# Estimating Tennessee Exports in the Face of "Port Bias"



by Steven G. Livingston

economic growth such as we face today. We would like as much exporting activity as possible. How do we judge if that's happening? How can we tell if firms are exporting "as much as they should?" There is evidently no single way to do this. For a state economy, we can at least compare how local industries are faring against the national average. Economies that feature significant "under-exporting" are, in a way, underachievers.

What about Tennessee? Are its companies exporting more (or less) than their national peers?

Here is an obvious first stab at the problem. We know the dollar value of exports for individual states. We also know the size of the industry in that state, based on employment, value of shipments, or a number of other measures. Why not take a simple ratio of exports to economic activity? We could divide Tennessee's percentage of national exports in industry X by Tennessee's percentage of national economic activity in X. That's how export intensive the Tennessee industry is. Then we could put this result over the national export intensity. The resulting ratio might be taken as "relative propensity to export." If it's higher than one, the state industry exports at a higher rate than its national peers. If it's lower than one, the industry is exporting less than its national peers.

If we look at the total Tennessee economy, it seems like a bit of an under-exporter. Nationally, about 24.8% of the total value of shipments in manufacturing is exported, while for Tennessee about 21.7% is exported. This modest difference may be due to differences in the particular industries that are located in Tennessee. Some industries are more export oriented than others. We need to proceed at the industry level, then, to make certain. Government statistics are divided into more than 80 different industries by NAICS codes. Rather than attempt to examine them all here, let's focus on four. Two are well-known Tennessee powerhouse industries: basic chemicals and motor vehicle parts. For comparison we will also look at two smaller industries: metal forging and stamping (NAICS 3321) and home appliances (NAICS 3352).

Of these four industries, one (forging and stamping) exports at a higher level than the national industry, while basic chemicals exports at virtually the same rate. The home appliances industry is well below the national average, and the motor vehicle parts industry also under-exports (perhaps an unexpected result), with the latter exporting at only about 72 percent of the national average. No obvious pattern appears.

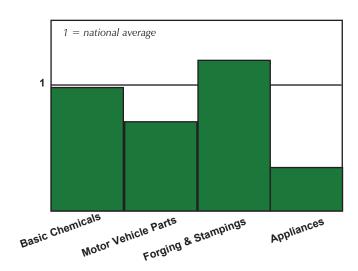
Unfortunately, things are not so simple. Export statistics may suffer from a significant bias. States with large ports are believed to be credited with substantially more exports than they should be. This is because much of the export documentation is created at the port (or on the way there). Documentation frequently falsely lists the port state as the origin of the export, rather than

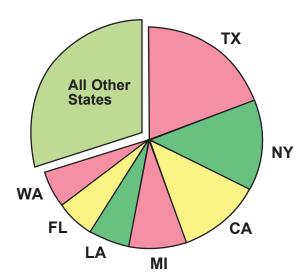
continued on page 2

#### **Tennessee Export and Industry Size**

Year 2011 (Dollar figures in thousands)

	Exports	Value of Shipments	% of U.S. Industry	% of Inland Exports
Basic Chemicals	\$2,136,570	\$8,473,061	3.18%	5.70%
Motor Vehicle Parts	\$2,790,067	\$13,598,152	7.34%	5.28%
Forging and Stamping	\$7,117	\$319,934	0.97%	1.68%
Appliances	\$261,175	\$2,655,036	14.77%	7.64%





continued from page 1

the state where it came from. Port activity in the U.S. is rather concentrated. Seventy percent of U.S. exports go through ports in just seven states. The magnitude of the bias is easy to see. Those seven states account for 37% of all U.S. manufacturing shipments but are credited with 50% of all U.S. exports. That's a third more exports than production. Even if we presume these states are unusually internationally oriented and perhaps even the site of particularly export-focused industries, that's still way too high. If we wish to ascertain whether Tennessee industries are under-exporting, we must correct that bias.

# One alternative is to assume a particular industry exports at the same rate no matter where it is located.

Then if we know the percentage of an industry that is located in a state, we know the percentage of U.S. exports from that state. They're the same. This, for example, is what the Brookings Institution does in its "Export Nation" reports. In a way this throws out the baby with the bathwater. If we assume the same export propensity across America, we can't really verify this.

Let's go another direction and make use of the industry production statistics in a different way. If we know the size of an industry in a major port state, we can estimate its exports as if it exported at the national average. We can then compare that number to its actual reported exports. The difference is the combination of the port state bias and any particularities of the export industry in that state. It's realistic to assume industries in major port states export at higher rates than inland industries. We could account for that, leaving the port bias. We could estimate a port state's exports if its firms

exported at 110% of the national average, 120%, and so forth. This would adjust for the likely greater export propensities in a port state. Reported exports higher than that estimate are credibly the result of a bias or an overallocation due to documentation or other port issues. If we reallocate that bias or over-allocation to the exports of inland states, we obtain an export figure that may more closely correspond to a state's actual export performance.

Let's take an example, the forging and stamping industry. Two-thirds of industry exports go through ports in just six states. These six states are reported as being the source of just under one-third of all U.S. exports while being home to just under one-quarter of U.S. industry (based on value of shipments). This means recorded exports from these port states are much higher than we would expect if the propensity to export were equal across the U.S. For this industry, these six states actually "over-export" by a factor of a third (the ratio of reported to expected exports is 1.34).

One possibility is that this is true. For whatever reasons forging and stamping operations in these states are simply much more export oriented. More plausible is a port state bias in export documentation. How big is that bias? Our strategy will be to take a plausible range. We will presume the export propensity of a port state industry is at least 110% the national rate and unlikely to exceed 120% of the national rate.

This means between roughly \$20 million and \$36 million of the port states' combined reported \$199

### TENNESSEE'S LARGEST EXPORT SECTORS

	Value of Exports	Change from Last Year	Change from Last Quarter
Medical Equipment	\$892,061,960	-1.1%	5.0%
Motor Vehicles	\$731,227,556	82.7%	-2.2%
Motor Vehicle Parts	\$683,340,843	-9.4%	1.4%
Computer Equipment	\$590,735,856	19.4%	5.7%
Basic Chemicals	\$573,090,124	6.1%	7.0%
Synthetic Fibers and Filament	\$475,808,124	-8.2%	1.1%
Instruments for Guidance, Control, etc.	\$391,696,807	0.7%	4.1%

#### WHAT'S HOT AND WHAT'S NOT\* 2nd Quarter 2014 \*Among Tennessee's top 100 exported goods Value of Exports Growth Decline **Sectors with the Greatest Growth** Unwrought Aluminum \$12,431,438 151.1% Styrene Polymers (in primary forms) \$19,514,118 99.6% Organic Cleaning Agents \$15,518,401 94.5% 85.7% Passenger Cars \$732,261,419 Precious Metal Waste and Scrap \$38,820,487 77.3% **Sectors with the Greatest Decline** \$5,579.160 Photovoltaic Cells and Panels -81.1% Kaolin Coated Paper and Paperboard -80.9% \$2,926,781 Charitable Goods \$3,774,749 -76.6% Synthetic Filament Yarn \$15,150,847 -54.5%

#### 2nd Quarter 2014 FASTEST-C

#### **FASTEST-CHANGING EXPORT DESTINATIONS\***

\$8,944,194

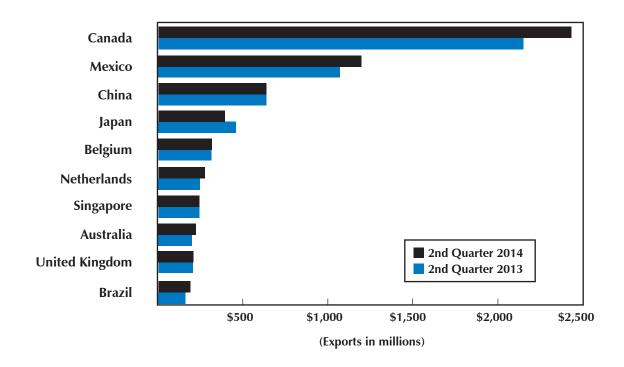
\*Among countries averaging > \$5m sales/quarter

Fabrics Woven from Synthetic Filament

	Value of Exports	Gain	Decline
Countries with the Greatest Gr	owth		
Romania	\$7,964,468	169.5%	
Greece	\$8,158,528	132.9%	
Norway	\$6,575,466	132.3%	
Trinidad and Tobago	\$14,884,171	111.5%	
Jordan	\$9,574,732	92.5%	
Countries with the Greatest De	ecline		
Luxembourg	\$1,380,647		-90.2%
Pakistan	\$4,145,623		-70.2%
Bangladesh	\$2,525,352		-61.0%
Honduras	\$13,203,906		-53.3%
Panama	\$10,491,515		-47.7%

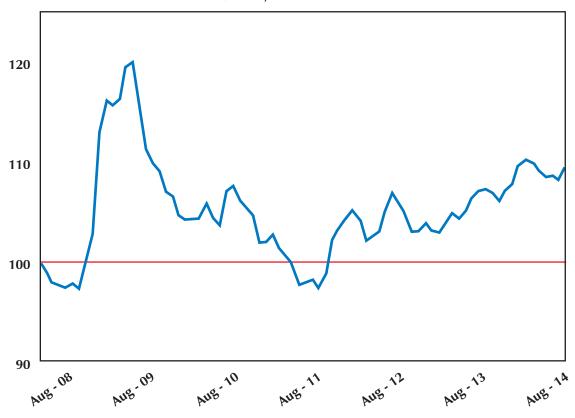
-51.4%

### TENNESSEE'S LEADING TRADE PARTNERS

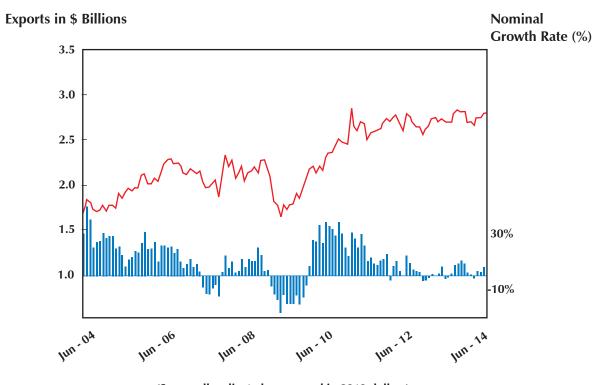


### TENNESSEE TRADE-WEIGHTED DOLLAR INDEX



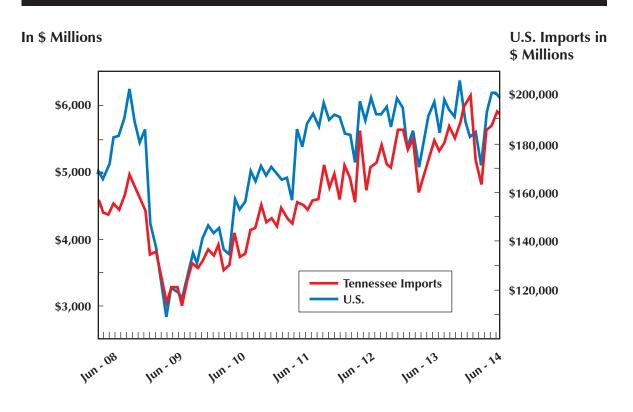


### TENNESSEE MONTHLY EXPORTS



#### (Seasonally adjusted, expressed in 2013 dollars)

### TENNESSEE MONTHLY IMPORTS





# The surge in passenger-vehicle exports remains the state's main export story.

ennessee exporters had a solid second quarter. State exports were up 6.1% from a year ago to \$8.45 billion. This ranked 19th among state performances and well above America's overall 3.3% export growth. This growth, though, hides a lot of volatility. Fifteen of the state's 50 largest export sectors (in the 4-digit HS) gained 20% or more in the value of their foreign shipments. Seventeen others saw their exports fall. The latter included some of Tennessee's largest industries. Cotton exports declined nearly \$100 million, and artificial filament tow was off more than \$30 million. These losses were concentrated in Asia, particularly China and Indonesia. Earth-moving equipment exports declined by nearly a third. Several auto-related industries also had a tough quarter, including internal combustion engines, off nearly \$60 million, and tires, down by about \$20 million.

These losses meant there was a lot of ground to be made up. Leading the way was another spectacular performance by the state's car and SUV exporters. With Nissan and Volkswagen dominating, passenger vehicle exports soared from \$394 million to \$732 million for the quarter. That remarkable gain exceeded the combined losses of all 17 sectors noted above. Once again, the growth was global, with large increases in shipments not only within NAFTA but to Australia, Colombia, China, and South Korea. Of the state's major auto markets, only the Gulf states did not ramp up their purchases.

No other export industry had quite the quarter that cars did, but several forged significant gains. After several rough patches over the past couple of years, laptop and PC shipments gained just over 20% for the quarter (to \$508 million). Most of these additional sales were in Mexico or Canada, but nice gains were made in China as well. Aircraft part shipments were up by a third. Brazil, France, and China accounted for most of those gains. Exports of cellular phone equipment were up by a fifth (\$177 million) thanks to gains in NAFTA and South America (Brazil and Argentina). Plastic and chemical

exporters had a strong quarter, led by increased polyester and pigment shipments. Medical equipment, the state's second largest export industry (behind cars), faced tough markets in Japan and Europe but still eked out a \$23 million gain globally.

Geographically the quarter's gains were built on the NAFTA market. Exports were up substantially both to Mexico (to \$1.2 billion, a 12% increase) and Canada (to \$2.4 billion, a 13% increase). This was the site of most of the automotive and computer industry gains. South America also grew by 12%, though gains were concentrated in Brazil (24%) and Colombia (58%). Given the economic problems in the euro zone, Tennessee's 5% increase in exports to that region (to \$1.06 billion) should probably be considered positive as well. (As a side note, more than half of Tennessee's exports inside the euro area go to either Belgium or the Netherlands.)



# State exports were up 6.1% from a year ago to \$8.45 billion.

Asia was a mixed bag, however. Sales to South Korea and China were both strong. China was interesting, for it matched large losses in textile-related shipments (artificial filament and cotton) with even larger increases in plastics, chemicals, automotive, and computer purchases. The state's \$644 million in exports to China was a record, breaking the \$617 million third quarter of 2010. But shipments to the Gulf states, Southeast Asia, and Japan were all down, rather substantially in the latter two cases. Southeast Asian sales fell 10%. Japan's fell 13%. In the case of Japan, solar panel equipment accounted for about half the loss, while the losses in ASEAN stretched across a number of products, including pharmaceuticals, cotton, cellular phone equipment, and engines.

The continuing surge in passenger-vehicle exports remains the state's main export story. The third quarter began with a 12% increase in the state's foreign shipments, led by cars. The dangers of over-reliance on one industry sector are obvious, but for now Tennesseans can enjoy the ride.

#### **Accounting for Port State Bias in Tennessee Exports**

All figures for year 2011. Export amounts in \$ thousands.

	1	2	3	4	5	6	7
Forging and Stamping	69%	1.34	\$7,118	\$7,459	\$7,709	1.280	1.180
Auto Parts	69%	1.71	\$2,790,067	\$3,636,585	\$3,802,200	0.977	0.717
Home Appliances	67%	1.88	\$261,175	\$301,502	\$307,419	0.426	0.363
Basic Chemicals	65%	1.05	\$2,136,570	\$1,881,286	\$2,050,843	0.939	0.979

- 1. Percent of U.S. exports through top five port states
- 2. Top five port states' ratio of exports/state value of shipments
- 3. Reported Tennessee state exports
- 4. Estimated Tennessee exports if port state exports were 120% of their expected exports
- 5. Estimated Tennessee exports if port state exports were 100% of their expected exports
- 6. Tennessee ratio of exports/state value of shipments based on reported exports
- 7. Tennessee ratio of exports/state value of shipments based on column 5

continued from page 2

#### million of exports are inaccurately allocated to them.

(The forging and stamping industry is not a particularly large export industry.) If we reallocate the portion of that amount that corresponds to Tennessee's percentage of inland state forging and stamping exports, the increase is considerable. Tennessee is reported to have had forging and stamping exports of \$7,117,730 in 2011. If we presume port states to be over-allocated by 10 to 20%, the state's estimated exports in this industry rise to between \$7,459,100 and \$7,709,298. That latter figure amounts to an 8% increase in state exports.

This is a Tennessee industry that already showed as a strong exporter. Attempting to account for that bias raises its export ratio from 1.18 to within a range of 1.24 to 1.28. This suggests forging and stamping is an industry in which Tennessee operations are significantly more export focused than the national average.

**Let's do the same analysis for the motor vehicle parts industry.** As is typical, over two-thirds of America's motor vehicle parts exports go through ports in just five states. Those states are reported to have half of all the industry's U.S. exports. These states thus "over-export" by a factor of 1.71. Again we'll project as more realistic an export ratio between 110%(1.1) and 120%(1.2).

Tennessee is a sizable exporter of motor vehicle parts, though according to reported statistics its industry

exports well less than the national average. In 2011, its reported exports stood at \$2.790 billion. As reallocated, its exports climb substantially, estimated at between \$3.636 and \$3.802 billion. This would place the state at between 93 and 98% of the national export intensity. This appears a more plausible number, given the industry's ties with major auto manufacturers.

Our final table includes the other two industries we investigated. The major lesson is that plausible estimations to account for port state bias would substantially raise the amount of exports credited to Tennessee. Tennessee industries are more export focused than simple reported state export figures suggest.

## That said, the results for the basic chemical industry remind us to treat even this conclusion carefully.

This is an industry dominated by large firms (for example Tennessee's Eastman Chemical) that for the most part perform their own export documentation. As a result, the state is probably being credited correctly for its exports. There is little port state bias in this industry (a ratio of 1.05), which means estimates that assume such bias are going to inaccurately reduce the state's export figures. So while the broader story is that a (relatively!) simple method can more accurately estimate state exports for many industries, we really have to know the features of the industry and the firms within it before we employ this method with abandon.

**Business and Economic Research Center** 

1301 E. Main Street, Box 102 Murfreesboro, TN 37132 www.mtsu.edu/berc • 615.898.2610



Author: Steven G. Livingston Editor/Designer: Sally Ham Govan

MTSU is an AA/EEO employer.