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Aerospace & Defense

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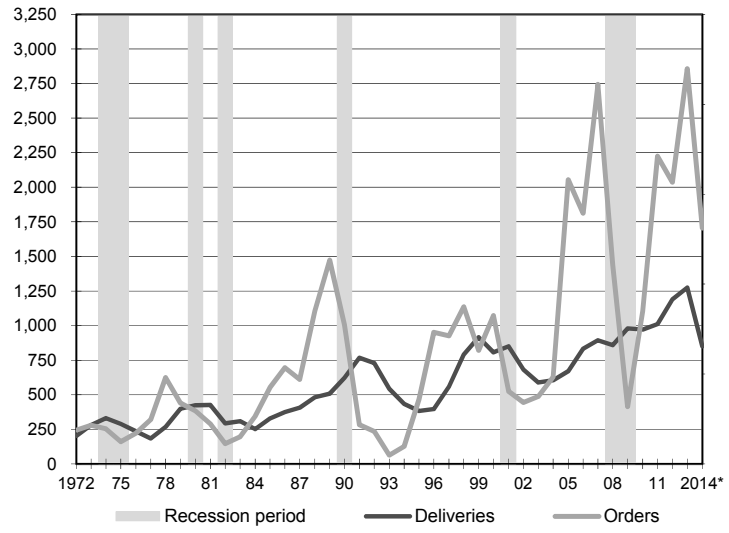
CURRENT ENVIRONMENT

Strong commercial aerospace cycle boosts production

Historically, commercial aircraft production has been highly sensitive to economic conditions. As shown in the accompanying chart, following each recession in the past, large commercial aircraft original equipment manufacturers (OEMs) Boeing Co. and Airbus SAS each significantly reduced production. Aircraft are long lead-time products, and airlines typically record large losses during a recession as air travel demand falls. At such times, aircraft orders are cancelled or deferred, aircraft manufacturer backlogs fall, and production rates are decreased until order books are replenished.

AIRCRAFT PRODUCTION LAGS ECONOMIC CONDITIONS
(Number of units ordered to and delivered by Boeing and Airbus)



*Data through August.
Sources: Boeing; Airbus; National Bureau of Economic Research.

As reflected in the chart, orders were recorded at a high of 2,745 in 2007 just before the recession, dropping 47.6% in 2008. Orders dipped further in 2009, decreasing 71.3% on a year-on-year basis. However, while orders did decline notably in 2008 and 2009 during the height of the global financial crisis, aircraft deliveries dipped only slightly in these years, confounding pundits and investors who predicted that production rates at Boeing and Airbus were bound to fall in this cycle, as they had in each past cycle.

As the global financial crisis began to recover, orders and deliveries started to pick up. In 2010 alone, orders reached a 167.3% increase on a year-on-year basis, followed by a 101.4% increase in 2011, on a year-on-year basis. After decreasing 8.5% in 2012, the highest level of orders since 1970 was recorded in 2013, totaling 2,858 units. In addition, 1,706 units were ordered year to date through August 2014, which is higher than the annual number of units ordered between 2008 and 2010.

S&P Capital IQ (S&P) sees two primary dynamics driving demand for aircraft, which differentiate this cycle from the last one and which we think will likely persist for some time.

The first factor is continued robust demand from emerging markets, such as Asia, the Middle East, Eastern Europe, and Latin America. Many airlines in these regions have remained profitable, and fleet size must rise to accommodate increased demand for business and personal travel.

The second is the need among airlines to replace aging and less fuel-efficient planes to address rising fuel prices. Although the price of oil is about 27% below its mid-2008 peak (and jet fuel is about 42% below its peak), prices remain persistently high, and many believe the supply-demand balance for petroleum favors a return to higher oil prices in the future. The two regions with the oldest (as well as the largest) fleets are the US and Western Europe. As global economic growth has reaccelerated, demand for aircraft from these regions has begun to improve.

Epic backlog at Boeing and Airbus continues. At the end of 2013, Boeing's backlog stood at 5,080 aircraft (3,680 narrow-body jets and 1,400 wide-body jets), up from 4,373 as of the end of 2012. As of the end of

August 2014, this backlog had reached 5,540, an increase of 16.7% on a year-on-year basis. Meanwhile, Airbus recorded a backlog of 5,892 aircraft (4,733 narrow-body jets and 1,159 wide-body jets) year to date through August 2014, a 13.5% increase from the year-ago period, higher than the backlog of 5,559 aircraft (4,298 narrow-body jets and 1,261 wide-body jets) at the end of 2013, and up from 4,682 as of the end of 2012.

In the first nine months of 2014, orders remained robust: Boeing reported 1,106 gross orders while Airbus reported 1,077 gross orders. In 2013, Boeing received 1,531 gross orders (the highest in the last decade) and Airbus 1,619, a 14.3% and 77.1% increase on a year-on-year basis for Boeing and Airbus, respectively. In 2011, Boeing recorded orders for 921 aircraft, and Airbus received orders for 1,608 aircraft.

Amid strong demand for passenger aircraft, Boeing and Airbus both continue to increase production on most of their models. Demand for dedicated freighter aircraft, however, remains poor amid weak global airfreight market conditions. Boeing continues to execute on planned increases to its 737NG production rates. As of October 2014, it produces 42 aircraft per month (up from 38 per month), and plans to increase the rate to 47 per month in 2017, and then 52 per month in 2018. This would represent about a 33% increase since 2010, when the production rate for the 737 was at 31.5 airplanes a month. Boeing increased production of the 777 to 8.3 aircraft per month (from seven previously) beginning in October 2012. While Boeing plans to roll out its new fuel-efficient 777X model in 2020, the company does not expect production cuts to the 777 during the transition.

After the 787 Dreamliner was grounded and its deliveries (though not production) halted in January 2013 amid safety concerns about the aircraft's lithium ion batteries stemming from two onboard fires, Boeing devised a fix, returned the aircraft to commercial service, and resumed deliveries by April 2013. The company also increased production of the 787 to seven aircraft per month in May 2013, from five per month in late 2012. In January 2014, Boeing further increased 787 production, to 10 aircraft per month.

In September 2014, Boeing and the Federal Aviation Administration (FAA) agreed on the fire-suppression fix of more than 80 of the company's 787 Dreamliner jets to ascertain that every unit will work properly during emergencies. Al Jazeera's documentary, entitled "Broken Dreams: The Boeing 787," details the quality concerns over this jet, and has sparked negative publicity for Boeing. We think negative publicity from this documentary could potentially hurt the company's brand image, if Boeing is not seen to be doing enough to rectify the problems that the film brought to light.

Meanwhile, Boeing's 747-8 jumbo jets have been struggling to attract buyers. In October 2013, the company announced that in 2015, it would cut the production rate for the 747-8 to 1.5 aircraft per month from the current rate of 1.75 per month, because of lower demand for large passenger and freighter aircraft.

Airbus has executed a number of production increases across its product line. It raised production of the narrow-body A320 family to 38 aircraft per month in August 2011 (from 36 previously), to 40 per month in the first quarter of 2012, and to 42 per month in November 2012. In February 2014, Airbus decided to increase the A320 family production rate to 44 per month by the first quarter of 2016, and to 46 per month by the second quarter of 2016, given the high demand for this aircraft. In January 2012, Airbus increased production of its A330 aircraft to nine per month, and then to 10 in April 2013.

However, Airbus suffered a major blow in June 2014 when Emirates Airline decided to cancel an order worth about $21 billion. The cancelled order, signed in 2007, was for 70 A350 aircraft (50 A350-900 and 20 A350-1000), and it was intended for delivered in 2019. According to Airbus, although Emirates Airline is one of its biggest customers, the large backlog of orders for the A350 (more than 740 planes) will help to soften the blow.

Demand for Airbus's largest model, the A380, has been weak. A deterrent, according to *The Wall Street Journal* article published in September 2014, could be that potential buyers fear they may not be able to sell enough seats on this superjumbo, which can accommodate about 525 passengers. According to an *Aviation Week* article dated May 15, 2013, Airbus reduced A380 production from 30 per year to 25 as a short-term measure to address technical problems in the aircraft's wings. In January 2014, Airbus reported that the company is moving toward a breakeven rate of 30 A380 aircraft annually based on improved production processes.

However, in the first seven months of 2014, the A380 was subject to order cancellations. In January 2014, Airbus cancelled Kingfisher Airlines Ltd.'s order for five A380s (along with five A350-800s). In July 2014, Airbus announced that it had cancelled Skymark Airlines' $1.7 billion order for six A380s due to concerns over Skymark's ability to afford the jets. In addition, there are rumors that Hong Kong Airlines may cancel an order placed in 2011 for 10 A380s.

To help bolster A380 sales, Airbus has been exploring possible changes for this jet model. In February 2014, Airbus announced that it was nearing a decision to revamp and offer the A380 with new engines by 2020. This decision does not augur well for one of its two current engine suppliers—Rolls-Royce Holdings plc and Engine Alliance.

Emirates Airline appears to have confidence in the Airbus A380, and it has ordered 140 units. The president of the airline, Tim Clark, has also said that the airline could be willing to purchase 60 to 80 more A380s if Airbus revamped the superjumbo with more fuel-efficient engines by 2020.

Airbus is focused on bringing its latest aircraft, the A350-XWB, to market. The aircraft's new assembly factory was inaugurated in Toulouse, France, in October 2012, and the A350-XWB made its first flight in June 2013. It is currently scheduled to enter service by the end of 2014 and Airbus expects the aircraft to reach a production rate of 10 aircraft per month by 2018.

BUSINESS JETS IN NORTH AMERICA AND EMERGING MARKETS

Following the recent upturn in global economic growth, the business jet market has begun to recover, albeit marginally and from depressed levels. Order patterns remain uneven, with demand for larger business jets significantly outpacing demand for smaller business jets, as the core buyers of large business jets (the ultra-wealthy and large multinational corporations) were less affected by the global financial crisis than less wealthy individuals and smaller corporate buyers. While North America remains the primary market for business jets, demand from the emerging markets (such as China, the Middle East, and India) has increased and has been a notable contributor to order books. So far, demand in these markets has been for larger, higher-priced business jets.

Most industry players believe it will be some time before demand for business jets regains its pre-recession levels. Forecast International Inc., an aviation market research firm, highlighted in October 2013 that it expects the business jet market to regain peak levels by 2020 but predicts a cyclical downturn between 2021 and 2022. Honeywell International Inc., in its 23rd annual *Business Aviation Outlook*, released in October 2014, forecast 9,450 new business jet deliveries from 2014 to 2024 worth $280 billion, a 7%–8% increase in projected delivery value from the 2013 forecast.

The performance of business jet makers shows that a recovery has begun, but results remain uneven. For instance, Gulfstream Aerospace Corp., the business jet–making unit of General Dynamics Corp., has seen a marked recovery in its operations over the past three years. Following year-on-year increases of 15.2% and 17.4% in 2012 and 2013, respectively, the first half of 2014 is already promising for Gulfstream Aerospace. In the first six months of 2014, revenues from the aerospace segment of General Dynamics increased 7.5% on a year-on-year basis. These revenues were driven primarily by increased deliveries of the new ultra-large-cabin G650, which began shipping in the fourth quarter of 2011, as well as stable demand for its legacy large-cabin business jets. Meanwhile, demand for Gulfstream's mid-sized business jet products remains weak. While business jet demand in the past few years at Gulfstream has been driven largely by international orders, the company noted that at the end of 2013, North American customers still accounted for more than 35% of the orders.

The business jet-making arm of Textron Inc., Cessna Aircraft Co., reported a 4.1% year-over-year increase in sales in 2012. However, Cessna's fortunes changed in 2013, with sales falling 10.5%, as management cut production rates for the Citation jet and Citation Air amid persistently weak customer demand for its small and mid-sized business jet product line. There is also a consistent decline in Cessna's contribution to Textron's overall profitability, with revenues in the Cessna segment accounting for 26% of Textron's total revenues in 2011, 25% in 2012, and 23% in 2013. In March 2014, Textron acquired Beech Holdings, LLC, the parent of

Beechcraft Corp., and brought together its Cessna segment with Beechcraft to form a new business segment called Textron Aviation. In the first six months of 2014, Textron Aviation's segment revenues increased 55.2% on a year-on-year basis. We think this acquisition could further bolster Textron's position in the business jet market.

While China currently represents a very small market for business jets, we see signs that this market is slowly opening up to foreign players. The tedious process of getting approvals to enter the fastest-growing economy of Asia appears to have eased recently. In addition, the process of filing flight plans for business jet owners/operators has become significantly less difficult, making owning jets more appealing.

Since 2011, many players have discussed joint ventures (JVs), or signed agreements to expand their business in China. For instance, on November 14, 2012, Cessna entered into a JV with China Aviation Industry General Aircraft Co. Ltd. (CAIGA), a unit of Aviation Industry Corp. of China (AVIC), to carry out the final assembly of the Cessna Citation XLS+ aircraft for sale in the Chinese market. Honeywell International Inc. reached five agreements in 2011 with Chinese aerospace companies to develop general aviation cockpit controls and to supply other aerospace products.

In a study entitled "Business Jet Market Gaining Traction" (October 2013), market research firm Forest International reported that around 9,575 business jets worth an estimated $235 billion (in constant 2013 US dollars) will be manufactured between 2013 and 2022. Cessna delivered its new Citation M2 light jet and an updated Citation Sovereign jet in December 2013. It is expected to deliver its updated Citation X in late 2014 and the new Citation Latitude jet in 2015. Embraer SA's new Legacy 500 jet is expected to enter service by December 2014 and its Legacy 450 in mid-2015. S&P thinks that business jet sales and production will further improve in the remainder of 2014 and into 2015, as 2014 will be largely over, amid reaccelerating US and global economic growth, improving business confidence, and the introduction of new aircraft models, which have historically stimulated end market demand.

MRO GROWTH CONTINUES

While aircraft manufacturing tends to be a long-cycle business, the maintenance, repair, and overhaul (MRO) segment of the aerospace industry tends to have a much shorter cycle. With little to no long-term backlog, it is usually the first to be hurt in an economic downturn, as airlines and jet owners seek to save costs by eliminating all discretionary spending on parts and service. However, it is also one of the first to recover as demand begins to pick up again.

Following the 2008–2009 economic recession, the MRO segment saw a steep decline in earnings. In 2010, following a significant decline in flight hours in 2009 and losses for global airlines, commercial MRO spending fell 7.4%. However, rising flight hours in 2010 and 2011—for both large commercial jets and business jets—led to strong growth in MRO spending in 2011.

Aviation consulting firm TeamSAI estimates that commercial MRO grew 10.8% in 2011, 5.5% in 2012, and 13.5% in 2013. TeamSAI projects the overall civil aviation aftermarket to grow from about $57.7 billion annually in 2014 to around $86.8 billion by 2024, or a compound annual growth rate (CAGR) of about 4.2%. For the next 10 years, TeamSAI expects airframe MRO to grow at a CAGR of 4.1%, engine MRO at 4.2%, line (in-service) maintenance at 4.1%, and component MRO at 4.4%. Engine MRO is the largest segment within the MRO forecast, accounting for $22.1 billion (38% of the total) in 2014 and $33.2 billion (38%) in 2024. TeamSAI also projects a significant shift in market share geographically over the period, with Asia-Pacific (APAC) accounting for 30% of MRO and the Americas accounting for 35% in 2014. By 2024, APAC is forecast to grow to 33% of total MRO and the Americas to shrink to 28%. Western Europe is expected to shrink from 24% share in 2014 to 20% in 2024, while Eastern Europe is expected to grow slightly from 4% to 5%.

DEFENSE SPENDING

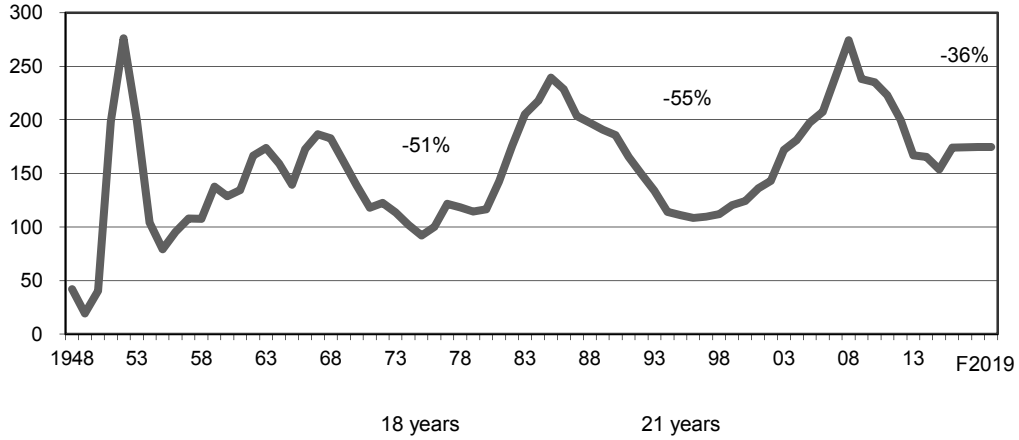
S&P expects defense spending to remain depressed given the mandatory defense budget cuts, despite the recent geopolitical issues. These issues include the US-led intervention in Iraq that started in August 2014 and the decision of the US government to keep its troops in Afghanistan beyond 2014.

While the US troops in Iraq withdrew in December 2011, marking the end of a war launched in March 2003, a US-led intervention in Iraq began in August 2014, which was a response to the conflict between the Islamic State of Iraq and the Levant (ISIL) and the Iraqi government, which started in June 2014. In August 2014, the US carried out airstrikes in Northern Iraq to target ISIL artillery positions. Consequently, between August and September 2014, the US deployed 1,600 troops in Iraq, which will help train and provide guidance on Iraqi forces, but will not be involved in combat. However, the US Army Chief of Staff revealed in September 2014 that the US might need more troops in Iraq given the current conflict there. Finally, in October 2014, Iraqi officials issued a plea for the US to deploy ground troops in Iraq.

On the other hand, despite the transfer of the responsibility of security in Afghanistan from NATO to the Afghan forces in June 2013, US troops will remain in Afghanistan even after 2014. In March 2014, the US commander in Afghanistan warned that a complete withdrawal of troops at the end of 2014 would lead to the regeneration of terrorist groups in the region. President Obama also said in June that he plans to withdraw all US troops from Afghanistan by the end of 2014, but has since signed a security deal with the Afghan government, on September 30, 2014. This deal allows US troops to stay in the country beyond 2014. S&P thinks that leaving US troops in Afghanistan would lead to some ancillary defense spending to support the continued operation, but the bulk of the spending related to Afghanistan operations is likely to be over.

The total amount spent on Overseas Contingency Operations (OCO) funding has been about $1.2 trillion between 2001 and 2011. These expenses relate to both the Iraq and Afghanistan wars. A total of $115.1 billion was allocated to OCO in fiscal 2012 (ended September 2012) and $82.0 billion in fiscal 2013. For the base budget, $530.4 billion was allocated in fiscal 2012 and $495.5 billion in fiscal 2013. For fiscal 2014, $85.2 billion was allocated for OCO and $496 billion for the base budget.

US MILITARY SPENDING FOR WEAPONS PROCUREMENT AND RESEARCH & DEVELOPMENT
(In billions of constant FY2014 dollars)



F-Forecast.
Source: Department of Defense.

Following the last two defense budget peaks in 1968 and 1985, the Procurement and Research & Development (R&D) segments of the US defense budget (together known as the "modernization" budget) fell 51% and 55% (in constant dollar, or inflation-adjusted, terms) over a period of 18 to 20 years. S&P thinks a similar level of decline in modernization funding is likely to occur over the next 15 to 20 years.

In 2010, then-US Secretary of Defense Robert Gates instituted a five-year $100 billion cost savings program for the Department of Defense (DOD), with the goal of moving money from lower-priority and support initiatives into forces modernization. However, in early January 2011, Gates announced $78 billion in cuts to the five-year budget, beginning in fiscal 2012, apparently under pressure from the White House.

In mid-April 2011, President Obama outlined his plan to reduce federal spending by $4 trillion over the next 12 years. Part of that plan included additional savings of $400 billion from security spending over the same period. In response, the Pentagon announced it would conduct a "comprehensive review" of defense missions and capabilities that would take months and have its first impact on the fiscal 2013 budget.

In August 2011, President Obama signed a deficit-reduction deal calling for a $2.1 trillion increase in the debt ceiling and federal spending cuts of about $900 billion over the next decade. A 12-member congressional panel, six Democrats and six Republicans, known as the Super Committee, was formed to work on finding ways for another $1.5 trillion in cuts or tax increases by November 23, 2011 (subject to approval by Congress). The committee failed to identify specific budget cuts, triggering $1.2 trillion of automatic across-the-board cuts, known as sequestration. Including the $450 billion of cuts already scheduled, the defense budget would face around $1 trillion of cuts over the next decade, with the first phase started in March 2013.

Essentially, sequestration places caps on defense spending, mandating cuts to spending above a set amount. Certain spending, such as OCO funding, is exempt from these caps. President Obama has also chosen to exempt military personnel from sequestration's effect and reallocate cuts to other defense accounts. For fiscal 2014, the defense spending cap stands at $581.2 billion ($496.0 billion excluding the proposed $85.2 billion in requested OCO funding exempt from the sequestration cap). Despite a mandate for sequestration cuts of $37 billion in fiscal 2013, the defense budget will remain about the same as the one in fiscal 2013 for the next several years due to offsets and cuts in fiscals 2014 and 2015.

Sequestration cuts have not had a significant impact on most defense companies' earnings to date. This is primarily due to their existing prior-year contract backlogs, as well as the DOD's ability to utilize unobligated fiscal 2013 funds to absorb a significant portion of the mandated 2013 sequestration cuts. As the amounts of their prior-year backlogs decline and most of the unobligated funds are used up, we think that defense companies will likely feel a substantially greater impact from sequestration in 2014 than in 2013.

US DEFENSE BUDGET
(In billions of dollars)

FISCAL YEAR	BASE DEFENSE BUDGET	OCO FUNDING	------ TOTAL ------ BIL. $	YR./YR. % CHG.
2015	495.6	79.4	575.0	(1.1)
2014	496.0	85.2	581.2	0.6
2013	495.5	82.0	577.5	(10.5)
2012	530.4	115.1	645.5	(6.0)
2011	528.2	158.8	687.0	(0.5)
2010	527.9	162.3	690.2	4.8
2009	513.2	145.6	658.8	(1.1)
2008	479.0	186.9	665.9	11.4
2007	431.4	166.2	597.6	13.6
2006	410.5	115.7	526.2	10.6
2005	400.0	75.6	475.6	1.8

Source: US Department of Defense.

A more recent proposal in reducing defense spending was put forward in February 2014, when Defense Secretary Chuck Hagel presented options to reduce defense spending, the purpose of which was to develop a comprehensive approach for the military to handle the impact of sequestration. The various measures suggested reducing the size of the army to pre-World War II levels and focusing more on technology. He suggested pay-related measures, such as a pay freeze for general and flag officers, and a meager 1% increase for military personnel.

FISCAL 2015 DEFENSE BUDGET

In March 2014, the Obama Administration released its fiscal 2015 budget proposal, seeking $495.6 billion for base defense spending and $79.4 billion for OCO.

The National Defense Authorization Act, which sets policies and guidelines on how the defense budget will be spent, is not yet out for fiscal 2015. The final authorization bill shapes defense policies and programs (by providing authorization for them), and it sets ceilings on the amount of money that each service can be given in each year, though it does not provide actual funding.

The budget proposal, if accepted, would represent a $400 million (0.1%) decrease in the base budget from the $496 billion enacted for fiscal 2014, and a $5.8 billion (6.8%) decrease in the OCO budget, compared with the $85.2 billion enacted for 2014. The budget proposed spending approximately $168 billion in fiscal 2015 on force modernization, slightly above the $167 billion requested in the fiscal 2014 budget proposal.

Amid highly partisan political rhetoric, the US government shut down for 16 days on October 1, 2013, after Congress failed to pass any fiscal 2014 funding bills, including the defense appropriations bill. Finally, in January 2014, the US government passed the Consolidated Appropriations Act (HR 3547), an omnibus spending bill, which packages several appropriation bills together into one. This Act became law on January 17, 2014, and provides appropriations through fiscal 2014. On the other hand, the fiscal 2015 budget will run from October 1, 2014 to September 30, 2015. While there is still no final budget as of October 2014, the Continuing Appropriations Resolution (CR) would fund the US government through December 11, 2014 by appropriating $1.01 trillion.

MAJOR WEAPON SYSTEMS SUMMARY

		BUDGET (BIL.$)			QUANTITY		
		FY 2013	FY 2014	FY 2015	FY 2013	FY 2014	FY 2015
AIRCRAFT							
F–35	Joint Strike Fighter	7,629.8	7,544.9	8,314.4	29	29	34
P–8A	Poseidon	3,127.7	3,653.7	2,360.0	13	16	8
KC-46A	Tanker	1,550.3	1,558.6	2,359.6	†	†	†
V–22	Osprey	1,845.3	1,711.9	1,613.3	22	22	19
UH-60	BlackHaw k	1,603.5	1,314.9	1,434.3	100	70	79
C–130J	Hercules	1,414.2	1,849.5	1,401.9	15	17	14
E–2D	Advanced Haw keye	1,059.5	1,331.8	1,230.3	5	5	4
C-5	Galaxy	1,156.7	1,101.2	385.0	‡	‡	‡
COMMAND, CONTROL, COMMUNICATIONS, AND COMPUTER (C4) SYSTEMS							
WIN–T	Warfighter Information	761.4	894.2	919.7	2,166	1,725	1,280
MISSILE DEFENSE							
AEGIS	AEGIS Ballistic Missile Defense	1,421.9	1,490.7	1,364.6	33	52	30
GMD	Ground-Based Midcourse Defense	923.5	910.8	1,003.8	5	1	< >
MUNITIONS AND MISSILES							
Trident II	Trident II Ballistic Missile Mods	1,361.4	1,453.4	1,517.2	‡	‡	‡
Chem–Demil	Chemical Demilitarization	1,444.9	1,126.6	867.6	«»	«»	«»
SHIPBUILDING AND MARITIME SYSTEMS							
SSN 774	VIRGINIA Class Submarine	4,855.1	6,717.5	6,300.4	2	2	2
DDG 51	AEGIS Destroyer	4,667.4	2,253.3	3,060.2	3	1	2
CVN 78	FORD Class Nuclear Aircraft Carrier	659.0	1,703.3	2,137.8	1	‡	‡
LCS	Littoral Combat Ship	2,288.7	2,389.8	2,071.2	4	4	3
OR	Ohio Replacement (OR)	573.9	1,146.1	1,289.8	†	†	†
SPACE- BASED AND RELATED SYSTEMS							
EELV	Evolved Expendable Launch Vehicle	1,463.9	1,392.3	1,381.0	4	5	3
GPS	Global Positioning System	1,221.5	1,207.4	1,013.5	2	2	1

†Developmental stage. ‡Modernization, overhaul, or systems upgrade. < > Continued development. «» Continues closure activities at three Chemical Materials Agency sites. §Funds third year of construction for USS John F. Kennedy, completion costs for USS Gerald R. Ford, and continued development of ship systems.
Source: US Department of Defense.

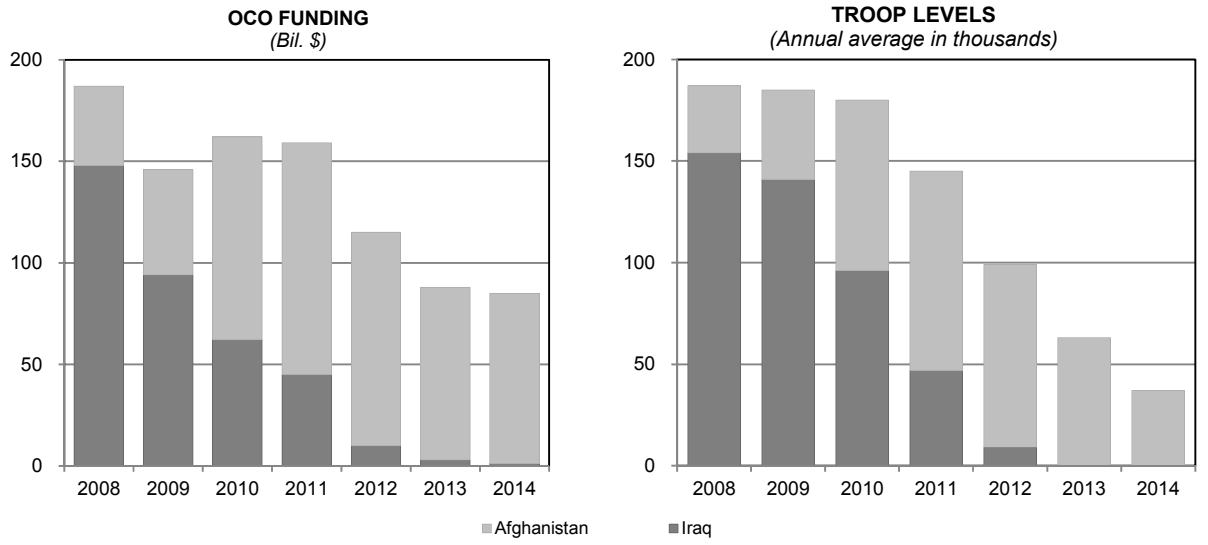
The effects of sequestration in the fiscal 2015 defense budget are also worth noting. In April 2014, the DOD released a report on estimated sequestration impacts. The report includes force-level cuts across the military services that would result in the number of active duty soldiers in the army being reduced to 420,000. In addition, the report mentioned that sequestration would result in the Defense Department cutting procurement and research funding. Finally, the report says, sequester-level cuts would result in an army that is too small to fulfill the requirements of its strategy, which would hence increase national security risks.

While US defense spending grew at a 6.7% CAGR from fiscal 2001 through 2013, S&P thinks that the overall defense budget (the base budget plus the OCO funding)is likely to remain flat to slightly down notwithstanding the recent international operations.

OCO funding

The fiscal 2015 budget proposes to allocate $79.4 billion to support OCOs, mostly in Afghanistan. The current objective of US troops is to defeat and root out the terrorist organization Al Qaeda from Afghanistan and Pakistan. During most of the last decade, the US allocated a significant percentage of the defense budget for OCO in Afghanistan and Iraq.

OCO FUNDING AND TROOP LEVEL TRENDS
(Fiscal years)



Source: US Department of Defense.

However, with the withdrawal of troops from Iraq in December 2011 and the initial intent of the US government to withdraw troops from Afghanistan, the proposed budget allocation for OCO has dropped 6.8% from $85.2 billion in fiscal 2014. The allocation was $82.0 billion in fiscal 2013, $115.1 billion in fiscal 2012, and $158.8 billion in fiscal 2011. Meanwhile, OCO troop levels have dropped from the annual average level of 99,000 in Afghanistan and Iraq combined in fiscal 2012 to 63,000 for Afghanistan for fiscal 2013, which is set to drop to 38,000 in fiscal 2014. During the peak war period of 2008–2010, the average annual troop level deployed in the two countries was more than 180,000.

Recent geopolitical events are worth noting in a defense spending discussion. First, US troops were supposed to withdraw from Afghanistan by the end of 2014, but the signing of the Bilateral Security Agreement in September permits troops to remain in the country beyond 2014. Second, in response to the conflict between the Islamic State of Iraq and the Levant (ISIL) and the Iraqi government that started in June 2014, the US government has deployed 1,600 US troops as of September 2014. Finally, in response to the Ukraine-Russia conflict, the US government pledged $1 billion in aid to Ukraine in March 2014 and accused Russia of causing the social unrest. Notwithstanding these recent geopolitical changes, we think defense spending will remain flat or decrease slightly.

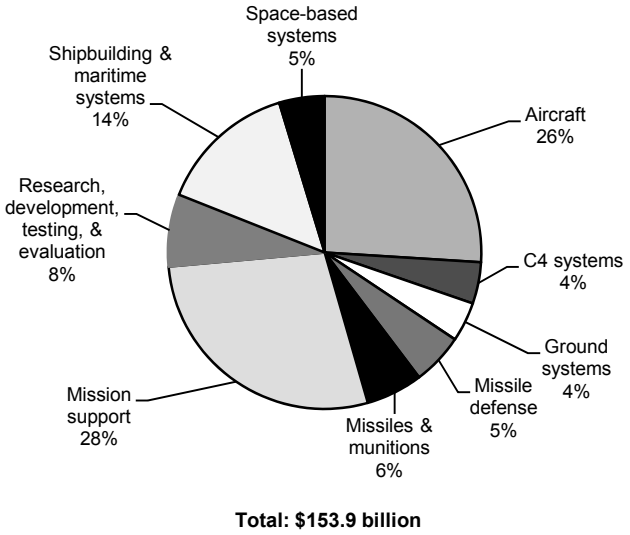
CYBER WARFARE

In January 2014, James Clapper, the Director of National Intelligence, stated that he considered cyber-attacks to be the top security threat to the US. Moreover, he expects cyber-attacks to grow with new technologies, such as the emergence of 3D printing, networked healthcare, and virtual money. Notably, such actions have targeted a wide variety of interests, from government entities to banks, to consumer

technology and Internet companies, disrupting the day-to-day lives of millions and threatening countless others. According to the April 2014 Government Accountability Office (GAO) report, federal agencies reported more than 46,160 cybersecurity "incidents" in fiscal 2013 (latest available), up 32.5% from the previous year and up 738.8% from 5,503 in 2006. These incidents are perpetrated by persons sponsored by foreign countries, terrorists, criminals, and political activists (often called "hacktivists" in this context).

According to the US-China Economic and Security Review Commission's 2012 Report to Congress, "Chinese hackers use pilfered information to advance political, economic and security objectives." This espionage takes aim at private enterprises, US defense, military, international organizations, and other non-government groups. The commission recommended that Congress enact tougher screening laws for Chinese investments in the US and conduct a detailed assessment of Chinese cyber espionage and its implications. Secretary Hagel sought cooperation with Chinese military officials in April 2014 by releasing details of the US cyber warfare doctrine and its capabilities. Chinese officials did not reciprocate. Consequently, in May 2014, the US Department of Justice charged five Chinese military officials with cyber espionage. These military officials allegedly conspired from 2006 through this year in collecting confidential information from companies such as US Steel Corp., Westinghouse Electric Co. LLC, and the US unit of SolarWorld AG.

WEAPONS SYSTEMS MODERNIZATION SPENDING—FY 2015



Total: $153.9 billion

Source: US Department of Defense.

Since 2012, US companies have been under siege from cyber-attacks. Banks across the US and around the world were attacked between 2012 and 2013, resulting in significant outages. As a result, attacked banks spent millions of dollars to restore the services for customers. Moreover as per the Ponemon Institute, Distributed Denial of Service (DDOS) attacks are responsible for 18% of power failures or blackouts at US-based data centers. In 2013, a number of consumer technology and Internet companies were also targeted, including Apple, Facebook, Microsoft, and Twitter. In April 2013, the House of Representatives approved the Cyber Intelligence Sharing and Protection Act (CISPA) to curb the growing number of cyber-attacks. However, cyber-attacks have not slowed down in 2014. eBay Inc. suffered this year's biggest hack so far. In May 2014, personal records of 233 million users were stolen in a hacking incident that took place between February and March.

With the dependence of developed countries on the Internet for commercial, financial, government, and military communications and database access, as well as its pervasive use to control everything from manufacturing facilities to electric utilities, S&P thinks cybersecurity and cyber warfare applications and expertise will be increasingly vital to national security. We expect such activities will continue to see robust spending growth, despite budgetary pressures elsewhere.

In cyber warfare and cyber defense, major players include traditional defense companies like Lockheed Martin, Northrop Grumman, General Dynamics Corp., and Raytheon Co. Other major cybersecurity providers to the government include L-1 Identity Solutions Inc., KEYW Holding Corp., ManTech International Corp., SAIC Inc., and CACI International Inc. Commercial cybersecurity providers include the RSA Security unit of EMC Corp., the McAfee unit of Intel Corp., Symantec Corp., Check Point Software Technologies Ltd., CommVault Software Systems Inc., Sourcefire Inc., Fortinet Inc., Guidance Software Inc., VASCO Data Security International Inc., and Websense Inc.

In October 2013, Cisco Systems Inc. acquired Sourcefire Inc. for approximately $2.7 billion, in a bid to strengthen its position in cyber-threat protection. We think there will be further consolidation in this rapidly growing and technologically evolving industry. Although US government cybersecurity spending is classified, people familiar with the cybersecurity effort estimate that it is currently near $10 billion and may reach $15 billion to $30 billion over the next few years. Market Research Media estimates that between 2015 and 2020, the cumulative market value of the US federal cyber-security market will reach $65.5 billion, growing at about a 6.2% compound annual growth rate (CAGR).

INDUSTRY OUTLOOK

As of the end of September 2014, we had a positive outlook on commercial aerospace and a neutral outlook on defense for the next 12 months. We are positive on the combined group, as a single ranking must be given to both industries. We continue to see improving commercial air traffic, driven by recovering global economic trends, which tend to fuel strong commercial aerospace results.

The International Air Transport Association (IATA), an industry trade organization, estimates that global passenger air traffic grew 5.3% for 2012 and 5.2% for 2013, and sees growth of 5.8% in 2014. We see continued solid demand for new commercial jets, fueled by growth in the developing markets and a need to replace aging, less fuel-efficient aircraft in developed markets. We see commercial aerospace shares selling at reasonable valuations. In June 2014, the IATA estimated that global airlines earned $6.1 billion in net profit in 2012 and $10.6 billion in 2013, while it sees growth to $18.0 billion in 2014.

In the first half of 2014, combined Boeing and Airbus orders and deliveries set new records and backlogs continue to grow, now containing some eight years of production. Both companies have announced continued production increases over the next several years and new-model introductions. In 2014, we expect the growth trend in the high end of the business jet market to continue, and see a turnaround in the lagging middle and lower ends of the market commencing, stimulated by the improving global economy and new product introductions. We see commercial aftermarket growth continuing to improve over the next couple of quarters.

As for the defense segment, conventional military equipment is aging; thus we see a need for replacement and/or repair. While large sums of money from both base and supplementary defense budgets are still benefiting contractors, shrinking wartime funding and rising US fiscal belt-tightening are pressuring defense spending. The recently forged bipartisan congressional budget agreement offsets some $22 billion of the $52 billion of mandated fiscal 2014 defense sequestration cuts, as well as $9 billion of fiscal 2015 cuts, resulting in base defense budget spending levels, which are likely to be about flat with fiscal 2013 for the next several years. Fiscal 2014 procurement and research and development (R&D) accounts are set to fall $14 billion from fiscal 2013 levels. While the fiscal 2015 DOD budget submission incorporating sequestration cuts should improve overall contractor visibility, which we think could spark a return of merger and acquisition (M&A) activity among suppliers, we also think specific program cuts will need to be digested.

Year to date through September 26, 2014, the S&P Aerospace & Defense Index rose 2.6%, compared with a 1.1% increase for the S&P Industrials Index and a 6.6% increase for the S&P 1500 Composite Index. The sub-industry index rose 52.5% in 2013, versus 38.4% for the Industrials and 30.1% for the S&P 1500. ■

INDUSTRY PROFILE

The realm of commercial aerospace and defense

The global aerospace and defense industry is a multibillion dollar industry with several main segments—commercial aircraft; maintenance, repair, and overhaul (MRO) services; jet engines; and military weapons. Each segment is profiled here.

COMMERCIAL AIRCRAFT

The global end market for new aircraft consists of about 500 major airlines (Boeing's customer list comprises about 500 airlines). According to the Boeing Co., the world's commercial airline fleet, including regional and large commercial jets, totaled 20,910 in 2013 (latest available). This total included 740 aircraft the size of 747s and larger, 3,970wide-body aircraft, 13,580 narrow-body planes, and 2,620 regional jets.

PRIMARY COMPETITORS—COMMERCIAL AEROSPACE INDUSTRY

			REVENUES (BIL.$)	
COMPANY	PARENT COMPANY	COUNTRY	2012	2013
LARGE COMMERCIAL JETS				
Airbus	EADS	France	72.6	78.7
Boeing	Boeing	US	53.0	49.1
REGIONAL & BUSINESS JETS				
Bombardier	Bombardier	Canada	8.6	9.1
Cessna	Textron	US	3.1	2.8
Embraer	Embraer	Brazil	6.3	6.3
Falcon Jet	Dessault	France	5.1	6.1
Gulfstream	General Dynamics	US	6.9	8.1
JET ENGINES				
General Electric	General Electric	US	20.0	21.9
Pratt & Whitney	United Technologies	US	14.0	14.5
Rolls Royce	Rolls Royce	UK	10.2	10.4

Source: Company reports.

Boeing's *Current Market Outlook 2014–2033* (latest available) forecasts total commercial jet deliveries of 36,770 aircraft worldwide from 2014 to 2033, with an estimated total value of $5.2 trillion. The highest demand is expected from Asia-Pacific (APAC), with deliveries of 13,460 aircraft in that time.

Also according to Boeing, in 2013 (latest available), North America had the largest fleet, with at least 31.8% of the installed commercial fleet worldwide based in the US. China was second, while Russia and the UK placed third and fourth, respectively.

According to Airbus's *Global Market Forecast 2014–2033*, which was released in September 2014, 31,358 new passenger and freighter aircraft valued at $4.6 trillion will be delivered through 2033, including 30,555 passenger aircraft. Passenger aircraft would include 22,071 single-aisle and 7,256 twin-aisle planes, and 1,228 very large aircraft.

LARGE COMMERCIAL JETS

Despite ongoing efforts by Bombardier Inc. and others to enter this market (as discussed below), the large commercial jet manufacturing segment (*i.e.*, makers of jets with 150 seats or more) currently operates as a duopoly, consisting of Airbus SAS (commercial aircraft revenues of approximately $78.7 billion in 2013) and Boeing ($49.1 billion).

Airbus, formerly a three-nation European consortium, completed a restructuring program in 2000 and now operates as a formal corporate entity. Europe's European Aeronautic Defence and Space Co. NV (EADS) owns a 100% interest in Airbus. As of January 31, 2014, EADS itself was owned by public investors (73.6%), the French government (11%), Germany (10.9%), and Spain (4.1%). On December 5, 2012, EADS agreed to overhaul its ownership structure, according to which Germany, France, and Spain lowered their stakes, ultimately resulting in an increase in the free float of the company's shares to around 74% from 49%.

The status of commercial aircraft development programs

◆ **Boeing ships the "Dreamliner."** Boeing's new long-range, mid-sized aircraft, the 787 Dreamliner, received certification from the US Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA) in August 2011. In September 2011, Boeing delivered the first 787 Dreamliner to All Nippon Airways. The aircraft was originally scheduled for first delivery to that airline in May 2008. In January 2013, with 50 787s delivered to customers in Japan, the US, and elsewhere, the FAA and international regulatory organizations grounded the 787, pending the resolution of investigations into overheating lithium ion batteries, which may have caused fires on two separate 787s operated by Japanese airlines. The FAA initiated a comprehensive review of the aircraft's design, manufacturing, and assembly, with a focus on its electrical systems. In April 2013, Boeing completed the final certification test of the new battery system and won the FAA's approval for the redesigned battery. Between 2011 and September 2014, Boeing had delivered 193 787s worldwide.

At least as important as first delivery is Boeing's manufacturing schedule for the 787. Boeing eventually plans to deliver 120 aircraft per year, to work off its backlog of 899 units (as of March 2014). The company, in January 2014, increased the production rate of the aircraft to 10 per month from seven per month. Boeing stated that the program remains profitable and plans to increase the production rate to 12 per month by 2016 and 14 per month by 2020. With its strong order book and the recent launch of the 787-10 variant, S&P Capital IQ (S&P) thinks Boeing is likely to explore options to raise 787 production above the current average of 10 aircraft per month. However, this is a complex and difficult process, and we do not currently expect a change in the production rate in 2014.

◆ **Airbus develops the A350-XWB.** Airbus is also building a new family of long-range aircraft intended to compete with Boeing's 787 and 777 models: the A350-XWB. The A350, powered by twin Rolls-Royce Trent XWB engines, first took flight in June 2013. In October 2012, Airbus's A350 assembly factory was inaugurated in Toulouse, France.

Like the 787 for Boeing, the A350 will be the first generation of Airbus aircraft to make heavy use of carbon fiber-reinforced plastic for fuselage and wing structures. This "composite" material is lighter weight and is expected to require less maintenance than aluminum.

The first A350 scheduled to enter service, the A350-900, will hold 314 to 366 passengers, with a maximum range of 14,990 nautical miles. Airbus claims the plane will be more fuel-efficient than Boeing's competing models, with an operating cost up to 8% lower than the 787.

Commenting on the A350's schedule, EADS CEO Louis Gallois noted in June 2010 that Airbus had outsourced 50% of A350 work to suppliers, versus 80% of the work on the 787 outsourced by Boeing. Much of the three-and-a-half-year delay on Boeing's 787 has been attributed to problems coordinating Boeing's vast supply chain and delays by suppliers. Airbus also notes that the A350 uses more hydraulic systems versus more electronic control systems on the 787.

In July 2014, the A350 XWB took off for the final stage toward certification, as Airbus progresses toward the first delivery before December 2014 to Qatar Airways, the first airline to fly paying passengers in the A350. Specifically, the variant that will be delivered to Qatar Airways, the A350-900, received certification from EASA in September 2014. Airbus had 750 orders for the A350 as of September 31, 2014.

◆ **Bombardier attempts to break into the mainline with the CSeries.** Canadian business and regional jet maker Bombardier's introduction of the CSeries, a family of 100- to 145-seat aircraft, has shaken up the commercial aircraft manufacturing industry, as Boeing and Airbus see a potential threat to their long-standing duopoly. The CSeries competes directly with the smallest Airbus and Boeing models, including the A318, A319, 737-600, and 737-700. The CSeries will be built with a PW1500G engine by Pratt & Whitney, a division of United Technologies. The PW1500G promises 20% less fuel consumption than current in-production aircraft. The CSeries will have two models: the CS100 with 100 to 125 seats, and the CS300 with 120 to 145 seats. The aircraft boasts a five-abreast cabin, larger windows and overhead luggage bins than current Airbus/Boeing models, and a significant reduction in both CO_2 emissions and noise. The

plane will also be 70% built from advanced materials (46% composite materials and 24% aluminum lithium, both of which reduce weight versus traditional aluminum).

The first flight of the aircraft, delayed three times, occurred in September 2013. The first delivery, earlier scheduled for late 2014, is expected to take place in the second half of 2015, according to the company. S&P thinks that this tight timetable could prove a challenge. According to Bombardier, it had 243 firm orders for the airplane as of September 26, 2014.

◆ **Airbus re-engines the A320.** In early December 2010, Airbus announced it would re-engine the A320 family. The new model, called the A320neo ("new engine option"), will be available with either CFM International's LEAP-X engine or Pratt & Whitney's PW1100G. The plane will also include large fuel-saving, wing-tip devices called sharklets. Airbus cites a 15% improvement in fuel efficiency over current models in its class. Airbus believes the A320neo will also provide double-digit reductions in emissions, reduced engine noise, lower operating costs, and a range of up to 500 nautical miles more compared with the current A320 family. The neo option will also be offered on the A319 and A321 models.

Airbus originally announced a spring 2016 delivery date. However, in April 2011, Airbus pulled the delivery date to October 2015. In March 2014, the company was expecting the first flight to take place in the fourth quarter of 2014, and the first delivery in the fourth quarter of 2015. As of July 2014, Airbus had received more than 3,000 firm orders for the A320neo. Airbus estimates market demand for the A320neo to be 4,000 orders over 15 years.

In September 2014, the Airbus A320neo completed its first flight. The Lufthansa Group has ordered a total of 115 such aircraft.

◆ **Boeing launches the 737 MAX.** In August 2011, Boeing introduced the 737 MAX, a new engine variant of the narrow-body 737, which is expected to deliver improved efficiency, reliability, and passenger comfort than its predecessor. S&P thinks the introduction of the MAX is in response to the large number of orders received by Airbus for the A320neo family. In June 2013, Boeing stated that the MAX would be 8% more fuel efficient than the A320neo. The MAX's first flight is scheduled in 2016, with deliveries to customers beginning in 2017.

The MAX is powered by LEAP-1B engines from CFM International, a joint venture between General Electric Co. (GE) and Safran Group. According to Boeing, the new engine will reduce fuel burn and carbon dioxide emissions by 14% compared with current narrow-body aircraft. Boeing believes the MAX will help airlines save about 7% in operating costs due to the fuel-efficient engine, better design, and lower maintenance requirements. In June 2014, Boeing announced that CFM International successfully tested the all-new LEAP-1B, which means that Boeing is on track for its first delivery in 2017. As of September 2014, Boeing had 2,295 orders for the aircraft.

In December 2011, Boeing received its first firm order from Southwest Airlines Co. for 150 MAX airplanes. With this order, Southwest has become the launch customer for the variant and is expected to take delivery of the first plane in 2017.

◆ **COMAC develops the C919.** Another entrant into the narrow-body market will be the C919, China's first locally produced commercial aircraft, which will be developed by the Commercial Aircraft Corp. of China (COMAC). The all-economy class layout of the C919 will have 168 seats and the mixed-class version will have 156 seats. The LEAP-1C engine, manufactured by CFM International (a joint venture between GE and Safran), will power the aircraft. COMAC's first flight of the aircraft, earlier scheduled for 2014, will now take place at the end of 2015.

Although the company is still trying to meet its target of first delivery in 2016, first deliveries have been pushed back to 2018. Further, the C919 is expected to take two years to receive airworthiness approval from the Civil Aviation Administration of China (CAAC). COMAC had secured 400 orders for the C919 as of September 2014, according to Flightglobal, a provider of aviation news and statistics. In the next two decades, COMAC estimates that Chinese carriers will buy about 5,000 jets estimated at about $560 billion.

Despite the fact that the aircraft is being manufactured in China, most of the suppliers are not local. For example, GE Aviation, Rockwell Collins, and Honeywell are supplying the C919's avionics. Honeywell is supplying the auxiliary power unit (APU), starter-generators, and the wheels, brakes, and tires. Hamilton Sundstrand, a unit of United Technologies, is supplying the electrical power generation and distribution systems; Parker Aerospace, a unit of Parker Hannifin, is supplying the complete hydraulic systems. Nexcelle of France is providing the engine nacelles and thrust reversers. Chinese suppliers are manufacturing the fuselage, nose cone, and empennage (tail assembly) of the plane.

Boeing Commercial Airplanes' Mr. James Albaugh, has expressed long-term optimism about the C919. However, he remains skeptical regarding approval of the aircraft by the CAAC, as COMAC has struggled to gain approval for the ARJ21. Mr. Albaugh believes that in the long term, the narrow-body air transport segment will be split among Boeing, Airbus, and COMAC, although he believes COMAC will have a hard time competing with the Boeing and Airbus duopoly outside of China.

◆ **Russia develops the MC-21.** Russian aircraft manufacturer OAO Irkut Corp. is building a 150–210 seat airliner, the MC-21. In June 2012, the company signed a definitive agreement with Pratt & Whitney to offer the PW1400G engine on Irkut's MC-21 family of aircraft. According to Pratt & Whitney, the new engine's advanced gear system, together with the specially designed aerodynamic body and wide use of composites, will deliver 21%–24% improvement in fuel efficiency, fewer environmental emissions, and less noise.

The PW1400G's first test is set to occur in the third quarter of 2014, and the first delivery is expected in 2017. As of February 2014, according to AirInsight, a commercial aviation consultancy, Irkut had 175 firm orders for the MC-21-300 (the 181-seat model) and the MC-21-200 (150 seats).

REGIONAL AND BUSINESS AIRCRAFT

The business and regional aircraft segment consists of five dominant competitors: Canada's Bombardier Inc. (aerospace revenue of $9.4 billion in 2013); Brazil-based jet maker Embraer SA (Embraer; $6.2 billion); Gulfstream Aerospace Corp., a unit of General Dynamics Corp. ($6.0 billion); Cessna Aircraft Co., a unit of Textron Inc. ($2.8 billion); and Falcon Jet, a unit of France's Dassault Aviation (€3.2 billion). Hawker Beechcraft Corp. filed for bankruptcy protection in May 2012. Upon emergence from bankruptcy in February 2013, it shut down its sizable business jet manufacturing operations and currently produces only business and military turboprop aircraft under the Beechcraft name. In March 2014, Textron completed the acquisition of Beechcraft for $1.4 billion.

Regional jets: Status of recently introduced and in-development programs

Bombardier and Embraer are the world's two primary makers of regional jets (the rest of the companies listed above manufacture only business jets). Both Bombardier and Embraer also manufacture business jets. However, a number of new competitors plan to enter the regional jet market, including companies in Russia, China, and Japan.

◆ **Bombardier's CSeries.** Bombardier is building a new aircraft, the CSeries, which bridges the gap between regional jets (it currently manufacturers the CRJ family of regional jets) and large commercial jets. The first flight of the CSeries, delayed three times, occurred in September 2013. The first delivery is expected to take place in the second half of 2015. Bombardier claims the CSeries will deliver 15% cash operating cost savings, versus current narrow-body aircraft.

The CS100 is designed to hold from 100 passengers, in a mixed-class configuration, to 125 seats in a "high density" configuration, and it will have a range of 2,200 to 2,950 nautical miles. The CS300 seats 120 to 145 and also has a range of 2,200 to 2,950 nautical miles (the latter for the extended-range version). Bombardier Aerospace president Guy Hachey noted that half of the fuel savings promised by the CSeries is derived from lighter composite parts and other advanced technologies, which the re-engined A320neo will not be able to take advantage of.

◆ **Embraer.** Embraer, a Brazilian aerospace company currently manufacturing the E-Jet family of regional jet aircraft, launched the second-generation E-Jet, the E2 family, at the Paris Air Show in 2013. The seating

capacity will range between 80 and 132, and the aircraft will compete directly with Bombardier's CSeries. The E-Jet E2 offers technologically superior features, advanced systems and avionics, full fly-by-wire flight controls, and a Pratt & Whitney engine. According to the company, this will reduce fuel consumption, emissions, noise and maintenance costs in double digits, and increase aircraft availability.

The E175-E2 will have a PW1700G engine and accommodate up to 88 passengers, and it is expected to enter service by 2020. The E190-E2 can accommodate up to 106 passengers, and it is expected to enter service in the first half of 2018; the E195-E2, which can seat 132 passengers, is expected to enter service in 2019. Both the E190-E2 and E195-E2 will run PW1900G engines. The company had 100 firm orders for E-175-E2 aircraft in July 2014.

◆ **Sukhoi.** Russia's Sukhoi Civil Aircraft Co. is building the Superjet (SSJ) 100, with two configurations seating 75 and 95 passengers (78 and 98 seats for all-economy class configurations). In order to gain international orders and to provide marketing and after-sales support for the aircrafts Western market, Sukhoi teamed with Italy's Alenia Aeronautica (a subsidiary of Finmeccanica SpA) in a joint venture called Superjet International, based in Venice, Italy. In February 2009, Superjet International opened a North American sales and customer support office in Washington, D.C.

The original first delivery target was late 2008 or early 2009. Sukhoi delivered the first SSJ in June 2011 to Aeroflot Russian Airlines, according to a report by ENPNewswire on June 20, 2011. Delivery to launch customer Armavia took place in April 2011.

In February 2011, the SSJ obtained type certificate from the Russian Aviation Register of the Interstate Aviation Committee (IAC AR). On February 3, 2012, the SSJ received type certification from EASA. As of September 2013, Sukhoi had 179 SSJ orders, according to the company's website. In March 2014, Henan Oberoi Aircraft, a Chinese firm, placed an order for 100 SSJs. Further, Sukhoi and Oberoi plan to build a delivery and assembly center for the SSJ at Zhengzhou. The plane is being marketed as a less expensive alternative to competing models from Embraer and Bombardier. *Aviation Week* estimated that development costs for the SSJ were near $1.2 billion.

The SSJ has been involved in a couple of accidents, leading to controversies surrounding the jet. In May 2012, an SSJ crashed over Indonesia, killing 45 people onboard. The flight was a demonstration of the aircraft and carried prospective buyers, journalists, and an eight-member Russian crew. According to a *Reuters* article dated December 18, 2012, investigators blamed Jakarta's inefficient radar system and the pilots for the crash, and said the aircraft was defect-free. However, in July 2013, during a fully automated landing system trial in Iceland, the aircraft made a belly landing and slid off the runway. The company stated that this incident would not hamper commercial usage of the jet because airlines do not make such landings.

Sukhoi Civil Aircraft is speeding up production beyond the 40 airplanes it plans for 2014. The company expects to produce 50 Superjets in 2015, increasing to 60 by 2016.

◆ **COMAC.** The Commercial Aircraft Corp. of China (COMAC) is developing the ARJ21, or the Advanced Regional Jet for the 21st century. The first production model, the ARJ21-700, seats 78 in a mixed-class configuration or 90 in a single-class configuration. The ARJ21-900, a stretched version of the 700, seats 98 in a mixed-class configuration or 105 in a single-class configuration. CFM International provides the CF34 engines for the plane.

By December 2011, all Type Inspection Approval (TIA) preparation programs for flight tests had been completed. According to aviationweek.com, an online aviation and aerospace news and information website, COMAC currently expects to receive Chinese civil aviation certification for the aircraft by late 2014 versus earlier expectations of mid-2013. The FAA has agreed to provide shadow certification of the aircraft, which means it will ensure that the Civil Aviation Administration of China certification process is in line with FAA standards. The plane's first delivery, earlier scheduled for 2007, has been rescheduled for April or May 2015. However, given the recent delays in obtaining certification, we think it is highly unlikely for COMAC to be able to deliver the first aircraft until at least 2016. According to Airline Fleet

Management, an online aviation and aerospace news and information website, as of July 2014, COMAC had 258 orders for the ARJ21, primarily from state-controlled companies in China.

◆ **Mitsubishi.** Japan's Mitsubishi Heavy Industries Ltd., a large supplier to Boeing, plans to produce the first passenger aircraft made in Japan, the Mitsubishi Regional Jet, or MRJ. The MRJ90 will seat 86 to 96 passengers, and the MRJ70 will seat 70 to 80 passengers. In September 2008, Boeing signed an agreement to act as adviser to Mitsubishi on aircraft development, sales, and customer support. The MRJ will be powered by twin Pratt & Whitney geared turbofan engines, a new technology that promises increased fuel efficiency.

The aircraft was launched in March 2008, and the first flight was originally scheduled for 2012, with the first delivery in 2014. However, due to delays, the first flight has been delayed to the second quarter of 2015, and the first delivery to the second quarter of 2017. As of August 2014 , the firm had a total of 375 firm orders and 184 options for the MRJ. Mitsubishi's target markets are North America, the US, and Japan (the plane is to receive both Japanese and FAA certification).

Business jets: Status of recently introduced and in-development programs

A slew of new business jets are also currently in production.

◆ **Gulfstream.** Gulfstream, a subsidiary of General Dynamics, offers a family of ultra-large, large and mid-size business jets. Production jets currently include the G150, G280, G350/G450, G500/G550 and G650. Gulfstream delivered its first ultra-large-cabin, ultra-long-range G650 in December 2012, which it dubbed the world's fastest long-range business jet, as well as its first mid-sized G280 in November 2012. The G650 is Gulfstream's largest business jet, seating 11 to 18 passengers and two pilots. Powered by twin Rolls-Royce BR725 engines, it has a maximum range of 7,000 nautical miles. Some examples of high-profile owners include Exxon Mobil Corp., Wal-Mart Stores Inc., and Qualcomm Inc. In our view, owning a G650 has become a corporate status symbol.

◆ **Cessna.** Cessna Aircraft Co., a unit of Textron Inc., offers the Citation family of medium- to small-sized business jets, the Caravan family of turboprop business aircraft, and the Cessna family of piston engine light aircraft. Cessna claims to have the largest installed base of business aircraft in the industry. The current Citation product line includes the Mustang, CJ2+, CJ3, CJ4, XLS+, Sovereign, and X models. In December 2013, Cessna announced first delivery of its Citation M2 light jet and updated Citation Sovereign models after receiving certification from the FAA. The first delivery of the updated Citation X (Citation X+) took place in June 2014, whereas first delivery of the new Citation Latitude and Longitude aircraft will be in 2015 and 2017, respectively.

◆ **Embraer.** Embraer provides small-sized Phenom 100 and Phenom 300, as well as various regional jet aircraft outfitted as business jets. The very light Phenom 100 carries four to seven passengers and has a maximum range of about 1,800 nautical miles. First delivery occurred in December 2008. On April 1, 2014, Embraer delivered its 300th Phenom 100. The Phenom 300 seats eight or nine occupants, and is powered by twin Pratt & Whitney 535-E engines. It has a range of 1,970 nautical miles. First delivery occurred in December 2009. As of December 2013, the company had delivered 177 Phenom 300s. The company is currently developing its mid-sized Legacy 500 (estimated end-2014 entry into service) and the Legacy 450 (mid-2015 entry into service).

◆ **Dassault.** Dassault Aviation offers business jets under the Falcon family. Current production models include the Falcon 900LX, 2000LX, and 7X. The company introduced the Falcon 2000S in May 2011, and the Falcon 2000LXS in October 2012. Both aircraft come with a Pratt & Whitney PW308C engine, which makes them more economical and environmentally friendly. The Falcon 2000S seats 10 passengers and has a range of 3,350 nautical miles; the Falcon 2000LXS offers a range of 4,000 nautical miles. Both aircraft received EASA approval in March 2013 and approval from the FAA in April. First delivery of the Falcon 2000S took place in April 2013, right after receipt of FAA approval. Delivery of 2000LXS was scheduled to begin in the fourth quarter of 2014.

◆ **Bombardier.** Bombardier offers business jets under the Learjet, Challenger, and Global brands. Current production jets include Learjet 40XR/45XR and 60, Challenger 300 and 605, and Global 5000/6000. The

company also provides various regional jet aircraft outfitted as business jets. Bombardier is developing the Learjet 85, an eight- to 10-seat passenger business jet, available with Pratt & Whitney's PW307B engine. The plane is expected to have a high-speed cruise of Mach 0.82 and a transcontinental range of up to 3,000 nautical miles. The maiden flight was scheduled for 2013, but it has been delayed indefinitely by the company.

Bombardier is also developing the Learjet 70/75 to replace the Learjet 40/45. The Learjet 70/75 comes with a Honeywell TFE731-40BR engine. The Learjet 70 has a range of 2,060 nautical miles. The Learjet 75 can cruise at a high speed of Mach 0.81, and has a range of 2,040 nautical miles. The company made its first delivery in the fourth quarter of 2013.

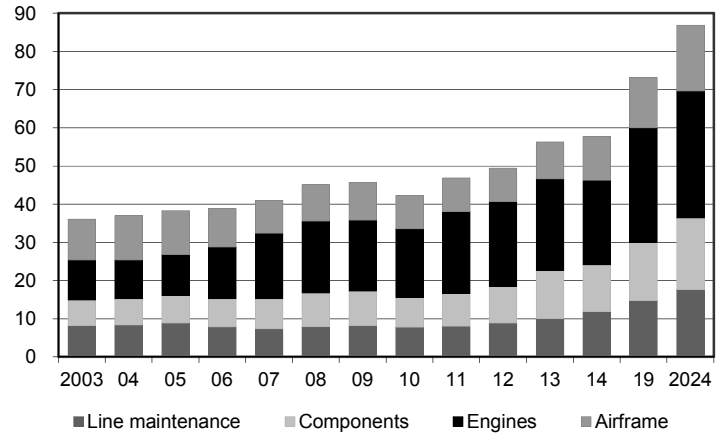
◆ **Boeing and Airbus.** Boeing, under the BBJ brand, and Airbus, under the ACJ brand, also provide large commercial aircraft specially outfitted as business jets. In February 2014, Boeing delivered the first two BBJ 787-8s. Not to be outdone, Airbus launched the ACJ319 Elegance in April 2014.

MAINTENANCE, REPAIR, AND OVERHAUL

The global maintenance, repair, and overhaul (MRO) business consists largely of repair service and replacement parts sales to the global commercial airline industry. The global commercial MRO market generated estimated revenues of $56.2 billion in 2013, according to statistics provided by TeamSAI, an aerospace consulting firm. This figure excludes business jet and military aircraft MRO, but includes MRO for large commercial jets and regional jets. Based on data from research firm Aerostrategy (which is now a part of ICF International), we think the military MRO market was about $62.5 billion in 2012, and an estimated $60.7 billion in 2013.

According to the *Global MRO Forecast 2014–2024* by TeamSAI, the global commercial MRO market is expected to total $57.7 billion in 2014 and is forecast to grow at a compound annual growth rate (CAGR) of 4.2% to reach $86.8 billion in 2024.

GLOBAL MRO SPENDING FORECAST
(Billions of dollars)



Source: TeamSAI for *Overhaul & Maintenance Magazine.*

The market consists of engine MRO (about 38% of total MRO), component MRO (21%), airframe MRO (20%), and line maintenance (21%). Geographically, TeamSAI estimates that 31% of MRO revenue comes from the Americas, 28% from Europe, and 30% from Asia. However, TeamSAI expects Asia to show the fastest growth and to account for 38% of revenue by 2024, with the Americas shrinking to 22%, and Europe staying at about 25%.

The largest companies in this segment are chiefly the repair and overhaul operations of aerospace companies or airlines. This group includes Singapore Airlines Ltd. and Deutsche Lufthansa AG; the jet engine division of GE; Pratt & Whitney and Hamilton Sundstrand Corp. (both units of United Technologies Corp.); Honeywell Aerospace (Honeywell International Inc.); UK-based Rolls-Royce plc; Goodrich Corp. (which was acquired by United Technologies in July 2012); and Boeing's aviation support services division. Smaller heavily MRO-exposed companies include TransDigm Group Inc. ($1.9 billion in revenues in the fiscal year ended September 2013 and $610.5 million in the second quarter of 2014), AAR Corp. ($2.1 billion in revenues in the fiscal year ended May 2013 and $469.2 million in the second quarter of 2014), and Heico Corp. (revenues of $1.0 billion in the fiscal year ended October 2013 and $291.0 million in the three months ended July 2014).

JET ENGINES

The industry operates as an oligopoly consisting of GE's jet engine-making division (first half of 2014 revenues of $6.1 billion), Rolls-Royce's jet engine division (£4.2 billion, includes civil and defense aerospace revenues), and United Technologies' Pratt & Whitney division ($6.9 billion).

GE also has a 50/50 joint venture, called CFM International, with France's Snecma, a division of Safran Group. CFM International makes the CFM56 engine used on the Boeing 737 and the Airbus A320. Another joint venture, International Aero Engines (IAE), which includes Pratt & Whitney (65% share), Japanese Aero Engine Corporation (23%), and Germany's MTU Aero Engines (12%), makes the V2500 engine, which powers the Airbus A320 family. In October 2011, Pratt & Whitney had purchased Rolls-Royce's interest in the venture, as Rolls was not interested in developing a new engine for the A320neo.

Boeing's new 787 will offer airlines the option of two new fuel-efficient engines: the General Electric GEnx and the Rolls-Royce Trent 1000. GE claims that the GEnx delivers 15% better fuel consumption than the engines it replaces. It is also designed to use 30% fewer parts than existing engines and with significantly less emissions. The GEnx engine will also power Boeing's upgrade of the 747, the 747-8. The engine generates maximum thrust of 63,800 pounds.

The Rolls-Royce Trent 1000 engine was built specifically for the Boeing 787, and promises 15% fuel savings and lower emissions. The Trent 1000 engine was selected by the 787's launch customer, All Nippon Airways, and it powered four of Boeing's six test aircraft. The Trent XWB, a derivative of the Trent 1000, will be the sole source engine for the Airbus A350.

Pratt & Whitney's PW1000G series geared turbofan engine is being offered as one of two options on the Airbus A320neo ("new engine option"), and it is the main power plant for Bombardier's CSeries, Embraer's E-Jets E2 family, Mitsubishi's MRJ, and Irkut's MC-21. The geared turbofan technology is a significant departure from traditional engine technology. The gearing system in the geared turbofan engine allows the engine's fan to operate independently of the low-pressure compressor and turbine, resulting in greater fuel efficiency, a slower fan speed, and less noise. The geared architecture allows the fan to complete only one revolution for every three rotations of the turbine. Industry observers believe that Pratt & Whitney's wins on the PW1100G may position it to become an engine supplier on the eventual 737 replacement. Pratt & Whitney supplied the engines on the original 737, but the company was replaced by CFM in the early 1980s.

CFM International's LEAP engine family (formerly called the LEAP-X) will supply the power for the COMAC C919 and the Boeing 737 MAX, and will be one of two engine options, with the PW1100G, on the Airbus A320neo. LEAP promises up to 15% lower fuel burn versus the current CFM56 engine that powers the Airbus A320 and the Boeing 737. CFM plans to attain certification for the LEAP for use on the C919 by 2014 and for use on the A320neo by 2016. The LEAP design includes lightweight composite fans, a new lean-burning combustor, and ceramic matrix composites in the high-pressure turbine.

On the defense side, Pratt & Whitney also makes the F135 jet engine used on the F-35 Joint Strike Fighter. The F135 is an afterburning turbofan, which Pratt & Whitney claims is the world's most powerful fighter engine. It is derived from the F119-PW-100 that powers the US Air Force's F-22 Raptor. The F135 has approximately 40% fewer parts than older military engines, increasing reliability. GE and Rolls-Royce had been developing the competing F136 engine, but Congress has discontinued funding for it.

THE DEFENSE INDUSTRY

Based on statistics provided by *Defense News*, a weekly publication covering the global military sector, the top-100 global defense contractors generated defense-related revenues of $395.5 billion in 2013 (latest available), down from $401.2 billion in 2012. Although the business comprises more than 100 investor- and government-owned military contractors and suppliers around the world, a handful of companies dominate. Market concentration increased significantly with the consolidation of the defense industries in the US in the early to mid-1990s and in Europe in the late 1990s.

LEADING GLOBAL DEFENSE CONTRACTORS
(Ranked by defense revenues, in millions of dollars)

		2013 REVENUES (MIL.$)		DEFENSE AS %
COMPANY	COUNTRY	DEFENSE	TOTAL	OF TOTAL
1. Lockheed Martin	US	40,494	45,358	89.3
2. Boeing	US	32,000	86,623	36.9
3. BAE Systems	UK	28,014	29,803	94.0
4. Raytheon	US	22,048	23,706	93.0
5. Northrop Grumman	US	19,500	24,661	79.1
6. General Dynamics	US	18,836	31,218	60.3
7. Airbus Group	Netherlands	16,547	81,193	20.4
8. United Technologies	US	11,894	62,600	19.0
9. Thales	France	10,962	19,457	56.3
10. Finmeccanica	Italy	10,896	21,968	49.6
11. L-3 Communications	US	10,337	12,629	81.9
12. Almaz-Antey	Russia	8,326	8,326	100.0
13. Huntington Ingalls Industries	US	6,324	6,800	93.0
14. Rolls-Royce	UK	6,124	25,409	24.1
15. Honeywell	US	4,900	39,055	12.5
16. DCNS	France	4,602	4,602	100.0
17. Textron	US	4,236	12,104	35.0
18. Booz Allen Hamilton	US	4,100	5,758	71.2
19. GE	US	4,100	146,045	2.8
20. Exelis	US	4,093	4,816	85.0
21. Leidos	US	4,080	5,772	70.7
22. Hewlett-Packard	US	4,071	112,000	3.6
23. Safran	France	4,027	20,135	20.0
24. Babcock International	UK	3,424	5,803	59.0
25. Russian Helicopters	Russia	3,406	4,231	80.5

Source: *Defense News*.

The world's largest defense contractors, according to *Defense News*, are Lockheed Martin Corp. (defense revenue of $40.5 billion in 2013), Boeing Co. ($32.0 billion), Britain's BAE Systems ($28.0 billion), Raytheon Co. ($22.0 billion), and Northrop Grumman ($19.5 billion).

INDUSTRY TRENDS

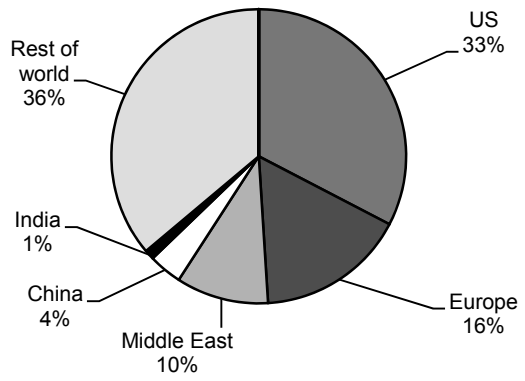
In evaluating the earnings growth and profitability potential of aerospace and defense contractors, it is important to consider demand trends. S&P Capital IQ (S&P) thinks that demand for commercial aerospace products and services is likely to grow at rates above the rate of growth in real (inflation-adjusted) global gross domestic product (GDP), which we project at about 3%, over the long term, while demand for military products is likely to decline.

Near term, S&P sees commercial aerospace growth continuing due primarily to large backlogs of unshipped aircraft at Boeing and Airbus, increased passenger air traffic leading to increased demand for maintenance, repair, and overhaul (MRO) services, and the beginning of a recovery in the business jet market.

LARGE COMMERCIAL AIRCRAFT: GOOD SALES GROWTH POTENTIAL

In our view, globalization of business and growth in developing economies, including China, India, the Middle East, Eastern Europe, and Latin America, will drive growth in global air travel and demand for new aircraft. We expect economic growth rates in these regions over the next two decades to be well above those in developed economies in North America and Europe. As a result, we expect substantial growth in air travel in these regions. According to the International Air Transport Association (IATA), total market revenue passenger-kilometers (RPK) year to date through July 2014 climbed by 5.8% in the Middle East, 12.7% in Africa, 1.1% in Asia/Pacific, 6.0% in Latin America, 5.7% in Europe, and 3.3% in North America. S&P thinks that developing and emerging economies will continue to experience much higher air traffic growth, over the long term, than developed economies will.

BOEING ORDERS BY REGION—2010-14*



Units ordered: 5,249

*Through August 2014.
Source: Boeing.

The Population Reference Bureau, a private non-profit organization, highlights that as of mid-2014, world population stood at 7.2 billion. Populations in Asia are very large, with an estimated 1.36 billion people in China and 1.29 billion in India, versus 318 million people in the United States and about 741 million in Europe. Boeing estimates that China's fleet of commercial aircraft was about 2,310 in 2013

(latest available) or about one for every 588,744 people. The fleet size in South Asia, which includes India, Pakistan, Bangladesh, and Afghanistan, was 450 in 2013, or one aircraft for every 3.6 million people. In contrast, North America (the US and Canada) had 6,650 aircraft, or one for every 53,000 people, and Europe had 4,350 planes, or one for every 170,344 people. (Note that the per capita figure for Europe includes Eastern Europe.) With economic growth moving from west to east, it is likely that fleet growth will also move in that direction. S&P expects significant expansion in aircraft fleets in Asia and other emerging regions over the next 20 years.

In Boeing's *Current Market Outlook 2014–2033*, the company sees Latin America as having the highest annual rate of air traffic growth over the next 20 years, with 6.9% growth. Asia-Pacific (APAC) is also expected to have high growth, at 6.4%; Africa, at 6.7%; and the Middle East, at 5.2%. By contrast, Boeing sees 20-year annual growth rates of 2.3% for North America and 3.5% for Europe.

We see both the Boeing Co. and Airbus SAS as strong competitors in commercial aerospace. As of September 2014, Boeing's 737 and Airbus' A320 narrow-body jets continue to be strong sellers, with Boeing having sold 6,205 737s since 2006 and Airbus receiving 7,079 orders for the A320. Boeing has also sold 1,031 of its new 787 Dreamliner jets, of which the first delivery was made in September 2011. As of August 2014, Airbus has received 750 orders for its competing A350-XWB, which is likely to be two to three years behind the 787. Airbus has also sold 324 of its super-jumbo A380, while Boeing, as of March 2014, has sold about 120 of its new 747-8 Intercontinental and Freighter models (total).

Projected health of long-term demand drivers

While large commercial jet manufacturing is a mature industry, growth in air travel in developing regions, coupled with the need for new fuel-efficient aircraft, has re-invigorated the industry. Total orders at Boeing and Airbus (combined) from 2005 through 2007 averaged more than 2,000 per year, versus total orders of about 1,000 per year during the previous cyclical peak years of 1996 through 2000. Although combined gross orders fell to just 573 in 2009 at the height of the global financial crisis from the peak 2,881 orders in 2007, the total rose to 1,269 in 2010, 2,529 in 2011, and 2,253 in 2012, largely reflecting strong demand for the A320neo (new engine option) and the 737 MAX. In 2013, combined gross orders totaled 3,150. Year to date through September 2014, combined gross orders amounted to 2,183.

Although it is still recovering from sizable losses incurred during the financial crisis, the global airline industry seems to have turned a corner in terms of capacity rationalization and financial performance. Profits remain relatively weak, but they are improving. In June 2014, the IATA trimmed its airline industry profit forecast for 2014 to $18.0 billion from its March 2014 forecast of $18.7 billion, primarily due to higher fuel costs, given the tensions in Ukraine and weakness in Argentina and Brazil. While the IATA expects industry-wide net profits to increase to $18.0 billion in 2014, or 2.4% of sales, it notes that this level of profitability corresponds to only a 5.4% return on invested capital, still well below the airline industry's 7%–8% weighted average cost of capital. According to the IATA, the global airline industry earned $12.9 billion in 2013, more than double the $6.1 billion in 2012.

The top US carriers' revenues reached $77.7 billion in the first half of 2014, up from $66.3 billion and $65.7 billion in the same period in 2013 and 2012, respectively, according to S&P Capital IQ's calculations. Results in early 2014 benefited from fare increases, improved business travel, and lower oil prices, while increases in ancillary fees such as baggage, change fees, and premium seating slowed.

Boeing predicates its fleet growth projections on a global GDP growth rate averaging 3.2% per year from 2013 to 2033, a 4.2% increase in airline passengers, and a 5.0% increase in airline traffic (RPKs). While S&P sees 20-year forecasts primarily as marketing tools for original equipment manufacturers (OEMs) to sell aircraft, we think that most airlines are currently planning their fleets with the expectation of significant global economic growth in the coming years.

In July 2014, the International Civil Aviation Organization (ICAO), a UN agency, in its most recent Medium-term Passenger Traffic Forecast, estimated that global and regional scheduled passenger traffic, as measured in passenger-kilometers performed (PKP), increased 5.5% in 2013 (latest available), following

growth of 4.9% in 2012 and 6.5% in 2011. The ICAO expects growth to reaccelerate to 6.0% in 2014 and 6.3% in 2015.

Fuel efficiency and emissions is another key driver in the industry. According to Seabury Group, an investment banking and advisory firm, airlines are looking for 15%–20% reduction in operating costs, 15%–20% emissions reductions, and 20- to 30-decibel noise reductions when purchasing new aircraft. One critical technology in generating these reductions is the jet engine. Airbus announced in December 2010 that it would offer a re-engined A320neo in the fourth quarter of 2015. Airbus says it expects a 15% fuel efficiency increase, and double-digit reductions in emissions and noise reduction, over the current A320 family. Despite recent sharp declines in oil prices, we think that the long-term trend in energy prices will be upward, and that fuel efficiency, as well as environmental "friendliness," will remain major factors driving aircraft purchases.

In August 2011, Boeing also announced a re-engined version of the 737, the 737 MAX, which it expects to deliver better efficiency, reliability, and passenger comfort than the prior model. According to the company, the MAX's new engine, the LEAP-1B, will reduce fuel burn by 10%–12% and would thus help airlines save approximately 7% in operating costs. Similarly, Boeing's 787 Dreamliner and A330neo are also competing in terms of fuel efficiency, according to a *Financial Times* article published in July 2014. In May 2014, Boeing announced that it had reached an agreement regarding its acquisition of ETS Aviation, a fuel-efficiency management and analytics software provider. This will further bolster the capabilities of Boeing in producing fuel-efficient aircrafts.

Growth continues for the MRO sector

S&P thinks that, due to recent improvements in passenger air-traffic growth and global airline profitability, sales growth for commercial aerospace MRO providers should begin to reaccelerate in 2014 and 2015. Aerospace consulting firm TeamSAI estimated a 13.5% increase in 2013 (latest available), after a 5.5% increase in 2012, and it sees air transport MRO revenue growing at a compound annual growth rate (CAGR) of 4.2% over the next 10 years to reach $86.8 billion by 2024. (Air transport includes large commercial and regional jets.)

Industry trends should mirror the geographic growth in airline fleets, with the highest levels of growth in developing economies. MRO provider Goodrich Corp. (acquired by United Technologies Corp. in July 2012) has noted that the "sweet spot" for most MRO providers is five years after a plane has been delivered. Deliveries of commercial aircraft have been strong since 2006, with just a slight dip in total deliveries in 2008. Given scheduled production increases at Boeing and Airbus through the remainder of 2014, MRO providers should continue to benefit for the foreseeable future.

GROWTH PROSPECTS FOR US DEFENSE INDUSTRY LIKELY TO DECLINE

Defense spending had been strong since fiscal 2001, with average annual growth in the defense budget (including funds for the Overseas Contingency Operations or OCO) of 8.3% from fiscal 2001 through fiscal 2011, well ahead of the inflation rate during this period. However, the overall defense budget rose 4% in fiscal 2010, and declined 1% in fiscal 2011. The defense budget declined 6% in fiscal 2012 and 10.5% in fiscal 2013. For fiscal 2014, the defense budget is more or less flat.

The wars in Iraq and Afghanistan drove defense spending, with the OCO funding swelling from $13 billion in fiscal 2001 to a high of $187 billion in fiscal 2008. OCO funding was $146 billion in fiscal 2009, $163 billion in fiscal 2010, and $157 billion in fiscal 2011. With US troops now withdrawn from Iraq, President Obama allocated $115 billion in fiscal 2012, $88 billion for fiscal 2013, and $85.2 billion for fiscal 2014.

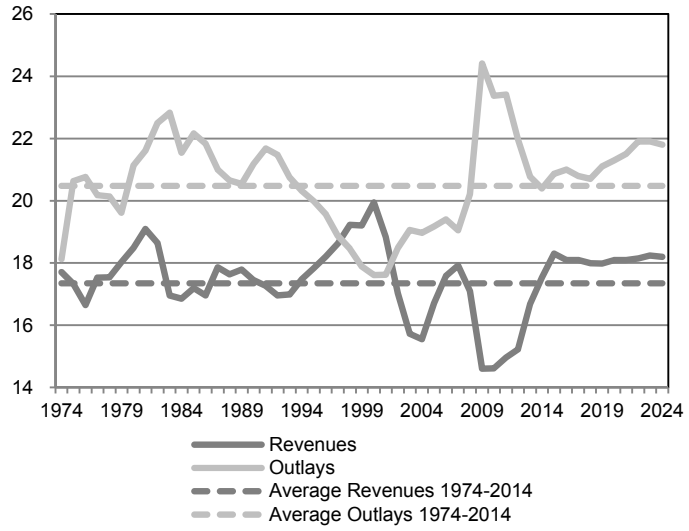
The declining defense spending environment has the potential to be interrupted by recent geopolitical events that manifested in the first half of 2014. The signing of the Bilateral Security Agreement between the US and Afghanistan, and the US involvement in the Islamic State of Iraq and the Levant (ISIL) conflict with the Iraqi government, and its involvement in the Ukraine-Russia conflict, may call for additional defense spending. However, S&P Capital IQ thinks the majority of the spending associated with most of these conflicts will be related to air support, which we think is less expensive than troop deployment. The base budget is more stable, as the Pentagon has been struggling to replace aging planes, ships, and ground

vehicles to field new technologies, and to repair or replace equipment used in the wars. However, President Obama has already approved plans to reduce the defense base budget for the next 10 years (beginning with fiscal 2012) and generate savings of approximately $487 billion during the period.

The Department of Defense (DOD) faces mandated spending caps from 2013 through 2021 that will result in spending cuts under a process known as sequestration. Sequestration took place because of the failure of a congressional group known as the Super Committee to make a comprehensive deficit-reduction plan that Congress would approve in order to avoid sequestration spending cuts.

Based on set budgetary caps, sequestration-related cuts to the defense budget were set to increase to around $52 billion beginning in fiscal 2014 (around 9% of the fiscal 2014 base defense budget request). However, in December 2013, the bipartisan congressional budget agreement offset $22 billion of the $52 billion of mandated fiscal 2014 defense sequestration cuts.

US FEDERAL BUDGET—REVENUES AND OUTLAYS AS A PERCENTAGE OF GDP



Source: Congressional Budget Office.

We think the US defense budget is in the midst of a decline that will carry it down 30% to 50% in real (inflation-adjusted) terms over the next 15 to 20 years. We see three factors likely to result in slowing budget growth: the end of the wars in the Middle East, with a drawdown in Afghanistan expected to be completed by the end of 2014; burgeoning budget deficits due to decreasing tax revenues and increases in government spending; and continued growth in the mandatory or "entitlements" budget. We will look at each of these issues.

President Obama approved a "surge" of 30,000 troops in Afghanistan, which brought the total number of US troops there to about 100,000 by the end of 2010. In June 2011, the president ordered the withdrawal of 10,000 troops from Afghanistan by the end of 2011, and in June 2013, the responsibility of security was transferred to Afghan forces. According to the DOD, the US kept around 38,000 troops in Afghanistan in fiscal 2014. The government had planned to withdraw all the troops from Afghanistan at the end of 2014, but the signing of the Bilateral Security Agreement between the US and Afghanistan permits US troops to stay in the region beyond 2014.

In the case of Iraq, President Obama kept his agreement with the Iraqis and the US public to pull the majority of US combat troops out of Iraq by August 2010, leaving behind some 50,000 training and support personnel. As of June 2011, there were around 46,000 US troops in Iraq, according to CNN (June 6, 2011). As per the agreement with the Iraqi government, the remaining troops were withdrawn in December 2011. Such a troop withdrawal may result in a large amount of money spent on the repair and replacement of equipment, which is called a Reset in military terms. However, the plea of the Iraqi officials for the US to deploy more troops in Iraq considering the threat brought by ISIL militants may shoot up defense spending even further.

The effects of the recent recession and financial crisis on US government finances are two-fold. First, income in the form of tax revenue fell sharply in 2009, due to the ailing economy, which lowered corporate profits and increased unemployment. Second, government spending climbed in order to fund bailouts and economic stimulus measures in 2009 and 2010. As a result, the government recorded budget deficits totaling $1.4 trillion (9.8% of GDP) in fiscal 2009, $1.3 trillion each in fiscal 2010 and 2011 (8.7% and 8.4% of GDP, respectively), $1.1 trillion (6.8% of GDP) in fiscal 2012, and $680 billion (4.1% of GDP in 2013). The latest Congressional Budget Office (CBO) projections show that this deficit spending is structural in nature. The

CBO projects the deficit to fall to 3.0% of GDP in fiscal 2014 and go to 2.6% of GDP in fiscal 2015. However, by fiscal 2024, the deficit is anticipated to climb back to 4.0% of GDP, as "entitlements" (discussed below) and interest outlays rise faster than anticipated tax receipts.

To counter the growing US debt, President Obama signed the Budget Control Act in August 2011, which called for a federal spending reduction of approximately $900 billion over the next decade. Although the Budget Control Act has been partially incorporated in the budget for fiscal 2014, the prospect of an additional $550 billion 10-year reduction in the defense budget, due to sequestration (discussed above), took effect in March 2013.

The growth in "entitlement" or mandatory programs is another risk factor for the defense budget. In fiscal 2012, programs, such as Social Security, Medicare and Medicaid, food stamps, unemployment, and housing assistance, plus interest on the federal debt, accounted for nearly two-thirds (62%) of the total federal budget. In comparison, outlays for this spending were only 34% of the total in 1965. With the baby boom generation entering retirement mandatory program spending is projected to squeeze the discretionary budget. The defense budget accounts for an estimated 50% of the so-called discretionary budget, and S&P sees it as susceptible to spending cuts going forward in order to offset growth in the mandatory budget and reduce the budget deficit. Initiatives, such as the US Patient Protection and Affordable Care Act, could play a role in this equation, but it remains to be seen whether this new law enacted in March 2010 will negatively or positively affect the federal budget.

High threat level remains

S&P thinks the military threat level currently faced by the US is the highest at any time since the Cold War ended in the early 1990s and perhaps since World War II. The US is facing rising military power from China and Russia. In recent years, Russia has been increasing its military capabilities significantly, though this trend has been constrained by the recent fall in oil prices. China is strengthening its naval fleet, and it plans to build its own aircraft carrier battle group. In December 2008, China's president, Hu Jintao, called for stronger military ties with Russia. Over the past 20 years, China has purchased fighter jets, transport planes, warships, and submarines from Russia, significantly strengthening its military capabilities.

In a May 2010 Reuters report, Wayne Ullman of the National Air and Space Center is quoted as testifying that US intelligence officials expect China to have a fifth-generation fighter by 2018. The production of the F-22 Raptor, the US's most advanced fifth-generation fighter, was capped at 195. Ullman noted that the People's Liberation Army (PLA) is preparing for "expected US intervention in support of Taiwan," and that the PLA's strategy included weakening US air power by striking air bases, aircraft carrier strike groups, and support elements, if the US stepped in.

In January 2011, the first clear photographs of a new Chinese stealth fighter, the J-20, appeared, perhaps indicating that the aircraft is making faster-than-expected progress in this arena. That same month, while then-US Secretary of Defense Robert Gates was visiting Beijing, the J-20 made a test flight.

China is also developing an aircraft carrier, and has developed a land-based anti-ship ballistic missile said to be capable of hitting US carriers before they are in striking range of the Chinese coast. Speaking in January 2011 about the anti-ship missile, the Navy's intelligence director said, "We underestimated when they would be competent and capable in delivering a technological weapon of that type." In August 2011, China launched its first aircraft carrier, the Shi Lang, a refurbished Russian-made carrier purchased from Ukraine. China is currently in the process of building its next carrier, which will be made entirely in China.

The US faces threats from nuclear powers, such as North Korea, and emerging nuclear powers, such as Iran. In addition to these nation-state threats, the US continues to face threats from Islamic-sponsored terrorists around the world. In the first half of 2014, the signing of the Bilateral Security Agreement between the US and Afghanistan, as well as US involvement in the ISIL-Iraq conflict and the Ukraine-Russia conflict, were additional potential threats to US national security.

Military priorities include traditional and nontraditional weapons

The US and the former Soviet Union engaged in a massive weapons build-up for both political and strategic reasons during the Cold War years (1945 to 1991). Following the collapse of the Soviet Union in 1991, the Pentagon revised its military master plan. The new goal was to ensure that the US had the ability to conduct simultaneously two "major regional contingencies"—defined as conflicts on a scale similar to the 1991 Persian Gulf War.

The US military puts forth its long-term strategic military objectives in the *Quadrennial Defense Review* (QDR), published every four years. The QDR released in February 2006 espoused a balanced approach to counter threats from both non-state terrorist organizations and threats from nation-states. Consequently, the 2010 QDR moved away from the previously stated goal of being able to fight two major combat operations simultaneously. Instead, the report posited a focus on so-called "hybrid" warfare, in which US defense forces are structured to fight both conventional wars and irregular conflicts, in which the enemy is not structured as a traditional military force, as has been the case in Iraq and Afghanistan.

The 2014 QDR cites three strategic objectives. The first is to prevent threats and/or attacks on the US through a variety of means, including military deterrence, as well as providing support to civil authorities to reduce the effects of natural disasters and potential attacks. The second is to build security globally to achieve regional stability, support allies, and address common security challenges. The third objective is to project power and win decisively by defeating and destroying terrorist networks.

Aside from the strategic objectives, the 2014 QDR also outlines six national security interests, which are the "ends" of the strategy. First is the survival of the nation; second is prevention of catastrophic attacks; third is the security of the global economic system; fourth is the security, confidence, and reliability of our allies; fifth is the protection of American citizens abroad; and sixth is the preservation and extension of universal values.

Evolving military priorities

The military appears to be showing an increased preference for unmanned operations, including unmanned aerial vehicles (UAVs), unmanned ships, and unmanned land vehicles. Such unmanned equipment provides low-cost solutions that do not expose military personnel to direct danger. For example, UAVs have been used extensively in Afghanistan and Pakistan where stealth, and the ability to "loiter" for long periods, is critical and where US air dominance is not in question. (Note that "unmanned" does not mean autonomous; some UAVs actually require larger crews than their manned counterparts.) S&P sees capability and weapons priorities evolving as a result of changing technology and the budgetary environment.

The military is emphasizing other intelligence, surveillance, and reconnaissance (ISR) equipment to deal with so-called "insurgents," such as those faced in Iraq and Afghanistan. ISR equipment helps the military deal with the primary difficulty of guerilla warfare: finding and tracking the enemy and thwarting enemy attacks. ISR equipment includes a variety of electronic equipment, including radar, electro-optic/infrared equipment, signals intelligence systems, sensors, etc., that help military personnel find, track, and otherwise gather information on enemy combatants.

The military branches are attempting to adapt their strategy to changing technologies, as well as the realities of the current budgetary environment and the uncertainties of sequestration. In September 2013 testimony in front of the House Armed Services Committee, the Chiefs of Staff for the Army, Navy, Air Force, and Marines provided descriptions of steps the services will have to take to deal with these mandated cuts. The Army Chief of Staff testified that by the end of fiscal 2014, only 85% of Army active and reserve brigades will be prepared for deployment. The Army would likely look to reduce its active force by around 26% over the next seven years, causing a 45% reduction in active Army combat teams. The Army Chief of Staff further noted, "We'll be required to end, restructure, or delay over 100 acquisition programs, putting at risk the ground combat vehicle, the armed aerial scout, the production and modernization of our other aviation programs, systems upgrades for UAVs and the modernization of air defense command and control systems, just to name a few."

The Navy Chief of Staff noted that significant cuts to the Navy's operation and maintenance and investment accounts are likely. He discussed a reduction in the Navy's ability to maintain its fleet response plan to deploy

aircraft carriers to regions of the world within a set period of time. The Navy will likely cut maintenance on ships and aircraft, leading to reduced lifespans. He testified that because the Navy will not be able to use prior-year funds to offset the impact of sequestration to investment accounts in fiscal 2014, as it did in fiscal 2013, the Navy would have to cut the purchase of a littoral combat ship, a Virginia-class submarine, an afloat forward-staging base, and 11 tactical aircraft without congressional action. He also noted that the Navy would be forced to delay delivery of the next aircraft carrier, the USS Ford, and the mid-life overhaul of the aircraft carrier USS George Washington.

Meanwhile, the Air Force Chief of Staff noted that, "Within three to four months, many of our flying units will be unable to maintain mission readiness." He said the Air Force would probably have to cut up to 550 aircraft (9% of its inventory), retiring whole fleets of aircraft in the process. He noted that the Air Force investment account outlook would be bleak if sequestration persisted and the Air Force would favor recapitalization over modernization. He added that the Air Force's top three acquisition priorities would be the KC-46 tanker, the F-35 Joint Strike Fighter, and the long-range strike bomber.

Finally, the Commandant of the Marine Corps told the committee that the service would be forced to cut troop levels below current requirements. He noted that the Marine Corps would have to reduce or cancel modernization programs and infrastructure investment to maintain its level of force readiness.

HOW THE INDUSTRY OPERATES

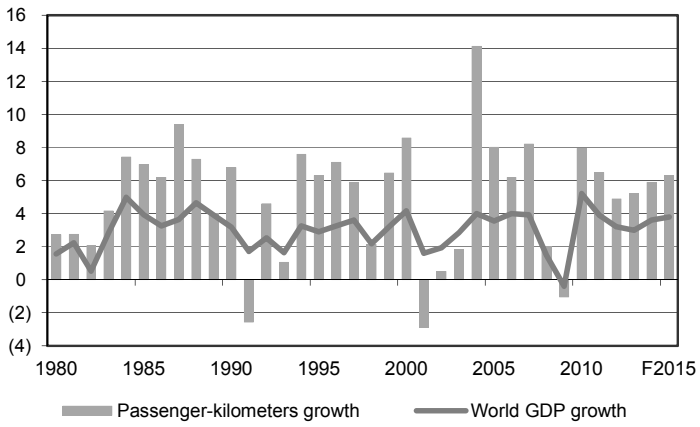
Although the aerospace and defense industry generally operates in mature, volatile markets, as well as in highly competitive and regulated environments, the major segments of the industry—the commercial aircraft, military weapons, and space sectors—also possess their own distinct demand drivers and operating characteristics. Therefore, we discuss each segment separately.

COMMERCIAL AIRCRAFT MANUFACTURING

The large passenger aircraft segment (makers of planes with 150 seats or more) operates as a duopoly. Based on order rates for the five years from 2009 to 2013, Boeing controlled about 47.9% of the 150-seat-plus commercial jet market, while Airbus held the remaining 52.1%. Based on deliveries over this same period, Airbus also held the lead with about 52% of the deliveries.

Demand for new commercial jets is driven by volatile factors such as airline profitability and growth in air traffic. Influencing these factors in turn are the overall health of the global economy, fuel prices, interest rates, and consumer confidence, which are also highly variable.

WORLDWIDE PASSENGER TRAFFIC GROWTH VS WORLD GDP GROWTH
(Year-to-year percent change)



Sources: International Civil Aviation Organization; International Monetary Fund.

As a result of a robust air traffic outlook, improving global airline profitability, and a rapidly aging fleet of inefficient aircraft, demand for new large commercial aircraft remains very strong. In the first eight months of 2014, Boeing and Airbus reported total gross orders of 2,005. In 2013, gross orders for Boeing and Airbus totaled 3,150, well above the 2012 gross order total of 2, 253.

Demand drivers for big jets

The airlines' willingness to buy new jets is influenced by the need to replace aging aircraft, match passenger demand with fleet capacity, meet environmental regulations regarding emissions and noise

reduction, and reduce operating costs by improving fleet commonality and reducing fuel costs.

Airlines' profitability and long-term fleet planning are the primary demand drivers for large commercial aircraft. Fleet planning, in turn, is based on overall air traffic forecasts, combined with each airline's route structure and the age of existing aircraft. The following discussion highlights historical trends in these areas. (For forecasts of air traffic growth, see the "Industry Trends" section of this *Survey*.)

◆ **Air traffic growth.** Using research provided by industry trade organizations such as the International Air Transport Association (IATA), UN agency International Civil Aviation Organization (ICAO), independent research firms, and aircraft makers Boeing and Airbus, airlines attempt to predict air traffic growth. Forecasting air traffic growth is difficult, as evidenced by the rosy forecasts for Asian air traffic growth that were knocked out of the sky by the region's financial crises in 1997. Before September 11, 2001, Boeing and Airbus issued predictions of strong 10- and 20-year global traffic growth, which were dashed by the terrorist attacks on that day.

According to Boeing, the key underlying drivers of air travel demand are global economic growth and global trade, which account for some 60%–80% of travel demand. The remaining 20%–40% of demand is accounted for by forces such as market liberalization and the perceived value travelers put on the speed and convenience of air travel.

The long-term growth rate of passenger air traffic provides a rough proxy for commercial aircraft demand or at least its directional trend. The latest available UN agency estimate from the ICAO *Medium-term Passenger Traffic Forecast* report projected that global and regional scheduled passenger traffic, as measured in passenger-kilometers performed (PKP) would increase 6.5% in 2014, following growth of 5.5% in 2013 and 4.9% in 2012. ICAO then expects growth to reaccelerate to 6.3% in 2015 and 6.5% in 2016.

◆ **Airline profitability and cash flow.** Another demand driver for new commercial aircraft is airline profitability and the ability to generate strong cash flow. Because aircraft tend to be very expensive assets that are typically heavily debt financed, an airline that is unprofitable and not generating solid, stable cash flow over a reasonable period of time will ultimately have difficulty financing new aircraft purchases at reasonable terms, no matter how optimistic management is about future traffic growth.

In 2001 and 2002, when global airlines recorded losses of $13.0 billion and $11.3 billion, respectively, commercial aircraft orders collapsed, according to the IATA. Total Airbus/Boeing orders fell to 689 in 2001 and 551 in 2002, from 1,108 in 2000. The industry reached a cyclical peak in profits and orders in 2007, with net profits of $14.7 billion and combined orders of 2,881. Orders plunged again in 2008 and 2009, amid a world financial crisis and economic recession, with combined Boeing and Airbus orders of 1,596 in 2008 and 573 in 2009, as the industry recorded net losses of about $26.1 billion in 2008 and around $4.6 billion in 2009.

The IATA estimated that the industry had net profit of $12.9 billion in 2013, up from $6.1 billion in 2012, $7.5 billion in 2011, and $17.3 billion in 2010, due to high fuel prices and slowing global economy. IATA expects global airline net profit to increase to $18.0 billion in 2014.

◆ **Fleet age and retirement cycle.** Commercial aircraft demand is also subject to fleet retirement cycles. The average economic life of a commercial airplane is about 20 years. According to www.airfleets.net, an online aircraft and airline database, some of the world's largest airlines show the following fleet ages: American Airlines, 13.6 years; Southwest Airlines, 11.7 years; Delta Airlines, 16.9 years; United Airlines, 13.6 years (now merged with Continental); Lufthansa, 12.0 years; British Airways, 13.1 years; Air France, 10.3 years; and Singapore Airlines, 7.4 years. In general, US airlines currently have the oldest fleets, and hence may be next to place significant orders. In its *Current Market Outlook 2014–2033* (latest available), Boeing projects replacement aircraft will account for 42% of its growth forecast over the next 20 years, as older, less fuel-efficient airplanes are replaced with newer, more efficient ones.

Purchase contracts favor buyers

Airlines usually buy new jets under long-term contracts. Typically, the aircraft buyer pays one-third or less of the contract price up front, makes several progress payments, and then makes a relatively large balloon payment upon aircraft delivery. Although these contracts specify a fixed purchase price, they generally also include price escalation clauses tied to a labor and materials costs (using the employment cost index and the producer price index for industrial commodities). Contracts also specify delivery dates. If the aircraft manufacturer does not meet the prescribed delivery date, it usually must pay a stiff penalty.

Aircraft makers cannot recognize any revenues or profits until the aircraft is delivered. Thus, aircraft delivery delays can materially disrupt a manufacturer's earnings. The newer the aircraft program, the higher the likelihood of delays in meeting development, certification, and production schedules.

For example, first delivery of Airbus's super-jumbo A380, which took place in October 2007, was about two years later than originally scheduled, resulting in Airbus projecting significant losses on the program for some time to come. Boeing also saw delays on its new 787 jet. The 787 experienced seven delays over three years, and the original first delivery date of May 2008 slipped to an actual first delivery date of September 2011. The first delivery date of Airbus's A350-XWB aircraft, originally scheduled to enter service in late 2013, as of August 2013, had slipped to the fourth quarter of 2014.

Long-term contracts primarily benefit the buyer because these contracts effectively shift some of the financial risk to the aircraft manufacturer. If the buyer realizes that it cannot afford to take delivery of some or all of the initial order, it may elect to defer delivery, which prevents forfeiture of its deposit. In the past several years, Boeing and Airbus have experienced a significant number of deferrals on their order books, due to the economic slowdown as well as some airlines' difficulties in obtaining credit. In 2008, Boeing reported seven cancellations, and Airbus reported 122 cancellations. In 2009, Boeing reported 121 cancellations, including 83 for the new 787; and Airbus reported 40 cancellations. In 2010, Boeing reported 95 cancellations and Airbus reported 70 cancellations. In 2011, Boeing reported 116 cancellations and Airbus reported 189 cancellations. In 2012, Boeing reported 136 cancellations and Airbus reported 81 cancellations. In 2013, Boeing reported 176 cancellations, while Airbus reported 116 cancellations. Finally, year to date through September 2014, data show that Boeing had 106 cancellations, lower than the 286 cancellations for Airbus.

Original equpiment manufacturers (OEMs) have a strong incentive not to accept orders from customers that they do not believe will take timely delivery. Given that manufacturers produce each aircraft model at a set rate, they tend to think of an aircraft in terms of one of a fixed number of delivery slots in a given year. When demand is strong and all the delivery slots over a period time are full, manufacturers will consider increasing the production rate to be able to satisfy incremental demand. Given enough upfront warning of a cancellation or deferral request, manufacturers are often able to find another customer to fill that delivery slot for that particular model of aircraft. If demand is not strong enough to fill all the delivery slots for a particular model over a given timeframe, the manufacture must decide whether or not to build the aircraft for its inventory (called a "white-tail" in industry vernacular, referring to the lack of airline customer logo on the aircraft's tail) or to cut the production rate. Manufacturers are usually loath to build white-tails, as they tie up significant working capital (aircraft are very expensive assets) and pose a significant financial risk.

Development and production profile

The production of commercial aircraft is capital intensive. Aircraft makers spend heavily on research and development (R&D) and must reconfigure or retool production lines whenever management decides to build a new or derivative aircraft model. For example, according to a *BBC News* article dated June 13, 2013, Airbus's new mid-range aircraft, the A350-XWB, cost around $15 billion and take six years to develop (current estimates from Airbus are €11 billion or about US$15.8 billion). Observers estimate that A380 development costs of $26 billion (€18 billion) were about 50% more than originally projected. A TendersInfo article (May 15, 2010) noted that some analysts believe Airbus will need to deliver 500 to 600 aircraft to reach breakeven on the project. Meanwhile, as of September 2014, Airbus received 318 orders for the A380, and 143 units are still in production.

Development costs for new engines are estimated to be in the $1 billion to $2 billion range. For example, Pratt & Whitney has spent over $1 billion over 10 years developing its PW1000G geared turbofan engine.

Aircraft manufacturing involves long lead times. According to Boeing, building a commercial jet aircraft takes about a year, on average. Designing an aircraft takes about eight to 10 years for a completely new model and about five years for a derivative of an existing model. Tooling costs typically comprise one-third to one-half of total development costs. Once the production line is up and running, the company must continue to spend heavily to maintain it. Production equipment, especially tooling equipment, wears out relatively quickly and it must be replaced.

Program accounting can skew results

To allocate development costs, aircraft manufacturers typically use a method called "program accounting." This involves estimating how many planes of a particular design will be sold over the program's lifetime (broken down into smaller timeframes calling accounting blocks), and then allocating development costs to that number of planes. This accounting method is controversial, however, because the aircraft maker can change its estimates of unit volume and/or assumed profit margin during the course of the program. Such estimate changes can boost or reduce reported profits by changing the cost per plane, resulting in large one-time accounting gains or losses in the current period as past deliveries within the accounting block are trued up to the new rate. Under this form of accounting, earnings estimates tend to be highly dependent on management's best judgment. As a result, investors tend to look closely at cash flow generation over time to ensure that earnings are real.

The jet engine business

With only three main competitors—General Electric Co. (GE), Pratt & Whitney (a subsidiary of United Technologies Corp.), and Rolls-Royce plc—the commercial jet engine-making industry is an oligopoly. In addition, GE and Snecma (a subsidiary of France-based Safran Group) have a joint venture formed in 1974 called CFM International SA, which produces commercial aircraft jet engines. Pratt & Whitney, Rolls-Royce, the Japanese Aero Engine Corp., and MTU Aero Engines GmbH (Germany) also formed a joint venture in 1983, called International Aero Engines AG, which makes the V2500 engine, one of two engines used on the Airbus A320.

Historically, these companies have competed with each other for jet engine contracts from the airlines—an arrangement that led to intense price wars, prompting many observers to contend the industry could support only two engine makers. To avert ruinous price wars, the three main competitors have historically entered into exclusive supplier contracts with aircraft manufacturers. In such arrangements, the engine maker becomes the sole provider of jet engines for a specific aircraft model. For example, CFM International is the only supplier of jet engines for the Airbus A340-200/300, while Rolls-Royce is the sole contractor for the long-range version of the Airbus A340-500/600.

However, aircraft makers are offering customers a choice of two competing engines on some new-model aircraft. While Rolls-Royce will be the sole supplier of power plants for Airbus' new A350-XWB (800, 900, and 1000) models, Airbus is offering customers a choice between Rolls-Royce and General Electric engines to power the super-jumbo A380.

Similarly, Boeing's new 787 wide-body offers airlines a choice of Rolls-Royce Trent 1000 or GE's GEnx-1B engines. Airbus' re-engined A320neo will be powered by either the Pratt & Whitney PW1100G PurePower engine or the CFM International LEAP-X engine.

The big engine makers also enter into joint venture agreements to share expensive development costs. For example, GE and Pratt & Whitney jointly developed an engine for the Airbus A380. This venture competes with Rolls-Royce, which produces the Trent line of jet engines, also available on the A380.

In general, the big jet engine makers are still willing to discount engine prices heavily (sometimes at a loss), primarily to lock in lucrative long-term replacement parts, repairs, and maintenance business. Besides being highly profitable, maintenance contracts shelter the engine makers from large variations in jet engine sales by providing stable, long-term revenue and earnings streams. Because of these contracts, jet engine makers enjoy healthy profit margins. GE's aviation segment, for example, generated operating profit margins of 19.8% in 2013, making it one of GE's highest-margin businesses. Pratt & Whitney generated operating margins of 12.9% in 2013. (P&W relies much more than GE on business and regional jet engines sales.)

THE DEFENSE INDUSTRY

The military weapons-making business operates in a highly regulated environment. Everything from weapons demand to cost allocation issues is dictated by the US government. Except in times of war, demand for weaponry is driven mainly by the US military's anticipated long-term needs: the Pentagon accounts for more than 40% of global military weapons sales. Other factors include the geopolitical climate and US government budget allocations.

Strategic planning: the Quadrennial Defense Review

The US Department of Defense (DOD) attempts to anticipate defense needs several decades into the future. Under a congressionally mandated process called the Quadrennial Defense Review (QDR), the DOD conducts an extensive study every four years to examine all military risks scenarios and, based on this, it makes recommendations regarding military strategy, troop size and deployment, and weapons procurement. Congress then reviews the recommendations. The most recent QDR was released in 2014. (See the "Industry Trends" section of this *Survey* for details of the latest QDR.)

Geopolitical climate

The global geopolitical environment influences the type and quantity of weapons systems the US military demands. It also influences foreign governments' demand for American-made weapons, and US approval of such export sales.

During the Cold War, the Pentagon bought large amounts of traditional, big-ticket weapons systems in a bid to outgun the former Soviet Union's once-formidable army and navy, and its nuclear missile arsenal. However, the end of the Cold War, the rise of Islamic terrorism, and escalating conflicts in strategically sensitive regions have reduced the perceived need for big tanks, heavy artillery, and short-range manned fighters. In their place, the Pentagon is looking to increase its arsenal of unmanned, radar-evading surveillance and fighter planes, highly sophisticated information technologies, precision missiles, and agile and compact combat vehicles.

In our view, the wars in Afghanistan and Iraq have had a significant effect on defense planning. These wars emphasized counterinsurgency equipment designed to find the enemy and protect US troops from covert attacks (*e.g.*, anti–improvised explosive device technologies). In addition, the wars demonstrated the need for the military not only to win conflicts, but also to conduct peacekeeping operations and to stabilize and secure areas of conflict once the conflict has been won.

Military planners realize that nation-state threats to US interests remain, particularly from China, Iran, Russia, and North Korea. With military equipment purchased during the Cold War aging, planners see a need to replace and upgrade ships, aircraft, tanks, and so forth. In February 2007, the US Air Force's top general suggested that, due to military buildups in China, Iran, and other nations, the US faces increasingly sophisticated weapons and air defense systems at a time when our current fleet "is at a point of obsolescence vis-à-vis these emerging threats."

Defense budget process: arduous and unpredictable

Formulating the US defense budget is a complicated, circuitous, and continuous process. Every year, the DOD, the president, and Congress review a five-year defense budget. Budgetary considerations dramatically affect the type and volume of weapons procurements.

In making long-range purchase decisions for specific weapons, the government considers force requirements and budget constraints. Nevertheless, even after all involved, from the DOD to Congress, have approved final budgets, spending on specific defense programs can deviate from previous plans. Even a decision to expand or terminate a program can be reversed the following year.

A fact of life for defense contractors is that weapons purchases are not based on price and performance alone, but also on political considerations. Military contractors often purposefully spread out jobs on high-profile programs over as many states and congressional districts as possible to help ensure local congressional representatives and senators will actively support their programs. Aerospace companies maintain legions of

lobbyists in Washington and give large sums of money to political action committees. Political website OpenSecrets.org reports that Lockheed Martin spent $14.5 million in lobbying expenditures in 2013, Northrop Grumman spent $20.6 million, and United Technologies spent $13.9 million. Boeing spent $15.2 million. The site notes that, "particularly active clients often retain multiple lobbying firms, each with a team of lobbyists."

The system engenders certain noncompetitive market situations—such as a long-running program that is no longer optimal from a military standpoint, but for which funding will continue due to strong political support. A clear example of such a program is the C-17 Globemaster strategic airlifter, which received strong funding from Congress in fiscal 2010, despite a veto threat from the president and the Pentagon's avowal that it had all the C-17s that it needed. In addition, awards for new contracts are sometimes influenced by political support for a particular contractor that needs new business or by the government's desire to give a supplier enough business to ensure its viability and maintain the defense industrial base.

Two branches of government conduct defense planning. The executive branch proposes a budget, and the legislative branch enacts the final budget. The Defense Resources Board, an advisory group within the DOD, is headed by the Deputy Secretary of Defense; it includes the chairman and vice chairman of the Joint Chiefs of Staff, a member of the Office of Management and Budget (OMB), and a member of the National Security Council. The Board prepares briefings on the state of the military and describes alternatives for force structure and individual weapons programs. From these alternatives, the DOD issues its recommendations, which are then reviewed by the OMB, the Department of the Treasury, and the Council of Economic Advisors. The final defense spending request is then incorporated into the overall federal budget proposal that is submitted annually by the president to Congress, usually in February.

At this point, it is up to Congress to draft the final budget. The budget has two main components: the authorization bill, which approves future spending levels on each military program, and the appropriations bill, which sets the level of actual spending allowed per program for a given fiscal year. The appropriations bill is the more critical to defense companies and investors as little work can happen if Congress has not given permission to spend money on it.

◆ **The authorization bill.** In the legislative process, the budget committees of the House and the Senate issue budget resolutions, which set a ceiling on defense allocations. Given that ceiling, the authorization bill for the DOD budget begins in the Senate Armed Services Committee and the House National Security Committee. These two committees review the president's recommendations and hold hearings with the Joint Chiefs of Staff, as well as representatives of the Army, Navy, Marines, and Air Force. This group then sets levels of budget authority on each military program.

Subsequently, a conference committee resolves any differences between the House and Senate recommendations, after which the bill passes to the House and Senate floors for ratification. Upon ratification, the bill is presented to the president for approval. The final authorization bill shapes defense policies and programs (by providing authorization for them), and it sets ceilings on the amount of money that each service can be given in each year, though it does not provide actual funding. The authorization bill also serves as a guide for planning future spending.

◆ **The appropriations bill.** The appropriations bill provides the actual amounts of money that may be spent in a given fiscal year. The procedure for passing it is similar to that of the authorization bill. In analyzing the defense budget, it is important to distinguish between budget authority (BA) and outlays (spending). The BA approved for a given fiscal year represents the legal ability to spend funds for specific purposes. Outlays are estimates of actual cash payments to be made on current and prior-year BA.

In such budget categories as military pay, virtually all BA is spent in the year authorized. Not all funds are necessarily spent during the year in which they receive budgetary authority, though. For procurement programs, progress payments are normally spread over a number of years. Programs with long lead times, such as shipbuilding and aircraft manufacturing, have the longest lag between BA budgeting and outlays.

International markets: offsets needed to win contracts

While the US represents by far the largest defense market, international defense contracts represent an important and growing opportunity for US defense contractors, especially given the outlook for a shrinking US defense budget. In the intensely competitive overseas military weapons markets, defense contractors typically must offer "offsets" to international customers, typically governments, to boost their chances of winning big contracts. In order to win a contract from a foreign country, the defense contractor typically must build a portion of the weapons system in the buyer's country. Offsets also may involve transferring jobs or skills to build the weapons systems, or facilitating agreements to help the country export its goods.

Offsets pose operational as well as ethical and national security issues. If a defense contractor must move production to the buyer's country, operating costs could increase materially. Moreover, offsets potentially upset the normal balance of supply and demand. For example, Contractor A, despite its product's superiority, may lose out to Contractor B because the latter has provided a more attractive offset arrangement.

Proponents of offsets argue that they are worth the cost. They claim that offsets entice foreign customers to buy older-generation weapons systems, whose production lines otherwise would be shut down. (Typically, foreign countries are allowed to buy only US weapons that do not possess the latest technology or war-fighting capabilities.)

Procurement processes and contract administration are highly regulated

Strict laws and regulations govern military weapons procurement processes and contracts. The primary one is the Defense Federal Acquisition Regulations Supplement (DFARS), which regulates everything from profit controls to cost allocation and reimbursement issues. Government inspectors, auditors, and technical specialists typically oversee contract administration and cost accounting practices. Consequently, the US government has enormous sway over how much a defense contractor may earn on invested capital.

Military contracts vary

The US government drives demand in the defense industry, deciding what kinds of systems are needed and then choosing a supplier. These decisions are based on price and performance, but sometimes on political considerations. Defense contractors typically bid for business by submitting proposals for development of specific weapons programs to be funded by the DOD. The prime contractor chosen to supply a weapons system then selects subcontractors to supply various systems, components, or services.

Historically, the military contractor system has used two basic kinds of contracts: cost-reimbursement and fixed-price. The government uses primarily cost-plus contracts for development programs, since it is very difficult to estimate the actual cost of a new program, especially one that involves significant R&D.

However, DOD officials have recently indicated a desire to decrease the number of cost-plus contracts and move toward fixed-price contracts even for development work, due to their view of unnecessary cost overruns on a variety of projects and pressures from overall budget constraint. Such a move presupposes that both the military and defense contractors can provide better cost estimation than is currently done at the start of a contract. Defense contractors strongly oppose the use of fixed-price contracts for development programs.

◆ **Cost-reimbursement (cost-plus) contracts.** These contracts typically constitute reimbursement of allowable costs plus an additional fee. The defense contractor is reimbursed periodically for allowable costs based on its progress in fulfilling the contract. Cost-plus contracts fall into three categories:

- *Cost-plus fixed fee contracts* include a fixed fee regardless of the program's final costs;
- *Cost-plus incentive fee contracts* include increases or decreases in the fixed fee within a certain range, based on whether the defense contractor completes the program under or over budget;
- *Cost-plus-award-fee contracts* provide the defense contractor with an award fee based on its performance against predetermined benchmarks, at the discretion of the customer.

◆ **Fixed-price contracts.** These typically fall into one of two categories: firm and incentive contracts.

- *Firm fixed-price contracts* allow the defense contractor to benefit from cost savings it may achieve by completing the contract under budget. At the same time, the contractor accepts sole responsibility for losing money if it experiences cost overruns.

- *Fixed-price incentive contracts* allow the defense contractor to share any savings based on target costs or to share the cost of overruns that exceed targeted costs, up to a negotiated ceiling price. The defense contractor is responsible for all costs above that ceiling.

◆ **Time-and-materials contracts.** A third type of contract, called a time-and-materials contract, is used when it is not possible to estimate accurately the extent or duration of the work or to anticipate costs with any degree of confidence. Time-and-materials contracts pay contractors for labor at negotiated hourly billing rates and for certain material expenses. Such contracts include a ceiling price that the contractors exceed at their own risk.

Big defense customers, such as the US government, sometimes cut back or cancel contracts. Even relatively small reductions in contract size can have an enormous impact on the future of a particular weapons program. When the government decides to reduce funding for a program, per-unit production costs typically rise, sometimes to the point where it becomes politically or economically difficult to continue the program. This scenario is called a "death spiral."

Revenue recognition varies

Defense companies primarily use an accounting method called percentage-of-completion to recognize revenues. Under this method, a portion of revenues (and thus profits or losses) is recognized based on the proportion of contract work completed. Thus, revenue recognition is contingent on production activity, not on final delivery or cash collections.

The proportion can be calculated in several ways. One way uses engineers' estimates of the contract's degree of completion. Another method uses the ratio of costs incurred to date to the total costs that the company expects to incur over the life of the contract. Because the percentage-of-completion method relies on estimates of production time or costs, the possibility always exists that management will change its estimates, which could have a material impact on earnings. As such, investors tend to monitor defense contractor cash flow generation closely to ensure that reported earnings and free cash generation are in fact closely correlated.

Development and production profile

The development of new weapons systems often involves very long lead times. A next-generation destroyer or fighter aircraft, for example, can take 15 to 22 years to develop. Production can also stretch out for decades, depending on the number of units ordered. In addition, defense contractors typically gain long-term revenue streams from large, successful programs by providing aftermarket parts and service to the military. For example, Lockheed Martin expects to provide aftermarket services for 30 to 40 years on new F-22 tactical fighter jets, although the F-22 program was truncated to just 187 jets.

KEY INDUSTRY RATIOS AND STATISTICS

◆ **Commercial aircraft orders and backlog.** Trends in aircraft orders and backlog foreshadow production and revenue patterns. The Aerospace Industries Association (AIA), a trade group, compiles data on net orders and backlog of major commercial aircraft companies by product group. Similar data for other kinds of aircraft and military equipment are also available from the AIA.

From 2005 through 2008, The Boeing Co. and Airbus SAS received a combined total of almost 8,500 orders. This number slightly exceeded the combined orders for the two aircraft makers for the preceding 10 years, due to a surge in demand for aircraft from the Middle East, Asia, and other developing regions, as well as rising jet fuel prices that accelerated the retirement of older, inefficient aircraft. New order bookings have improved dramatically since the recent cycle low of 573 in 2009; such orders exceeded 2,200 annually in both 2011 and 2012, and totaled 3,150 in 2013. Orders reached 1,701 year to date through September 2014.

The result is that backlogs at both Boeing and Airbus are very strong. As of September 2014, Boeing and Airbus had unshipped orders of 11,459 aircraft (5,552 for Boeing and 5,907 for Airbus), or about an average combined eight years of production at current build rates. Given our view of continued economic growth and airline profitability, we expect that most of these orders will ultimately be delivered.

◆ **Airline industry profits.** The financial success of the airline industry drives new orders (or cancellations) for commercial aircraft. Airlines for America (or A4A, formerly the Air Transport Association), a trade group, compiles reports on aggregate airline industry profits and reports earnings results from major air freight carriers.

◆ **Production capacity utilization.** This measure is an important indicator in assessing aerospace manufacturers' cost structure and pricing power. These, in turn, are important determinants of profit margin and return on equity (ROE), two key profitability measures. In general, rising capacity utilization rates lead to higher profit margin and ROE; conversely, declining capacity utilization rates lead to lower profit margin and ROE. The Federal Reserve provides various production capacity statistics.

When an aerospace manufacturer operates its production facilities at rates well below capacity, each aircraft produced must absorb a higher proportion of fixed manufacturing costs. These higher per-unit costs reduce profit margin and ROE. Low utilization rates usually erode pricing power. To raise volume, many companies resort to heavy price discounting, which typically also reduces margins and ROE. As a result, declining utilization rates are most often associated with declining profitability. Very low capacity utilization rates typically predict plant closings, which can lead to big restructuring charges.

According to the latest available Federal Reserve statistics, capacity utilization for the Aerospace and Miscellaneous Transportation Equipment group was 77.3% as of August 2014, down from a high of 90.0% in November 2007, but up from an October 2008 low of 67.9%.

◆ **Air traffic forecasts.** Because the world's airlines are the civil aircraft industry's primary customer base, their air traffic forecasts constitute another important indicator for civil aircraft manufacturers. The airlines use short- and long-term air traffic forecasts to help determine whether to expand or contract fleet size. Several airline-industry trade organizations, such as the IATA and Airlines for America (A4A), provide air traffic statistics.

Boeing's *Current Market Outlook 2014–2033* (latest available) projects that worldwide air traffic and cargo traffic will grow at a compound annual growth rate (CAGR) of 5.0% and 4.7%, respectively, over the next 20 years. These growth rates are predicated on a world GDP growth assumption of 3.2% and growth of 4.2% in the number of airline passengers. As a result, Boeing sees 3.6% CAGR in the number of airplanes in service over this period. As previously mentioned, S&P thinks that the outlook for commercial aircraft sales is strong over the next 20 years, but also thinks that Boeing's projections may prove to be too optimistic. (The projections assume that 5,960 aircraft out of the current world fleet of 20,310 will be retained over the next 20 years, 14,350 will be replaced, and 20,930 additional aircraft will be needed.)

WORLDWIDE UNIT DELIVERIES OF GENERAL AVIATION AIRCRAFT

				---- TOTAL ----	
YEAR	PISTON ENGINE	TURBO-PROP	JET	UNITS	YR./YR. % CHG.
2014*	520	272	318	1,110	4.8
2013*	500	276	283	1,059	8.9
2013	933	645	678	2,256	4.3
2012	908	584	672	2,164	2.1
2011	898	526	696	2,120	5.0
2010	889	368	763	2,020	(11.4)
2009	963	446	870	2,279	(42.6)
2008	2,119	538	1,313	3,970	(7.2)
2007	2,675	465	1,136	4,276	5.5
2006	2,755	412	886	4,053	12.9
2005	2,465	375	750	3,590	21.2
2004	2,051	319	591	2,961	10.3
2003	1,896	272	518	2,686	0.3

*Data through June.
Source: General Aviation Manufacturers Association.

◆ **General aviation shipments.** The General Aviation Manufacturers Association (GAMA) compiles and publishes quarterly data on units shipped and the dollar value of shipments by general aviation manufacturers of small jets and turboprop planes. This information can be used to calculate historical growth statistics and projections.

In the first six months of 2014, worldwide factory unit shipment (and total billings) for general aviation airplanes totaled 1,110 ($10.9 billion), a 4.8% increase in units on a year-on-year basis. In 2013, worldwide factory unit shipments for general aviation airplanes totaled 2,256 planes ($23.4 billion), up 4.3% on a unit basis from 2,146 planes in 2012. In 2012, unit shipments totaled 2,164 planes ($18.9 billion), up 2.1% from 2011. For 2011, unit shipments were up 4.7% from 2010. This compares to an 11.3% drop in unit

shipments in 2010 versus 2009, but a gain of 1.2% in total billings. General-aviation planes include business jets, turboprops, and piston aircraft. At the industry's peak in 2007, manufacturers shipped 4,272 aircraft, with a total value of $21.8 billion.

S&P expects business jet deliveries to accelerate throughout 2014, as corporate profits (the key driver of business jet demand) continue to recover, corporate confidence improves, and many new and updated business jet models begin to be delivered.

◆ **US defense budget.** Every fall, the US Congress and the president finalize the annual budget for the US Department of Defense (DOD). The budget specifies planned purchase levels for each military program.

The defense budget for fiscal 2014 proposed $496 billion as a base budget, flat compared with fiscal 2013. Further, $85.2 billion in war funding, referred to as Overseas Contingency Operations (OCO) funding, is up 3.9% from the $82 billion in fiscal 2013. Fiscal 2012 figures were $530.4 billion for the base budget and $115.1 billion for OCO.

With the presence of US troops in Iraq and Afghanistan, S&P sees that there will be a likely increase in the base budget. (See the "Current Environment" and "Industry Trends" sections of this *Survey* for a more complete discussion of factors affecting the defense budget.)

HOW TO ANALYZE AN AEROSPACE & DEFENSE COMPANY

To analyze the financial health and investment prospects of an aerospace and defense company, it is important to assess the company's business fundamentals, the competitive landscape, and health and major trends of the industry in which the company competes. It is also critical to determine the company's profitability and solvency ratios, as indicated by its financial statements, in order to evaluate its financial performance relative to its own history and that of its peers.

BUSINESS FUNDAMENTALS

Analysis of an aerospace company begins with an in-depth look at markets served as well as the competitive environment it operates in.

Market profile and competitive landscape

The US defense market is dominated by a few large players and a number of much smaller competitors, with the "Big Five" defense contractors—Lockheed Martin Corp., the Boeing Co., Northrop Grumman Corp., Raytheon Co., and General Dynamics Corp.—dominating. In addition, L-3 Communications Holdings Inc., although significantly smaller than any of the Big Five, appears to be moving up the revenue ladder rapidly, although its growth has slowed in recent years in the absence of large acquisitions. We think that the defense market remains highly competitive but profitable. In addition, we see the number of large competitors as appropriate, given the size of the market and likelihood of future demand. However, given declining defense budgets in general, we think many smaller players will merge or be acquired.

The large commercial aerospace market currently consists of two major players, Boeing and Airbus SAS (a unit of European Aeronautic Defence and Space Co. NV, or EADS). Despite the market duopoly, we view competition as intense. Both Boeing and Airbus offer major airlines substantial discounts as purchase incentives and as a way to maintain brand loyalty. In a July 2012 article, *The Wall Street Journal* found that discounts on large commercial aircraft ranged from about 20% to 60% (with an average of 45%), and the *Journal* noted that "savvy buyers" are unlikely to pay more than half of the list price. Moreover, as discussed in the "Current Environment" and "Industry Trends" sections of this *Survey*, China recently launched a company that plans to build large commercial aircraft, though it will be several years before it has one ready to sell.

We also view the regional jet market, which is dominated by Canada's Bombardier Inc. and Brazil's Embraer SA, as highly competitive. Russia recently partnered with Alenia Aeronautica, a subsidiary of

Finmeccanica SpA, to sell its Superjet 100, a 75- and 95-seat passenger jet, in the West. First delivery to Aeroflot occurred in April 2011. China plans to sell its Advanced Regional Jet for the 21st century (ARJ21), a 78- to 105-seat regional jet, which is due for first delivery in April or May of 2015. In addition, Bombardier has begun development work on a 110- and 130-seat regional jet, the CSeries, which will take advantage of new engine technology and a composite airframe structure to increase fuel and emissions efficiency, and Japan's Mitsubishi is also working on its own regional jet, the MRJ. Entry into service is scheduled for the second half of 2015 for the CSeries, and the second quarter of 2017 for the MRJ.

The business jet market is also competitive. Major players include Bombardier, Gulfstream Aerospace Corp. (a division of General Dynamics), Cessna Aircraft Co. (a subsidiary of Textron Inc.), Embraer, and France's Dassault Aviation. While there remains a significant installed base of Hawker Beechcraft Corp. aircraft, the company has exited the business jet market following its emergence from bankruptcy in February 2013. New entrants include Honda Motor Co. Ltd. and a number of other makers of very light business jets, which can be flown by a single pilot.

LOOKING AT THE NUMBERS

An aerospace company's financial statements—the income statement, balance sheet, and the statement of cash flows—provide an important basis for assessing its overall performance.

Quality of revenues and earnings

Assessing the quality of revenues and earnings is important when analyzing aerospace and defense companies. In our opinion, high-quality revenue growth comes from internally generated volume expansion and price increases. Lower quality (and less predictable) revenue expansion mostly comes from acquisition-related sales volume growth, which is not internally generated. High-quality earnings consist primarily of income generated by the company's ongoing business operations. Lower-quality earnings typically include nonrecurring gains from asset sales, pension plans, and litigation, insurance, or tax-related settlements. High-quality earnings should also track free cash flow generation, as there is a high degree of program accounting used by companies in the industry so earnings can be heavily influenced by subtle changes in management estimates.

◆ **Assessing revenue growth.** It is important to identify the factors driving revenue expansion. Are revenues rising on sales volume growth from operations, or from one-time boosts related to acquisitions? If revenue growth is being driven by acquisitions, will the acquisitions enable cost reductions, and if so, will they justify the purchase price of the acquired company? Is growth in sales volume benefiting from favorable market fundamentals and management acumen, or from large price discounts?

Compound annual sales growth in the commercial aerospace industry is 6.2% over the 30 years ended in 2012. Growth was particularly strong in the mid-1980s and late 1990s and, since 2004, it has shown signs of reaccelerating, with growth of 10.3% in 2004, 10.6% in 2006, 8.4% in 2007 (though it was just 2.1% in 2005). However, sales growth turned negative in 2009 (down 10%) and 2010 (down 2%), before growing around 3% in both 2011 and 2012.

The defense industry has seen slower growth, with compound annual sales growth of 5.2% over the 30 years ended in 2012. Following the September 2001 terrorist attacks in the US, however, sales growth accelerated, with double-digit growth from 2001 through 2004. Growth rates subsequently moderated a bit—to 8.7% in 2005, 6.4% in 2006, and 9.0% in 2007—but remained above average due to continued high US troop levels in both Iraq and Afghanistan. In recent years, sales growth has slowed significantly, with growth of 6.2% in 2008, 4.3% in 2009, and 1.8% in 2010, then slowing to declines of 0.8% in 2011 and 2.8% in 2012. With slowing defense budget growth likely to continue for an extended period, S&P expects sales growth to remain low or negative for the foreseeable future.

◆ **Analysis of free cash flow.** Free cash flow represents actual cash generated by operations; capital expenditures, or costs needed to maintain the company's business operations, are excluded from this measure. While reported earnings are accounted for through an accrual method that seeks to match

expenses with the revenues they generate, cash flow is reported as it occurs and is thus more variable than reported earnings.

Nevertheless, cash flow represents a real return on invested capital, and the best businesses generate significant amounts of cash, particularly businesses that are at or near maturity and no longer need large amounts of cash for growth. Free cash flow can be used to grow the business, make acquisitions, pay down debt, repurchase shares, and/or pay dividends—activities that shareholders generally like to see.

Rapidly growing businesses sometimes have low or even negative cash flow, as heavy investments are made in inventory, plant and equipment, and other cash outlays necessary to grow the business. At some point, however, these businesses must begin generating significant positive cash flow, if they are to provide decent returns for investors.

We also use free cash flow generation as a check on the quality of earnings. Given the high degree of program accounting used in the industry, earnings are highly susceptible to changes in management estimates. Sector investors tend to pay close attention to the old street adage that "Earnings are an opinion. Cash is fact." As such, we monitor the degree to which net income is converted into free cash flow over several quarters.

◆ **Restructuring charges and asset write-downs.** Since the early 1990s, the tempo and magnitude of restructurings and asset write-downs have increased greatly. Many companies have come to believe that Wall Street overlooks "big-bath" (all-encompassing) restructurings and asset write-downs, as there seems to be a large contingent of investors who believe that the size and "nonrecurring" nature of these charges have little to do with the underlying performance of a company's earnings in a particular period. Other companies, such as General Electric Co. (GE) and United Technologies Corp., regularly offset large asset sales gains with restructuring charges and/or asset write-downs, in attempts to reduce earnings volatility.

Because the timing and size of restructurings and write-downs are often discretionary, we think that restructuring charges and asset write-downs materially reduce earnings quality. Questions arise as to whether assets were obsolete or overvalued in earlier periods, which signals that the company may have been under-depreciating the asset—and, thus, overstating reported net earnings. Questions also arise as to whether large asset write-downs overstate future earnings, especially when companies continue to operate assets that previously had been written down. Amounts charged typically can be found either in the "Management Discussion and Analysis" or in the footnotes section of a company's annual report.

Measures of financial condition

Among the useful measures of financial condition are the current ratio and the debt-to-equity ratio.

◆ **Current ratio.** This commonly used ratio helps in assessing a company's ability to service its short-term financial obligations; it is one indicator of solvency, or the ability to pay debts and meet other financial responsibilities as they come due. The current ratio is derived by dividing current assets by current liabilities. Current assets are those that can be readily converted into cash or used up in the course of a firm's operating cycle (typically one year). Current liabilities generally encompass short-term debt, accounts payable, and other short-term obligations.

A ratio above 1.0 is viewed as a positive; the higher the current ratio, the better the company is able to service its short-term obligations. A good practice is to compare a company's present current ratio with its historic ratio, to make sure that the present ratio is not abnormally low.

The average aerospace industry current ratio from 1982 to 2012 was 2.0X. Larger companies tend to have lower current ratios, since they generate much more cash from operations and therefore do not need to maintain as large a working capital cushion. For example, United Technologies Corp.'s average over the same period was 1.3X, while small-cap aerospace parts maker Heico Corp.'s average was 3.8X.

The defense industry's average current ratio from 1982 to 2012 was 1.9X. Again, larger companies tend to have lower ratios: Northrop Grumman's average was 1.1X and Lockheed Martin's was 1.2X, versus 2.4X for small-cap defense contractor DRS Technologies Inc. (DRS was acquired by Finmeccanica SpA in 2008.)

◆ **Debt-to-equity ratio.** This ratio, used to assess a company's financial strength and flexibility, is based on the level of debt relative to total equity. The ratio is calculated by dividing long-term debt (including lease obligations) by total equity. A high debt-to-equity ratio would indicate that a company is highly leveraged and thus generally more vulnerable to economic downturns, when interest and debt payments might take up a significant portion of income.

The average debt-to-equity ratio for the aerospace industry from 1982 to 2012 was about 90%, but the ratio has varied widely, with lows below 30% and highs well above 100%. Low-debt, large-cap companies include Parker Hannifin Corp., with a ratio of 31% in 2011, and Precision Castparts Corp. (37%). Companies such as GE (254%) and Boeing (153%) have high debt-to-equity ratios due to their financing arms, which use debt as part of their operations. Smaller-cap companies may take on significant amounts of debt to grow their businesses. However, some smaller companies, such as Heico (21%), maintain very low debt ratios in order to minimize financial risk to their businesses.

The defense industry has a 30-year average debt-to-equity ratio of about 60%, but this ratio has varied widely, with lows around 20% and highs around 100%. Larger-capitalization names such Northrop Grumman (43%) and Raytheon (30%) have tended to maintain more conservative leverage metrics than smaller-cap companies such Alliant TechSystems (149%) and DRS Technologies (94%).

Measures of profitability

Among the useful profitability measures are operating and net profit margins, return on equity (ROE), and return on assets (ROA).

◆ **Operating margins.** These ratios measure a company's profits as a percentage of revenues; the higher the ratio, the greater the company's profitability. Operating profit margins are derived by dividing operating income (which excludes interest, taxes, special gains and charges, and non-operating income) by total revenues. Net profit margins are calculated by dividing net income by total revenues.

From 1982 through 2012, operating profit margin for the aerospace industry averaged 11.8%. Aerospace operating margin rose to a peak of 15.1% in 2007, but fell to 11.8% in 2009, still above the long-term average. Operating margins averaged 14.3% in 2012, flat with 2011 and up from 13.1% in 2010. Aerospace companies with the highest operating margins in 2012 included Precision Castparts (25.9%), Heico (19.4%), and GE (18.9%).

Defense industry operating margins are significantly lower than in aerospace, averaging 7.5% over the past 30 years. Average operating margins rose to an all-time high for the industry in 2007 and 2008, at 12.4%. We note that the seven years from 2004 to 2010 were the most profitable in history for defense contractors, as a result of the significant investments these companies made in productivity and efficiency, as well as strong defense budgets, in our opinion. Defense companies with the highest operating margins in 2012 included Harris Corp. (18.3%), Northrop Grumman (12.4%), and Raytheon (12.4%). In 2014, we expect operating margins for defense companies to remain relatively stable with 2013 levels as management teams focus on managing profitability amid shrinking US defense sales.

◆ **ROE and ROA.** These measures reveal how profitably a company manages its capital investments. ROE, which measures the rate of return on common shareholders' equity, is calculated by dividing net income (less preferred stock dividends) by average common shareholders' equity. ROA, a measure that compares net income to assets, independent of the company's debt leverage, is calculated by dividing net income by total assets.

The aerospace and defense industry recorded average ROE of 12% over the past 30 years. In 2013, average ROE was 15.5%, down from 17.4% in 2012 and 16.8% in 2011. Companies with the highest ROE were Lockheed Martin Corp. (119.0%), Boeing Co. (44.2%), and Rockwell Collins Inc. (43.9%). ROA in the aerospace industry averaged 5.1% from 1982 to 2012; ROA was 4.3% in 2013, flat with 2012 and 2011. Companies with the highest ROAs were Taser International, Inc. (13.8%), Gencorp Inc. (12.5%), and Rockwell Collins (11.8%).

EQUITY VALUATION

Aerospace and defense stocks generally have quite different profitability and growth profiles and, therefore, trade at significantly different earnings multiples. Investors typically use price-to-earnings (P/E) multiples in valuing stocks, and we also use this metric as our primary valuation tool. We also use enterprise value (EV)–to-EBITDA (earnings before interest, taxes, depreciation, and amortization) multiples as a check and, in some cases, as a primary valuation metric in valuing aerospace and defense issues, as these measures exclude the effects of below-the–operating line items and taxes and thus make earnings more comparable across companies.

Valuation multiples of aerospace supplier companies have historically tended to be tied to the commercial aerospace cycle. Since 2000, forward P/E multiples have tended to move in a range of between 16x and 18x forward earnings in the expansion part of the cycle, while in down cycles multiples have tended to fall to a range between 6x and 8x forward earnings expectations.

Defense sector P/E multiples tend to be tied to investors' outlook for defense spending. Since 2000, multiples have ranged from between 20x, shortly after 9/11, to a low of around 8x in late 2011 amid shrinking overseas commitments and investors' mounting concerns about the future health of defense spending. ■

GLOSSARY

A, B, C, and D checks—The various levels of aircraft maintenance inspections. "A check" is the most cursory; "D check" is the most extensive.

Attack aircraft—A tactical aircraft designed to intercept and destroy enemy aircraft and/or missiles.

Avionics—A contraction of "aviation electronics" that refers to a wide variety of cockpit instruments: communications equipment (radio and data links); sensor systems (radar, infrared devices, and signal-relay equipment); computer displays, processors, and data recorders; navigation equipment; and flight management systems (fuel indicators, engine controls, and flight management software).

Ballistic missile—A missile without guidance or propulsion systems that follows a free trajectory after being fired.

Bomber—A military aircraft designed to carry and release large bombs at high altitudes.

Booster—A motor that aids the normal propulsion system of a rocket or vehicle in some phase of flight, as in a launch vehicle.

Budget authority—Legal right given to a governmental agency (*e.g.*, the US Department of Defense) to expend specified funds allocated by Congress.

Budget outlays—Funds that a governmental agency (*e.g.*, the Department of Defense) actually spends in a given year. Funds come from three sources: new budget authority, budget authority left over from a prior year, and another agency's unspent funds from a prior year that were transferred to the agency.

Buy-in—A process used by various branches of the US military whereby the services understate the ultimate cost of a weapons program in order to win initial congressional support for the project.

Cruise missile—A long-range, jet-propelled, electronically guided submarine-, aircraft- or sea-launched missile that is capable of operating at very low altitudes.

Downselect—Term describing the Pentagon's choice of a weapons systems proposal from among a pool of designs submitted by defense contractors.

Electronic warfare—The use of electromagnetic energy to infiltrate, control, and/or disable an enemy's electronic systems (including electronically guided missiles, air defense systems, command and control networks, etc.) and to protect one's own electronic systems.

Fighter aircraft—A military jet designed primarily to engage in air-to-air combat.

Fuselage—The central structure of an aircraft, which houses crew, passengers, and/or cargo.

Geosynchronous Earth Orbit (GEO) satellite—A satellite that orbits 22,300 miles above the equator, which allows the satellite to travel at a speed matching that of Earth's rotation and thus to maintain a constant relation to a fixed point on Earth.

Green deliveries—Aircraft delivered to a customer in some degree of completion short of a finished aircraft. Usually, green deliveries lack a final coat of paint (and may be painted green) and have unfinished interiors.

Guided missile—A missile directed by electronic signals or other means.

Information warfare—Computer tactics and devices used for offensive purposes (such as the disruption of an enemy's computer and telephone networks) or defensive purposes (such as the protection of one's own networks). Offensive devices include computer viruses; defensive devices include firewalls that deny outsiders access to networks.

Jet engine—An engine in which air is taken from the outside, compressed, heated (via fuel combustion), expanded in a jet or a turbine, and expelled from the jet at a much higher velocity than the intake velocity, which creates propulsive thrust.

Launch vehicle—An assembly of booster engines and guidance and control systems, used to launch spacecraft into outer space.

Low Earth Orbit (LEO) satellite—A satellite that orbits between 500 and 1,500 miles above the Earth's surface.

Narrow-body—A passenger jet with one aisle in its cabin.

Network-centric warfare—A method of combat that uses processed information (via centralized satellite and ground station networks) to coordinate and implement military strategy.

Nuclear weapons—Weapons of mass destruction (*e.g.,* atomic bombs and hydrogen bombs) powered by nuclear fission or fusion that produce enormous radiation-emitting explosions. Tactical nuclear weapons can have the power of a fraction of a kiloton of TNT; strategic weapons can produce thousands of kilotons of force.

Piston engine—An internal combustion engine in which thermal energy is released when fuel is burned and converted into mechanical energy. A combustible mixture is compressed in a cylinder and ignited, thrusting down a piston that imparts a rotary motion to a crankshaft.

Radar—A contraction of "radio detection and ranging"; a method for the detection and tracking of objects by emitting radio waves and timing the return of reflected waves.

Range—The distance an aircraft can travel before needing to refuel.

Reconnaissance aircraft—An aircraft equipped for photographic and/or electronic reconnaissance missions, to seek out information about an enemy's position, installations, etc.

Residual-value guarantee—Pledge by an aircraft manufacturer to pay the difference between an aircraft's agreed-upon resale price and its market price when the customer (an airline) decides to dispose of it.

Rocket engine—An engine that can operate outside of the Earth's atmosphere, because it carries with it all substances necessary for combustion, including oxygen.

Rotor—An assembly of rotating airfoils (or rotor blades) attached to a hub that generates air velocity as it turns; used on helicopters to lift and propel the aircraft and in turbine engines to generate power.

Satellite—An unmanned Earth-orbiting spacecraft that relays communications, video, or data signals to other satellites or terrestrial dish antennas. Its transponder responds to, amplifies, and transmits Earth- or satellite-based signals. The transponder's signal-relaying function is the heart of a communications satellite.

Sensors—Electronic equipment, such as radar, that can detect the presence of airborne, land-based, and sea-based objects.

Space-based infrared system (SBIRS)—A proposed constellation of military satellites that would detect and track incoming enemy missiles.

Standoff weapon—A weapons system with the capability of striking enemy targets, without placing its operator in harm's way.

Stealth—The ability of aircraft, marine vessels, or other military hardware to evade radar detection, primarily using electronic systems, special materials, and/or aerodynamic shapes.

Tactical mission—A military action designed to have an immediate effect in a conflict situation, as opposed to a long-term strategic mission.

Thrust reverser—A jet engine component used to slow an aircraft by changing the direction of the engine's power (or thrust).

Transport—A commercial or military aircraft designed principally for the movement of people and/or cargo.

Turboprop—A gas turbine engine that employs a portion of its drive to rotate a propeller; also, an aircraft with such an engine.

White-tails—Commercial jets with tails that have not yet been painted with the airline's logo. They are new planes that have not been delivered to the customer, usually due to the latter's financial problems.

Wide-body—A passenger jet with two aisles in its cabin. ■

INDUSTRY REFERENCES

PERIODICALS

Aerospace Daily
Aviation Week & Space Technology
http://www.aviationweek.com
The first is a daily newsletter on the aerospace and defense industries; the second provides comprehensive weekly coverage of the aviation, defense, and space industries.

Current Market Outlook
http://www.boeing.com/commercial/cmo
Annual; provides Boeing's long-range air traffic and commercial aircraft market forecasts.

Defense News
http://www.defensenews.com
Weekly; covers developments in the defense industry.

The Military Balance
http://www.iiss.org
Annual from the International Institute for Strategic Studies; provides analysis and data on global defense capabilities, trends, and economics.

Overhaul & Maintenance
http://www.aviationweek.com
Ten times a year; covers the maintenance, repair, and overhaul (MRO) business for executives in the large- and small-passenger, corporate, and military aircraft sectors.

Report of the Quadrennial Defense Review
http://www.defense.gov/home/features/2014/0314_sdr/qdr.aspx
Every four years from the US DOD; projects long-term military threats and outlines US military strategies and objectives needed to counter them; projects force size and types of weapons systems required to carry out strategies and objectives.

TRADE ASSOCIATIONS

Aerospace Industries Association (AIA)
http://www.aia-aerospace.org
Represents the nation's major manufacturers of aircraft, aircraft engines, missiles, spacecraft, and related components and equipment. Releases numerous statistical series, including industry financial results, employment, imports/exports, and backlogs. The "Statistics/Additional Resources" page has a comprehensive list of links to other aerospace research and web sites.

Airlines for America (A4A)
http://www.airlines.org
Trade organization for the principal US airlines (formerly called the Air Transport Association); publishes statistics on airline traffic, revenues, costs, and capacity.

General Aviation Manufacturers Association (GAMA)
http://www.gama.aero
Represents more than 50 manufacturers of fixed-wing aircraft, engines, avionics, and components; compiles and publishes quarterly statistics on US general aviation manufacturers' shipments.

International Air Transport Association (IATA)
http://www.iata.org
Trade association of the world's largest airlines; publishes statistics on the global airline industry.

National Business Aviation Association Inc. (NBAA)
http://www.nbaa.org
Represents more than 8,000 companies that provide business aviation services; compiles statistics on business aircraft users.

Regional Airline Association (RAA)
http://www.raa.org
Represents US regional airlines and their suppliers; publishes an annual report on the industry's participants and fleet composition.

RESEARCH FIRMS

Center for Strategic and Budgetary Assessments
http://www.csbaonline.org
Nonprofit institute specializing in military planning and funding strategies.

The International Institute for Strategic Studies
http://www.iiss.org
Nonprofit institute specializing in military planning and funding strategies.

JETNET
http://www.jetnet.com
Business and commercial aircraft intelligence and data services.

OAG Aviation Solutions
http://www.oag.com
Civil aviation research and consulting; provides strategic and technical consulting, and data information services.

Seabury Airline Planning Group (APG)
http://www.seaburyapg.com
Full-service aviation consulting firm, specializing in network planning and fleet planning issues.

Teal Group
http://www.tealgroup.com
Aerospace and defense market analysis.

Walsh Aviation
http://www.walshaviation.com
Commercial aircraft forecasting.

REGULATORY AND GOVERNMENT AGENCIES

Federal Aviation Administration (FAA)
http://www.faa.gov
Federal agency that is part of the Department of Transportation; monitors the commercial and general aviation industries and designs regulations governing aviation safety.

National Aeronautics and Space Administration (NASA)
http://www.nasa.gov
Government agency that administers US government space programs.

Office of Management & Budget (OMB)
http://www.whitehouse.gov/omb
A division of the US executive branch that assists the president in preparing the federal budget; oversees and coordinates administrative procurement, financial management, information, and regulatory policies.

US Department of Defense (DOD)
http://www.defense.gov
A division of the US executive branch in charge of planning defense forces and overseeing military operations; compiles annual DOD budget information and discussion of military programs and structure of US military forces.

US Department of Transportation (DOT)
http://www.dot.gov
Regulates transportation in the United States; publishes monthly air carrier traffic statistics and quarterly information on air carrier financial results and space launches.

COMPARATIVE COMPANY ANALYSIS

Operating Revenues

Ticker		Company	Yr. End	Million $ 2013	2012	2011	2010	2009	2008	2003	CAGR (%) 10-Yr.	5-Yr.	1-Yr.	Index Basis (2003 = 100) 2013	2012	2011	2010	2009
AEROSPACE / DEFENSE‡																		
AIR	§	AAR CORP	# MAY	NA	2,167.1	2,074.5 A,C	1,775.8 D	1,352.2 A	1,424.0	652.0	NA	NA	NA	NA	332	318	272	207
AVAV	§	AEROVIRONMENT INC	# APR	NA	240.2	325.0	292.5	249.5	247.7	NA	NA	NA	NA	**	**	**	**	NA
ATK	†	ALLIANT TECHSYSTEMS INC	# MAR	NA	4,362.1	4,595.4	4,842.3	4,807.7	4,583.2	2,366.2 A	NA	NA	NA	NA	184	194	205	203
ASEI	§	AMERICAN SCIENCE ENGINEERING	# MAR	NA	186.7	203.6	278.6	242.1	218.4	76.3	NA	NA	NA	NA	245	267	365	317
BEAV	†	B/E AEROSPACE INC	DEC	3,483.7	3,085.3 A	2,499.8	1,984.2 A	1,937.7	2,110.0 A	624.4	18.8	10.5	12.9	558	494	400	318	310
BA	[]	BOEING CO	DEC	86,623.0	81,698.0	68,735.0	64,306.0 A	68,281.0 A	60,909.0	50,485.0	5.5	7.3	6.0	172	162	136	127	135
CUB	§	CUBIC CORP	SEP	1,360.7 A	1,381.5	1,285.2 A	1,194.2 C	1,016.7	881.1 A	634.1 A	7.9	9.1	(1.5)	215	218	203	188	160
CW	§	CURTISS-WRIGHT CORP	DEC	2,510.8 A	2,097.7 A,C	2,054.1 A	1,893.1 A	1,809.7 A	1,830.1 A	746.1 A	12.9	6.5	19.7	337	281	275	254	243
EGL	§	ENGILITY HOLDINGS INC	DEC	1,407.4	1,655.3 D	2,180.0	2,521.0	NA	NA	NA	NA	NA	(15.0)	**	**	**	**	NA
ESL	†	ESTERLINE TECHNOLOGIES CORP	OCT	1,969.8	1,992.3	1,718.0 A	1,526.6 D	1,425.4 A	1,483.2 D	562.5	13.4	5.8	(1.1)	350	354	305	271	253
XLS	†	EXELIS INC	DEC	4,816.0	5,522.0	5,839.0	5,891.0 D	NA	NA	NA	NA	NA	(12.8)	**	**	**	**	NA
GY	§	GENCORP INC	NOV	1,383.1 A	994.9	918.1	857.9	795.4	742.3	1,192.0	1.5	13.3	39.0	116	83	77	72	67
GD	[]	GENERAL DYNAMICS CORP	DEC	31,218.0	31,682.0 A	32,677.0 A	32,466.0 A	31,981.0 A	29,300.0 A	16,617.0 A,C	6.5	1.3	(1.5)	188	191	197	195	192
HON	[]	HONEYWELL INTERNATIONAL INC	DEC	39,055.0	37,665.0	36,529.0 D	33,370.0	30,908.0	36,556.0	23,103.0	5.4	1.3	3.7	169	163	158	144	134
HII	†	HUNTINGTON INGALLS IND INC	DEC	6,820.0	6,708.0	6,575.0	6,723.0	6,292.0	NA	NA	NA	NA	1.7	**	**	**	**	NA
LLL	[]	L-3 COMMUNICATIONS HLDGS INC	DEC	12,629.0 A	13,146.0 A,C	15,169.0	15,680.0 A	15,615.0 A	14,901.0 A	5,061.6 A	9.6	(3.3)	(3.9)	250	260	300	310	308
LMT	[]	LOCKHEED MARTIN CORP	DEC	45,358.0 A	47,182.0 A	46,499.0 A,C	45,803.0 D	45,189.0	42,731.0	31,824.0 A	3.6	1.2	(3.9)	143	148	146	144	142
MOG.A	§	MOOG INC -CL A	SEP	2,610.3 A	2,469.5 A	2,330.7 A	2,114.3 A	1,848.9 A	1,902.7 A	755.5	13.2	6.5	5.7	346	327	308	280	245
NPK	§	NATIONAL PRESTO INDS INC	DEC	NA	472.5	431.0	479.0	478.5	448.2	133.8 A	NA	NA	NA	NA	353	322	358	358
NOC	[]	NORTHROP GRUMMAN CORP	DEC	24,661.0	25,218.0	26,412.0 D	34,757.0	33,755.0 D	33,887.0 D	26,206.0 D	(0.6)	(6.2)	(2.2)	94	96	101	133	129
ORB	§	ORBITAL SCIENCES CORP	DEC	1,365.3	1,436.8	1,345.9	1,294.6 A	1,125.3	1,168.6 D	581.5	8.9	3.2	(5.0)	235	247	231	223	194
PCP	[]	PRECISION CASTPARTS CORP	# MAR	NA	8,377.8 A,C	7,214.6 D	6,220.1 D	5,486.6 D	6,827.9 D	2,174.7 A,C	NA	NA	NA	NA	385	332	286	252
RTN	[]	RAYTHEON CO	DEC	23,706.0	24,414.0 D	24,857.0	25,499.0	24,881.0	23,174.0	18,109.0 D	2.7	0.5	(2.9)	131	135	137	141	137
COL	[]	ROCKWELL COLLINS INC	SEP	4,613.0	4,730.0	4,808.0 D	4,673.0 A	4,477.0 A	4,780.0	2,551.0	6.1	(0.7)	(2.5)	181	185	188	183	175
TASR	§	TASER INTERNATIONAL INC	DEC	137.8	114.8	90.0	86.9	104.3	92.8	24.5	18.9	8.2	20.1	564	469	368	355	426
TDY	§	TELEDYNE TECHNOLOGIES INC	DEC	2,338.6 A	2,127.3 A	1,941.9 A	1,644.2 A,C	1,765.2	1,893.0 A	840.7 A	10.8	4.3	9.9	278	253	231	196	210
TXT	[]	TEXTRON INC	DEC	12,104.0 F	12,237.0 F	11,275.0 F	10,525.0 F	10,500.0 D,F	14,246.0 D,F	9,859.0 D,F	2.1	(3.2)	(1.1)	123	124	114	107	107
TGI	†	TRIUMPH GROUP INC	# MAR	NA	3,702.7 A	3,407.9	2,905.3 A	1,294.8 A	1,240.4 A	608.3 A	NA	NA	NA	NA	609	560	478	213
UTX	[]	UNITED TECHNOLOGIES CORP	DEC	62,626.0	57,708.0 A,C	58,190.0	54,326.0	52,827.0 C,F	58,518.0 A,F	31,059.0 A,F	7.3	1.4	8.5	202	186	187	175	170
OTHER COMPANIES WITH SIGNIFICANT AEROSPACE / DEFENSE OPERATIONS																		
BBD.B		BOMBARDIER INC -CL B	DEC	19,307.2	16,697.6	18,655.2 H	17,747.4	20,628.7	24,385.0	21,321.0 D	(1.0)	(4.6)	15.6	91	78	87	83	97
CAE		CAE INC	# MAR	NA	2,068.5 A	1,823.0 A,C	1,676.4 A	1,502.9 A	1,318.6 A	834.5	NA	NA	NA	NA	248	218	201	180
ERJ		EMBRAER SA -ADR	DEC	6,235.0	6,177.9	5,803.0 A	5,364.1	5,466.3	6,335.2	2,143.5	11.3	(0.3)	0.9	291	288	271	250	255
GE	[]	GENERAL ELECTRIC CO	DEC	142,937.0 D,F	144,796.0 D,F	141,547.0 D,F	149,060.0 D,F	155,777.0 F	180,929.0 A,F	133,585.0 F	0.7	(4.6)	(1.3)	107	108	106	112	117
HRS	[]	HARRIS CORP	JUN	5,111.7	5,451.3 D	5,924.6 A	5,206.1	5,005.0 A,C	5,311.0	2,092.7	9.3	(0.8)	(6.2)	244	260	283	249	239
HEI		HEICO CORP	OCT	1,008.8 A	897.3 A	764.9	617.0 A	538.3	582.3	176.5	19.0	11.6	12.4	572	509	433	350	305
HXL		HEXCEL CORP	DEC	1,678.2	1,578.2	1,392.4	1,173.6	1,108.3	1,324.9	896.9	6.5	4.8	6.3	187	176	155	131	124
SPR		SPIRIT AEROSYSTEMS HOLDINGS	DEC	5,961.0	5,397.7	4,863.8	4,172.4	4,078.5	3,771.8	NA	NA	9.6	10.4	**	**	**	**	NA
TDG		TRANSDIGM GROUP INC	SEP	1,924.4	1,700.2	1,206.0 A,C	827.7	761.6	713.7	293.3 A	20.7	21.9	13.2	656	580	411	282	260

Note: Data as originally reported. CAGR-Compound annual growth rate. ‡S&P 1500 index group. []Company included in the S&P 500. †Company included in the S&P MidCap 400. §Company included in the S&P SmallCap 600. #Of the following calendar year. **Not calculated; data for base year or end year not available. A - This year's data reflect an acquisition or merger. B - This year's data reflect a major merger resulting in the formation of a new company. C - This year's data reflect an accounting change. D - Data exclude discontinued operations. E - Includes excise taxes. F - Includes other (nonoperating) income. G - Includes sale of leased depts. H - Some or all data are not available, due to a fiscal year change.

Net Income

Ticker		Company	Yr. End	Million $ 2013	2012	2011	2010	2009	2008	2003	CAGR (%) 10-Yr.	5-Yr.	1-Yr.	Index Basis (2003 = 100) 2013	2012	2011	2010	2009
ATK																		
AIR	§	AAR CORP	# MAY	NA	55.0	67.7	73.1	44.6	80.6	3.5	NA	NA	NA	**	1,570	1,933	2,087	1,274
AVAV	§	AEROVIRONMENT INC	# APR	NA	10.4	30.5	25.9	20.7	24.2	NA	NA	NA	NA	**	**	**	**	NA
ATK	†	ALLIANT TECHSYSTEMS INC	# MAR	NA	271.8	262.6	313.2	278.7	155.1	162.3	NA	NA	NA	**	167	162	193	172
ASEI	§	AMERICAN SCIENCE ENGINEERING	# MAR	NA	17.5	21.4	42.8	36.2	28.4	1.9	NA	NA	NA	**	913	1,121	2,241	1,893
BEAV	†	B/E AEROSPACE INC	DEC	365.6	233.7	227.8	143.3	142.0	(99.4)	(53.5)	NM	NM	56.4	NM	NM	NM	NM	NM
BA	[]	BOEING CO	DEC	4,586.0	3,903.0	4,011.0	3,311.0	1,335.0	2,654.0	718.0	20.4	11.6	17.5	639	544	559	461	186
CUB	§	CUBIC CORP	SEP	19.8	91.9	84.8	70.6	55.7	36.9	36.5	(5.9)	(11.7)	(78.5)	54	252	232	193	152
CW	§	CURTISS-WRIGHT CORP	DEC	138.0	92.3	130.4	106.6	95.2	109.4	52.3	10.2	4.8	49.5	264	177	250	204	182
EGL	§	ENGILITY HOLDINGS INC	DEC	49.5	(349.7)	26.0	(9.0)	NA	NA	NA	NA	NA	NM	**	**	**	**	NA
ESL	†	ESTERLINE TECHNOLOGIES CORP	OCT	166.0	112.5	133.1	130.0	107.2	113.5	29.7	18.8	7.9	47.5	558	378	447	437	360
XLS	†	EXELIS INC	DEC	281.0	330.0	326.0	448.0	NA	NA	NA	NA	NA	(14.8)	**	**	**	**	NA
GY	§	GENCORP INC	NOV	167.7	(5.7)	2.9	6.0	66.0	1.6	22.0	22.5	153.6	NM	762	(26)	13	27	300
GD	[]	GENERAL DYNAMICS CORP	DEC	2,486.0	(332.0)	2,552.0	2,628.0	2,407.0	2,478.0	997.0	9.6	0.1	NM	249	(33)	256	264	241
HON	[]	HONEYWELL INTERNATIONAL INC	DEC	3,924.0	2,926.0	1,858.0	2,022.0	2,153.0	2,792.0	1,344.0	11.3	7.0	34.1	292	218	138	150	160
HII	†	HUNTINGTON INGALLS IND INC	DEC	261.0	146.0	(94.0)	135.0	124.0	NA	NA	NA	NA	78.8	**	**	**	**	NA
LLL	[]	L-3 COMMUNICATIONS HLDGS INC	DEC	778.0	782.0	956.0	955.0	901.0	929.0	277.6	10.9	(3.5)	(0.5)	280	282	344	344	325
LMT	[]	LOCKHEED MARTIN CORP	DEC	2,950.0	2,745.0	2,667.0	2,645.0	3,024.0	3,217.0	1,053.0	10.9	(1.7)	7.5	280	261	253	251	287
MOG.A	§	MOOG INC -CL A	SEP	120.5	152.5	136.0	108.1	85.0	119.1	42.7	10.9	0.2	(21.0)	282	357	319	253	199
NPK	§	NATIONAL PRESTO INDS INC	DEC	NA	38.9	48.0	63.5	62.6	44.2	15.5	NA	NA	NA	**	251	310	410	404
NOC	[]	NORTHROP GRUMMAN CORP	DEC	1,952.0	1,978.0	2,086.0	2,038.0	1,573.0	(1,281.0)	808.0	9.2	NM	(1.3)	242	245	258	252	195
ORB	§	ORBITAL SCIENCES CORP	DEC	68.4	61.0	67.4	47.5	36.6	45.3	20.2	12.9	8.6	12.1	338	301	333	235	181
PCP	[]	PRECISION CASTPARTS CORP	# MAR	NA	1,432.0	1,230.5	1,009.4	924.3	1,038.1	135.5	NA	NA	NA	**	1,057	908	745	682
RTN	[]	RAYTHEON CO	DEC	1,932.0	1,889.0	1,867.0	1,804.0	1,936.0	1,674.0	535.0	13.7	2.9	2.3	361	353	349	337	362
COL	[]	ROCKWELL COLLINS INC	SEP	632.0	609.0	615.0	561.0	594.0	678.0	258.0	9.4	(1.4)	3.8	245	236	238	217	230
TASR	§	TASER INTERNATIONAL INC	DEC	18.2	14.7	(7.0)	(4.4)	NA	3.6	4.5	15.1	38.1	23.8	410	331	(158)	(98)	NA
TDY	§	TELEDYNE TECHNOLOGIES INC	DEC	185.0	161.8	142.1	119.9	113.3	111.3	29.7	20.1	10.7	14.3	623	545	478	404	381
TXT	[]	TEXTRON INC	DEC	498.0	581.0	242.0	92.0	(73.0)	344.0	281.0	5.9	7.7	(14.3)	177	207	86	33	(26)
TGI	†	TRIUMPH GROUP INC	# MAR	NA	297.3	281.6	152.4	85.3	97.8	19.4	NA	NA	NA	**	1,532	1,451	785	439
UTX	[]	UNITED TECHNOLOGIES CORP	DEC	5,686.0	4,840.0	4,979.0	4,373.0	3,829.0	4,689.0	2,361.0	9.2	3.9	17.5	241	205	211	185	162
OTHER COMPANIES WITH SIGNIFICANT AEROSPACE / DEFENSE OPERATIONS																		
BBD.B		BOMBARDIER INC -CL B	DEC	599.9	585.5	851.1	756.5	743.5	1,246.4	(195.0)	NM	(13.6)	2.5	NM	NM	NM	NM	NM
CAE		CAE INC	# MAR	NA	137.0	180.5	174.7	142.3	159.1	51.2	NA	NA	NA	**	267	352	341	278
ERJ		EMBRAER SA -ADR	DEC	342.0	347.8	111.6	330.2	248.5	388.7	136.0	9.7	(2.5)	(1.7)	251	256	82	243	183
GE	[]	GENERAL ELECTRIC CO	DEC	15,177.0	14,679.0	14,074.0	12,623.0	11,218.0	18,089.0	15,589.0	(0.3)	(3.4)	3.4	97	94	90	81	72
HRS	[]	HARRIS CORP	JUN	466.4	558.7	588.0	561.6	312.4	444.2	59.5	22.9	1.0	(16.5)	784	939	988	944	525
HEI		HEICO CORP	OCT	102.4	85.1	72.8	54.9	44.6	48.5	12.2	23.7	16.1	20.3	838	697	596	450	365
HXL		HEXCEL CORP	DEC	187.9	164.3	135.5	77.4	56.3	111.2	(11.1)	NM	11.1	14.4	NM	NM	NM	NM	NM
SPR		SPIRIT AEROSYSTEMS HOLDINGS	DEC	(621.4)	34.8	192.4	218.9	191.7	265.4	NA	NA	NM	NM	**	**	**	**	NA
TDG		TRANSDIGM GROUP INC	SEP	302.8	325.0	152.2	163.4	162.9	133.1	(72.8)	NM	17.9	(6.8)	NM	NM	NM	NM	NM

Note: Data as originally reported. CAGR-Compound annual growth rate. ‡S&P 1500 index group. []Company included in the S&P 500. †Company included in the S&P MidCap 400. §Company included in the S&P SmallCap 600.
#Of the following calendar year. **Not calculated; data for base year or end year not available.

Ticker		Company	Yr. End	Return on Revenues (%)					Return on Assets (%)					Return on Equity (%)				
				2013	2012	2011	2010	2009	2013	2012	2011	2010	2009	2013	2012	2011	2010	2009
AEROSPACE / DEFENSE‡																		
AIR	§	AAR CORP	# MAY	NA	2.5	3.3	4.1	3.3	NA	2.5	3.5	4.6	3.1	NA	6.2	8.0	9.2	6.4
AVAV	§	AEROVIRONMENT INC	# APR	NA	4.3	9.4	8.9	8.3	NA	2.8	8.7	8.4	7.7	NA	3.4	10.8	10.4	9.4
ATK	†	ALLIANT TECHSYSTEMS INC	# MAR	NA	6.2	5.7	6.5	5.8	NA	6.1	5.8	7.5	7.5	NA	19.9	22.0	32.0	39.4
ASEI	§	AMERICAN SCIENCE ENGINEERING	# MAR	NA	9.3	10.5	15.4	14.9	NA	5.8	6.5	13.5	12.7	NA	7.5	8.2	17.6	17.9
BEAV	†	B/E AEROSPACE INC	DEC	10.5	7.6	9.1	7.2	7.3	6.8	5.2	6.3	4.6	4.9	15.3	11.5	13.1	9.4	10.5
BA	[]	BOEING CO	DEC	5.3	4.8	5.8	5.1	2.0	5.1	4.6	5.4	5.1	2.3	44.2	83.2	127.7	135.3	320.1
CUB	§	CUBIC CORP	SEP	1.5	6.7	6.6	5.9	5.5	1.9	9.3	9.3	8.8	8.0	2.9	15.0	16.3	15.5	13.8
CW	§	CURTISS-WRIGHT CORP	DEC	5.5	4.4	6.3	5.6	5.3	4.2	3.2	5.3	4.9	4.6	9.6	7.3	10.9	9.7	10.1
EGL	§	ENGILITY HOLDINGS INC	DEC	3.5	NM	1.2	NM	NA	5.1	NM	1.6	NA	NA	12.3	NM	2.3	NA	NA
ESL	†	ESTERLINE TECHNOLOGIES CORP	OCT	8.4	5.6	7.7	8.5	7.5	5.1	3.4	4.5	5.3	5.1	9.5	7.1	8.9	9.8	9.4
XLS	†	EXELIS INC	DEC	5.8	6.0	5.6	7.6	NA	5.6	6.4	6.9	NA	NA	21.1	34.6	18.6	NA	NA
GY	§	GENCORP INC	NOV	12.1	NM	0.3	0.7	8.3	12.5	NM	0.3	0.6	6.8	NA	NA	NA	NA	NA
GD	[]	GENERAL DYNAMICS CORP	DEC	8.0	NM	7.8	8.1	7.5	7.1	NM	7.6	8.3	8.1	19.2	NM	19.2	20.4	21.4
HON	[]	HONEYWELL INTERNATIONAL INC	DEC	10.0	7.8	5.1	6.1	7.0	9.0	7.2	4.8	5.5	6.0	25.8	24.6	17.3	20.7	26.9
HII	†	HUNTINGTON INGALLS IND INC	DEC	3.8	2.2	NM	2.0	2.0	4.1	2.4	NM	2.6	NA	23.9	19.0	NM	9.5	NA
LLL	[]	L-3 COMMUNICATIONS HLDGS INC	DEC	6.2	5.9	6.3	6.1	5.8	5.6	5.3	6.2	6.3	6.2	13.5	12.9	14.3	14.3	14.5
LMT	[]	LOCKHEED MARTIN CORP	DEC	6.5	5.8	5.7	5.8	6.7	7.9	7.2	7.3	7.5	8.8	119.0	527.9	113.3	67.5	86.5
MOG.A	§	MOOG INC -CL A	SEP	4.6	6.2	5.8	5.1	4.6	3.8	5.1	4.9	4.0	3.5	8.5	12.2	11.8	9.9	8.3
NPK	§	NATIONAL PRESTO INDS INC	DEC	NA	8.2	11.1	13.3	13.1	NA	10.2	11.6	15.5	16.3	NA	12.4	14.1	18.7	19.4
NOC	[]	NORTHROP GRUMMAN CORP	DEC	7.9	7.8	7.9	5.9	4.7	7.4	7.6	7.3	6.6	5.2	19.4	19.9	17.5	15.5	12.8
ORB	§	ORBITAL SCIENCES CORP	DEC	5.0	4.2	5.0	3.7	3.3	5.5	5.2	6.1	4.8	4.1	9.1	9.0	11.1	8.9	7.6
PCP	[]	PRECISION CASTPARTS CORP	# MAR	NA	17.1	17.1	16.2	16.8	NA	10.4	12.6	12.1	12.9	NA	15.8	15.9	15.5	17.2
RTN	[]	RAYTHEON CO	DEC	8.1	7.7	7.5	7.1	7.8	7.3	7.2	7.4	7.5	8.3	20.3	23.3	20.8	18.4	20.5
COL	[]	ROCKWELL COLLINS INC	SEP	13.7	12.9	12.8	12.0	13.3	11.8	11.4	11.8	11.6	13.5	43.9	43.8	40.9	40.4	44.0
TASR	§	TASER INTERNATIONAL INC	DEC	13.2	12.8	NM	NM	NA	13.8	13.3	NM	NM	NA	18.7	17.4	NM	NM	NA
TDY	§	TELEDYNE TECHNOLOGIES INC	DEC	7.9	7.6	7.3	7.3	6.4	7.2	7.6	8.4	8.0	7.7	14.1	15.2	16.1	16.5	18.9
TXT	[]	TEXTRON INC	DEC	4.1	4.7	2.1	0.9	NM	3.8	4.4	1.7	0.5	NM	13.5	20.3	8.5	3.2	NM
TGI	†	TRIUMPH GROUP INC	# MAR	NA	8.0	8.3	5.2	6.6	NA	6.1	6.2	4.9	5.2	NA	15.5	16.4	12.2	10.4
UTX	[]	UNITED TECHNOLOGIES CORP	DEC	9.1	8.4	8.6	8.0	7.2	6.3	6.4	8.3	7.7	6.8	19.7	20.3	23.0	21.1	21.3
OTHER COMPANIES WITH SIGNIFICANT AEROSPACE / DEFENSE OPERATIONS																		
BBD.B		BOMBARDIER INC -CL B	DEC	3.1	3.5	4.6	4.3	3.6	2.0	2.2	3.5	3.2	2.9	35.5	87.2	39.0	19.5	22.9
CAE		CAE INC	# MAR	NA	6.6	9.9	10.4	9.5	NA	3.9	5.9	6.3	6.0	NA	13.0	15.5	14.3	13.6
ERJ		EMBRAER SA -ADR	DEC	5.5	5.6	1.9	6.2	4.5	3.5	3.8	1.3	3.9	2.9	10.1	11.1	3.7	12.3	10.9
GE	[]	GENERAL ELECTRIC CO	DEC	10.6	10.1	9.9	8.5	7.2	2.3	2.1	1.8	1.6	1.4	12.0	12.3	11.1	10.4	9.8
HRS	[]	HARRIS CORP	JUN	9.1	10.2	9.9	10.8	6.2	8.9	9.5	10.8	12.2	6.9	26.6	25.2	25.1	27.7	15.1
HEI		HEICO CORP	OCT	10.2	9.5	9.5	8.9	8.3	7.5	8.0	8.5	7.3	6.3	16.7	14.9	14.6	11.9	10.2
HXL		HEXCEL CORP	DEC	11.2	10.4	9.7	6.6	5.1	10.9	11.0	10.3	6.2	4.6	17.4	18.3	18.5	12.5	10.4
SPR		SPIRIT AEROSYSTEMS HOLDINGS	DEC	NM	0.6	4.0	5.2	4.7	NM	0.7	3.8	4.6	4.7	NM	1.8	10.2	12.9	13.4
TDG		TRANSDIGM GROUP INC	SEP	15.7	19.1	12.6	19.7	21.4	5.2	6.5	4.2	6.4	6.9	68.6	32.0	21.7	23.1	22.1

Note: Data as originally reported. ‡S&P 1500 index group. []Company included in the S&P 500. †Company included in the S&P MidCap 400. §Company included in the S&P SmallCap 600. #Of the following calendar year.

Ticker		Company	Yr. End	Current Ratio					Debt / Capital Ratio (%)					Debt as a % of Net Working Capital				
				2013	2012	2011	2010	2009	2013	2012	2011	2010	2009	2013	2012	2011	2010	2009
AEROSPACE / DEFENSE‡																		
AIR	§	AAR CORP	# MAY	NA	2.7	2.2	2.2	2.7	NA	37.1	40.6	26.1	29.5	NA	96.5	113.5	66.2	62.5
AVAV	§	AEROVIRONMENT INC	# APR	NA	6.2	4.4	4.8	5.6	NA	0.0	0.0	0.0	0.0	NA	0.0	0.0	0.0	0.0
ATK	†	ALLIANT TECHSYSTEMS INC	# MAR	NA	2.4	2.2	1.9	2.2	NA	40.5	50.9	52.7	63.3	NA	78.0	116.7	129.5	148.2
ASEI	§	AMERICAN SCIENCE ENGINEERING	# MAR	NA	3.7	5.1	4.9	4.3	NA	1.4	1.7	2.1	3.1	NA	1.6	1.8	2.4	3.3
BEAV	†	B/E AEROSPACE INC	DEC	3.6	3.6	3.8	4.0	4.8	41.4	45.8	38.7	42.5	41.2	85.9	97.7	77.6	91.8	79.1
BA	[]	BOEING CO	DEC	1.3	1.3	1.2	1.1	1.1	35.2	60.5	74.0	80.6	85.2	59.4	72.8	117.4	221.6	510.7
CUB	§	CUBIC CORP	SEP	2.9	2.5	2.0	2.2	2.2	12.7	1.0	2.0	3.2	4.7	21.4	1.6	3.4	4.3	6.5
CW	§	CURTISS-WRIGHT CORP	DEC	2.5	1.8	2.3	2.1	1.6	36.4	35.6	31.8	24.9	26.7	119.4	140.3	88.2	83.5	122.6
EGL	§	ENGILITY HOLDINGS INC	DEC	1.7	1.6	1.7	1.7	NA	30.3	43.1	0.0	0.0	NA	132.3	175.7	0.0	0.0	NA
ESL	†	ESTERLINE TECHNOLOGIES CORP	OCT	2.7	2.6	2.5	3.3	2.7	24.4	31.6	36.2	28.0	27.3	97.7	131.1	164.3	79.6	103.5
XLS	†	EXELIS INC	DEC	1.7	1.4	1.3	1.2	NA	28.2	39.0	42.1	0.0	NA	93.2	130.3	164.3	0.0	NA
GY	§	GENCORP INC	NOV	1.2	1.2	1.3	1.2	1.4	93.3	-175.0	267.7	234.7	297.8	598.7	497.0	320.1	457.6	378.4
GD	[]	GENERAL DYNAMICS CORP	DEC	1.5	1.4	1.4	1.3	1.3	21.1	25.3	22.6	15.2	19.6	68.7	94.8	92.5	80.8	109.8
HON	[]	HONEYWELL INTERNATIONAL INC	DEC	1.5	1.3	1.3	1.3	1.3	26.9	31.7	37.5	33.7	40.0	97.4	140.5	178.3	174.7	224.0
HII	†	HUNTINGTON INGALLS IND INC	DEC	1.9	1.8	1.7	0.6	0.6	51.5	72.7	67.7	6.5	15.1	132.4	161.7	204.2	NM	NM
LLL	[]	L-3 COMMUNICATIONS HLDGS INC	DEC	1.8	1.8	1.9	1.9	2.1	35.4	38.7	37.1	36.9	37.6	171.4	185.1	161.9	176.4	154.4
LMT	[]	LOCKHEED MARTIN CORP	DEC	1.2	1.1	1.2	1.2	1.2	55.6	99.4	86.6	57.5	55.0	278.5	362.2	328.9	296.3	284.8
MOG.A	§	MOOG INC -CL A	SEP	2.3	2.3	2.5	2.7	2.7	26.8	33.3	36.4	38.9	41.6	65.0	75.8	85.7	93.2	106.6
NPK	§	NATIONAL PRESTO INDS INC	DEC	NA	4.8	5.0	5.2	5.6	NA	0.0	0.0	0.0	0.0	NA	0.0	0.0	0.0	0.0
NOC	[]	NORTHROP GRUMMAN CORP	DEC	1.6	1.4	1.3	1.2	1.2	35.8	29.2	27.6	23.0	24.8	161.4	168.2	244.3	266.5	254.0
ORB	§	ORBITAL SCIENCES CORP	DEC	3.1	2.6	2.2	1.9	2.2	14.1	16.5	16.9	18.1	19.3	21.1	27.4	31.5	39.6	33.0
PCP	[]	PRECISION CASTPARTS CORP	# MAR	NA	3.0	3.5	3.9	2.8	NA	25.5	2.4	2.9	3.7	NA	107.0	7.7	8.2	14.4
RTN	[]	RAYTHEON CO	DEC	1.7	1.6	1.5	1.5	1.4	29.4	37.1	36.0	26.7	19.1	118.2	141.5	144.9	126.1	99.3
COL	[]	ROCKWELL COLLINS INC	SEP	1.6	1.9	1.9	1.9	1.7	25.8	38.2	25.6	26.0	28.9	50.6	57.8	37.9	42.4	53.0
TASR	§	TASER INTERNATIONAL INC	DEC	4.2	4.4	3.9	6.9	6.2	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0
TDY	§	TELEDYNE TECHNOLOGIES INC	DEC	1.9	1.8	1.8	1.9	1.9	25.7	32.0	24.1	25.2	27.4	144.1	164.8	116.0	86.5	100.4
TXT	[]	TEXTRON INC	DEC	NA	NA	NA	NA	NA	38.8	48.5	59.8	63.9	71.4	NA	NA	NA	NA	NA
TGI	†	TRIUMPH GROUP INC	# MAR	NA	2.2	2.0	1.3	2.6	NA	33.5	33.9	38.2	29.8	NA	134.4	145.6	364.8	84.8
UTX	[]	UNITED TECHNOLOGIES CORP	DEC	1.3	1.2	1.4	1.3	1.3	38.2	45.2	29.9	31.6	28.8	297.2	370.8	133.0	173.2	156.4
OTHER COMPANIES WITH SIGNIFICANT AEROSPACE / DEFENSE OPERATIONS																		
BBD.B		BOMBARDIER INC -CL B	DEC	1.1	1.1	1.1	NA	NA	74.2	79.6	87.1	51.6	52.4	817.3	594.2	363.0	NA	NA
CAE		CAE INC	# MAR	NA	1.3	1.3	1.3	1.3	NA	47.1	38.1	24.0	26.0	NA	331.4	259.0	171.2	199.5
ERJ		EMBRAER SA -ADR	DEC	2.0	1.9	1.8	2.1	2.0	41.5	39.2	33.9	36.1	42.6	87.1	82.3	66.9	66.3	64.1
GE	[]	GENERAL ELECTRIC CO	DEC	NA	NA	NA	NA	NA	67.1	69.1	70.6	72.7	75.9	NA	NA	NA	NA	NA
HRS	[]	HARRIS CORP	JUN	1.5	1.8	1.5	1.9	1.7	50.3	49.3	43.0	35.0	38.6	242.4	158.8	240.0	123.5	157.0
HEI		HEICO CORP	OCT	2.7	2.8	2.6	3.2	3.7	32.2	14.5	5.7	2.4	8.6	134.5	55.5	20.6	7.9	31.0
HXL		HEXCEL CORP	DEC	2.4	2.4	2.1	2.4	2.3	19.4	19.2	22.9	31.5	38.3	75.3	70.5	86.1	104.4	138.3
SPR		SPIRIT AEROSYSTEMS HOLDINGS	DEC	2.2	3.1	3.5	2.8	2.9	43.0	36.8	36.9	39.5	35.8	71.5	50.9	51.4	55.7	47.3
TDG		TRANSDIGM GROUP INC	SEP	4.1	4.5	4.2	5.2	5.0	99.2	69.5	73.6	69.9	58.0	571.2	440.7	470.7	376.5	343.5

Note: Data as originally reported. ‡S&P 1500 index group. []Company included in the S&P 500. †Company included in the S&P MidCap 400. §Company included in the S&P SmallCap 600. #Of the following calendar year.

Ticker		Company		Yr. End	Price / Earnings Ratio (High-Low) 2013	2012	2011	2010	2009	Dividend Payout Ratio (%) 2013	2012	2011	2010	2009	Dividend Yield (High-Low, %) 2013	2012	2011	2010	2009
AEROSPACE / DEFENSE‡																			
AIR	§	AAR CORP	#	MAY	NA - NA	17 - 7	19 - 9	15 - 8	21 - 9	NA	22	18	4	0	NA - NA	3.0 - 1.3	2.0 - 0.9	0.5 - 0.3	0.0 - 0.0
AVAV	§	AEROVIRONMENT INC	#	APR	NA - NA	68 - 41	26 - 17	29 - 17	42 - 19	NA	0	0	0	0	NA - NA	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
ATK	†	ALLIANT TECHSYSTEMS INC	#	MAR	NA - NA	8 - 5	10 - 6	10 - 6	11 - 7	NA	11	10	2	0	NA - NA	2.1 - 1.4	1.6 - 1.0	0.3 - 0.2	0.0 - 0.0
ASEI	§	AMERICAN SCIENCE ENGINEERING	#	MAR	NA - NA	38 - 22	40 - 23	18 - 14	20 - 12	NA	96	68	25	22	NA - NA	4.3 - 2.5	2.9 - 1.7	1.8 - 1.4	1.8 - 1.1
BEAV	†	B/E AEROSPACE INC		DEC	25 - 14	22 - 16	19 - 13	27 - 15	17 - 4	0	0	0	0	0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
BA	[]	BOEING CO		DEC	24 - 12	15 - 13	15 - 10	17 - 12	30 - 15	32	34	31	37	89	2.7 - 1.4	2.6 - 2.3	3.0 - 2.1	3.1 - 2.2	5.8 - 3.0
CUB	§	CUBIC CORP		SEP	77 - 55	15 - 12	18 - 12	19 - 12	20 - 11	32	7	9	7	9	0.6 - 0.4	0.6 - 0.5	0.8 - 0.5	0.6 - 0.4	0.8 - 0.4
CW	§	CURTISS-WRIGHT CORP		DEC	21 - 10	21 - 14	14 - 9	16 - 11	17 - 11	13	18	11	14	15	1.3 - 0.6	1.2 - 0.8	1.2 - 0.8	1.2 - 0.9	1.4 - 0.9
EGL	§	ENGILITY HOLDINGS INC		DEC	12 - 6	NM - NM	NA - NA	NA - NA	NA - NA	0	NM	NA	NA	NA	0.0 - 0.0	0.0 - 0.0	NA - NA	NA - NA	NA - NA
ESL	†	ESTERLINE TECHNOLOGIES CORP		OCT	19 - 12	21 - 14	19 - 11	16 - 8	12 - 5	0	0	0	0	0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
XLS	†	EXELIS INC		DEC	13 - 7	7 - 5	8 - 5	NA - NA	NA - NA	28	23	6	NA	NA	4.1 - 2.1	4.6 - 3.2	1.3 - 0.8	NA - NA	NA - NA
GY	§	GENCORP INC		NOV	7 - 3	NM - NM	NM - 75	67 - 31	8 - 2	0	NM	0	0	0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
GD	[]	GENERAL DYNAMICS CORP		DEC	14 - 9	NM - NM	11 - 8	11 - 8	11 - 6	24	NM	26	24	24	2.6 - 1.8	4.1 - 3.4	3.4 - 2.3	3.0 - 2.1	4.2 - 2.1
HON	[]	HONEYWELL INTERNATIONAL INC		DEC	18 - 13	17 - 14	26 - 17	21 - 14	15 - 8	34	41	58	46	42	2.6 - 1.8	2.9 - 2.4	3.3 - 2.2	3.3 - 2.3	5.2 - 2.9
HII	†	HUNTINGTON INGALLS IND INC		DEC	18 - 8	17 - 11	NM - NM	NA - NA	NA - NA	10	3	NM	0	NA	1.2 - 0.5	0.3 - 0.2	0.0 - 0.0	NA - NA	NA - NA
LLL	[]	L-3 COMMUNICATIONS HLDGS INC		DEC	12 - 9	10 - 8	10 - 6	12 - 8	12 - 7	25	25	20	19	18	3.0 - 2.0	3.0 - 2.6	3.1 - 2.0	2.4 - 1.6	2.5 - 1.6
LMT	[]	LOCKHEED MARTIN CORP		DEC	16 - 9	11 - 9	10 - 8	12 - 9	11 - 7	52	49	41	36	30	5.6 - 3.2	5.2 - 4.3	4.9 - 3.9	3.9 - 3.0	4.1 - 2.7
MOG.A	§	MOOG INC -CL A		SEP	26 - 15	14 - 10	16 - 10	17 - 12	20 - 9	0	0	0	0	0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
NPK	§	NATIONAL PRESTO INDS INC		DEC	NA - NA	19 - 12	20 - 12	15 - 10	12 - 5	NA	222	118	88	61	0.0 - 0.0	19.2 - 11.8	10.0 - 6.0	9.1 - 6.1	11.9 - 5.0
NOC	[]	NORTHROP GRUMMAN CORP		DEC	14 - 8	9 - 7	10 - 7	10 - 8	12 - 7	28	27	26	27	34	3.7 - 2.0	3.8 - 3.0	4.0 - 2.7	3.4 - 2.6	5.0 - 2.9
ORB	§	ORBITAL SCIENCES CORP		DEC	21 - 12	15 - 10	17 - 10	24 - 16	31 - 18	0	0	0	0	0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
PCP	[]	PRECISION CASTPARTS CORP	#	MAR	NA - NA	19 - 15	21 - 16	21 - 14	18 - 7	NA	1	1	2	2	NA - NA	0.1 - 0.1	0.1 - 0.1	0.1 - 0.1	0.3 - 0.1
RTN	[]	RAYTHEON CO		DEC	15 - 9	10 - 8	10 - 7	12 - 9	11 - 7	37	35	39	23	25	4.2 - 2.4	4.2 - 3.4	5.5 - 3.9	2.6 - 1.9	3.7 - 2.3
COL	[]	ROCKWELL COLLINS INC		SEP	16 - 12	15 - 11	17 - 11	19 - 15	15 - 7	26	26	24	27	26	2.1 - 1.6	2.3 - 1.8	2.2 - 1.4	1.9 - 1.4	3.5 - 1.7
TASR	§	TASER INTERNATIONAL INC		DEC	53 - 19	34 - 15	NM - NM	NM - NM	NM - NM	0	0	NM	NM	NM	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
TDY	§	TELEDYNE TECHNOLOGIES INC		DEC	19 - 13	15 - 12	16 - 11	14 - 11	15 - 7	0	0	0	0	0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
TXT	[]	TEXTRON INC		DEC	21 - 14	14 - 9	33 - 17	77 - 48	NM - NM	4	4	9	24	NM	0.3 - 0.2	0.4 - 0.3	0.5 - 0.3	0.5 - 0.3	2.2 - 0.4
TGI	†	TRIUMPH GROUP INC	#	MAR	NA - NA	11 - 9	11 - 7	14 - 7	10 - 6	NA	3	2	2	3	NA - NA	0.3 - 0.2	0.4 - 0.2	0.3 - 0.2	0.5 - 0.3
UTX	[]	UNITED TECHNOLOGIES CORP		DEC	18 - 13	16 - 13	16 - 12	17 - 13	17 - 9	35	38	33	35	37	2.6 - 1.9	2.9 - 2.3	2.8 - 2.0	2.7 - 2.1	4.1 - 2.2
OTHER COMPANIES WITH SIGNIFICANT AEROSPACE / DEFENSE OPERATIONS																			
BBD.B		BOMBARDIER INC -CL B		DEC	16 - 12	15 - 9	15 - 7	15 - 10	13 - 5	31	40	21	24	24	2.7 - 1.9	4.3 - 2.6	3.1 - 1.4	2.4 - 1.6	4.6 - 1.9
CAE		CAE INC	#	MAR	NA - NA	21 - 17	19 - 12	17 - 12	17 - 8	NA	36	23	22	20	NA - NA	2.1 - 1.7	1.9 - 1.2	1.9 - 1.3	2.4 - 1.2
ERJ		EMBRAER SA -ADR		DEC	21 - 14	19 - 12	57 - 34	17 - 11	18 - 7	24	21	99	42	40	1.7 - 1.2	1.8 - 1.2	2.9 - 1.7	3.8 - 2.4	5.8 - 2.1
GE	[]	GENERAL ELECTRIC CO		DEC	19 - 14	17 - 13	18 - 11	17 - 12	17 - 6	53	50	50	40	59	3.8 - 2.8	3.9 - 3.0	4.4 - 2.8	3.3 - 2.3	10.6 - 3.5
HRS	[]	HARRIS CORP		JUN	17 - 10	11 - 7	12 - 7	13 - 9	20 - 11	35	25	22	20	34	3.6 - 2.1	3.4 - 2.3	3.1 - 1.9	2.2 - 1.6	3.1 - 1.7
HEI		HEICO CORP		OCT	40 - 21	30 - 21	35 - 23	35 - 20	27 - 13	118	7	6	6	7	5.6 - 2.9	0.3 - 0.2	0.3 - 0.2	0.3 - 0.2	0.6 - 0.3
HXL		HEXCEL CORP		DEC	24 - 14	17 - 14	19 - 13	25 - 12	24 - 8	0	0	0	0	0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
SPR		SPIRIT AEROSYSTEMS HOLDINGS		DEC	NM - NM	NM - 58	19 - 10	15 - 10	15 - 6	NM	0	0	0	0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0	0.0 - 0.0
TDG		TRANSDIGM GROUP INC		SEP	69 - 56	26 - 15	37 - 26	29 - 18	15 - 9	NM	0	0	304	0	26.2 - 21.2	0.0 - 0.0	0.0 - 0.0	16.4 - 10.5	0.0 - 0.0

Note: Data as originally reported. ‡S&P 1500 index group. []Company included in the S&P 500. †Company included in the S&P MidCap 400. §Company included in the S&P SmallCap 600. #Of the following calendar year.

Ticker		Company	Yr. End	Earnings per Share ($) 2013	2012	2011	2010	2009	Tangible Book Value per Share ($) 2013	2012	2011	2010	2009	Share Price (High-Low, $) 2013	2012	2011	2010	2009
AEROSPACE / DEFENSE‡																		
AIR	§	AAR CORP	# MAY	NA	1.38	1.68	1.85	1.17	NA	12.45	10.73	16.46	14.63	31.55 - 16.02	23.67 - 10.00	31.66 - 14.96	28.61 - 14.91	24.96 - 10.49
AVAV	§	AEROVIRONMENT INC	# APR	NA	0.47	1.40	1.20	0.97	NA	13.94	13.45	12.00	10.74	31.50 - 16.98	32.00 - 19.25	36.49 - 24.01	35.38 - 20.70	41.22 - 18.50
ATK	†	ALLIANT TECHSYSTEMS INC	# MAR	NA	8.38	7.99	9.41	8.48	NA	4.35	(4.40)	(6.76)	(13.62)	123.34 - 62.30	63.63 - 43.08	78.17 - 51.26	89.80 - 60.13	91.39 - 60.76
ASEI	§	AMERICAN SCIENCE ENGINEERING	# MAR	NA	2.08	2.37	4.73	4.06	NA	25.59	28.94	29.02	24.60	74.07 - 55.28	78.99 - 46.30	94.90 - 54.67	87.42 - 66.29	83.22 - 49.29
BEAV	†	B/E AEROSPACE INC	DEC	3.54	2.29	2.25	1.44	1.44	5.39	2.01	4.57	2.12	3.98	88.43 - 48.52	49.50 - 36.51	42.85 - 28.83	38.94 - 22.09	24.29 - 6.32
BA	[]	BOEING CO	DEC	6.03	5.15	5.38	4.50	1.89	9.07	(3.02)	(6.01)	(7.00)	(6.98)	142.00 - 72.68	77.83 - 66.82	80.65 - 56.01	76.00 - 54.80	56.56 - 29.05
CUB	§	CUBIC CORP	SEP	0.74	3.44	3.17	2.64	2.08	19.17	18.11	13.15	14.88	12.45	56.92 - 40.61	52.53 - 41.92	58.33 - 36.71	50.65 - 31.26	42.24 - 22.11
CW	§	CURTISS-WRIGHT CORP	DEC	2.94	1.98	2.81	2.33	2.10	(0.61)	(2.58)	4.48	4.91	2.98	62.92 - 30.64	41.91 - 28.55	38.92 - 25.67	37.54 - 26.11	36.67 - 22.62
EGL	§	ENGILITY HOLDINGS INC	DEC	2.94	(21.48)	1.49	(0.47)	NA	(8.09)	(12.16)	NA	NA	NA	35.21 - 18.31	20.75 - 13.91	NA - NA	NA - NA	NA - NA
ESL	†	ESTERLINE TECHNOLOGIES CORP	OCT	5.32	3.66	4.36	4.34	3.61	5.21	(3.16)	(9.63)	9.38	3.16	102.44 - 62.61	76.86 - 51.13	82.28 - 47.48	71.30 - 36.75	44.27 - 18.91
XLS	†	EXELIS INC	DEC	1.49	1.76	1.75	2.45	NA	(3.84)	(7.29)	(8.03)	NA	NA	19.43 - 10.08	12.88 - 8.99	13.50 - 8.25	NA - NA	NA - NA
GY	§	GENCORP INC	NOV	2.76	(0.09)	0.05	0.11	1.12	(4.09)	(8.39)	(5.40)	(5.24)	(6.88)	18.50 - 9.25	10.38 - 5.28	7.09 - 3.74	7.35 - 3.45	9.12 - 1.83
GD	[]	GENERAL DYNAMICS CORP	DEC	7.09	(0.94)	7.01	6.89	6.24	3.70	(5.77)	(6.05)	(3.56)	(5.04)	95.76 - 64.47	74.54 - 61.09	78.27 - 53.95	79.00 - 55.46	70.84 - 35.28
HON	[]	HONEYWELL INTERNATIONAL INC	DEC	4.99	3.74	2.38	2.61	2.86	2.43	(2.43)	(4.56)	(4.48)	(5.00)	91.56 - 64.16	64.49 - 52.21	62.28 - 41.22	53.74 - 36.68	41.55 - 23.06
HII	†	HUNTINGTON INGALLS IND INC	DEC	5.25	2.96	(1.93)	2.77	NA	2.30	(15.37)	(11.04)	NA	NA	93.04 - 43.03	48.93 - 31.32	42.74 - 22.62	NA - NA	NA - NA
LLL	[]	L-3 COMMUNICATIONS HLDGS INC	DEC	8.70	8.12	9.14	8.31	7.65	(23.98)	(28.69)	(24.97)	(22.43)	(17.34)	108.69 - 74.28	77.91 - 66.46	88.55 - 58.30	97.81 - 66.11	89.23 - 57.12
LMT	[]	LOCKHEED MARTIN CORP	DEC	9.19	8.48	7.94	7.26	7.86	(17.02)	(32.18)	(28.50)	(20.01)	(18.81)	149.99 - 85.88	95.92 - 79.05	82.43 - 66.36	87.18 - 67.68	87.06 - 57.41
MOG.A	§	MOOG INC -CL A	SEP	2.66	3.37	2.99	2.38	2.00	12.35	7.28	5.74	4.63	3.23	69.97 - 40.95	45.53 - 33.46	46.46 - 30.45	40.67 - 29.34	39.58 - 17.90
NPK	§	NATIONAL PRESTO INDS INC	DEC	NA	5.64	6.98	9.26	9.13	NA	39.58	46.23	48.43	47.30	81.00 - 67.32	105.67 - 65.01	137.00 - 82.76	134.40 - 89.50	111.85 - 46.53
NOC	[]	NORTHROP GRUMMAN CORP	DEC	8.50	7.96	7.54	6.86	4.93	(8.83)	(12.77)	(8.64)	(2.54)	(5.55)	116.19 - 64.20	71.25 - 56.59	72.50 - 49.20	69.80 - 53.50	57.31 - 33.81
ORB	§	ORBITAL SCIENCES CORP	DEC	1.13	1.03	1.14	0.81	0.64	11.89	10.62	9.54	8.37	7.86	24.16 - 13.97	15.23 - 10.59	19.38 - 11.80	19.63 - 12.66	19.68 - 11.60
PCP	[]	PRECISION CASTPARTS CORP	# MAR	NA	9.83	8.52	7.07	6.57	NA	5.79	24.91	26.56	18.13	271.99 - 180.06	189.58 - 150.53	178.98 - 136.00	145.40 - 100.99	115.60 - 47.71
RTN	[]	RAYTHEON CO	DEC	5.97	5.67	5.31	4.84	4.96	(7.33)	(16.44)	(14.79)	(7.80)	(6.94)	91.39 - 52.24	59.34 - 47.50	53.12 - 38.35	60.10 - 42.65	53.84 - 33.20
COL	[]	ROCKWELL COLLINS INC	SEP	4.63	4.19	3.99	3.57	3.76	4.08	1.32	2.84	2.61	2.09	75.25 - 57.75	61.46 - 46.37	67.29 - 43.82	68.04 - 51.85	56.88 - 27.67
TASR	§	TASER INTERNATIONAL INC	DEC	0.35	0.27	(0.12)	(0.07)	0.00	2.01	1.65 J	1.48 J	1.88 J	1.89 J	18.52 - 6.70	9.26 - 3.96	6.49 - 3.55	7.88 - 3.52	5.88 - 3.11
TDY	§	TELEDYNE TECHNOLOGIES INC	DEC	4.96	4.41	3.88	3.31	3.15	4.34	(2.91)	2.20	3.46	1.51	93.77 - 65.80	67.03 - 54.74	60.91 - 43.56	45.25 - 35.34	46.75 - 21.65
TXT	[]	TEXTRON INC	DEC	1.78	2.07	0.87	0.33	(0.28)	8.41	4.07	2.99	3.51	2.91	37.43 - 24.87	29.18 - 18.37	28.87 - 14.66	25.30 - 15.88	21.00 - 3.57
TGI	†	TRIUMPH GROUP INC	# MAR	NA	5.99	5.77	3.38	2.59	NA	(12.56)	(11.76)	(15.93)	8.36	85.50 - 65.73	67.51 - 53.46	60.90 - 39.84	46.28 - 23.75	25.46 - 15.56
UTX	[]	UNITED TECHNOLOGIES CORP	DEC	6.31	5.41	5.58	4.82	4.17	(12.90)	(18.58)	0.02	(0.43)	0.25	113.94 - 83.11	87.50 - 70.71	91.83 - 66.87	79.70 - 62.88	70.89 - 37.40
OTHER COMPANIES WITH SIGNIFICANT AEROSPACE / DEFENSE OPERATIONS																		
BBD.B		BOMBARDIER INC -CL B	DEC	0.33	0.32	0.48	0.42	0.42	(4.34)	(3.64)	(3.03)	(0.43)	(0.36)	5.43 - 3.80	4.93 - 2.97	7.29 - 3.30	6.24 - 4.25	5.35 - 2.22
CAE		CAE INC	# MAR	NA	0.53	0.70	0.68	0.55	NA	1.15	1.89	3.75	3.56	13.29 - 9.60	11.25 - 9.17	13.64 - 8.50	11.72 - 7.97	9.21 - 4.67
ERJ		EMBRAER SA -ADR	DEC	1.88	1.92	0.62	1.83	1.37	13.35	12.66	12.15	12.78	12.84	39.47 - 26.53	35.55 - 22.57	35.41 - 20.98	31.43 - 19.93	25.28 - 9.27
GE	[]	GENERAL ELECTRIC CO	DEC	1.48	1.39	1.23	1.15	1.03	3.84	3.61	3.00	4.19	3.73	28.09 - 20.68	23.18 - 18.02	21.65 - 14.02	19.70 - 13.75	17.52 - 5.73
HRS	[]	HARRIS CORP	JUN	4.19	4.83	4.63	4.31	2.36	(4.10)	(1.59)	(3.40)	2.26	0.20	70.73 - 41.08	52.23 - 35.98	53.39 - 32.68	54.50 - 40.24	48.25 - 26.11
HEI		HEICO CORP	OCT	1.54	1.30	1.12	0.86	0.70	(4.88)	(1.21)	0.11	0.54	0.80	62.30 - 32.61	38.55 - 27.21	39.66 - 25.23	30.21 - 16.83	18.62 - 8.77
HXL		HEXCEL CORP	DEC	1.88	1.64	1.37	0.79	0.58	11.12	9.37	7.54	6.20	5.37	44.93 - 26.20	28.01 - 22.17	26.48 - 17.33	19.53 - 9.86	13.92 - 4.49
SPR		SPIRIT AEROSYSTEMS HOLDINGS	DEC	(4.40)	0.24	1.36	1.56	1.39	10.17	13.80	13.63	12.59	11.00	34.47 - 15.80	26.00 - 13.96	26.49 - 14.27	24.00 - 16.23	20.50 - 8.03
TDG		TRANSDIGM GROUP INC	SEP	2.39	5.97	2.80	2.52	3.36	(92.46)	(56.92)	(51.92)	(27.90)	(20.76)	164.62 - 133.00	152.62 - 91.97	102.73 - 72.46	72.93 - 46.54	50.94 - 29.70

Note: Data as originally reported. ‡S&P 1500 index group. []Company included in the S&P 500. †Company included in the S&P MidCap 400. §Company included in the S&P SmallCap 600. #Of the following calendar year.
J-This amount includes intangibles that cannot be identified.

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