



Aircraft Engine Manufacturers: Providing the Thrust

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As intrinsic value investors, there are several factors that drive our favorable view of the aircraft engine industry. We believe passenger air traffic growth, which drives the sale of airplanes and engines, will enjoy secular tailwinds for the next several years. Additionally, aircraft engines are complex, highly technical, and enjoy patent protection, creating high barriers to entry for competitors. The industry is also very consolidated, keeping competitor behavior rational and driving industry profitability. Lastly, and most importantly, engine programs can take up to 10 years to break even, with high losses in the initial years of the program and high profits in the later years as financially lucrative repairs and services are performed on the engines. This delayed profitability makes commercial aircraft engine manufacturing companies susceptible to being undervalued, a fact that is especially evident to us as long-term investors.

Long-Term Growth Tailwinds

Globally, passenger air miles travelled have increased by about 6% annually since 1970, roughly double the real global GDP growth in U.S. dollars over the same period. Moreover, growth in air travel has been resilient across economic cycles. This growth can be explained by shifts in global demographics and other socioeconomic changes including rising incomes, the rapid growth of the middle class, urbanization, and consumers' tendency to allocate a portion of income growth to discretionary air travel. Over the next decade, more than a billion people, mainly from India and China, are expected to join the ranks of the global middle class. As such, we expect above GDP-level growth in global air passenger travel to continue for the foreseeable future.

The Rise of Single-Aisle Aircraft

When air travelers are looking to purchase tickets, we believe cost and convenience are the two leading factors that influence their ultimate buying decision. Single-aisle aircrafts fit well into this dynamic. They have fewer



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seats, which makes them ideal for point-to-point travel to convenient locations, enable higher utilization rates, lower operating costs, and quick turnaround times for airlines. Increasingly, both full-service and low-cost carriers are using single-aisle aircrafts, such as Airbus' A320 and Boeing's 737, to meet demand for flights under 3,000 miles. According to Boeing, single-aisle aircrafts comprise about 69% of the global passenger jet fleet today, and their usage is expected to increase to 75% over the next 20 years. Given this trend, we expect single-aisle aircraft build rates to be more attractive than build rates for the overall passenger aircraft industry going forward.

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Barriers to Entry

Aircraft engines use precise and highly engineered parts that enjoy patent protection, which is why we believe parts are the most profitable portion of engine service. The main competitive advantage that incumbent aircraft engine makers enjoy is the ability to deliver ever-increasing reliability and fuel efficiency on engines that is very difficult to replicate for new entrants. History suggests that innovations in the jet engine industry have been incremental, built over several decades of data gathering, analysis, research and development, and it seems unlikely that new entrants could usurp the existing technological advantage of incumbent manufacturers.

Moreover, all airplane parts and components, including engines, must be approved by the Federal Aviation Administration (FAA) before use, which is a lengthy and expensive process. Therefore, airframers like Boeing and Airbus typically source parts from less than a handful of suppliers. Once a part has been FAA-approved, it enjoys a very low threat of being displaced by competitor products through the life of the aircraft, which can be more than 25 years.

A Concentrated Industry with Rational Competitors

Today, there are only two entities that manufacture narrow-body aircraft engines. Given the uncertainties in forecasting demand for new aircrafts, and to minimize the risk of stranded research and development expenses, engine makers tend to partner with their competitors on certain programs (i.e. A380-Engine Alliance), while operating independently on others (i.e. A320neo and B737 MAX), depending upon each program's risk assessment. The industry is therefore a bit unique as two companies could be partners as well as competitors, which keeps participants' behavior quite rational and helps preserve industry profitability.

A Long Way to Break Even

Another unique characteristic of the commercial aircraft engine industry is that it has a very long profit cycle, taking up to 10 years after the first new engine is sold for a program to break even. This extended break-even point is due to the fact that new aircraft engines are typically sold at a loss to airlines. As critical parts wear out, engines need repairs, maintenance, and overhaul services, also known as MRO services. These services are high margin and help the engine maker not only offset losses on the original sale of the engine but can also lead to a positive net present value over the life of the engine. The medium-term losses accruing to companies ramping up new engine production, if not adjusted properly in valuation models, can cause a stock to be meaningfully undervalued. Our long-term investment horizon helps us to exploit these opportunities as they arise.

Given how long it takes for profits to accrue from an engine program, ascertaining the value of these programs is not a straightforward endeavor. As time passes, risks such as waning demand for specific aircraft types, rising production costs for new engines, and encroachment of non-critical MRO service revenues by airframers can potentially reduce the value of an engine program for a company. At Diamond Hill, we pay close attention to these risks but are cognizant of the fact that the future is difficult to forecast. Therefore, we make conservative

assumptions about the net present value of engine programs, aiming for a reasonable margin of safety when estimating the intrinsic value of a company.

Current Exposure

Currently, Diamond Hill has exposure to single-aisle aircraft engines through our ownership in two companies: Safran and United Technologies.

Safran is a French company that has a 50% economic interest in CFM International, which is a joint venture with General Electric. CFM has 100% market share on Boeing's 737 MAX and has over 50% market share on Airbus' A320neo, meaning that the joint venture has over 75% market share in the single-aisle aircraft engine market. In addition to a formidable position in the single-aisle engine duopoly, Safran is the market leader in carbon brakes and the number two player in aircraft engine nacelles, which is the circular metal casing around an aircraft engine. Safran also has a strong position in several other product categories in the aircraft interior solutions business, including seating and lighting. We believe Safran is well-positioned to improve its operating margins at a healthy clip over the next several years as its new LEAP engines begin to enter their MRO phase in increasing numbers.

United Technologies has been a long-term investment for Diamond Hill and we continue to like the company for several reasons. The company holds about a 25% market share in the single-aisle aircraft engine market through its 50% market share of Airbus' A320neo aircraft. Additionally, it has one of the broadest product portfolios for passenger aircrafts, ranging from interior lights to jet engines, exposing it to the secular tailwinds of passenger air travel. We believe the company's Pratt & Whitney division, which makes aircraft engines, is meaningfully underearning its long-term earnings potential as it ramps up production of its new engine - the Geared Turbo Fan for the A320neo.

Both Safran and United Technologies own other businesses outside of aircraft engine manufacturing, yet they collectively control about two-thirds of the single-aisle aircraft engine market. It is worth noting that none of the key manufacturers of single-aisle aircraft engines are pure-plays, or manufacturing just engines. At Diamond Hill, we try to take a more holistic view of a company rather than being too focused on certain products or end-markets. That said, the main thrust behind our current investment thesis on these companies is the undervaluation caused by their exposure to narrow-body aircraft engines.

As of March 31, 2019, Diamond Hill owned shares of Safran S.A. and United Technologies Corp.

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