riker and Thurner (2011) estimate that workers in export-intensive services industries earned fifteen to twenty percent more than comparable workers in other services industries between 2006 and 2008. Ferris and Riker (forthcoming) uses a similar methodology but focuses on differences in export earnings premia across U.S. cities.

data on the value of shipments for each of the manufacturing and services industries are from the 2012 U.S. Economic Census.

I designate the manufacturing and services industries as export-intensive if the industries' exports were greater than ten percent of their total shipments in 2012.[3]

Table1: Export Intensity of U.S. Manufacturing Industries [4]

Industry Name (NAICS Code)	Export Value in 2012 ($ million)	Export Share in 2012 (%)
Computer and Electronic Products (334)	123,897	36.73
Machinery Manufacturing (333)	149,405	36.65
Electrical Equipment and Appliance Manufacturing (335)	38,265	30.86
Transportation Equipment Manufacturing (336)	226,575	28.57
Miscellaneous Manufacturing (339)	43,998	28.57
Textile, Apparel, and Leather Manufacturing (313-316)	17,557	24.98
Chemical Manufacturing (325)	188,116	23.43
Primary and Fabricated Metal Products (331-332)	114,453	18.72
Plastics and Rubber Products (326)	28,884	13.22
Petroleum and Coal Products (324)	110,286	13.07
Paper and Printing (322-323)	30,340	11.52
Non-Metallic Mineral Products (327)	10,144	10.31
Food Manufacturing (311)	63,582	8.50
Wood Products (321)	5,952	7.63
Furniture and Fixtures Manufacturing (337)	4,411	6.52
Beverage and Tobacco Products (312)	6,847	4.96

Table 1 ranks the export intensity of the sixteen manufacturing industries in the CPS-MORG. In 2012, the export values of these industries ranged from $4.4 billion for furniture and fixtures manufacturing to $226.6 billion for transportation equipment manufacturing. The export shares ranged from 4.50 percent for beverages and tobacco products to 36.73 percent for computer and electronic products.

[3] When comparing industries' engagement in export markets, it is important to adjust for the significant differences in the sizes of the industries. The export share is calculated using 2012 trade and shipments data in order to utilize the more comprehensive Economic Census data on industry shipments. It is the value of exports (from the official trade statistics of the U.S. Census Bureau) divided by the total value of the shipments of the U.S. manufacturing industry (from the Annual Survey of Manufactures and Economic Census of the U.S. Census Bureau).

[4] The industry indicator in the CPS-MORG is *dind02*. I use this NAICS code to link the individual worker to the export intensity of his or her manufacturing industry.

Table 2 ranks the export intensity of the services industries in the CPS-MORG. The table includes all of the services industries that received at least one percent of their total revenues in 2012 from cross-border exports. The export values of these nine industries ranged from $6.3 billion for other information services to $83.6 billion for transportation and warehousing. The export shares ranged from 2.44 percent of total sales for telecommunications to 16.95 percent for motion picture and sound recording.

Table 3 divides the 22 occupation codes in the CPS-MORG into two occupation groups. The management and professional occupations are for the most part white collar jobs, and the production and support occupations are for the most part blue collar jobs.

Table 2: The Export Intensity of U.S. Manufacturing Industries [5]

Industry Name (NAICS Code)	Export Value in 2012 ($ million)	Export Share in 2012 (%)
Motion Picture and Sound Recording Industries (512)	16,165	16.95
Publishing Industries, Except Internet (511)	42,460	16.38
Internet Service Providers and Data Processing (518)	12,086	11.97
Transportation and Warehousing (48-49)	83,592	11.24
Finance (522-523)	76,605	9.13
Other Information Services (519)	6,261	6.78
Professional and Technical Services (541)	83,346	5.40
Telecommunications (517)	13,756	2.44

[5] The table includes the U.S. services industries with an export share greater than one percent in 2012. The export share for the services industries is the value of cross-border exports (from the Bureau of Economic Analysis) divided by the total revenues of the U.S. services industry. The services categories in the BEA data are not reported by NAICS code. The link from the worker's industry to the export intensity measure is based on the NAICS-CIC concordance described in Riker and Thurner (2011).

Table 3: Grouping of Occupations [6]

Management and Professional Occupations	Production and Support Occupations
Management	Healthcare Support
Business and Financial Operations	Protective Services
Computer and Mathematical Science	Food Preparation and Serving Related
Architecture and Engineering	Building and Grounds Cleaning and Maintenance
Life, Physical, and Social Science	Personal Care and Service
Community and Social Service	Sales and Related
Legal	Office and Administrative Support
Education, Training, and Library	Farming, Fishing, and Forestry
Arts, Design, Entertainment, Sports and Media	Construction and Extraction
Healthcare Practitioner and Technical	Installation, Maintenance, and Repair
	Production
	Transportation and Material Moving

Finally, Table 4 summarizes the percentage differences in average weekly earnings by industry group, occupation group, and export intensity. The first column focuses on workers in management and professional occupations. Within manufacturing, the workers' average weekly earnings were 14.6% higher in the export-intensive industries. Within services, the workers' average weekly earnings were 10.3% higher in export-intensive industries. The second column of the table focuses on workers in production and support occupations. In this occupation group, the gaps were even larger: average weekly earnings were 27.6% higher in export-intensive industries in manufacturing and 29.1% higher in export-intensive industries in services.

Table 4: Differences in Weekly Earnings by Industry and Ocupation Groups and Export Intensity

	Management and Professional Occupations	Production and Support Occupations
Manufacturing Industries		
Export Share > 10%	$1,514	$809
Export Share ≤ 10%	$1,321	$634
% Difference	14.6%	27.6%
Services Industries		
Export Share > 10%	$1,299	$808
Export Share ≤ 10%	$1,178	$626
% Difference	10.3%	29.1%

[6] The occupation indicator in the CPR-MORG is *docc00*.

ECONOMETRIC APPROACH

The earnings differences in Table 4 are not adjusted for differences in the characteristics of the workers in each of the occupation and industry groups. Ideally, the earnings differences would be calculated by comparing workers who are employed in the different sets of industries but are otherwise similar in terms of their education, experience, location, and demographics. This comparison is the aim of the multivariable regression analysis in this section. The regression model effectively removes the contributions of the individual characteristics from the workers' earnings before calculating the inter-industry differences in weekly earnings.

Equation (1) is the multivariate econometric model.

$$lnW_i=\beta_0\, ExportIntensive_i+\beta_1\, CollegeGrad_i+\beta_2\, GraduateDeg_i+\beta_3\, Experience_i+$$

$$+\beta_4\, Male_i+\beta_5\, White_i+\Sigma_s\gamma_s\, D_{is}+\varepsilon_i \quad (1)$$

The variable InW_i is the log of worker *i*'s average weekly earnings. $ExportIntensity_i$ is an indicator that is equal to one if the worker's industry is export intensive. $CollegeGrad_i$ 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. $Experience_i$ is an indicator that is equal to one if the individual is at least 35 years old. $White_i$ and $Male_i$ indicate individual *i*'s race and sex. D_{is} represents a set of indicator variables that are equal to one if individual *i* is located in state *s*, and ε_i is the error term of the model.

The coefficient on export intensity, β_0, measures the premium in export-intensive industries, either in manufacturing or in services. The coefficients on the individual characteristics, β_1 through β_5, measure the effect of education, experience, location, and demographic characteristics on the worker's earnings.

I estimate the model in equation (1) separately for each industry group (manufacturing, services) and occupation group (management and professional occupations, production and support occupations). The econometric model includes state fixed effects, and the individual observations are weighted using the sampling weights in the CPS-MORG data. The reported standard errors are corrected for potential clustering by industry.

ECONOMETRIC ESTIMATES

Table 5 reports the econometric estimates for workers in the manufacturing industries. The measures of the worker's human capital (education and experience) and demographic profile (race and sex) have the expected signs and are statistically significant. The export intensity of the worker's industry has a large, positive, and statistically significant effect on the earnings of workers in the production and support occupations but a smaller, positive, and statistically insignificant effect on the earnings of workers in the management and professional occupations.

The estimated coefficient on the export intensity variable (multiplied by 100) indicates the percentage difference in the conditional means of the two groups of industries: earnings in the export-intensive industries are 19.0% higher for the production and support occupations, and they are 9.9% higher for the management and professional occupations. The state fixed effects control for geographic differences in earnings within the same industry and occupation. The individual γ_s coefficients are not reported in Table 5, but the *F* test at the bottom of the table indicates that these state effects are jointly significant.

There are several important differences across the two occupation groups. First and foremost is the export earnings premium, which is much higher for the blue collar workers in the production and support occupations. In addition, experience and post-graduate education of the worker have larger effects on earnings in the management and professional occupations. On the other hand, the race and sex of the worker have larger effects on earnings in the production and support occupations.

Table 5: Earnings Models for Workers in Manufacturing Industries [7]

Dependent variable: log of weekly earnings	Management and Professional Occupations	Production and Support Occupations
Export-Intensive Industries	0.0992 (0.0596)	0.1903 (0.0396)
Experience (Age ≥ 35)	0.3365 (0.0180)	0.2751 (0.0140)
College Graduate	0.3868 (0.0256)	0.4055 (0.0524)
Graduate Degree	0.1774 (0.0314)	0.0969 (0.0567)
White	0.0850 (0.0190)	0.0998 (0.0169)
Male	0.2383 (0.0289)	0.3162 (0.0245)
Number of Observations	5,258	12,012
R^2	0.2059	0.1769
F Statistics for the State Fixed Effects	F = 62.40 *p value* = 0.00	F = 54.08 *p value* = 0.00

[7] Both regressions include state fixed effects, and the standard errors that are reported in parentheses are corrected for clustering by industry.

Table 6 reports the econometric estimates for workers in the services industries. There are still differences in the export earnings premia of the two occupation groups, but the gap is much smaller. A graduate degree has a larger effect on earnings in the management and professional occupations in services, but experience and the race and sex of the worker all have larger effects on earnings in the production and support occupations.

Table 6: Earnings Models for Workers in Services Industries[8]

Dependent variable: log of weekly earnings	Management and Professional Occupations	Production and Support Occupations
Export Intensity	0.1199 (0.0694)	0.1764 (0.0724)
Experience (Age ≥ 35)	0.3526 (0.0222)	0.4173 (0.0505)
College Graduate	0.3926 (0.0215)	0.3935 (0.0404)
Graduate Degree	0.1378 (0.0154)	0.0427 (0.0289)
White	0.0410 (0.0103)	0.0759 (0.0177)
Male	0.2941 (0.0289)	0.3666 (0.0471)
Number of Observations	57,800	89,214
R^2	0.1849	0.1721
F Statistics for the State Fixed Effects	F = 64.84 *p value* = 0.00	F = 485.26 *p value* = 0.00

[8] Both regressions include state fixed effects, and the standard errors (reported in parentheses) are corrected for clustering by industry.

CONCLUSIONS

The econometric model indicates that the relatively high weekly earnings in export-intensive manufacturing and services industries in Table 4 can be explained in part by the education and experience levels of the workers in these industries. However, even after controlling for observable human capital, demographic, and location factors in the regression models in Tables 5 and 6, there remains a significant difference in earnings between industries that are export-intensive and industries that are not. The export earning premia are larger for blue collar workers than for white collar workers, and they are larger in manufacturing than in services.

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It is important to understand the limitations of the 2014 estimates in this article. They are the average differences in the earnings of comparable workers across industries. Even though there were measurable, economically significant earnings premia in the export-intensive industries in 2014, it is not clear whether these large premia will continue or diminish as these industries grow through exporting. Still, the persistence of these export earnings premia over the years as U.S. exports have grown is certainly hopeful.

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