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Studies in Applied Finance

**INVESTMENT THESIS FOR
FIRST SOLAR , INC.
(NASDAQ: FSLR)**

Andrew Timmons

Johns Hopkins Institute for Applied Economics,
Global Health, and the Study of Business
Enterprise



Investment Thesis for First Solar (NASDAQ: FSLR)

By Andrew Timmons

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About the Series

The studies in Applied Finance Series is under the general direction of Professor Steve H. Hanke (hanke@jhu.edu), Co-Director of The Johns Hopkins Institute of Applied Economics, Global Health, and study of Business Enterprise and Dr. Hesam Motlagh (hnekoor1@jhu.edu), a Fellow at The Johns Hopkins Institute of Applied Economics, Global Health, and study of Business Enterprise.

This working paper is one in a series on applied financial economics, which focuses on company valuations. The authors are mainly students at The Johns Hopkins University in Baltimore who have conducted their work at the Institute as undergraduate researchers.

Author

Andrew Timmons (atimmon1@jhmi.edu) is a Ph.D. Candidate at the Johns Hopkins Hospital in the Pharmacology and Molecular Sciences graduate program. He conducted the research for this paper while taking Prof. Hanke's Applied Economics and Finance course at the Johns Hopkins Institute of Applied Economics, Global Health, and study of Business Enterprise during the fall of 2017. Currently, Andrew is concluding his Ph.D. work and preparing to graduate in the fall of 2018.

Summary

This work is an in-depth financial analysis of First Solar (FSLR). We examine historical trends, present cash flows, and future earning potential to assess the investment potential of FSLR at current market prices. Using a probabilistic discounted cash flow model (pDCF) paired with Monte Carlo Analysis, we calculate an objective share price along with a quantitative measure of the uncertainty implicit in our model. In addition, we include an analysis of proxy statements and executive compensation plans to educate assumptions on how executives will manage the business moving forward.

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Keywords: FSLR, First Solar, Discounted Cash Flow, Monte Carlo, Investment Thesis, Simulation



PRICE TARGET (\$41.63, -10.00%)

Investment Thesis – Andrew Timmons

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| | |
|---------------------------------|-------------------|
| Date | 9/27/2017 |
| Fiscal year ends | 12/16 |
| Current Price | \$46.26 |
| 52 Week High (Date) | \$51.84 (9/15/17) |
| 52 Week Low (Date) | \$25.56 (4/06/17) |
| Market Cap (mn) | \$5091.4 |
| Enterprise Value (mn) | \$3183.3 |
| Total Debt (mn) | \$321 |
| Net Debt/EV | 10.08% |
| Cash (mn) | \$2229.1 |
| Cash/Share | \$21.35 |
| Dividend | None |
| Shares Outstanding/Float | 104.4 (77.1) |
| Current P/E | 26.01 |
| 2019 P/E (EPS) | 19.813 (\$2.46) |
| 2018 P/E (EPS) | 36.939 (\$1.32) |
| 2017 P/E (EPS) | 21.594 (\$2.26) |
| 2016 EPS | \$5.17 |
| 2015 EPS | \$5.47 |
| 2014 EPS | \$3.91 |

Executive Summary

First Solar (NASDAQ: FSLR) is a company that designs, manufactures, installs, and maintains photovoltaic (PV) solar systems. FSLR is a world leader in the solar industry, and has developed a strong vertically integrated position. FSLR sells the majority of their products to large utility-scale installations, often implementing solar modules that they design and manufacture. FSLR only manufactures PV modules of the cadmium-telluride (CdTe) type, which are continually improved via their research programs. In 2018 FSLR will begin shipping its new line of solar modules, the Series 6, which will replace the current Series 4 design. As such, FSLR has incurred substantial restructuring costs within the past year. Restructuring costs and low margins have resulted in negative earnings before taxes (EBT) values in 2012 and 2016. FSLR qualifies these negative EBT values as deferred tax assets, which make up a substantial portion of the assets held by FSLR. We believe that over the ten years of our model, FSLR will struggle to increase margins, revenues, and free cash flows (FCF). We argue that foreign competition will ultimately prevent FSLR from leveraging its position as a leader in the sector to generate FCF. Through discounted cash flow (DCF) analysis, we find that FSLR's future performance is unable to justify the current share price. As such, we are rating FSLR a **sell** with a price target of \$41.63.

Catalysts and Risks

Catalysts

- Conversion of business focus to series 6 modules will lower overhead costs. According to management guidance, the series 6 modules exhibit higher efficiency and lower manufacturing costs. The 2018 conversion to series 6 production will lower costs of goods sold (COGS) which is currently >65% of revenues yielding a more favorable gross margin structure.
- Technological differences between CdTe and traditional silicon crystal modules will decrease future competition. CdTe modules exhibit greater flexibility than silicon crystal modules that make them advantageous to implement for large-scale installations. They operate better at a wider range of temperatures and light conditions. We believe that competition with silicon crystal modules for large-scale installations will diminish in the next five years.
- CdTe installations have a multi-decade lifespan, on which FSLR provides operational maintenance. As of the end of 2016 FSLR reported 7.1 Gigawatts (GW) of solar capacity under maintenance contracts, which represents a sustainable and growing income stream.

Risks

- Solar energy is an intensely competitive and capital-intensive industry. To remain competitive FSLR maintains a robust research program as well as narrow margins to decrease the eventual cost per Megawatt (MW) of energy generated. An inability to increase margins will decrease the overall cash that FSLR can return to shareholders.
- Reduction of government programs to incentivize solar energy could decrease the commercial viability of solar energy. This is especially true in the United States, which is the major area of business for FSLR.
- Global demand for solar products may decrease, resulting in reduced profit margins and increased supply.



Fig. 1 – 5 Year trailing performance of FSLR (blue) and the NASDAQ composite index (orange). Over the past five years, FSLR has underperformed the NASDAQ composite index, especially in 2016 where decreasing revenues suppressed stock price. Data sourced from Bloomberg using the <GP> command.

Company Description and Performance

FSLR is a vertically integrated designer and manufacturer of solar panels and utility-scale solar systems. Incorporated in Delaware, FSLR became a public company in November of 2006. FSLR markets its products on 6 continents, and has production facilities in multiple countries. Due to growing demand for alternative energy energy FSLR has been able to leverage several tax incentives, including a 100% tax holiday in Myanmar through 2027. FSLR offers solar systems at a competitive cost-per-watt basis, which are often cheaper to install and operate than traditional fossil fuel systems. FSLR has also seen strong growth in their operations and maintenance revenues, in which they contractually operate and maintain the solar energy systems. Currently, they have maintenance contracts for 7.1GW of production capacity in the US and abroad.

Despite the growth of the solar industry overall, FSLR has struggled to outperform benchmarks and has underperformed the NASDAQ since the beginning of 2016 (Figure 1). We believe that the root causes of this underperformance will persist in our 10-year model forecast. As we explain in detail, we postulate that FSLR will face significant headwinds in increasing revenues and translating those revenues into bottom line growth. Large capital requirements to remain competitive and vulnerability to policy changes make FSLR an unattractive asset to hold long term. Ultimately, we believe that Chinese exports will continue to dominate the solar technology market. We see no near-term way in which FSLR will sufficiently differentiate itself from competition, and will be subjected to stagnant revenues and declining earnings.

Business Segments

FSLR operates and reports revenues in two distinct business segments- a components segment and a systems segment. The components segment covers all of the business that involves the design,

manufacture and sale of solar modules. The systems segment covers all of the business that involves the development, planning, construction, operation and maintenance of PV systems. There is substantial integration between the two business segments, in which the systems designed by FSLR primarily use the components manufactured by FSLR.

Historical Performance

The historical performance of FSLR has closely matched macroscale trends in the industry. The per-watt cost for solar energy has fallen dramatically in the past five years as competition and module efficiency increases (Figure 2). With respect to FSLR, this has manifested on the income statement as stagnant top-line revenues and restriction of profit margins. It is this pattern that forms the crux of our investment thesis- competition and necessary capital investments will decrease the amount of FCF that FSLR can generate for shareholders. Figure 2 plots the installed solar energy capacity for the US is plotted along with FSLR revenues (“EIA - Electricity Data”; “FSLR 2016 10K”). In the past 10 years, it is clear that the 2007-2012 period saw substantial growth in FSLR top-line revenues. However, in the five subsequent years, FSLR revenues have plateaued despite the continuance of exponential growth in installed solar capacity. In addition to the attenuation of top-line revenue growth, FSLR has historically shown difficulty in converting top-line revenues into EBT growth (Figure 3). This is primarily due to an overreliance on favorable tax policy and the rapid evolution of PV technologies. We believe such problems will affect FSLR in perpetuity, and cannot be overcome by differentiation or outpacing of competition. In an industry that is rapidly racing to the bottom in terms of price, FSLR will continually grapple with low profit margins and high capital expenditure (CAPEX) costs. Much harder to predict are the

Figure 2 - Historical utility solar prices and FSLR revenue trends

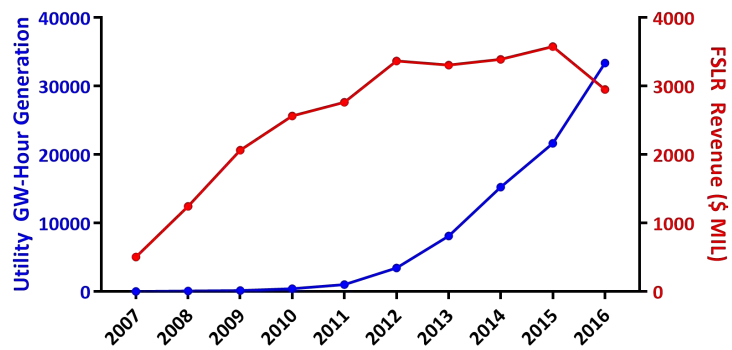


Fig. 2 - FSLR revenues (red, right axis) and utility-scale GW hours of solar electricity produced in the United States (blue, left axis) in the past decade. Substantial growth in utility-scale solar production in the US has occurred over the past 10 years, but FSLR revenues have tapered off and have not correlated with growth of solar energy within the past five years. We believe that this reflects increasing competition that will continually suppress top-line revenues

Figure 3 - FSLR Revenues and EBT over the past 10 years

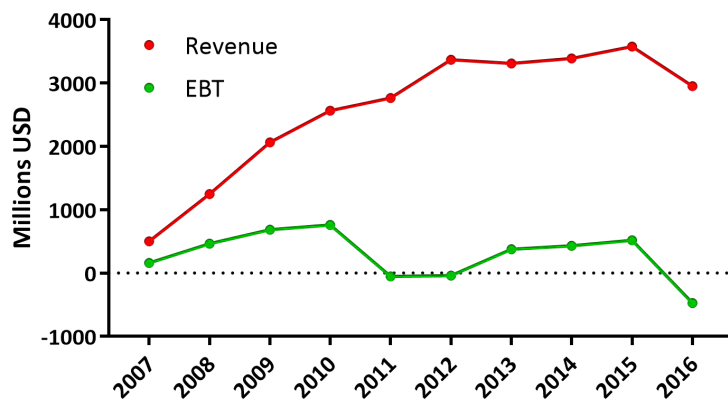


Fig. 3 - FSLR Revenues (red) and EBT (green) over the past ten years. Despite top line growth and expanding market share, FSLR has failed to reliably convert revenues into free cash flows. We believe that this is due to competition within the solar industry that will be impossible to substantially outpace. Due to a predicted inability to return cash to shareholders, we rate FSLR a sell

effects of legislation, which can often cause substantial effects on the overall business strategy. Indeed, in 2012 FSLR incurred a large >\$400mn restructuring cost related to closing of facilities in Germany. These facilities were predicted to have a >10-year lifespan but instead were prematurely closed with FSLR citing 'lack of policy support.'

Investment Thesis

We believe that FSLR will remain a world-leading producer of solar panels over the next decade, but foreign and domestic competition will continually reduce the amount of FCF available to shareholders. Further, periodic restructuring charges and requisite upgrades in manufacturing facilities will result in large corrosive CAPEX and restructuring charges. Historically, FSLR cash flows are highly susceptible to changes in local policies and tax advantages. Changes in tax policy have had a demonstrable negative impact on FSLR revenues and EBT. With what we consider to be bullish estimates of business segment growth, we believe that FSLR will fail to generate FCF for investors, and instead have to focus the majority of resources on maintaining competitiveness.

Market Headwinds

The past ten years have seen exponential growth in solar installations in the US (Figure 2). FSLR has seen a concomitant increase in the number of installations that it implements and maintains. This has not resulted in an increase in revenues, primarily due to plummeting price-per-watt utility scale solar capacity. Figure 4 plots the average price of utility scale solar over the past ten years. It is clear that the price per watt has declined by 78% in the past 8 years (Margolis, Feldman, and Boff). This plummet is fueled in large part by massive increases in the solar output of Asian countries (Figure 5). We believe that US shipments of solar panels will not increase dramatically within the next ten years, and concomitantly the revenues of FSLR will not increase to a point that warrants the current share price.

Figure 4 – The price of solar energy in the US

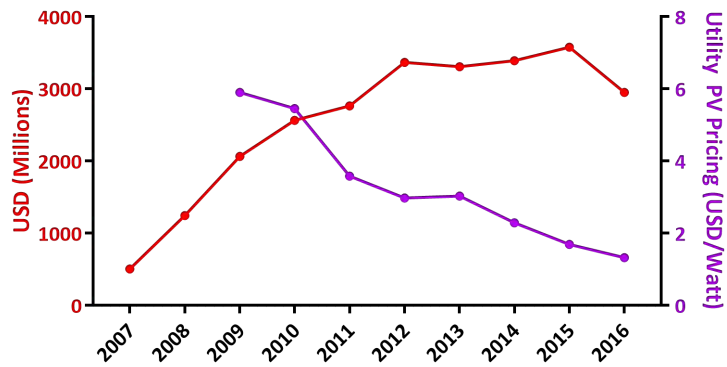


Fig. 4 – FSLR revenues (red) and the average price-per-watt installed (purple) over the past ten years. Since 2009, the utility scale price of solar has fallen 78% and can be expected to keep falling. The decreasing price of solar energy will restrict FSLR’s profit margins and reduce cash returned to shareholders.

Figure 5 – Global shipments of solar panels by region

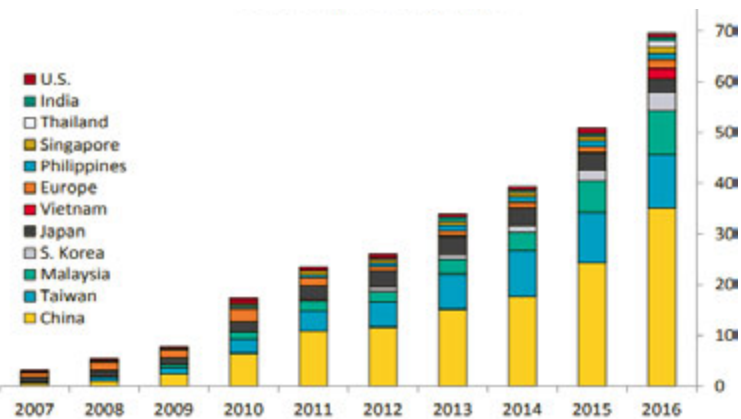


Fig. 5 – Global shipments of solar panels by region. Clearly, China and other Asian countries account for the bulk of solar panels produced (>95% in 2016). There has not been significant growth in the US market, of which FSLR obtains 85% of its revenues.

Model Assumptions

The chief assumptions that we make in our model are:

1. FSLR will incur substantial periodic restructuring costs that account for 25% of revenue.
2. FSLR will report substantially lower revenues in 2018 related to a decreased module output as they ramp up their Series 6 module line
3. FSLR will accumulate deferred tax assets in the form of net operating losses (NOL) as a result of restructuring, and FSLR will immediately utilize these NOL in the following year.
4. The costs of goods sold (COGS) will remain constant for the components and systems business over the next ten years.

We believe that our assumptions are both warranted and bullish. With regards to the restructuring costs, we model a restructuring cost every four years given the cyclical nature of the asset base. We chose this time frame because this was the time between the introduction and phasing out of the Series 4 solar modules. Barring any dramatic breakthrough technologies in PVs, we believe that FSLR will repeatedly have to roll out new, more efficient product lines to maintain a competitive cost-per-watt measure.

Further, in the Management Discussion and Analysis (MD&A) section of the 2016 10-K, FSLR stated that they expect to ship 2.2GW of PV capacity in 2018 as opposed to 3.1GW of capacity in 2017. This is due to FSLR still ramping up production and sales of the Series 6 module. As such, we project a decline in revenues in 2018 corresponding to a scalar adjustment of (2.2/3.1). Our handling of NOL is very bullish, in that we assume that FSLR will immediately be able to utilize these assets to reduce the following year's EBT.

Balance Sheet and Income Trends

Balance Sheet Trends

While our model relies on forward estimates of revenues, inspection of the balance sheet is necessary for assessing both the company's health and its historical patterns of capital deployment. Chiefly, the balance sheet shows decreasing values in property, plants and equipment (PPE) with an associated influx of cash (Table 1). This corresponds with the large sales of production facilities brought on by changes in tax policy.

Table 1 – Selected trends from the Balance Sheet

| (Millions) | Dec 31 2012 | Dec 31 2013 | Dec 31 2014 | Dec 31 2015 | Dec 31 2016 | Q2 2017 (Adj) |
|------------|-------------|-------------|-------------|-------------|-------------|------------------|
| PPE | 1525.38 | 1385.08 | 1402.30 | 1284.14 | 629.14 | 784.937 |
| Cash | 901.29 | 1325.07 | 1482.05 | 1126.83 | 1347.16 | 1509.52 |
| PV systems | 0.00 | 0.00 | 46.39 | 93.74 | 448.60 | 461.617 |

Tbl. 1 – Selected trends from the balance sheet. Notice that PPE decreases with a concomitant increase in cash due to cash sales of production facilities. Also, direct ownership of PV systems has increased substantially.

Because tax calculations are central to our valuation, we made an adjustment to the way that deferred tax assets are reported in the analysis. In 2015, the accounting practices of FSLR changed to remain aligned with FASB-ASU2015, in which all deferred tax assets must be re-classified as long-term assets. We retroactively rearranged previous years' balance sheets to reflect all deferred tax assets as long term assets.

Also denoted within the balance sheet is a trend in which FSLR has substantially increased ownership of PV solar systems. This may represent a shifting in strategy for FSLR where FSLR owns and operates solar plants as opposed to selling them to third parties. If FSLR maintains its accumulation of PV solar systems such that direct electric sales and power-purchase agreements become a substantial portion of revenues, our model will have to be reconsidered.

Income Statement Trends

In addition to the trends revealed in the balance sheet, the income statement provides necessary insight regarding revenue generation and its conversion to bottom-line FCF. These will be most fruitful for informing our forward projections of revenues. Notably, In the past five years FSLR has struggled to increase top line revenues. Indeed, between 2012 and 2016 FSLR reported a negative compounded annual growth rate (CAGR) and a resulting decrease in EBT. Corporate guidance suggests that this trend will continue in the short term as they work to increase the production capacity of the new series 6 modules.

Table 2 – Selected Trends from the Income Statement

| (Millions) | Dec 31 2012 | Dec 31 2013 | Dec 31 2014 | Dec 31 2015 | Dec 31 2016 | Q2 2017 (Adj) |
|---------------|----------------|----------------|----------------|----------------|----------------|------------------|
| Revenue | 3368.55 | 3308.99 | 3391.19 | 3579.00 | 2951.33 | 2518.20 |
| COGS | 2515.80 | 2211.87 | 2320.45 | 2401.90 | 2016.41 | 2640.08 |
| Restructuring | 469.10 | 86.90 | 0.00 | 0.00 | 818.79 | 76.63 |
| EBT | -39.80 | 378.38 | 432.10 | 519.84 | -471.69 | 50.65 |

Tbl. 2 – Selected trends from the Income Statement. Notice that revenues have not increased over the past five years, and that EBT has also struggled to rise. Note that the 2017 adjusted values are projected to the end of the year based on performance in Q1 and Q2.

In addition to stagnant revenue growth, FSLR has also been subjected to high operating expenses related to business restructuring (Table 2). For example, in 2012 FSLR decided to entirely focus on CdTe modules, resulting in substantial costs related to closing production facilities and reconfiguring manufacturing equipment previously used for traditional silicon crystal PV systems. A similar situation is currently unfolding as FSLR restructures to ramp down production of the series 4 module in favor of the series 6 module.

With regards to non-operating expenses, we had to make significant assumptions with regards to tax rates. The tax rate of FSLR is highly variable and contingent upon how they choose to utilize deferred tax assets. We believe that this invalidates historical tax rates as guidance for future tax rates. For future tax rates, we calculate taxes *de novo* and assume immediate utilization of deferred tax assets.

Value Drivers Tab

From the balance sheet and income statement we can calculate a series of ratios pertaining to cash generation, expenses, CAPEX and FCF. Collectively called value drivers, these values will help to inform our assumptions pertaining to expenses and capital allocation.

Table 3 – Selections from Value Drivers

| (Millions) | Dec 31 2012 | Dec 31 2013 | Dec 31 2014 | Dec 31 2015 | Dec 31 2016 | Average |
|---------------------------------------|----------------|----------------|----------------|----------------|----------------|---------|
| COGS net D&A (% of Revenue) | 66.89% | 66.84% | 68.43% | 67.11% | 68.32% | 67.52% |
| Restructuring (% of Revenue) | 13.93% | 2.63% | 0.00% | 0.00% | 27.74% | 8.86% |
| Noncurrent Assets (mn) | 3,516.37 | 3,090.74 | 3,533.97 | 3,970.75 | 3,080.59 | 3438.48 |
| CAPEX (Reported in SCF; % of Revenue) | -11.26% | -8.54% | -7.59% | -4.65% | -7.77% | -7.96% |

Tbl. 3 – Selections from Value Drivers. Note that COGS has consistently been >65% of revenues; a result of foreign competition and price restriction. Additionally, periodic restructuring has resulted in substantial costs in 2012 and 2016.

Factory closures within the past five years have interfered with our ability to denote flows of capital. The reporting of long-term assets is relatively stochastic within the past five years, imparting a high error rate on any average we calculate (Table 3). Because our model hinges on a Monte Carlo simulation, this high level of error would prevent us from reaching an accurate price target. To obtain estimates for CAPEX and associated error, we instead used the values obtained from the statement of cash flows instead of calculating our own CAPEX. The CAPEX reported in the statement of cash flows was much more consistent and very close to the levels of D&A representing a very bullish assumption.

Model Results

Model Tuning Parameters

To inform our model inputs, we analyzed the most recent five years of historical data and identified a series of ratios that are helpful to inform our model. Termed ‘tuning parameters,’ these ratios take into account several different cash inflows and outflows relative to yearly revenues. The first of these model tuning parameters is the Potential Free Cash flow Yield (PFCFY), which represents the maximum amount of cash flow that can be returned to shareholders by making no cash flow investments. Next, Free Cash Flow Return on Invested Capital (FROIC) denotes how well the business converts investment into the business into cash flows for investors. Long Term asset Turnover (LTAT) is simply the ratio of long-term assets to revenues at any given time. Finally, the ratio of long term assets to invested capital (LTA/IC) depicts how management has invested assets in either short or long-term goals. It is typical to adjust in such a way that aligns the predicted model tuning parameters with historical model tuning parameters.

In this model, however, differences in the way that we handle forward looking CAPEX and restructuring costs will cause our model tuning parameters to differ from historical norms. As shown in Figure 6, our future projections of CAPEX differ from historical patterns. Historical data is obfuscated by dramatic changes in (LTA) related to a series of factory divestitures.

Figure 6 - Historical vs Projected Model Tuning Parameters

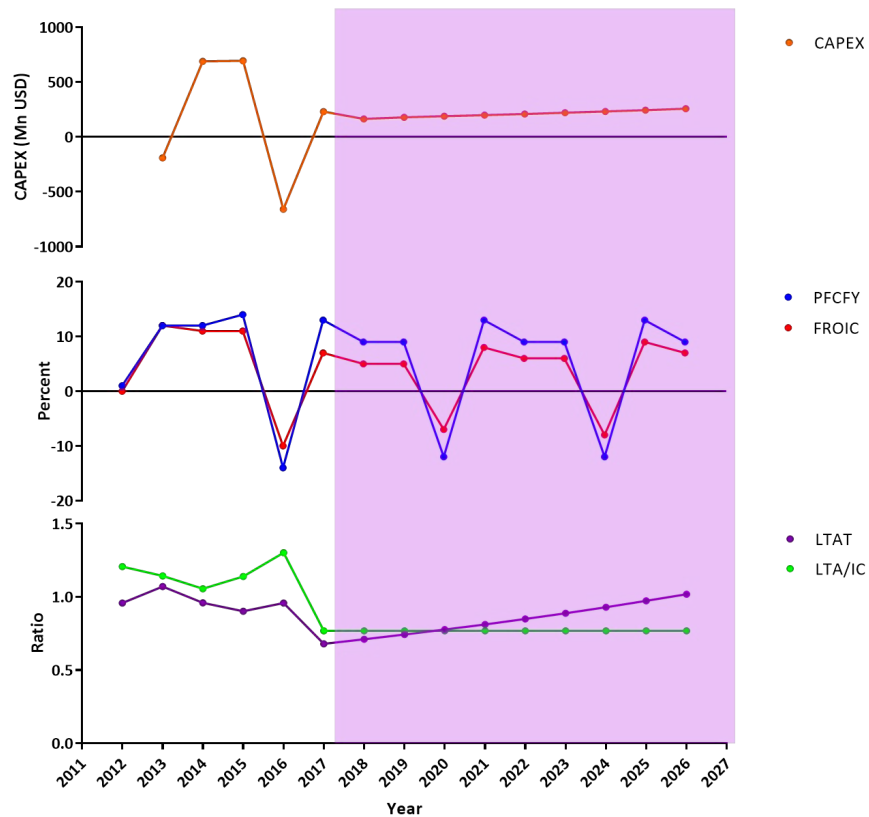


Fig. 6 – Historical (unshaded) vs Projected (purple shaded) model tuning parameters. While our model tuning parameters do diverge from historical averages, we believe that this is warranted given our assumptions of how the business will perform in the future. We predict that FSLR will be subject to several periods of restructuring, in which they incur large expenses in updating machinery or moving factories. This results in the periodic nature of the PFCFY and FROIC, which are closely related to cash flow generation.

Monte Carlo Simulation

To construct our model, we used a probabilistic discounted cash flow model with a forward view of 10 years. To offer sensitivity and a sense of uncertainty in our calculation of a share price, we included in our analysis a 100,000-trial Monte-Carlo (MC) simulation to arrive a share price via the central limit theorem. Our model predicts a fair value estimate of \$41.63, a 10% downside from the current stock price. By running an MC simulation, we can quantitatively express the uncertainty in our estimates of share price. Further, from the data generated in the MC we can rigorously identify which variables have the most substantial impact on our valuation.

Shown in Figure 7 are the summarized results from our MC analysis. The histogram demonstrates that our DCF approaches a central limit of \$41.63; the statistically most probable result based on our analysis. Further, a vertical line is placed at today's stock price of \$46.26. In addition to the histogram, the horizontal bar chart depicts the inputs of our model that have the most substantial impact on our valuation. Interestingly, the CAPEX, COGS and SG&A terminal values have the most substantial impact on our valuation.

We believe that the MC simulation is further confirmatory to our valuation of FSLR. First, the statistical improbability of obtaining the current share price suggests that FSLR is a sell based on DCF analysis. In addition, the impact of long-term CAPEX, COGS and SG&A also suggests that FSLR is a sell. The crux of our thesis is precisely that these values will increase in the long term as a result of competition and the capital investments required to remain on the leading edge of solar technology.

Figure 7 – MC Calculations of DCF and concomitant sensitivity analysis

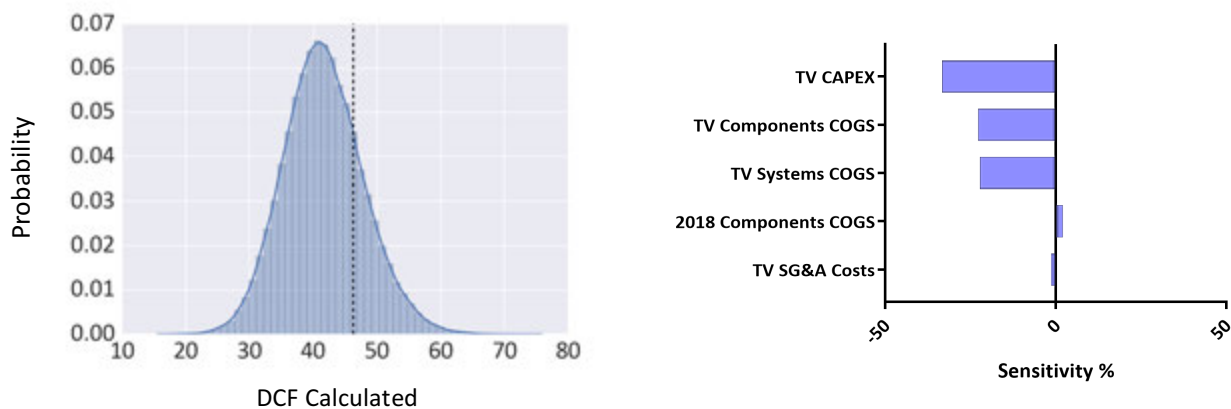


Fig. 7 – MC calculations of DCF (left) and sensitivities of our analysis (right). We performed an n=100,000 MC simulation using historical values and standard deviations for revenues, costs, and cash flow drivers. The left graph is a histogram representing our fair-value calculations for share price, with a vertical line placed at today's share price of \$46.26. The right graph is the relative influence of the denoted variables to our valuation.

Analyst Consensus

It is important to understand the overall wall street consensus surrounding FSLR. Clearly, Analyst consensus surrounding FSLR is generally positive and predicts either market-perform or market-outperform (Figure 8).

Figure 8 – FSLR Analyst Consensus



Fig. 8 – FSLR analyst consensus as of 9.28.17. The outlook for FSLR appears generally positive. Data accessed through Bloomberg using the <ANR> command

This is at odds with our current estimate of price per share. We believe that this discrepancy stems from our use of different valuation methods. As discussed later, we find that using relative valuation approaches based on common multiples lead FSLR to be over-valued. Many of the lines of evidence we use for our sell rating stem from issues with the solar module industry as a whole. As such, a comparison of FSLR against a peer group of solar producers would lead price targets to be inordinately high.

Proxy Statement Discussion and Analysis

Overview

The executive board of FSLR is composed of a team of directors that have played varying roles in solar, semiconductor, and energy industries. Interestingly, a substantial portion of the executive board is composed of outside hires beginning in ~2010. We believe that this is in line with the change in company direction around that time, which has seen two substantial restructuring periods in 2012 and 2016. The sitting CEO was appointed in July 2016, and was an internal promotion of the Chief Accounting Officer. Additionally, inspection of current vested shares shows that the entirety of the board of directors and named executive officers of FSLR own less than 1% of the current outstanding stock. We believe that this fundamentally misaligns executives with shareholder interest and is a substantial component of our sell recommendation.

Figure 9 – Executive compensation scheme for 2016

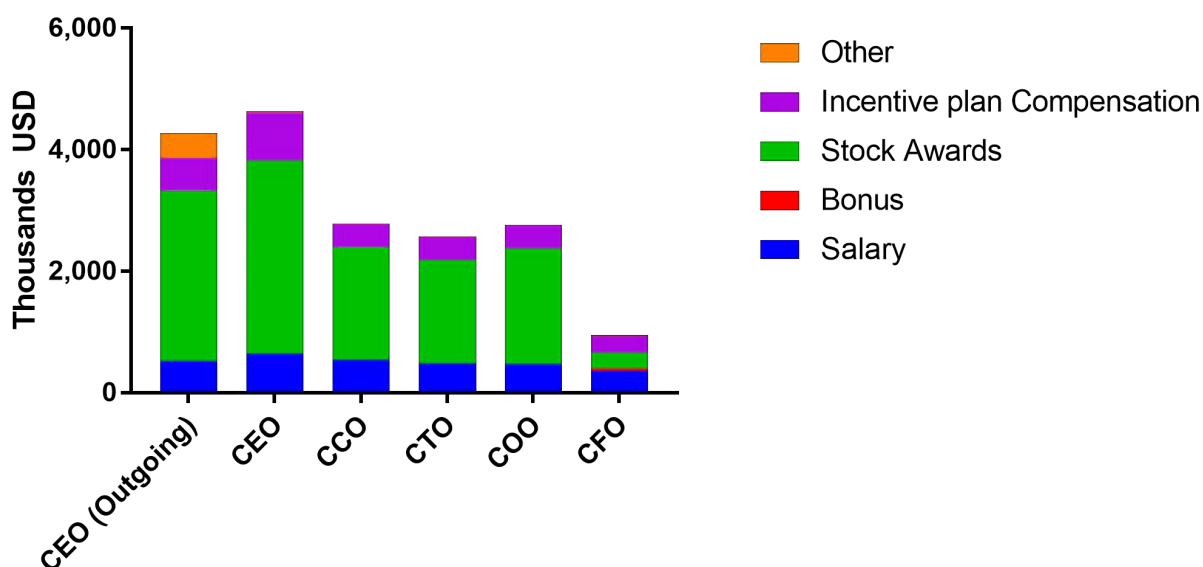


Fig. 9 - 2016 Equity compensation scheme used by FSLR. The majority of compensation is at-risk stock awards and incentive plans. We believe that this level of compensation is too high for a company of this size with these revenues. Additionally, 2016 saw substantial restructuring costs and declining revenue, but executive were still paid a majority of their at-risk compensation

Compensation

The compensation structure for FSLR is an industry-standardized mix of equity and cash awards. A third-party consulting group formed the compensation structure. The cash compensation structure is a relatively flat rate depending on certain appointments in the board of directors.

Approximately 50% of the cash awarded to FSLR executives is considered at-risk and is contingent upon company performance. These performance metrics are both cash flow based and technology based. Chief among these performance metrics are adjusted income before taxes of 200mn, which must be met for any bonuses to be paid. Following this chief metric are measures of the cost-per-watt shipped by FSLR, sales figures, and operating expenditures("2016 DEF-14a").

This same compensation structure is used for equity compensation, in which the executive board is awarded open and restricted stock awards to promote retention and alignment with company interests. We believe, however, that the metrics set to determine compensation are too low and do not challenge directors and executives to drive creativity and business development. As seen in Figure 9, despite FSLR having a negative year in terms of revenue, high restructuring costs, and a negative EBT executives were still paid aggressively with stock awards and incentive plan compensation. They did not receive a bonus, but all executives except the CFO were paid multiple millions of dollars in equity awards.

Equity Ownership and relative valuations

The methods that we use in this model to identify share price are all based on objective predictions of free cash flows as opposed to relative valuations. However, due to the ubiquity of relative valuation as a

research tool we find that a discussion is warranted. The price-earnings (PE) ratio of FSLR is graphed compared to the average PE ratio of a comparable index (Figure 10).

Observation of the PE ratios would suggest that FSLR is undervalued compared to a relevant index, and on par with the current S&P 500 PE ratio of 25. We believe that this is a reason that our valuation differs from several other analysts who predict market outperform. Further, if we adjust the price of FSLR such that the PE ratio equals that of the relevant index (i.e. multiply by 1.23) we arrive at a predicted price of \$58. This is very close to the analyst consensus of \$55, which leads us to believe that relative valuation in this instance is resulting in errantly bullish estimates.

Figure 10 – PE ratios of FSLR compared to a comparable index

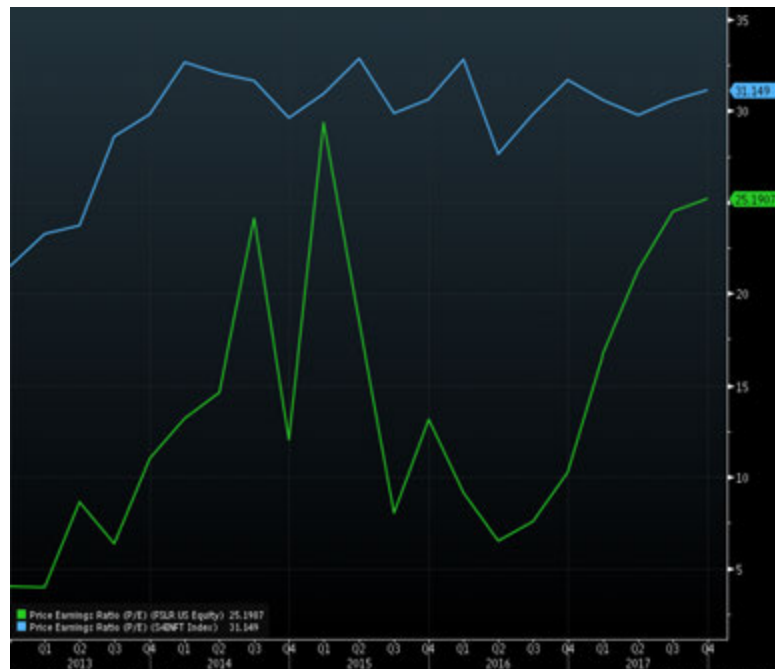


Fig. 10 – Historical PE ratios of FSLR (green) relative to the S&P 400 midcap information technology index. This index contains several semiconductor companies of similar size so we find that this is a warranted comparison. Data accessed through Bloomberg using the <GP> Command

The substantial equity owners in FSLR are a combination of standard institutional investors and individuals. Currently, over 21% of FSLR is owned by Lukas Walton, heir to the Walmart fortune (Figure 11). We find this concerning given that fact that Mr. Walton holds a disproportionate level of influence over company direction.

Figure 11 – Equity Ownership of FSLR

| Holder Name | Portfolio Name | Source | Opt | Position | % Out | Latest Chg | File Dt |
|-----------------------------|---------------------|---------|-----|------------|-------|------------|----------|
| 1. WALTON LUKAS TYLER | | All | All | 22,490,432 | 21.54 | 0 | 03/28/17 |
| 2. BLACKROCK | | Proxy | | 6,895,061 | 6.60 | -27,483 | 06/30/17 |
| 3. VANGUARD GROUP | | ULT-AGG | | 6,545,727 | 6.27 | 243,787 | 06/30/17 |
| 4. JTW TRUST NO 1 UAD 9... | | 13G | | 4,067,475 | 3.90 | 0 | 10/26/16 |
| 5. TWO SIGMA | | ULT-AGG | Y | 2,982,913 | 2.86 | 881,733 | 06/30/17 |
| 6. WELLINGTON MANAGEHE... | WELLINGTON MANA... | 13F | | 2,940,558 | 2.82 | -98,366 | 06/30/17 |
| 7. FRANKLIN RESOURCES | | ULT-AGG | | 2,512,669 | 2.41 | -5,651,640 | 06/30/17 |
| 8. STATE STREET CORP | | ULT-AGG | | 2,341,596 | 2.24 | -25,674 | 06/30/17 |
| 9. THOMPSON SIEGEL & W... | THOMPSON SIEGEL... | 13F | | 1,788,872 | 1.71 | -713,357 | 06/30/17 |
| 10. SCHRODERS PLC | | ULT-AGG | | 1,679,286 | 1.61 | 1,666,064 | 06/30/17 |
| 11. CITADEL ADVISORS LLC | CITADEL ADVISORS... | 13F | Y | 1,610,676 | 1.54 | 540,796 | 06/30/17 |
| 12. DIMENSIONAL FUND AD... | DIMENSIONAL FUN... | 13F | | 1,415,142 | 1.36 | -1,341,838 | 06/30/17 |
| 13. BNY MELLON | | ULT-AGG | | 1,373,912 | 1.32 | 202,579 | 06/30/17 |
| 14. UNICREDIT SPA | | ULT-AGG | | 1,072,916 | 1.03 | -28,268 | 06/30/17 |
| 15. GOLDMAN SACHS GROU... | | ULT-AGG | Y | 913,006 | 0.87 | -19,881 | 06/30/17 |
| 16. TRANSAMERICA INVEST... | Multiple Portfolios | MF-AGG | | 813,402 | 0.78 | -253,750 | 09/26/17 |
| 17. STATE TREASURER, STA... | STATE TREASURER ... | 13F | | 754,373 | 0.72 | 375,500 | 06/30/17 |
| 18. GUGGENHEIM | | ULT-AGG | | 751,212 | 0.72 | -74,637 | 06/30/17 |
| 19. GEODE CAPITAL MANAGE... | GEODE CAPITAL MA... | 13F | | 704,186 | 0.67 | 31,286 | 06/30/17 |

Fig. 11 - Equity ownership of FSLR. As of 9.30.17, a substantial portion of FSLR is owned by Lukas Walton. Owing over 21% of the company, Mr. Walton owns more than the rest of the institutional investors combined. Data accessed through Bloomberg using the <OWN> command

Insider trading has also reveals no clear pattern that would suggest substantial overvaluing or undervaluing of FSLR. As seen in Figure 12, insiders have both bought and sold FSLR consistently.

Figure 12 – All open-market transactions within the past year

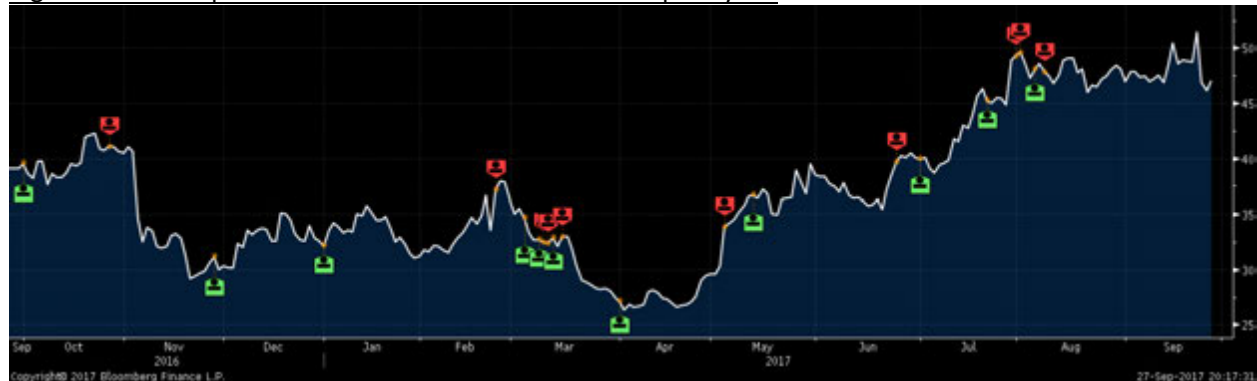


Fig. 12 – Open market transactions of insiders with respect to FSLR. Insiders have revealed no clear buying and selling patterns. The maximum shares sold were by JCL FSLR Holdings with a sale of 25mn shares. The maximum shares bought were by Antoun Georges, who bought ~24,000 shares. Data accessed through Bloomberg using the <GPTR> Command.

Summary and Concluding Remarks

We believe that FSLR will maintain its position as a leading producer of solar modules, PV solar systems, and solar maintenance programs. Despite this, we are giving FSLR a **sell** rating on the basis that FSLR will struggle to increase both top and bottom line revenues. Rapidly growing competition from Chinese manufacturers has substantially reduced the price-per-watt of solar energy without a concomitant decrease in manufacturing costs. As such, FSLR has experienced multiple periods of expensive business restructuring, stagnant revenue growth, and tepid generations of cash flows. We see no catalysts in the coming ten years that will produce substantial changes for FSLR. Based on these projections, our discounted cash flow model predicts a fair value estimate of \$41.63, which is a 10% downside from the current share price. For this reason, we ascribe a **sell** rating to FSLR with a price target of \$41.63.

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