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Measuring the export potential of urban regions: A case study from Appalachia, USA

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**MEASURING THE EXPORT POTENTIAL OF URBAN REGIONS:
A CASE STUDY FROM APPALACHIA, USA**

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ABSTRACT

The economic benefits from exporting can be very significant for a region. New research shows that the export-related jobs pay 20 percent above the national average. Productivity growth in exporting industries is three times the rate for the country as a whole. And export-related jobs provide the best long-run security. The Southern Appalachian region of the U.S. provides an excellent case study for examining the potential for exports. It has an economic base rich in the production of agricultural, mining, and manufactured goods. The federal government has just released two studies on export-related employment and the value of exports originating in metropolitan statistical areas. This study examines these data to measure the export performance and potential of eight MSAs in Southern Appalachia. The results indicate that most metropolitan areas are not reaching their expected potential in exporting. Just one of the eight metro areas appears to be operating well above its potential, two are performing consistent with their expected level of exports, while the other five are exporting significantly less than the potential index would predict. Conclusions regarding export achievement levels based on this data is preliminary and should be supplemented by interviews or site visits to each location. Perhaps the type of export data employed in this study could be utilized or made available for urban areas within Europe. The approach used to estimate export potential for U.S. metropolitan areas could prove useful to urban planners seeking export development for cities within Europe.

INTRODUCTION

Exporting can be very profitable for a firm, an industry, or a region. The jobs related to exports pay the highest wages, enjoy the greatest productivity growth, and have the best long-term security. As a result, regions with a large and dynamic exporting sector possess the highest rates of economic growth and the brightest prospects for future prosperity.

The Appalachian region, a goods producing area, is uniquely situated to benefit from exporting activity. However, the region is usually viewed in terms of the job and income losses due to import-competition. It is well understood that manufacturing jobs relying on cheap labor and mature production technologies have no future in Appalachia or the United States.

This paper studies exporting activity within Appalachia. Data on the export performance of eight metropolitan areas within Appalachia is examined. This type of research has only become possible within the past six months due to the first time release of MSA level export data, including data on the employment and income impacts of exports.

The Importance of Exporting

Since the 1970s, the U.S. Department of Commerce has been tracking the impact of exports on the domestic economy. Their most recent report *U.S. Jobs Supported by Goods and Services Exports, 1983-94* was issued in November 1996. The report found that workers in industries that directly export goods and services are receiving wages 20 percent above the national average. When direct and indirect employment effects are combined, nearly one-third of the growth in all employment in the United States between 1986 and 1994 was in exporting industries. In 1994, one in ten private sector jobs, one in five manufacturing jobs, and one in three agricultural jobs, and one in fourteen services jobs was due to exports.

Exports of goods account for over 70 percent of total exports. The industries that produce goods for export have a 23 percent higher productivity level than industries that produce only for the domestic market. Further, in these exporting industries, productivity growth is triple the overall national rate. This higher productivity permits the exporting industries to pay higher

wages and to provide greater job security (USDOC/OCE, 1996).

These findings are in line with the international trade theory of comparative advantage. Beginning with David Ricardo (1821), economists have argued that nations and regions should export those goods and services that they produce the most efficiently, and import the goods and services that they produce the least efficiently.

A nation or region will have a comparative advantage in producing goods and services that make maximum use of the most abundant types of resources. Through trade, the resources used primarily in exporting industries will enjoy the highest gains, while resources used primarily in industries competing with imports will suffer the greatest losses (Lindert and Pugel, 1996).

The reports issued by the Department of Commerce since the 1970s provide striking evidence for the comparative advantage analysis of employment and income results in exporting industries. Data and theory both concur that the highest paying jobs and the best long-run job security is linked to the export of goods and services.

The following analyses in this paper must be limited to a discussion of the employment impact of the export of goods. The trade documentation collected by the U.S. Customs Service covers merchandise trade only, and there is no equivalent set of detailed reports on trade in services, despite the growing importance of services trade to the U.S. economy. As a result, the information on the geographic origin of exports covers only traded goods.

Only certain industries produce goods that can be exported, and these are agriculture, mining, and manufacturing. The construction industry produces goods, but they lack the mobility required for international trade. These three industry groups -- agriculture, mining, and manufacturing -- make up the exportable goods producing sector, and represent the opportunities for employment and income growth linked to the export trade in goods. Among the regions of the United States, the Appalachian region is well endowed with a variety of goods that can be exported.

The MSA Export Performance Index

In the fall of 1996, the U.S. Department of Commerce released an innovative study on the geographic origin of U.S. exports of goods. Recent improvements in data processing capabilities permitted the export origin to be pinpointed by five digits ZIP code. To maintain required confidentiality, the ZIP code data were aggregated and published at the level of the metropolitan statistical area. The aggregated data on export origins appear in *An Export Performance Report on Selected Metropolitan Areas*. Published in seven volumes, the report covers 253 metropolitan areas and provides MSA export origin data for 1993, 1994, and 1995.

As mentioned above, this export origin data covers only the export of goods since no documentation is available from the Customs Bureau on the origin of exported services. Beyond this, the most significant problem with this new data set remains the federal confidentiality requirements. When a single exporter accounts for the bulk of export shipments in a certain commodity category or to a certain destination, the data cell must be left blank. In larger MSAs, this is not a problem. In the smaller inland MSAs, such as those in Appalachia, there are serious confidentiality problems that result in large gaps in the data. For example, the export trade of the Tri-Cities MSA is dominated by a single firm so only trade totals are reported. In contrast, destination data is provided for the Huntsville MSA, but no detail is available on the composition of exports. The detailed data, especially regarding the types of products being exported, would be very useful in analyzing export performance at the MSA industry level. At present, our analyses must be restricted to the overall metropolitan area.

When the MSA export origin data is combined with *U.S. Jobs Supported by Goods and Services Exports, 1983-94*, it is possible to develop indexes showing the level of export attainment, export potential, and export performance for each metropolitan statistical area as a whole.

The MSA export attainment index. The newly released data on MSA export origin cover the three years 1993, 1994, and 1995. Since these data represent exports that are frequently small in amount or originate in small metropolitan areas, the actual export levels over the three years often show large changes. The MSA export origin data are microeconomic data and the figure

for any one-year could reflect a unique and non-reoccurring event in the local metropolitan economy. Due to this factor, an average over the three-year period would be more representative of the true level of MSA exports of goods.

The next step is to use conversion ratios from *U.S. Jobs Supported by Goods and Services Exports, 1983-94* to convert the dollar level of MSA exports into the MSA employment that is export-related. The export-employment ratios are national data, and are for the year 1994. As national ratios, these are macroeconomic data and are not subject to the fluctuations frequently seen in regional microeconomic data; thus no smoothing or averaging is required. It is also convenient (as well as the preferred statistical procedure) to match the 1994 national export-employment ratios with the MSA export origin data which are averaged over the period 1993 to 1995, and thus would be interpreted as representing the midpoint of the period which is 1994.

There are two sets of export-employment ratios. The direct employment ratios show the jobs that are located in the industries that produce the exported goods. The indirect employment ratios reflect the jobs that are located in industries that are suppliers to the exporting industries. From a national or macroeconomic perspective, it is proper to use both the direct and indirect employment effects to find the total employment that is related to exports. From the microeconomic perspective of a metropolitan statistical area, the indirect employment will largely occur outside of the MSA, so it is more accurate to use the direct export-employment ratios as conversion ratios.

As previously mentioned, the direct export-employment ratios are national ratios and are being applied to metropolitan level data to estimate MSA export-related employment. This procedure requires some assumptions. Location quotient analysis provides a useful guide to identifying the types of statistical problems inherent in using more aggregate information at a lower level of geographic coverage. For example, it is assumed that the structure of the exportable-goods sector in the MSA is not too dissimilar to the national exportable-goods sector. Another assumption is that the export productivity of individual MSA industries is also comparable to national patterns. To the extent that these assumptions do not hold at the MSA level, the use of the national ratios may result in some error when applied to regional export activity.

The final step in the procedure is to compare the export-related employment in the MSA with the employment in the industries that produce goods that can be exported. The exportable-goods producing sector consists of agriculture, mining, and manufacturing. These employment figures are available from the *Regional Economic Information System* that is a CD-ROM database published each year by the U.S. Bureau of Economic Analysis (part of the Commerce Department). The ratio of export-related employment to the total employment in the exportable-goods producing sector is the MSA export attainment index. This can be understood as the percent share of the workers in the MSA exportable-goods producing sector that actually owe their jobs to exports under the assumption that regional patterns do not significantly differ from the national pattern.

The MSA export potential index. National data can also provide a benchmark for the export potential of an MSA and show whether the MSA is performing above or below national patterns. The national benchmark is found by comparing all direct employment related to exports of goods, to the total employment in the exportable-goods producing sector. For 1994, the direct export-related employment is found in *U.S. Jobs Supported by Goods and Services Exports, 1983-94* and the total employment in the nation in the exportable-goods producing sector is found in the *Regional Economic Information System*. The resulting national figure is 10.5 percent -- over one-in-ten jobs in agriculture, mining, and manufacturing in the United States is directly due to the export of goods (USDOC/BEA, 1996; USDOC/OCE, 1996).

This national figure may be used as a benchmark to show the export employment potential of a metropolitan area. The use of a national ratio to generate a regional benchmark requires certain assumptions. As discussed previously, we are assuming that the structure and capabilities of the national and regional economies are sufficiently similar so that such a comparison may be made. But as suggested by location quotient analysis, there is a risk that such an assumption may be in error.

The national figure of 10.5 percent is used with the MSA employment in the exportable-goods producing sector to show the level of export-related employment that would be expected under the national pattern -- the potential MSA export related employment. The ratio of potential export-related employment to the total employment in the exportable-goods producing sector is

the MSA export potential index. This index can be understood as the percent share of the workers in the exportable-goods producing sector that would owe their jobs to exports if national patterns were applied to the MSA economy.

The MSA export performance index. The two measures developed above show the level of export attainment and the level of export potential for the metropolitan statistical area. Comparing the two indexes provides a measure of MSA export performance. Specifically, the export performance index is found by subtracting the export potential index from the export attainment index. The performance index can be interpreted as representing the degree to which the exportable-goods producing sector in the MSA is performing above or below the national pattern.

An example will help illustrate this discussion. Assume that average merchandise exports from some MSA over 1993, 1994, and 1995 equal \$400 million. Then, assume the direct export-employment ratio for the United States in 1994 is five jobs for each million dollars in exports. The export-related employment in the MSA is thus 2,000 jobs. If there are 50,000 workers in the MSA exportable-goods producing sector, the MSA export attainment index will be 0.04.

From national data, assume the level of direct export-related employment is ten percent of total employment in the exportable-goods producing sectors. The MSA export potential index will be 0.10 which implies that 5,000 workers in the MSA would have export-related jobs if MSA patterns matched national patterns.

The MSA export performance index is found by subtracting the export potential index from the export attainment index, and in this example the MSA export performance index is - 0.06. The minus value of the index shows export-related employment in the MSA exportable-goods producing sector is below the national pattern. The value of 0.06 shows that this below average performance is equal to six percent of total MSA employment in the exportable-goods producing sector (or 3,000 jobs). In this example, the metropolitan statistical area may not be achieving its potential for export-related employment and income.

TABLE 1
EXPORT RELATED EMPLOYMENT AND
EXPORT PERFORMANCE INDEXES

Several Appalachian MSAs

	MSA EXPORTS						Jobs	MSA Exp
METROPOLITAN	Millions Dollars						Export	Related
STATISTICAL AREA	1993	1994	1995	AVG 94	Re-Exp	Adj AVG 94	Ratio	Jobs
				(1)	(2)	(3)	(4)	(5)
United States		512415.6		512415.6	30915.6	481500.0	4.77	2295000
Asheville NC	232.3	228.6	185.2	215.4	13.0	202.4	4.77	965
Chattanooga TN-GA	218.3	237.3	301.0	252.2	15.2	237.0	4.77	1130
Huntsville AL	573.6	672.1	829.0	691.5	41.7	649.8	4.77	3097
Knoxville TN	580.4	689.2	633.2	634.3	38.3	596.0	4.77	2841
Memphis TN-AR-MS	2055.1	2729.5	4163.8	2982.8	180.0	2802.8	4.77	13359
Nashville TN	1104.1	1310.5	1412.3	1275.6	77.0	1198.7	4.77	5713
Roanoke VA	164.0	195.9	231.3	197.1	11.9	185.2	4.77	883
Tri-Cities TN-VA	1356.7	1580.8	1677.5	1538.3	92.8	1445.5	4.77	6890
	MSA Exp	MSA Exp	MSA	Exp Gds	MSA Exp	MSA Exp	MSA Exp	
METROPOLITAN	Related	Gds Prod	Total	Total Emp	Attain	Potential	Perform	
STATISTICAL AREA	Jobs	Employ	Employ	Ratio	Index	Index	Index	
	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
United States	2295000	21931000	144390500	0.152	0.105	0.105	0.000	
Asheville NC	965	25372	125114	0.203	0.038	0.105	-0.067	
Chattanooga TN-GA	1130	51372	256409	0.200	0.022	0.105	-0.083	
Huntsville AL	3097	42241	196439	0.215	0.073	0.105	-0.031	
Knoxville TN	2841	61303	372858	0.164	0.046	0.105	-0.058	
Memphis TN-AR-MS	13359	78518	637904	0.123	0.170	0.105	0.065	
Nashville TN	5713	120826	719467	0.168	0.047	0.105	-0.057	
Roanoke VA	883	22326	158614	0.141	0.040	0.105	-0.065	
Tri-Cities TN-VA	6890	68350	240813	0.284	0.101	0.105	-0.004	

Export performance indexes have been calculated for a sample of eight metropolitan

areas within the Appalachian region. The figures reported in column (11) indicate the relative level of export attainment versus its potential for each of the metropolitan areas. Their interpretation is as follows. Only one of the eight regions has attained exports in excess of the amount predicted by the export potential index. That is Memphis, TN-AR-MS. Their exports are 17 percent of total employment - - fully 6.5 percent above the national 10.5 percent. Obviously, Memphis has a comparative advantage in exporting goods versus other U.S. cities. The Tri-Cities TN-VA and Huntsville, AL have export performance indexes just below the export potential index of .105. The figures for these metro areas seem to suggest that they are both exporting at nearly the national average may have little room for more export development. On the other hand, the other five metro areas have significantly less export activity that the export potential index would suggest. The degree of deficiency ranges from between 6 to 8 percent less than the national average for the other five metro areas. Site visits were done for two of the metro areas to investigate whether the perceptions based on the economic data were accurate.

Export Performance of the Huntsville MSA

The city is located in northern Alabama and is best known as the development center for the large rockets used by NASA in the manned-missions to the moon. Today the NASA facility is involved in shuttle missions and work on the multinational space station. Stimulated by the NASA presence, the area is now a diversified manufacturing center specializing in high-technology electronic products for the consumer market. The 1994 summary data for the Huntsville, Alabama, MSA are:

Total MSA Employment	196,439
Exportable Goods Producing Sector Employment	42,241
Percent of Total Employment in EGPS	21.5%
Exports of Domestic Goods (Million Dollars)	\$ 649.8
Direct Export Related Jobs (per Million Dollars)	4.77
Export Related Employment	3,097
MSA Export Attainment Index	7.3
MSA Export Potential Index	10.5
MSA Export Performance Index	- 3.1

The total employment in the metropolitan area for 1994 is nearly 200,000, of which slightly over one-fifth is in the exportable goods producing sector (USDOC/BEA, 1996). Over the period 1993 to 1995, the average exports of merchandise originating in the MSA was \$691.6 million (USDOC/ITA, 1996). This figure includes re-exports of goods that are officially imported into the United States and then exported without entering into domestic commerce. Their value for Huntsville is estimated to be \$41.7 million and need to be subtracted from the merchandise export figure (USDOC/ITA, 1996; USDOC/OCE, 1996). Domestic merchandise exports originating in the Huntsville MSA in 1994 will then be \$649.8 million. These exports directly create jobs in the exportable goods producing sector (agriculture, mining, and manufacturing).

Nationally, each million dollars of domestic exports of merchandise directly creates 4.77 jobs in the exporting industries (USDOC/OCE, 1996). Assuming this ratio can be used for the Huntsville MSA, then export related employment equals 3,097 jobs. The export attainment index is 7.3 -- thus about one out of each 14 jobs in the exportable goods producing sector is actually linked to export activity. At the national level, over ten percent of the jobs in the exportable goods sector are directly related to exports (USDOC/BEA, 1996; USDOC/ITA, 1996; USDOC/OCE, 1996). Using this figure gives the Huntsville MSA an export potential index of 10.5. The metropolitan area is actually exporting at a lower level than the nation as a whole. Therefore the export performance index will be -3.1, and suggests that perhaps another 1,200 export related jobs could be added to the Huntsville economy.

During the author's visit to the Huntsville MSA, we found regional business firms to be very involved in export activities. Significantly, even though domestic exports from the MSA are only about \$650 million, *An Export Performance Report on Selected Metropolitan Areas:*

South Central Region provides detailed data on the foreign destinations for the exported merchandise (USDOC/ITA, 1996). Participation in exporting in the MSA is so diverse that no one firm or type of product dominates the export trade. When there is such domination, the detailed data must be suppressed to preserve business confidentiality according to federal law. Also, the 10.5 MSA export potential index is a national average and coastal MSAs will probably have a higher index value while inland MSAs will have a lower level. Even so, this first look at the data for Huntsville does suggest that the MSA may be performing below its export employment and income potential. These results conflict with the general impression that Huntsville is maximizing its export potential. The site visit suggests that some additional export growth is possible.

Export Performance of the Tri-Cities MSA

This MSA is located on the border between Tennessee and Virginia and includes the northeast corner of Tennessee and the southwest corner of Virginia. The Tri-Cities are Johnson City, Kingsport, and Bristol. The MSA has a diversified manufacturing economy with a large presence of high-technology firms. The 1994 summary data for the Tri-Cities, Tennessee-Virginia, MSA are:

Total MSA Employment	240,813
Exportable Goods Producing Sector Employment	68,350
Percent of Total Employment in EGPS	28.4%
Exports of Domestic Goods (Million Dollars)	\$ 1,445.5
Direct Export Related Jobs (per Million Dollars)	4.77
Export Related Employment	6,890
MSA Export Attainment Index	10.1
MSA Export Potential Index	10.5
MSA Export Performance Index	- 0.4

The total employment in the metropolitan area for 1994 exceeds 240,000, of which over 28 percent are in the exportable goods producing sector (USDOC/BEA, 1996). Over the period 1993 to 1995, the average exports of merchandise originating in the MSA was \$1,538.3 million (USDOC/ITA, 1996). This figure includes re-exports of goods that are imported into the United

States and then exported without ever entering into domestic commerce. The re-exports for the Tri-Cities are estimated to be \$92.8 million and need to be subtracted from the merchandise export figure (USDOC/ITA, 1996; USDOC/OCE, 1996). Domestic merchandise exports originating in the Tri-Cities MSA in 1994 will then be \$1,445.5 million. These exports directly create jobs in the exportable goods producing sector (agriculture, mining, and manufacturing).

Nationally, each million dollars of domestic exports of merchandise directly creates 4.77 jobs in the exporting industries (USDOC/OCE, 1996). Assuming this ratio can be used for the Tri-Cities MSA, then export related employment equals 6,890 jobs. The export attainment index is 10.1 -- thus about one out of each ten jobs in the exportable goods producing sector is actually linked to export activity. At the national level, over ten percent of the jobs in the exportable goods sector are directly related to exports (USDOC/BEA, 1996; USDOC/ITA, 1996; USDOC/OCE, 1996). Using this figure gives the Tri-Cities MSA an export potential index of 10.5. The metropolitan area is actually exporting at a level only slightly below the nation as a whole. Therefore the export performance index will be -0.4, and suggests that only a few additional export related jobs could be added to the Tri-Cities economy.

This level of export performance for the Tri-Cities MSA is very misleading. Both authors are long-time residents of this area, and regional business firms in general have a very low level of export interest or participation. Significantly, even though domestic exports from the MSA approach \$1.5 billion, *An Export Performance Report on Selected Metropolitan Areas: South Central Region* provides no detailed data on the exported merchandise (USDOC/ITA, 1996). The Tri-Cities is home to Eastman Chemical Company, a large multinational firm, and the exports of this one company lie behind the high level of exports originating in the region. When one firm so dominates the data, the detail data must be suppressed to preserve business confidentiality according to federal law. It is the authors' feeling that the Tri-Cities MSA, after allowing for this one firm, is performing well below its export employment and income potential.

The data suggest the Tri-Cities, Tennessee-Virginia, MSA is operating at its export potential. However, the data for the Tri-Cities is distorted by the exports of a major multinational company. The site visit revealed that the level of export awareness is low, and the export infrastructure is still evolving. The trends suggest exports should continue to grow.

FINDINGS AND CONCLUSIONS

Exporting produces tremendous economic benefits to a region. Export related jobs pay well above the national average, boost productivity levels of workers, and provide greater job security. Appalachia is well positioned to benefit from the increased participation by the United States in the world economy due to its greater involvement in producing exportable goods.

Two recent reports from the U.S. Department of Commerce contain new data on the employment related to exporting, and the level of exports originating in metropolitan statistical areas. This paper uses that data to develop three measures of export performance by metro area. They are: MSA export attainment index, MSA export potential index, and the MSA export performance index. These measures have been applied to eight Appalachian MSAs. In addition, the authors conducted on-site visits and interviews in Huntsville, AL and Tri-Cities TN-VA.

Export performance indexes were used to indicate the relative level of export attainment versus its potential for each of the metropolitan areas. Only one of the eight regions has attained exports in excess of the amount predicted by the export potential index. That is Memphis, TN-AR-MS. Their exports are 17 percent of total employment - - fully 6.5 percent above the national 10.5 percent. Obviously, Memphis has a comparative advantage in exporting goods versus other U.S. cities. The Tri-Cities TN-VA and Huntsville, AL have export performance indexes just below the export potential index of .105. The figures for these metro areas seem to suggest that they are both exporting at nearly the national average may have little room for more export development. The other five metro areas have significantly less export activity that the export potential index would suggest. The degree of deficiency ranges from between 6 to 8 percent less than the national average for the other five metro areas. In order to test the accuracy of the MSA export performance indices, site visits were made to two of the eight metro areas – Huntsville, AL and Tri-Cities TN-VA.

In Huntsville, current export volume is \$650 million, and export related employment results in 3,097 jobs. The corresponding export attainment index is 7.3. Nationally, 10.5 percent

of jobs are linked to exporting. Assuming this same rate of export-related jobs could exist in Huntsville, the export performance index is - 3.1. This means 1,200 additional export-related jobs could be added to the Huntsville economy. Site visits to Huntsville found regional business firms to be highly involved in export activities. The exports of \$650 million are very diverse and are not dominated by a few firms or type of product. Even so, the index shows potential for greater export activity.

In the Tri-Cities, value of exports is \$1,445 million, ranking it among the top metro areas within Appalachia. Exporting is related to 6,890 jobs in the region. This figure is 10.1 of total MSA employment in the exportable goods sector and results in an export performance index of - 0.4. This figure seems to indicate the area is performing close to its export potential. Being long-time residents of this region, the authors feel the index for the Tri-Cities is misleading. The Tri-Cities is home to a large multinational chemical company and the exports of this company so dominate the local export picture that no detailed data by type of merchandise can be released. On site visits confirm expectations that this region is performing well below its potential due to the low degree of involvement of other firms in exporting.

Perhaps the type of export data employed in this study could be utilized or made available for urban areas within Europe. The approach used in estimating export potential for U.S. metropolitan areas in this paper might prove useful to urban planners in encouraging export development for cities within Europe.

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