



Intercollegiate Finance Journal

SPRING 2019
BROWN UNIVERSITY

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Chegg

Invest in Growth
the Same Way You
Get Problem Sets
Done

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The New Industrial Revolution

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Green Energy Will Save the World — but is it Profitable?

JACK FARLEY



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Invest in Growth the Same Way You Get Problem Sets Done: Through Chegg

ALEXANDER JOHNSON / BROWN UNIVERSITY

Even with a conservative growth rate estimate, CHGG can nab nearly a quarter of all students in the United States, solidifying their already enormous market share.

Chegg (CHGG) is an online learning platform for high school and college students of all academic disciplines. Some of their services offered are study materials, online educational videos, flashcards, textbook question solutions, and online tutoring services. Recently, CHGG has pushed further into the writing assistance space with a new partnership agreement with Purdue OWL (Online Writing Lab) and are capitalizing on education's shift towards online learning and engagement. With the number of college students growing every year, and with more services being available online, CHGG is placing itself in a position to further expand its market share in the online education space.

As of CHGG's most recent Q4 2018 and FY2018 earnings report released on February 11, 2019, the online learning service has an 87% awareness of their brand on college campuses¹; that's roughly 31.32 million of the United States' 36 million college students. To add to this, CHGG faces very little competition, with their main competitor being Course Hero, a

private company (meaning you cannot purchase their shares in the public market). Using alexa.com – a service that tracks website traffic – CHGG ranks 99th overall in online traffic in the United States², while Course Hero ranks 206th.³ CHGG users average 6 minutes and 31 seconds of daily time of their site, where Course Hero clocks in at 2 minutes and 47 seconds. It is clear that CHGG is leagues above its competition in terms of traffic and usage. This is important because we can use these metrics to (loosely) determine subscriber count – one would typically spend more time on a website they were a subscriber of and would visit that site more frequently as opposed to the alternative.

Speaking of subscriber count, CHGG currently has 5.1 million paying customers, and 3.1 million subscribers – a year-over-year (YoY) increase of 38%.⁴ If we want to estimate CHGG subscriber growth for the next five years, we can assume a continuous 38% YoY growth rate; let's assume the amount of college students stays at 36 million. The results are below:

Growth Case (38% continuous YoY growth)

Year	College Students	Chegg Subscribers	Coverage Percentage	Growth Rate
2018	36,000,000	3,100,000	8.61%	38%
2019	36,000,000	4,278,000	11.88%	20%
2020	36,000,000	5,903,640	16.40%	20%
2021	36,000,000	8,147,023	22.63%	20%
2022	36,000,000	11,242,892	31.23%	20%
2023	36,000,000	15,515,191	43.10%	20%

If CHGG continues to grow their subscriber base at its current rate, by 2023 they will cover over 43% of all students in the United States. While these are rather liberal and slightly optimistic estimates, it goes to show how large of a subscriber base that CHGG can capture in just a few short years. As CHGG inches towards the 100% brand recognition on college campuses – which is not out of the realm of possibility – subscriber count could increase at potentially faster rates.

For a conservative estimate, let's assume that the number of college students increases by one million each year for the next five years and that CHGG's subscriber growth rate plateaus at 20%.

CHGG is cementing itself as the country's leading online educational resource

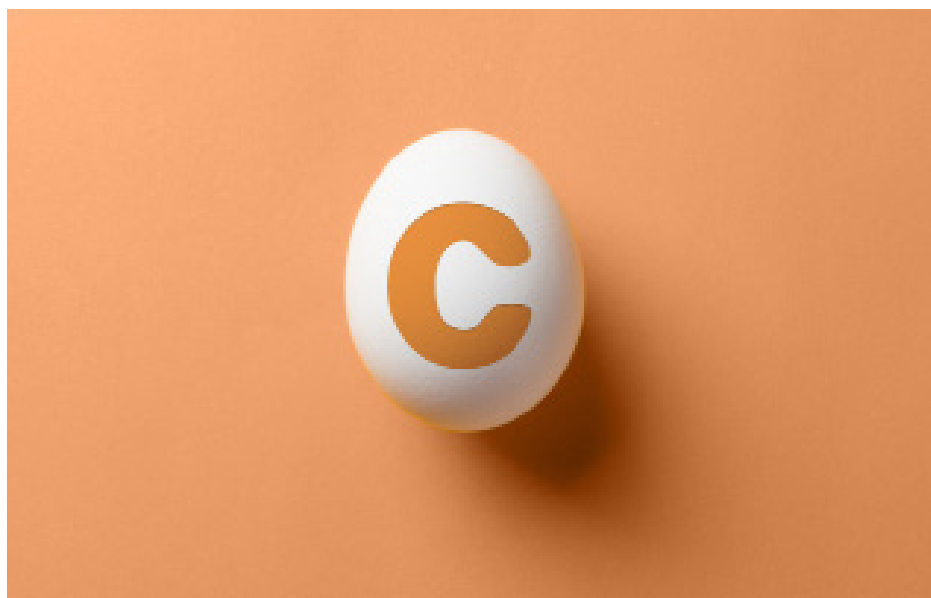
Even with a conservative growth rate estimate, CHGG can nab nearly a quarter of all students in the United States, solidifying their already enormous market share. This is important to note because CHGG's Chief Executive Officer, Dan Rosensweig, stated in their Q4 earnings report, "...we also believe we have significant pricing power. But as long as we continue to grow like this, we want to continue to pick up as much market share as we can."⁵

On top of subscriber growth, CHGG is also expanding its services. They have answers to 26 million questions and solutions for 35,000 textbooks and have recently added over 15,000 new educational videos. They have measured an increase in user engagement, with 650 million views in 2018, up 48% from last year.⁶ As their available content expands, it will draw more users to subscribe, giving them access to swaths of information on all academic subjects. Regarding CHGG's financials, their total revenue grew 26% to \$321 million, while gross margin (the amount of sales revenue that a company retains after incurring the direct costs associated with producing the services it sells; the higher the amount, the more the company retains on each dollar of sales to service its other costs and debt obligations) increases from

69% in 2017, to 75% in 2018. They also doubled their cash to nearly \$484 million since 2017, which management credited to the results of their convertible debt (a type of bond that the holder can convert into a specified number of shares of common stock or cash of equal value) offering from Q2 2018.⁷ With an increase in cash, revenue, and assets, CHGG maintains a strong and attractive balance sheet.

A point of contention on the merits of investing in CHGG would be that the company is overpriced, with a forward price-to-earnings (P/E) ratio of nearly 50 (a stock is typically considered overvalued if their P/E ratio is significantly above the S&P500's P/E, which currently sits around 21). While at first look, CHGG could seem wildly overpriced; however, when one looks at some of the factors behind raising earnings (which decreases P/E ratio, given the price hasn't increased exorbitantly), such as an increase in margins and revenue growth, you'll find that CHGG is poised to increase earnings rather quickly, especially given their share increases in revenue and gross margin. While today their P/E ratio seems lofty, it is likely to decrease to more sane valuations in the future.

CHGG is cementing itself as the country's leading online educational resource. Subscriber count is rapidly increasing, revenue growth is rising, their balance sheet is strengthening, and education is making a swift march towards online ubiquity. For all of these reasons and more, CHGG is poised to be a strong growth play for the next few years.



¹ Chegg's Q4 2018 Earnings Report

² <https://www.alexam.com/siteinfo/chegg.com>

³ <https://www.alexam.com/siteinfo/coursehero.com>

⁴ Chegg's Q4 2018 Earnings Report

^{5, 6, 7} Ibid.

The New Industrial Revolution

TALIA SHAKHNOVSKY / BROWN UNIVERSITY

With the advent of new Artificial Intelligence (AI) technology, the world waits on the verge of a new Industrial Revolution. Along with transforming technology, AI will also transform day to day life. AI will have a fundamentally positive effect due to its macroeconomic benefits in spite of its negative impacts like widening inequality.

Economic Growth

During the Industrial Revolution, the invention of the steam engine increased economic productivity by .3 percent annually. Other innovations, like robots and IT technology have had even larger impacts on productivity: .4 percent and .6 percent annual growth, respectively. The McKinsey Institute, however, predicts that AI will produce an annual transformation of 1.2%, an impact four times as large as the first Industrial Revolution. Overall, McKinsey concludes that AI will add 16%, or \$13 trillion to global economic output. Other reports reach similar conclusions, such as PricewaterhouseCoopers which expects global GDP to increase 14% by 2030 due to AI technology.

This economic impact comes from many sources. The largest facet of growth is the automation of labor, which will add 11%, or around \$9 trillion, to global GDP. Furthermore, innovations in products and services themselves will add up to 7%, or around \$6 trillion to global GDP. Other contributors include increases in global data flow (2%) and wealth creation through reinvestment (3%). As a result, the global economic impact of AI is vast.

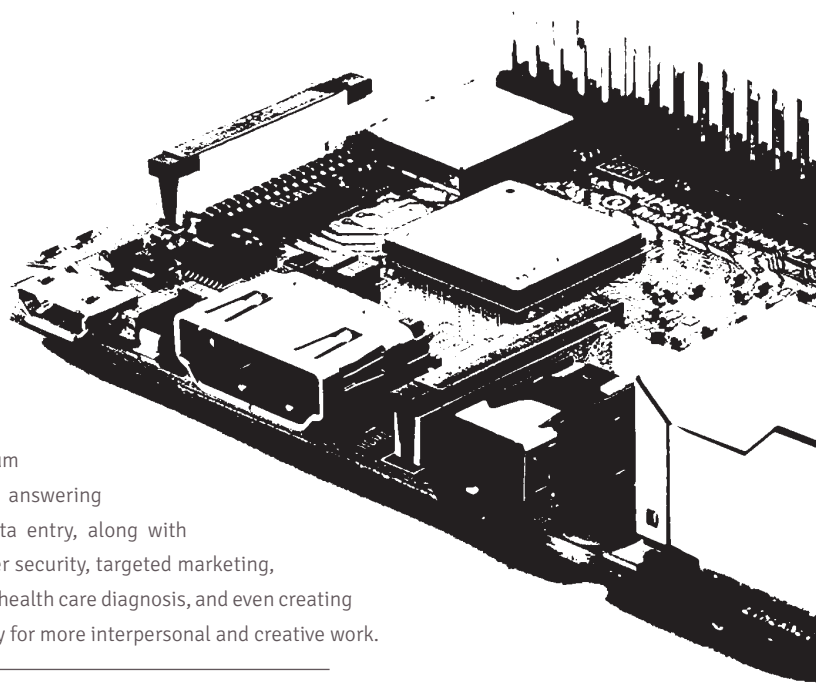
These broad changes come from the minute. AI enhances efficiency and throughput, creates new opportunities for revenue generation, and saves production costs through increased automation. It will gradually evolve the job market, and make knowledge more accessible to a broader population. Moreover, AI allows for better demand side management by decreasing the probability of (mainly human) error in tasks like efficient energy distribution. Of course, these impacts come along with enhancements in lifestyle -- AI will likely become

responsible for humdrum tasks like answering emails and data entry, along with providing better security, targeted marketing, more accurate health care diagnosis, and even creating the opportunity for more interpersonal and creative work.

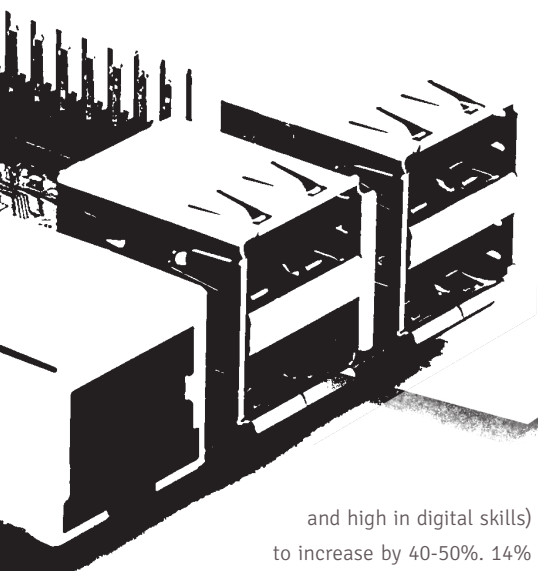
Increased Economic Inequality

The benefits of AI will not be evenly spread throughout society, though. As the McKinsey report concludes, "If the development and deployment of these technologies are not handled effectively, inequality could deepen, fueling conflict within societies" (Wladawsky-Berger). AI will cause significant turmoil for workers, companies, and entire economies.

While the McKinsey report predicts that the net impact of AI is 16% GDP growth, the gross GDP impact is actually 26%. This discrepancy in values comes from labor-market transitions: AI technology will leave many workers behind, reducing GDP by approximately 10%. New technology shifts demands new digital skills, expanding the divide between workers. Jobs high in repetitive activities and low in digital skills are expected to decline by 30%, while those high in non repetitive activities



AI will produce an annual transformation of 1.2%, an impact four times as large as the first Industrial Revolution



incentive to automate labor, and their GDPs are experiencing slowing growth due to aging populations. Developing countries, however, have less investment capacity, existing technology infrastructure, and educated workers. As a result, developed countries will capture 20-25% in net economic benefits of AI technology, while developing countries are only expected to capture 5-15% of this benefit.

Net Benefit

Although the transformation of AI technology will be tumultuous, society will, on balance, benefit. The 16% net GDP growth from AI technology highlights that the economic effect of AI will be positive and extensive. Moreover, while reskilling and job turnover must occur, net employment is expected to increase by 5% before 2030 due to new jobs driven by investment. More automated technology will also

and high in digital skills) are expected to increase by 40-50%. 14% of the global workforce, or 375 million people may need to change occupations. While wages as a whole will rise, those with high technology skills will benefit disproportionately. The total wage bill's distribution will shift, with low skill jobs decreasing from 33% to 20% of total wage. These wages will shift to those in high skill occupations.

Companies and countries will face the same transformation as the labor market. For instance, companies that already have a strong IT base and a willingness to invest in new technology will be front-runners in the AI revolution. These early adopters (10% of companies) will benefit disproportionately from new technology, experiencing a 6% increase in annual cash flow. On the other hand, companies that are slow to adopt AI technology will experience a 20% decline in cash flows. Similarly, developed countries are expected to pursue AI investment because their higher wage rates are an

create new employment opportunities in service and creative industries. Consequently, while today's high skilled workforce will receive more immediate benefits, the workforce as a whole will grow in the long run as demand for different types of jobs increases. Similarly, while economic growth will not be uniform between countries, all countries will experience growth. Finally, global quality of life will increase with new technology. Soon a world without AI will be as incomprehensible as a world without computers, or even a world without mechanization.

The Beginning of Change

Overall, AI presents more benefits than drawbacks due to its enormous impact on economic growth, benefiting the workforce, national economies, and quality of life. Today, the world is in the early stages of AI development. Machine learning is taking AI to the market in the form of self-driving cars, intelligent personal assistants, and smart recommendation algorithms. This coming change is uncontainable, but not uncontrollable. While people should not be Luddites, people should be cognizant of and embrace the coming turbulence as society implements AI.

AI presents more benefits than drawbacks due to its enormous impact on economic growth, benefiting the workforce, national economies, and quality of life.



Costly College

EMILY BELT / BROWN UNIVERSITY

Thus, college is the most expensive it has ever been in United States history, even when including inflation rates but is simultaneously more important than ever before to earn a job that will sustain someone in the middle class (or higher)

The Problem

College is becoming increasingly inaccessible while at the same time increasingly imperative for maintaining a sustainable job. Since 1978, the cost of attending a four-year college has increased by 1,122 percent (Ellison), but according to the Bureau of Labor Statistics consumer price index, prices in 2017 are only 275.95 percent higher than prices in 1978 (“Inflation Calculator”). Thus, college is the most expensive it has ever been in United States history, even when including inflation rates (Ellison) but is simultaneously more important than ever before to earn a job that will sustain someone in the middle class (or higher). In fact, 41 percent of employers hire college graduates for jobs that were formerly held by high school graduates (Williams). College must be made more affordable to the public, and while programs that allow this affordability may burden American taxpayers in the short run, the long

run benefits of free or subsidized public college tuition would outweigh the immediate drawbacks.

The Debt Crisis

The debt crisis is at the forefront of the issue with college’s high cost. In 2015, 38 million students in the United States were in debt and together owed 1.3 trillion dollars in loans; fears of such crippling debt has made college increasingly inaccessible. This debt particularly targets graduates of color and graduates of lower economic classes. Specifically, 80 percent of black graduates take on debt compared to only 63 percent of white graduates. Thus, student debt is also affecting students’ ability to progress in life post-graduation and has fostered inequality. Between 2015 and 2016, almost 4 million students dropped out of college due to debt. Addressing the debt crisis by making college more affordable is imperative to helping increase the pool of graduates and boost prosperity post-graduation.

A Proposed Solution

Recently, politicians have recognized this issue and have proposed plans to help students. Current presidential candidate Bernie Sanders proposed a bill in April of 2017 that would eliminate tuition at public four-year colleges for students from families earning 125,000 dollars or less in income a year and would make community college free for all student, regardless of economic background. This bill would surely ease student debt and make the possibility of higher education more accessible. However, it would also cost a lot of money. The proposed bill would cost 47 billion USD a year for the federal government and 23.5 billion a year for state governments. Sanders proposes that this large sum of money be paid for by a speculation tax (basically a tax on Wall Street). Is such a major tax worth the benefits?

Why It's Worth It

In the long run, this tax would actually save the public money. First, college graduates are less likely to experience unemployment. According to the Bureau of Labor Statistics, only 2.7 percent of workers with a college education face unemployment, compared to 5.7 percent of workers with just a high school education (Bogle). Unemployment costs are not cheap; in fact, from 2007 to 2012, unemployment benefits cost the government 520 billion dollars (Luhby). Thus, if more people

had college educations, the unemployment rate would be lower, and the government would have to fund fewer unemployment benefits. This same argument can be applied to other public assistance programs. For example, college graduates comprise 75 percent of the home buying population (Bogle) and are less likely to need housing assistance than those who do not have a college degree; thus, with a more educated population, housing assistance programs, such as Section 8 rental vouchers, would be less necessary. Investing in college education for all would mean that Americans pay less in taxes in the long run.

Moving Forward

The high costs of a college tuition has made a college education increasingly less accessible, which has negative impacts on future wellbeing and economic growth. Directly tackling this issue through increased taxation would benefit the country in the long run, despite short-term incurred costs. As the United States enters the start of the 2020 presidential race, free public college education must be placed at the forefront as an issue that needs to be addressed.

In 2015, 38 million students in the United States were in debt and together owed 1.3 trillion dollars in loans; fears of such crippling debt has made college increasingly inaccessible. This debt particularly targets graduates of color and graduates of lower economic classes.

Alaska Power and Telephone Company (OTCPK:APTL)

A Hidden Gem

KERIM SARAOGU / BROWN UNIVERSITY

1

According to William Baumol, a natural monopoly is a company that operates in “[a]n industry in which multi-firm production is more costly than production by a monopoly.”

2

AP&T 2017 Annual Report, page 25.

3

AP&T 2017 Annual Report, page 7.

4

Ibid., page 19.

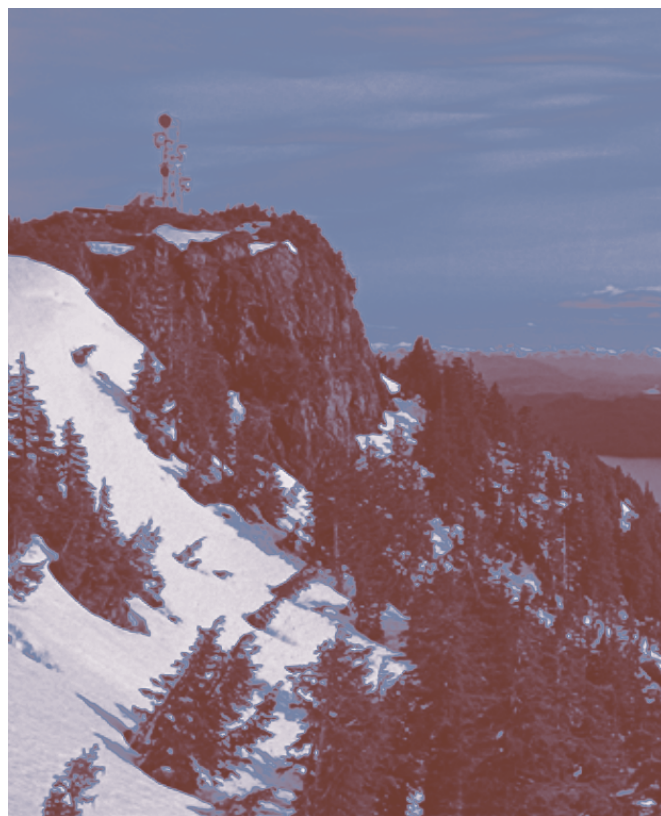
Company Background

One would likely overlook the sleepy hinterland of Southeast Alaska when searching for potentially attractive investment opportunities. After all, it seems outlandish to assert that substantial value can exist in a backwater expanse that houses two people per square mile and whose primary sources of economic output are commercial fishing, mining, and logging. However, even though this region produces minimal innovative or widely – demanded goods, its populace still has basic needs that must be met. Alaska Power and Telephone Company (AP&T) is a business that meets two such needs: electricity and telecommunication.

AP&T currently serves 38 (mostly rural) municipalities located within the Alaskan Panhandle and the Wrangell Mountains. It generates revenue through three business segments: (1) Electric, via the production and transmission of hydrocarbon and diesel power; (2) Telecommunications (Telecom), by way of maintenance of wireline infrastructure; and (3) Other Nonregulated, which provides wireless and long-distance cellular services. Because AP&T is the sole electric utility and/or fixed wireline telecom company in the majority of its served communities – it thus acts as a natural monopoly¹ – these two segments are regulated by the Regulatory Commission of Alaska (RCA) and Federal Communications Commission (FCC). As such, Electric and Telecom revenues have exhibited consistent twenty-year compound annual growth rates (CAGR) of 2.91% and 4.85%, respectively. The stable cash flows derived from these operations have recently been deployed toward nonregulated broadband and wireless network upgrades, both of which continue to generate high returns on investment.

Thesis

At a price-to-earnings (P/E) and enterprise value-to-EBITDA (EV/EBITDA) ratio of 9.24x and 4.89x, respectively, the market is grossly undervaluing AP&T relative to its fundamental



strengths. Specifically, investors are not fully accounting for the following: (1) earnings stability; (2) aggressive debt paydown; (3) high growth ceiling for nonregulated broadband, with maximum download speeds in many of AP&T’s served areas standing at only 8 Mbps; (4) potential boost to Electric revenues brought forth from completion of the Hiilangaay hydropower project; and (5) the realization of certain catalysts.

Even while Alaska continues to endure a recession, AP&T has quietly grown its earnings to record levels. This divergence can be attributed to the fact that “oil and gas jobs are not present in the communities AP&T serves,” and thus affirms the benefits of operating within a geographically isolated market.² Capital allocation decisions – this simply means the manner in which earnings are deployed – also continue to strike a sensible balance between reinvestment in core operations, the pursuit of opportunistic ventures, and return of capital to shareholders.

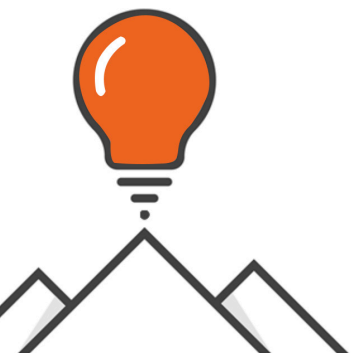
The Lynn Canal Fiber (LCF) project, which provides up to 7 TB of capacity throughout the Lynn Canal Region, is one such opportunistic venture. By “increas[ing] ... access to higher internet speeds at lower cost,” the LCF endows customers with greater optionality while providing revenue diversification for AP&T.³ In addition, the project possesses a scalability component: achieved by appending new last-mile fiber facilities to existing network infrastructure. Copper wire and labor serve as the only required inputs for this process, meaning that marginal costs are kept low. Because favorable



⁵
AP&T 2013 Annual Report,
page 18.

⁶
AP&T 2009 Annual Report,
page 3.

“Oil and gas jobs are not present in the communities AP:T serves”



cost dynamics bring forth lower hurdle rates in prospective markets, AP&T has the flexibility to aggressively expand its broadband offerings. Such expansions can be bundled together with power projects, as was the case with the community of Naukati. In 2015, the village was interconnected “with the rest of the Prince of Wales Island (POW) power grid, yet also brought the benefit of fiber to support local broadband.”⁴

Bundling has the potential to be especially lucrative in POW, home to the Hiilangaay hydropower project. This project, which is nearing completion, will provide 5MW of renewable energy to the island and thus reduce its reliance on diesel fuel. Further, it complements planned last-mile fiber investments on POW. Both of these offerings will accommodate pent-up demand, driven primarily by corporate customers who operate in the mineral exploration industry. For example, in 2017, AP&T took on Sundance Mining, which is developing mining claims near Dawson Mine, as a new electric customer. Given that explorations in POW have “confirmed commercially viable precious metal deposits, as well as one of the largest domestic supplies of heavy rare earth elements,” the extraction of these minerals will likely attract even more miners to the area. This represents just one of many bullish catalysts for AP&T.⁵

Both idiosyncratic and systemic catalysts will provide tailwinds going forward. First, according to the Alaska Department of Labor and Workforce Development, the state is projected to exit its three-year-long recession by the end of 2019. This downturn, driven by an enormous reliance on the

oil and gas industry, prompted the loss of over 12,000 jobs; today, unemployment still hovers around 7%. And even while AP&T’s market areas remain insulated from the state’s boom and bust economy, Alaska’s nearly \$3bn budget shortfall has necessitated the implementation of austerity measures. Specifically, the state nixed various subsidies meant to facilitate the deployment of renewable energy, forcing companies like AP&T to rely solely on federal funding. Moving forward, a stronger Alaskan economy should lead to the contraction of fiscal deficits, which bodes well for the restoration of grant programs. Second, even amidst the current dearth of energy subsidies, AP&T sees to benefit from the FCC’s increase in Alternative Connect America Cost Model (A-CAM) funding; this took place in November 2018 and has not been fully priced-in by investors.

A-CAM provides broadband support to rural rate-of-return carriers; these subsidies are contingent upon the achievement of specified deployment targets. The FCC’s most recent offer requires that recipients upgrade connection speeds to either 10/1 Mbps or 25/3 Mbps, depending on population density, at all locations eligible for model-based funding. To support these initiatives, maximum funding per location was raised from \$146.10 to \$200.00: leading to immediate increases in revenue for qualifying entities. For AP&T, annual funding is set to rise from \$6,718,322 to \$7,512,071, remaining at this level for the next 10 years. Year-over-year, the company will thus gain an additional \$793,749 in revenues. These gains do not

“take advantage of the shift [...] to data – driven services and associated transport needs.”

require the assumption of incremental expenses. Therefore, at a 25% effective tax rate, A – CAM benefits will add \$595,312 to AP&T’s FY19 net income, all else equal.

Perceived Risks / What the Market is Missing

Why is AP&T trading at such a steep discount to fair (intrinsic) value? Two main factors shed light on this discrepancy: (1) illiquidity and (2) lack of information. Most notably, at a current market capitalization of ~\$80m, the company is far too small to garner any analyst following. Further, since shares trade over-the-counter, the stock likely falls out of the investment mandate of most ETFs, mutual funds, and hedge funds. In short, very few (if any) institutions actively follow AP&T, so there exists no incentive to publish research on the company. This forces retail investors to conduct their own due diligence, such as combing through annual reports, scrutinizing financials, and so on. Because the vast majority of this cohort is not willing to work through this process, an attractive opportunity exists for patient, inquisitive investors to identify and capitalize upon valuation inefficiencies associated with AP&T’s stock.

Even then, those who do happen to analyze the stock have a high likelihood of succumbing to first – order thinking, or the process of only weighing the intended and perhaps obvious implications of its current circumstances. For example, one might overlook the industry composition of AP&T’s served markets and mistakenly conclude that the stock is not worth buying due to Alaska’s weak economy. The company’s regulated telecom segment could provide another cause for concern, seeing as the wireline industry is in secular decline. However, management caught wind of this trend very early on, in 2009, and responded by investing in the Southeast Alaska Microwave Network (SAMN) broadband project. This timely investment enabled AP&T to “take advantage of the shift [...] to data – driven services and associated transport needs.”⁶ Without any institutional research to use as a reference point, investors are more vulnerable to such lapses in thinking.

Valuation

I use two valuation methods to estimate a fair value range for APTL: (1) a discounted cash flow (DCF) model and (2) comparables (comps) analysis.

Discounted Cash Flow (DCF) Valuation

The DCF model includes the following assumptions: zero growth in operating profits (EBIT) over the next five years, a ~25% tax rate, annual depreciation and amortization (D&A) expense growth of ~6%, roughly \$10m to \$11m in annual capital expenditures (capex), perpetual growth of 2.8%, and a weighted average cost of capital (WACC) of ~7.5%. Growth assumptions are particularly conservative when weighed against AP&T’s 20 – year revenue CAGR of 6.32%. Even then, implied share price comes out to \$114.41. After applying a 12% marketability discount – using methods outlined by Silber (1991) – fair value stands at \$100.59: 62%+ above current trading levels.

Next, I sensitize my assumptions for perpetual growth and WACC. Based on the sensitivity table’s output, we can see that APTL’s implied value will exceed its current share price given that WACC stays below ~9%. This will hold unless 10 – year Treasury yields suddenly rise by 150+ bps or the stock’s performance somehow becomes tightly correlated with that of the broader market; both events are unlikely.

DCF Model Output

Perpetuity approach with applied marketability discount

2023E UFCF	9,709,308
2024E UFCF	9,981,168
Perpetual Growth Rate	2.8%
Terminal Value	212,626,375
PV of Terminal Value	150,152,482
PV of Initial Stage Cash Flows	38,132,013
Enterprise Value	188,284,495
Plus: Cash and Equivalents	2,457,051
Plus: Short-term Investments	2,849
Plus: Carrying Value of Investments	6,000,112
Less: Total Debt	(500,029,700)
Equity Value	146,714,807
Diluted Shares Outstanding	1,282,315
Implied Share Price	\$114.41
Less: Marketability Discount	(\$13.82)
Fair Value	\$100.59
Current Share Price	\$62.00
Implied Discount to Fair Value	(38.4%)

WACC Assumptions

TTM Interest Coverage Ratio	4.10x
Market Capitalization	79,503,530
Book Value of Debt	50,029,700
Weight of Equity	61.4%
Weight of Debt	38.6%
10Y Treasury Yield	2.63%
Implied Default Spread	2.00%
Cost of Debt	4.63%
Less: Tax Shield	-1.18%
After-Tax Cost of Debt	3.45%
Risk-Free Rate	2.63%
Russell Microcap Index 10-year CAGR	17.03%
Beta	0.51423
Cost of Equity	10.04%
WACC	7.49%

Sensitivity Analysis

Share Price:	Perpetual Growth Rate				
	2.2%	2.5%	2.8%	3.1%	3.4%
\$100.59					
11.49%	\$38.55	\$40.13	\$41.82	\$43.62	\$45.57
10.49%	\$46.51	\$48.57	\$50.79	\$53.19	\$55.79
9.49%	\$56.64	\$59.41	\$62.43	\$65.73	\$69.36
8.49%	\$70.00	\$73.88	\$78.16	\$82.93	\$88.25
7.49%	\$88.39	\$94.13	\$100.59	\$107.94	\$116.37

WACC

Company Name	Ticker	Price	Common Shrs (000)	Market cap (\$000)	D/ET	TM P/E Ratio	EV/EBITDA	ROIC	
Alaska Power & Telephone	APTL	\$62.00	1,282.315	79,503.530	62.93%	9.24x	4.89x	12.36%	
Telecommunications Comps									
LICT Corporation	LICT	\$15,600.00	20.134	314,090.400	5.72%	10.75x	6.77x	15.92%	
North Street Telecom	NORSA	\$57.28	2,264.680	129,720.870	45.61%	17.27x	7.18x	15.31%	
Nuvera Communications	NUVR	\$19.30	5,175.258	99,882.479	63.95%	12.86x	6.83x	6.91%	
Alaska Communications	ALSK	\$1.87	53,185.478	99,456.844	172.79%	10.95x	3.99x	2.75%	
Atlantic Tele-Network	ATNI	\$55.99	16,003.345	896,027.287	10.15%	25.69x	7.50x	2.45%	
Consolidated Communications	CNSL	\$10.32	71,187.301	734,652.946	317.71%	N/A	6.69x	-1.85%	
Otelco Inc. Class A	OTEL	\$15.71	3,388.624	53,235.283	137.15%	5.62x	4.89x	11.72%	
Electric Utility Comps									
Unitil Corp	UTL	\$54.11	14,878.075	805,052.638	61.41%	24.40x	10.20x	4.52%	
Spark Energy Inc.	SPKE	\$8.67	34,941.872	302,946.030	48.34%	N/A	4.33x	-0.50%	
Atlantic Power Corp	AT	\$2.55	109,686.626	279,700.866	251.20%	7.52x	10.15x	4.29	
					Average:	111.40%	14.38x	6.85x	6.15%
					Median:	62.68%	11.91x	6.80x	4.41%

APTL's comps universe consists of telecom and electric utility companies with market capitalizations of below \$1bn, many of which operate in rural markets. Compared to its peers, the company is similarly leveraged and only trails two firms, LICT Corp. and North Street Telecom, in terms of return-generating capabilities; the latter is gauged via return on invested capital (ROIC). Even so, APTL trades at a discount to both the average and median EV/EBITDA and P/E of its comps universe. Based on the aforementioned metrics, as well as points outlined in the *Thesis* section, it is fair to assert that the stock deserves to trade in-line with its peers.

Due to the presence of outliers, I use median values for "EV/EBITDA" and "TTM P/E ratio" from the above table to derive APTL's fair value. Both multiples bring forth similar results: \$92.68 and \$96.50 for EV/EBITDA and P/E, respectively. Taking the average of these numbers yields an implied share price of \$94.59. Combining results from both valuation methods gives us the following range for intrinsic value per share: **\$94.59 – \$100.59**. Note that neither the comps analysis nor the DCF explicitly accounts for the increased A – CAM revenues that will accrue to AP&T from FY19 onwards. I make this accounting omission with the expectation that a full fiscal year of operations at this new subsidy level will serve as a catalyst for future value realization, with the market repricing shares to accommodate higher operating profits and net income.

Concluding Remarks

Operating out of the public eye, AP&T continues to quietly generate cash, pay off debt, and make smart investments. These initiatives, coupled with the company's strong efficiency and profitability metrics, are not being fully appreciated by investors. However, with multiple catalysts on the horizon, one should reasonably expect the gap between price and intrinsic value to close over the near- to medium-term: providing buyers with a steady rate of return in the meantime.

Comps Analysis: Output

EV/EBITDA	
APTL 2020E EBITDA	23,588,492
Median Industry EV/EBITDA	6.80x
Implied Enterprise Value	160,408,644
Plus: Cash and Equivalents	2,457,051
Plus: Short-Term Investments	2,849
Plus: Carrying Value of Investments	6,000,112
Less: Total Debt	(50,029,700)
Equity Value	118,838,956
Diluted Shares Outstanding	1,282,315
Implied Share Price	\$92.68
P/E	
APTL 2020E Net Income	10,390,543
Median Industry P/E	11.91x
Implied Equity Value	123,742,808
Diluted Shares Outstanding	1,282,315
Implied Share Price	\$96.50
Average Share Price:	\$94.59

Providing buyers with a steady rate of return in the meantime.



Green Energy will Save the World — But is it Profitable?

JACK FARLEY / BROWN UNIVERSITY

¹
Relative to 2018 \$ USD

Over the past decade, the cost-per-megawatt for wind and solar has decreased significantly. Bloomberg New Energy Finance predicts that these improvements in cost-efficiency will continue, and that by 2050, the cost in real terms ¹ of solar and wind will decrease by 71% and 58%, respectively.

Investors have been eager to cash in on this tremendous growth, and capital has flooded the market in order to fund renewable energy and green infrastructure. They estimate that, while climate change is a threat to carbon-based industries it may render obsolete (namely, the extraction and rarefaction of coal, oil, and natural gas), it is also an opportunity for investment in industries that may address its harm.

Some of these investors subscribe to the school of Socially Responsible Investing (SRI), which recommends that investors take into account the social impact of a capital purchase, which includes not only its environmental consequences, but also other metrics like ethical labor sourcing and fair governance.

As CO2 levels continue to rise, these strides in green energy investing could not have come soon enough. A 2018 special report from the U.N Intergovernmental Panel on Climate Change (IPCC) stated that a failure to reduce global carbon emissions by 60% by 2035 will most likely subject more than one billion additional people to water stress, destroy 99% of all coral reefs, as well as cause over \$30 trillion worth of damage to infrastructure, farmland, and housing.

If the report is correct, it's no doubt that massive government action is needed to avert a climate catastrophe. But activity in the private markets will also play a large role in saving the world.

Green Investing— By Asset Class

The majority of investment in renewables has come in the form of equity and debt. While both asset classes offer the promise of significant returns, so-called 'green bonds,' or debt issuances used to finance renewable infrastructure, have met investors' objectives with more consistency than have green stocks. Green

stocks, on the other hand, continue to underperform the S&P 500, NASDAQ, and other indices.

Green Bonds

Green bonds are generally the least risky way to invest in green energy, not only because of their seniority in the capital structure, but also because they are frequently collateralized by working capital, stored wattage, and infrastructure. No wonder they are the most popular vessel for green energy investment, amounting for 60-70% of all green investment in any given year.

The success of green bonds can be seen in two revealing statistics. First, their yields have fallen. In France, for example, the average yield for financing wind projects has declined from 5% in 2012 to 2.25% in 2017. In exchange for lower return, investors have asked for a new-issue premium, an incentive that rewards investment in incipient projects, as well as an increased collateralization to reduce their downside.

Secondly, the dramatic rise in green bond issuance, in concord with falling yields, indicates a supply rising to meet pent-up demand. As investors have come to trust green bonds more and more, their required rate of return has decreased. Industry reports indicate that oversubscription (that is, when debt issuances have a demand that exceeds the supply) of green bonds is common. Overall, the stability green bonds has offered investors is an example of the SRI thesis that profit and sustainability can be in alignment. But as excess demand for green bonds has pushed their yields down so low, they might have become the victim of their own success. The year 2018 saw the growth of Green Bond issuance slow down dramatically: from 2007 to 2017, it increased roughly 50% per year, but in 2018 it increased only 4%.

2

Including capital appreciation (share price going up) and dividends

3

Not annualized

4

And after Elon Musk was forced by the SEC to step down as Chairman of the Board after he falsely claimed on Twitter that the Saudi Arabia would buy the company at \$420 a share. That number for Mr. Musk appears to have some significance, as shareholders later were aghast when he openly smoked a joint on comedian Joe Rogan's podcast

Green Equities

While the success of green bonds fully validates the SRI thesis, the results of green stocks have been more mixed. In aggregate, equities have not offered investors the same stability, reliability, and performance that they have come to expect of green bonds.

The Wilderhill New Energy Global Innovation Index (NEX), an index fund that bundles the 109 biggest green energy companies around the world, has historically underperformed traditional equities. Despite brief rallies in 2013 and 2017, the NEX has generated a compounded annual return of 2-3% over the past decade, lagging behind the S&P 500, DOW Jones, FTSE 500, and almost all other prominent indices.

However, underperformance in the aggregate does not imply downswings on the margin. Some individual companies in green energy have performed remarkably well. Green stocks in particular that have given investors excellent returns include the organic LED production company Universal Display Corporation (OLED), which over the past five years has yielded a 38% annualized total return, and the windblade construction company TPI Composites (TPIC), which has yielded a 30% annualized total return ² since its initial public offering (IPO) in July 2016.

In addition, the renewable utility conglomerate NextEra Energy (NEE) has delivered investors a 22% annualized total return over the past five years, while Brookfield Renewable Partnership, a multinational investment trust, has yielded a 6-8% dividend over its 11-year history.

On the other hand, there have been green stocks that have lost investors a great deal of money. The German wind turbine

Nordex (NRDXF) shed over \$2.5 billion of its market cap from December 2015, or 76% of its value. The photovoltaic solar panel producer SunPower Corporation (SPWR) is down 80% ³ over the same period. And even Tesla (TSLA), the eminent electric car and battery manufacturer, is down over 30% since its peak in June 2017 as it struggled to keep to its own production schedules. ⁴

Perhaps one of the reasons green stocks have underperformed is its failure to establish a competitive advantage. It's hard for manufacturers of wind turbines and solar panels to distinguish themselves if their competitors are making very similar products.

Another systemic factor exerting pressure on green energy companies is their sensitivity to exogenous price shocks. When oil dips below a certain price - some experts have asserted this to be \$50— the production of renewable energy is simply uneconomic.

But the underlying cause of these green stocks' poor performance is their juniority in the capital structure, which ensures that equities have to bear the brunt of these systemic risks. If a project goes south, investors in green bonds can rely on recouping most of their losses by claiming the infrastructure as collateral, while investors in green stocks have no such recourse.

The historical underperformance of green stock makes some think that they are undervalued. But the fact remains that, in aggregate, green stocks have not delivered the stability investors have come to expect of green bonds, nor the returns they have come to expect of traditional equities.





But the underlying cause of these green stocks' poor performance is their juniority in the capital structure, which ensures that equities have to bear the brunt of these systemic risks.

Conclusion

If nothing is done to combat climate change, continued greenhouse gas emissions will cook the earth to a slow-boil. A rapid transformation away from hydrocarbons towards renewables is necessary.

The ecological catastrophe on the horizon is so dire that investors might want to take climate change into consideration when allocating their capital. But investors no longer need to be motivated by altruism. Funding the transition to renewables, long thought to be a selfless act, now offers profit margins that are steep and steadfast.

The security of green bonds has allayed worries that green energy is too risky to invest in, and while green stocks have historically underperformed the S&P, prudent stockpickers can win big as wind and solar continue to make exponential advances in cost efficiency.

Ultimately, we must remember that climate change does not conform to the periodic rhythm of the business cycle. Interest rates, commodity prices, and capital inflows will ebb and flow, but environmental collapse is headed in just one direction.



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