DPRK RAILROAD AND SHIPPING SECTOR IMPORTS AND EXPORTS FROM AND TO CHINA AND OTHER NATIONS, 2000-2017: IMPLICATIONS FOR THE STATUS OF THE RAIL AND SHIPPING SUB-SECTORS IN THE DPRK ENERGY ECONOMY



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DAVID VON HIPPEL AND PETER HAYES

SEPTEMBER 5, 2018

I. INTRODUCTION

In this Special Report, the authors find that overall, "the DPRK has increased purchases of in many rail and ship HS categories in the last seven or so years, relative to 2000 through 2009, but the aggregate value of these purchases is much less than those for road vehicles" and that these changes may be explained by "partial modernization in the DPRK rail, shipping, and fisheries sectors, including an expansion of the fleet of rail cars, likely many purchased to carry coal, but with modernization in these transport subsectors appearing to badly lag that in the road transport subsector."

David von Hippel is Nautilus Institute Senior Associate. Peter Hayes is Director of the Nautilus Institute and Honorary Professor at the Centre for International Security Studies at the University of Sydney.

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Banner image: North Korean vessel Dai Hong under attack by Somali pirates, October 31, 2007, image from US Defense Visual Information Distribution Service here.

II. NAPSNET SPECIAL REPORT BY DAVID VON HIPPEL AND PETER HAYES

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Background

This Special Report focuses on the possible implications of statistics for trade in railroad equipment and in ships and boats since 2000 for the North Korean Transport sector. [1] The initial findings of Nautilus Institute's ongoing analysis of the DPRK energy sector[2] suggest a significant modernization of the DPRK economy in some sectors in recent years. It is not clear, however, that the investment made to modernize the road transport sector has been shared in the rail and shipping sectors, where overall purchases, in value terms, have been more than 10-fold less than in

the road transport sector in recent years. Our review of trade statistics for rail equipment (locomotives, rail cars, and related parts and materials) and for ships and boats of various kinds, ranging from goods and passenger vessels to fishing vessels and pleasure vessels, over the period 2000 through 2017 shows an increase in imports, and, in one specific category (ships sold for scrap) of exports, during the last decade, and particularly since 2010. These changes, however, suggest that these transport subsectors are modernizing much more slowly than the road transport sector.

Imports of Rail Equipment to the DPRK

Based on trade statistics available through the United Nations "Comtrade" data system,[3] the value of the DPRK's rail equipment imports from China (trades include in HS category 86) have varied significantly from year to year, from a low of less than $1 million in 2004 to a high of over $28 million in 2012. In many years between 2000 and 2017 a number of trades, both exports and imports, in railroad equipment were reported by other nations, sometimes including trades valued at hundreds of thousands of dollars annually, but China has generally dominated trade in with the DPRK in this category. China accounted for nearly 85 percent of the value of rail equipment imports to the DPRK from 2000-2017, and nearly 95 percent of value in the last decade (2007-2017). The significant annual variation in trade notwithstanding, the average value of DPRK rail equipment imports from China has climbed over time, from an average of less than $3 million per year in 2000-2005 to nearly $10 million per year in 2012-2017, but the latter average is strongly influenced by the large purchases in 2012.

Rail equipment reported in category HS 86 ranges from locomotives and train cars for passengers and goods to parts for rolling stock and other railroad equipment.

Figure 1 shows the imports of rail moving stock and container, in number of units, by type from 2000 through 2017. Notable here is the significant growth, and then decline, in the imports of freight cars in the period from 2010 through 2014. The average values of these freight cars varied on an annual basis from about $10,000 to $20,000 per unit, approximately consistent with the cost of freight cars from China as advertised on Alibaba.com,[4] thus we assume that these represented cars for carrying freight, and, perhaps in many cases, coal, as this period coincided with the rapid build-up of the DPRK's coal export industry. Also notable are the large purchases, in 2000, 2004, and 2008, of "self-propelled railway coaches", possibly trams/streetcars and/or cars for subway systems. The average costs of these "coaches", ranging from $5000 to $20,000 per unit, suggests that they may have been older ("used") units.

The relatively few larger (over about $700,000 annual value) trades of rail equipment to the DPRK from nations **other than** China included:

- Two railway or tramway service vehicles from Switzerland, in 2001 and 2006, costs of $1.3 and $1.7 million, respectively.
- 117 tonnes of railway parts from Germany in 2003, and 108 tonnes in 2004, at costs of $2.7 million and $1.8 million respectively. The implied costs per tonne (on the order $20,000) of these imports suggest that the shipments were relatively specialized parts, as the average value per tonne of railway parts in this category (HS 8607) imported from China has on average been considerably lower (a few thousand dollars per tonne).
- 20 units of railway/tramway coaches from Poland in 2008, at a cost of $1.3 million.
- One diesel locomotive (or possibly more—as the quantity is not given) from Slovakia in 2005 at a cost of $0.7 million.
- 96 tonnes of railway parts from India in 2015, at a cost of about $0.8 million.

Figure 1:

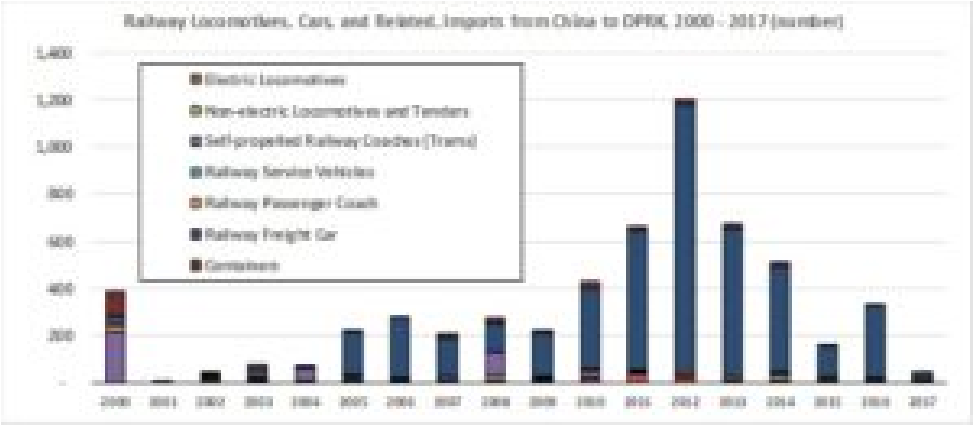


Figure 2 provides additional detail on DPRK imports of locomotives and rail cars from China. Between 2000 and 2017, about 180 electric locomotives and 130 diesel and diesel/electric locomotives were imported. Of the electric locomotives, most had a relatively low average cost, on the order of $10,000 each, suggesting that most were small units designed for use, for example, in mining. The diesel locomotives appear to be much larger, with costs on the order of a few hundred thousand dollars to a million dollars each. As a result, we conclude that the DPRK has been working on modernizing its diesel locomotive fleet, but not so much on its electric locomotive fleet, suggesting a shift, for the main rail system, to diesel power, possibly due to ongoing electricity reliability issues.

The DPRK imported about 100 passenger rail cars between 2000 and 2017, of which at least 20 appear to have been, based on their average cost, not designed for full-size railways. This suggests that the DPRK has not updated its passenger rail system much in the last two decades. On the other hand, nearly 2000 open rail cars for goods were added since 2000, particularly between 2009 and 2014. We suspect most of these were coal cars. On the order of 60 boxcars (covered/closed rail cars) were also added, along with on the order of 1000 of what seem, based on their cost per unit, to be smaller rail cars, probably for use in mining railway systems. Most of the latter were imported in the last five years.

Figure 2:

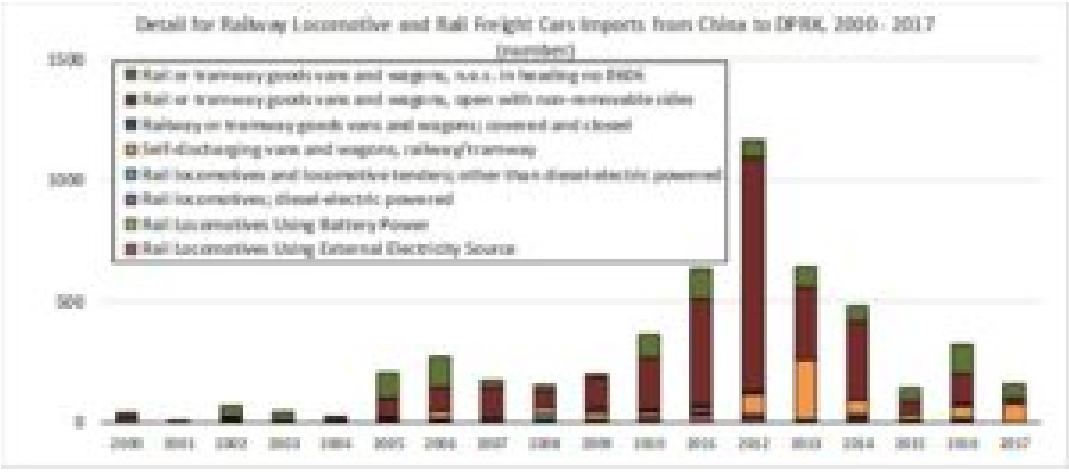
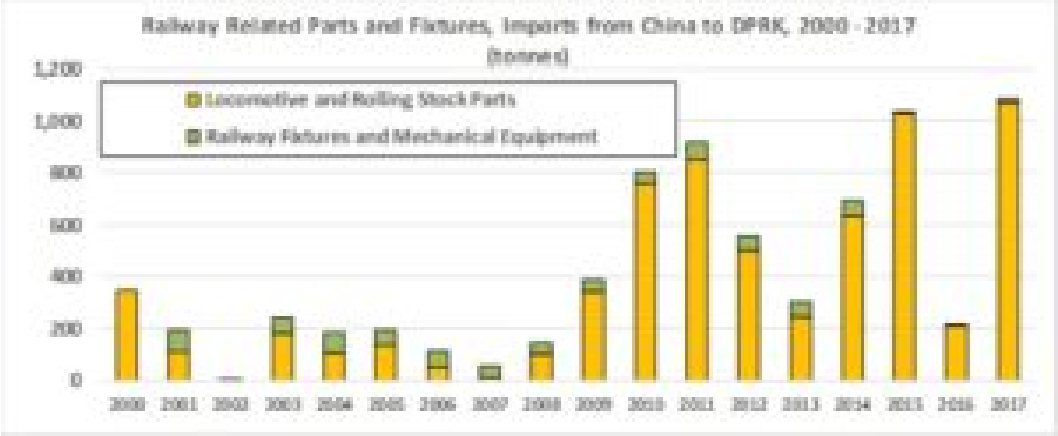


Figure 3 shows DPRK imports of railway parts and other railway equipment from China since 2000 from the disposition of truck imports by type over time. Here again, most of the purchases over the period occur over the last seven or so years, suggesting an accelerated effort at railway

modernization since about 2010.

Figure 3:

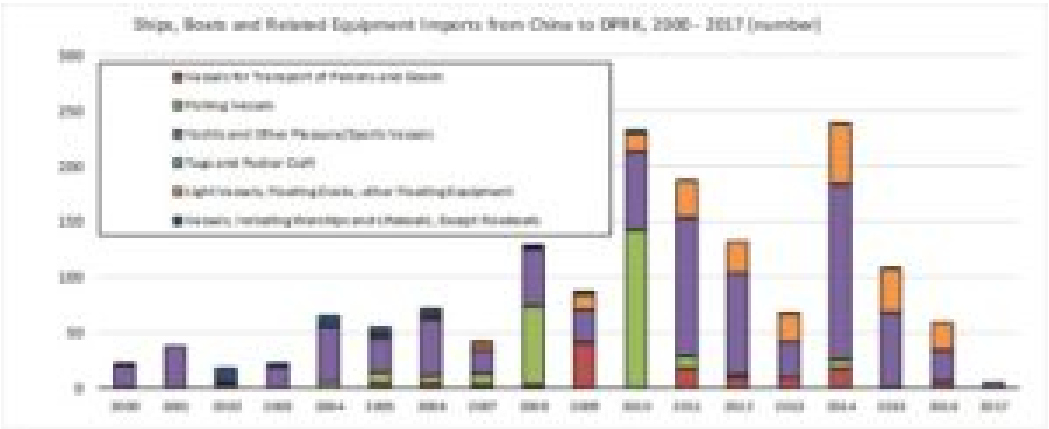


Imports of Ships, Boats, and Related Equipment

Imports of ships, boats, and related equipment (HS 89) to the DPRK since 2000 have not been quite as dominated by Chinese goods as imports of motor vehicles and in the railway sector, but China still provided nearly three quarters of the DPRK's imports in the category, by value, since 2000, and virtually all imports since 2009. The overall value of the DPRK's imports in the category since 2000 averaged $5.1 million annually, rising to an average of $6.4 million annually in the last decade. As such, imports of water transport vessels, at least those reported in trade statistics, were a small fraction of imports of road vehicles, and on the order of two thirds, by value, of imports of rolling stock and equipment for the rail sector.

Figure 4 shows imports of ships, boats, and related equipment to the DPRK from China from 2000 through 2017 by number of items. By sheer volume, the category "Yachts and other Pleasure/Sports Vessels" appear to dominate, but by value they amount to only about $1.4 million of the $68 million of imports in the category from China since 2000, and with average costs per unit (vessel) in each year ranging from hundreds to a bit over one thousand dollars, it seems clear that most of these trades represent sales of small craft such as canoes, rowboats, small sailboats, or small motorboats, rather than more expensive pleasure craft.

Figure 4:



visible in Figure 4 are significant imports of fishing vessels, most notably in 2008 and 2010. Although many of these were also clearly smaller vessels, some years, particularly 2011 and 2014, did see imports of larger (and thus more expensive) fishing boats, with values on the order of

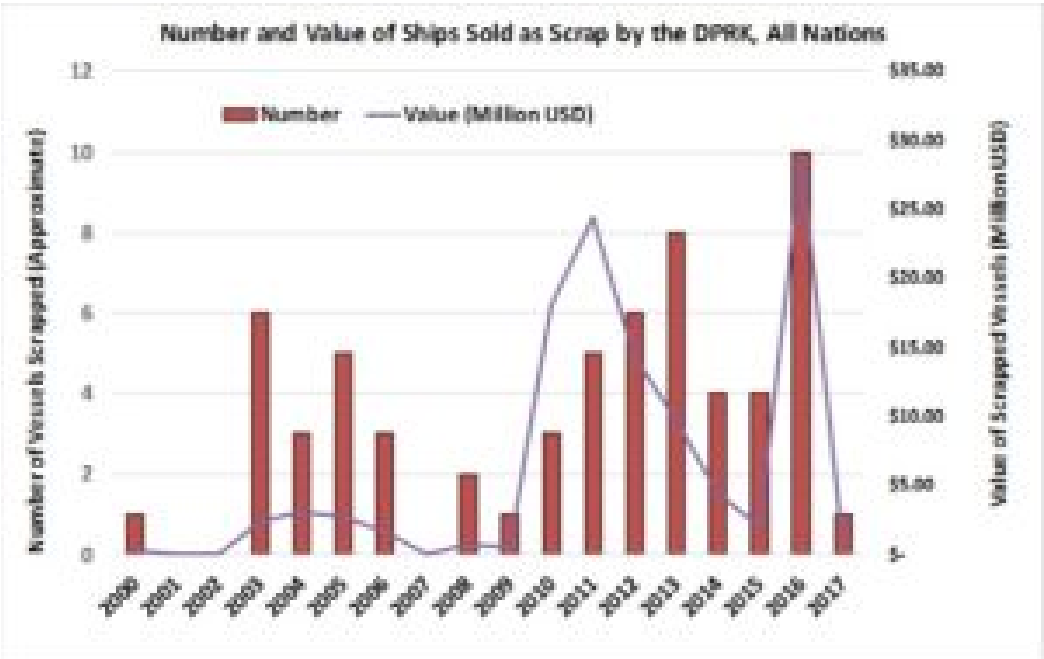
$200,000 each.[5] Apart from pleasure boats, the most numerous vessels listed in imports from China to the DPRK, particularly in recent years are in the category “Light Vessels, Floating Docks, and Floating Equipment”, with average values on the order of $10,000 per vessel, and about 90 percent of approximately 230 vessels imported since 2000 having come into the country since 2010. Two-thirds of the value of imports since 2000 in HS 89, however, were in the category HS 8901, “Passenger and goods transport ships, boats”. About 120 vessels, in total, were imported by the DPRK from China since 2000, but over $21 in value, more than half of all expenditures on vessels in this category, were spent in 2011 and 2012 alone, for the purchase of a total of 28, ships.

DPRK Exports to China and Other Nations in HS 89

In addition to imports of ships, boats and related equipment by the DPRK, international trade statistics include a number of reports of purchases by other countries of vessels and related items **from** the DPRK. Some of these purchases are sufficiently large, including a $55 million trade by Spain in 2000, and a $94 million trade for a single vessel by Greece in 2008 (both in the “passenger and goods transport ships, boats” category), that our guess is that these were actually trades with the Republic of Korea (ROK), which builds more commercial ship tonnage annually than any nation but China, but have been mis-reported. It is possible, though it seems not likely, that these nations commissioned ships from the DPRK. A number of other trades in the million-dollar range may also have been mis-reported, such as $1.2 million in imports listed as coming from the DPRK by India in a year in which India did $120 million in trade with the ROK in the same category (again HS 8901).

One category that features prominently in trades showing imports to both China and other countries and seems likely to have been reported accurately is HS 8908, “Vessels and other floating structures for breaking up”. Trade in this category, both in number of vessels and in value, between the DPRK and other nations, is shown in Figure 5. Between 2000 and 2017, at least 62 ships, with a weight of nearly one-half million tonnes, were sold as scrap by the DPRK, with a total transaction value over this time period of over $113 million, or nearly twice what the DPRK **spent** on imports of ships and boats. The value of these exports per unit weight rose and fell over the years, ranging from about $0.09 to $0.45 per kg of reported trade weight (which we assume to be mostly scrap steel), and in the process fairly closely tracked international market prices for scrap steel.

Figure 5:



It would be interesting to be able to estimate what fraction of the DPRK maritime fleet these sales of ships for scrap represent, but, alas, the calculation is not straightforward. We have not been able to obtain a definitive and complete listing of the number and tonnage of goods transport vessels in use by the DPRK, but a 2018 article suggests that the DPRK has "as many as 240 merchant ships in its fleet",[6] and a Wikipedia provides a partial listing of North Korean merchant ships that includes 122 ships with a gross tonnage of "420,000 grt" (gross registered tonnes).[7] If the Wikipedia list is representative of the average grt per vessel in the overall DPRK fleet, and the Foreign Policy estimate of the number of vessels is correct, it suggests that there are on the order of 800,000 to one million gross registered tonnes of vessels in the DPRK fleet. As of the 1990s, we estimate that the DPRK fishing fleet had a deadweight displacement of about 440,000 tonnes—and this estimate probably overlaps the Wikipedia listing. A detailed conversion of grt and/or deadweight tonnes to an estimate of the mass of steel in those vessels, however, is beyond the scope of our work, and not straightforward, due to the various definitions used for ship weight and capacity. The nearly one-half million tonnes of ships sold for scrap since 2000, however, clearly represents a significant fraction of the weight of the current DPRK merchant and fishing fleets, though some of the ships sold for scrap could also have been obsolete DPRK Navy vessels. In addition, these sales—totaling more than $100 million since 2010 alone—appear to have been a significant source of revenue for the DPRK

Conclusions

Although the focus of this Special Report is mostly on trades between the DPRK and China in the rail and ship/boat equipment sectors, these trades do represent most of the DPRK's imports in these categories since 2000 from all nations. It is possible, even likely, that "off books" trades in these categories also occurred, but we have no information on which to base an estimate of their significance. Overall, customs data show that the DPRK has increased purchases of in many rail and ship HS categories in the last seven or so years, relative to 2000 through 2009, but the aggregate value of these purchases is much less than those for road vehicles. We surmise that a reason for this difference is that many purchases of road vehicles are made by (or for) the private sector, whereas many purchases of rail equipment and ships/boats are of larger unit value, and thus more dependent on purchases by organizations such as rail authorities and state-owned national shipping companies. As with road transport purchases, 2017 purchases for the rail and ship subsectors by the DPRK have fallen relative to 2015 and 2016, probably due at least in part to changes in DPRK imports due to UN Security Council sanctions on the DPRK.

In sum, the changes in imports of goods in categories HS 86 and HS 89, and of exports by the DPRK of ships to be scrapped, may be interpreted as signs of:

- An improved and more vibrant DPRK economy (based on increases in purchases in recent years);
- The availability of more disposable income in the DPRK, as evidenced by the increase in imports of (mostly inexpensive) pleasure boats, some of which might have been destined for, for example, resort areas;
- At least partial modernization in the DPRK rail, shipping, and fisheries sectors, including an expansion of the fleet of rail cars, likely many purchased to carry coal, but with modernization in these transport subsectors appearing to badly lag that in the road transport subsector;
- An increase in the importance of diesel fuel among energy forms for railroads, as evidenced by the expanding fleet of diesel locomotives, with relatively much fewer purchases of large electric locomotives;
- An increase, coinciding with the increase in the mining of coal and other mineral for export, in the import of rail cars for (likely) use in mines, particularly in about 2009 through 2014; and

- Significant earnings by the DPRK from selling (presumably) obsolete ships to nations that will scrap them, with the number and tonnage of ships scrapped potentially significant relative to the number and tonnage in the overall DPRK shipping and fishing fleets.

III. ENDNOTES

[1] This essay follows on from our recent analysis of what statistics for road vehicles trades involving the DPRK, focusing on trades with China, might mean for the evaluation of the DPRK economy. See David von Hippel and Peter Hayes (2018), "DPRK MOTOR VEHICLE IMPORTS FROM CHINA, 2000-2017: IMPLICATIONS FOR DPRK ENERGY ECONOMY", NAPSNet Special Reports, August 23, 2018, available as https://nautilus.org/napsnet/napsnet-special-reports/dprk-motor-vehicle-imorts-from-china-2000-2017-implications-for-dprk-energy-economy/.

[2] For reports based on earlier versions of Nautilus' DPRK Energy Sector Analysis, see, for example, David von Hippel and Peter Hayes (2012), *Foundations of Energy Security for the DPRK: 1990 – 2009 Energy Balances, Engagement Options, and Future Paths for Energy and Economic Development*, dated September 13, 2012, and available as

https://nautilus.org/wp-content/uploads/2012/12/1990-2009-DPRK-ENERGY-BALNCES-ENGAGEMENT-OPTIONS-UPDATED-2012_changes_accepted_dvh_typos_fixed.pdf; David F. von Hippel and Peter Hayes (2014), *Strategies for the Rehabilitation of the DPRK Energy Sector*, NAPSNet Special Reports, June 22, 2014, available as https://nautilus.org/napsnet/napsnet-specia--reports/strategies-for-the-rehabilitation-of-the-dprk-energy-sector/; and David von Hippel and Peter Hayes (2014), *An Updated Summary of Energy Supply and Demand in the Democratic People's Republic of Korea (DPRK)*", NAPSNet Special Reports, April 15, 2014, available as https://nautilus.org/napsnet/napsnet-special-reports/an-updated-summary-of--nergy-supply-and-demand-in-the-democratic-peoples-republic-of-korea-dprk/.

[3] Available as https://comtrade.un.org/data.

[4] See, for example, https://www.alibaba.com/product-detail/Type-C80B-open-top--agon-rail_60290770296.html?spm=a2700.7724838.2017115.10.551f1d5bFmG1y6.

[5] Examples of fishing vessels in this price range include the 16.5 meter (length), 39-tonne vessel shown here https://www.alibaba.com/product-detail/16-5m-Steel-Material-Professonal-Trawler_60655687889.html?spm=a2700.7724838.2017115.10.535e57e7gYIZAa&s=p, and the 21.3 meter, 56-tonne trawler shown here https://www.alibaba.com/product-detail/21--m-Commercial-Trawler-Fishng-Boat_60516997753.html?spm=a2700.7724838.2017115.105.535e57e7gYIZAa.

[6] Keith Johnson and Dan De Luce (2018), "Busting North Korea's Sanctions-Evading Fleet", *FP (Foreign Policy)*, February 28, 2018, available as https://foreignpolicy.com/2018/02/28/busting-nort--koreas-sanctions-evading-fleet-ofac-treasury-shipping/,

[7] Wikipedia (2018), ""List of North Korean merchant ships", dated August, 2018, and available as https://en.wikiedia.org/wiki/List_of_North_Korean_merchant_ships.

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Nautilus Institute
608 San Miguel Ave., Berkeley, CA 94707-1535 | Phone: (510) 423-0372 | Email: nautilus@nautilus.org