

The Henry Fund

Henry B. Tippie College of Business

Yun-Hsin (Jocelyn) Liu [yun-hsin-liu@uiowa.edu]



CME Group Inc. (CME)

Financial Services – Securities and Exchanges

April 17, 2020

Stock Rating

Hold

Investment Thesis

We recommend a hold rating for CME Group Inc. with 5% potential upside from strong revenue and market growth originated from the market's elevated volatility. However, we are closely monitoring the potential risk introduced by further regulations to the firm's products, increased competition in the industry, and higher default rate on trade from customers.

Drivers of Thesis

- **Strong Profitability Given High Portfolio Turnover Attributed by Elevated Market Volatility:** As direct impact of fears and uncertainties caused by COVID-19 pandemic, market volatility will spike and remain elevated. Risk-off sentiment leads to higher portfolio turnover by moving to less risky or risk-mitigating assets and hence increase trading revenue generated by CME Group Inc. Specifically, our model indicates a forward P/E ratio of 29.9x in 2020 which exceeds the historical average of 22x [3].
- **Competitive Advantage with the Wide Product Breadth:** CME Group offers a variety of products and platforms to trade repo, fixed income, OTC FX, and etc. A larger scope of the product categories provides a competitive position in the industry [6].
- **Ongoing Expansion Across Products and Geographic Regions:** CME Group has continued to seek opportunities for potential acquisitions, joint ventures, and partnerships in order to expand product offerings and market shares [2]. Our model forecasts an average 5% annual growth rate in product line as a result of expanding the product line going forward [3].

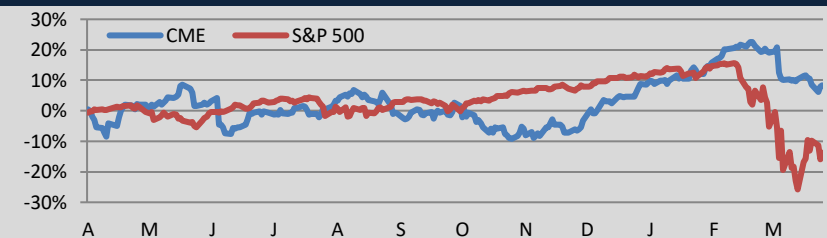
Risks to Thesis

- **Exposure to Credit Risk Originated from Higher Default Rate of Trade:** With slowing economy and ongoing market uncertainties, it is more likely that customers will default and not be able to fulfill trade obligations [6]. As a result, our model assumed 2.5% CV growth from the impact of the weak economy [3].
- **Regulatory Oversight on Derivative Market Trading:** Restrictions introduced by regulatory rules on derivative markets can limit the firm's services and capacity to provide and match client's needs. Such regulations include the Dodd-Frank Act, EMIR 2.2, Basel III, and MiFID II, etc. CME Group might bear the increasing costs associated with the efforts to mitigate regulatory risk [6].
- **Increasing Competition in the Industry:** Our model shows an average historical annual growth rate of 4% decline in firm's total revenue due to increasing competition in the industry. In order to maintain its competitive advantage, our Henry Fund model assumed more expenses to incur going forward because of ongoing expansion [4].

Earnings Estimates

Year	2017	2018	2019	2020E	2021E	2022E
EPS	\$11.94	\$5.71	\$5.91	\$7.34	\$7.96	\$8.71
Consensus Growth		-52.18%	3.50%	30.12%	2.73%	0.13%

12 Month Performance



Source: Yahoo! Finance

Target Price

\$185-199

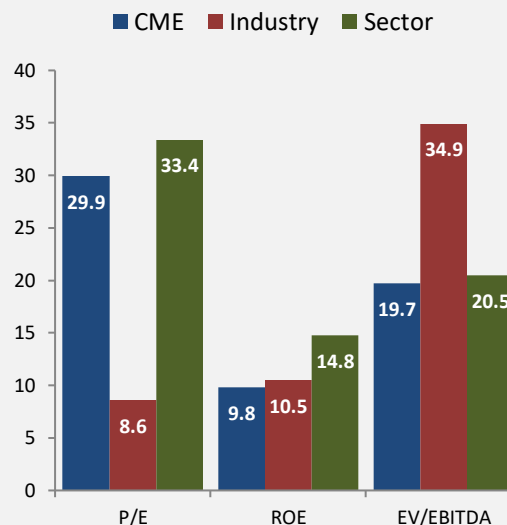
Henry Fund DCF	\$199
Henry Fund DDM	\$185
Relative Multiple	\$201
Price Data	
Current Price	\$191.62
52wk Range	\$131.80 – \$225.36
Consensus 1yr Target	\$196.71

Key Statistics

Market Cap (B)	\$65.39
Shares Outstanding (M)	358.40
Institutional Ownership	88.10%
Five Year Beta	1.00
Dividend Yield	1.84%
Est. 5yr Growth (EPS)	6.92%
Price/Earnings (TTM)	29.92x
Price/Earnings (FY1)	29.50x
Price/Sales (TTM)	13.01x
Price/Book (mrq)	2.70x

Profitability

Operating Margin	56.10%
Profit Margin	81.20%
Return on Assets (TTM)	3.00%
Return on Equity (TTM)	9.80%



Source: NetAdvantage, FactSet

Company Description

CME Group, Inc. was founded in 1898 and is headquartered in Chicago, IL. It operates as a security and commodity exchange company, providing risk management and investment needs for the customer. It offers interest rates, equity indexes, foreign exchange, energy, agricultural commodities, metals, weather and real estate products. Most of the trades are through CME Globex electronic trading platform across the globe and its open outcry trading facilities located in Chicago and New York City.

Important disclosures appear on the last page of this report.

EXECUTIVE SUMMARY

CME Group underperformed the SP500 last year. From February 2020, CME Group has outperformed the SP500 index as a result from investors switch to less risky assets that CME Group provides. Going forward, we see a potential 5% upside for CME Group driven by strong profitability led by the high market volatility and the variety of product offerings.

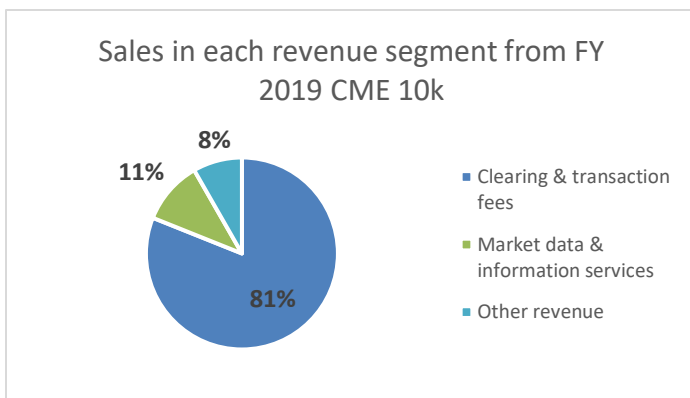
Our Henry Fund model also indicates a 29.9x forward P/E ratio in 2020 which exceeds the historical average of 22x [3]. There is still growth in CME Group, which is justified by higher market volatility due to COVID-19 and being the largest derivatives exchange in the world by market share. On the other hand, weaker economy indicates more credit risk would be embedded to CME Clearing that makes up 81% of CME Group’s total revenues, and more regulations might be in place within this industry. Also, more competition in this industry will also add more pressure to CME Group to expand its operating regions and products, leading to an average annual growth rate of 5% in total expenses going forward [3].

Therefore, we recommend a hold rating for the CME Group.

COMPANY DESCRIPTION

CME was founded in 1898 and is headquartered in Chicago, IL. CME Group operates as a security and commodity exchange company, providing risk management and investment needs of customers around the world. CME Group is the largest futures and options exchange in the world, its product line includes interest rates, equity indexes, foreign exchange, energy, agricultural commodities, metals, and weather and real estate products.

CME Group has three different streams of revenue including clearing & transaction fees, market data & information services, and other revenue. The chart below shows 81% of the total revenue is generated by clearing and transaction fees, 11% from market data & information services, and 8% from other revenues throughout 2019 fiscal year.



Source: CME Group 10K

CME switched open outcry method of trade to electronic platforms. According to CME Group’s 2019 annual report, CME focuses 90% of its trade from CME Globex, which is an electronic platform [6].

We expect the open outcry method of trade to decrease going forward as the trend of electronic trading continue to rise. CME Group has indicated that it will continue to expand its trading platforms to gain more electronic advantage worldwide.

The following map shows CME Group coverages around the world:

CME Group Global Trading Platform as of April 17, 2020



Source: Google Map – CME Group Global Trading Places

The following table shows CME Group’s global exchanges and indexes currently in its portfolio:

Exchanges	Summary
B3	Commercial agreement based on cross listing of products and future business development.
Bursa Malaysia Derivatives Berhad (BMD)	Commercial agreement based on settlement price licensing of BMD crude Palm Oil futures and listing of BMD contracts on CME Globex.
Dubai Mercantile Exchange	Joint venture with Dubai Holdings and the Oman Investment Fund (OFI) establishing the Middle east’s premier commodities Exchange.
Minneapolis Grain Exchange (Ticker: MGEX)	Commercial agreement to list MGEX products on CME Globex.
Singapore Exchange Limited (Ticker: S68.SI)	Mutual Offset System(MOS) provides around-the-clock trading of Eurodollar, Nikkei and Nifty 50 futures.
Indexes	
B3	CME Group offers USD futures on CME Globex. A cross-listing arrangement gives clients access to key, globally relevant benchmark products.
FTSE Russell Indexes	Licensed agreement to offer futures and options and futures on benchmark U.S. and International FTSE Russell indexes.
NASDAQ (Ticker: NDAQ)	Licensed agreement to offer futures and options on futures on the benchmark NASDAQ-100 index, as well as futures on the NASDAQ Biotechnology Index.
Nikkei Inc. (Ticker: NI225)	Licensed agreement to offer both Yen- and USD-denominated futures and options on the Nikkei 225 Stock Average.
S & P Dow Jones Indices (Ticker: ^GSPC)	Joint venture between CME Group and McGraw-Hill financial. License agreement to offer futures and options on a range of S&P and Dow Jones indices, including the benchmark S&P 500 index.
Tokyo Stock Exchange, Inc. (Ticker: TOPIX)	Strategic partnership. Licensed agreement to offer Yen-denominated futures on the Tokyo Stock Price Index (TOPIX)

Source: CME Group 10K

CME Group has continued to look for opportunities to acquire businesses that would strengthen its business by expanding the

product categories and global footprints [6]. For example, in 2018, CME Group acquired NEX for \$5.5 billions in order to improve trading technology and broaden CME Group’s foreign exchange spot & forward contracts offering [7]. However, mergers and acquisitions are expected to lower annual average revenue growth rate to 9% from year 2020 to 2021 which is lower than the current growth rate of 13% [3].

The following sections detail further information about each revenue segment and its profitability:

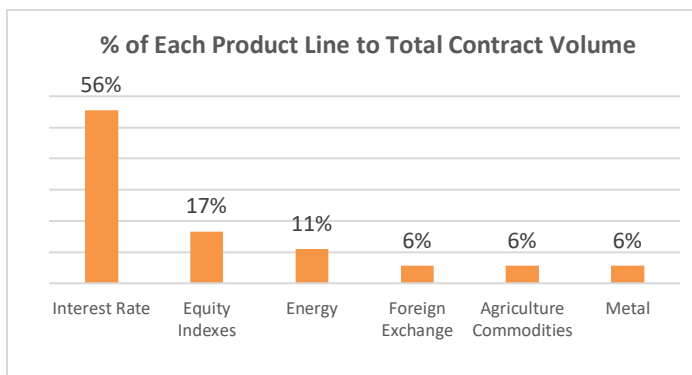
Clearing & Transaction Fees

As firm’s core business, clearing & transaction fees make up more than 80% of CME Group’s total revenue. Majority (90%) of the trades are executed through CME Globex (electronic) while others are traded via open outcry and privately negotiated [3]. Among the major competitors in clearing services, CME Group holds the lowest clearing transaction rate per contract and hence can attract more investors to trade on their platforms.

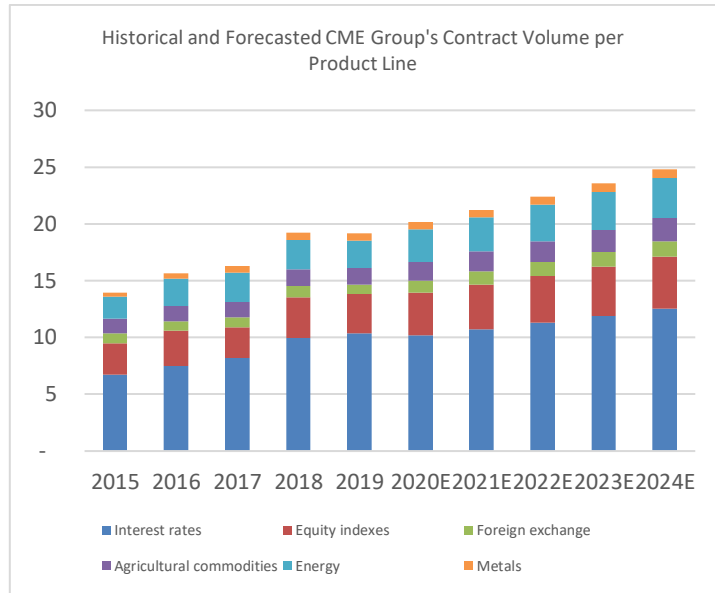
	Clearing Transaction Rate per Contract	% of Clearing Transaction Fee as Total Revenue
CME Group	\$0.82	82%
Intercontinental Exchange	\$1.42	93%
CBOE Holdings Inc.	\$1.00	69%

Source: CME Group 10K, Intercontinental Exchange 10K, CBOE Holdings Inc. 10K

Looking at fiscal year 2019 CME Group’s annual report, product lines within this revenue segment cover 56% of trading volume in interest rates products, followed by 17% in equity indexes, 11% in energy contracts, 6% in foreign exchanges, 6% in agriculture commodities, and 6% in metals.



Source: CME Group FY 2019 10K



Source: CME FY 2019 10K, HF Model

Moreover, data has shown the increasing demand for interest rate products due to current low interest rate environment. In fact, on April 8, 2020, the firm announced a 46 percent year on year increase in interest-rate products in Q1 2020 [10].

Therefore, our model indicates an average annual growth rate of 2% in total contract volume for the next five years as investors attempting to reposition and rebalance their portfolios through a dynamic market, particularly the investors who are adopting a hedging strategy via CME Group’s products to mitigate the potential investment risk [3].

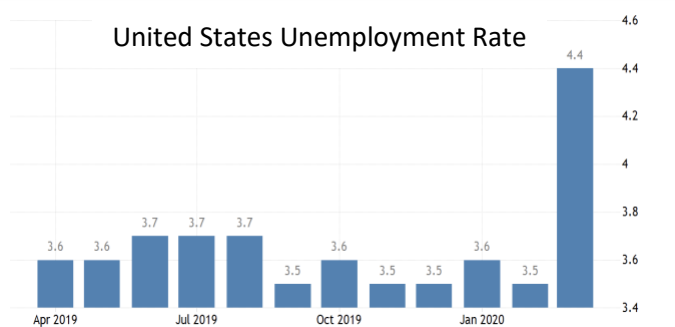
Clearing & transactions fee are separated into two categories: investors who use clearing services to mitigate risk, and investors that do not need risk mitigation. Investors who do not need to minimize their risks will get charged \$0.70 per future and option transaction [6]. However, investors who decided to add additional risk mitigation service will get charged with an average rate per contract of \$0.82 [6].

The risk mitigation is classified as CME Clearing House services in which investors enter into either as a buyer or seller, and CME Clearing acts as the counterpart of the investor in order to minimize counterparty risk. CME Clearing maintains a matched book and risk-neutral position so that investors do not have to worry about the other end of their trade falling through [9]. This service hence costs more than solely being an intermediary between the buyer and seller during derivative market trade as CME group has to enter into the opposite party of what investors decided to choose and be a part of the trade.

In addition, analysis concluded that we might expect a higher default risk on trade in the near future from post coronavirus pandemic as the economy worsen and clients are more likely to

default. We used unemployment rate data to indicate the possibility of customer default risk as people start losing jobs, they also lose income sources that support their positions in the derivative markets.

Based on the chart below, the unemployment rate has reached the highest level over the last 12 months. Thus, we have adjusted the average annual growth rate of daily volume to 5% from the historical annual average growth rate of 8% in the Henry Fund model [3].



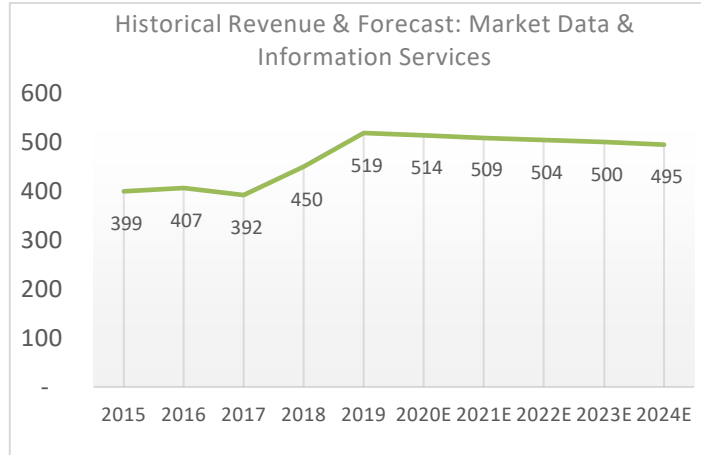
Source: Trading Economics

Market Data & Information Services

Eleven percent of the firm’s total revenue is generated by market data & information services which is the second largest revenue source from CME Group’s total revenues. Subscribers can access market data either directly from the CME Group or indirectly from the third-party distributors to obtain real-time information on futures, equities, OTC, cash and cleared swaps [6]. According to CME Group’s 10K (dated as of 2019), the firm has increased its market data and information services fee from \$85 per month to \$105 per month for each device as a result from the NEX acquisition in November 2018 and higher costs inquired by the data distributors [6]. CME Group has also experienced a decrease in the number of market data subscriptions due to ongoing economic uncertainty, high unemployment levels and aggressive cost cutting initiatives at the subscriber’s firm [6].

Therefore, we believe less revenue can be generated in this revenue segment as the price of data services increased from \$85 per month to \$105 per month. Going forward, if revenues generated from market data subscriptions keep lowering, CME might need to reduce its subscription price back to \$85/ per month to compete with its competitors.

Moreover, a higher demand on the competitors such as FactSet, Bloomberg, and S & P Global certainly does not help. These firms provide not only the data on derivatives but also equity, FX, and fixed income [12]. As a result, we forecast a -1% growth in market data services going forward in the Henry Fund model [3].

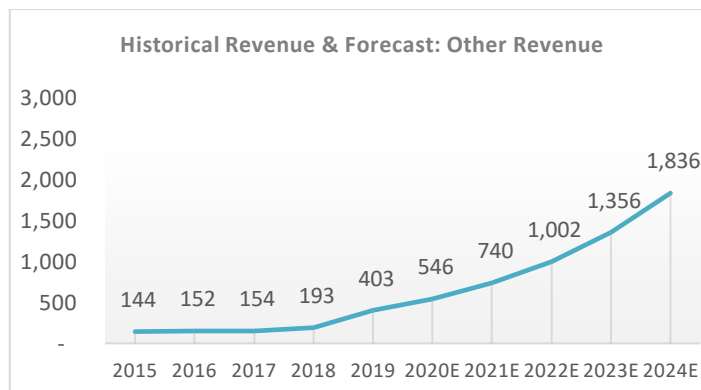


Source: Henry Fund Model

Other Revenues

Eight percent of the firm’s total revenue is generated from other revenue segments. Other revenues include access and communication fees that are charged to members and clearing firms that use CME’s various telecommunications networks and communications services, fees for optimization services that includes fees for risk management and information services for the over-the-counter markets, portfolio reconciliation and post-trade processing, fees for post-trade services, fees for collateral management, equity subscription fees, and fees for trade order routing through agreements from various strategic relationships [6].

In our model, we forecast an annual average growth rate of 35% as we expect more investors choose to use risk mitigation services [3].



Source: Henry Fund Model

Cost Structure

Most of CME Group’s expenses do not vary directly with changes in contract volume. However, licensing and other fee agreements can vary directly with certain equity, energy and

swap volumes. Employee bonuses also vary with overall contact volume [6].

With increased market volatility, we expect increased trading volumes. For this reason, we forecast an average annual growth rate of 7% increase in compensation & benefits. Licensing & other fee agreements are expected to increase at an average annual growth rate of 11% as CME Group plans to expand its products and trading platforms. Communication & technology expenses are also subjected to an average annual growth rate of 4% increase as the industry shifts to electronic trade.

As a result, we forecast an average annual growth rate of 13% in net income which is lower than the historical annual growth rate of 15% [3].

RECENT DEVELOPMENTS & INDUSTRY TRENDS

CME Group starts to realize the benefits of acquiring NEX which lead to larger user base and stronger profitability in 2019. Going forward, M&A activities are expected to continue in order to broaden the firm’s geographic and product scope over the next 5 years. Note the expansion can also lead to higher expenses.

CME FY 2019 Annual Report

The table below shows CME Group’s street consensus EPS and revenue for the fiscal year 2019:

	Street Consensus	Actual	Miss/Beat?
EPS	\$5.91	\$5.93	Meet
Revenue	\$4.9 billion	\$4.9 billion	Meet

Source: *Simply Wall St*

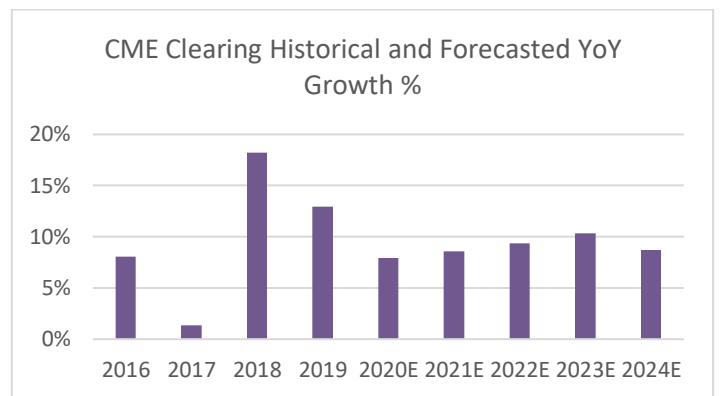
CME Group released its 2019 annual report on February 12, 2020 that highlighted the delivery of significant client value and efficiencies through the acquisition of NEX business. As a result, trading volume has increased, especially in commodities, total revenue increased 13% from 2018 and average rate per contract increased from \$0.76 to \$0.82 per contract, and EPS also grew from \$5.73 per share to \$5.93 per share.

Management guidance indicates that trading activity in CME Group’s centralized markets due to ongoing uncertainty in the financial markets caused by the United States and European credit crises, fluctuations in the availability of credit, variations in the amount of assets under management as well as the Federal Reserve Bank’s interest rate policy and quantitative easing. In addition, management also expects competition to intensify, especially in light of ongoing regulatory reform in the financial services industry, so CME Group will continue adapt

trading technology and clearing services to meet the needs of the customers [6].

In 2020, CME Group is expected to launch the BrokerTec fixed income markets alongside of its benchmark futures and options on CME Globex [6]. However, data suggests a more neutral outlook on the firm’s profitability going forward with the evident upside coupled with potential risks to it. Market environment does exhibit some catalysts for growth in trading volume with the market volatility caused by Brexit, COVID-19, Lumber price drop, and oil price drop, etc. For this reason, we forecasted a \$7.34 EPS for 2020 fiscal year because of CME’s plan to complete more acquisitions and expand product lines [3].

However, as the rise in unemployment rate, investors who choose to invest through CME Clearing would have higher chance of default on trade and can consequently increase credit risk exposure/loss to the CME Group. Therefore, in the Henry Fund model, we forecast 8% average annual revenue growth rate for the next 2 year and 10% for the next 3 years as market uncertainty can take approximately 2 years to recover [3].



Source: *Henry Fund Model*

Ongoing Geographic and Products Expansion

CME Group is expected to continue to expand its global footprints and product categories in order to position itself at the front line in the industry. During the past few years, CME Group has been obtaining exposure to more products and acquired more companies to attract new users to the exchange.

From geographic perspective, on November 2, 2018, CME Group acquired a U.K based firm NEX Group for \$5.5 billions in cash and stock. This acquisition increased CME Group exposures to European markets. Post the acquisition, according to FactSet, CME Group now holds 7.29% of its business in Europe which increases from 1.79% before the acquisition [14]. Older than that, in 2012, CME Group acquired Pivot to enhance its electronic trading system [15]. However, we maintain a neutral outlook on CME Group’s expansion plan over the next five years

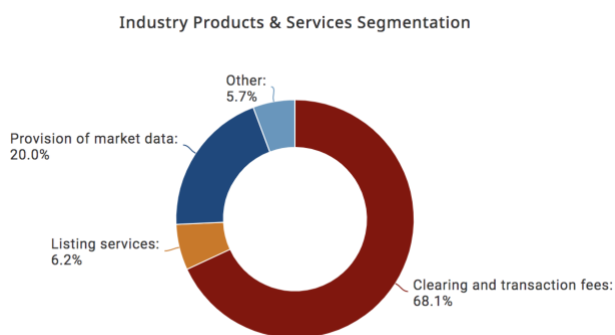
since the recent acquisition was just completed in 2018 and the one before that was 6 years ago.

From a product perspective, for example, in 2013, CME Group acquired The Board of Trade of Kansas City, Missouri, Inc. (KCBT) and its hard-red winter wheat product line [6]. CME Group has also launched new gold futures recently due to increased volume of gold as investors are seeking to hedge their risk from the higher volatile equity market. The new gold futures contract comes with expanded delivery option that include 100-troy ounce, 400-troy ounce and 1-kilo gold bars. This will allow customers to have more flexibility in managing physical delivery. The new gold futures are also expected to launch in April this year pending regulation approval. [16] We believe that CME Group would continue to expand its product line as the trading volume and needs increase, but also associated with the costs to support the effort. Our Henry Fund model shows an annual average growth rate of 6% increase in total expenses which is around 2 % higher than the historical average annual growth rate [3].

Industry trends include cuts in the Fed fund rate, regulations on financial services industry, and the rise of electronic trading.

Given the current low interest rate environment, it is expected to see increasing trading volume and hence increasing revenues generated by clearing and transaction fees. As of 12/31/2019, Clearing and transaction fees are 68% of this industry’s revenue source. However, on the other hand, there are also increasing costs estimated for the firm to comply with the regulations, which could potentially offset the transactional revenue.

Below is the revenue decomposition for stock and exchange industry based on 2019 industry data:



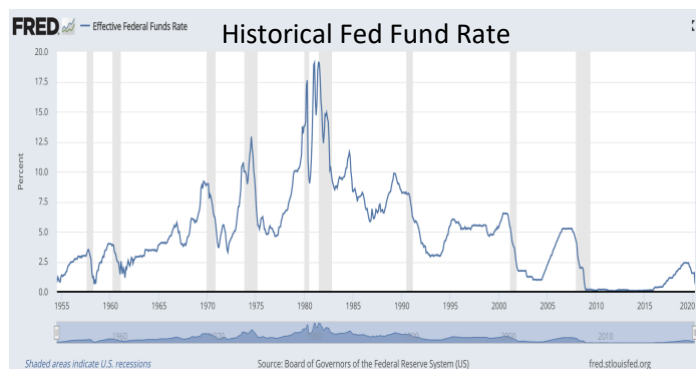
Source: IBIS World

Low Interest Rates

As a mechanism to stimulate the impacted and slowing economy caused by recent COVID-19 pandemic, the Fed has determined to drop the rate close to 0%. This increases investors interests in hedging interest rate products which is around 50% of CME

Group the trading volume across products. In the near term, we expect the Federal Reserve to keep the rate at 0.65% or with a possibility to cut another 25 basis points in order to aid the weak economy.

Moreover, given current market volatility and uncertainties around COVID-19, we expect trading volume to increase as investors start deploying hedging strategy or speculating potential profits via futures and options. For this reason, we believe more investors would also be interested in trading futures, options, and interest rate products over the next five years. Therefore, we forecast an average annual growth rate of 5% in trading volume in our Henry Fund model [3].



Source: FRED

Regulations

Various regulations such as the Dodd-Frank Act, EMIR 2.2, Basel III, and MiFID II aim to regulate and refrain the stock and exchange industry from having too much power in the financial markets. For example, the Dodd-Frank Act was established after the 2008 Financial Crisis that its Volcker Rule attempts to reinforce the regulatory framework on how stock and commodity exchanges operate and minimize systemic financial risks [18].

It is inevitable that CME group is being regulated with different regulations both domestically and internationally, given its global footprint.

Within domestic market, CME Clearing and NEX San Francisco is subject to extensive regulation by Commodity Future Trading Commission (CFTC) that requires CME Group’s regulated subsidiaries to satisfy the requirements of certain core principles with regard to the operation and oversight of CME’s markets and clearing house [6]. CME is also designated to follow under Title VIII of Dodd-Frank Act. As a result, the firm must comply with CFTC regulations to a systemically important Derivatives Clearing Organization (DCO) for financial resources and liquidity resources. Additionally, CME Group is subject to the rules and regulations of the local jurisdiction in which CME requires additional regulatory oversight of certain risk-management

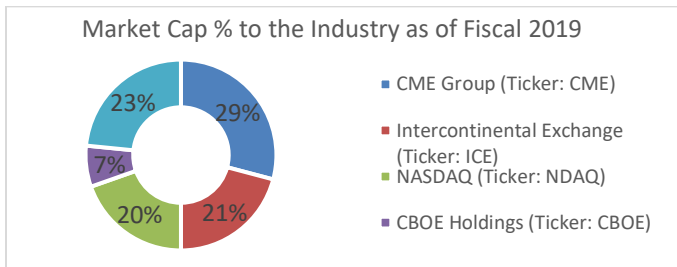
standards, clearing and settlement activities by the CFTC and the Federal Reserve Board.

As to firm’s exposure to global markets, CME Group is subject to the rules and regulations from the local jurisdictions including the European Securities and Markets Authority (ESMA) and the United Kingdom Financial Conduct Authority (FCA). In addition, CME Optimization services business is subject to Swedish Financial Supervisory Authority, the FCA, CFTC and the National Futures Association, ESMA and the Australian Securitisation and Investments Commission [6]. In the most recent annual report, CME group also disclosed potential negative impacts on the firm with the EMIR 2.2 becoming effective on January 1, 2020.

Due to the regulatory costs, while the firm continues its expansions in product offerings and global businesses, we expect the costs of following these regulations might partially offsets the revenue generated by larger trading volume [18].

MARKETS AND COMPETITION

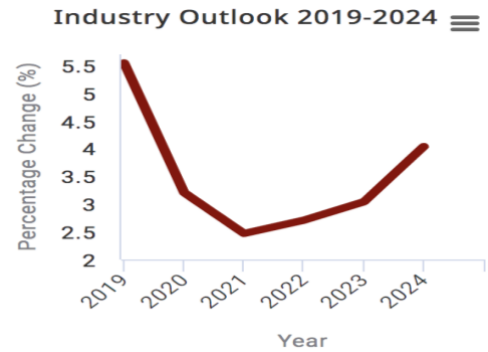
There are four major players in stock & commodity exchange industry in US, with 29% of market shares owned by the CME Group as the largest participant in the industry.



Source: IBIS World

Future Growth Prospect: Stock & commodity exchanges industry is expected to continue to grow over the next five years. Though in the near-term, we might see a weaker economy and slower growth in the industry following the recent coronavirus pandemic.

The following chart is forecasted growth rate for securities and exchange industry for the next 5 years:



Source: IBIS World

Peer Comparisons

Geographic Locations: Holding the largest market share and larger user base in the industry, CME Group operates across countries including Asia, North and South America, Europe, and Australia[5]. On the other hand, Intercontinental Exchange (ICE) offices locate across US, London, Tel Aviv and Singapore. NASDAQ and CBOE Holdings both solely operate in the U.S.

Geographic Locations	CME Group	Intercontinental Exchange	NASDAQ	CBOE Holdings
Asia	v	v (Only in Singapore)	x	x
North and South America	v	v (Only in the U.S.)	v (Only in the U.S.)	v (Only in the U.S.)
Europe (Including London)	v	x	x	x
Australia	v	x	x	x
Middle East	v	v (Only in Israel)	x	x

Source: FactSet

Looking at each key player geographic locations, CME Group is the best positioned because it covers most of the continent and operates in regions that its competitors do not. This would be beneficial to CME as it is more exposed to different customers around the world so that it would be benefit from different market volatility worldwide as well, leading to more trading volume.

Target Market: CME Group not only shares a similar target customer base with its competitors, but also include the Central Bank which could generate profits when the Central Bank has any announcement on financial stimulus packages. While most of its counterparts, including Intercontinental Exchange, NASDAQ, and CBOE, target customers such as professional

traders, financial institutions, institutional and individual investors, major corporations, manufacturers, producers and governments [5].

CME Group is also the best positioned in the market as its brand of being the world largest derivative exchange because one of its target customers will benefit CME Group from any stimulus package that might need assistance from CME Group that other competitors cannot perform.

Industry Life Cycles: The stock and commodity exchanges industry is at the mature stage of its economic life cycle. This industry has been able to generate consistent revenue and maintain its profit streams. However, the industry has undergone considerable consolidation in the recent years, as the major players have acquired other exchanges, joined international ventures and merged among themselves.

According IBIS World, on November 13, 2013, Intercontinental Exchange Inc. finalized the acquisition of NYSE Euronext. In March 2017, BATS was acquired by CBOE Holdings Inc [12]. In 2018, CME Group has also acquired NEX to expand its product line and user base.

Profitability: Looking at historical data, CME Group, Intercontinental Exchange, and CBOE Holdings all generated the revenue mainly on the clearing and transaction fees. On the contrary, NASDAQ generated revenue mainly by the provision of market data and listing services. As the trading volume increase in the volatile market environment, data indicates CME Group, Intercontinental Exchange, and CBOE Holdings are in a better position for profitability due to their overweight in clearing and transaction services. Though undeniably, higher trading volumes might also associate with higher regulatory costs for CBOE and CME Group. The following table details the revenue decomposition for the key players in the industry:

	CME Group	Intercontinental Exchange	NASDAQ	CBOE Holdings
Clearing and transaction fees	81%	59%	0%	93%
Listing services	0%	20%	12%	0%
Provision of Market Data	11%	21%	80%	0%
Other	8%	0%	8%	15%

Source: FactSet

Majority of CME Group competitors rely their revenues from clearing and transaction fees. The following table shows each company's clearing and transaction fees:

Clearing and transaction fees	CME Group	Intercontinental Exchange	NASDAQ	CBOE Holdings
Average rate per contract	\$0.82	\$1.42	NA	\$1.00

Source: FactSet

Out of the two other competitors whose main source of revenue comes from clearing and transactions, CME Group has the lowest average rate per contract. For this reason, increasing trading volume going forward will give CME group more opportunities to increase its value as its low average rate per contract will attract more investors.

Looking across profitability metrics, CME Group exhibits outperforming operating margin, and EPS due to its large business across domestic and international markets. However, CBOE Holdings presents a stronger overall profitability with its highest return on equity, and strong P/E.

The following table details the 5-year average profitability metric for these four key players in this industry:

	CME Group	Intercontinental Exchange	NASDAQ	CBOE Holdings
P/E	9.8	22.4	39.8	30.9
Operating Margin	56.1	40.4	22.8	31.4
EPS	\$6.36	\$3.15	\$2.97	\$3.1
ROE	9.8	11.4	8.9	38.4

Source: FactSet

Overall, we see growth to continue in this industry in general and CME Group is specifically best positioned with its existing and expansion plans of product offerings and global footprint.

ECONOMIC OUTLOOK

Uneased market uncertainties and the imminent presidential election will collectively add more risk exposures for the CME Group throughout 2020.

2020 Presidential Election

The presidential election in 2020 would be critical to this industry. If the Republican Party is elected, there would be chances to roll back certain sections of the Dodd-Frank Act that would benefit the CME Group. The Dodd-Frank Act has been restricting majority of CME Group's products include rules relating to the implementation of mandatory clearing of certain OTC derivatives, swap reporting, operation of a clearing house, anti-manipulation, larger trader reporting, and product definitions. Leading to higher cost going forward and lowering the forecasted revenue to an average annual growth rate of 9% which is lower than the historical average growth rate of 13%.

However, if the Democratic Party is elected, current strict or even tighter regulations could be put in place in the Dodd-Frank Act.

Market Volatility

Market volatility has spiked and reached the highest-level post 2015 due to various current market events including COVID-19 pandemic, Brexit, etc. and the imminent 2020 presidential election. As market uncertainties remain, we expect more trading volume and hence higher revenue generated by the CME Group.



Source: FRED

Climate Change

Climate change can be a key factor as CME Group offers futures on weather. With the awareness of the impact and risk of climate change, it is expected to attract higher demand in weather futures as investors hedging the portfolio or speculating to generate profits.

VALUATION

According to DCF and DDM models, it is estimated the stock price target for CME Group is between \$185 to 199.

According to Relative Valuation analysis, comparing with CME's key competitors S&P Global Inc (Ticker: SPGI), MSCI Inc(Ticker: MSCI), FactSet(Ticker: FDS), Nasdaq(Ticker: FDS), CBOE Holding Inc(Ticker: CBOE), Intercontinental Exchange, Inc(Ticker: ICE), and Moody's Corporation(Ticker: MCO), the conclusion is aligned with the DCF and DDM models.

Within the industry, the average company's P/E multiple for 2020 is 27x, and 25x for 2021. CME Group is currently trading at 25.9x P/E of 2020, and 23.9x P/E of 2021 and undervalued than its peers [3]. Therefore, the model results indicate approximately 5% potential upside. This is led by strong revenue and market growth originated from market's elevated volatility. However, we are closely monitoring the potential risk introduced by further regulations on the firm's products, increased competition from the industry peers, and higher default rate on trade.

Therefore, we recommend a HOLD rating for the CME Group Inc.

General Assumptions

When building the DCF model, several assumptions were made based on the key economic trends and industry outlook.

Marginal Tax Rate: We assumed a 21% marginal tax rate going forward to be consistent with the U.S. federal income tax rate. Foreign tax took around 3% of CME Group's income tax, according to fiscal year 2019 annual report [6]. When building our Henry Fund model, we assumed foreign tax out as it is only a small percentage of the income tax.

Even with potential M&A activities, we observed that during 2018 NEX acquisition, the effective tax rate is 21.3%. Therefore, we assumed a 21% marginal tax rate going forward [3].

CV Long Term Growth Rate (NOPLAT): Given securities and exchange industry has reached its mature state [18], the long-term growth rate would equal to the GDP growth rate. Since CME Group operates globally, we used international global GDP growth rate as our Long-Term CV NOPLAT growth. According to the World Bank, global GDP growth rate would be around 2.5% in 2020. [19] Thus, we used 2.5% as CV growth of NOPLAT.

CV Long Term Growth Rate (EPS): We found EPS growth in this industry to be around 4% according to CSI Market [5]. Therefore, we used 4% on CV long term growth rate as we believe CME Group's EPS growth will be aligned with the industry.

Normal Cash as % of Sales: A cash level of 32% was assumed to be normal as it is the historical lowest cash flow/ total sales value.

Risk Free Rate: The risk-free rate is using the 10-year treasury rate of the current day. Post the adjustment made by Fed, the risk free rate is estimated at 0.78%.

Revenue Decomposition Assumptions

Revenue decomposition was broken down by clearing transaction fees, market data services, and other revenues. In particular, we also break down the revenue stream of clearing and transaction fees by products. We have observed that interest rate products are the main source of revenue within the clearing and transaction segment. With the increasing market volatility, we forecast a 2% annual growth rate in total contract volume in 2020 compared to 0% annual growth rate in 2019.

Revenue Segments	Assumed Growth Rate	Reasons
Clearing & transaction fees	5%	We used unemployment trend as our main indicator of investors' ability to pay their contract. With higher unemployment risk, we expect higher default risk on trade. Thus, clearing & transaction fees are expected to grow at 5% lower than historical average of 8%.
Market data & information services	-1%	Decreased in market data as a recent increased data subscription fee from \$85 to \$105/ per month.
Other revenue	35.41%	Other revenues are expected to increase as more trading volumes are expected going forward. Growing higher than historic average growth rate.

Source: HF Model

Income Statement Assumptions

Regulations and potential M&A activities could potentially lead to higher expenses going forward for the firm.

Total Operating Expenses: We expect total operating expenses to continue to grow on an average annual growth rate of 6% as the industry building and strengthening its trading capacity via electronic trading platforms.

As a result, we expect more expenses associated with technology equipment, maintenance fees, and online support to be available to CME Group's customers. In addition, CME Group is expected to pay higher license fees in equity products as trading volume increases [6].

Compensation & benefits expense is expected to grow at 16.24% annually as we expect increased in trading volume going forward, employees will receive more bonuses.

Communication & technology is also expected to grow at 3% annually higher than historical average growth rate since CME Group noted to expand its trading platform and enhance technology on trading to compete in this increased competition industry.

Professional fees & outside services is expected to grow at the same level of historical average annual growth rate of 4% since CME Group indicates that trading volume would not affect professional fees & outside services expenses.

Licensing & other fee agreements expense is however varied from number trading volumes, according to CME Group 2019 annual report [6]. Therefore, licensing & other fee agreements growth is increased to 3.8% higher than historical average growth rate as we expect trading volume to increase going forward [3].

Other expenses are also growing at historical average growth rate since CME Group indicated that other expenses would not be affected by trading volume [6].

We believe capital expenditure will grow 0.2% higher than historical average as we expect CME Group to acquire more companies to increase its trading platform going forward [3].

EPS: CME Group's outstanding shares include class A, and B. Class B common stock is neither listed on a national securities exchange nor traded in an organized over-the-counter market.

Class B common stock is associated with a membership in a specific division of CME exchange. Class B dividend payment is based on Class A. Since Class B is not publicly traded and is based on Class A EPS, we used class A common stock forecast to calculate EPS going forward.

Dividend per Common Share: Dividend per share was assumed based on the dividend payout ratio. We believe that by calculating the average of the dividend payout ratio based on historical data could provide us the reasonable forward-looking estimate in dividend payments.

In fact, CME Group has been paying dividend consistently over the past ten years (2009 – 2019). Moreover, since only class A shares are public information and make up the majority of total basic shares, we only used class A's EPS divided by dividend common share to get each year's dividend payout per share. Similarly, for the forecasting period, we used the average dividend payout ratio multiply by the projected EPS for the class A.

Balance Sheet Assumptions

Property, Net: Property is expected to decrease over the next five years. Since CME Group has been using its property and land from 1848, we expect the land to continue to depreciate. Internal and external costs will be incurred in developing or obtaining computer software for internal use as well. Since many trades are now done electronically, we also expect more software purchases going forward [6]. Therefore, we forecast a 5% decreased to the depreciated property and 10% growth in capital expenditure.

Deferred Income Tax Liabilities: Since CME Group is expected to expand its business via M&A activities, we forecast a 4.55% growth rate (historical average growth with 2018 NEX acquisition growth rate) in deferred tax liabilities. In 2018 and 2019, deferred tax liabilities were increased because of the NEX acquisition where losses incurred in the operation of various foreign entities and capital losses from the sales of securities [6].

WACC

Both cost of equity and cost of debt are calculated based on McKinsey's guidance. Equity risk premium was determined by Henry Fund analysts. We used most current Damodaran equity risk premium to reflect the current market environment. From our model, 6.16% was used as our risk premium as economy being affected by COVID-19.

Debt Maturity Analysis

With more expected M&A activities going forward, we expect CME Group to be short in cash. Therefore, increasing needs to fund through debt to meet funding requirement by direct borrowing from financial institutions through CME committed revolving credit facilities.

Cash requirement for CME Group is based on operating leases and non-cancellable purchase obligations as well as other obligations reflected as long-term liabilities [6]. From our Henry Fund model, we expect performance bonds and guaranty fund contributions to grow at 2% annually, and long-term debt average growth rate of 8% as more M&A activities will require more cash out of the firm and lead to more debt rising.

From all of assumptions above, we estimate a target price of \$199.15 using DCF/EP model, \$185.61 using DDM, and \$201.05 using relative valuation multiples [6]. Particularly, we believe that DCF model shows more perspectives on CME Group's fundamental metrics on operating metrics, DDM shows more growth in CME Group dividends, and relative valuation shows peer comparison within this industry. Each model exhibits different perspectives hence it is more robust to project the target price based on three analysis conclusions collectively. To summarize, the target price for CME Group is between \$185 to \$199 with an upside of 5% potential [3].

KEYS TO MONITOR

Key things to monitor going forward include 2020 Presidential Election, and economic factors including unemployment rate, consumer savings, etc.

2020 Presidential Election

Various domestic and international regulations regulated CME Group. Consequently, the firm tends to have higher regulatory costs relative to peers. As the US presidential election approaching, it is critical to monitor the results. If the Republican Party is elected, there is a higher chance that certain rules in Dodd-Frank Act could be rolled back and hence a lower regulatory cost for the CME group.

Economic Factors

Elevated market volatility tends to increase portfolio turnover rate and rebalance allocations from risky assets to less risky or risk-mitigating assets, which will increase trading volumes and revenue for CME group. However, if the volatility remains and economy worsen for an extended period of time, the default rate is also expected to be pushed higher which would increase the firm's credit risk. Therefore, it is critical to monitor the state of economy with various economic metrics such as unemployment rate, consumer saving, etc.

INVESTMENT POSITIVES

- **Strong Profitability Given High Portfolio Turnover Attributed by Elevated Market Volatility:** As direct impact of fears and uncertainties caused by COVID-19 pandemic, market volatility will spike and remain elevated. Risk-off sentiment leads to higher portfolio turnover by moving to less risky or risk-mitigating assets and hence increase trading revenue generated by CME Group Inc. Specifically, our model indicates a forward P/E ratio of 29.9x in 2020 which exceeds the historical average of 22x [3].
- **Competitive Advantage with the Wide Product Breadth:** CME Group offers a variety of products and platforms to trade repo, fixed income, OTC FX, and etc. A larger scope of the product categories provides a competitive position in the industry [6].
- **Ongoing Expansion Across Products and Geographic Regions:** CME Group has continued to seek opportunities for potential acquisitions, joint ventures, and partnerships in order to expand product offerings and market shares [2]. Our model forecasts an average 5% annual growth rate in product line as a result of expanding the product line going forward [3].

INVESTMENT NEGATIVES

- **Exposure to Credit Risk Originated from Higher Default Rate of Trade:** With slowing economy and ongoing market uncertainties, it is more likely that customers will default and not be able to fulfill trade obligations [6]. As a result, our model assumed 2.5% CV growth from the impact from the weak economy [3].
- **Regulatory Oversight on Derivative Market Trading:** Restrictions introduced by regulatory rules on derivative markets can limit the firm's services and capacity to provide and match client's needs. Such regulations include the Dodd-Frank Act, EMIR 2.2, Basel III, and MiFID II, etc. CME

Group might bear the increasing costs associated with the efforts to mitigate regulatory risk [6].

- **Increasing Competition in the Industry:** Our model shows an average historical annual growth rate of 4% decline in firm's total revenue due to increasing competition in the industry. In order to maintain its competitive advantage, our Henry Fund model assumed more expenses to incur going forward because of ongoing expansion [4].

and figures included in this report are from publicly available sources. This report is not a complete compilation of data, and its accuracy is not guaranteed. From time to time, the University of Iowa, its faculty, staff, students, or the Henry Fund may hold an investment position in the companies mentioned in this report.

REFERENCES

1. IBIS World, Stock & Commodity Exchanges in the US Report
2. NetAdvantage
3. HF CME Financial Model
4. Verus Analytics, CME Earning performance
5. CSI Market
6. CME Group's 10K
7. Google Map
8. CNBC, NEX and CME Group Acquisition
<https://www.cnbc.com/2018/03/29/cme-group-deal-to-buy-nex-for-5-point-5-billion.html>
9. CME Clearing House
<https://www.cmegroup.com/clearing.html>
10. FN London, CME Group trading volume went up because of interest rate products.
<https://www.fnlondon.com/articles/virus-volatility-drives-record-trading-at-cme-outside-america-20200408>
11. Trading Economics, Unemployment rate
12. IBIS World, Financial Services Provider
13. Simply Wall St. CME FY 2019 EPS consensus
14. FactSet
15. CrunchBase, CME Group M &A history
16. Yahoo! Finance, CME new gold futures
17. FRED
18. IBIS World, Stock & Commodity Exchanges
19. The World Bank, CV NOPLAT growth rate Assumption
<https://www.worldbank.org/en/publication/global-economic-prospects>
20. The World Bank
21. Finra

IMPORTANT DISCLAIMER

Henry Fund reports are created by graduate students enrolled in the Applied Securities Management program at the University of Iowa's Tippie College of Business. These reports provide potential employers and other interested parties an example of the analytical skills, investment knowledge, and communication abilities of our students. Henry Fund analysts are not registered investment advisors, brokers or officially licensed financial professionals. The investment opinion contained in this report does not represent an offer or solicitation to buy or sell any of the aforementioned securities. Unless otherwise noted, facts

CME Group Inc.
Revenue Decomposition- All figures in millions of U.S. Dollar except per share items

Fiscal Years Ending Dec. 31	2017	2018	2019	2020E	2021E	2022E	2023E	2024E
Clearing & transaction fees	3,099	3,667	3,946	4,192	4,454	4,732	5,028	5,153
Total contract volume	4,089	4,844	4,830	4,912	4,995	5,080	5,166	5,295
Average daily volume by product line:								
Interest rates	8	10	10	10	11	11	12	13
Equity indexes	3	4	3	4	4	4	4	5
Foreign exchange	1	1	1	1	1	1	1	1
Agricultural commodities	1	1	1	2	2	2	2	2
Energy	3	3	2	3	3	3	3	4
Metals	1	1	1	1	1	1	1	1
Aggregate average daily volume	16	19	19	20	21	22	24	25
YoY Growth %	4%	18%	0%	5%	5%	5%	5%	5%
Method of Trade from the Average daily volume:	-	-	-					
CME Globex (Electronic)	15	17	17	18	19	20	21	22
Open outcry	1	1	1	1	1	1	1	1
Privately negotiated	1	1	1	1	1	1	1	1
Electronic Volume as a % of Total Volume	89%	90%	90%	89%	89%	89%	89%	89%
Total contract volume (252 trading days / year)	4,089	4,844	4,830	4,912	4,995	5,080	5,166	5,295
YoY Growth %	4%	18%	0%	2%	2%	2%	2%	2%
Clearing and transaction fees for futures and options	3,030	3,514	3,396	3,560	3,732	3,913	4,102	4,300
Average rate per contract for future and options	\$ 0.74	\$ 0.73	\$ 0.70	\$ 0.72	\$ 0.75	\$ 0.77	\$ 0.79	\$ 0.81
Interest rate swap and credit default swap	68	62	67	67	67	67	68	68
Cash markets business	-	91	483	483	483	483	483	483
Total Clearing & transaction fees	3,099	3,667	3,946	4,192	4,454	4,732	5,028	5,153
Average rate per contract for total services	\$ 0.76	\$ 0.76	\$ 0.82	\$ 0.85	\$ 0.89	\$ 0.93	\$ 0.97	\$ 0.97
Market data & information services	392	450	519	514	509	504	500	495
Other Revenue	154	193	403	546	740	1,002	1,356	1,836
Total revenues	3,645	4,309	4,868	5,252	5,703	6,238	6,884	7,485
YoY Growth %	1%	18%	13%	8%	9%	9%	10%	9%

Notes:

Other revenues include:

- Access and communication fees
- Revenues from optimization services

- Post-trade services, fees for collateral management, equity subscription fees and fees for trade order touting through agreements

Total contract volume includes contracts that are traded on our exchange and cleared through our clearing house and certain cleared only contracts

volume is considered a completed transaction that involves a purchase and an offsetting sale of a contract

CME Group Inc.
Income Statement - All figures in millions of U.S. Dollar except per share items

Fiscal Years Ending Dec. 31	2017	2018	2019	2020E	2021E	2022E	2023E	2024E
Revenues								
Clearing & transaction fees	3,099	3,667	3,946	4,192	4,454	4,732	5,028	5,153
Market data & information services	392	450	519	514	509	504	500	495
Other Revenue	154	193	403	546	740	1,002	1,356	1,836
Total revenues	3,645	4,309	4,868	5,252	5,703	6,238	6,884	7,485
Expenses								
Compensation & benefits	(563)	(672)	(899)	(853)	(926)	(1,013)	(1,118)	(1,215)
Communications & Technology	(102)	(117)	(202)	(159)	(173)	(189)	(208)	(227)
Professional fees & outside services	(118)	(166)	(174)	(193)	(209)	(229)	(253)	(275)
Amortization of purchased intangibles	(96)	(130)	(315)	(187)	(203)	(222)	(245)	(266)
Depreciation & amortization	(113)	(119)	(159)	(187)	(204)	(223)	(246)	(267)
Licensing & other fee agreements	(146)	(171)	(172)	(200)	(217)	(237)	(262)	(285)
Other expenses	(116)	(327)	(360)	(277)	(301)	(330)	(364)	(395)
Total expenses	(1,333)	(1,702)	(2,280)	(2,056)	(2,232)	(2,442)	(2,694)	(2,930)
Operating income (loss)	2,312	2,608	2,588	3,197	3,471	3,796	4,189	4,555
Non-Operating Income								
Investment income	532	745	638	570	570	570	570	570
Interest & other borrowing costs	(117)	(158)	(178)	(89)	(93)	(101)	(111)	(122)
Equity in net earnings (losses) of unconsolidated subsidiaries	129	153	177	173	188	205	226	246
Other non-operating income (expense)	(330)	(570)	(535)	(535)	(535)	(535)	(535)	(535)
Total non-operating income (expense)	214	170	102	119	129	139	151	159
Income (loss) before income taxes	2,526	2,778	2,690	3,315	3,600	3,935	4,340	4,714
Income tax provision (benefit)	1,537	(814)	574	696	756	826	911	990
Net income	4,063	1,964	2,116	2,619	2,844	3,109	3,428	3,724
Net income (loss) attributable to non-controlling interests	-	(2)	1	1	1	1	1	1
Net income attributable to CME Group	4,063	1,962	2,117	2,620	2,844	3,109	3,429	3,725
Basic shares outstanding	339	342	357	357	357	357	357	357
EPS	12.00	5.73	5.93	7.34	7.96	8.71	9.60	10.43
Dividends per share	2.64	2.80	3.00	3.35	3.63	3.97	4.38	4.76

Notes:

Equity in net earnings (losses) of unconsolidated subsidiaries include S&P/ DJI business venture and net earnings from M&A with NEX.

CME Group Inc.
Balance Sheet - All figures in millions of U.S. Dollar except per share items

Fiscal Years Ending Dec. 31	2017	2018	2019	2020E	2021E	2022E	2023E	2024E
Assets								
Current Assets:								
Cash & cash equivalents	1,904	1,375	1,551	8,446	9,404	11,302	13,375	15,598
Marketable securities	90	73	83	86	89	92	95	98
Accounts receivable, net of allowance	360	553	492	564	613	670	739	804
Other current assets	368	431	364	412	447	489	540	587
Performance bonds & guaranty fund contributions	44,185	39,456	37,077	37,685	38,303	38,930	39,569	40,217
Total current assets	46,907	41,887	39,568	47,193	48,855	51,483	54,317	57,304
Property, net	400	449	544	525	504	481	455	428
Cap Ex.	(82)	(117)	(246)	(168)	(183)	(200)	(220)	(240)
Intangible assets - trading products	17,175	17,175	17,175	17,175	17,175	17,175	17,175	17,175
Intangible assets - other, net of accumulated amortization	2,346	5,500	5,118	(589)	68	(8)	1	(0)
Goodwill	7,569	10,805	10,743	10,743	10,743	10,743	10,743	10,743
Other assets	1,394	1,660	2,068	2,292	2,488	2,722	3,004	3,266
Total assets	75,791	77,476	75,215	77,339	79,832	82,596	85,695	88,916
Liabilities								
Current Liabilities								
Accounts payable	31	116	62	67	73	80	88	96
Short-term debt	-	574	-	-	-	-	-	-
Other current liabilities	1,456	1,127	1,385	1,788	1,941	2,124	2,343	2,548
Performance bonds & guaranty fund contributions	44,185	39,456	37,076	37,683	38,301	38,928	39,566	40,214
Total current liabilities	45,673	41,273	38,523	39,539	40,315	41,132	41,998	42,858
Long-term debt	2,233	3,827	3,743	3,940	4,278	4,677	5,158	5,602
Deferred income tax liabilities, net	4,858	5,666	5,635	5,379	5,134	4,901	4,678	4,465
Other liabilities	616	745	1,155	897	974	1,065	1,176	1,278
Total liabilities	53,379	51,510	49,056	49,755	50,702	51,775	53,009	54,204
Shareholder's Equity								
Additional paid-in capital	17,897	21,054	21,113	21,113	21,113	21,113	21,113	21,113
Retained earnings (accumulated deficit)	4,497	4,855	5,009	6,433	7,980	9,671	11,535	13,561
Accumulated other comprehensive income (loss)	14	5	3	3	3	3	3	3
Class A Common Stock in dollar value -> \$0.01 par value	3.39	3.42	3.57	3.57	3.57	3.57	3.57	3.57
Class B Common Stock in dollar value -> \$0.01 par value	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Total CME Group shareholders' equity	22,412	25,919	26,129	27,553	29,100	30,791	32,656	34,681
Non-controlling interests	-	47	30	30	30	30	30	30
Total equity	22,412	25,965	26,159	27,584	29,131	30,821	32,686	34,712
Total liabilities and equity	75,791	77,476	75,215	77,339	79,832	82,596	85,695	88,916

CME Group Inc.
Historical Cash Flow Statement- All figures in millions of U.S. Dollar except per share items

Fiscal Years Ending Dec. 31	2017	2018	2019
Net income (loss)	4,063	1,964	2,116
Cash Flows From Operating Activities			
Stock-based compensation	58	97	73
Amortization of purchased intangibles	96	130	315
Depreciation & amortization	113	119	159
Loss on datacenter	-	-	-
Loss (gain) on sale of BM&FBOVESPA shares	(87)	-	-
Gain on sale of Bolsa Mexicana de Valores, S.A.B de C.V.	(2)	-	-
Income tax expense reclassified from accumulated other comprehensive income upon final sale of BM&FBOVESPA shares	88	-	-
Loss on derivative contracts	-	62	18
Net realized & unrealized gains on investments	-	(97)	2
Undistributed earnings, net of losses, of unconsolidated subsidiaries	(27)	(8)	(44)
Deferred income taxes	(2,446)	114	(4)
Change in:			
Accounts receivable	6	(66)	61
Other current assets	4	(85)	110
Other assets	(18)	30	29
Accounts payable	5	32	(54)
Income tax payable	4	195	(29)
Other current liabilities	(9)	(37)	(99)
Other liabilities	(9)	(21)	(53)
Others	1	11	12
Net cash flows from operating activities	1,840	2,441	2,673
Cash Flows From Investing Activities			
Proceeds from maturities & sales of available-for-sale marketable securities	3	12	19
Purchases of available-for-sale marketable securities	(3)	(10)	(15)
Purchases of property, net	(82)	(117)	(246)
Investments in business ventures	(5)	-	-
Proceeds from sale of business ventures	4	21	90
Proceeds from sale of BM&FBOVESPA shares	244	-	-
Proceeds from sale of Bolsa Mexicana de Valores, S.A.B de C.V.	20	-	-
Cash paid to acquire NEX, net of cash received	-	(1,795)	-
Net cash flows from investing activities	180	(1,890)	(153)
Net cash flows from financing activities			
Proceeds from issuance of commercial paper, net of issuances	-	387	-
Proceeds from other borrowings, net of issuance costs	-	1,185	-
Repayment of other borrowings	-	(453)	(569)
Cash dividends	(1,994)	(2,150)	(1,696)
Payments for (proceeds from) derivative contracts	-	-	16
Proceeds from exercise of stock options	37	12	-
Excess tax benefits related to employee option exercises & restricted stock vesting	-	-	-
Employee taxes paid on restricted stock vesting	(31)	(35)	(37)
Others	3	4	38
Net cash flows from financing activities	(1,985)	(1,080)	(2,341)
Net change in cash & cash equivalents	35	(529)	-
Cash & cash equivalents, beginning of period	1,869	-	-
Cash & cash equivalents, end of period	1,904	1,377	1,557

CME Group Inc.

Forecasted Cash Flow Statement- All figures in millions of U.S. Dollar except per share items

Fiscal Years Ending Dec. 31	2020E	2021E	2022E	2023E	2024E
Net income / loss, including portion attributable to noncontrolling interest	2,620	2,844	3,109	3,429	3,725
Adjustments to reconcile net income to net cash provided by operating activities:					
Add: Depreciation and amortization	187	204	223	246	267
Change in working capital accounts:					
Account Receivable	(72)	(48)	(57)	(69)	(65)
Other current assets	(48)	(35)	(42)	(51)	(47)
Other assets	(224)	(197)	(234)	(282)	(262)
Account payable	5	6	7	8	8
Other current liabilities excluding income taxes payable	403	153	182	220	205
Other non-current liabilities	(258)	77	91	110	103
Deferred income tax liabilities, net	(256)	(245)	(234)	(223)	(213)
Net cash provided by operating activities	2,358	2,759	3,046	3,389	3,720
Cash Flows From Investing Activities					
(Increase) decrease in performance bonds and guranty fund contrinutions, assets	(608)	(618)	(628)	(638)	(649)
Change Marketable Securities	(3)	(3)	(3)	(3)	(3)
Intangible Assets - Trading	-	-	-	-	-
Intangible Assets - Other	5,706	(656)	75	(9)	1
Capital Expenditure	(168)	(183)	(200)	(220)	(240)
(Increase) decrease in performance bonds and guranty fund contrinutions, liabilities	607	617	628	638	648
Net cash flows from investing activities	5,535	(842)	(127)	(232)	(242)
Net cash flows from financing activities					
Proceeds from issuance of notes payable & long-term debt	197	338	399	481	445
Payment of dividends	(1,195)	(1,298)	(1,419)	(1,564)	(1,699)
Proceeds from issuance of common stock	0	0	-	-	-
Short term debt	-	-	-	-	-
Net cash flows from financing activities	(998)	(960)	(1,020)	(1,084)	(1,255)
Net change in cash & cash equivalents	6,895	957	1,899	2,073	2,224
Cash & cash equivalents, beginning of period	1,551	8,446	9,404	11,302	13,375
Cash & cash equivalents, end of period	8,446	9,404	11,302	13,375	15,598

CME Group Inc.
Common Size Income Statement

Fiscal Years Ending Dec. 31	2017	2018	2019	2020E	2021E	2022E	2023E	2024E
Revenues								
Clearing & transaction fees	85.02%	85.09%	81.06%	79.66%	77.94%	75.88%	73.42%	70.57%
Market data & information services	10.75%	10.43%	10.65%	10.26%	9.83%	9.38%	8.89%	8.37%
Other Revenue	4.25%	4.48%	8.28%	10.08%	12.22%	14.75%	17.68%	21.06%
Total revenues	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Expenses								
Compensation & benefits	-15.43%	-15.60%	-18.46%	-16.24%	-16.24%	-16.24%	-16.24%	-16.24%
Communications & Technology	-2.78%	-2.71%	0.00%	-2.20%	-2.20%	-2.20%	-2.20%	-2.20%
Professional fees & outside services	-3.23%	-3.85%	-3.58%	-3.67%	-3.67%	-3.67%	-3.67%	-3.67%
Amortization of purchased intangibles (As % of intangibles)	-0.56%	-0.76%	-1.83%	-1.12%	-1.25%	-1.40%	-1.58%	-1.80%
Depreciation & amortization	-3.10%	-2.75%	-3.26%	-3.12%	-2.98%	-2.83%	-2.67%	-2.50%
Licensing & other fee agreements	-4.01%	-3.96%	-3.54%	-3.80%	-3.80%	-3.80%	-3.80%	-3.80%
Other expenses	-5.38%	-7.59%	-7.40%	-5.28%	-5.28%	-5.28%	-5.28%	-5.28%
Total expenses	-36.57%	-39.49%	-46.84%	-37.87%	-37.72%	-37.57%	-37.41%	-37.25%
Operating income (loss)	63.43%	60.51%	53.16%	62.13%	62.28%	62.43%	62.59%	62.75%
Non-Operating Income								
Investment income	14.59%	17.29%	13.10%	10.52%	9.42%	8.40%	7.44%	6.54%
Interest & other borrowing costs	-3.21%	-3.66%	-3.66%	-1.40%	-0.99%	-0.89%	-0.80%	-0.71%
Equity in net earnings (losses) of unconsolidated subsidiaries	3.54%	3.55%	3.63%	3.27%	2.92%	2.61%	2.31%	2.03%
Other non-operating income (expense)	9.04%	13.23%	10.99%	9.88%	8.85%	7.88%	6.98%	6.14%
Total non-operating income (expense)	5.88%	3.95%	2.09%	22.27%	20.21%	18.00%	15.93%	14.00%
Income (loss) before income taxes	69.31%	64.46%	55.25%	84.40%	82.48%	80.42%	78.52%	76.76%
Income tax provision (benefit)	-42.17%	18.89%	11.79%	17.72%	17.32%	16.89%	16.49%	16.12%
Net income	111.49%	45.57%	43.46%	66.67%	65.16%	63.53%	62.03%	60.64%
Net income (loss) attributable to non-controlling interests	0.00%	-0.03%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Net income attributable to CME Group	111.49%	45.53%	43.48%	66.69%	65.17%	63.54%	62.04%	60.65%

CME Group Inc.
Value Driver Estimation

Fiscal Years Ending Dec. 31	2017	2018	2019	2020E	2021E	2022E	2023E	2024E
Revenues								
Clearing & transaction fees	3,099	3,667	3,946	4,192	4,454	4,732	5,028	5,153
Market data & information services	392	450	519	514	509	504	500	495
Other Revenue	155	193	403	546	740	1,002	1,356	1,836
Expenses								
Compensation & benefits	(563)	(672)	(899)	(853)	(926)	(1,013)	(1,118)	(1,215)
Communications & Technology	(101)	(117)	-	(159)	(173)	(189)	(208)	(227)
Professional fees & outside services	(118)	(166)	(174)	(193)	(209)	(229)	(253)	(275)
Amortization of purchased intangibles	(96)	(130)	(315)	(187)	(203)	(222)	(245)	(266)
Depreciation & amortization	(113)	(119)	(159)	(187)	(204)	(223)	(246)	(267)
Licensing & other fee agreements	(146)	(171)	(172)	(200)	(217)	(237)	(262)	(285)
Other expenses	(116)	(327)	(360)	(277)	(301)	(330)	(364)	(395)
+Implied interest on op. lease	16	19	25	18	20	19	19	18
EBITA	2,409	2,627	2,814	3,214	3,491	3,816	4,208	4,573
Less: Adjusted Taxes								
Income tax provision (benefit)	1,537	(814)	574	696	756	826	911	990
+ tax shield on interest and other borrowing costs	(25)	(33)	(37)	(19)	(20)	(21)	(23)	(26)
-tax shield on investment income	112	156	134	120	120	120	120	120
-tax shield on non-op income	(69)	(120)	(112)	(112)	(112)	(112)	(112)	(112)
+tax shield on op. leases	3	4	5	4	4	4	4	4
- tax shield on equity in earnings of unconsolidated affiliates	27	32	37	36	39	43	48	52
Total Adjusted Taxes	1,446	(912)	483	638	694	759	837	909
Add: Change in Deferred Taxes								
DTL-DTA	4,858	5,666	5,635	5,379	5,134	4,901	4,678	4,465
-DTL(t-1)-DTA(t-1)	7,291	4,858	5,666	5,635	5,379	5,134	4,901	4,678
Change in Deferred Taxes	(2,433)	808	(31)	(256)	(245)	(234)	(223)	(213)
NOPLAT	(1,471)	4,347	2,300	2,320	2,552	2,824	3,148	3,451
Invested Capital (IC):								
Normal Cash (min. Historical cash over sales 32%)	1,162	1,373	1,551	1,674	1,817	1,988	2,194	2,385
+ Account Receivable	360	553	492	564	613	670	739	804
+ Other Current Assets	368	431	364	412	447	489	540	587
-Account payable	31	116	62	67	73	80	88	96
-Other current liabilities	1,456	1,127	1,385	1,788	1,941	2,124	2,343	2,548
+Net PPE	400	449	544	525	504	481	455	428
+ Intangible assets - trading products	17,175	17,175	17,175	17,175	17,175	17,175	17,175	17,175
+ Intangible assets - other, net of accumulated amortization	2,346	5,500	5,118	(589)	68	(8)	1	(0)
+ Other assets	1,394	1,660	2,068	2,292	2,488	2,722	3,004	3,266
+ PV of Op. lease	628	827	585	677	650	620	587	552
- Other liabilities	616	745	1,155	897	974	1,065	1,176	1,278
Invested Capital (IC)	21,729	25,980	25,387	19,977	20,773	20,868	21,088	21,275
Free Cash Flow (FCF):								
NOPLAT	(1,471)	4,347	2,300	2,320	2,552	2,824	3,148	3,451
Change in IC	(280)	4,251	(593)	(5,410)	796	95	220	187
FCF	(1,191)	97	2,893	7,730	1,757	2,729	2,928	3,264
Return on Invested Capital (ROIC):								
NOPLAT	(1,471)	4,347	2,300	2,320	2,552	2,824	3,148	3,451
Beg. IC	22,009	21,729	25,980	25,387	19,977	20,773	20,868	21,088
ROIC	-6.68%	20.01%	8.85%	9.14%	12.78%	13.59%	15.08%	16.36%
Economic Profit (EP):								
Beg. IC	22,009	21,729	25,980	25,387	19,977	20,773	20,868	21,088
x (ROIC - WACC)	-13%	13%	2%	2%	6%	7%	8%	10%
EP	(2,939)	2,898	567	627	1,220	1,438	1,756	2,044

CME Group Inc.*Weighted Average Cost of Capital (WACC) Estimation***Cost of Equity:**

Risk-Free Rate	0.78%
Beta	1.00
Equity Risk Premium	6.16%
Cost of Equity	6.94%

Cost of Debt:

Risk-Free Rate	0.78%
Implied Default Premium	2.22%
Pre-Tax Cost of Debt	3.00%
Marginal Tax Rate	21%
After-Tax Cost of Debt	2.37%

Market Value of Common Equity:

Total Shares Outstanding	357
Current Stock Price	\$190.16
MV of Equity	67,916.59

MV Weights

94.01%

Market Value of Debt:

Short-Term Debt	-
Current Portion of LTD	-
Long-Term Debt	3,743
PV of Operating Leases	585
MV of Total Debt	4,328

5.99%

Market Value of the Firm

72,245

100.00%

Estimated WACC

6.67%

CME Group Inc.*Discounted Cash Flow (DCF) and Economic Profit (EP) Valuation Models*

Key Inputs:

CV Growth of NOPLAT	2.50%
CV Year ROIC	16%
WACC	6.67%
Cost of Equity	6.94%
CV NOPLAT	3,451

Fiscal Years Ending Dec. 31

2020E	2021E	2022E	2023E	2024E
-------	-------	-------	-------	-------

DCF Model:

Free Cash Flow (FCF)	7,730	1,757	2,729	2,928	3,264
Continuing Value (CV)					70,116
PV of FCF	7,247	1,544	2,248	2,262	54,157

Value of Operating Assets:	67,457
Non-Operating Adjustments	
+Excess Cash	6,772
+Marketable Securities	86
- PV of operating lease	(677)
+ PV of the non-consolidated entities	177
- ESOP	(30)
- Short-term debt	-
- Long-term debt	(3,743)
Value of Equity	70,042
Shares Outstanding	357
Intrinsic Value of Last FYE	196
Implied Price as of Today	\$ 199.15

EP Model:

Economic Profit (EP)	627	1,220	1,438	1,756	2,044
Continuing Value (CV)					49,028
PV of EP	588	1,072	1,185	1,356	37,869

Total PV of EP	42,069				
Invested Capital (last FYE)	25,387				
Value of Operating Assets:	67,457				
Non-Operating Adjustments					
+Excess Cash	6,772				
+Marketable Securities	86				
- PV of operating lease	(677)				
+ PV of the non-consolidated entities	177				
- ESOP	(30)				
- Short-term debt	-				
- Long-term debt	(3,743)				
Value of Equity	70,042				
Shares Outstanding	357				
Intrinsic Value of Last FYE	\$ 196.11				
Implied Price as of Today	\$ 199.15				

CME Group Inc.*Dividend Discount Model (DDM) or Fundamental P/E Valuation Model***Fiscal Years Ending Dec. 31****2020E****2021E****2022E****2023E****2024E**

EPS

\$ 7.34 \$ 7.96 \$ 8.71 \$ 9.60 \$ 10.43

Key Assumptions

CV growth of EPS

4.00%

CV Year ROE

10.73%

Cost of Equity

6.94%

Future Cash Flows

P/E Multiple (CV Year)

21.31

EPS (CV Year)

\$ 10.43

Future Stock Price

222.21

Dividends Per Share

3.35 3.63 3.97 4.38 4.76

Discounted Cash Flows

3.13 3.18 3.25 3.35 169.88

Intrinsic Value as of Last FYE

\$ 182.78

Implied Price as of Today**\$ 185.61**

CME Group Inc.*Relative Valuation Models*

Ticker	Company	Price	EPS		P/E 20	P/E 21
			2020E	2021E		
SPGI	S & P Global, Inc.	\$283.55	\$9.90	\$10.97	28.64	25.85
MSCI	MSCI Inc. Class A	\$310.69	\$6.82	\$7.86	45.56	39.53
FDS	FactSet	\$279.16	\$9.10	\$9.80	30.68	28.49
NDAQ	Nasdaq	\$107.92	\$5.11	\$5.46	21.12	19.77
CBOE	CBOE Holding Inc.	\$93.42	\$4.53	\$4.70	20.62	19.88
ICE	Intercontinental Exchange, Inc	\$87.38	\$3.99	\$4.20	21.90	20.80
MCO	Moody's Corporation	\$197.55	\$8.46	\$9.45	23.35	20.90
Average					27.41	25.03

Grou CME Group Inc. \$190.16 7.34 7.96 25.9 23.9

Implied Relative Value:

P/E (EPS20) \$ 201.05

P/E (EPS21) \$ 199.34

CME Group Inc.*Key Management Ratios*

<i>Fiscal Years Ending Dec. 31</i>	2017	2018	2019	2020E	2021E	2022E	2023E	2024E
Liquidity Ratios:								
Current ratio (current assets/current liabilities)	1.03	1.01	1.03	1.19	1.21	1.25	1.29	1.34
Quick ratio (cash+securities+receivables)/current liabilities)	0.05	0.05	0.06	0.23	0.25	0.29	0.34	0.38
Operating CF ratio (operating cash flow/ current liabilities)	0.04	0.06	0.07	0.06	0.07	0.07	0.08	0.09
Asset-Management Ratios:								
Total asset turnover (total revenue/avg assets)	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09
Accounts receivable turnover (total revenue/ avg receivables)	10.07	9.44	9.32	9.95	9.69	9.73	9.77	9.70
Net working capital turnover (net sales/ working capital)	2.95	7.02	4.66	0.69	0.67	0.60	0.56	0.52
Financial Leverage Ratios:								
Debt ratio (total debt/total assets)	0.70	0.66	0.65	0.64	0.64	0.63	0.62	0.61
Debt to equity ratio (debt/avg equity)	2.29	2.21	1.98	1.83	1.75	1.69	1.63	1.57
LT Debt to Assets (LT debt/avg assets)	0.03	0.05	0.05	0.05	0.05	0.06	0.06	0.06
Profitability Ratios:								
Gross margin (total revenue - COGS/total revenue)	63.43%	60.51%	53.16%	60.86%	60.86%	60.86%	60.86%	60.86%
Free Cash Flow margin (free cash flow/sales)	-40.36%	100.88%	47.25%	44.17%	44.76%	45.26%	45.73%	46.11%
ROA (net income/ avg assets)	5.60%	2.56%	2.77%	3.43%	3.62%	3.83%	4.08%	4.27%
ROE (net income/ avg total equity)	19.01%	8.11%	8.12%	9.75%	10.03%	10.37%	10.80%	11.05%
EBITDA Margin (EBITDA/ total revenue)	66.09%	60.96%	57.80%	61.19%	61.21%	61.17%	61.13%	61.09%
Payout Policy Ratios:								
Dividend Payout Ratio (Dividend/EPS)	22.00%	48.87%	50.59%	45.62%	45.62%	45.62%	45.62%	45.62%
Total Payout Ratio ((Divs. + Repurchases)/NI)	22.01%	48.85%	50.62%	45.62%	45.62%	45.62%	45.62%	45.62%

CME Group Inc.*Present Value of Operating Lease Obligations*

Fiscal Years Ending Dec. 31	2014	2015	2016	2017	2018	2019
Year 1	59.1	50.2	59.0	64.3	82.5	63.8
Year 2	90.2	89.4	119.3	125.4	151.0	61.4
Year 3	0.0	0.0	0.0	0.0	0.0	64.4
Year 4	0.0	0.0	0.0	0.0	0.0	60.7
Year 5	83.6	86.9	115.2	113.3	154.7	55.1
Thereafter	221.7	182.8	309.6	435.2	586.2	398.7
Total Minimum Payments	454.6	409.3	603.1	738.2	974.4	704.1
Less: Cumulative Interest	58.9	50.7	81.0	110.2	147.2	118.8
PV of Minimum Payments	395.7	358.6	522.1	628.0	827.2	585.3
Implied Interest in Year 1 Payment		11.9	10.8	15.7	18.8	24.8
Pre-Tax Cost of Debt	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Years Implied by Year 6 Payment	2.7	2.1	2.7	3.8	3.8	7.2
Expected Obligation in Year 6 & Beyond	83.6	86.9	115.2	113.3	154.7	55.1
Present Value of Lease Payments						
PV of Year 1	57.4	48.7	57.3	62.4	80.1	61.9
PV of Year 2	85.0	84.3	112.5	118.2	142.3	57.9
PV of Year 3	0.0	0.0	0.0	0.0	0.0	58.9
PV of Year 4	0.0	0.0	0.0	0.0	0.0	53.9
PV of Year 5	72.1	75.0	99.4	97.7	133.4	47.5
PV of 6 & beyond	181.2	150.6	253.0	349.7	471.3	305.1
Capitalized PV of Payments	395.7	358.6	522.1	628.0	827.2	585.3

CME Group Inc.

Effects of ESOP Exercise and Share Repurchases on Common Stock Account and Number of Shares Outstanding -All figures in millions

Number of Options Outstanding (shares):	0.227
Average Time to Maturity (years):	<u>1.40</u>
Expected Annual Number of Options Exercised:	0.000162

Current Average Strike Price:	\$ 54.45
Cost of Equity:	6.94%
Current Stock Price:	\$190.16

<i>Fiscal Years Ending Dec. 31</i>	2020E	2021E
Increase in Shares Outstanding:	0.000162	0.000065
Average Strike Price:	\$ 54.45	\$ 54.45
Increase in Common Stock Account:	0.0000088	0
Change in Treasury Stock	0	0
Expected Price of Repurchased Shares:	\$ 190.16	\$ 203.36
Number of Shares Repurchased:	-	-
Shares Outstanding (beginning of the year)	357	357
Plus: Shares Issued Through ESOP	0.000162	0.000065
Less: Shares Repurchased in Treasury	-	-
Shares Outstanding (end of the year)	357	357

CME Group Inc.*Valuation of Options Granted under ESOP - All figures in millions*

Current Stock Price	\$190.16	
Risk Free Rate	0.78%	
Current Dividend Yield	1.84%	
Annualized St. Dev. of Stock Returns	23.29%	Implied volatility

Range of Outstanding Options	Number of Shares	Average Exercise Price	Average Remaining Life (yrs)		B-S Option Price	Value of Options Granted
Range 1	0.227	54.45	1.40	\$	131.47	\$ 30
Total	0.227	\$ 54.45	1.40	\$	136.30	\$ 30

DCF:

Beta

		0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.3	1.4	1.5
Equity Risk Premium	199.15										
	5.66%	493.91	374.28	302.94	255.56	221.81	196.53	176.90	161.21	148.38	137.70
	5.76%	477.52	363.56	295.12	249.46	216.83	192.34	173.29	158.04	145.56	135.16
	5.86%	462.24	353.47	287.72	243.66	212.09	188.34	169.84	155.01	142.86	132.72
	5.96%	447.94	343.96	280.70	238.15	207.57	184.53	166.54	152.11	140.28	130.39
	6.06%	434.54	334.98	274.05	232.91	203.26	180.88	163.39	149.34	137.80	128.16
	6.16%	421.95	326.49	267.72	227.91	199.15	177.40	160.37	146.67	135.42	126.01
	6.26%	410.11	318.44	261.71	223.14	195.22	174.06	157.47	144.12	133.14	123.95
	6.36%	398.94	310.80	255.98	218.59	191.45	170.86	154.69	141.67	130.94	121.96
	6.46%	388.40	303.55	250.52	214.24	187.85	167.79	152.03	139.31	128.83	120.05
	6.56%	378.43	296.65	245.31	210.07	184.39	164.84	149.46	137.04	126.80	118.22
	6.66%	368.99	290.08	240.32	206.08	181.08	162.01	147.00	134.86	124.85	116.44

CV NOPLAT Growth

		2.10%	2.20%	2.30%	2.40%	2.50%	2.60%	2.70%	2.80%	2.90%	3.00%
WACC	199.15										
	6.16%	210.86	213.97	217.26	220.71	224.36	228.21	232.28	236.59	241.17	246.04
	6.26%	206.20	209.14	212.22	215.46	218.87	222.48	226.28	230.30	234.56	239.09
	6.36%	201.77	204.53	207.43	210.47	213.68	217.05	220.61	224.36	228.34	232.55
	6.46%	197.54	200.14	202.87	205.73	208.74	211.90	215.24	218.75	222.46	226.39
	6.56%	193.50	195.95	198.53	201.22	204.05	207.02	210.14	213.43	216.90	220.57
	6.67%	189.26	191.57	193.98	196.50	199.15	201.92	204.84	207.91	211.14	214.54
	6.76%	185.94	188.13	190.42	192.81	195.32	197.95	200.71	203.61	206.65	209.86
	6.86%	182.39	184.47	186.63	188.89	191.26	193.74	196.33	199.06	201.92	204.93
	6.96%	179.00	180.96	183.01	185.14	187.38	189.71	192.16	194.72	197.41	200.24
	7.06%	175.73	177.59	179.53	181.56	183.67	185.87	188.18	190.59	193.12	195.78
	7.16%	172.60	174.37	176.20	178.12	180.11	182.20	184.38	186.65	189.04	191.54

Clearing Transaction fee growth rate

		1.97%	2.47%	2.97%	3.47%	9.27%	9.37%	9.47%	9.57%	9.67%	9.77%
Communication and technology fee as % of sales	199.15										
	-2.53%	201.07	201.07	201.07	201.07	201.07	201.07	201.07	201.07	201.07	201.07
	-2.63%	200.68	200.68	200.68	200.68	200.68	200.68	200.68	200.68	200.68	200.68
	-2.73%	200.30	200.30	200.30	200.30	200.30	200.30	200.30	200.30	200.30	200.30
	-2.83%	199.91	199.91	199.91	199.91	199.91	199.91	199.91	199.91	199.91	199.91
	-2.93%	199.52	199.52	199.52	199.52	199.52	199.52	199.52	199.52	199.52	199.52
	-3.03%	199.15	199.15	199.15	199.15	199.15	199.15	199.15	199.15	199.15	199.15
	-3.13%	198.75	198.75	198.75	198.75	198.75	198.75	198.75	198.75	198.75	198.75
	-3.23%	198.36	198.36	198.36	198.36	198.36	198.36	198.36	198.36	198.36	198.36
	-3.33%	197.98	197.98	197.98	197.98	197.98	197.98	197.98	197.98	197.98	197.98
	-3.34%	197.94	197.94	197.94	197.94	197.94	197.94	197.94	197.94	197.94	197.94
	-3.35%	197.90	197.90	197.90	197.90	197.90	197.90	197.90	197.90	197.90	197.90

CV ROIC Rate

		12.36%	13.36%	14.36%	15.36%	16.36%	17.36%	18.36%	19.36%	20.36%	21.36%
Risk Free Rate	199.15										
	-0.22%	239.31	242.98	246.15	248.90	251.32	253.45	255.35	257.06	258.60	259.99
	-0.02%	227.35	230.80	233.77	236.35	238.63	240.63	242.41	244.02	245.46	246.77
	0.18%	216.64	219.89	222.69	225.12	227.26	229.14	230.82	232.33	233.69	234.93
	0.38%	206.99	210.06	212.70	215.00	217.02	218.79	220.38	221.81	223.09	224.26
	0.58%	198.25	201.16	203.66	205.83	207.75	209.43	210.93	212.28	213.50	214.60
	0.78%	190.15	192.90	195.27	197.33	199.15	200.74	202.17	203.44	204.60	205.64
	0.98%	183.04	185.66	187.91	189.87	191.60	193.11	194.47	195.69	196.78	197.78
	1.08%	179.64	182.19	184.39	186.30	187.99	189.47	190.79	191.98	193.05	194.02
	1.18%	176.37	178.87	181.01	182.88	184.53	185.97	187.26	188.42	189.47	190.41
	1.28%	173.24	175.68	177.78	179.60	181.21	182.62	183.88	185.01	186.03	186.95
	1.38%	170.24	172.62	174.67	176.45	178.02	179.39	180.63	181.73	182.73	183.63

DDM:

CV EPS Growth

		3.60%	3.70%	3.80%	3.90%	4.00%	4.10%	4.20%	4.30%	4.40%	4.50%
Cost of Equity	185.61										
	6.44%	206.02	210.25	214.81	219.72	225.03	230.80	237.09	243.96	251.51	259.83
	6.54%	198.79	202.63	206.75	211.18	215.97	221.14	226.76	232.87	239.56	246.91
	6.64%	192.04	195.53	199.26	203.27	207.58	212.24	217.27	222.73	228.68	235.19
	6.74%	185.72	188.89	192.29	195.92	199.82	204.01	208.53	213.42	218.74	224.52
	6.84%	179.79	182.68	185.77	189.07	192.60	196.38	200.46	204.85	209.60	214.76
	6.94%	174.00	176.63	179.43	182.42	185.61	189.02	192.68	196.62	200.87	205.46
	7.04%	168.97	171.38	173.95	176.68	179.58	182.69	186.01	189.58	193.42	197.56
	7.14%	164.02	166.23	168.57	171.05	173.70	176.52	179.53	182.75	186.21	189.93
	7.24%	159.34	161.36	163.50	165.77	168.18	170.74	173.47	176.39	179.51	182.86
	7.34%	154.91	156.76	158.72	160.79	162.99	165.32	167.80	170.45	173.27	176.30
	7.54%	146.73	148.29	149.93	151.67	153.50	155.43	157.49	159.67	161.98	164.46