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At the Movies: Some Stylized Facts on Investment Returns and Consumption Patterns

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Abstract

This article examines the impact of a movie's budget on its profitability by measuring movie profitability using its return on investment (ROI). With a dataset comprising 3309 movies, we find that a movie's ROI negatively correlates to its production budget. Our findings further reveal that its ROI is highest in the category of low budget films when compared to other groups of different budget categories, i.e., moderate, big, and mega budget. In terms of an investment portfolio strategy, we argue that the better option for movie studios is to concentrate more on smaller-scale film projects instead of investing heavily in major productions, or at the very least, to consider having a more balanced portfolio in order to realize greater overall returns.

Key words: return on investment; production budget; movie industry; box office; consumption pattern

JEL classification: L80; M20; M21

1. Introduction

The business of making movies is fraught with uncertainty and involves huge undertakings of risk given the sizeable amount of money that is invested in them. While returns can also be potentially attractive with major Hollywood blockbuster movies bringing in revenue in excess of US$1 billion, there are also many that stumble spectacularly – raking in less than half the money used to produce them. For example, the last two movies by director James Cameron, *Titanic* (1997) and *Avatar*

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(2009), both cost in excess of US$200 million, but went on to earn more than US$2 billion worldwide. Having said that, Hollywood is also notorious for its share of big failures, with a recent one being Disney's *The Lone Ranger* (2013). Under a budget of US$275 million, it took in ticket sales of only US$260 million globally (www.the-numbers.com).

To be fair to studio executives, the movie industry is both complex and dynamic, not to mention impacted by ever-changing consumer sentiments and tastes. The influence of social media further complicates the equation, while the cost of marketing is another factor as well. In fact, many instances of major film failures actually involved top directors – 1979's *Heaven's Gate* had Warren Beatty at the helm, while the expensive WWII comedy, *1941* (released 1979), even boasted of Steven Spielberg, probably the most prolific filmmaker of all time, as its director.

One of the main reasons for the unpredictability of movie returns is that there are often too many factors that could potentially dictate a movie's box-office run. Given the relatively short run at the box office for an average movie (the usual minimum contractual run is between 4-8 weeks; see De Vany & Wallis, 1999) and also the fact that moviegoers are exposed to huge amounts of information (e.g., critics' reviews, etc.), De Vany and Walls (1999) argued that such complexity (of movies as products) and the overwhelming cascading of information during its run at the theaters often result in the impossibility of identifying the main factor that ultimately affects a movie's box-office performance. Furthermore, this is also an industry that is characterized by positive information feedback, i.e., the success of a film leads to even further success, while unsuccessful movies in turn experience failures swiftly (see De Vany & Walls, 1996), and that eventually a few product winners (*hit* movies) garner a disproportionally larger share of the overall total payoffs (box-office receipts) compared to the larger pool of the losers' share; hence, a winner-takes-all situation. Walls (2009) found such a pattern appears in Thailand's movie industry, which is a finding similar to a host of other film markets including the U.S., UK, Australia, and Hong Kong. Such findings further underline the challenges and risks associated with the business of making movies.

The movie industry itself has also experienced many changes over the years. For instance, the introduction of videotapes in the mid-1970s resulted in new and additional sources of revenue for studios. When this came to an end, consumers were next offered the option of DVDs, which is a form of home entertainment that comes complete with additional materials (i.e., cast interviews, trailers, and so on) of the movie. While these options serve as additional revenue for studios, the same cannot be said when the Internet came into the picture in the mid-1990s as it eventually led to illegal downloading that exacerbated into the 2000s. With policing less than perfect, studios continue to lose millions in revenue every year due to this phenomenon.

In this paper, we are not trying to ascertain the most pivotal driver in box-office returns of a movie nor are we looking to investigate the impact of alternative media on movie industry sales. Our objective is to examine the impact of a movie's budget (or investment) on its profitability. This is an interesting question, because box-

office figures as reported by studios are basically sales and not profits. In fact, on many occasions, the portion of the box-office revenue (sales) that goes to the studios is not even enough to cover the production and marketing budgets. Thus, despite the millions that are reported, it is not uncommon that many studios still struggle to break even. The studios' cut from box-office receipts is roughly 50-55% for domestic gross (North America) and 40-45% for overseas gross (i.e., the rest of the world) (The Economist, 2011). To our best knowledge, most papers on the movie industry have looked at the drivers of box-office returns, which would include the production budget of course, but the measures look at the impact of those factors on revenue (box-office receipts) and not financial returns (profits). As such, we hope to fill this gap by assessing both the profits and returns on investment for movies – i.e., does investing in big budget blockbuster movies necessarily mean bigger returns on investment for studios?

2. Literature Review

There has been no shortage of research on the determinants of box-office receipts over the years, with the list of variables ranging from critics' reviews, production budget, star power, timing of release, future works (sequel/prequel), genre, etc. In recent years, users' reviews have also been a key subject of analysis in this topic, but mixed findings underline the complexities associated with forecasting a movie's performance. Industry-wise, such difficulty presents a huge challenge for studios as far as selecting the types of movies to be produced, because poor returns can substantially hurt studios' earnings and even lead to bankruptcy. King (2007) dispelled the notion that critics' reviews are correlated to a movie's box-office returns, except for big releases (i.e., those released on more than 1000 screens), while D'Astous & Colbert (2005) argued that neither positive nor negative reviews impact movie revenues. Eliashberg & Shugan (1997) professed that critics' reviews should be viewed as a "predictor" of movie success rather than a "motivator" (or otherwise) for movie attendances.

The invention of social media in recent times has also prompted research into various determinants. Liu (2006) reported that the volume of word-of-mouth can affect box-office performance, while Lee (2014) found users' reviews are stronger than critics'. Goes et al. (2012) noted that the amount of Internet search on a movie can be used to forecast its opening box-office gross. The other key drivers on the list include the genre of the movie, the timing of a release, brand extensions/prior work, production budget, and so on – for e.g., Fernández-Blanco et al., 2014 (sequels/franchises); Goetzmann et al., 2013 (screenplays); and John et al., 2017 (directors).

While there are indeed many factors at play when it comes to movie consumption decisions (see Caves (2000) on the issue of symmetrical ignorance in the industry that results in the near impossibility to predict the outcome of a movie), the issue of production budget being correlated to box-office revenue is hard to dismiss, as bigger budget movies are more likely to be released in more theaters and

hence likely to earn higher box-office gross. De Vany & Wallis (1999) showed higher budgets to be linked to a higher number of opening screens released for a movie and also a higher *hit* probability as well, while Lee (2014) stated that production budget and total screens released are the most important factors affecting a movie's box-office returns, ahead of users' and critics' reviews, timing of release, star appeal, movie ratings, and prior work (i.e., sequel). Similarly, King (2007) also found that production budget is significant in predicting box-office receipts. However, most of these papers looked at the effects of various factors on box-office revenue, but not on profits. While higher box-office revenue should translate to high profits, such an argument can be at times potentially misleading. Given the substantial costs during the production/marketing of movies, high returns (profits on such investment) are not guaranteed in many cases.

3. Data and Methodology

We take our data from the website http://www.the-numbers.com/movie/budgets/all (accessed 13 July 2016), which provided a list of 5155 movies that was complete with their respective budgets and domestic and worldwide box-office gross receipts. The movies include those with budgets ranging from US$1,100 to US$425,000,000 (nominal figures). As data on a movie's budget are notoriously difficult to source, not to mention potentially inaccurate (e.g., studios have been accused of manipulating figures), we decided not to combine data from other sources as such discrepancies are difficult, if not impossible, to verify. We did, however, conduct some accuracy checks on the data – we compared some of the box-office figures (both domestic and worldwide) in this list against another website that has also been cited regularly, i.e., www.boxofficemojo.com, and did not find any major discrepancies between them. We do find differences in the production budget though – the figures from our source (i.e., www.the-numbers.com) are higher in most instances as compared to others like www.boxofficemojo.com.[1]

Our objective in this paper is to measure the rate of return of the 5155 movies in the list and to ascertain statistically if a movie's production budget is correlated to its profitability - the latter being measured by a series of simple *return on investment* formulae. The return on investment ratio (ROI) is defined as profit divided by investment and is commonly used in financial analysis for comparing performances between firms or within a firm, or for comparing the performances of different divisions for evaluation purposes. One of the advantages of using the ratio (instead of an absolute figure) is that it can compare subjects of different sizes, i.e., it normalizes divisions or companies with different investment base sizes, thus enabling a big company (division) to be compared to a smaller one (Reece & Cool, 1978). We use a similar concept for our paper since we want to compare the returns from investing in different categories of movies, i.e., returns on investment for big budget films versus low budget films. In our case the returns refer to the film's profits, whereas the investment base, the film's production budget, is similar to the approach employed by John et al. (2017).

We include three types of returns to distinguish between domestic, international-only, and worldwide box offices (sum of the first two) and hence present equations (a) to (c) in the next paragraph. One advantage with having a production budget as the denominator in our model (instead of investment base as in the financial analysis ratio) is that it avoids the problem that usually affects ROI usages – e.g., the issue of depreciation methods may be a problem if the net book value of investment base is used or the issue concerns leasing instead of buying a fixed asset to restrain the investment base figures in order to raise ROI (Mauriel & Anthony, 1966).

We list our ROI formulae are as follows:

(a) Return on Investment, ROI (domestic) =

$$\frac{\text{Total Revenue (domestic)} - \text{Production Budget}}{\text{Production budget}}$$

(b) Return on Investment, ROI (international-only) =

$$\frac{\text{Total Revenue (international)} - \text{Production Budget}}{\text{Production budget}}$$

(c) Return on Investment, ROI (worldwide) =

$$\frac{\text{Total Revenue (domestic} + \text{international)} - \text{Production Budget}}{\text{Production budget}}$$

Given that our approach requires data on both domestic and worldwide gross amounts, we have to truncate the list as some of the movies in the list do not include their worldwide gross (e.g., domestic gross figures quoted as the same as worldwide figures). We also exclude movies released in 2016 as some of these movies were either awaiting release or still in their box-office run (at the time when the data are collated for this paper). The same goes for those movies that are slated for release post-2016 (their expected budgets are provided, but obviously there are no box-office figures yet). After the necessary truncations, our final list has 3309 movies with their date of releases ranging from 1925 to 2015 (see Table 1 for the descriptive statistics).

Table 1. Descriptive Statistics of the List of 3309 Movies

	Max. (in US$)	Min. (in US$)	Mean (in US$)	Standard Deviation
Production budget (in nominal figures)	425,000,000	6,000	$40,143,117	44200178
Production budget (adjusted for inflation figures)	198,050,000	3,472	20,301,349	21194245
Rate of Return (domestic)	152.069	-0.999	0.553	6.275
Rate of Return (International only)	210.969	-1.000	1.367	9.286
Rate of Return (Worldwide)	308.300	-0.998	2.68	15.262

We define profits as revenue minus cost (budget) before taxes. As per The Economist's report on the movie industry, our measurement of the studios' cut (revenue) from the box-office receipts is between 50-55% and 40-45% for domestic (North America) and international markets (outside North America), respectively. Given the range quoted, we take the averages – for domestic gross, the studios' cut is 52.5%, while for international it is 42.5%.

As the objective of our paper is to investigate the effect of budgets on a movies' ROI, we thus sort the 3309 movies in our list into four different groups based on their production budget levels: mega budget group, big budget group, moderate budget group, and low budget group. Given that Hollywood still identifies a hit film as one that makes more than US$100 million domestically, we categorize mega budget event movies as those with budgets in excess of US$100 million. Next, we define a big budget movie as those that cost anywhere between US$50 and 99 million, while a moderately priced movie is one with a budget between US$20 million to US$49 million.[2] Finally, low budget films are anything from US$1,000 to US$19 million.[3]

Our categorization exercise is based on both nominal price and real price, thus leading to two sets of analysis[4] (see Table 2 and Table 3). The latter is important as we are comparing movies with different budget/production costs that are released across different time periods. We next compare the mean ROIs (all three types of ROI) of the four different movie budget categories (both in terms of nominal and real prices). We also perform a correlation test between production budget (real values) and the ROIs to ascertain the extent of their relationship. Finally, *t*-tests are executed to determine if there are any differences in means (in terms of their respective ROIs) between the different categories of movies.

Table 2. A Comparison of the Mean Rate of Return for Different Categories of Movies (Budgets Unadjusted for Inflation)

Type of Movie Production	No of movies	Mean Budget (in US$)	Mean Rate of Return (domestic)	Mean Rate of Return (Int'l only)	Mean Rate of Return (worldwide)
Mega budget	314	148,140,127	-0.521	-0.185	0.294
Big budget	652	67,510,493	-0.352	-0.390	0.259
Moderate budget	1010	48,409,621	-0.158	0.424	0.448
Low budget	1333	$8,238,073	1.679	3.11	5.79
Overall	3309	$40,143,117			

Table 3. A Comparison of the Mean Rate of Return for Different Categories of Movies (Budgets Adjusted for Inflation)

Type of Movie Production	No of movies	Mean Budget (in US$)	Mean Rate of Return (domestic)	Mean Rate of Return (Int'l only)	Mean Rate of Return (worldwide)
Mega budget	24	119,375,833	-0.460	-0.002	0.539
Big budget	288	66,727,436	-0.464	-0.187	0.3499
Moderate budget	878	32,253,495	-0.204	0.017	0.570
Low budget	2119	7,916,977	0.948	2.030	3.690
Total	3309	20,301,349			

4. Findings

4.1 Budgets and Rate of Returns

Table 2 shows the ROI figures based on domestic, international-only, and worldwide box-office figures for the four different categories of movies, unadjusted for inflation. Based on the categorizations according to amount spent on a movie as per our measurement, there are 314 mega budget movies, 652 big budget ones, 1010 moderate budget movies, and 1333 in the low budget category. The results reveal both the mega and big budget movies (i.e., movies with budgets of at least of US$50 million) record negative ROIs when revenues take into account both domestic and international-only box-office grosses, respectively. Only the low budget movie category shows a positive return for all three measurements of ROIs. Movies with budgets in the moderate category have negative ROI (a 15.8% negative returns on investment) when taking into account only domestic gross, but record a positive 42.4% ROI when their revenue only include international-only box-office gross. This indicates that movies with at least a US$50 million budget would need to rely on the international box office if they are to be profitable overall. All four categories of movies have positive ROI when income measurement takes into account worldwide gross with the low budget category leading the way at 579% ROI, or significantly superior than the other three categories. In fact, none of the other three categories have ROIs exceeding 45% in the case of world-wide gross.

Table 3 provides a similar analysis to Table 2 albeit using production budgets that have been adjusted for inflation. With the re-categorization based on inflation-adjusted budget figures, the number of movies in the respective budget categories changes – now, the mega budget category has only 24 movies, there are 288 big budget movies, and there are 878 moderately budget movies. The low budget category has the largest number at 2119 movies. In terms of the results, they are fairly similar to those in Table 2 in that the low budget category has the highest return for all three ROIs (and also the only category with positive ROIs for all three cases), be it returns from domestic, international-only, or worldwide. Similarly, for the mega budget and big budget categories, the ROIs are negative for both domestic and international-only box offices. Overall, the results from Table 2 and 3 show that low budget movies have the highest returns followed by moderately budget ones. For mega and big budget movies, studios do not make positive returns solely from the domestic box office and hence overseas markets are crucial – only when this is added to the overall revenue (i.e., worldwide gross) can studios make positive returns, or 54% and 35% respectively for mega and big budget movies (last column in Table 3). The managerial/marketing value of these results is that studios need to pay greater attention to the international market when producing movies in excess of US$50 million since domestic earnings are insufficient to ensure positive returns.

Table 4 provides the correlation tests between the ROIs and movie budgets (inflation-adjusted). When all movies in our sample are used (second column Table 4), we find a negative and statistically significant correlation between budget and the ROIs, thus confirming our earlier results in Tables 2 and 3 – that is, the lower a

movie's budget is, the higher the ROI. However, we do not observe such results when we use only mega budget movies or mega and big budget movies together – in these cases, the relationships are mostly positive, but they are all insignificant (columns 3, 4, and 5). When we use only low budget movies, we find negative and significant correlations between budget and ROIs, which are consistent with the findings when movies from all four categories (3309) are used. This may be due to a lack of sample sizes for the mega (24) and big budget (288) categories, but not the case for low budget movies (2119).

Table 4. Correlation Tests using Inflation-adjusted Budgets

	All movies	Mega & Big Budget combo	Mega budget	Big budget	Moderate budget	Low budget
R.O.I. (domestic)	-0.112**	-0.027	0.256	-0.085	-0.092*	-0.153**
R.O.I. (Int'l only	-0.119**	0.104	0.342	0.021	-0.116**	-0.148**
R.O.I. (worldwide)	-0.117**	0.054	0.322	-0.022	-0.060	-0.171**

Table 5 provides results of the independent-samples *t*-tests, which we conduct to determine if there are differences in 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. We decide to combine mega and big budget movies into a single category due to their low number of observations. From the results, with the exception of one datapoint (i.e., ROI for worldwide gross in the case of moderate budget category versus mega/big budget category – it is significant only at 10%), all the *t-tests* results are significant at 5%, indicating that there are differences in the mean ROI (for all three cases, i.e., domestic, international-only, and worldwide) between the three categories of movies. The results indicate that, on average, the returns for low budget movies are higher than those of both the moderate and mega/big budget categories, while the returns for moderate budget movies are higher than those of the mega/big budget category.

Table 5. T-tests (2-tailed) for Equality of Means between the Different Categories of Movies' Budgets

	Mega & Big (N=312) Vs Moderate (N=878)		Mega & Big (N=312) Vs Low (2119)		Moderate (N=878) vs Low (N=2119)	
	t-value*	Sig.	t-value*	Sig.	t-value*	Sig.
R.O.I. (domestic)	-5.445 (1161.2)	0.000	-8.308 (2180.4)	0.000	-6.631 (2373.6)	0.000
R.O.I. (Int'l only	-2.494 (1154.8)	0.013	-8.787 (2188.4)	0.000	-7808 (2419.2)	0.000
R.O.I. (worldwide)	-1.810 (1164.5)	0.071	-8.120 (2181.1)	0.000	-7.447 (2369.8)	0.000

*degrees of freedom in parentheses; non-assumption of equal variances.

4.2 Trade-offs between Risk and Returns

As with any financial investment decisions, there is a need to consider the issue of risk-return trade-offs. Theories of finance point to higher yield assets being correlated to higher risk - this being the risk premium, i.e., the additional returns from taking on greater risks. Not surprisingly, many empirical papers find the existence of such a positive risk premium in financial markets; for instance, results in Darrat et al. (2011) reveal significantly positive risk aversion in the Australia financial market, thus supporting the notion of markets subscribing to a positive risk premium.

In order to substantiate our findings from section 4.1, we decide to include a section on this, i.e., the need to factor-in risk when making investment decisions based on expected returns. If the level of risk is not substantially higher (or of similar levels or even lower) in the case of the low budget movie film category, then we can argue that studios' decision to focus on this category of movies makes better business sense.

A common measure of risk is the standard deviation (σ) – basically in the context of finance, if one faces two investment options with similar expected returns, then the better option would be the one with the lower standard deviation, i.e., lower risk. However, the use of standard deviation is less appropriate if the mean return values (expected returns) of the two choices are not identical – in this case, the coefficient of variation (CV) is more meaningful given that it shows the risk per unit of return (Brigham & Houston, 2004). The formula for the coefficient of variation is:

$$\text{Coefficient of Variation (CV)} = \frac{\sigma}{\mu};$$

Here, σ is the standard deviation, while μ is the mean returns.

In finance one can similarly say that an investor can be compensated for taking on more risks – this would be the inverse of CV, i.e., returns per unit of risk taken (Holgersson et al., 2012). Table 6 reports the standard deviation scores for the 4 categories of movies (adjusted for inflation), while Table 7 lists the CV scores respectively with the inverse values in parentheses. The standard deviation scores are higher in the case of the low budget movies (followed by the moderate ones), thus indicating higher levels of riskiness (e.g., the σ for low budget movies for domestic ROI is 7.759, while the mega budget and big budget categories have only 0.309 and 0.892, respectively). Comparisons yield less conclusive outcomes when CV values (or their inverse values) are used instead. In fact, results in Table 7 show that the low budget movies have a lower CV compared to the moderate budget movies (lower CV denotes lower risk per rate of return) for both the international and worldwide grosses.

The gap between the low budget movies and the other categories also narrows significantly when CV is used instead. For example, in the case of CV for worldwide gross, low budget movies' CV is only 3 times higher than mega budget's CV as compared to more than 18 times if σ is used. Finally, while we recognize that negative values for CV may not be meaningful especially in the context of interpreting the figures, their inverse value (i.e., the returns to every unit of risk borne) may be useful to our discussion. As the inverse CV values are negative (i.e., having negative returns for bearing risks) for both the mega budget and big budget movie categories for domestic and international-only grosses, we thus argue that investing in low budget movies would be the more sensible business option. Notwithstanding the above, it also important to highlight that risk depends a lot on investors' preferences as well.

Table 6. A Comparison of Standard Deviation of Return on Investment for Different Categories of Movies (Budgets Adjusted for Inflation)

Type of Movie Production	No of movies	Standard Deviation		
		(domestic)	(Int'l only)	(worldwide)
Mega budget	24	0.309	0.656	0.920
Big budget	288	0.892	0.572	0.374
Moderate budget	878	1.261	2.032	3.015
Low budget	2119	7.759	11. 437	18.700
Total	3309			

Table 7. A Comparison of Coefficient of Variation on the Return on Investment for Different Categories of Movies (Budgets Adjusted for Inflation)

Type of Movie Production	No of movies	Coefficient of Variation		
		(domestic)	(Int'l only)	(worldwide)
Mega budget	24	-0. 671 (-1. 491)	-328.040 (-0.003)	1.706 (0.586)
Big budget	288	-1.923 (-0.520)	-3.058 (-0.327)	1.069 (0.935)
Moderate budget	878	-6.186 (-0.162)	119.5131 (0.008)	5.290 (0.189)
Low budget	2119	8.184 (0.122)	5. 634 (0.1775)	5.068 (0.197)
Total	3309			

Note: Inverse CV in parentheses.

4.3 Consumption Patterns in Movies

The graphical representations in Figure 1 show that the ROIs (i.e., domestic, international-only, and worldwide) from movies exhibit a significant downward trend over the period from the 1920s to 2015 based on our sample of movies. This should not be surprising as the industry has seen several major shifts in its sources of revenue, notably from the advent of home entertainment (i.e., videotapes and DVDs), private television channels (i.e., cable and syndication), and not least, in recent times, the Internet. The latter, in the form of illegally free downloading of movies, has impacted the industry adversely. Nonetheless, improved experience at the movies has also countered the wave of these alternative sources to movie consumption – the introduction of digital surround systems and the IMAX experience at theaters has been significant in bringing back audiences to cinemas.

Fig. 1. Trends on the Return on Investments from Box-office Receipts (1925-2015)

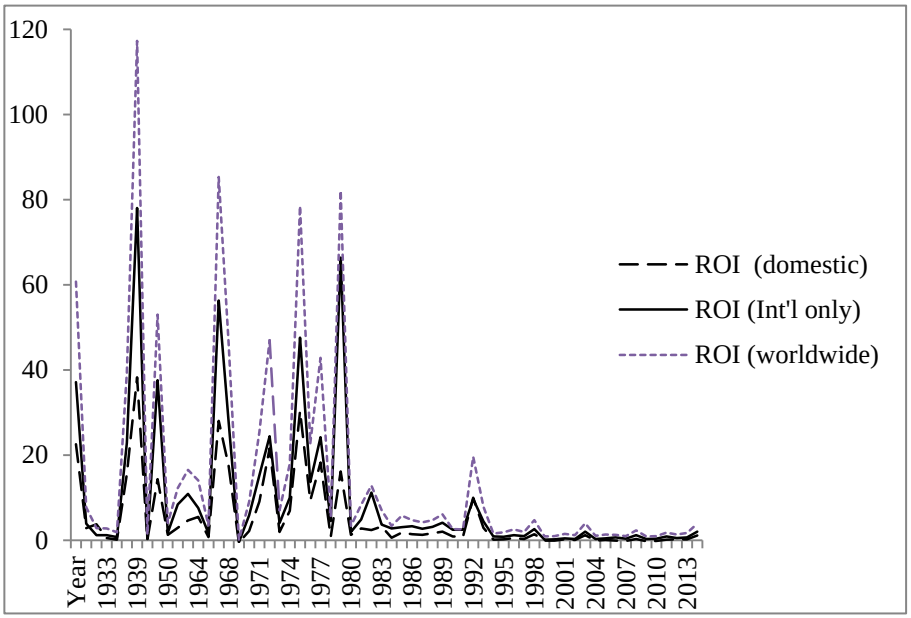

Table 8 categorizes our list of movies in accordance to four different eras: pre-videotape (prior to 1975), the videotape era (1975-1986), the golden age of videotape (1986-1996), and the DVD era (1997 onwards).[5] The figures for all three ROIs show a considerable drop moving from the pre-videotape era (from our data, 1925-1974) to the DVD era (post-1996). Such a steep fall in the ROIs of movies is consistent with many analyses on the sector – in fact, Young et al. (2010) reported that the percentage of people watching movies at the cinema has fallen from a high of 65% in 1930 to around only 10% in recent decades. However, the figures may not be as alarming, because it is likely that consumers have just shifted their preference to home entertainment options in order to enjoy the comforts of watching movies in their own homes via cable or DVDs. Walls (2009) also echoed such reasoning – the contribution of a movie's worldwide box-office revenue to its overall revenue has been falling due to the rising prominence of home video and other ancillary revenue streams. Nonetheless, the drop may also be attributed to illegal downloads, but it would be difficult to ascertain the extent of the impact of such actions. Unsurprisingly, some key future directions in movie industry research (Chisholm *et al.*, 2015) have identified topics on how handheld devices compete with big-screen theaters for moviegoers and how the evolution on technology affects the costs of deterring electronic theft/piracy.

Table 8 shows the ROIs for the four eras, with the DVD era (1997-2015) recording 26.5% and 82.3% for domestic and international-only box-office returns. While the figures are significantly lower than the previous three eras, it is nonetheless still encouraging for studio executives as such figures are considered

very attractive when compared to other industries, although we do note that profit earnings are returns calculated before taxes. Given that our calculations on ROI only include takings from the box-office alone, they likely underestimate the actual returns as studios can also earn revenue from other downstream sources. As such, even if a movie fails at the box office, it can still break-even and possibly even make profits through overseas markets, video-on-demand options, DVDs, and product-licensing deals (Schwartz, 2010). According to Young et al. (2010), up to four-fifth of a movie's revenue actually come from its downstream income.

Table 8. Impact of Home Entertainment on Box-office R.O.I.s

Period	No. of movies from our list	ROI (domestic)	ROI (Int'l-only)	ROI (worldwide)
Pre-video tape era <1975	41	10.078	18.870	27.947
Early part of the home video tape era 1975-1985	57	8.391	17.370	25.900
Golden age of home video tape era 1986-1996	225	2.130	3.391	5.623
DVD era 1997-2015	2986	0.265	0.823	1.874

5. Concluding Remarks

The movie industry is both competitive and risky, with major studios jostling for market shares under a variety of movie projects that oftentimes involve huge financial investments (budgets). The fact that consumer preferences are difficult to predict, let alone pinpointing the winning product characteristics (i.e., actors involved, movie genre, directors, etc.), led to the famous "*nobody knows anything*" quote from legendary screenwriter William Goldman on the business of making movies. In fact, costly failures can possibly even bankrupt studios - Carolco Pictures' *Cuththroat Island* (1995) is regarded as one of the biggest flops of all time and was deemed by many as the catalyst for the studio's eventual bankruptcy (see Daniel, 1996).

The objective of this paper is not to ascertain the factors that affect box-office returns - this has been covered in many previous studies - but rather to determine the kind of movies, in terms of production budget, that matters most when it comes to having the highest rate of returns on investment (ROI). We know that there is a relationship between budgets and box-office receipts based on the previous literature,

but in this paper we investigate the issue of whether it pays (in terms of ROI) for studios to invest in mega and big budget projects or to alternatively concentrate on smaller scale projects instead. We measure ROI using box-office receipts for domestic (North America), international-only, and worldwide (the aggregate of both domestic and international) and compare their means statistically.

We found on average that ROI is significantly higher in the case of low and moderately budget movies (i.e., budgets that are below US$50 million). Mega budget and big budget movies do not produce attractive ROIs. In fact, these types of movies only show positive returns if international takings are added to domestic gross, indicating that studios have to rely heavily on overseas markets in order to make profits overall. This in turn leads to an even greater budget outlay as millions are pumped into international marketing and promotion. Notwithstanding this, it is also highly plausible that studios tend to prefer investing in big budget movies as these may lead to subsequent sequels, which could increase the potential returns substantially. However, while it is easy not to disagree that the bigger/mega budget films may benefit from future works, the possibility of sequels is also contingent on the profitability of the initial film regardless of it being a big budget project or otherwise. In this regard, it is also very likely that even low budget films could spawn sequels (or prequels) if the returns are high enough. A perfect example of this is the micro-low budget film, *Saw*, which cost only US$1.2 million, but went on to recoup US$103 million in 2004 and eventually resulted in 7 more films from 2005 to 2017 (www.boxofficemojo.com).

Our results illustrate that movie studios should instead focus on lower budget and/or moderate budget movies if they wish to achieve a higher ROI. There are several reasons for this result, with one of them being the fact that studios tend to over-invest in both production and marketing expenditures, thus limiting the potential returns from such investment. There is also the issue of production delays, contractual disputes, and so on that could potentially increase the costs substantially (not to mention a delay in the release, which would have even more serious cost implications), a problem that is greater in the case of "bigger" movies. In fact, it is not uncommon for the marketing expenditure of big budget movies to hit US$100 million or beyond. McClintock (2014) reported that the average cost of marketing a movie in the U.S. has gone up 3 times (in real terms) from 1980 to 2007, adding that studios are now spending up to US$100 million to market their big budget films internationally. Furthermore, the issue of studios' cut from the box-office receipts, especially in the case of foreign territories, is also another reason why many "blockbuster" films struggle to see the desired returns. Many foreign markets do not see the same 55% cut (of these receipts) that studios get domestically, i.e., North America box office. The example of China is a good case in point – not only are studios getting a substantially lower cut from exporting their films there (their cut is only 15%), but they also have to contend with the quota of non-Chinese films (only 20) that can be released there as well (The Economist, 2011). Given that big budget movies usually come with a huge cost, overseas markets are very critical. As such, a better strategy for studios may be to concentrate on smaller films instead of major

productions or at the very least have a more balanced portfolio.

While the issue of risk (i.e., higher standard deviation, from our paper's findings) may undermine investment in low budget films, we also show that once we factor-in the returns into the risk (volatility) analysis, i.e., the use of CV and its inverse values, the issue of a high risk trade-off in the case of investing in low/moderate budget movies dissipates. On this note, we argue that studios' best pay-off strategy may still be to invest in lower budget fares rather than big budget movies. We offer a simple example to illustrate this point - instead of investing in one US$100 million big budget movie, studios should consider investing in five US$20 million or even ten US$10 million projects. At the very least, studios should be more conscientious in their portfolio planning of movie investments/projects – the balance between big and small budget projects is crucial.

One good industry example following the rationale of investing and benefitting from making more cost-conscious movies is the case of *Working Title Films*, the independent British movie production company that is responsible for a slate of hits that were largely conservative in their production costs – *Four Weddings and a Funeral* (1994, US$5 million budget, US$246 million worldwide gross), *Love Actually* (2002; US$40 million budget, US$247 million worldwide gross), and *The Theory of Everything* (2014; US$15 million budget, US$123 million worldwide gross), to name a few. While the company's focus has changed over the years, with its partnership with American studio/distributor (initially *Polygram* and later *Universal*) enabling it to pursue bigger budget projects, it has nonetheless continued to balance bigger budget commercial movies with much lower budget offerings successfully, with the latter still very much in the company's priority.[6]

Hollywood movie moguls continue to make big budget movies despite the huge undertakings – in 2016 alone, the industry witnessed a considerable number of big-budget failures despite them being considered as relatively "safe" bets: *Ben-Hur* and *Ghostbusters* as classic remakes, *Alice in Wonderland*, *Independence Day*, and *Star Trek Beyond* as sequels, *The BFG* (involving a legendary director), and so on. The conglomeratization of the industry, as reported in *Variety* (2016), is responsible for this, because smaller movies, despite making good returns, are unlikely to affect studios' stock prices – for any impact, studios need a host of attractions to induce investors, from theme parks, toys, licensing, merchandising, and so on, to go with the box-office receipts. Unsurprisingly, studios spend millions hyping their new releases (presumably big budget ones) given that the box-office success of their movies could potentially raise the market value of the studios substantially. However, it is also worth noting that excess marketing launches of new movies that do not eventually produce the expected success could potentially lead to the opposite effect on studios' stock prices. Joshi & Hanssens (2009) found that overhyping movies with questionable market appeal actually leads to negative stock price reaction, which is a result of the exaggerated expectations created for which the movie ultimately fails to achieve. Given that it is virtually impossible to determine the market's appetite in movies, such a strategy of investing in big budget movies and thus the enormous marketing costs that come with it may have serious potential

downsides.

Our findings do show that, in the case of mega and big budget movies, studios should heed the preferences of international markets as box-office receipts outside North America are crucial for them to recoup sufficient earnings for a positive ROI overall. This is already evident in recent years, with Hollywood taking a keen interest in the Chinese market as many movies have avoided potentially huge losses only due to the growth and demand there. Prime examples include *Terminator Genisys* (2015) and *Warcraft* (2016) – both underperformed in North America, but both were huge in China, with their Chinese box-office shares alone making up 26% and 51% of their total worldwide box-office receipts, respectively (www.boxofficemojo.com). In fact, studios have even gone to the extent of ensuring Chinese ethnic representation in the casting of some movies, presumably to pander to the audiences there (Daniel, 2013). This is not surprising as China is poised to be the biggest market for movies by 2018 (Bloomberg, 2016). Our findings of low returns for mega and big budget films should interest studios and distributors in terms of future movie project selections since those movies are usually those laden with expensive special effects. De Vany & Walls (1999) in fact identified heavy spending on special effects as the riskiest strategy when considering strategies for making a hit movie.

Finally, we acknowledge that there are obviously limitations in our paper. Much more investigative work can be done on this topic especially given the intricacies of calculating the exact earnings of a movie. The constant change in the industry also continues to complicate the business and most certainly casts an influence on studios' strategies in movie investment, e.g., the emergence of China as a major market, Internet movie streaming, evolving strategies, and so on. However, on the basis of the findings from this paper, we suggest that studios should practice more restraint in committing to making too many big budget movies if they are to maximize their returns on investment.

Notes

1. We take the higher figures quoted on www.the.numbers.com to avoid any possible error of an overestimation of profits – for e.g., the production budget for *Mummy* (2017) was quoted at US$125 million by www.boxofficemojo.com and www.imdb.com, but www.the.numbers.com lists it at US$190 million. According to *Variety*, the figure is closer to US$195 million (see Desta, 2015).
2. We also take into consideration the industry's average budget in defining our categories - in 2005, the average cost of a U.S. (feature) film was US$60 million (Brunet & Gornostaeva, 2006).
3. The ten best low budget movies compiled by the New York Daily News for 2015 had budgets that ranged from US$700,000 (*Dope*) to US$15 million (*Ex Machina*) (Lepore, 2015).
4. Prices of the budgets are adjusted for inflation using U.S. consumer CPIs (provided by U.S. Department of Labor Bureau of Labor Statistic), sourced from http://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008/ (accessed 28 July 2016).

5. Our categorization of the eras is based on the following: The videotape was first introduced by Sony in Japan in May 1975 (http://www.sony.net/SonyInfo/CorporateInfo/History/SonyHistory/2-01.html); Studios began earning more from the domestic home video market (sales and rentals) than theatrical releases in 1986, with the sales of video alone exceeding theatrical box-office by 1992, while DVDs were first sold in the U.S. in 1997 (Young et al., 2010).
6. See Brunet & Gornostaeva for a detailed discussion on the success formula and philosophy of *Working Title Films*, notably on their success with small and quirky movies. The box-office figures are also sourced from www.boxofficemojo.com.

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