

TAKE-TWO INTERACTIVE (NASDAQ: TTWO)

RECOMMENDATION: HOLD (8% UPSIDE)

IMPLIED PRICE: \$67.93

MARKET PRICE: \$62.55



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Introduction

For our final report, we have decided to look at a firm in a slightly different sub-sector within the Software business – Take-Two Interactive. Just like the previous firms that we have looked at in the previous reports, this video game manufacturer has also been going through substantial growth in its size. In a short period of time, the company's stock price has jumped four-fold, from a price of \$14.30 in April 2012 to 62.55 as of today. This fairly large and consistent growth over such a short time period led us to check whether this is due to some mispricing, or is it simply a fundamentally strong firm that the market appreciates. After looking into the company in detail, we found that Take-Two interactive is simply a fundamentally strong firm that the market seems to appreciate and adequately price. Since there's only so much we could talk about for a fairly priced firm, we will focus in this report on its key revenue streams, both current and in the pipeline.



Open	63.07
High	63.25
Low	62.44

Mkt cap	6.35B
P/E ratio	366.89
Div yield	-

Perhaps the key challenge we faced in our attempting to value this firm is the difficulty in slicing and dicing its revenue streams. On one hand, the company's reports treat all of its revenues as one unit, without making a distinction across its different segments, and on the other hand, one can't make a reasonable forecast of a video-game firm without looking at each one of its products separately. We therefore attempt to use a rather different approach, that mixes and matches multiple pieces of information from a

combination of newswires and company reports to obtain a reasonable approximation that allows us to split the firm's revenues across its different product offerings¹.

Company Overview

Take-Two Interactive was founded in 1993 by Ryan Brant, is an American multinational publisher and distributor of video games. Take two wholly owns two publishers: RockStar Games and 2k Games. The company is headquartered in New York City and UK with development studios all over North America. The company's most Notable games include Grand Theft Auto, Civilisation, NBA 2K and WWE 2K. In 2014, Grand Theft Auto V smashed 7 Guinness world records in 2013 including the best-selling video game within 24 hours and the "fastest entertainment property" to generate \$1 billion, according to Guinness World Records. As of 2016, it is the third largest publicly-traded video game company in North America.

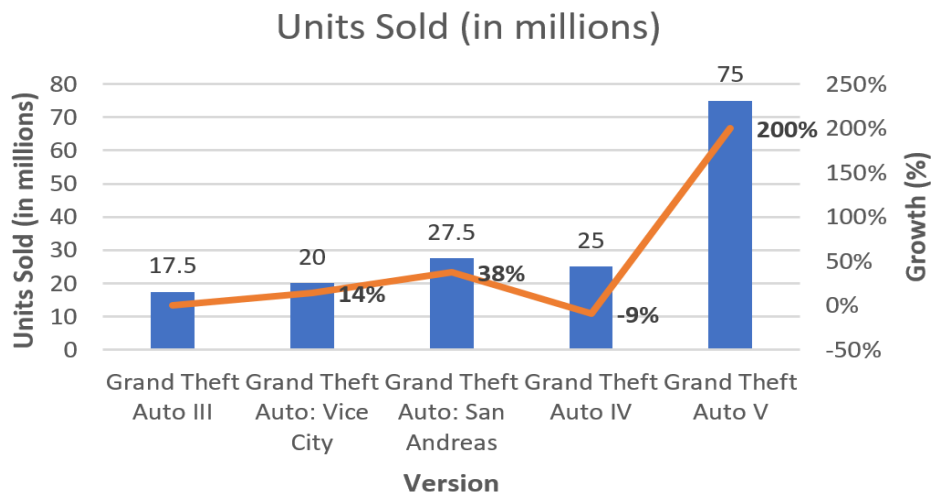
Current Products

1. Grand Theft Auto V:

Grand theft Auto V is by far the jewel on the crown when it comes to the company's revenues. The action/adventure video game series, based in the fictional crime-ridden metropolis of Los Santos, has been up and running since 1997 and has sold over 250 million units in total. The most fascinating point however was the key contribution of its latest version, GTA V to these figures, by selling 75 million copies (as of February 2017), more than the previous three versions combined, despite it only being running since 2014. To provide some further context, GTA V has managed to sell 13 million copies worth \$800 million on the very first day of its release.

¹ Appendix 1 provides details on our data collection process for obtaining the number of units and the average price per unit.

Figure 1: Number of units sold for GTA series (in millions)



As is the case with the vast majority of video games, the bulk of the sales occur during the first few weeks of issuing, when the game is at the peak of its publicity. However, after the first year of issue, sales drop substantially as most individuals who are keen on buying the game would have already purchased it early on. In the particular case of GTA V, 33 million units were sold in 2013, accounting for 44% of the aggregate number of units sold as of February 2017.

We also notice that sales after the year of release don't follow any particular pattern that could be explained, as we find no reference or explanation from the management in their earnings calls or 10K reports for the possible reasons behind these fluctuations. We therefore refer back to the sales of GTA V's predecessor, GTA IV's over its life cycle to see if there's a common trend in GTA's sales over its life cycle. We have attempted to look at earlier versions of GTA V to provide a more convincing case but unfortunately we faced significant data limitations in the earlier versions that prevented us from going further back in time.

We find that the number of units sold tend to stabilize after the first two years of release for GTA products. Therefore, for our forecast, we assume that the number of units sold will stabilize at 10 million units over the lifecycle of GTA V. We are comfortable about the prospects of GTA V meeting this target, especially with the launch of GTA's first ever online version, which is likely to bring further recurring revenue to GTA V.

Figure 2: Historic number of units sold for GTA IV vs. number of units sold for GTA V (in millions)

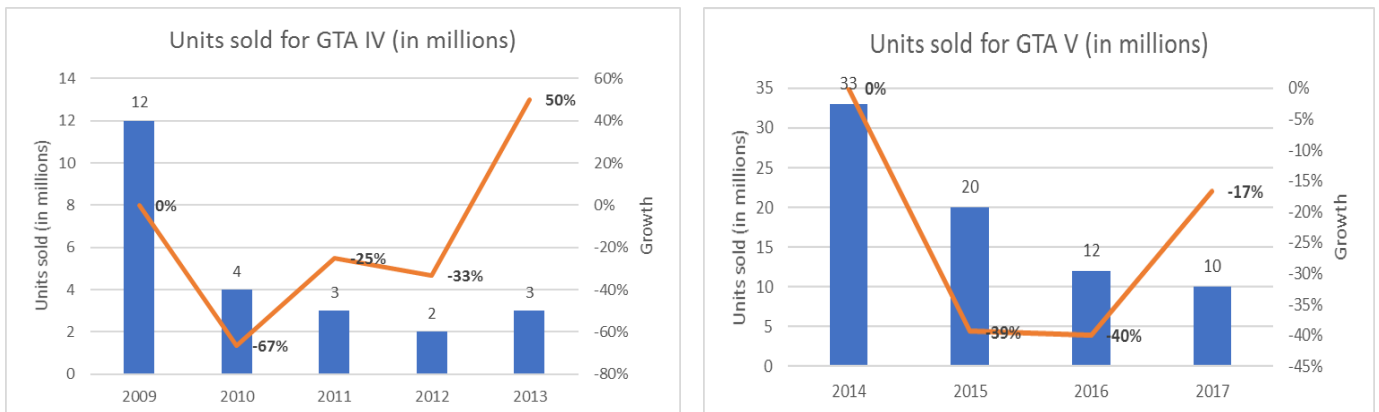
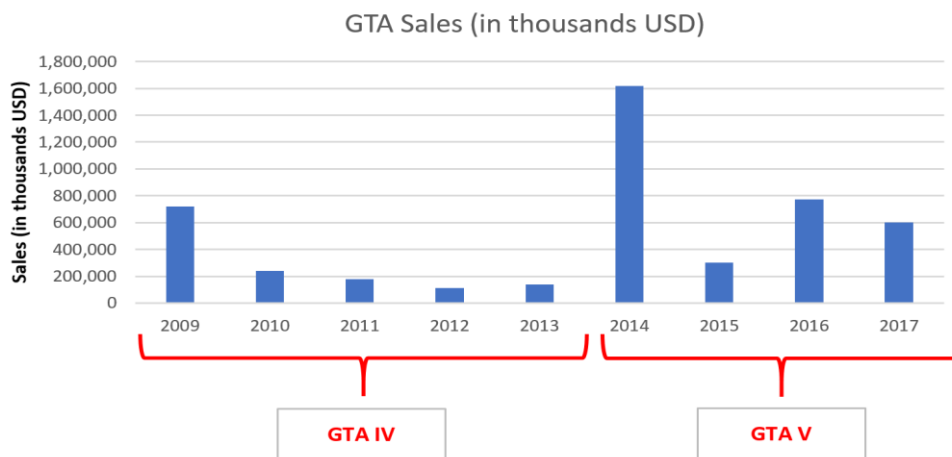


Figure 3: Historic sales revenue for GTA IV vs. GTA V (in USD thousands)



Another crucial factor that should be taken into consideration in our forecast period is the likelihood of Take-Two releasing a newer version of GTA during our forecast period. Although Take-Two tends to follow a policy of staying quiet regarding the nature of any releases of GTA versions, Rockstar’s CEO, Leslie Benzies broke the silence in as early as October 2013 by confirming that they are working on GTA VI – “We have ‘45 years’ worth of ideas we want to do for GTA VI”. Disregarding this is very likely to severely understate Take-Two’s expected future cash flows.

We therefore look at the past timeline of the releases of all the versions of GTA to try to infer a potential release date for GTA VI. We find that Take Two tends to delay releases of newer versions of GTA compared to their predecessors. Initially we have considered 2019 as an expected release year, in line with the increased delays over the latest

versions. However, with the resignation of Leslie Benzies last year, who is considered the brain behind GTA, we believe that the anticipated release date is bound to be postponed. Furthermore, given the anticipated release of key consoles such as Playstation 5 and Xbox 2 in 2020, we believe that the firm is more likely to release GTA VI during or after that period. Indeed, we do find that the release dates of GTA IV and V have occurred during or in the year following the releases of PS3 in 2007 and Xbox1 and PS4 in 2013. We therefore anticipate that the release of GTA VI is more likely in the 2020-2021 period and assume that GTA VI sales would be realized starting in 2021.

Table 1: Year of release for GTA series

Version	Year	Time elapsed (in years)
Grand Theft Auto	1997	-
Grand theft Auto II	1999	2
Grand theft Auto III	2001	4
Grand Theft Auto: Vice City	2002	1
Grand Theft Auto: San Andreas	2004	2
Grand Theft Auto: IV	2008	4
Grand Theft Auto: V	2013	5
Grand Theft Auto VI	2020	7

Having anticipated a release date for GTA VI, the next question that comes to mind is about the expected revenue from GTA VI. To begin, we believe that expected sales would be at least as large as GTA V, which has enjoyed phenomenal sales since its release. Our belief stems from two reasons: First, GTA V has attracted a substantial loyal customer based who are likely to buy GTA VI given their satisfactory experience with GTA V – a claim that we make based on aggregates of online ratings of GTA V from the top gaming websites. This would be even further compounded by the anticipated release of Playstation 5 and Xbox2; customers who buy those consoles would have to buy a version of GTA compatible with those new consoles. This absence of backward compatibility is likely to work in favour of GTA VI.

Table 2: Ratings of GTA V from leading gaming websites

Source	Score
Metacritic	97/100
Game Informer	9.75/10
GameSpot	9 /10
IGN	10/10
PC Gamer (US)	92%
VideoGamer.com	10/10

Since it's very difficult to put a figure on a product that had such a large variation in its past growth, we use a historical 15-year CAGR of 9% to forecast sales growth (in units) for GTA VI over and above the sales figures of GTA V. We believe that such a figure is attainable in light of the favourable status of GTA V, which is likely to reflect on GTA VI.

Table 3: Total number of units sold for different GTA series and 15-year CAGR

Year	Game	Units sold (Total in millions)	CAGR
2002	Grand Theft Auto: Vice City	20	9%
2004	Grand Theft Auto: San Andreas	27.5	
2008	Grand Theft Auto IV	25	
2013	Grand Theft Auto V	75	

Bottom line: To sum up, we forecast that sales for GTA V will remain stable at 10 million units until GTA VI is expected to be released in 2021. The sale for GTA VI are forecasted to be 9% higher than those of its predecessor. With an average price of \$60 per unit, our forecasts are as follows:

Table 4: Revenue forecast for GTA V and VI (in USD thousands)

Year	2018E	2019E	2020E	2021E	2022E
GTA Revenue (in thousands USD)	600,000	600,000	600,000	1,765,300	1,308,000

2. [Sid Meier's Civilization VI:](#)

Civilization VI is a series of turn-based strategy wargames that is generally played online in a multiplayer setting or offline with computer-based AI opponents. While it was only released in October 2016, it has managed to sell just over 1million units as of November 2016, adding a revenue of \$40 million for the fiscal year 2017. We expect

that sales will reach a similar level in 2018 due to unrealized sales revenues carried over from 2017 but will slow down to an average of 0.5 million units for the remaining years. Based on the recently announced sales revenue of \$40 million, we estimate the average price per unit to be \$40 and we use that for our forecast. Given that the every consecutive Civilization series is taking more time than it's respective predecessor, reaching 6 years for Civilization V, we do not expect a release of Civilization VII before our forecast period ending 2022.

Table 5: Year of release for Civilization series

Series	Year of Release
Civilization III	2001
Civilization IV	2005
Civilization V	2010
Civilization VI	2016

Bottom line: With an average price of \$40 per unit sold, we forecast that sales revenues for our forecast period to be as follows:

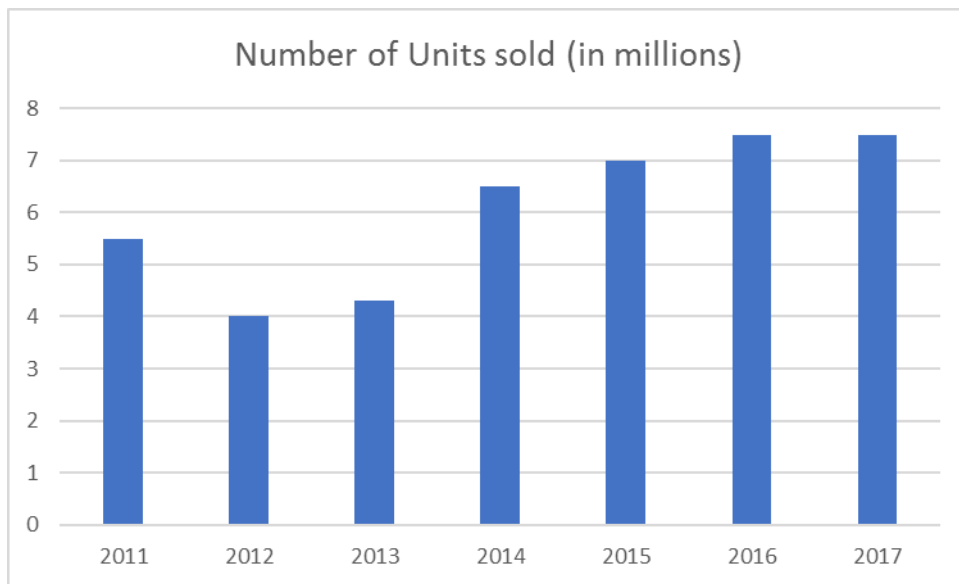
Table 6: Revenue forecast for Civilization VI (in USD thousands)

Year	2018	2019	2020	2021	2022
Civilization VI	40,000	20,000	20,000	20,000	20,000

3. [NBA 2K17:](#)

The NBA2K series is a basketball simulation game that has been running since 1999. As of February 2017, the company has released a version on an annual basis from NBA2K to NBA 2K17. The absence of other basketball video games to compete with NBA 2K made it a key revenue source that provides stable and consistent sales revenue historically. Given the relatively stable sales since 2014 to 2017, we forecast that the company would maintain a stable sales figure of 7.5 units over the forecast period. We are comfortable with using such a flat figure as we believe that this product caters to a specific client base who desire basketball video games.

Figure 4: Number of units sold (in millions) for NBA 2K series



Bottom line: With an average price of \$45 per unit and 7.5 million units sold every year, we predict the following revenue figures:

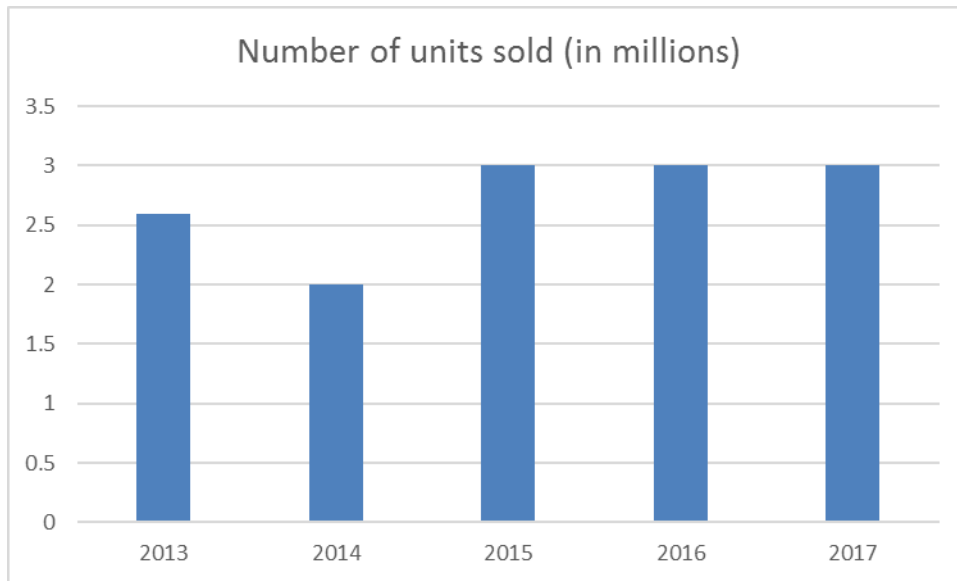
Table 7: Revenue forecast for NBA 2K series (in USD thousands)

Year	2018	2019	2020	2021	2022
NBA 2K	337,500	337,500	337,500	337,500	337,500

4. WWE 2K17:

WWE 2K is a series of professional wrestling games that have been up and running under Take-Two since 2013. Similar to NBA 2K, WWE 2K maintains a stable source of revenue for Take-Two as a new version is released every year. The company has maintained a sales level of 3 million units each year, and given the recurring nature of this product, we believe that the same would be maintained over our forecast period.

Figure 4: Number of units sold (in millions) for WWE 2K series



Bottom line: With an average price of \$32 per unit and 3 million units sold every year, we predict the following revenue figures:

Table 8: Revenue forecast for WWE 2K series (in USD thousands)

Year	2018	2019	2020	2021	2022
WWE 2K	96,000	96,000	96,000	96,000	96,000

5. Others:

Our attempt to isolate the company's key revenue generators and examine them separately leaves us with some residual revenue (accounts for 9% of total revenue as of 2016 and 14% as of 2017) that is attributed to other peripheral sources. In the absence of any management information on these revenues sources, we take a rolling average of

the last three years of “Other Revenue” over our forecast period. We think that the contribution of these revenue sources will be minimal in our valuation.

Table 9: Revenue forecast for other revenues (in USD thousands)

	2018	2019	2020	2021	2022
Others	199,049	168,493	180,747	182,763	177,334

Pipeline

Red Dead Redemption 2:

The sequel to 2010’s Red Dead Redemption, Red Dead Redemption 2 is an upcoming action-adventure video game that emulates Grand Theft Auto in almost all aspects, with the only exception being in the period in history. While GTA is based on a cosmopolitan city in the 21st century, Red Dead Redemption is based on the 19th century American West. The game, which is expected to be released in October 2017 has already received upbeat response from video-game pundits, with research firm, Cowen & Company expecting it to sell at least 15 million copies.

While the forecast of 15 million units may have some accuracy to it, we preferred to make our own attempt to forecast Red Dead Redemption’s sales. Our approach is as follows: First, we look at historical sales levels for its predecessor, Red Dead Redemption. Second, given the substantial similarities between Red Dead Redemption and GTA, we look at the sales growth rate between GTA V and its predecessor, GTA IV during each of their respective first years of release. We then use the growth rate between year 1 of GTA IV and year 1 of GTA V to forecast sales for Red Dead Redemption 2. The expected sales (in units sold) is the number of units sold for Red Dead Redemption 1 scaled by the growth rate obtained from GTA IV to GTA V. Finally, we obtain the forecasted sales revenue by using the average price per unit of Red Dead Redemption of \$60, which also happens to be the same for GTA V and IV. This is not surprising given that both games are similar in many aspects and would intuitively charge a comparable price. The reasoning behind our approach stems from the large similarities between both video games. If GTA V has managed to obtain such a large growth compared to its predecessor, we see no reason why the same wouldn’t apply to Red Dead Redemption 2, especially given its predecessor’s stellar sales record. We then

forecast that sales in the subsequent years of our forecast period would decrease at the same rate as its predecessor did.

Table 10: Growth in number of units sold in GTA V vs GTA IV (in millions)

Series	2008	2013
Grand Theft Auto IV (#units sold in millions)	13	25
	2014	2017
Grand Theft Auto V (#units sold in millions)	33	75
Growth in year 1 GTA IV to GTA V	154%	

Table 11: Forecasted number of units sold for Red Dead Redemption 2 (in millions)

Series	2011	2012	2015	2016	Total
Red Dead Redemption (#units sold in millions)	8.5	4.5	1	1	15
Forecast	2018	2019	2020	2021	2022
Red Dead Redemption 2 (expected #units sold in millions)	13	8	5	4	3

Bottom line: Based on our projections for sales growth (in units) and an average price of \$60 per unit, we project the following over our forecast period:

Table 12: Revenue forecast for Red Dead Redemption (in USD thousands)

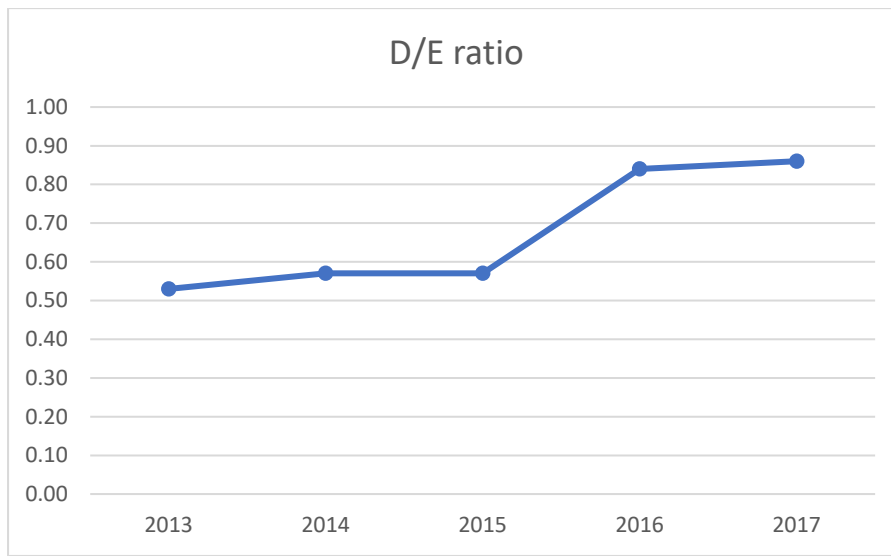
	2018	2019	2020	2021	2022
Red Dead Redemption 2	780,000	480,000	300,000	240,000	180,000

Valuation Assumptions

Capital Structure:

For our Discounted Cash Flow valuation, we use the Adjusted Present Value approach to account for the variation in Take-Two's debt-to-equity ratio.

Figure 5: Debt-to-Equity Ratio for the years 2012 to 2017



Expenses:

With no management guidance on any cost-cutting plans, we keep operational expenses as a fixed proportion of sales revenue based on the last three-years historical average.

1. Cost of Revenues: We hold cost of revenues fixed at 59% of sales revenue.
2. Research and Development: We hold them fixed at 10% of sales revenue.
3. Sales, General and Admin: We hold them fixed at 13.6% of sales revenue

Depreciation and Amortization:

We hold Depreciation and Amortization fixed at 2.2% of Sales Revenue, in line with a stable average over the last three years.

Capital Expenditure:

We hold Capital Expenditure fixed at 2% of Sales Revenue, in line with a stable average over the last three years.

Change in Net Working Capital:

We use a three-year rolling average to project Changes in Net Working Capital.

Corporate Tax:

We use an effective tax rate of 22%, based on the management's earnings call in February 2017.

Cost of Debt:

We calculate the cost of Debt by taking the interest paid in 2017 and dividing it by the average total debt of the last two years. We obtain a cost of Debt of 2%.

Market Risk Premium:

We use an implied equity premium of 7.91% from Aswath Damadoran's website.²

Cost of Equity:

Our cost of equity estimation considers two factors – First, to account for the time-variation in the company's systemic risk exposure, we calculate monthly rolling beta estimates over the last 60 months, by regressing Take-Two's monthly stock returns on the monthly stock returns of the CRSP value-weighted index minus the short-term treasury bill from Kenneth French's website³. Second, we unlever each of our monthly beta estimates using the company's quarterly debt-to-equity ratio pertaining to each particular month. This allows us to explicitly factor the company's variation in its Debt-to-Equity ratio into our cost of equity calculation. We find that the company's (unlevered) Beta has been decreasing since 2015, from an average of 1.02 pre-2015 to

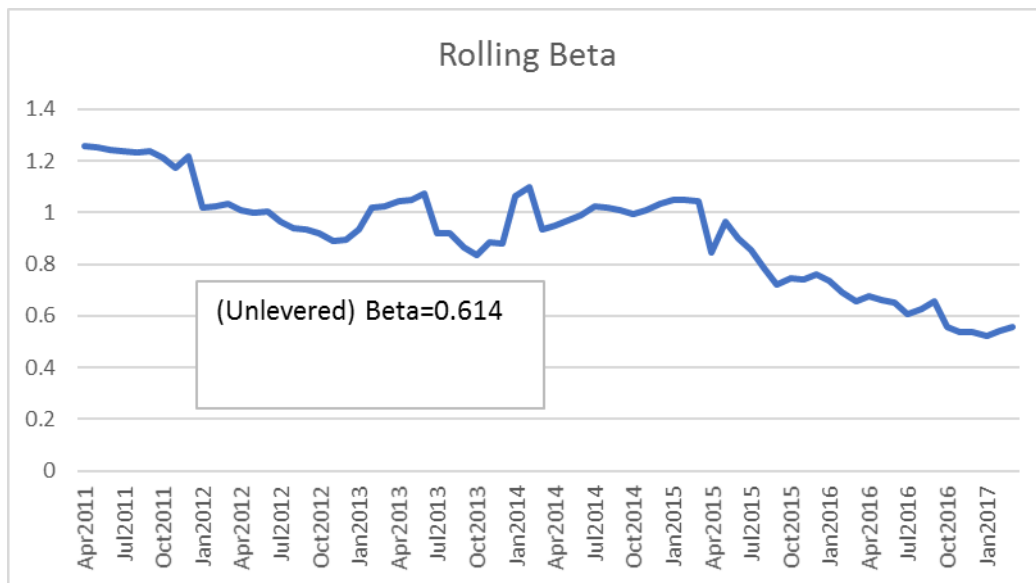
² <http://pages.stern.nyu.edu/~adamodar/>

³ http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

0.55 as of March 2017. We take the average Beta from January 2015 up to March 2017 of 0.614. We believe that this estimate is more representative of the company's riskiness in the long-run.

We finally use the de-levered Beta to calculate the company's cost of equity, using the CAPM. We adopt the latest 5-year treasury rate of 1.83% as a proxy for the risk-free rate. This give us a cost of equity of 6.69%.

Figure 6: Rolling (Unlevered) Beta estimates based on a 60-month window



Interest Tax Shield:

We calculate the interest tax shield assuming constant debt payments over our forecast period. We find no reason why the company would take on more debt or settle debts early given that the company is not engaging in any share-buybacks/acquisitions that would warrant taking on additional debt. Since we are assuming perpetuity, the tax shield is simply the company's debt level multiplied by the tax rate.

Terminal Growth Rate:

We use a growth rate of 2.5% to calculate the terminal value, in line with US GDP growth.

Valuation Results

Our APV valuation therefore leads to an implied stock price of \$67.93, compared to a market price of \$62.55, which represents a modest upside of 9%. Given the relatively small margin, we conclude that the company is fairly valued and recommend a HOLD.

Table 14: Valuation results of APV (all figures in thousands USD except stock price)

Sum of discounted CF	1,599,496
Terminal Value	6,057,971
Enterprise Value	7,657,466
(minus) Debt	2,008,892
(plus) PV of TS	441,956
(plus) Cash	798,742
Implied value of Equity	6,889,272
#shares outstanding	101,410
Implied Price	67.93
Market Price	62.55
Upside	9%

Sensitivity Analysis

A legitimate concern regarding our choice of US GDP growth as a terminal growth rate is that it would potentially leave little room for new firms to enter the market, which in turn might be too optimistic an assumption to make. We rerun our valuation using terminal growth rates of 2% and 1.5% for robustness and find that they lead to an implied stock price of \$61.57 (2% downside) and \$56.42 (10% downside) respectively. With both implied prices being within the 10% range for a HOLD recommendation our conclusion remains unchanged.

Appendix 1 – Data Collection Approach

In our attempt to split revenue into its key components, we relied on the following steps to obtain average number of units sold and average price of units:

1. We focus on the products that the management announced in its respective 10K report to have contributed the most to revenue. To be more specific, the Management Discussions section of the 10K report mentioned that GTA V, WWE 2K and NBA 2K contributed to 93% of total revenues for the fiscal year 2016.
2. For the average number of units sold, we start by looking at the company's 10K and reports and earnings calls for the years 2013-2017 for find any reference to the number of units sold for any of its products.
3. If it fails, we look for Newswires in Nexis about any announcements pertaining to the company's realized sales. We select announcements closest to the company's Fiscal year end.
4. For the average price per unit, we first check if there is any mention of total revenues per product in the company's 10K reports or earnings calls. Management does occasionally mention such figures in their reports. We then divide the total revenues for a product by the number of units sold to obtain the average price per unit. Prices of video games tend to be quite sticky over time with very little variation. We therefore believe that this approximation is sufficient.
5. If the company reports do not provide us with the required information, we take the mid-point between the highest and lowest price from GameStop.com.
6. We plug the obtained approximate revenue based on the number of units sold and average prices into the figures for 2016 and find that based on our approximation, GTA V, WWE 2K and NBA 2K account for 91% of total revenue, compared to management's claim of 93%. We are therefore comfortable with this approximation for our future projections.

Appendix 2 – Discounted Cash Flow Estimation (in thousands USD)

	2017	2018E	2019E	2020E	2021E	2022E
Sales Revenue	1,775,000	2,052,549	1,701,993	1,534,247	2,641,563	2,118,834
YoY(%)		16%	-17%	-10%	72%	-20%
Operating Expenses:						
Cost of Goods Sold	1,047,250	1,211,004	1,004,176	905,205	1,558,522	1,250,112
R&D Expenses	177,500	205,255	170,199	153,425	264,156	211,883
S G&A	241,400	279,147	231,471	208,658	359,253	288,161
Total Operating Expenses	1,466,150	1,695,405	1,405,846	1,267,288	2,181,931	1,750,157
Operating Revenue	308,850	357,143	296,147	266,959	459,632	368,677
Investment Income	49,000	54,390	60,373	67,014	74,385	82,568
EBIT (Total)	357,850	411,533	356,520	333,973	534,017	451,245
Tax	67,947	78,572	65,152	58,731	101,119	81,109
EBIT(1-T)	289,903	332,962	291,367	275,242	432,898	370,136
(plus)Depreciation & Ammortization	39,050	45,156	37,444	33,753	58,114	46,614
(minus)Capital Expenditure	35,500	41,051	34,040	30,685	52,831	42,377
(minus) Increase in NWC	-44.684	-16	36	50	6	6
Free Cash Flow	293,498	337,083	294,735	278,261	438,175	374,367
Discounted Cash Flow (Unlevered)	275,286	296,549	243,204	215,362	318,086	254,903

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