Consumption Patterns and Returns in the US DVD Market

Lee Yoong Hon[1] and Ruth Lim Sheau Yen[2]

Abstract

We examine the ancillary revenue for movies, specifically its revenue from DVD sales. We compared the sales and returns to investment for DVD among different categories of DVD titles/movies based on their movie production budgets. We find that while bigger budget movies will sell more DVDs they performed poorer when it comes to returns to investment (ROI).

Keywords: DVD, consumption pattern, home entertainment industry, returns to investment

JEL: L80, L82, M20, M21

[1] Nottingham University Business School, University of Nottingham Malaysia. lee.yoong-hon@nottingham.edu.my; tel: +60 3 8924 8269; fax: +60 3 8924 8019.
[2] School of Social Sciences, Heriot-Watt University Malaysia.

1. Introduction

The business of making movies is considered a risky venture especially when it comes to wide studio releases that involve millions of dollars in production and subsequently marketing budgets. Major studios like Disney, Paramount, Universal, Warner Bros and so on bet on millions if not billions annually on a string of major movies and like many businesses, face huge risk in terms of the payoffs. This is not surprising given that the industry is notorious for its unpredictability due to the nature of the product involved - there are simply too many factors that can affect audiences' appetite for movie choices and this is further complicated given that a movie's theatrical run is often very short. Further, with the huge amounts of information (e.g., critics' reviews, on-line users' comments and so on) available upon a movie's release, the end result of one's movie choice may be next to impossible to predict[3].

Nonetheless, the advantage of the movie business is that the returns are not only restricted to theatrical movie receipts alone - far from it, in fact. In essence, the ancillary income stream of a movie includes DVD, VHS (pre-DVD era), TV broadcast, cable TV, video-on-demand and so on. Ever since the introduction of VHS in the 1970s, the movie industry has benefited substantially from home entertainment, both in terms of sales (i.e., VHS, DVDs) and rentals (video rentals). With falling numbers of people going to the cinemas (from an industry high of 65% in 1930 to just around 10% in more recent times according to Young *et al*, 2010), the home entertainment has been a pivotal alternative income stream for the industry. In fact, it was the largest source of revenue for motion pictures – larger than even theatrical runs (Feingold, 2004). Further, Young *et al* (2010) argue that as high as 80% of a movie's revenue come from its downstream income, these include DVD and others. However, such optimism (in DVD income stream) is likely to be dimmed in recent times as a result of the internet (illegal downloads in the virtual world continues to be a problem) and perhaps to a more legitimate and significant threat, which is the rise of video/subscription streaming.

In any case, Lee & Lim (2018) reported that the returns on investment (ROI) for movies (in terms of its theatrical revenue) has been steadily falling from the highs during the pre-videotape (pre-1975) to the videotape era of 1975-1986, the then so-called golden era of VHS (1986-1996) to finally, the DVD era of 1997 and beyond. This strongly suggests possible a shift in consumption patterns from theatrical experience to the home entertainment option. We would expect these figures (ROI from movies) to further plummet (at least from casual observation) given the rise of the streaming era - not only are consumers given a choice of watching the movies via DVDs, they are also swamped with alternative original contents available from subscription-based video streaming platforms like Netflix, Hulu, Amazon Prime and so on. In fact, the latter is now a serious threat to the former!

Similar to the motion picture analysis, ascertaining the main drivers for DVD sales is an arduous task since there are obviously too many factors that are at play – timing of release, box office performance (of the movie), genre, production budget (of the movie), critics' reviews, users' reviews, film ratings and so on are likely to have a hand in the demand for DVD titles. In this paper, we are not building a model of measuring the effects of all the possible drivers of DVD sales. Instead, we are hoping to build on the findings by Lee & Lim (2018) – while that paper assesses the extent to which movie budgets play in the returns for motion pictures, this paper intents to focus on the impact of movie budgets on the returns (in this case, both the sales and returns to capital invested) of a movie's DVD releases. As such our objective is simple – we want to investigate the impact of budget on a movie's DVD sales/investment returns. This is an interesting question since DVD sales not only represent a significant portion of a movie's revenue stream (Nelson & Rutherford (2010) argued that DVD sales and rental more than double domestic box-office revenue), it also has a larger window for the sales

[3] See De Vany & Wallis (1999) for more on these issues that plague the industry.

to take place upon the movies' releases. According to Blume (2004), the window for DVD sales can be up to 10 years after a title's release – this in contrast to movies' window, which is only around 6 months. In fact, a film's run at the box-office (i.e., contractual run) is only 4-8 weeks according to De Vany & Walls (1999). Further, given that the production costs for DVD releases are minimal (once the investment made to a movie is completed), this source of additional revenue stream provides a lucrative return to investment (or capital employed)[4]. As such, studios may need to re-evaluate their strategies even at the upper stream (movie) as this may also affect the subsequent downstream returns (DVD), i.e., to focus on big budget productions or smaller ones – such decisions may have a direct impact on the optimization of returns to their investments in the business of making movies.

2. Literature Review

McKenzie (2010) using Australian data, finds strong correlation between the revenue of movies and its DVD contemporaries' sales - the relation stronger in the context of larger release titles as compared to artful/limited releases. A basic regression not only confirms this but also showed increasing relation between the two indicating that box-office success not only leverages DVD success but also at an increasing rate[5]. While acknowledging that the DVD market also exhibits the "winner-takes-all" sort of characteristic seen in the movie industry, McKenzie further argues that the unique institutional features surrounding the DVD market would result in the top DVD titles earning even a larger proportion of the revenue share (of the DVD market) as compared to the movie market scenario[6]. Finally, regressing both box-office receipts and DVD sales (separately) on a host of potential drivers, these including movie budget, opening theatrical screens, star power, genre, movie ratings, advertising budget and continued works (i.e., sequels) – his results showed the effects of budget to be stronger (positively) in the case of DVD sales compared to box-office revenue although both were insignificant. However, it (budget) became significant once advertising was omitted, at least in the case of DVD sales.

Walls (2010) using data from the North American market, in contrast to the findings of McKenzie (2010), does not find the DVD market to exhibit increasing returns to information phenomenon - with little evidence of heavier-than-normal tails in the DVD market's distribution of cumulative revenues, unlike the motion picture industry. Such information feedback characteristic, as argued by De Vany & Walls (1996) is pertinent to the movie industry, entails that initial success would lead to even more successes and vice-versa, thus successful movies at the box-office would ultimately go on to dominate a lion's share of the receipts while the failures consigned to minimal returns. Walls' (2010) paper also opined that factors which contribute to information feedback phenomenon, i.e., word-of-mouth, critical reviews and so on, have little systematic impact on the market for DVD rentals. Finally, it also highlighted that the DVD market has a marked difference compared to the motion picture industry – while it has less uncertainty, the competition is more intense in that it also faces direct competition not only from other DVD titles but also direct to video fares (i.e., movies that are not released theatrically but directly to video/DVD) and also previously TV-broadcasted materials that are eventually repackaged and sold through DVD releases/boxsets.

3. Data and methodology

Our data is taken from the website http://www.the-numbers.com which provides a list of annual top 100 DVD title sales in the United States. The data include both the annual sales in terms of units sold

[4] Squire (2004) estimated that the production costs of DVD would range from US$3-5.
[5] However, Nelson & Rutherford (2010) found that early releases of DVD may instead dampen a movie's box-office revenue thus studios may benefit from delaying a movie's DVD release.
[6] The winner-takes-all nature of the industry sees only a few stand-out candidates raking in the bulk of the market share.

and also in terms of monetary value (i.e., in US$ terms)[7]. We opted for the use of DVD sales instead of Blu-ray sales given that most titles are available in the case of the former but not necessarily the latter, an approach similar to Yu *et al* (2018). We also collated the data on a movie's budget and its domestic box-office receipts from the same site to ensure accuracy and consistency. We assess the annual data from 2008 to 2018 separately and also collectively (i.e., pooling the annual data) and made all efforts to ensure the accuracy of the data used. For example, when we analyze the relationship between DVD sales to production budget (or box-office receipts) for both the annual and pooled analysis, we omitted those observations (titles) with the following characteristics: (a) movie box-sets (i.e., bundling of several titles), (b) TV series box-sets, (c) TV movie/direct to video fares, and (d) those with missing/unavailable data (i.e., production budget unavailable). This is to restrict the analysis to DVD movie titles only. However, these observations (i.e., those omitted due to (a) – (d)) are nonetheless included in the analysis in section 4.1 in the DVD consumption pattern analysis. Due to the necessary truncations, the total observations annually are less than 100 despite the source being the top 100 titles of the year. Further, we adjusted the nominal variables (i.e., annual DVD sales in dollars; production budget; box-office receipts) for inflation to provide more meaningful comparisons since (a) not all titles in the annual top 100 were released (in theaters) in that particular year and (b), some titles appear in different years due to the longevity of their demand and thus continue to earn sales (DVD) revenue in different years (this inflation adjusted measures would be essential when we pool together the observations in each of the annual top 100 titles into a combined list). The total amount of observations for each year (after the necessary omissions) and their descriptive statistics are presented in Table 1.

Next, we pooled the annual data and through this exercise, we have a total of 692 observations (titles). The most recent title was released in 2018 while the oldest, 2007. For the pooled list (and eventual analysis using it), we had to omit titles released theatrically before 2007 since those titles would have seen part of their DVD sales in the pre-2008 period thus our pooling of data from 2008-2018 would have then omitted some of their pre-2008 DVD sales figures – given the fact that most titles' DVD release take place around 6 months after their theatrical releases, one would expect most of their DVD revenues to take place around the time of their theatrical release. Even for those titles which had their theatrical release in 2007, only those which had their DVD released in December 2007 are included since our data are from 2008 - 2018. Meanwhile, the price variables (i.e., sales, movie budget and box-office revenue) are all adjusted for inflation using the US CPI since the analysis here is solely on the US market[8].

We next sort the pooled DVD titles (692 titles) in our list into four different groups based on their production budget. Following the approach (and definitions) by Lee & Lim (2018) – their paper identifies the 4 distinct groups accordingly - i.e., the mega-budget group, the big budget group, the moderate budget group and the low budget group. The definitions are as follows: the mega budget movie category is defined as those with production budgets in excess of US$100 while the big budget category deemed as one in the range of US$50-99.99 million. Next, the moderate category covers those with budgets in the range of US$20-49.99 million and finally, the low budget is will include movies with production budgets from $US1,000 to $US19.99 million[9].

[7] The data for 2008-2015, 2018 were downloaded on 10 May 2019. Data for 2016-17 was downloaded on 9 February 2019.

[8] The prices of production budgets, box-office receipts and DVD revenues are adjusted for inflation using US consumer CPIs (as per the U.S. Department of Labor Bureau of Labor Statistic figures - 1982, 1983 and 1984 serve as the base years). The figures were sourced from http://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008/ (accessed 10 May 2019)

[9] Lee & Lim (2018) identifies a low budget film based on the assertions made in the New York Daily News article in 2015 compiling the best low budget films for that year. The top ten list had movies ranging from from $US 700,000 ("*Dope"*) to $US15 million (*Ex Machina*). See Lepore, 2015.

Table 1: Descriptive statistics of the annual data

Year	No. of Obs.	Budget (US$)		Total Units Sold		Total Sales (US$ nominal)	
		Max.	Min.	Max.	Min.	Max.	Min.
2008	75	185,000,000	7,000,000	10,944,319	975,701	191,678,575	15,581,289
2009	82	210,000,000	500,000	10,233,407	883,665	208,850,705	11,720,216
2010	83	425,000,000	450,000	10,173,099	765,823	183,637,624	10,805,959
2011	86	410,600,000	3,000,000	7,089,179	622,489	97,030,550	6,946,452
2012	80	275,000,000	2,000,000	7,434,058	642,374	123,736,419	5,570,378
2013	78	275,000,000	12,000,000	5,068,331	589,474	77,250,269	3,607,509
2014	80	275,000,000	1,150,000	11,034,558	501,048	185,483,063	3,101,035
2015	72	330,600,000	500,000	2,630,395	453,193	45,746,016	3,242,309
2016	65	306,000,000	500,000	2,365,371	383,060	46,018,499	3,081,512
2017	69	260,000,000	3,000,000	2,002,732	295,042	32,192,216	1,814,772
2018	67	317,000,000	3,000,000	1,864,545	232,687	26,919,258	966,948

In assessing the returns of DVD titles of different budgets (i.e., the movie's budget), we performed correlation tests between production budget (real values) and the cumulative sales (both in terms of dollars (adjusted for inflation) and units) annually and also with the pooled data. Further, with the pooled data, we split the observations according to their respective budget categories and performed a series of *t-tests* to determine whether there are in fact, any differences in the mean values (in terms of their respective dollar and unit sales) between the different budget categories of the DVD titles/movies. Finally, we also tested for any differences between the different budget categories of the DVD titles/movies in terms of their returns to investment (ROI). Our formula for the ROI is defined as:

$$\text{Return on Investment, ROI for specific DVD titles/movies} =$$

$$\frac{\text{DVD Sales Revenue for the movie/title} - \text{Production Budget of the movie/title}}{\text{Production budget of the movie/title}}$$

This formula is similar to the approach taken Lee & Lim (2018) and John *et al.* (2017) although both cases involved movies rather than DVDs. Given that the sales receipt of DVD is also part of the income stream for movies, we identify the cost of DVD as the production budget (movie) for the DVD title/movie. Meanwhile, the use of ROI is important as the comparisons between the different categories of movies need to be executed in a way that allows for meaningful comparisons given those vast differences (in their production budgets) between the groups. The use of ROI allows for this since the production budget is the denominator thus allowing for comparisons between major and smaller budget titles/movies. We nonetheless, are also mindful that while the production budget may be an appropriate investment base for the business of movies (in this case, the revenue would be box office revenue), it may not be for DVDs – for this we may need the actual production costs of the DVDs but given that such figures are unavailable and also the fact that theatrical box-office and its subsequent DVD sales are in fact both part of the revenues for the product of movies (just different windows of generating revenue but the product is virtually the same), we believe the use of ROI should still be relevant in this case.

4. Findings

4.1 Consumption Patterns in the DVD market

In terms of consumption patterns of DVDs in the last 10 years, it is perhaps unsurprising see a steady decline in DVD sales given the continuous changes that have taken place in the industry – video on demand (streaming) has been dominating the home entertainment industry, with sites like *Netflix* and *Hulu* experiencing impressive growth in their subscriber base in the last few years. In fact, not only the DVD market is under threat, even traditional TV broadcast and cable TV has been undermined by such alternative entertainment option. The prominent rise of streaming services platforms and the fact that Netflix is not the only major player in this (other dominant platforms include *Amazon Prime* and *Hulu* while soon to be launched *Disney+ and Apple TV* await) strongly points towards the impending end of the once hugely profitable DVD era of the last 2 decades of so (it has been the top in terms of alternative income stream for movies).

From Table 2, the DVD sales, on average, have declined by about 17% from 2008-2018 in terms of actual unit sales, with a decline recorded in every year. Such drop is alarming by any industry standards especially considering that the 2008-2018 period represent the post 2008 financial crisis in which economy and businesses would have since picked up considerably. In fact, when we observe the sales in terms of dollars, the drop is even more pronounced, i.e., 23% when prices are adjusted for inflation. While internet pilferaging (for entertainment content) is probably one of the reasons, a more likely source is the rise of the subscription-based video streaming platforms. According to Yu *et al* (2018), video streaming adversely cut the sales of DVDs by up to 34.31%. Further, Parlow & Wagner (2018) argued that Netflix, although initially a complementary product to the movie theater experience given its older titles in the offering but has since (post 2015) morphed into a competitor (to the movie experience) as it began to offer more original and exclusively produced movies and acclaimed TV series. Their study reported a sharp drop in movie ticket sales (up to 2-digit rates for some markets) around the time (beginning 2016) when Netflix began to invest huge sums of money into their own original movies, these offering involving major movie stars in their prime, *Will Smith, Adam Sandler* and *Ben Affleck* to name a few. Unsurprisingly, video streaming platforms have seen steady growth in their subscribers in the last decade. For example, market leader Netflix has recorded positive growth every year in their worldwide subscriber base from 2007 to 2016 – from 7.48 million in 2007 to 93.8 million in 2016 (Dunn, 2017).

Table 2: DVD Sales (Annual top 100) from 2008-2018

Year	total units	Total Sales (US$, Nominal)	Total Sales (US$, adjusted for Inflation)	%Δ (units)	% Δ (sales)	%Δ (Inflation adjusted sales
2008	230154493	4046701521	1879537917	-	-	-
2009	236304277	3989767519	1859710688	0.03	-0.01	-0.01
2010	200274139	3522363812	1615348265	-0.18	-0.12	-0.15
2011	147267131	2260532847	1004953719	-0.36	-0.36	-0.61
2012	148284741	2390511059	1041190562	0.01	0.06	0.03
2013	128453589	2074034586	640219098.8	-0.15	-0.13	-0.63
2014	105563682	1587974873	670778788.6	-0.22	-0.23	0.05
2015	88697927	1221932344	515546287.4	-0.19	-0.23	-0.30
2016	69222472	971354852	404719384	-0.28	-0.21	-0.27
2017	53166721	751459964	306568196.8	-0.30	-0.23	-0.32
2018	52333292	730229671	290804187.5	-0.02	-0.03	-0.05
Mean				-0.17	-0.15	-0.23

Source: thenumbers-com

In terms of the popularity of titles according to type of release, we look at the annual top 100 titles (in terms of the number of units sold) according to the following classifications (see Table 3) – i.e., new release (defined as releases of 1-2 years old at the time of its DVD release), older release (movies older than 2 years at the times of their release), direct to video (i.e., titles that are not released theatrically but instead directly to DVD), movie box sets (i.e., bundling of movie titles, usually related – sequels/prequels), TV movie/box sets (movies released in DVD after TV broadcast/older TV series given a DVD release) and sports video. New releases dominate the annual sales although their share has been falling steadily over time – if fact, in 2018, new releases account for just over 50% of the total sales. This may be attributed to several possibilities, with one possibility being that new DVD releases may have been more severely cannibalized by video streaming – this argument would be in line with the findings by Yu *et al* (2018) who found the phenomenon of subscription streaming cannibalizing physical sales (DVD) to be stronger in the case of recent movie titles. Such development may not necessarily be an adverse phenomenon for the DVD industry as older titles tend to have higher profit margins (though lower volume) for retailers while newer titles, the reverse (Feingold, 2004).

Table 3: Annual top 100 DVD sales according to Category

Year	New Releases	Non-New releases	Direct to video	Movie Box sets	TV Series Box sets/tv movie	Sport Videos	Total
2008	84	8	5	1	2		100
2009	87	5	6	-	2		100
2010	82	7	4	-	6	1	100
2011	82	8	6	1	3		100
2012	75	15	4	1	5		100
2013	73	15	4	2	5	1	100
2014	72	24	2	-	2		100
2015	59	35	2	-	3	1	100
2016	59	36	1	-	3	1	100
2017	61	34	1	3	1	-	100
2018	55	40	-	4	1	-	100
Mean	71.7	20.6	3.2	1.1	3	0.4	

Source: thenumbers-com

Another notable trend observed from Table 3 is the continuous fall in market share of non-theatrically released DVD titles, i.e., direct-to-video titles, sports videos and TV movie/TV series boxsets over the last decade. As such, the issue of greater number of competitors (substitutes) faced by DVDs (compared to movies) as argued by Walls (2010) is less of an issue from our observation. Nonetheless, this is not saying that there is less of a competition threat for DVDs – far from it in fact. We attribute this (the drop in the non-theatrically released DVD titles) to the fact that these releases are much more of a direct substitute to the contents offered by the video streaming platforms especially TV series and direct-to-video titles. While the latter had been a prominent source of income to studios since the early 1990s (once accounted for $2 billion of the roughly $22 billion North American home video business – see Feola, 2004), such contribution to the studios are unlikely to be sustainable given that movies made by streaming platforms like Netflix has in recent times, come with huge budgets and popular movie stars. For example, Netflix's *Bright*, released 2017, had *Will Smith* in the lead with a budget of US$90,000,000 (on par even with some Hollywood blockbuster movie budgets) and was touted as the first movie franchise in content streaming films (Lynch, 2017). Given such credentials, it is not hard to dismiss the adverse impact of streaming-only movies even on theatrical releases, what more direct-to-video (DVD) offerings. Similarly, TV box set releases may also been significantly undermined by similar competitors - more acclaimed TV series available via streaming – Netflix's *Stranger Things*' amazing success is a good case in point[10]. Going by the sharp decline in DVD sales, it is undisputable that the video streaming has also impacted the DVD sales substantially thus the greater threat now for DVD movies (theatrically released ones) is much more from streaming than from those of non-theatrically released DVD titles/TV series previously.

[10] The biggest show on Netflix with over 40 million household account viewers while Nielsen data also reported its record-breaking feat with its measure showing 19.7 million tuning in to the season 3's opening episode (Tassi, 2019)

4.2 DVD Sales, Movie Budget and Domestic Box-office (Annual Analysis)

Table 4 breaks down the correlations between DVD sales (unit) with both movie budget and domestic box office performance of the respective titles by year, i.e., from 2008 – 2018. We used the annual top 100 list for each year but excluded DVD titles that are released before December 2007 as the bulk of the DVD sales for those titles would have taken place in 2007 or before.

The correlations are positive and significant for most of the years, both in the case of movie budget and domestic box office. However, we identify two observations – first, the correlations between units sold and movie budget steadily declines over the 10-year period, and second, the correlations between units sold and domestic box office is consistently greater than units sold and movie budget. The first observation is interesting in that it appears that a movie's budget has less correlations to the sales of its DVD release, at least in more recent times – a finding that contradicts the motion picture industry in which bigger budget movies tend to score bigger box-office revenue (this is unsurprising since bigger budget movies are usually link to bigger marketing/advertising outlay and also bigger number of opening screens and so on - factors that will lead to bigger weekend box office openings at the very least – see King (2007); Lee (2014)). But while bigger budgets tend to deliver greater sales (i.e., box-office) for movies, the business rationale (for investing in bigger budgets) is a little more complicated when assessing movies since revenue does not necessarily translate to profits given the huge capital invested in the case of movies. But in the case of a DVD release, the returns are more easily assessed – the cost of producing, market and distributing is around US$3-5 per disc (Feingold, 2004) thus the analysis for returns to investing in a DVD release in some ways, much simpler, i.e., the sales or the unit sales recorded[11]. In any case, based on the first observation, it appears that the impact of budget to sales has diminished over time. Further, with the correlation figures consistently stronger between units sold and box office than units sold and budget, it does suggest that it may actually be a movie's success rather than its big budgets that is key to the sales of DVDs (see McKenzie (2010) on similar conjectures). If so, predicting a DVD release's sales success may as well be elusive (as in the case of movies) since the movie industry itself is famous for its impossibility of predicting one's box office success.

In the second observation, the figures are not entirely surprising given that many consumers tend to purchase the DVD copy of the movie which they enjoyed at the theater – this especially for those blockbuster movies which tend to induce moviegoers to purchase the DVD, both for repeat viewing or for collection purposes, which explains the tendency for studios to issue special editions or boxset editions (these presumably bundled-in with the previous installments in the case of blockbuster movie franchises). Nonetheless, even this relationship appears to be weaker with time – the 2017 and 2018 correlation figures are not only weaker but also insignificant as well. One explanation for both the observed correlation trends could be that buying DVDs has simply gone out of fashion among consumers of movies especially given the current trend of streaming contents – instead of owning physical library of titles, one may prefer to have access to a virtual one instead.

[11] Manufacturing DVD is even cheaper than its predecessor format, i.e., the VHS video tapes (cassettes). While it costs US$2-3 to manufacture a cassette (depending on volume and other factors), at a high volume, it costs only US$1.50 or less to produce a disc (Sweeting, 2004).

Table 4: Correlations of DVD Sales (Unit) versus Movie Budget and Domestic Box office

Year(obs)	Units sold/Movie Budget (nom.)	Units Sold/Domestic Box office (nom.)	Units sold/Movie Budget (real)	Units Sold/Domestic Box office (real)
2008 (75)	0.570*	0.805*	0.564*	0.803*
2009 (82)	0.418*	0.683*	0.419*	0.684*
2010 (83)	0.432*	0.746*	0.433*	0.745*
2011 (86)	0.292*	0.512*	0.294*	0.506*
2012 (80)	0.259**	0.557*	0.253*	0.540*
2013 (78)	0.150	0.384*	0.146	0.379*
2014 (80)	0.189	0.544*	0.184	0.536*
2015 (72)	0.278**	0.593*	0.267**	0.648*
2016 (65)	0.331*	0.543*	0.322*	0.539*
2017 (69)	0.241**	0.376*	0.230	0.123
2018 (67)	0.026	-0.023	0.082	0.021

*sig. at 1% level
**sig. at 5% level

4.3 Movie Budget, DVD Sales and Return to Investment (ROI)

Table 5 shows the mean unit sales, sales and R.O.I figures according to the 4 different categories of DVD titles (movies), their budgets adjusted for inflation. Based on the categorizations as per the movie budget, there are 22 mega budget DVD titles (movies), 179 big budget ones, 244 moderate, and finally, 247 in the low budget category. All the categories except the low budget had negative ROIs - the low budget movie category (i.e., DVD titles/movies with production budget below US$20 million) shows a positive return (almost 58%). The mega budget category (i.e., production budget in excess of US$100 million) had the lowest ROI, approximately -85% returns. Elsewhere, DVD titles/movies with budgets in the big and moderate category both also had negative ROIs albeit better than the mega category, with -75% and -61% respectively. However, in the case of unit sales and dollar sales, the pattern is reverse i.e., the higher budget categories had better results. From Table 5, the mega budget category had the highest figures for both mean unit and dollar sales followed by the rest, with the figures in descending order matching the respective descending order of budget categories. We interpret the results in two ways – firstly, the bigger budget movies sold more DVDs, unsurprisingly since bigger budget movies would most likely made more money theatrically thus leading to more demand for repeat viewing via DVDs. However, the fact that the ROIs are lower the lower the budget category suggest that despite the increased in revenue (through sales), profit-wise, it is the lower budget titles which provide better returns as far as capital utilization is concerned, assuming that we use a movie production budget as the capital employed.

Table 5: A comparison of the mean Return to Investment, Mean DVD Unit Sales and Mean DVD Dollar Sales for different categories of movies (all price variables adjusted for inflation)

Type of Movie Production	No of movies	Mean Budget (in US$)	Mean DVD Unit Sales	Mean DVD Dollar Sales (US$)	Mean Return to Investment
Mega budget	22	122,422,873	65,347,330	19,793,868	-0.842
Big budget	179	70,874,976	2,409,045	17,572,068	-0.755

Moderate budget	244	32,538,491	1,686,365	12,044,515	-0.610
Low budget	247	11,612,653	1,358,805	9,834,378	0.577
Overall	692				

Table 6 shows the correlation tests between production budget and the following variables: unit sales, dollars sales and ROI according to the respective budget categories. While budget is positively correlated to sales (both in terms of unit and dollar sales), it is only significant in the case of the big budget category – this supports the finding of McKenzie (2010). We also added an additional category, i.e., mega and big budget combination, since the number of observations for the two (especially mega budget) is considerably lower than the moderate and low categories. The combined category (i.e., mega and big budget) also had significant and positive correlations between budget and sales, as so when we combined all the categories (see, 'All Titles' column in Table 6). However, in the case of 'All Titles' (i.e., all the observations), the correlations between unit (and dollar) sales and box office are higher than for unit (and dollar) sales and budget – they suggest that the success at the box office is the bigger driver to DVD sales. However, the correlation between budget and ROI is negative (and significant) overall (i.e., 'All Titles'). Further, it is both significant and negative in the case of both the moderate and low budget categories.

Table 6: Correlation tests with ROI, DVD Unit Sales and DVD Sales among the different budget categories

	Budget (All Titles)	Mega & Big Budget Combo	Mega budget	Big budget	Moderate budget	Low budget
ROI (domestic)	-0.167*	-0.027	0.127	0.084	-0.162**	-0.319*
DVD Unit Sales	0.263*	0.178**	0.259	0.179*	0.050	0.109
DVD Dollar Sales	0.261*	0.199*	0.363	0.240*	0.034	0.119

Note: we also conducted the correlation tests between DVD Unit Sales/Dollar Sales and box office performances (adjusted inflation) – they were higher (0.498* and 0.483* respectively) than the correlations between DVD Unit Sales/Dollar Sales and budget (see Budget *(All Titles)* column). Further, the correlation between budget (adjusted for inflation) and domestic box-office (adjusted for inflation) is 0.603*.
*sig. at 1% level
**sig. at 5% level

Finally, Table 7 provides results of the independent-samples *t*-tests, this for the purpose of ascertaining if there are indeed any differences in the unit sales, dollar sales and the ROI between (a) mega & big budget and moderate budget movies, (b) mega & big budget and low budget movies, and (c), moderate and low budget movies. Table 7's *t-tests* are all significant and from the results, there are differences in the mean unit sales, dollar sales and ROI between the three categories of DVD titles/movies. Firstly, the results indicate that, on average, the DVD unit and dollar sales are higher for mega & big budget (category) compared to moderate and low budget (categories). Similarly, the DVD unit sales are found to be higher on average, in the case of moderate (category) compared to low (category). However, in the case of dollar sales, the low (category) is higher compared to the moderate (category). Finally, in the case of ROI, the mean returns for low budget (category) are higher than those of both the moderate and mega & big budget (categories) while the mean returns for moderate (category) is higher than the mega & big budget (category).

Table 7: T-tests (2-tailed) for Equality of Means between the different categories of movies' budgets

	Mega & Big (n=201) Vs Moderate (n=244)		Mega & Big (n=201) Vs Low (n = 247)		Moderate (n=244) vs Low (n=247)	
	t-value*	Sig.	t-value*	Sig.	t-value*	Sig.
ROI	-4.518 (386.8)	0.000	-3.887 (247.3)	0.000	-3.431 (249.6)	0.001
DVD Unit Sales	3.566 (334.9.)	0.001	5.395 (277.6)	0.000	2.326 (447.9)	0.02
DVD Sales	3.503 (332.3)	0.001	5.163 (275.8)	0.000	-7.447 (2369.8)	0.000

*sig. at 1% level
**sig. at 5% level

5. Concluding Remarks

Movie studios have and will always be willing to inject millions into their movie projects despite the huge uncertainty that surrounds their box-office payoffs. There are a variety of reasons for this- e.g., inducing investors, stock prices post-announcement of major releases, lucrative product merchandising/tie-ins and so on. An equally plausible one is the fact that after a movie's run at the box-office, its post-theatrical revenue window run can easily extent to home video (e.g., DVD), pay-per-view, pay television, video on demand (V.O.D.), cable TV, syndication, and others (e.g., non-theatrical markets like airlines, hospitals etc.). But as far as these non-theatrical revenues are concerned, the home video revenue has been the most crucial, with the income generated from this even outweigh those from theatrical runs for many movies. As such, the DVD market has been an important one for studios since its market entry in 1997 although its prominence has been steadily undermined in recent years by the rise of video streaming platforms.

In this paper, we look into the DVD markets in the last decade – starting with its consumption trends/patterns and then analyze the extent to which its sales are correlated to a DVD title/movie's budget and also calculated the returns to investment (ROI) for it as well, the latter to provide some meaningful comparisons of performance between DVD titles/movies of different production budget category. We believe these issues are important for both the motion picture and home entertainment industry – the findings may be of significance to studios in terms of their pursuance of strategies in maximizing their returns to the capital invested (into their movie projects). We found that on average, the ROI is highest in the case of low budget fares followed by moderate, big and mega budget, in descending order. In fact, only the low budget category recorded a positive ROI This result is consistent with those found by Lee & Lim (2018) in the case of the motion picture industry. However, on the basis of sales and unit sales, the order of superiority is reverse, i.e., the bigger budget fares delivers greater figures. Nonetheless, the performance of a DVD title/movie may have more to do with its box office performance rather than its budget *per se* – its sales are more strongly correlated to the former than the latter. If this true, then studios would be well advised against making too optimistic projections of revenue stream (at least the DVD one) for big budget titles since the DVD revenues are more strongly linked to box office performance rather than just big budget and marketing prowess of such titles. In any event, from our results, movie studios should instead focus more on lower budget ones if they are to maximize their return to investments.

Next, on a more pressing note, the DVD industry itself has been in decline in recent years as a result of the *creative destruction* phenomenon that is associated with the home entertainment industry – the rise of video/subscription streaming options has seriously altered the consumption preference of the market with fewer and fewer now opting for physical collection as opposed to access to a digital library instead. From our analysis, we find the mean annual decline (in both unit and dollar sales) from 2008-2018 to be substantial – unit sales falling at a 17% rate while dollar sales (inflation adjusted), a staggering 23%. Given that video streaming players have also embarked on their own original content in recent years, not only would the DVD income be seriously affected but even the box office receipts for movies itself may be at stake. Nonetheless, the latter may be in a better position since it offers a different viewing experience but even so, studios should take heed of the impending industry landscape change. That said, a few key takeaways from our analysis of the DVD markets – one, the drop in DVD sales seemed to have a bigger effect on the new releases (i.e., new movies that are released on DVD) in recent years, a finding that is consistent with Yu *et al* (2018) and two, the relationship between both movie budget and box office performances to unit sales has been steadily declining from 2008-2018. The latter raises some concern to studios in terms of picking winners among their DVD title releases (projections of revenue may be challenging). On a positive note, studios may be buoyed by the fact that their back catalogues sales could make up for the declining interest in recent titles' DVD releases – these older titles would incur little costs (they have been released many years ago anyway) and also good for the retailers as well (older titles tend to have a higher profit margin – see Feingold, 2004). A casual observation on the data reveal that many of these older titles shared similar themes, e.g., Christmas – titles like *The Polar Express* (2005), *Elf* (2003) and *Home Alone* (1990) continues to appear in the top 100 list regularly (even up to 2018) while older installments of movie series (i.e., trilogies, prequels, sequels) tend to see sales spikes the year a new installment of a popular series is released (e.g., the *Indiana Jones* franchise, the *Twilight* franchise and so on). Finally, the previously successful option of having movies released directly to video/DVDs (i.e., direct-to-video fares) has probably been the hardest hit given that video streaming players have, in recent times, not only produced their own original content (hence a direct substitute) but also with the kind of quality and budget that even match theatrical releases. As such, we argue that the wisest way forward may be to re-visit older back catalogue of movies – this may not only be good for sales but also ensure a high return to investment (given the almost negligible capital investments!).

To conclude, we acknowledge the obvious limitations present in this paper – for example, future papers may want to consider using a more extensive database (e.g., sales of Blu-ray DVDs as well), a more sophisticated econometric model or even consider looking into the accounting details of home entertainment business (profits, expenses or even the revenue-sharing of video/DVD-rental between the studios and the retailers). Such ventures may offer better insights to the question of whether if in fact, a bigger budget investment in movies actually provide better payoffs in terms of its main ancillary revenue stream, i.e., the DVD sales. In any case, based on the findings from this paper, studios may be wise not to make overly optimistic projections of their DVD income streams, especially the big budget ones.

References

Blume, S.E. (2004), "The Revenue Stream: An Overview" in Squire, J. E. (ed.), "Movie Business Book", 3rd edition, New York: Shuster & Shuster.

De Vany, A. & W.D. Walls (1999), "Uncertainty in the movie industry: Does star power reduce the terror of the box office"? *Journal of Cultural Economics*, 23, 285 – 318. https://doi.org/10.1023/A:1007608125988

Dunn, J. (2017, January 19). "Here's how huge Netflix has gotten in the past decade". Business Insider US [On-line] Available at: https://www.businessinsider.my/netflix-subscribers-chart-2017-1/?r=US&IR=T [Accessed 7 September 2019].

Feingold, B.S. (2004), "Home Video Business" in Squire, J. E. (ed.), "Movie Business Book", 3rd edition, New York: Shuster & Shuster.

Feola, L.A. (2004), "Home Video Business" in Squire, J. E. (ed.), "Movie Business Book", 3rd edition, New York: Shuster & Shuster

John, K., Ravid, S.A. & J. Sunder (2017), "Performance and managerial ability: Evidence from the career-paths of film directors", *Journal of Corporate Finance*, 44, 425- 439. https://doi.org/10.1016/j.jcorpfin.2014.11.001

King, T. (2007), "Does film criticism affect box office earnings? Evidence from movies released in the U.S. in 2003", *Journal of Cultural Economics*, 31(3). https://doi.org/10.1007/s10824-007-9041-z

Lee, Y.H. (2014), "Experts versus Audience's Opinions at the Movies: Evidence from the North American Box-Office", Marketing Bulletin, 25, 1.

Lee Y.H. and R.S.Y. Lim (2018), "At the movies: Some stylized facts on investment returns and consumption patterns", *International Journal of Business & Economics*, 17(2):123-142, September 2018.

LePore, S. (2015, September 14). "The Biggest Low-Budget Hits of 2015". New York Daily News. [On-line] Available at: https://www.nydailynews.com/entertainment/2015-low-budget-hits-article-1.2359590
[Accessed 6 September 2016]

Lynch, J. (2017, December). "Netflix ordered a sequel to its Will Smith fantasy film 'Bright' — making it the first movie franchise in streaming-only history", Business Insider. [On-line] Available at: https://www.businessinsider.com/netflix-orders-sequel-bright-will-smith-fantasy-film-2017-12?IR=T [Accessed 20 August 2019]

McKenzie, J. (2010), "How do theatrical box office revenues affect DVD retail sales? Australian empirical evidence", *Journal of Cultural Economics*, 34:159–179. https://doi.org/10.1007/s10824-010-9119-x

Nelson, R.A. & P. Rutherford (2010), "The Impact of early DVD release on box-office revenues", *Applied Economics Letters*, 17, 689-693. https://doi.org/10.1080/13504850802297913

Parlow, A. & S. Wagner (2018), "Netflix and the Demand for Cinema Tickets - An Analysis for 19 European Countries", MPRA Paper No. 90023, posted 15 November 2018

Sweeting, P. (2004), "The Video Retailer" in Squire, J. E. (ed.), "Movie Business Book", 3rd edition, New York: Shuster & Shuster.

Tassi, P. (2019). "Nielsen Confirms Netflix's Massive 'Stranger Things' Season 3 Viewership Numbers", Forbes. [On-line] Available at: https://www.forbes.com/sites/paultassi/2019/07/12/nielsen-confirms-netflixs-massive-stranger-things-season-3-viewership-numbers/#3425027417b1 [Accessed 20 August 2019]

The Numbers – Where Data and the Movie Business Meet (2019). [online] Available at: https://www.the-numbers.com [Accessed 9 February 2019; 10 May 2019]

US Inflation Calculator (2019). [On-line] Available at: http://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008/ [Accessed 10 May 2019].

Walls, W.D. (2010), "Superstars and heavy tails in recorded entertainment: empirical analysis of the market for DVDs", *Journal of Cultural Economics*, 34:261–279. https://doi.org/10.1007/s10824-010-9125-z

Young, S.M., Gong, J.J. & W. A. Van der Stede (2010), "The business of making money with movies", *Strategic Finance*, February, pp. 35-40.

Yu, Y., Chen, H., Peng, C.H. & Chau, Patrick Y. K. (2018), "The Causal Effect of Subscription Video Streaming on DVD Sales: Evidence from a Natural Experiment" (July 1, 2018). Available at SSRN: https://ssrn.com/abstract=2897950 or http://dx.doi.org/10.2139/ssrn.2897950