

When All the Choices Are Bad: The Megaship and the Shipping Crisis of the 21st Century

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On August 16, 2006, at five thirty in the afternoon, five tugboats dragged the *Emma Maersk* from the Odense Steel Shipyard and towed her backwards to the sea. *Emma*, painted light blue, was as long as four football pitches. Her keel was 30 meters below her deck, and she required such deep water that she could barely escape the confines of the Danish fjord on which she was built. Owned by Maersk Line, the vessel dwarfed every containership that preceded her. In the entire history of shipping, only a handful of oil supertankers were as large.

Emma Maersk was more than a bet on globalization. She was part of a deliberate effort by AP Moller-Maersk, the venerable Danish conglomerate that owned Maersk Line, to force consolidation upon the hypercompetitive container shipping industry. In a business obsessed with scale, Maersk Line calculated that *Emma* and seven nearly identical ships would be able to transport the world's trade far more economically than any other vessels on the seas, bolstering its bottom line while weakening its competitors. Its bet would have dramatic consequences, not only for the shipping industry but for AP Moller-Maersk itself.

Let's start with a bit of background. Containerships are the workhorses of globalization. They are designed to carry nothing but steel boxes of a standard design,

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which can easily be transferred to trucks, trains, and barges. Most containers used in maritime trade are 12.2 meters (40 feet) long and 2.4 meters (8 feet) wide. Some are refrigerated to transport foodstuffs or pharmaceuticals under temperature-controlled conditions, but most are simple watertight boxes with wooden floors, two doors at one end, and reinforced walls to allow for stacking. The vessels are usually employed in weekly service on specific routes; for example, CMA CGM, a French carrier, offers a containership leaving Ancona for Malta every Thursday at 2100 hours. Historically, the industry has been intensely competitive, making ocean freight quite inexpensive. In late 2017, the cost of shipping a pair of athletic shoes by sea from Vietnam to California, a distance of 11,000 kilometers, was less than 30 U.S. cents, representing less than one half of one percent of the average U.S. retail price of the shoes.²

Over time, the size of newly ordered ships has increased steadily as ship owners have sought economies of scale. All other things equal, their cost to provide a “slot”—that is, space for one container—is much lower aboard a larger ship than aboard a smaller one. Capacity in this industry is measured in 20-foot units, or TEUs, with one standard 40-foot container counting as two TEUs. The first pure containership to cross the Atlantic, in 1966,

² The average spot rate for shipping a 40-foot container eastbound across the Pacific Ocean in late 2017 was approximately \$1,200. See Bill Mongelluzo, “Eastbound trans-Pacific spot rates flatline,” *joc.com*, December 22, 2017, https://www.joc.com/maritime-news/trade-lanes/trans-pacific/eastbound-trans-pacific-spot-rates-flatline_20171222.html. The rates between specific ports may differ, and most cargo moves under contractual rates that differ from the spot rate. A standard container holds around 5,000 pairs of boxed athletic shoes, yielding an ocean shipping cost of \$0.24 per pair. According to NPD Group, a market research firm, the average selling price of athletic shoes in the United States in 2017 was \$58.16. See NPD Group, “U.S. Athletic Footwear Industry Sales Grew 2 Percent,” press release, February 6, 2018, <https://www.npd.com/wps/portal/npd/us/news/press-releases/2018/us-athletic-footwear-industry-sales-grew-2-percent-to-19-6-billion-in-2017-npd-group-reports/>. The calculation here does not include ground transportation and other cost of moving freight from origin to destination.

carried about 400 TEUs. By 2002, the biggest vessels on order reached 8,100 TEUs, too large to fit through the Panama Canal, although the average ship was far smaller. Since the late 1990s, experts have warned that economies of scale are diminishing due in part to the challenges of handling bigger vessels in port.³

Since its earliest days, the container shipping industry has been marked by booms and busts. When world trade is growing strongly, freight rates soar. As one example, the daily cost of leasing a 4,500-TEU containership jumped from \$6,000 in July 2002, when the United States and some European countries were in recession, to \$42,000 in early 2004, when economic conditions were much better.⁴ High freight rates meant high profits, triggering orders for new containerships. Two years later, as those new ships were completed, freight rates plummeted, and the daily cost of leasing a containership fell 36 percent. So while the number of containers shipped by sea grew an average 8.7 percent per year between 1994 and 2003, that growth was not smooth, even as the annual volume of containers shipped approached 300 million TEUs.⁵

This is the context in which Maersk Line, the largest operator of container ships, established a secret committee in June 2003 to develop proposals for new containerships. The committee was instructed to work quickly, because Maersk management wanted to make a decision within three months.⁶

³ Data taken from Theo E. Notteboom, "Container Shipping and Ports: An Overview," *Review of Network Economics* 3 (2004), 99; Kevin Cullinane and Mahim Khanna, "Economies of Scale in Large Container Ships," *Journal of Transport Economics and Policy* 33 Part 2 (1998), 185-208; United Nations Conference on Trade and Development (UNCTAD), *Review of Maritime Transport 2003*, 62-63; UNCTAD, *Review of Maritime Transport 2004*, 74-75.

⁴ Daniel Jessel, "Banking on the Dragon," *Fairplay*, January 6, 2005, 15.

⁵ *Fairplay*, March 30, 2006, 53

⁶ The discussion of Maersk's strategy here and below is drawn from information in the Maersk archives.

One of its recommendations was a ship known internally as the Euromax. The Euromax was designed from the start to be larger than any other containership afloat. It would be 396 meters long and wide enough to carry 22 rows of containers across its deck. Maersk's planners calculated that eight such vessels, sailing at a top speed of 24 knots, or about 44 kilometers per hour, would support weekly service from southern China to Hong Kong and Malaysia, through the Suez Canal to Spain, on to Northern Europe, and then back to China. All told, they estimated, an average of 44,001 containers would be moved on and off each time a ship traveled the 47-day loop. The Euromax would allow Maersk to offer more capacity between Asia and Europe with fewer ships. If Maersk could finance them at 6% interest—not an impossibility in 2003—the vessels would pay for themselves in eight-and-a-half years.

Maersk's culture was serious and sober, and the committee meticulously weighed the risks of this plan. There were operational risks: around the world, only 22 ports had deep enough harbors and long enough wharves to handle the Euromax, so if traffic between Yantian and Rotterdam slumped, Maersk couldn't put the ships to work elsewhere. There were maintenance risks: Maersk could identify only seven shipyards with drydocks large enough to do a complete overhaul. There were construction risks: fuel efficiency required that the ship have only a single propeller, 23 tons larger than any propeller ever cast, and Maersk's consultant warned, "The manufacture of a monobloc propeller of this size will present problems." And, of course, there were financial risks. The ships would cost \$154 million apiece, so the full order of eight would require more than \$1.2 billion. Even with Danish government subsidies, the price tag was considerable.

Yet Maersk management saw no alternative. Maersk had previously held a

competitive edge by operating the largest ships, but other carriers had caught up. The Euromax would put it back in the lead by lowering the cost of each container slot by 18 percent, allowing Maersk to underprice competitors. As this occurred, Maersk projected its share of container traffic on the China-Europe route to rise from 13.8 percent in 2004 to 17.8 percent by 2008. Maersk forecasted trade between Europe and Asia to grow 10 percent a year, so filling the new vessels wouldn't be a problem. "Even in the most pessimistic scenario, we face an improved supply-demand balance in the coming years," an internal study found in late 2003. What's more, the Euromax would let Maersk shift other ships to the Asia-North America route, where it could gain market share as well.

And there was one additional factor in play. In the early 2000s, there were many different lines running container ships. The top 20 collectively controlled about 62 percent of the world market, and the presence of dozens of smaller carriers kept downward pressure on rates. Maersk's giant new ships might convince some players they could no longer compete. Forcing them out while increasing Maersk's size through mergers was a deliberate strategy. The new ships were ordered at the end of 2003, for delivery starting in 2006. While they were under construction, Maersk Line's top executive declared bluntly, "We just see the need for industry consolidation."⁷

Maersk kept the details about the Euromax under wraps by building in a company-owned shipyard. When *Emma Maersk*, the first of the vessels, entered service in July 2006, her capacity was announced as 11,000 TEUs. This was 20 percent larger than any other containership then in service. But Maersk Line was not being entirely candid. It soon told a

⁷ Comment by Knud Stubkjaer, head of Maersk's container business, reported in "Maersk deal will stir up liners," *Fairplay*, May 19, 2005. Market share data are from United Nations Conference on Trade and Development (UNCTAD), *Review of Maritime Transport 2003*, 63.

leading shipping publication that her capacity was 12,504 TEUs. The publication guessed that the true number was 13,400. As it turned out, minor modifications would allow her to carry around 15,500 TEUs. In other words, *Emma* was half again as large as any vessel in service at the time she was launched.⁸

The entire shipping industry was stunned by her size. As one admiring headline put it, “Emma Maersk may be as big as a container ship can get.” With such a size advantage, Maersk Line would have an intolerable cost advantage. Competitors who wanted to stay in the game saw themselves obliged to order large ships of their own. By the end of 2007, 16 months after *Emma*’s launch, there were 118 vessels on order with capacity exceeding 10,000 TEUs. Two years earlier, except for the Euromax vessels, there had been none.⁹

Having started the race to build megaships, Maersk Line had to respond to its competitors’ decisions to bulk up. Only now, circumstances had changed. In 2005, Maersk had purchased the fourth-largest container ship line, P&O Nedlloyd. Outsiders saw Maersk in an increasingly dominant position, but Maersk management saw a beleaguered company struggling to integrate its acquisition. It expected that the launch of the last of its eight Euromax ships, plus the new capacity other ship lines had ordered, would flood the market in 2009. “We should use every opportunity to voice our view that this is indeed bad for the industry to have such speculative overcapacity coming (sic) to market,” an internal memo

⁸ The largest containership operating in 2005 reported capacity of 9,200 TEU; see Jonathan Roach, “Is there trouble ahead?” *Containerisation International Yearbook 2005* (London: T&F Informa, 2005), 7. John Fossey, “Tougher times ahead,” *Containerisation International Yearbook 2007*, 5. Capacity was reported as 15,500 in *Containerisation International Yearbook 2012*; one year earlier the yearbook had stated her capacity as 14,770 TEUs. Reported capacity depends, in part, on assumptions about average weight per container.

⁹ Gregory Richards, “Emma Maersk may be as big as a container ship can get,” *Virginian-Pilot* (Norfolk, VA), August 23, 2006.

from a top Maersk executive advised. Nonetheless, Maersk began planning a series of even larger ships in late 2006. According to simulations, if it did not add capacity while other ship lines did, Maersk would lose market share.

The aggressive growth projections of Maersk's planners, though, flew in the face of other developments. First, Maersk Line was deeply in the red, because its purchase of P&O Nedlloyd was not delivering the expected efficiencies. Second, business was turning down. By the middle of 2007, demand for Chinese exports was slowing in both Europe and the United States. Growth forecasts that had seemed reasonable a few months before suddenly looked wildly optimistic. Management decided to focus on cutting costs rather than building new ships.¹⁰

This was the situation as the many big vessels ordered after the launch of Emma Maersk began to enter service in 2009. In November 2006, all the world's containerships combined had a capacity of 11.2 million TEUs. In November 2010, total capacity was 16.1 million TEUs, an increase of 44 percent in just four years. This surge in capacity, combined with a 25 percent fall in demand, made 2009 the worst year in the history of the container shipping industry. More than 500 ships were taken out of service and anchored. Maersk Line lost more than \$2 billion, and all its competitors were deeply in the red as well.

There had never been an annual decline in container traffic before 2009. There had been occasional periods of slower growth, and each dip in the growth rate had been followed by a boom. The industry expected that pattern to repeat. Once again, Maersk decided to leapfrog the competition. In 2010, even though revenue was barely higher than

¹⁰ Chris Jephson and Henning Morgan, *Creating Global Opportunities: Maersk Line in Containerisation, 1973-2013* (Cambridge, UK: Cambridge University Press, 2014), 321; John Fossey, "Mixed prospects," *Containerisation International Yearbook 2008*, 7.

it had been in 2007, it developed a plan for another new generation of ships. These vessels would be even larger than the Euromax. Each would be able to carry 18,200 TEUs, nearly 4,000 more than any vessel owned by a company other than Maersk. Their slot cost would be 24 percent below those of its competitors' newest ships. In February 2011, Maersk ordered 10 of these giants, known as the Triple-Es, with options for 20 more, for delivery starting in 2013.

Again, Maersk's aggressiveness took its competitors by surprise. Again, they were confronted with an unwelcome choice. They could do nothing and face a future in which they would have much higher costs than their largest competitor, or they could stretch their finances to order new ships they might not be able to fill. CMA CGM, the third-largest container line, tried the latter approach, ordering three ships larger than *Emma Maersk*. The cost, upwards of \$450 million, placed it under such financial stress that in January 2011 it arranged a \$500 million investment from a Turkish company, a stunning move for the secretive family-owned carrier. As other carriers pondered whether to build ships above 18,000 TEUs, freight rates fell so low that revenue did not cover operating costs, and a longtime industry consultant offered a stark warning: "We see no major improvement in the global supply/demand balance in the next five years."¹¹

Carriers tried to form alliances to soak up the excess capacity and put a floor under rates. But Maersk's strategy of forcing its competitors to make undesirable choices forced them to spend money they could not afford. In 2012, the founder of Mediterranean Shipping Company, the third-largest line, said his company had no intention of following

¹¹ Drewry Maritime Research, cited in John Fossey, "What a difference a year makes," *Containerisation International Yearbook 2012*, 5.

Maersk by ordering 18,000-TEU vessels. A few months later, his company ordered 19,000-TEU ships instead. Other lines followed suit, one after another, pushing the maximum size upward. By April 2015, shipyards in Korea, China, and the Philippines had no fewer than 52 vessels on order with capacities larger than 18,000. The largest would carry more than 21,000 TEUs.¹²

Whether there was really a need for ships with the capacity of 11,000 full-size trucks was almost a second thought; most of the major ship lines were state run or family controlled, and their powerful leaders had no intention of playing second fiddle to the Danes. As one industry source observed at the time, “Big may not necessarily be better, but it is certainly good for image.” But the growth of shipping capacity was not matched by the growth of trade. “The development of the world container fleet over the last decade is completely disconnected from developments in global trade and actual demand,” the OECD’s International Transport Forum observed in 2015.¹³

For many companies, merger offered the only path to survival. In December 2014, the Chilean carrier CSAV joined with Germany’s Hapag-Lloyd. In 2015, China’s two large state-owned container lines were ordered to merge. Japan’s three container ship lines, hard-pressed to finance new ships, formed a joint venture that became a merger. Hapag-Lloyd and United Arab Shipping merged, and Maersk swallowed up Germany’s Hamburg-Süd. In August 2016, Hanjin of South Korea, the seventh-largest container line, collapsed in bankruptcy. And in 2018, Overseas Orient, owned by the Singaporean government, was

¹² Comment by Gianluigi Aponte to Lloyd’s List, cited in Fitch Solutions, “Mediterranean Shipping Company (MSC),” December 17, 2012. Figure on ships under construction is from International Transport Forum, *The Impact of Mega-Ships* (Paris: OECD, 2015), 18.

¹³ Ramadas Rao, “Chaebols welcome the box giants,” *Fairplay*, September 16, 2006, 27; International Transport Forum, *The Impact of Mega-Ships*, 29.

sold to the Chinese. Maersk, now easily the leader with 18 percent of global capacity, had achieved its goal of squeezing out the weak. Four alliances of container ship lines dominated the market. Smaller carriers survived only by cozying up to the giants. In the span of a few years, a highly competitive industry had become an oligopoly.¹⁴

Yet for AP Moller-Maersk, victory was elusive. The financial burden of building megaships was more than the conglomerate could bear. Under pressure, it sold its 49 percent ownership of Denmark's largest retail chain in 2014. A year later, it sold its 20 percent stake in Denmark's largest bank. In 2016, the company's controlling family fired the CEO and announced that AP Moller-Maersk would divest energy-related businesses that provided one-fourth of its revenue. Despite this desperate maneuvering, and despite its fleet of megaships promising economies of scale, the company's share price was lower in July 2018 than it had been when *Emma Maersk* was ordered back in December 2003. Maersk Line's market share has grown, but its container shipping business has performed no better than those of the competitors it sought to push aside. Maersk's current leaders have suggested that aggressively building megaships to dominate the market may have been a mistake. As its chief executive sighed recently, "There's no point in being the largest carrier if we don't translate that into above-average margins." It was a very costly lesson to learn.¹⁵

¹⁴ Market share data from Alphaliner as of July 31, 2018, <https://alphaliner.axsmarine.com/PublicTop100/>.

¹⁵ Richard Milne, "Maersk shares slide as chief warns on US-China trade war risks," *Financial Times*, May 18, 2018