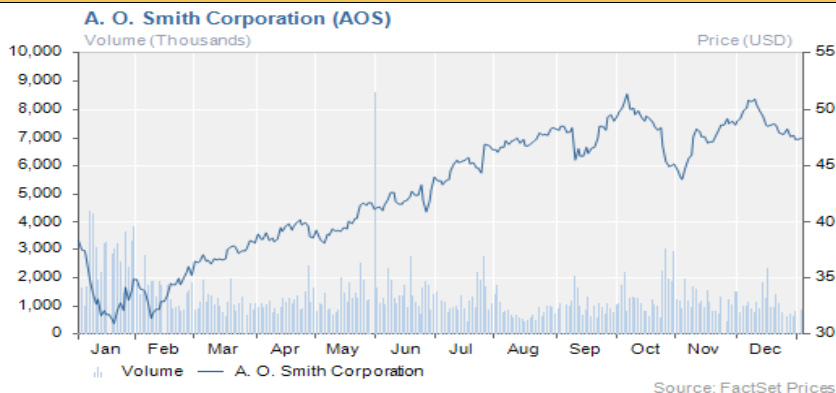


Recommendation	NEUTRAL
Target (today's value)	\$47
Current Price	\$47.76
52 week range	\$30.15 - \$51.49

Building Products

# A.O. Smith Corporation (AOS)

Share Data	
Ticker:	AOS
Market Cap. (Billion):	\$8.3
Inside Ownership	2.9%
Inst. Ownership	86.5%
Beta	1.21
Dividend Yield	1.0%
Payout Ratio	24.9%
Cons. Long-Term Growth Rate	11.5%



	'14	'15	'16E	'17E	'18E
Sales (billions)					
Year	\$2.4	\$2.5	\$2.7	\$2.9	\$3.2
Gr %		7.7%	6.9%	7.9%	8.1%
Cons	-	-	\$2.7	\$2.9	\$3.2
EPS					
Year	\$1.15	\$0.80	\$1.87	\$2.12	\$2.34
Gr %		-30.4%	128.9%	17.0%	9.9%
Cons	-	-	\$1.84	\$2.07	\$2.30

**Summary:** **Hold**-AOS has great long-term growth potential, but conservative valuation metrics show this company as fairly priced for the near term. Potential for upside exists if India or air purifiers come on line faster than expected. Current models do not show either India nor air purifiers affecting balance sheet in the near term. AOS is exposed to negative yuan devaluation and Chinese economic slowdown risks. The company is under indebted - any increase in debt would increase returns to equity holders. The stock is rated a hold for a 12-18 month time frame, but a long-term buy could be argued given the expected long term growth rates of its markets (as reviewed in the report).

Ratio	'14	'15	'16	'17E	'18E
ROE (%)	15.3%	20.0%	21.4%	22.7%	23.1%
Rel Industry	0.75	0.98	0.97	0.83	0.81
NPM (%)	9.0%	11.4%	11.9%	12.3%	12.3%
Rel Industry	1.75	2.53	2.03		
A. T/O	0.96	0.98	0.99	1.01	1.03
ROA (%)	8.5%	11.0%	11.6%	12.1%	12.5%
Rel Industry	1.33	2.03	1.47	1.29	1.24
A/E	1.81	1.83	1.85	1.87	1.86

### Key Drivers:

- The firm has strong, sustained replacement market for residential water heaters and strong pricing power. It seamlessly passes along price increases from increased regulation and commodity costs.
- Chinese urbanization and digitalization provides a sustained target market growth through 2050. As Chinese consumer earns more, more buy foreign-branded water heaters and consumers pay up for best technology (reverse osmosis water filtration). An ecommerce platform was launched in 2012. Chinese consumers are unafraid to purchase big-ticket items online, unlike US consumers, which drives margin growth, even with heavy advertising.
- Launching commercial leasing of boilers in China: AOS is into its second year of its air filtration product launch. Chinese smog levels are the worst in the world, reaching 10x the healthy limit.
- Average Chinese household dwellings grow in size with income, which will push consumers to more powerful and profitable water heaters

Valuation	'14	'15	'16	'17E
P/E	24.7	24.2	26.1	25.0
Rel Industry	1.08	0.85	1.19	1.35
P/S	2.2	2.7	3.1	2.9
P/B	3.7	4.67	5.5	5.4
P/CF	19.5	19.9	22.2	22.3
EV/EBITDA	10.8	11.5	12.8	11.4

**Valuation:** Using a relative valuation approach, AOS appears to be slightly undervalued to fairly valued in comparison to the building product industry. Due to the ability to incorporate longer-term forecasts, DCF analysis provides the best way to value the stock. A combination of the approaches suggests that A.O. Smith is fairly valued, as the stock's value is about \$47 and the shares trade at \$47.76.

Performance	Stock	Industry
1 Month	-6.1%	-14.5%
3 Month	-4.7%	10.4%
YTD	0.9%	0.6%
52-week	42.1%	30.2%
3-year	83.0%	50.6%

**Risks:** Chinese economy is transitioning into a consumer driven economy. This is guided by government dictate. If the transition does not go well and the rate of urbanization or income growth stalls, AOS's sales will fail to meet expectations. AOS is also exposed to yuan devaluation. If it devalues faster than projections, this too will depress sales when converting to the USD.

## Company Overview

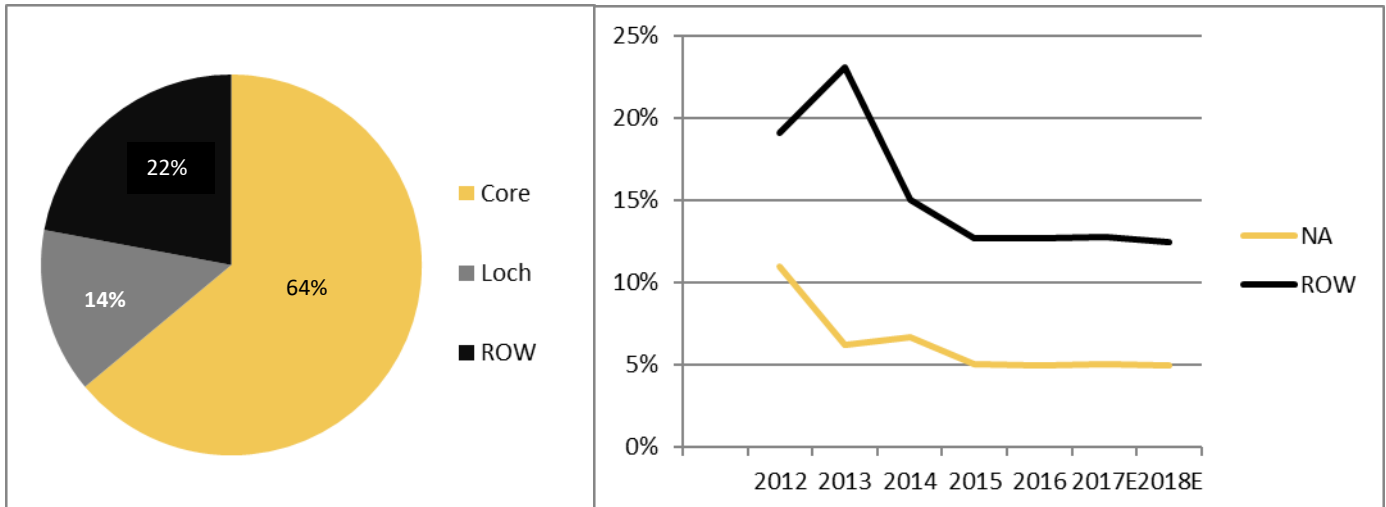
A. O. Smith Corporation (AOS) manufactures and distributes water heater, water treatment, and air purifier products. It serves residential and commercial customers in the North America and residential customers in its Rest of World segment, although AOS just launched commercial water treatment products in China. AOS operates in two segments: North America (NA) and Rest of World (ROW). The North America segment manufactures and markets commercial water heating equipment, condensing and non-condensing boilers, and water treatment tanks. AOS distributes its residential water heaters to the consumer through a 50% wholesale, 50% retail strategy. Replacements constitute 85-90% of the NA water heater volume, with the rest driven by new construction. AOS is the leader in the U.S. residential water heater market and dominates the commercial water heater market segment. The drive for efficiency has caused gas water heater sales to double in the past five years.

The Rest of World segment includes China, India, and Europe. Here AOS manufactures and markets water treatment products, water heaters, and air purifying products. A. O. Smith targets the affluent and mainstream income earners in China and the upper-middle class in India with its premium brands. AOS is able to leverage the trust in foreign brands overseas into higher price points. It primarily competes in the premium residential market and is the market leader in gas and electric water heaters priced at more than \$400. It distributes water heaters through its multi-tiered store approach alongside a growing e-commerce platform. Electric water heaters dominate the wall-hung market. AOS launched a line of air purifiers in 2015 targeting the smog season in Q4/Q1.

A.O. Smith focuses on an organic growth strategy centered on expanding its Chinese footprint, servicing North American high efficiency water treatment and boiler needs through its Lochinvar brand, and servicing the replacement market for North American water heaters. AOS estimates it can maintain an eight-percent growth rate with the following strategies, product mix, and expectations:

- China: (15% sales growth, RMB) (currently 30% of sales): Target homeowners, expand geographic footprint, roll out air purifiers, expand e-commerce platform, advertise heavily to leverage foreign brand. Management assumes 2x GDP growth in this segment. 97% ROW sales.
- Lochinvar: (10% sales growth): High-efficiency commercial and residential hydronic space heating, and water heating. Currently 12% of sales.
- NA residential water Market (Core) (4% sales growth): Servicing the residential water-heater replacement market. Annual volume: about 8 million units. Currently 58% of total sales.

Figures 1 + 2: Revenue By Segment (L) + Historical Growth Rates Post 2012 (R) (Constant Margins x ROW)



## ***Business/Industry Drivers***

Although several factors may contribute to A.O. Smith's future success, the following are the most important business drivers:

- 1) Market expansion in China (30% of sales)
- 2) Asian product expansion
- 3) Chinese consumer and demographic trends
- 4) U.S. industry trends

### Market Expansion in China

AOS is now selling in all tiered cities in China

AOS entered China in tier 1 cities, has expanded into tier 2 and 3 cities, and in 2016 began rolling out into tier 4 and 5 cities. AOS increased its presence to more than 8,000 outlets. Thirty-one percent of its outlets are in tier 1 cities and 69% are in tier 2 and 3 cities. It is also diversifying its distribution network. AOS has 23% of sales through regional stores, 29% through AOS specialty stores, and 30% through Suning and Guomei outlets.

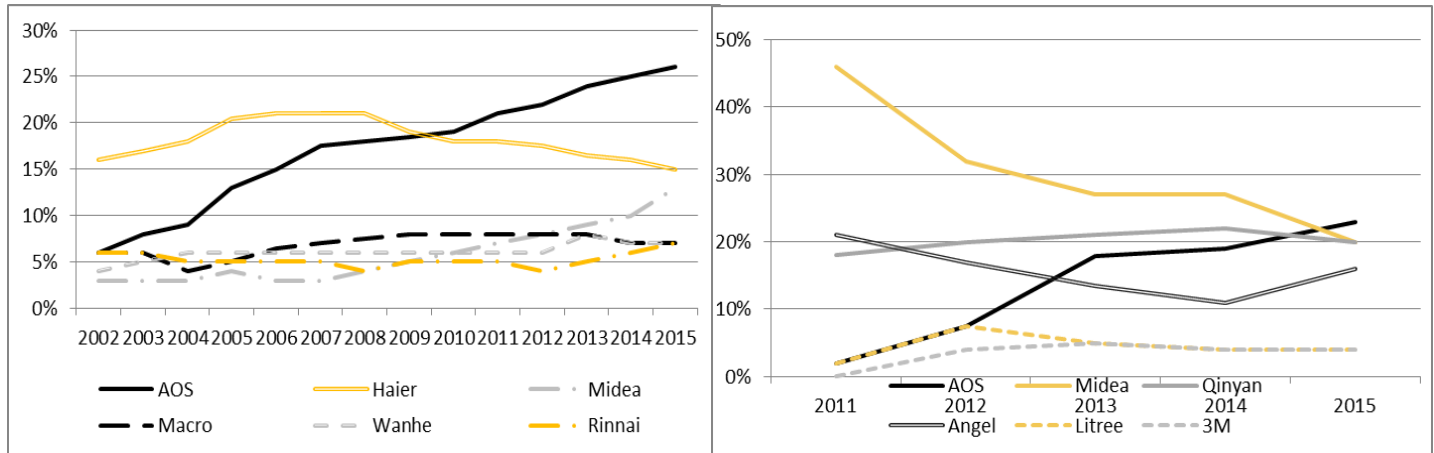
In 2012, AOS launched an e-commerce platform, which caught on quickly. Four years in, it now accounts for 18% of all Chinese sales, allowing digital expansion into even smaller cities and rural areas. Chinese consumers display an affinity for ordering large home goods online that American consumers do not. Consumers use smartphones in 35% of Chinese sales, accelerating the pace of market penetration into lower-tiered cities. This helps somewhat offset the increasing development and advertising costs associated with expansion.

Due to strong growth of the water treatment business in China, the company projects it will soon reach production capacity and is building a new water treatment manufacturing and air purification assembly facility (estimated completion 2018) to meet new demand, doubling current capacity. Sales in local currency were up 20% in 2015; AOS sees 15% organic growth in China for the foreseeable future. AOS uses 2x Chinese consumption growth as a proxy to project water heater market growth. Chinese residential consumption growth expected to grow 7-8% per year for the foreseeable future. At current growth rates, China alone adds 4.5% (15% x 30% of sales (roughly \$800M)) to overall sales growth. China currently

Water treatment products grew to \$110M in 2015, up 47% YOY and added 5% to sales growth in the ROW segment. The water treatment market grew 30% with instant gas water heaters leading the growth. Recall, AOS led its entry into China with water heaters, which still make up the large majority of its sales in China. Water treatment and air purification products are seeing very rapid growth on low bases now as the Chinese consumer gains wealth and can now look outside the most basic of essentials

A.O. Smith is not just entering new markets; it is also gaining market share in current ones. One advantage is the company's American brand. According to a 2012 McKinsey Annual Chinese Consumer Survey, Chinese consumers, young and old, trust foreign companies more than state-run enterprises by overwhelming margins. AOS is an industry leader in the premium (>\$400) electric water heater market, with no close competitors and leads in market share in the competitive premium (>\$400) gas water heaters.

Figures 3 and 4: Dollar Volume Water Heater Market Share (L) and Water Treatment Market Share (R)



Source: AOS Summer 2016 Analyst Presentation

Product Expansion In Asia

AOS launched an air purification line in 2015 to complement its existing product line. In 2015, AOS began commercial leasing of its water treatment products. The five-year lease model opens up a new consumer base for AOS. While initially dampening revenue per sale, the decreased volatility of revenue, and growing commercial market share all make commercial leasing a large net positive for continued revenue growth. Per company investor presentations, industry studies predict almost 40% CAGR over the next five years for the Chinese water heater market as the Chinese economy grows and urbanizes.

Water heater replacement market emerges

In addition, a water heater replacement market is emerging in tier 1 cities. As the residential water heater market matures, it will resemble the U.S. water heater market. With lifespans of 10-15 years, the first water heaters are just needing replacement in Tier 1 cities. In the mature U.S. market, replacement represents 85-90% of core AOS residential water heater sales. While 8-10 years off in Tier 2 and 3 cities and 10-15 years off in tier 4 and 5, the larger the market share gained now, the larger the recurring revenue base to be harvested as those markets mature at much lower SGA costs, resulting in much higher margins. AOS water heater revenue has grown 5-7%, in line with market growth.

Air Purification Products just launched 4Q15

AOS's latest product innovation are its air purification products. These launched to coincide with the Q4/Q1 smog season. In China smog reaches 453 ug/m<sup>3</sup> regularly in peak season, leading to many health concerns. For comparison, San Madera, CA leads the US with air pollution with 69.2ug/m<sup>3</sup> in 2013<sup>1</sup>. The World Health Organization cites 10 ug/m<sup>3</sup> yearly mean and a quick mean of 25ug/m<sup>3</sup> as its 24-hour healthy level as safe levels of particulate matter (PM<sub>2.5</sub>) in the air<sup>2</sup>.

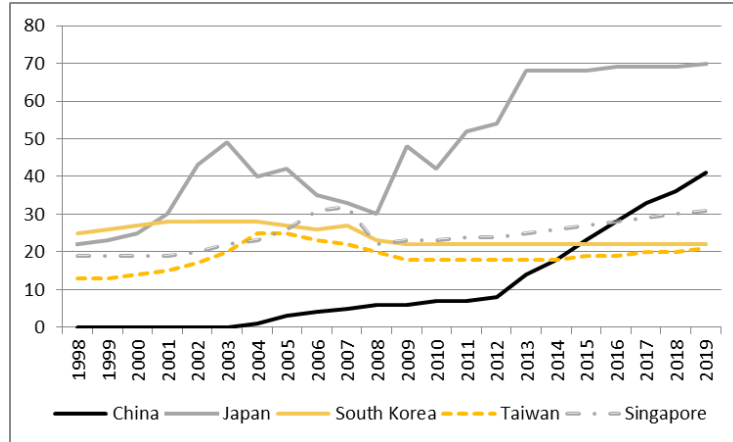
Market penetration now is in the very low single digits, but consumer adoption has been quick and air purifiers have a 30% growth rate with sales up \$1M YOY (off-peak season) in 2Q16 and up to \$5M in 4Q15 (peak season). Current penetration for the air purifier market is at 3.4% of households overall, with 14% penetration in tier 1 cities. At the present time, there are about 19 sales per thousand urban households, which is projected to reach 40 unit sales per thousand urban households over the next five years. If China's air pollution problem worsens, the Japanese usage rate, close to 70 unit sales per thousand, may be possible. In a best case scenario, the market may be

<sup>1</sup> "U.S. Cities Ranked by Air Pollution." Statistic Brain, 18 Oct. 2015, <http://www.statisticbrain.com/the-most-polluted-us-cities/>.

<sup>2</sup> "Abient (outdoor) air quality and health." World Health Organization. Sept. 2016, <http://www.who.int/mediacentre/factsheets/fs313/en/>.

almost twice as large as currently projected. However, marketing and consumer education has proven costly, compressing operating margins. Revenue from 2015 was \$10M, and \$20M (about 0.67% of sales) is expected in 2016. Investment is fueling growth, product expansion, market penetration, and market share growth.

**Figure 5: Unit sales rates per thousand urban households across select Pacific Rim Countries**



Source: Company report (Eurozone), without replacement for China

CMM currently values the Chinese air purifier market at \$2 billion (physical sales, online not included), growing 30-35% per year. As AOS just launched its product line, concrete analysis is difficult. Using the population statistics from the following section, I estimate the total market (physical + online) unit size to currently be 7.5 million units, growing to 12.8 million by 2020 and 26.7M units by 2050. Given AOS recent success in rolling out water heating and treatment products in China, penetrating and growing market share looks achievable. If AOS is able to achieve the 30% dollar value market share it has in the water heating/treatment markets by 2050, this could be worth \$1.7 billion (using 2020 figures as an target).

An average price of \$267 was backed out of current data from CMM and company reports. This price is understated as CMM's market estimation does not include online sales, which represents a noticeable portion of sales. This in turn, would understate the value of the AOS and market sales. But that is deliberate, as I am attempting to determine the value's lower bound. The following table assumes no replacement market, which is inherently false, but product lifetimes are not available in company literature.

**Figure 6: Approximating cumulative target market share value of first air purifiers purchased** (2020 represents a 10-20 year target) (see appendix 15)

(30% growth)	2016	2017E	2018E	2019E	2020E	2050E
market size \$M	2,000	2,600.0	3,380.0	4,394.0	5,712.2	7,153.3
N units	7,476,707	8,979,875	9,983,041	11,277,764	12,743,598	26,741,741
avg unit price	\$ 267	\$ 290	\$ 339	\$ 390	\$ 448	\$ 448
	<b>Tgt mkt share (30%) annual value</b>					
	Premium product/premium price  (30% mkt share by \$)		<b>AOS unit price</b>		\$ 1,000	\$ 1,000
<b>AOS unit sales (M)</b>			<b>2020</b>	<b>2050</b>		
<b>AOS sales (\$M)</b>			\$ 1,714	\$ 2,146		

Source: IMCP, Company reports, later footnotes

ROW OP margin compressed by advertising, education:

Operating Margins:

NA: 23%  
ROW: 13%

This is distant, however, as its current air purifier market share is 0.5%. Even if its sales double every year until 2020, it will only reach 2.8% market share. The building of the new manufacturing plant is an effort to hasten market share growth. Up to date sales numbers will provide crucial insight into AOS’s market penetration. If Chinese consumers quickly adopt AOS air purifiers as they did with other products, AOS may quickly capture market share and air purifiers will prove a boon to shareholders in the near future. This lower bound estimate projects a 14.7% long term CAGR for air purifier sales, currently adding (14.7% x 0.67%) 0.1% to company sales growth forecasts. Should air purifiers reach \$100M in sales in 2018, this segment would add 0.45% to total company sales growth.

While small when compared to ~\$800M in ROW annual sales, consumers are expected to quickly adopt air purifiers, driving sales, according to company forecasts, to a 30% annual growth rate for the near term; it would only take 6 years to reach over \$100M in sales of air purifiers. Reaching the target market share after 2020 would require annual sales growth of 12.8% thereafter. Combined sales of water treatment and air purification products are expected to increase the ROW growth rate by 5% in 2016. Longer term, once penetration matures margins will be harvested, driving earnings growth further.

Chinese Consumer and Demographic Trends

China urbanization responsible for urban target market growth into near future

While AOS offers a diversified array of products, with the products available in a growing number of markets, its markets are also growing. Government policy encourages the rural population to move into the cities in the east. Chinese urbanization is projected to drive 29% of all global growth. Fifty-six percent of the population now lives in cities with the government target of 60% by 2020 and 70% by 2050. Using current population growth trends from the Chinese government<sup>3</sup>, I calculate (from 2015) that an additional 74.5 million people will live in cities by 2020 (in table on next page), and another 375 million people by 2050. Chinese home ownership is unusually high among industrialized countries. Using average household size<sup>4</sup>, the number of new households in 2020 is projected to be 24.8 million from emigration alone. AOS recently changed target markets, and is now targeting homeowners instead of apartment builders. This seems reasonable given the 85%<sup>5</sup> home ownership rates among urban centers, leading to about 21 (24.8 x 85%) million new homeowners looking for water heaters and treatment products to enhance their homes. AOS only targets the mainstream and affluent classes, which make up 57% of the population (2020 estimates, company data).

Using the above trends and data (and assuming no change in market share) I calculate the addition of 6.3 million households (lower bound cumulative value (\$2.5 billion) buying water heaters from AOS by 2020. This is before identifying those buying second or third homes<sup>5</sup>, as is more common in urban China. In light of this, the company’s 15% (local currency) near term CAGR estimates for Chinese sales are reasonable. Chinese currency devaluation will cost AOS approximately 2% of sales growth each year.

**Figure 7: Dollar value of Chinese sales at 13% CAGR**  
 (-2% from local currency growth due to translation costs)

Chinese Sales	2016	2017	2018	2019	2020
	\$ 976	\$ 1,103	\$ 1,246	\$ 1,408	\$ 1,591
<b>Total(M)</b>	<b>\$ 5,349</b>				

When long term water heater sales growth is taken in conjunction with the rapid growth and adoption of water treatment and air purification products, these estimates are even firmer.

<sup>3</sup> “China Statistical Yearbook 2015.” National Bureau of Statistics of China, 28 Sept. 2016, [www.stats.gov.cn/tjsj/ndsj/2015/indexeh.htm](http://www.stats.gov.cn/tjsj/ndsj/2015/indexeh.htm).

<sup>4</sup> “Average number of people living in households in China from 1990 to 2014.” Statista, 28, Sept 2016, [www.statista.com/statistics/278697/average-size-of-households-in-china/](http://www.statista.com/statistics/278697/average-size-of-households-in-china/).

<sup>5</sup> “Homeownership Soars in China.” Gallup, 1 March 2005, <http://www.gallup.com/poll/15082/homeownership-soars-china.aspx>.

Figure 8: Calculations Table Projecting New Chinese Water Heater Market Share Value (See also appendix 1,2) ignores replacement market

(in millions)	2015	2020E	2050E	Notes
China POP	1,375.0	1,410.7	1,637.2	China pop
Urban Pop (2020 x 60%, 2050x70%)	771.4	845.8	1,146.1	Urban pop
Addl Pop (minus prev urban period)		74.5	374.7	New pop
		2020E	2050E	
New households		24.8	149.7	Addl pop/3
New Homeowners	<i>new households x 85%</i>	21.1	127.3	Owned households
Addl customer households	<i>new homeowners x 30% mkt sh</i>	6.3	38.2	At 30% mkt share
mkt value @ 400/unit (lowest) (approx lower bound given current FX trend)	<i>addl customer households x \$400/unit (no replacement)</i>	\$ 2,532	\$ 15,271	Viewed from 2015

Sources: <http://www.stats.gov.cn/tjsj/ndsj/2015/indexeh.htm>  
<http://data.worldbank.org/indicator/SP.POP.GROW?locations=CN>

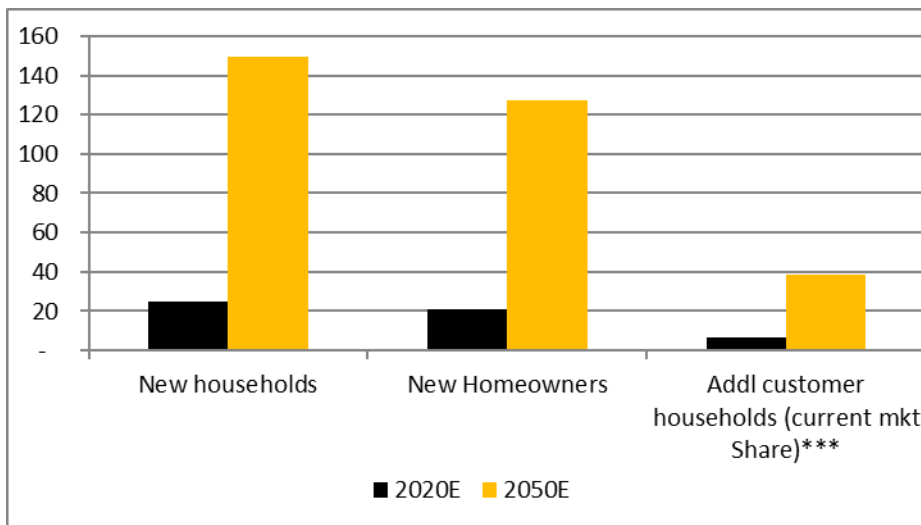
(Assume: No replacement market (extreme lower bound))

Increasing home size may lead to increasing space heating demand

Using the above data, new Chinese water heater sales are projected to grow 6% annually until 2050. Note the figures presented for market value to AOS are cumulative numbers (sum of sales totals), not annual sales approximations.

In addition to new household formation, AOS earnings suggest residential households have increased 20% in square footage. This is backed up by analysis done by the Australian government using information obtained through the Ministry of Statistics of China (CEIC)<sup>6</sup> 2014 data. It found Chinese households increased from about 52m<sup>2</sup> to 62m<sup>2</sup>. This points to increased demand per household, increasing the average size of water heater purchased, leading to higher margins.

Figure 9: Estimated Water Heater Market growth (In Millions) from 2015 to 2020, 2050



- 1.90% Pop Growth Rate (2015-2020)
- 1.20% Pop Growth Rate (2020-2050)
- For Scale
- 1% growth = 10M+ customers/year become possible customers

<sup>6</sup> "Housing Trends in China and India." Reserve bank of Australia, March 2014, <http://www.rba.gov.au/publications/bulletin/2014/mar/7.html>.

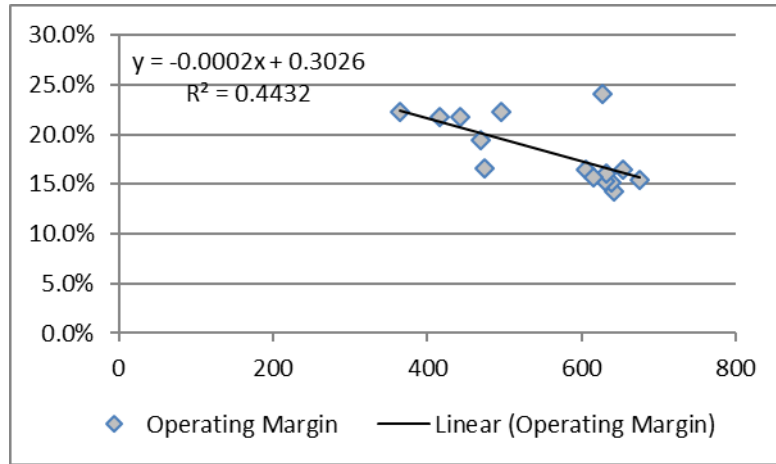
U.S. Industry Trends

Steel's price increases will put increasingly negative pressure on margins

Industry trends can be broken into four parts: steel prices, NAECA 3 (National Appliance Energy Conservation Act 3) /Lochinvar, water heater replacement market, and new demand (to be discussed later).

Steel's demise two years ago provided a helpful tailwind, but now the price of steel has more than doubled since 2015 lows. Steel accounts for 15% of COGS. Given steel's previous rise, AOS passed on a 5-8% price increase to wholesalers to help offset the rising cost of steel. The company noted no negative pushback from wholesalers. Historically, as steel traded higher, this has had a negative impact on NA margins. I expect further price increases in 2017 given steel's sharp price increase in 2016. The substantial increase in input cost will make YOY comparisons difficult for the next year.

**Figure 10: Effect of Steel Prices on Operating Margins (1Q13-**



Source: Factset, Company Slides

See the prior graph. The recent high margins (historically) are actually the driver of the error in the graph (the only quarters with 20%+ margins are the previous 5 quarters) and this weakens the calculated relationship. Also, prices are sticky so margins automatically improve when AOS passes through a price increase. AOS expects to hold 21.5% operating margins in its NA segment, offsetting rising steel costs with increased efficiencies with its ERP systems installation.

NAECA 3 causing generational shift to high efficiency products- only affects new sales, not existing models

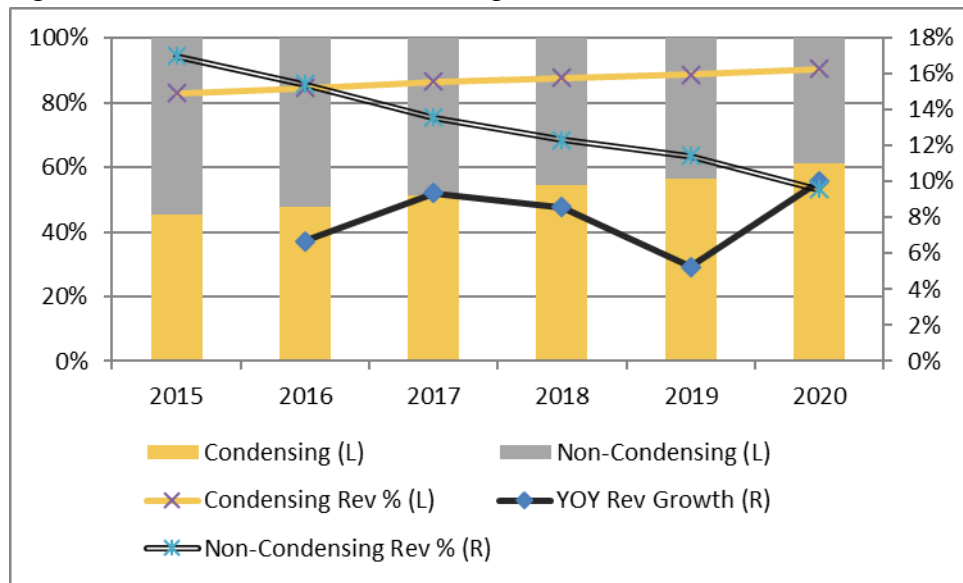
The 2015 NAECA (National Appliance Energy Conservation Act) 3 requires water heaters to become more efficient. It is the most recent act of Congress that regulates energy consumption of specific household appliances through minimum efficiency standards. These standards are put in place to ensure manufacturers are building products at the maximum energy efficiency levels that are technically feasible and economically justified. Units less than 55 gallons are taller and wider by two inches (for added insulation), while units sized over 55 gallons have new, more efficient technology inside. Water heaters less than 55 gallons must be larger to be more energy efficient. Some sizes are no longer manufactured. In tight spaces, smaller sizes may have to be used which opens the market for smaller, high efficiency units produced by the Lochinvar brand as heaters need replacing. As companies seek to become more efficient and cut costs, Lochinvar's premium commercial products stand out in their ability to generate savings. This has propelled Lochinvar to 10% annual CAGR (although 6% growth in 2016 is expected) for those seeking efficiency savings, as it leads the industry with some models registering 98% efficiency. Lochinvar is currently 14% of sales, achieving the 10% CAGR would add 1.4% to overall sales growth.



AOS was easily able to pass along a 20% price increase due NAECA 3 costs from increased insulation, design, and upgraded technology on larger models. Operating margins increased to 22.3% from 16.4% (2Q14-3Q16). Discontinuing certain sizes should increase margins overall. Residential demand has fallen while commercial demand is up since the inception of NAECA 3. The company notes consumers may be buying smaller commercial water heaters for multi-family housing (instead of newer residential but data is not provided along the single/multi-family housing divide). This may be because some small residential models are no longer offered (NAECA 3) and a few commercial models are close comparisons.

Lochinvar leads the market in boiler efficiency. As the NA market shifts to condensing boilers (83% of new dollar sales in 2015) to meet regulatory standards and meet cost savings goals, residential and commercial customers will choose Lochinvar since 83% of Lochinvar’s boilers rate 90% thermal efficiency or better.

**Figure 11: Effect of Transition to Condensing Boilers on Revenue**



Source: Company Data, 2016 Summer Investor Presentation Slides

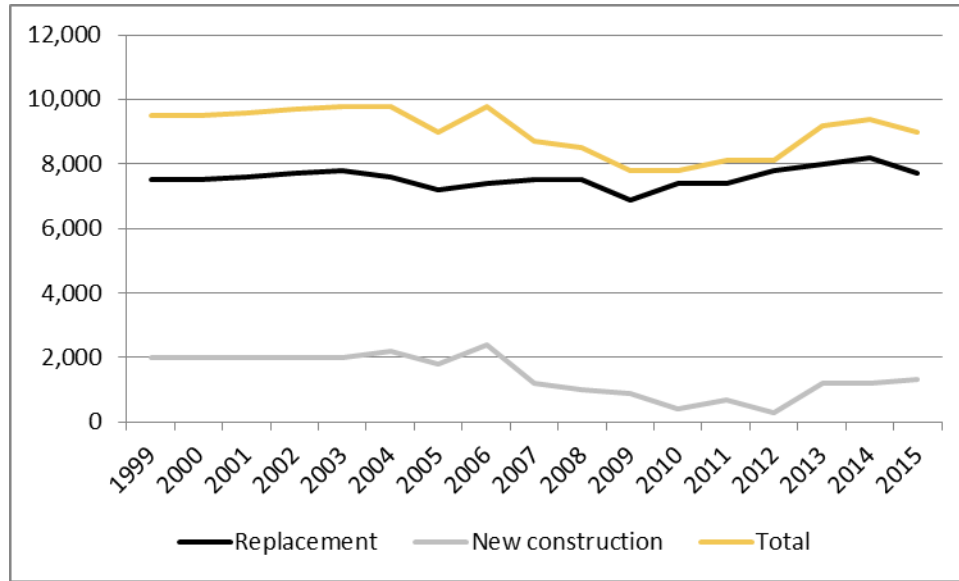
Rotation into high efficiency boilers drives sales growth in slow growing market

The growth in the boiler market, coupled with the rotation into condensing boilers, may drive an 8% 5-year boiler revenue CAGR. Even as unit growth is projected to be 1-2% for the foreseeable future, revenue growth will average (with constant prices) 8% annually because of the rotation into the higher efficiency condensing boilers.

NA water heater sales largely replacement, only 10-15% sensitive to new home sales

Water heaters have an average life span of 10-15 years. As a water heater is a necessity for American households, AOS is built on a solid replacement market totaling about 7.9-8.1M units per year. AOS has about 42% market share, meaning AOS churns (sales replacing current water heaters, without market growth or penetration) 3.4M units per year. With residential retail prices ranging from \$400-\$1,100 (AOS is the wholesaler), using the lowest price to determine a lower sales value bound, and adding in a 30% retail margin (ex. AOS sells to retailer for \$280, retailer sells for \$400), AOS’s sales value lower bound comes to \$952 million. On top of this, 15% of the segment is sensitive to new home construction, currently worth about \$200 million per year to AOS. This would put the US residential market value around \$1.2 billion, or 44.2% of sales. Assuming that US commercial water heater retail price points average \$1,500-\$2,500, the total 2015 commercial water heater market is 185,500 units (source: company presentations), and AOS retains a 55% market share, the US commercial segment is worth about \$200 million in sales to AOS, or 7.4% of sales. In total water heaters make up about \$1.4 billion in sales, or 51.6% of total sales.

Figure 12: NA Residential Water Heater Market Mix (Thousands of units)



Source: Company Slides

In the commercial space, all the growth in the commercial gas water heater market comes from the 90%+ efficiency market. Those with less than 90% efficiency represent a base of about 50 thousand units a year (~\$75 million). All incremental additions have been energy efficient models.

### Financial Analysis

I anticipate EPS to grow to \$2.11 in FY 2017. Increased revenues from China and North America should increase earnings by \$0.15, driven by further Chinese market penetration and urbanization trends, Chinese market growth, and a continued rotation to high efficiency products in North America. I estimate gross margins decline slightly in from 2015 to 2016 due to much higher steel prices, then hold steady in my base case. In 2017-18, I assume modestly increasing steel prices are offset by the shift to higher efficiency, higher margin products. Gross margins also benefit from the continued growth of Chinese online sales and more big data systems coming online in America (ERP). Overall, gross margins should be flat in 2018. EBIT margins improve in 2016, with slight improvement in 2017, reflecting general improvement trends since FY 2012, and add \$0.01 to FY2017 earnings. I keep EBIT margins stable in 2018 as SG&A cost cuts/ efficiency improvements have not been highlighted since the divestiture. Continued share buybacks of \$209M add \$0.05 to 2017 EPS and \$169 in 2018 adds another \$0.05 to EPS.

Big data system aims (ERP) to cut SG&A costs, improving EBIT margins

Share buybacks policy continues to add 5 cents to EPS YoY

I am ever slightly more bearish on 2017 revenue (0.3% lower) and slightly more bullish EPS 2% higher) than consensus. Fourth quarter 2016 revenue estimates drive the majority of the difference between my estimates and consensus. Company reports suggested AOS will grow North American sales at 5%, consensus estimates YoY NA sales growth at 3.8%. Company reports also suggested Rest of World sales would grow 12-13%; consensus estimates YoY sales growth to be 10.2%. I also assume tax rates of 30.5% per company reports.

Figure 13: Quantification of 2017 Drivers

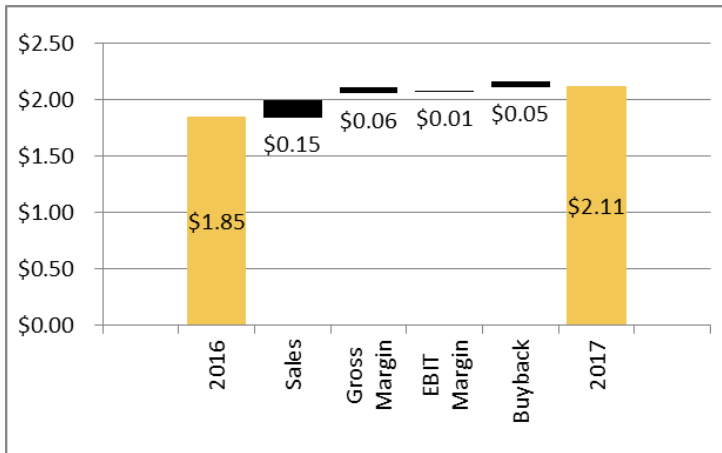
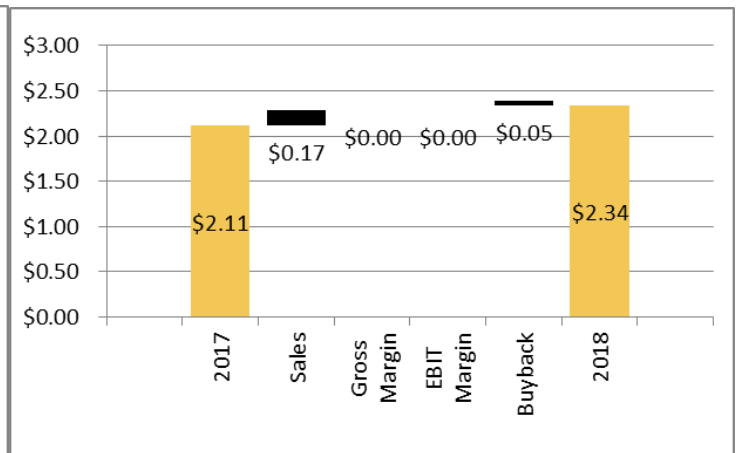


Figure 14: Quantification of 2018 Drivers



Source: IMCP

Below I illustrate the impact of consensus 4Q 2016 sales estimates on FY2017 and FY2018; keeping company estimates for divisional sales growth in FY2017 and FY2018 the same. I show both to show a sensitivity analysis. Matching 16Q4 sales to consensus shaves a penny from FY2016 EPS and two cents from 2018 EPS. For the rest of the report, I model 4Q16 revenues to match consensus.

Figure 15: Future EPS Matched to Consensus 16Q4 Sales Estimates



Source: IMCP

Figure 16: Model vs Consensus-L, Model vs Consensus matched to 4Q16 consensus-R Source: IMCP

	FY 2016	FY 2017	FY 2018		FY 2016	FY 2017	FY 2018
Revenue-Estimates (\$M)	\$2,712	\$2,930	\$3,167	Revenue-Estimates (\$M)	\$2,697	\$2,911	\$3,145
YoY Growth	7%	8%	8%	YoY Growth	6%	8%	8%
Revenue-Consensus (\$M)	\$2,695	\$2,938	\$3,181	Revenue-Consensus (\$M)	\$2,697	\$2,938	\$3,181
YoY Growth	6%	9%	8%	YoY Growth	6%	9%	8%
EPS- Estimate	\$ 1.85	\$ 2.05	\$ 2.27	EPS- Estimate	\$ 1.84	\$ 2.10	\$ 2.32
YoY Growth	17%	11%	11%	YoY Growth	16%	14%	10%
EPS- Consensus	\$ 1.84	\$ 2.07	\$ 2.30	EPS- Consensus	\$ 1.84	\$ 2.07	\$ 2.30
YoY Growth	16%	13%	11%	YoY Growth	16%	13%	11%

Higher EPS despite narrowly lower revenue stems from my aggressive projections that AOS continues its stated policy of maintaining a net \$300M cash position, returning extra cash to shareholders via repurchases.

Revenues (Base Case)

Water treatment products will need another national event to put water quality at the forefront of consumer consciousness

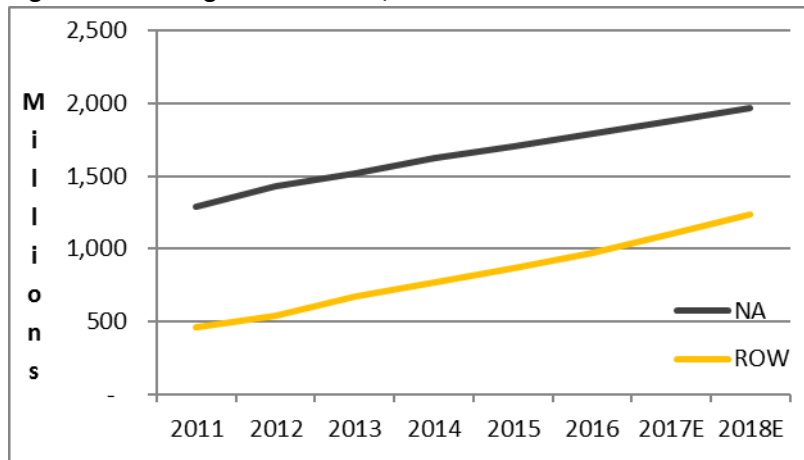
Sales growth in North America will remain steady, growing 5% to \$1.8 billion in FY2017 and \$2 billion in FY2018. Company objectives are to grow the segment 15% YoY, which will not be achieved in 2016. I then improved sales growth slightly, but not to the 15% the company expects for 2017-18. Strong housing starts will add to sales incrementally, but higher price points as consumers buy NAECA 3 water heaters and further price increases to offset any increase in steel prices will be the main drivers of increased North American sales. The Aquasana purchase will not add substantially to sales in the near term. As Flint’s lead laden, undrinkable water recedes from America’s memory, AOS will unfortunately have to wait for another water quality crisis to expand the North American consumer awareness.

Air purification and water treatment market to grow at 2x Chinese consumer consumption (currently 7-8%)

Rest of World sales growth will remain strong, growing 13% to \$1.1 billion in FY 2017 and \$1.25 billion in FY2018. The nascent water heater replacement market in tier one Chinese cities will give AOS another chance to sell its foreign, premium branded water heaters to affluent consumers, possibly growing market share. Ancillary product market growth in air purifiers and commercial leasing of water heaters will prove 2x Chinese consumer consumption growth can be expected far into the future. Air purifiers could drive sales in the near future if AOS is able to double sales yearly for the near future.

Sales of water heaters and treatment products will strengthen as AOS gains market share in tier 4 and 5 Chinese cities using its foreign brand as a draw to pull consumers away from more suspect Chinese branded competitors. The continued growth of online sales in China will strengthen gross margins of the ROW segment (12.9% ROW vs 22.3% in NA).

**Figure 17: AOS Segment revenues, 2011-2018E**



Source: Company reports

Future EPS Drivers

AOS’s next bet is on India. Currently, losses amount to \$10 million per year in India, up from a \$20 million a few years ago. Water heater sales did not meet expectations as temperatures remained historically high. Water treatment, however, has far exceeded expectations. Strategy has shifted to focus on water treatment products. With less discretionary income than their Chinese counterparts, Indians purchase the cheaper Micro-Filtration and Ultra filtration water

treatment systems. AOS is committed to India for the long term because of its population base and that base's need for clean drinking water. India will not be accretive to the income statement in the near term, however. One could consider investing now in AOS as a long term, out of the money call option on the Indian water treatment market, and collect the benefits of China and North America in the meantime. If the Indian government were to subsidize, partially or fully, water treatment products, this would be a big boon to Indians and AOS alike.

ERP systems aim to push EBIT margins and gross margins.

1% EBIT savings adds 6 cents to FY 2017 EPS.

On the other hand, Enterprise Resource Planning products (big data systems) will be accretive to earnings in the near future. A small number of AOS North American plants are already online, with more coming online with each passing year. EBIT margins will benefit most, as most of the benefits are back-office. Gross margins should increase too, as systems help maximize cost savings and supply chain logistics. As these margins expand, shareholders can expect larger buybacks and dividends with AOS's stated policy of returning value to shareholders. To illustrate possible return to shareholders, a 1% EBIT savings in 2017 would raise FY2017 EPS 6 cents and FY 2018 EPS 7 cents.

As always, AOS's policy of returning cash above \$300M to shareholders via buybacks is a constant boost to EPS growth. Current model projections show the buybacks alone increase EPS 5 cents per year (constant price assumed). Share buybacks would be lower if AOS needs funds to finance plant construction or data systems, slowing EPS growth.

Free Cash Flow

Recent history: AOS buys back ~2% shares/year

AOS uses a measured expansion strategy, only expanding into product lines, markets, or acquisitions it can internally finance. Strong North American operations, supported by an ever-growing Chinese market, have created a small cap that buys back nearly 2% of its shares each year while paying out increasing dividends. The company operates with shareholders in mind.

**Figure 18: Free Cash Flows 2012-2018E**

Free Cash Flow							
	2012	2013	2014	2015	2016	2017E	2018E
NOPAT	\$169	\$174	\$210	\$288	\$326	\$364	\$393
<i>Growth</i>		2.8%	20.6%	37.5%	13.2%	11.6%	8.0%
NWC*	164	143	186	170	216	233	252
Net fixed assets	1,164	1,186	1,196	1,191	1,266	1,366	1,476
Total net operating capital*	\$1,328	\$1,329	\$1,382	\$1,361	\$1,482	\$1,599	\$1,728
<i>Growth</i>		0.0%	4.0%	-1.5%	8.9%	7.9%	8.0%
- Change in NWC*		(21)	43	(16)	46	17	19
- Change in NFA		22	10	(5)	75	100	110
FCFF*		\$173	\$156	\$309	\$205	\$247	\$265
<i>Growth</i>			-9.7%	97.5%	-33.6%	20.3%	7.3%
- After-tax interest expense	6	4	4	5	6	7	7
FCFE**		\$169	\$152	\$304	\$199	\$239	\$257
<i>Growth</i>			-9.9%	99.4%	-34.6%	20.4%	7.5%
FCFF per share		\$0.47	\$0.43	\$0.87	\$1.18	\$1.45	\$1.59
<i>Growth</i>			-7.9%	100.8%	35.4%	23.3%	9.5%
FCFE per share		\$0.46	\$0.42	\$0.86	\$1.14	\$1.41	\$1.55
<i>Growth</i>			-8.1%	102.7%	33.5%	23.5%	9.7%

Source: Company Reports, IMCP

AOS's free cash flow has been remarkably steady over the last several years. FFCF and FFCE dropped precipitously in 2016 because of an expansion in NWC and NFA. This was expected as AOS broke ground on a large manufacturing plant in China, expanded other North American plants, and increased its investment in ERP systems in North American plants. AOS's main use of cash are expanding net fixed assets and distributing cash to shareholders.

AOS under indebted compared to peers. Increasing debt would increase ROE

I expect solid growth for FCFF and FCFE into the near future, only dropping to finance new projects. When compared to its industry average (30%), AOS is under indebted. Increasing debt could unlock value and free cash to firm and shareholders. It would do well from a firm value perspective to finance future NFA investments with debt (especially near-future investments as the world is in an artificially low interest rate environment). However, shareholders cannot argue with firm operations much, as the firm returns nearly \$250 million a year in buybacks and dividends. This is above FCFE without debt, so my model does assume modestly higher debt in 2016.

Return on Equity

In 2012, AOS completed selling off all operations not related to building materials to refocus the company. Since then, A.O. Smith has had remarkable improvement on all solvency and liquidity ratios. It has been able to deliver high returns on equity without increasing leverage. DuPont analysis reveals increasing margins and increased sales efficiency as measured by average assets drives ROE. Gross margins have increased 2.6% over the previous four years, while AOS has managed to increased EBIT margins 5.8%, meaning AOS has increased SG&A efficiency 3.2%. Net profit margins have increased from 8% to 11.8% since 2013.

Increased sales efficiency and margins are drivers of recent ROE increases

**Figure 19: 3-Stage DuPont Analysis**

3-Stage DuPont	2012	2013	2014	2015	2016	2017E	2018E
Net income / Sales	8.4%	7.9%	9.4%	11.2%	11.9%	12.3%	12.3%
Sales / avg assets	0.85	0.92	0.96	0.98	0.98	1.00	1.03
ROA	7.2%	7.3%	9.0%	11.0%	11.6%	12.3%	12.6%
Avg assets / avg equity	1.91	1.85	1.81	1.90	1.96	1.97	1.93
ROE	13.7%	13.5%	16.3%	20.8%	22.8%	24.1%	24.3%

Source: Company reports, IMCP

AOS would be able to deliver higher ROE if it shifted financing of new plants and equipment to debt financing (debt is currently 12% of assets, although it is up from 8% in 2013), but history and practice would suggest it will not add debt. It is already delivering remarkable ROE (compared to comps) to shareholders. Sales efficiency has improved greatly since the divestiture and plants will be built as needed to match demand in China. AOS projects to grow at 8%, while its sustainable growth (ROE x Retention rate) rate is 16.6%. This gap explains why AOS has so little debt on its balance sheet; it can finance much more growth internally.

**Valuation**

**Figure 20: Summary valuation table**

<b>R<sub>e</sub></b>	<b>11.50%</b>
<b>Method</b>	<b>Value</b>
<b>NTM PE</b>	\$ 50
<b>NPM v P/S- Intl</b>	\$ 39
<b>ROE v P/B- Intl</b>	\$ 30
<b>NTM ROE v P/B-Dom</b>	\$ 53
<b>DCF</b>	\$ 44
<b>Probability Scenario</b>	\$ 42

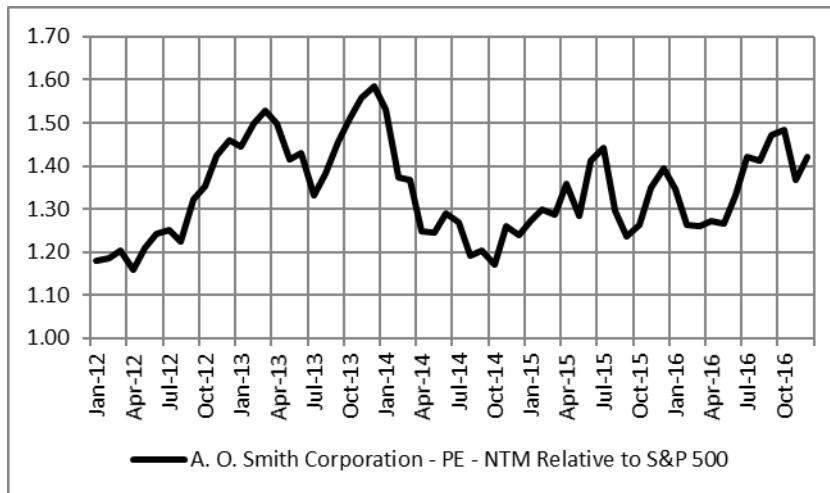
P/S and P/B show AOS to be overvalued. Fail to account for future sales of new product lines

AOS is valued using multiples and a 3-stage discounting cash flow model. Based on the earnings multiples, the stock is expensive relative to its peers, and only one of two among the comps (figure 18, appendix) who maintains a NTM PE above 20. Using multiples and next year’s projected earnings, its stock is worth \$50. Relative valuation shows the firm overvalued based on its fundamentals (figure #22-23); in fact, its scores on its comps valuation put it in a class of its own. Price to sales valuation yielded a price \$39 (using a weak relationship). A DCF valuation using the company’s assumption of 8% sales growth yields a value of \$44. I disregard international comps, and then take an average of values to arrive a \$47 price estimate for proven operations.

Trading History

AOS is currently trading around the midpoint of its 5-year range relative to the S&P 500 of 1.4. Post divestiture, it has oscillated between 1.2x and 1.6x S&P 500 P/E. The market expects continued sales growth in China with nascent product lines adding appreciably to earnings growth. As AOS has proved out its Chinese sales model, and begun to improve margins with its ecommerce platform, the market has rewarded it with historically high P/E multiples (26 TTM).

**Figure 21: AOS PE relative to S&P 500**



Source: Factset

AOS stock trading around median P/E relative to S&P 500

I do not expect multiple reversion over the next two years. Assuming the firm maintains a 24.1 NTM PE, it should trade at \$49.65 today.

- Price = P/E x EPS = 24.1 x \$2.10 = \$50.61

Relative Valuation-International

AOS a "unicorn":  
3x median P/B  
and P/S of  
industry and

AOS is currently trading at a P/B and P/S much higher than anything in the industry, at 6.03 (median 2.35) and 3.31 respectively (median 1.09). This is due to its substantially higher ROE and profit margins. Its NTM P/E is 24.1 (median 16.1), but the NTM data has a sample size issue. AOS trades at 26.4 TTM P/E (median 17.7, ex a 98 P/E data point for 5943-JP, which turned losses into a small profit). Investors have long been willing to pay a premium for AOS because it has potential for greater growth in an enormous market. The company combines its foreign brand as an economic moat with local expertise to grow market share in all product lines. It is already the market leader in the premium water heater and water treatment markets in China. Its business model specifically targets fast growing economies with large middle class populations. AOS is positioning itself well to significantly accelerate sales growth as India's economy comes online.

Figure 22: AOS Comparable companies-Intl

Ticker	Name	Current Price	Market Value	Price Change					Earnings Growth					LT Debt/ S&P			LTM Dividend				
				1 day	1 Mo	3 Mo	6 Mo	52 Wk YTD	LTG	NTM	2015	2016	2017	2018	Pst 5yr	Beta	Equity	Rating	Yield	Payout	
AOS	SMITH (A O) CORP	\$48.24	\$8,390	0.8	(2.0)	(2.1)	17.9	24.8	25.9	11.5	9.4%	18.4%	29.5%	15.8%	13.1%	21.2%	1.51	21.6%	A-	0.99%	24.9%
5947-JP	RINNAI CORP	\$80.69	\$4,196	0.1	1.1	(0.5)	8.0	(10.3)	(12.0)	0.2	2.3%	-23.6%	9.7%	9.9%	5.5%	7.0%	0.50	0.0%		0.86%	20.1%
5943-JP	NORITZ CORP	\$17.28	\$826	0.3	1.1	(4.3)	10.4	12.0	9.4			-52.0%	-213.1%	-172.5%	132.0%		0.72	0.0%		1.57%	147.6%
500031-IN	BAJAJ ELECTRICALS	\$3.08	\$311	(1.1)	(3.3)	(23.1)	(6.5)	(2.0)	(0.3)	11.8		100.0%	-800.0%	42.9%	20.0%	-8.4%	1.38	12.8%		1.93%	
SIE-DE	SIEMENS AG	\$121.10	\$97,519	0.5	7.9	11.6	32.5	29.2	28.8	7.2	2.6%	-11.3%	7.7%	9.9%	8.0%	-1.3%	0.94	72.4%		3.38%	
009450-KR	KYUNG DONG NAVIEN	\$35.85	\$453	(5.3)	(8.2)	(29.1)	(15.8)	34.9	38.6			-20.5%	66.7%	156.4%	45.4%	16.2%	0.63	5.1%		0.21%	4.0%
9911-TW	TAIWAN SAKURA	\$0.98	\$214	(4.0)	(12.3)	(18.9)	(4.1)	49.5	46.2		7.1%	-100.0%		18.2%	4.9%	1.41	0.0%		4.50%		
1169-HK	HAIER ELECTRONICS	\$1.53	\$4,267	0.0	(6.2)	(7.8)	7.4	(22.8)	(24.6)	15.0		15.4%	0.0%	-6.7%	7.1%	17.6%	1.34			0.93%	
000333-CN	MIDEA GROUP CO LTD	\$4.07	\$26,163	0.6	(2.4)	8.2	19.7	33.9	29.3	14.9	4.8%	42.1%	14.8%	9.7%	14.7%	20.8%	0.80	11.5%		2.64%	
Average			\$15,815	(0.9)	(2.7)	(7.3)	7.7	16.6	15.7	10.1	5.3%	8.6%	-109.4%	8.2%	29.3%	9.8%	1.03	15.4%		1.89%	49.1%
Median			\$4,196	0.1	(2.4)	(4.3)	8.0	24.8	25.9	11.7	4.8%	2.1%	7.7%	9.9%	14.7%	11.6%	0.94	8.3%		1.57%	22.5%
SPX	S&P 500 INDEX	\$2,269		0.2	2.5	5.0	13.4	10.1	11.0			7.7%	1.2%	7.6%	12.4%						

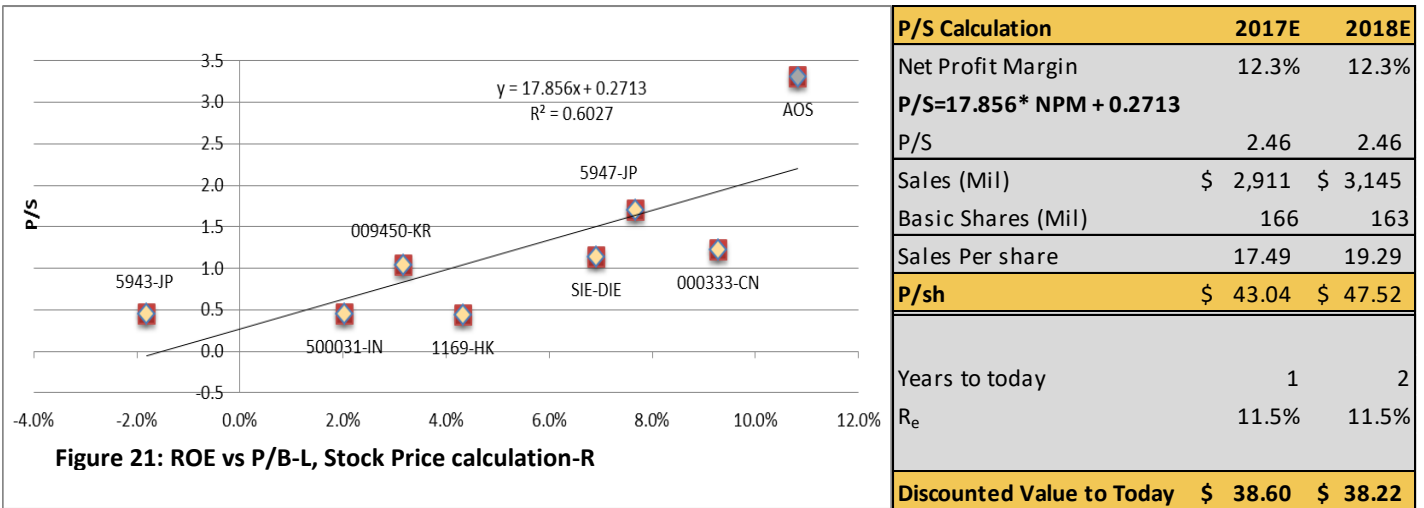
Ticker	Website	2016 ROE	P/B	P/E					2016			EV/ EBIT	P/CF		Sales Growth			Book Equity		
				2014	2015	2016	TTM	NTM	2017	2017 NPM	2016 P/S		2016 OM	ROIC	Curren	5-yr	NTM		STM	Pst 5yr
AOS	http://www.aosmith.com	19.8%	6.03	23.2	24.2	26.3	26.4	24.1	26.4	23.3	10.8%	3.31	17.3%	17.3%	16.4	9.7%	9.9%	11.2%	\$8.00	
5947-JP	http://www.rinnai.co.jp	8.4%	1.87	18.6	24.4	22.2	21.8	21.3	20.2	19.2	7.7%	1.71	10.5%	9.0%	12.3	0.7%	6.0%	6.0%	\$43.05	
5943-JP	http://www.noritz.co.jp	-3.7%	0.93	13.6	28.3				34.6	14.9	-1.8%	0.45	4.0%	-3.5%	13.5	6.1	7.0	4.6%	\$18.57	
SIE-DE	http://www.siemens.com	16.4%	2.70		17.7	16.4	16.5	16.1	15.0	13.8	6.9%	1.14	9.3%	8.8%	14.1	11.2	10.1	1.3%	-1.6%	\$44.90
500031-IN	http://www.bajajelectricals.com	12.9%	2.83				22.0	21.3	15.4	12.8	2.0%	0.45	4.9%	11.2%	9.6	13.1	24.2		10.9%	\$1.09
009450-KR	http://www.kdnaviens.com	7.2%	2.35	43.2	54.3	32.6	16.5		12.7	8.7	3.2%	1.04	8.3%	7.8%	18.5	9.9	9.2	14.9%	10.7%	\$15.25
9911-TW	http://www.sakura.com.tw	0.0%	1.80		14.0		9.8	9.1	8.9	7.5			12.7%	12.2%	5.9	9.1	9.4	4.6%	8.1%	\$0.54
1169-HK	http://www.haier-elec.com.hk	17.8%	1.81	11.8	10.2	10.2			10.9	10.2	4.3%	0.44		18.7%	10.2	9.0	13.7		13.5%	\$0.84
000333-CN	http://www.midea.com.cn	23.6%	3.10	21.4	15.1	13.1	11.8	11.3	12.0	10.4	9.3%	1.22	10.5%	28.6%	9.3	9.5	7.5	9.7%	13.2%	\$1.31
Average		11.4%	2.60	22.0	23.5	20.4	17.7	16.4	17.3	13.4	5.3%	1.22	9.7%	12.2%	12.2	10.3	11.8	6.8%	4.1%	8.9%
Median		12.9%	2.35	20.0	21.0	22.0	16.5	16.1	15.0	12.8	5.6%	1.09	9.9%	11.2%	12.3	9.7	9.8	7.1%	4.1%	10.7%
spx	S&P 500 INDEX			20.9	19.4	19.2			17.9	15.9										

Source: Factset

Both AOS's P/B and P/S are remarkable among its peers. NPM and ROE explain some of the variation in P/S and P/B. A ROE regression on P/B explains 41% of the variation, and a NPM regression on P/S explains 60% of the regression. Remarkably, an OLS model for P/S explains less if I remove AOS from the data set, but a regression on P/B explains more ( $r^2=61.7%$ ) when I remove AOS. Thus, I calculate a price using a P/B model without the AOS data point and a price using P/S containing the AOS data point. AOS is overvalued by both measures shown here.

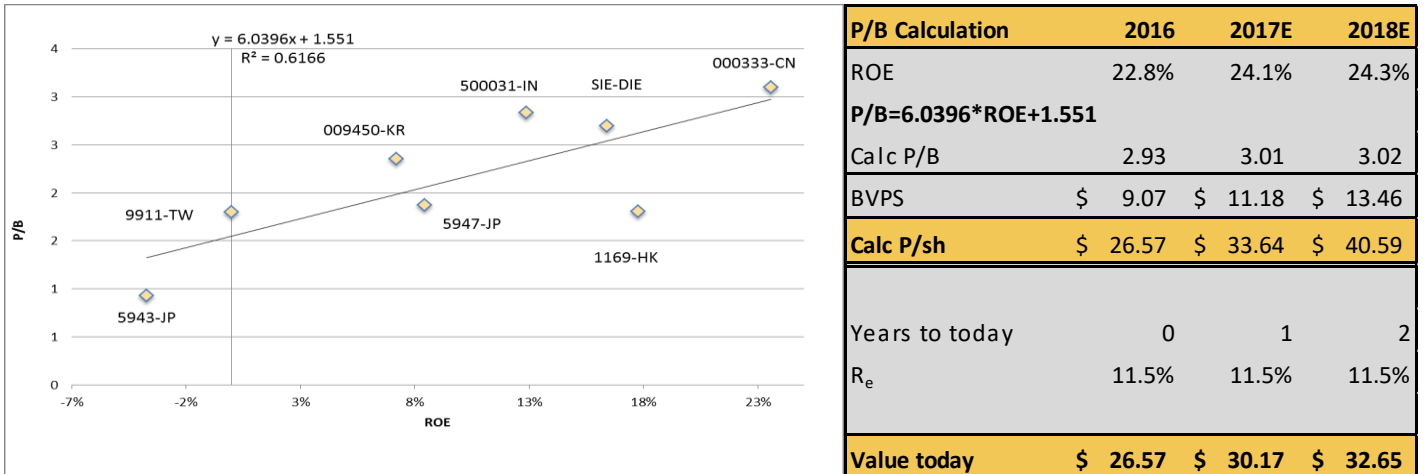


Figure 23: NPM vs P/S-L, Stock price calculation-R, with calculations



Source: IMCP

Figure 24: P/B v ROE-L, Stock price valuation-R



Source: IMCP

For the summary valuation table I take an average of the three years values.

For final comparison, I created a composite ranking of several valuation and fundamental metrics. Since variables have different scales, each was converted into a percentile before calculating the composite score. The most explanatory power was found in a model comparing an equal weight of 2016 ROE and 2016 NPM (fundamental) and an equal weight of P/B, P/S, P/CF (valuation). The regression line has an R-squared of 0.503. One can see AOS is well above this line, so it is either quite expensive on fundamentals, or a “unicorn.”

Figure 25: Composite valuation, % of range-International (top) Domestic (Bottom)

		Fundamental		Valuation				
Weight		50.0%	50.0%	34.0%	33.0%	33.0%		
		2016	2016					
Ticker	Name	ROE	NPM	P/B	P/S	P/CF	Fund	Value
AOS	SMITH (A O) CORP	84%	100%	100%	100%	71%	92%	90%
5947-JP	RINNAI CORP	36%	71%	31%	52%	100%	53%	61%
5943-JP	NORITZ CORP	-16%	-17%	15%	14%	42%	-16%	24%
500031-IN	BAJAJ ELECTRICALS	55%	19%	47%	14%	91%	37%	50%
SIE-DE	SIEMENS AG	31%	29%	39%	31%	69%	30%	46%
009450-KR	KYUNG DONG NAVIEN	31%	29%	39%	31%	69%	30%	46%
9911-TW	TAIWAN SAKURA	0%	42%	30%	57%	63%	21%	50%
1169-HK	HAIER ELECTRONICS	75%	40%	30%	13%	62%	58%	35%
000333-CN	MIDEA GROUP CO LTD	100%	86%	51%	37%	66%	93%	51%

		Fundamental Percent of Range				Valuation Percent of Range				
		25.0%	25.0%	25.0%	25.0%	33.3%	33.3%	33.3%		
		1/	2016	2016	Sales					
Ticker	Name	Payout	ROE	NPM	Growth	P/E			Weighted	
			NTM	NTM	P/B	P/CF	Fund	Value		
AOS	SMITH (A O) CORP	80%	19%	100%	40%	50%	58%	50%	60%	53%
aaon-us	AAON INC	100%	75%	82%	44%	100%	92%	100%	75%	97%
fbhs-us	FORTUNE BRANDS HOME & SECUR	80%	0%	0%	30%	9%	27%	42%	28%	26%
tile-us	INSTALLED BLDG PRODUCTS INC	50%	100%	38%	0%	0%	23%	59%	47%	27%
wso-us	WATSCO INC	0%	6%	89%	14%	67%	47%	50%	27%	55%
awi-us	ARMSTRONG WORLD INDUSTRIES	50%	3%	50%	24%	30%	97%	0%	32%	43%
ssd-us	SIMPSON MANUFACTURING INC	35%	4%	36%	7%	25%	13%	49%	20%	29%
bld-us	TOPBUILD CORP	50%	4%	35%	50%	50%	0%	19%	35%	23%

Source: IMCP

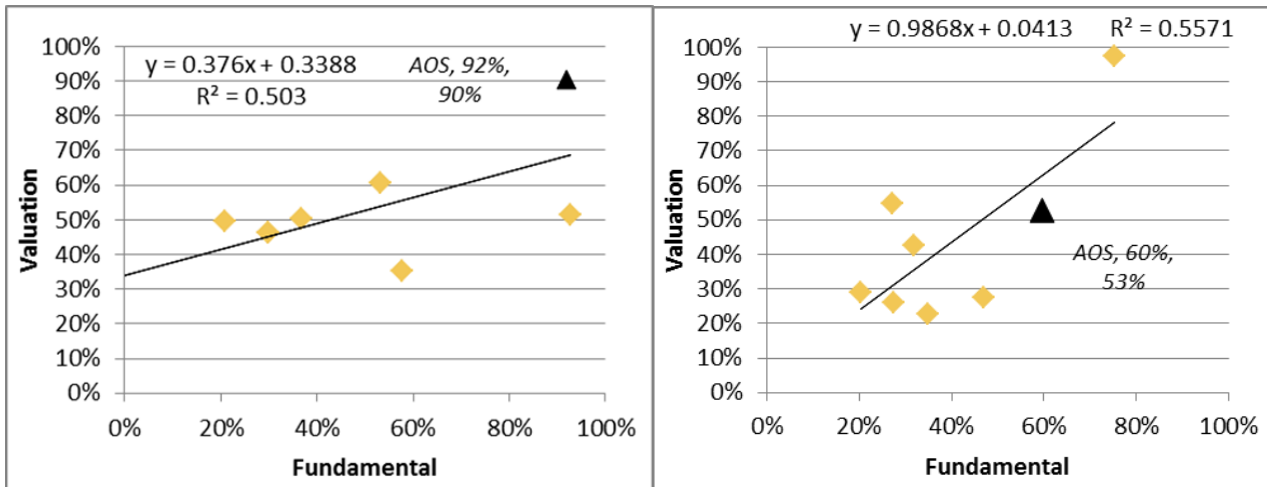
There is support the unicorn theory. AOS's operating margin (17.3%) is over 64% higher than its closest competitor, Midea (10.5%). It also leads the industry in 5-year earnings growth CAGR, although the low starting point explains much of this since the divestiture. AOS delivers an enormous amount of EVA (figure #23) to shareholders. The EVA delivered to shareholders is a partial explanation of why investors are willing to pay such a premium to own AOS. The company has a proven its expansion strategy with regional expertise and a long runway for continued growth into the future in Asia backed by large, low volatility replacement water heater sales in the North American market.

Figure 26: AOS EVA calculations

EVA	2015	2016	2017E	2018E
ROIC (using BOY IC)	16.9%	18.4%	19.3%	19.5%
WACC	10.4%	10.4%	10.4%	10.4%
EVA (in percent)	6.5%	8.8%	8.5%	9.4%

Source: IMCP

Figure 27: Composite relative valuation-International-L, Domestic -R



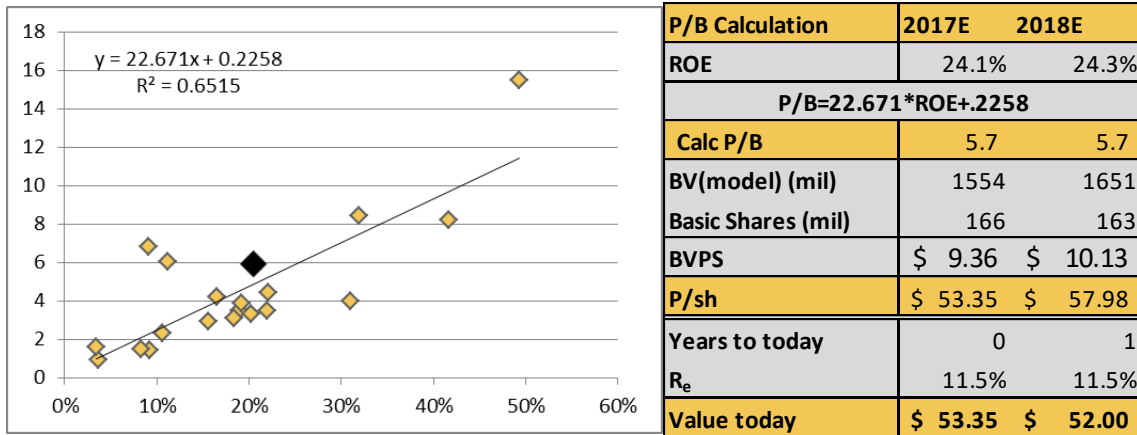
Source: IMCP

Relative Valuation-Domestic

Domestic valuation paints a different picture. While AOS is the strongest company in China in the building material industry, at home it is much closer to its comparables. The comparables are not exact matches, while some of the international companies are better comparisons. I chose comps from the building products industry from FactSet. I determined target prices using a NTM ROE-P/B(current) relationship. The R<sup>2</sup> was quite strong at 65%.

The composite ranking model shows AOS slightly undervalued compared to its domestic comps. This projects either fundamental deterioration or valuation measure increases. I think it is likely and increase in ROE from an increase in leverage, increasing P/E is more likely than deterioration in fundamentals (unless the Chinese economic transition falters)

Figure 28: NTM ROE v P/B<sub>current</sub>, -L, Price per share calculation-R (domestic comps used)



Source: IMCP, FactSet

Discounted Cash Flow Analysis

Beta calculated to be 1.2

R<sub>e</sub> calculated to be 11.5%

A three stage discounted cash flow model was also used to value AOS.

For the purpose of analysis, the company's cost of equity was calculated to be 11.5% using the Capital Asset Pricing Model. The underlying assumptions used in calculating the base case rate are as follows:

- The risk free rate, as represented by the ten-year Treasury bond yield, is 2.51%.
- The ten year beta of 1.2 was created by a sales weighted average of 0.9 for North American sales (68%) and 1.4 for ROW sales (32%) as investments in China pose additional risks.
- A long term market rate of return of 10% was assumed, since historically, the market has generated an annual return of about 10%
- $11.5\% = 2.51\% + 1.2 * (10.0 - 2.51\%)$

Stage one contributes \$2.51 of value

*Stage One* - the model's first stage simply discounts fiscal years 2017 and 2018 free cash flow to equity (FCFE). These per share cash flows are forecasted to be \$1.41 and \$1.55, respectively. Discounting these cash flows, using the cost of equity calculated above, results in a value of \$2.51 per share. Thus, stage one of this DCF analysis contributes \$2.51 per share.

*Stage Two* – Stage two of the model focuses on fiscal years 2019 to 2023. During this period, FCFE is calculated based on revenue growth, NOPAT margin and capital growth assumptions (NOPAT 12.3%, sales growth of 8%). The resulting cash flows are then discounted using the company's 11.5% cost of equity. I assume 8% sales growth throughout the period, per company assumptions, which I made the case for earlier. The ratio of NWC to sales will remain at 2018 levels along with NFA turnover (for conservative estimations this is kept constant, but ERP and the new plant in China coming online could affect this). NOPAT growth moves with sales. I also assume 2% share buybacks each year.

**Figure 29: FCFE and discounted FCFE, 2017-2023**

	2017	2018	2019	2020	2021	2022	2023
FCFE	\$1.41	\$1.55	\$1.71	\$1.88	\$2.08	\$2.29	\$2.52
Discounted FCFE	\$1.26	\$1.24	\$1.23	\$1.22	\$1.21	\$1.19	\$1.18

Stage two adds \$6.02 of value

Adding stage one and two together, yields discounted cash flows total of \$8.53.

*Stage Three* – Net income for the year 2019 – 2023 is calculated based upon the same margin and growth assumptions used to determine FCFE in stage two. EPS is expected to grow from \$2.10 (using data EPS estimates matching 4Q16 to consensus, otherwise it would be \$2.11) in 2017 to \$3.77 in 2023.

**Figure 30: EPS estimates for 2017-2025**

	2017	2018	2019	2020	2021	2022	2023
EPS	\$2.10	\$2.32	\$2.56	\$2.82	\$3.10	\$3.42	\$3.77

Stage three calculates a terminal value adding \$35.20 to current value

Stage three of the model requires an assumption regarding the company's terminal price-to-earnings ratio. For the purpose of this analysis, it is generally assumed that, as the company grows larger and matures; its P/E ratio will converge near the historical average of the S&P 500. Therefore, a P/E of 20 is assumed at the end of AOS's terminal year. While this may be a high multiple at the end of 2023, one must consider what the market will price in today. A lower multiple may be better to calculate a fair value, but the stock will likely trade above this value because of AOS's continued increasing sales in China. It is reasonable to assume the stock could trade at a higher multiple at the end of 2023 if India's sales are appreciably adding to operating earnings. It is important to note, I also assume AOS continues with its stated policy of share buybacks, buying back about 2% of shares a year with excess cash.

DCF gives valuation of current operations of \$44/share

Given the assumed terminal earnings per share of \$3.77 and a price to earnings ratio of 20, a terminal value of \$75.42 is calculated. Using the 11.5% cost of equity, this number is discounted back to the present value of \$35.20.

*Total Present Value* – Given the above assumptions and utilizing a three stage discounted cash flow model, an intrinsic value of \$43.73 = (\$35.20 + 2.51 + 6.02). Given AOS's current price of \$47.59, this model indicates it is overvalued by about 9%.

#### Scenario Analysis

Predicting sales or sales growth in AOS has been a challenge. The company has a handful of nascent products or markets where it is too soon to quantify their addition to sales growth in China (air purifiers or commercial leasing of water heaters), or their quantifiable additions are a decade away (residential water heater replacement market in China). Thus, even the bull and bear cases presented are based on conservative growth rates, as these incremental sales still need to be added.

The market already views AOS as a fast growing company; expectations and targets are already high. Therefore, my scenario analysis considers a bull case only slightly stronger than the base case; sales growth increased from 7.9% in the base case to 9.2% and gross margins rise to 39%, from either falling steel prices, or a stronger than expected rotation into higher margin products or a price increase is passed along seamlessly. The bear case also assumes a recession, a Chinese slowdown, increasing steel prices, or new protectionist policies reducing sales growth to 4.9% YoY. A spike in steel prices that moves faster and higher than AOS can pass along in one year drives the bear case. In 2018, I have AOS passing along a second price increase.

Scenario analysis shows AOS currently priced near perfection

The below scenario analysis below shows AOS's stock is currently fairly valued. Even in an environment of slightly improve margins, alpha from today's stock price is \$0.47. Given that steel's current price is below historical averages and steel is about 20% of COGS for water heaters, the bear case represents a case where steel increases more than 25% in the second half of the year. AOS generally passes along price increases in the summer and recent history suggests the company only does one price increase a year.

Given AOS's industry leading, and historically high operating margins, I am unsure how much these can improve. Ecommerce sales in China are one way. It already sells 18% of Chinese business on its e-commerce platform. If American consumers become comfortable buying large products online instead of from subcontractors they currently use, that would drive margins even higher.

Weighting the bear case 25%, the bull case 20% and the base case 55% yields an estimated price of \$42. The bear case is more likely to occur in some measure as steel returns to historical averages.

Figure 31: Assumptions and outcomes of scenario analysis

<b>Outcomes</b>	<b>Bear Case</b>		<b>Base Case</b>		<b>Bull Case</b>	
	<b>Dec-17</b>	<b>Dec-18</b>	<b>Dec-17</b>	<b>Dec-18</b>	<b>Dec-17</b>	<b>Dec-18</b>
<b>Income Statement</b>						
<b>Sales</b>	\$2,830	\$2,970	\$2,911	\$3,145	\$2,943	\$3,217
<i>Growth</i>	4.9%	4.9%	7.9%	8.0%	9.1%	9.3%
<b>EBIT</b>	382	431	524	566	524	573
<i>Margin</i>	13.5%	14.5%	18.0%	18.0%	17.8%	17.8%
<b>Tax Rate</b>	30.5%	30.5%	30.5%	30.5%	30.5%	30.5%
<b>NOPAT</b>	266	299	364	393	364	398
<i>Margin</i>	9.4%	10.1%	12.5%	12.5%	12.4%	12.4%
<b>Share Data</b>						
<b>Basic Shares (Mil)</b>	173.537	170.581	169.904	166.434	169.103	165.613
<b>EPS</b>	\$1.49	\$1.71	\$2.10	\$2.32	\$2.11	\$2.36
<b>Multiple</b>	22	22	24.1	25.1	24.5	24.5
<b>Projected Share Price</b>	\$32.73	\$37.65	\$50.61	\$58.23	\$51.69	\$57.79
<b>Discounted to today</b>	<b>\$26.33</b>	<b>\$30.29</b>	<b>\$45.39</b>	<b>\$46.84</b>	<b>\$46.36</b>	<b>\$46.48</b>
<b>Probability</b>	25%		55%		20%	
<b>Probability weighted Price</b>	\$7.08		\$25.36		\$9.28	
<b>Estimated price</b>	\$41.72					

Source: IMCP

## Risk Factors

AOS must defend its economic moats and continue to deliver high levels of EVA to justify its current market price. Every relative and absolute indicator show AOS overpriced at current levels. This doesn't consider the advantages the company has in operations as well as its proven, long runway to increase sales. There are several risks to continue operations, which could impinge on the AOS's advantages.

### Global economy/credit market downturn

If the global economy were to stall it could adversely affect consumer confidence and spending patterns, which could result in decreased demand for products or slower adoption of energy efficient water heaters and boilers.

### Instability in Chinese economic transition

Sales growth in china has averaged approximately 19 percent over the past three years and the company expects to maintain 15% sales growth in local currency for 2016 and 2017. If there is a slowdown in the transition to a more consumer driven economy, or the rate of urbanization was to stall, it could adversely affect the results of operations.

Sales growth of Lochinvar brand could stall

Lochinvar's sales growth has averaged 10% since the acquisition in 2011, largely due to the transition in the boiler industry to high efficiency condensing boilers. AOS expects Lochinvar sales to grow 10% annually for the near future. If the transition were to stall because of a recession or technology, AOS's growth rate would slow.

Customer concentration

Net sales to the five largest customers represent 38% of 2015 sales. The company expects this concentration to continue for the near future. The loss of one or more of the largest customers could have a material adverse effect on the company's financial position, results and operations and cash flows.

Model risk

The hold recommendation is based on an attempt to model the existing, established product lines and the 12-18 month timeline. If these lines value the company at the current stock price, then the resulting new businesses are not priced in fully and there exists a buying opportunity. The conservative nature of this model is an attempt to provide for a free roll on future business, not to gauge its value. This stems from my not giving the firm full credit for the air purification and commercial leasing opportunities in China. Anything substantial to the bottom line would factor into the second stage DCF models. Similarly, commercial leasing was just launched in 2016 so this business is young and risky. My model thus attempted to provide a lower bound for valuation. If this lower bound was at or near the current stock price, a significant buying opportunity (although unquantified) exists. If we have better clarity on these markets, I could include further valuation and quantification.

Foreign currency risk

An increase of the USD relative to the renminbi devalues ROW sales. AOS incurs currency transaction risk whenever one of its subsidiaries enters into a transaction using a currency different from the operating subsidiaries' functional currency. The majority of the FX transaction risk is a result of Canadian water heater operations. These risks may hurt reported sales and profits or negatively impact revenues and earnings translated from foreign currencies into USD.

Appendix 1: Quantification and Addition of Water Heater Replacement

Further derivation of sales post 2020 on next page

1.4 M unit mkt share derived from smoothing sales data to model (see following page)

		fitting model to data to back out avg sales price (or remitted back to AOS) comes to about \$530/unit, then cycled back through Key Benchmarks											
Notes	New Mkt	*nascent replacement mkt						Nascent T4/5 mkt b * replacement mkt fully mature?					
		2015	2016	2017	2018	2019	2020	2025	2030	2035	2040	2045	2050
0.5% pop growth to 60% 2020, 70% 2050	China Pop (mil) Urban Rate	1,375 56.10%	1,382 56.89%	1,389 57.68%	1,396 58.49%	1,403 59.31%	1,410 60.00%	1,445 61.5%	1,482 63.1%	1,519 64.7%	1,558 66.3%	1,597 68.0%	1,637 70%
3/household 85% owned in cities	Urban Pop Households Owner Households	771 257 219	786 262.03 223	801 267 227	816 272 231	832 277 236	846 282 240	889 296 252	935 312 265	982 327 278	1,033 344 293	1,085 362 308	1,146 382 325
*see ** at bottom of chart	AOS mkt sh @ 35% new AOS units (M)	760 1.4	780 1.5	794 1.5	810 1.5	825 1.5	83.9 1.4	88.2 0.9	92.7 0.9	97.4 1.0	102.4 1.0	107.6 1.1	113.7 1.6
	\$ value @ \$530/unit	\$ 742	\$ 774	\$ 788	\$ 803	\$ 818	\$ 731	\$ 464	\$ 488	\$ 512	\$ 539	\$ 566	\$ 867
	# need replacement								1.38	0.88	0.92	0.97	1.02
	\$ value @ \$530/unit	\$	\$	\$	\$	\$	\$	\$	\$ 731	\$ 464	\$ 488	\$ 512	\$ 539
	Total Value (million)	\$ 742	\$ 774	\$ 788	\$ 803	\$ 818	\$ 731	\$ 464	\$ 1,219	\$ 976	\$ 1,026	\$ 1,079	\$ 1,406
		**1.4M derived from 2014 and 2015 mkt size estimates. To be provided in another table											



Appendix 2: Derivation of Water Heater Yearly Volume Through 2050

Notes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
<i>all values in millions</i>																
<b>Combined Mkt</b>																
China pop (Mil)	1,368	1,375	1,382	1,389	1,396	1,403	1,410	1,417	1,424	1,431	1,438	1,445	1,453	1,460	1,467	1,474
Urb rate (calculated)	54.8%	56.1%	56.9%	57.7%	58.5%	59.3%	60.0%	60.3%	60.6%	60.9%	61.2%	61.5%	61.8%	62.1%	62.4%	62.8%
Urban Pop	750	771	786	801	816	832	846	854	863	872	880	889	898	907	916	925
Households	250	257	262	267	272	277	282	285	288	291	293	296	299	302	305	308
owner households	212	219	223	227	231	236	240	242	244	247	249	252	254	257	260	262
aos mkt share @35%	74	76	78	79	81	82	84	85	86	86	87	88	89	90	91	92
In Million																
mkt value of New cust	1.40	1.46	1.46	1.49	1.51	1.54	1.58	1.61	1.64	1.67	1.70	1.73	1.76	1.79	1.82	1.85
<b>replacement mkt</b>	742	773	788	803	818	831	846	855	864	873	882	891	900	909	918	927
Assume long life, 10Yr																
Need replacement																
value replacement																
total value																
Kinks bc of sudden replacement mkt emergence																

Notes	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
<i>all values in millions</i>																					
<b>Combined Mkt</b>																					
China pop (Mil)	1,482	1,489	1,497	1,504	1,512	1,519	1,527	1,534	1,542	1,550	1,558	1,565	1,573	1,581	1,589	1,597	1,605	1,613	1,621	1,629	1,637
Urb rate (calculated)	63.1%	63.4%	63.7%	64.0%	64.3%	64.7%	65.0%	65.3%	65.6%	66.0%	66.3%	66.6%	67.0%	67.3%	67.6%	68.0%	68.3%	68.6%	69.0%	69.3%	70.0%
Urban Pop	935	944	953	963	973	982	992	1,002	1,012	1,022	1,033	1,043	1,053	1,064	1,075	1,085	1,096	1,107	1,118	1,130	1,146
Households	312	315	318	321	324	327	331	334	337	341	344	348	351	355	358	362	365	369	373	377	382
owner households	265	267	270	273	276	278	281	284	287	290	293	295	298	301	304	308	311	314	317	320	325
aos mkt share @35%	93	94	95	95	96	97	98	99	100	101	102	103	104	106	107	108	109	110	111	112	114
In Million																					
mkt value of New cust	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	1.11	1.14
<b>replacement mkt</b>	488	492	497	502	507	512	518	523	528	533	539	544	550	555	561	566	572	578	583	589	603
Assume long life, 10Yr																					
Need replacement																					
value replacement																					
total value																					
Kinks bc of sudden replacement mkt emergence																					

Appendix 3: Sales Model Forecast Assumptions

Sales								Bull Case		Bear Case	
Items	Dec-12	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-17	Dec-18	Dec-17	Dec-18
Sales	\$1,939	\$2,154	\$2,356	\$2,537	2,697	2,911	3,145	2,943	3,217	2,830	2,970
Growth		11.1%	9.4%	7.7%	6.3%	7.9%	8.0%	9.1%	9.3%	4.9%	4.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
North America	1,431	1,520	1,622	1,703	1,768	1,856	1,949	1,869	1,977	1,843	1,921
Growth		6.2%	6.7%	5.0%	3.8%	5.0%	5.0%	5.8%	5.8%	4.3%	4.3%
% of sales	73.8%	70.6%	68.8%	67.1%	65.5%	63.8%	62.0%	63.5%	61.5%	65.1%	64.7%
ROW	543	668	768	866	961.70	1,086.72	1,228	1,106	1,272	1,019	1,081
Growth		23.1%	15.0%	12.7%	13.0%	13.0%	13.0%	15.0%	15.0%	6.0%	6.0%
% of sales	28.0%	31.0%	32.0%	34.1%	35.7%	37.3%	39.0%	37.0%	39.5%	36.0%	36.4%
Intersegment	(34)	(34)	(34)	(33)	(32)	(32)	(32)	(32)	(32)	(32)	(32)
Growth		0.0%	-0.6%	-4.1%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%	-0.6%
% of sales	-1.8%	-1.6%	-1.4%	-1.3%	-1.2%	-1.1%	-1.0%	-1.1%	-1.0%	-1.1%	-1.1%

Forecast assumptions											
*steel price triple, but small price increase passed thru											
Income Statement											
Sales Growth		11.1%	9.4%	7.7%	6.3%	7.9%	8.0%	9.1%	9.3%	4.9%	4.9%
Gross margin	33.0%	35.9%	30.5%	39.8%	38.5%	39.0%	39.0%	39.8%	39.8%	34.0%	36.0%
EBIT margin	12.5%	11.2%	12.4%	16.2%	17.4%	18.0%	18.0%	17.8%	17.8%	13.5%	14.5%
Rate on debt		2.6%	2.7%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Tax rate	30.5%	28.2%	28.3%	29.7%	30.5%	30.5%	30.5%	30.5%	30.5%	30.5%	30.5%

Appendix 4: Income Statement Generated from Assumptions, Base, Bull, Bear cases

Financial Information								Base Case		Bull Case		Bear Case	
Items	Dec-12	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-17	Dec-18	Dec-17	Dec-18		
<b>Income Statement</b>													
Sales	\$1,939	\$2,154	\$2,356	\$2,537	\$2,697	\$2,911	\$3,145	\$2,943	\$3,217	\$2,830	\$2,970		
Growth		11.1%	9.4%	7.7%	6.3%	7.9%	8.0%	9.1%	9.3%	4.9%	4.9%		
EBIT	243	242	292	410	469	524	566	524	573	382	431		
Margin	12.5%	11.2%	12.4%	16.2%	17.4%	18.0%	18.0%	17.8%	17.8%	13.5%	14.5%		
Tax Rate	30.5%	28.2%	28.3%	29.7%	30.5%	30.5%	30.5%	30.5%	30.5%	30.5%	30.5%		
NOPAT	169	174	210	288	326	364	393	364	398	260	299		
Margin	8.7%	8.1%	8.9%	11.4%	12.1%	12.5%	12.5%	12.4%	12.4%	9.4%	10.1%		
<b>Balance Sheet</b>													
Invested capital	1,595	1,710	1,701	1,685	1,852	1,923	2,056	1,883	2,018	2,003	2,072		
Growth		7.2%	-0.5%	-1.0%	10.0%	3.8%	6.9%	1.6%	7.2%	8.1%	3.4%		
Invested capital ex cash	1,328	1,329	1,382	1,301	1,482	1,599	1,728	1,573	1,719	1,710	1,801		
Growth		0.0%	4.0%	-1.5%	8.9%	7.9%	8.0%	6.2%	9.3%	15.8%	4.9%		
Short-term and long-ter	244	192	224	249	330	330	330	330	330	330	330		
Debt/invested capital	15.3%	11.2%	13.2%	14.8%	18.1%	17.5%	16.3%	17.9%	16.7%	16.8%	16.2%		

Appendix 5: Balance Sheet Assumptions

Financial Information	Base Case							Bull Case		Bear Case	
Items	Dec-12	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-17	Dec-18	Dec-17	Dec-18
<b>Balance Sheet</b>											
New marketable securities		(91)	117	99	-	-	-	-	-	-	-
<b>Invested capital</b>											
Op assets ex cash % sal	33.0%	33.4%	33.0%	31.9%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Op liab % sales	25.1%	26.8%	25.1%	25.2%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
NOWC turnover (EOY)	4.50	4.11	4.67	5.14	4.60	5.23	5.42	5.40	5.79	5.51	5.83
NFA turnover (EOY)	1.67	1.82	1.97	2.13	2.13	2.13	2.13	2.20	2.20	1.90	1.90
IC turnover (EOY)	1.22	1.26	1.38	1.51	1.46	1.51	1.53	1.56	1.59	1.41	1.43
<b>Supplied capital</b>											
New short-term and long-term de		(52)	32	25	-	-	-	-	-	-	-
New other liab		(59)	25	(4)	-	-	-	-	-	-	-
New debt/equity-like securities		-	-	-	-	-	-	-	-	-	-
Stock buyback (issuance)		75	160	175	167	209	169	248	170	32	144
Other equity		-	-	-	-	-	-	-	-	-	-
Share price for buyback (issuance)		-	-	-	\$48.71	\$48.71	\$48.71	\$48.71	\$48.71	\$48.71	\$48.71
Dividends	33.3	84.7	108.4	135.0	71.7	77.4	83.7	78.3	85.6	75.3	79.0

Appendix 6: Balance Sheet Generated: Base, Bull, Bear

Financial Information				Base Case				Bull Case		Bear Case	
Items	Dec-12	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-17	Dec-18	Dec-17	Dec-18
<b>Balance Sheet</b>											
<b>Capital</b>											
Cash	267	381	319	324	370	323	328	310	299	287	272
Operating assets ex cas	652	720	777	810	890	960	1,038	971	1,061	934	980
Operating assets	919	1,100	1,097	1,134	1,260	1,284	1,366	1,281	1,360	1,221	1,252
Operating liabilities	488	577	592	640	674	728	786	736	804	708	742
NOWC	431	524	505	493	586	556	580	545	556	514	509
NOWC ex cash (NWC)	164	143	186	170	216	233	252	235	257	226	238
NFA	1,164	1,186	1,196	1,191	1,266	1,366	1,476	1,338	1,462	1,489	1,563
Invested capital	\$1,595	\$1,710	\$1,701	\$1,685	\$1,852	\$1,923	\$2,056	\$1,883	\$2,018	\$2,003	\$2,072
Marketable securities	196	105	223	322	322	322	322	322	322	322	322
Total assets	\$2,279	\$2,392	\$2,515	\$2,647	\$2,849	\$2,972	\$3,164	\$2,941	\$3,144	\$3,033	\$3,137
Short-term and long-ter	\$244	\$192	\$224	\$249	\$336	\$336	\$336	\$336	\$336	\$336	\$336
Other liabilities	353	294	319	315	315	315	315	315	315	315	315
Debt/equity-like securit	-	-	-	-	-	-	-	-	-	-	-
Equity	1,194	1,329	1,381	1,442	1,523	1,594	1,727	1,554	1,689	1,674	1,743
Total supplied capital	\$1,791	\$1,815	\$1,924	\$2,006	\$2,174	\$2,245	\$2,378	\$2,205	\$2,340	\$2,325	\$2,394
Total liabilities and equi	\$2,279	\$2,392	\$2,515	\$2,647	\$2,849	\$2,972	\$3,164	\$2,941	\$3,144	\$3,033	\$3,137

Appendix 7: Common Size Balance Sheets

Financial Information				Base Case				Bull Case		Bear Case	
Items	Dec-12	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-17	Dec-18	Dec-17	Dec-18
<b>Common Size</b>											
Cash	11.7%	15.9%	12.7%	12.2%	13.0%	10.9%	10.4%	10.5%	9.5%	9.5%	8.7%
Operating assets ex cas	28.6%	30.1%	30.9%	30.6%	31.2%	32.3%	32.8%	33.0%	33.8%	30.8%	31.2%
Operating assets	40.3%	46.0%	43.6%	42.8%	44.2%	43.2%	43.2%	43.6%	43.3%	40.3%	39.9%
Operating liabilities	21.4%	24.1%	23.5%	24.2%	23.7%	24.5%	24.8%	25.0%	25.6%	23.3%	23.7%
NOWC	18.9%	21.9%	20.1%	18.6%	20.6%	18.7%	18.3%	18.5%	17.7%	16.9%	16.2%
NOWC ex cash (NWC)	7.2%	6.0%	7.4%	6.4%	7.6%	7.8%	8.0%	8.0%	8.2%	7.5%	7.6%
NFA	51.1%	49.6%	47.6%	45.0%	44.4%	46.0%	46.7%	45.5%	46.5%	49.1%	49.8%
Invested capital	70.0%	71.5%	67.6%	63.7%	65.0%	64.7%	65.0%	64.0%	64.2%	66.1%	66.1%
Marketable securities	8.6%	4.4%	8.8%	12.2%	11.3%	10.8%	10.2%	10.9%	10.2%	10.6%	10.3%
Total assets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Short-term and long-ter	10.7%	8.0%	8.9%	9.4%	11.8%	11.3%	10.6%	11.4%	10.7%	11.1%	10.7%
Other liabilities	15.5%	12.3%	12.7%	11.9%	11.1%	10.6%	10.0%	10.7%	10.0%	10.4%	10.0%
Debt/equity-like securit	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Equity	52.4%	55.6%	54.9%	54.5%	53.5%	53.6%	54.6%	52.8%	53.7%	55.2%	55.6%
Total supplied capital	78.6%	75.9%	76.5%	75.8%	76.3%	75.5%	75.2%	75.0%	74.4%	76.7%	76.3%
Total liabilities and equi	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix 8: Ratio Analysis

Financial Information				Base Case				Bull Case		Bear Case	
Items	Dec-12	Dec-13	Dec-14	Dec-15	Dec-16	Dec-17	Dec-18	Dec-17	Dec-18	Dec-17	Dec-18
<b>Ratios</b>											
<b>Profitability</b>											
Gross margin	33.6%	35.9%	36.5%	39.8%	38.5%	39.0%	39.0%	39.8%	39.8%	34.0%	36.0%
Operating (EBIT) margin	12.5%	11.2%	12.4%	16.2%	17.4%	18.0%	18.0%	17.8%	17.8%	13.5%	14.5%
Net profit margin	8.4%	7.9%	9.4%	11.2%	11.9%	12.3%	12.3%	12.1%	12.1%	9.1%	9.8%
<b>Activity</b>											
NFA (gross) turnover		1.83	1.98	2.12	2.20	2.21	2.21	2.26	2.30	2.05	1.95
Total asset turnover		0.92	0.96	0.98	0.98	1.00	1.02	1.02	1.06	0.96	0.96
<b>Liquidity</b>											
Op asset / op liab	1.88	1.91	1.85	1.77	1.87	1.76	1.74	1.74	1.69	1.73	1.69
NOWC Percent of sales		22.2%	21.8%	19.7%	20.0%	19.6%	18.1%	19.2%	17.1%	19.4%	17.2%
<b>Solvency</b>											
Debt to assets	10.7%	8.0%	8.9%	9.4%	11.8%	11.3%	10.6%	11.4%	10.7%	11.1%	10.7%
Debt to equity	20.4%	14.4%	16.2%	17.3%	22.1%	21.1%	19.5%	21.6%	19.9%	20.1%	19.3%
Other liab to assets	15.5%	12.3%	12.7%	11.9%	11.1%	10.6%	10.0%	10.7%	10.0%	10.4%	10.0%
Total debt to assets	26.2%	20.3%	21.6%	21.3%	22.9%	21.9%	20.6%	22.1%	20.7%	21.5%	20.8%
Total liabilities to as	47.6%	44.4%	45.1%	45.5%	46.5%	46.4%	45.4%	47.2%	46.3%	44.8%	44.4%
Debt to EBIT	1.00	0.79	0.77	0.61	0.72	0.64	0.59	0.64	0.59	0.88	0.78
EBIT/interest	26.41	42.47	51.30	55.39	51.24	49.78	53.79	49.78	54.41	36.30	40.92
Debt to total net op ci	15.3%	11.2%	13.2%	14.8%	18.1%	17.5%	16.3%	17.9%	16.7%	16.8%	16.2%
<b>ROIC</b>											
NOPAT to sales		8.1%	8.9%	11.4%	12.1%	12.5%	12.5%	12.4%	12.4%	9.4%	10.1%
Sales to IC		1.30	1.38	1.50	1.53	1.54	1.58	1.58	1.65	2.83	1.46
Total		10.5%	12.3%	17.0%	18.4%	19.3%	19.8%	19.5%	20.4%	26.5%	14.7%
Total using EOY IC	10.6%	10.2%	12.3%	17.1%	17.6%	18.9%	19.1%	19.3%	19.7%	13.3%	14.4%
<b>ROE</b>											
<b>5-stage</b>											
EBIT / sales		11.2%	12.4%	16.2%	17.4%	18.0%	18.0%	17.8%	17.8%	13.5%	14.5%
Sales / avg assets		0.92	0.96	0.98	0.98	1.00	1.02	1.02	1.06	0.96	0.96
EBT / EBIT		97.6%	105.5%	98.2%	98.0%	98.0%	98.1%	98.0%	98.2%	97.2%	97.6%
Net Income / EBT		71.8%	71.7%	70.3%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%
ROA		7.3%	9.0%	11.0%	11.6%	12.3%	12.6%	12.3%	12.8%	8.8%	9.5%
Avg assets / avg equity		1.85	1.81	1.83	1.85	1.87	1.85	1.88	1.88	1.84	1.81
ROE		13.5%	16.3%	20.0%	21.6%	22.9%	23.3%	23.2%	24.1%	16.2%	17.1%
<b>3-stage</b>											
Net Income / sales		7.9%	9.4%	11.2%	11.9%	12.3%	12.3%	12.1%	12.1%	9.1%	9.8%
Sales / avg assets		0.92	0.96	0.98	0.98	1.00	1.02	1.02	1.06	0.96	0.96
ROA		7.3%	9.0%	11.0%	11.6%	12.3%	12.6%	12.3%	12.8%	8.8%	9.5%
Avg assets / avg equity		1.85	1.81	1.83	1.85	1.87	1.85	1.88	1.88	1.84	1.81
ROE		13.5%	16.3%	20.0%	21.6%	22.9%	23.3%	23.2%	24.1%	16.2%	17.1%
<b>Payout Ratio</b>											
Payout Ratio		49.9%	49.0%	47.7%	22.4%	21.7%	21.7%	21.9%	21.9%	29.2%	27.1%
<b>Retention Ratio</b>											
Retention Ratio		50.1%	51.0%	52.3%	77.6%	78.3%	78.3%	78.1%	78.1%	70.8%	72.9%
<b>Sustainable Growth Rate</b>											
Sustainable Growth Rate		6.7%	8.3%	10.5%	16.7%	17.9%	18.2%	18.1%	18.8%	11.4%	12.5%

Appendix 9: Full Comps Sheet

Ticker	Name	Current Price		Price Change					Earnings Growth					P/E		P/C/F		LT Debt/ S&P		LTM Dividend			
		Value	1 day	1 Mo	3 Mo	6 Mo	52 Wk YTD	LTG	NTM	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
AOS	SMITH (A O) CORP	\$48.24	0.8	(2.0)	(2.1)	17.9	24.8	25.9	11.5	9.4%	18.4%	29.5%	15.8%	13.1%	13.1%	1.51	21.2%	21.2%	0.99%	24.9%			
5947-JP	RINNAI CORP	\$80.69	0.1	1.1	(0.5)	8.0	(10.3)	(12.0)	0.2	2.3%	-23.6%	9.7%	9.9%	5.5%	7.0%	0.50	7.0%	7.0%	0.86%	20.1%			
5943-JP	NORITZ CORP	\$17.28	0.3	1.1	(4.3)	10.4	12.0	9.4	11.8	2.3%	-52.0%	-213.1%	-172.5%	132.0%	132.0%	0.72	0.0%	0.0%	1.57%	147.6%			
500031-IN	BAJAJ ELECTRICALS	\$3.08	(1.1)	(3.3)	(23.1)	(6.5)	(2.0)	(0.3)	7.2	2.6%	100.0%	-800.0%	42.9%	20.0%	-8.4%	1.38	12.8%	12.8%	3.93%	3.38%			
SIE-DE	SIEMENS AG	\$121.10	0.5	7.9	11.6	32.5	29.2	28.8	11.8	2.6%	-11.3%	7.7%	9.9%	8.0%	-1.3%	0.94	72.4%	72.4%	3.38%	3.38%			
009450-KR	KYUNG DONG NAVIEN	\$35.85	(5.3)	(8.2)	(29.1)	(15.8)	34.9	38.6	7.2	2.6%	-20.5%	66.7%	156.4%	45.4%	16.2%	0.63	5.1%	5.1%	0.21%	4.0%			
9911-TW	TAIWAN SAKURA	\$0.98	(4.0)	(12.3)	(18.9)	(4.1)	49.5	46.2	7.1	7.1%	15.4%	0.0%	-6.7%	7.1%	17.6%	1.34	17.6%	17.6%	0.93%	2.64%			
1169-HK	HAIER ELECTRONICS	\$1.53	0.0	(6.2)	(7.8)	7.4	(22.8)	(24.6)	15.0	4.8%	42.1%	14.8%	9.7%	14.7%	20.8%	0.80	11.5%	11.5%	1.89%	49.1%			
000333-CN	MIDEA GROUP CO LTD	\$4.07	0.6	(2.4)	8.2	19.7	33.9	29.3	14.9	4.8%	42.1%	14.8%	9.7%	14.7%	20.8%	0.80	11.5%	11.5%	1.57%	22.5%			
Average		\$15.815	(0.9)	(2.7)	(7.3)	7.7	16.6	15.7	10.1	5.3%	8.6%	-109.4%	8.2%	29.3%	9.8%	1.03	15.4%	15.4%	1.89%	49.1%			
Median		\$4.196	0.1	(2.4)	(4.3)	8.0	24.8	25.9	11.7	4.8%	2.1%	7.7%	9.9%	14.7%	11.6%	0.94	8.3%	8.3%	1.57%	22.5%			
SPX	S&P 500 INDEX	\$2,269	0.2	2.5	5.0	13.4	10.1	11.0			7.7%	1.2%	7.6%	12.4%									

Ticker	Website	2016 ROE	P/B	Price Change					Earnings Growth					P/E		P/C/F		LT Debt/ S&P		LTM Dividend		
				1 day	1 Mo	3 Mo	6 Mo	52 Wk YTD	LTG	NTM	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
AOS	http://www.aosmith.com	19.8%	6.03	23.2	24.2	26.3	26.4	24.1	26.4	23.3	10.8%	3.31	17.3%	17.3%	17.3%	17.3%	9.7%	9.7%	11.2%	\$8.00		
5947-JP	http://www.rinnai.co.jp	8.4%	1.87	18.6	24.4	22.2	21.8	21.3	20.2	19.2	7.7%	1.71	10.5%	9.0%	12.3	14.4	13.2	0.7%	11.2%	\$43.05		
5943-JP	http://www.noritz.co.jp	-3.7%	0.93	13.6	28.3	24.4	22.2	21.8	21.3	20.2	7.7%	1.71	10.5%	9.0%	12.3	14.4	13.2	0.7%	11.2%	\$18.57		
SIE-DE	http://www.siemens.com	16.4%	2.70	17.7	17.7	16.4	16.5	16.1	15.0	13.8	6.9%	1.14	9.3%	8.8%	14.1	11.2	10.1	1.3%	-1.6%	1.6%		
500031-IN	http://www.bajajelectricals.com	12.9%	2.83	43.2	54.3	32.6	16.5	22.0	21.3	15.4	12.8	2.0%	0.45	4.9%	11.2%	10.1	1.3%	-1.6%	1.6%	\$44.90		
009450-KR	http://www.kdnavien.co.kr	7.2%	2.35	43.2	54.3	32.6	16.5	22.0	21.3	15.4	12.8	2.0%	0.45	4.9%	11.2%	10.1	1.3%	-1.6%	1.6%	\$1.09		
9911-TW	http://www.sakura.com.tw	0.0%	1.80	11.8	10.2	10.2	9.8	9.1	8.9	7.5	3.2%	1.04	12.7%	12.2%	5.9	9.1	9.4	4.6%	8.1%	\$0.54		
1169-HK	http://www.haier-elec.com.hk	17.8%	1.81	21.4	15.1	13.1	11.8	11.3	12.0	10.4	9.3%	1.22	10.5%	18.7%	10.2	9.0	13.7	13.5%	13.5%	\$0.84		
000333-CN	http://www.midea.com.cn	23.6%	3.10	22.0	23.5	20.4	17.7	16.4	17.3	13.4	5.3%	1.22	10.5%	28.6%	9.3	9.5	7.5	9.7%	13.2%	\$1.31		
Average		11.4%	2.60	22.0	23.5	20.4	17.7	16.4	17.3	13.4	5.3%	1.22	10.5%	12.2%	12.2	10.3	11.8	6.8%	4.1%	8.9%		
Median		12.9%	2.35	20.9	21.0	22.0	16.5	16.1	15.0	12.8	5.6%	1.09	9.9%	11.2%	12.3	9.7	9.8	7.1%	4.1%	10.7%		
SPX	S&P 500 INDEX			20.9	19.4	19.2			17.9	15.9												

Ticker	Name	Current Price	Market Value	Price Change					Earnings Growth					P/E		P/C/F		LT Debt/ S&P		LTM Dividend		
				1 day	1 Mo	3 Mo	6 Mo	52 Wk YTD	LTG	NTM	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
AOS	SMITH (A O) CORP	\$47.35	\$8,235	(0.7)	(2.6)	(4.1)	7.5	21.4	23.6	11.5	9.4%	18.4%	29.5%	15.8%	13.1%	1.51	21.2%	21.2%	1.01%	24.9%		
aaon-us	AAON INC	\$33.05	\$1,744	(1.5)	0.5	14.7	20.1	39.6	42.7	12.0	6.0%	-23.6%	9.7%	9.9%	5.5%	16.6%	10.6	0.0%	0.73%	21.6%		
fbhs-us	FORTUNE BRANDS HOME & SECUR	\$53.46	\$8,249	(1.1)	(3.1)	(8.0)	(7.8)	(5.0)	(3.7)	15.7	19.4%	-52.0%	-213.1%	-172.5%	132.0%	39.3%	11.6	67.2%	1.20%	24.8%		
lbp-us	INSTALLED BLDG PRODUCTS INC	\$41.30	\$1,300	(0.4)	(0.5)	15.1	13.8	67.6	66.3	6.3	50.6%	100.0%	-800.0%	42.9%	20.0%	0.77	99.8%	99.8%	0.00%			
tile-us	INTERFACE INC	\$18.55	\$1,202	(1.6)	6.6	11.1	21.6	(5.7)	(3.1)	6.8%	-11.3%	7.7%	9.9%	8.0%	53.6%	1.25	53.7%	1.19%				
wso-us	WATSCO INC	\$148.12	\$5,262	(0.6)	(0.6)	5.1	5.3	25.7	26.5	15.0	12.7%	-20.5%	66.7%	156.4%	45.4%	14.2%	0.83	21.2%	2.43%	64.2%		
awit-us	ARMSTRONG WORLD INDUSTRIES	\$41.80	\$2,307	(1.6)	0.2	1.2	6.8	4.6	5.5	18.8	11.7%	-100.0%	-6.7%	18.2%	38.9%	1.74	30.5%	0.00%				
ssd-us	SIMPSON MANUFACTURING INC	\$43.75	\$2,080	(1.2)	(7.2)	(0.5)	9.5	27.2	28.1	13.0	-26.1%	15.4%	0.0%	-6.7%	7.1%	18.8%	1.63	0.0%	1.60%	38.0%		
bid-us	TOPBUILD CORP	\$35.60	\$1,354	(0.9)	(1.9)	7.2	(1.7)	15.7	15.7	15.7	42.1%	14.8%	9.7%	14.7%		0.49	17.1%	17.1%	0.00%			
Average		\$3,526	\$1,100	(1.0)	4.7	8.3	21.2	22.4	14.3	11.3%	8.6%	-109.4%	8.2%	29.3%	28.9%	1.16	67.9%	67.9%	0.91%	34.7%		
Median		\$2,080	(1.1)	(0.6)	5.1	7.5	21.4	23.6	14.0	10.6%	2.1%	7.7%	9.9%	14.7%	21.2%	1.16	21.6%	21.6%	1.01%	24.9%		
SPX	S&P 500 INDEX	\$2,239		(0.5)	1.8	3.3	6.7	8.5	9.5		7.7%	1.2%	7.6%	12.4%								

Ticker	Website	2016 ROE	P/B	Price Change					Earnings Growth					P/E		P/C/F		LT Debt/ S&P		LTM Dividend		
				1 day	1 Mo	3 Mo	6 Mo	52 Wk YTD	LTG	NTM	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
AOS	http://www.aosmith.com	19.8%	5.92	23.2	24.2	26.3	26.4	24.1	26.4	23.3	10.8%	3.31	17.3%	17.3%	17.3%	17.3%	9.7%	9.7%	11.2%	\$8.00		
aaon-us	http://www.aaon.com	93.6%	8.52	7.6	10.0	9.1	32.4	30.6	8.3	7.9	7.8%	0.71	21.0%	17.3%	17.3%	24.3	20.9	10.4%	8.0%	\$3.88		
fbhs-us	http://www.fbhs.com	-4.5%	3.50	42.1	87.6	-77.5	21.4	17.9	106.9	46.1	-5.9%	4.53	12.8%	9.4%	18.8	15.7	18.3	8.0%	7.5%	7.2%		
tile-us	http://www.instalbuildngprod.com	3.1%	9.12	-4130.0	-2065.0	295.0	35.3	23.4	206.5	172.1	0.6%	1.87	11.0%	13.0%	12.3	20.0%	20.0%	0.8%		\$15.29		
lbp-us	http://www.interfaceglobal.com	126.5%	3.18	2.4	2.7	2.5	17.8	16.7	23.2	2.1	0.6%	0.01	7.6%	14.2%	19.9	18.2	2.8%	2.8%	5.3%	\$4.53		
wso-us	http://www.watSCO.com	3.8%	5.06	178.5	224.4	134.7	29.3	26.0	52.5	36.1	8.9%	12.05	8.1%	13.3%	12.9	9.3	13.3	6.9%	5.5%	7.7%		
awit-us	http://www.armstrong.com	0.0%	8.92	597.1	23.4	20.9	380.0	321.5	597.1	3.1%	20.1	3.1%	20.1	3.1%	20.1	9.3	13.3	6.9%	-2.7%	\$29.25		
ssd-us	http://www.simpsonmfg.com	0.8%	2.42	336.5	291.7	291.7	14.9	20.2	312.5	291.7	0.1%	0.22	16.2%	7.9%	12.1	16.7	17.7	4.0%	6.6%	7.4%		
bid-us	http://www.topbuild.com	1.2%	1.42	187.4	131.9	114.8	104.7	91.3	104.7	91.3	0.1%	0.06	7.5%	7.7%	14.9	12.1	12.1	6.6%	7.4%	\$18.11		
Average		27.1%	5.34	-419.0	-77.3	99.6	25.0	22.4	133.3	110.2	2.9%	2.84	12.3%	12.4%	16.1	16.0	17.6	8.4%	6.9%	5.7%		
Median		3.1%	5.06	32.6	87.6	70.6	24.6	22.2	104.7	46.1	0.6%	1.29	11.0%	13.0%	16.4	16.2	18.0	7.4%	6.6%	7.4%		
SPX	S&P 500 INDEX			20.6	19.2	19.0			17.6	15.7												

Appendix 10: DCF Calculations

	Year						
	1	2	3	4	5	6	7
	First Stage		Second Stage				
Cash flows	2017	2018	2019	2020	2021	2022	2023
Sales Growth	7.9%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
NOPAT / S	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
S / NWC	12.50	12.50	12.50	12.50	12.50	12.50	12.50
S / NFA (EOY)	2.13	2.13	2.13	2.13	2.13	2.13	2.13
S / IC (EOY)	1.82	1.82	1.82	1.82	1.82	1.82	1.82
ROIC (EOY)	22.8%	22.8%	22.8%	22.8%	22.8%	22.8%	22.8%
ROIC (BOY)		24.0%	24.0%	24.0%	24.0%	24.0%	24.0%
Share Growth		-2.0%	-2.0%	-2.0%	-2.0%	-2.0%	-2.0%
Sales	\$2,911	\$3,145	\$3,396	\$3,668	\$3,962	\$4,279	\$4,621
NOPAT	\$364	\$393	\$425	\$459	\$496	\$535	\$578
Growth		8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
- Change in NWC	17	19	20	22	23	25	27
NWC EOY	233	252	272	293	317	342	370
Growth NWC		8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
- Chg NFA	100	110	118	128	138	149	161
NFA EOY	1,366	1,476	1,595	1,722	1,860	2,009	2,169
Growth NFA		8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Total inv in op cap	117	129	138	149	161	174	188
Total net op cap	1599	1728	1866	2016	2177	2351	2539
FCFF	\$247	\$265	\$287	\$310	\$334	\$361	\$390
% of sales	8.5%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
Growth		7.3%	8.3%	8.0%	8.0%	8.0%	8.0%
- Interest (1-tax rate)	7	7	8	9	9	10	11
Growth		0.0%	8.0%	8.0%	8.0%	8.0%	8.0%
FCFE w/o debt	\$239	\$257	\$279	\$301	\$325	\$351	\$379
% of sales	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Growth		7.5%	8.3%	8.0%	8.0%	8.0%	8.0%
/ No Shares	169.9	166.4	163.1	159.8	156.6	153.5	150.4
FCFE	\$1.41	\$1.55	\$1.71	\$1.88	\$2.08	\$2.29	\$2.52
Growth		9.7%	10.5%	10.2%	10.2%	10.2%	10.2%
* Discount factor	0.90	0.80	0.72	0.65	0.58	0.52	0.47
Discounted FCFE	\$1.26	\$1.24	\$1.23	\$1.22	\$1.20	\$1.19	\$1.18
<b>Third Stage</b>							
Terminal value P/E							
Net Income	\$357	\$386	\$417	\$450	\$486	\$525	\$567
% of sales	12.3%	12.3%	12.3%	12.3%	12.3%	12.3%	12.3%
EPS	\$2.10	\$2.32	\$2.56	\$2.82	\$3.10	\$3.42	\$3.77
Growth		10.5%	10.2%	10.2%	10.2%	10.2%	10.2%
Terminal P/E							20.00
* Terminal EPS							\$3.77
Terminal value							\$75.42
* Discount factor							0.47
Discounted terminal value							\$35.20
First stage	\$2.51	Present value of first 2 year cash flow					
Second stage	\$6.02	Present value of year 3-7 cash flow					
Third stage	\$35.20	Present value of terminal value P/E					
Value (P/E)	\$43.74	= value at beg of fiscal yr 2017					

Appendix 11: Calculation of NTM ROE and P/B (Today)-Domestic Comps

	NTM Net income	now equity	NTM equity	avg equity	NTM ROE	P/B-today
MAS-US	608	56	82	69		
FBHS-US	487	2404	2748	2576	19%	3.5
AOS-US	318	1521	1587	1554	20%	5.9
LII-US	336	45	80	62.5		
ALLE-US	358	223	428	325.5		
WSO-US	191	1144	1168	1156	17%	4.2
AWI-US	136	255	398	326.5	42%	8.2
SSD-US	96.7	887.5	929.9	908.7	11%	2.3
TREX-US	80.7	125.3	201.6	163.45	49%	15.5
APOG-US	84	406	469	437.5	19%	3.9
BLD-US	89	960	960	960	9%	1.4
IBP-US	59.3	154.8	216.7	185.75	32%	8.4
BMCH-US	81	685	764	724.5	11%	6.0
BLDR-US	114	308	428	368	31%	4.0
AMWD-US	69	281	348	314.5	22%	3.5
TILE-US	77.2	390.7	451.6	421.15	18%	3.1
GFF-US	39	410.9	449.9	430.4	9%	6.8
NCS-US	69	301	380	340.5	20%	3.3
PGEM-US	93	6	102	54		
CBPX-US	51.8	316.5	346.8	331.65	16%	2.9
NX-US	32.2	367.8	406.1	386.95	8%	1.5
PGTI-US	33.3	133.2	167.7	150.45	22%	4.4
AFI-US	23	622	636	629	4%	0.9
LYTS-US	5.4	155.5	160.5	158	3%	1.6

Appendix 12: Determining mkt unit size + 2016 average price point

	2014	2015	2016	2017	2018	2019	2020	2050
China Pop (M)	1375	1382	1389	1396	1403	1410	1445	1637
Urbanization Rate	56%	57%	58%	58%	59%	60%	62%	70%
Urban pop (M)	771	786	801	816	832	846	889	1146
Urban households (M)	257	262	267	272	277	282	296	382
households	257,125,000	262,028,374	267,025,255	272,117,426	277,306,706	281,944,095	296,362,753	382,024,877
N thousand households	257,125	262,028	267,025	272,117	277,307	281,944	296,363	382,025
unit sales rate per 1k urban households	19	23	28	33	36	40	43	70
mkt unit sales	4,885,375	6,026,653	7,476,707	8,979,875	9,983,041	11,277,764	12,743,598	26,741,741
mkt unit sales (M)	4.89	6.03	7.48	8.98	9.98	11.28	12.74	26.74
avg retail price 2016			mkt ~\$2B in 2016 per CMM 2 billion/7,476,707					
			\$ 267					

Source: IMCP, company reports



**Appendix 13: SWOT Analysis**

<b>Strengths</b>	<b>Weaknesses</b>
Foreign brand name	Increased advertising expenses in ROW
Foreign comp leading operating margin	No steel hedging
Foreign comp leading net profit margin	Middling ROE compared to domestic comps
<b>Opportunities</b>	<b>Threats</b>
Air purification market	Global economic slowdown
Commercial water heating leasing	Chinese economic transition stall
Urbanization sustains growth	Yuan/Renmibi devaluation
Margin harvesting in ROW	Possible future technological obsolescence

**Appendix 14: Porter’s Five Forces**

Threat of New Entrant

A new competitor would need to build large plants and purchase steel in large quantities to achieve economies of scale similar to what AOS in its water heater operations. However, the water treatment and air purification products face lower barriers to entry from a capital-intensive perspective, and face the highest possibility of competition from improved technology. AOS insulates itself by catering to the premium product market, where most low cost competition would service the consumers AOS does not target.

Threat of Substitutes-Medium

Residents do not purchase water heaters often enough to develop brand loyalty. Therefore, when the must purchase one, they purchase one that feeds their needs/space regardless of brand. In China, the threat of substitutes in the premium market is somewhat low. AOS has a foreign-brand, and that draws Chinese consumers, as they trust Chinese companies less than they trust foreign companies.

Supplier Power-Low

AOS buys commodity steel. Suppliers hold very little power as AOS can switch suppliers rather easily should prices deviate too much from the market.

Buyer Power- Moderate (commercial), Low (retail)

The top five commercial customers account for 38% of 2015 sales. AOS may lower premium product prices to keep its business with this buyer. Residential consumers view purchasing a water heater as a once in a decade hassle and will pay up to guarantees they will not have to deal with it for 10 years, price is not a factor.

Intensity of Competition-High

Over a dozen companies alone in China and more in North America supply the water heater industry. Ecommerce platforms increase margins, but also make competition global.