Is the Grass Greener on the Other Side? A Comparison of Compounded Year-to-Year Long-term Performance of American Depository Receipts and U.S. Pharmaceuticals

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ABSTRACT

Previous research has compared the returns of American Depository Receipts (ADRs) and stock indices (e.g., NASDAQ, S&P500), but did not compare the compounded year-to-year buy-and-hold returns of ADRs at the individual stock level within a specific industry. For portfolio diversification purposes, it is possible that investors buy-and-hold certain ADRs for a period longer than three years. As such, it is important for both institutional and individual investors to evaluate the returns of ADRs in more details, so they can make informed investment decisions. Filling this gap of knowledge, this research selected eleven pharmaceutical ADRs from eight countries that are listed in NYSE from 2000 to 2016 and compared them against five major U.S. pharmaceutical companies during the same time period. The focus on pharmaceutical industry is because U.S. is the largest single pharmaceutical market in the world with a 45% market share. Our empirical results found most ADRs over-perform when compared to U.S. pharmaceuticals during this time period. The non-parametric test results confirmed that the returns of ADRs and U.S. pharmaceuticals are not the same, and ADRs no the whole had higher returns than U.S. pharmaceuticals and S&P 500. The findings have important managerial implications.

Keywords: Pharmaceutical companies, Non-Parametric Test, Buy-and-Hold Returns, Portfolio management, S&P 500.

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1. INTRODUCTION

U.S. is the largest single market for pharmaceuticals in the world with a 45% market share consuming more than 400-billion-dollar worth of pharmaceutical products in 2016 (Statista, 2017). In 2015, more than a quarter of pharmaceutical products that U.S. consumers purchase came from abroad, mainly Ireland, Germany, Switzerland, Israel, and India (ITA, 2016). Pharmaceutical companies around the world enter the U.S. market for two main purposes: raise capital, and market its products. It is imperative for pharmaceutical companies to raise large sum of funds because the upfront costs of Research and Development (R&D) to develop drugs are very high (Espinosa, Gietzmann, and Raonic, 2009). The attractiveness for foreign companies to use U.S.

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bourses to raise capital is based on U.S. large financial market size that attracts new capital, liquidity (Diamond and Verrecchia, 1991), and relatively transparent governance for listings (Chemmanur and Fulghieri, 2006). For instance, the Indian National Stock Exchange of India with a market cap of USD 2.1 trillion with an average monthly trading volume of 93 billion shares, while NYSE has a market cap of USD 21 trillion with a monthly trading volume of 1.7 trillion shares (Wikipedia, 2018). In other words, the market cap of NYSE is ten times and the liquidity are seventeen times that of India's. For an Indian pharmaceutical company looking to raise funds, the U.S. market is superior in both liquidity and access to capital.

There are two main theoretical concepts underlying the rationale for cross-listing stocks in the U.S. financial market. First, Merton's (1987) investor recognition hypothesis (i.e., issuing an ADR attracts media attention and thus increases visibility to investors interested in purchasing the stock). Second, Coffee's (1999) bonding hypothesis in which some legal system protects minority shareholders' interests more than others (e.g., common law countries like the U.S. has a stronger legal system for stock listing than countries governed by civil codes such as France, for a review, see Karolyi, 2006).

From the investors' perspective, the most common motivation for investing in ADRs is for portfolio diversity (Arnold, Nail, and Nixon, 2004). One major research stream surrounding this is the returns of such portfolio diversity from a market timing strategy perspective measuring ADRs returns from its first day of listing to 21-day or to a 3-year window and compared their returns to a major stock index of NASDAQ or S&P 500 (e.g., Schaub, 2012; Schaub, 2016). The results reported from this research stream is mixed with some reporting superior and some inferior ADRs comparative returns. Researchers further divided ADRs into their country of origin crudely grouping them into developed versus developing economies and again reported mixed results with sometimes the group of ADRs originating from developing countries performed better than NASDAQ or S&P 500 and vice versa. Similar results were reported for the group of ADRs originating from developed countries.

What is absent from these prior research is that they did not investigate individual ADRs performance from a long-term perspective beyond 3 years. Nandy & Sussan (2018) investigated individual pharmaceutical ADRs for the time period between 2000 and 2017 and evaluated their risk-free Sharpe Ratios (as represented by 91-day US Treasury Bill) and found that the distributions of Sharpe Ratios of ADRs, U.S pharmaceuticals, and S&P 500 have the same medians. Their work used the average of the medians of Sharpe Ratios each year without considering compounded rates on investment. This current research differs from their work in that it focuses on long term buy-and-hold returns on ADRs and compare the compounded year-to-year returns of each ADRs with U.S. pharmaceutical equities and S&P 500. In other words, this paper addresses the situation that portfolio managers will buy-and-hold ADRs continuously for the entire time period. Furthermore, this research does not use 91-day Treasury Bill as risk-free approach. Instead, this paper uses risk-adjusted calculation that is the result of buy-and-hold return divided by standard deviation. In this long-term buy-and-hold situation, we hypothesize that pharmaceutical ADRs will over-perform when compared to U.S. stock indices and U.S. pharmaceutical stocks based on continuous investor recognition hypothesis. In the remaining of the paper, we will begin with a brief

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literature review followed by the details of our proposed buy-and-hold measurement. Data from NYSE of eleven pharmaceutical ADRs and top 5 U.S. pharmaceutical stocks from the same Exchange will be presented and analyzed. We conclude with discussions and managerial implications.

2. LITERATURE REVIEW

2.1 ADRs performance as compared to home market performance

Two streams of research address ADRs performance as compared to home market stocks performance. First, research that investigates how well ADRs perform as compared to their underlying stocks listed in their respective home markets. Some research found the underlying shares in the home market perform better than the ADRs, when the U.S. stock market return is low and when U.S. economy is underperforming (Peterburgsky and Yang 2013). Second, the comparison of the performance of cross-listed versus non-cross-listed stocks. Most research found cross-listed firms stock prices perform better than non-cross-listed stock (Doige, Karolyi, and Stulz, 2004), given the continual increase of US investors base (King and Segal, 2009).

2.2 Not All ADRs performance are the same: Developed versus developing countries, comparison to stock indices in the U.S.

Nandy and Sussan (2018) summarized past studies which measured the over- and under-performance of ADRs when compared with major U.S. stock indices, and whether the ADRs were originated from developed or developing markets. They also described the timeline of short- versus long-term measurements and their subsequent performance evaluations. In general, past research mostly found ADRs in developing countries more likely to out-perform U.S. Indices while ADRs in developed countries more likely to under-perform U.S. Indices.

Aybar (2002) investigated 143 ADRs in twenty-nine industries in thirty one markets between the years 1984 to 1999, and found that the returns of ADRs from developed countries outperform that of ADRs from developing counties, and these ADRs in turn outperformed FT World Index but not S&P500. Spinu (2015) theorized that over a fixed time interval, the buy-and-hold portfolio had the greater expected return, with equality if and only if the underlying assets have the same expected returns. In fact, equity portfolio managers have used buy-and-hold returns to evaluate their investments (Nandy, 2014; Sharifzadeh and Hojat, 2012). Recently, Nandy and Sussan (2018) performed a non-parametric hypothesis test to show that the Sharpe ratios of pharmaceutical ADRs, US pharmaceuticals and S&P 500 index from 2000 through 2016 do not have statistical significant difference.

2.3 Pharmaceutical stock performance globally

European pharmaceutical companies like Novaratis (Switzerland), Sanofi (France), Pfizer Roche (Switzerland) and Glaxo Smith Kline (United Kingdom) are dominant players in the global market, with the top manufacturers of new drugs being Novaratis, Sanofi and Pfizer (Riboldazzi, 2015). Pharmaceutical firms from India,

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Israel, and China are also becoming active in the ADR market. Recently, Glaxo Smith Kline has been suggested by analyst as a 25-year buy and hold stock (Stephens, 2017). Sanofi was also highly recommended by analysts (Mitra, 2017).

Thus far, the literature confirmed that ADRs relationship with their underlying equities, exchange rate, and host country index are highly contextual. Results reported from prior studies of ADRs performance are mixed. When compared with underlying stocks, some studies found ADRs over- while others found under-performance. ADRs do not always have better returns than non-cross-listed stocks at home either. Depending on the time-period of investigation, ADRs issued by firms from developing countries have higher chance to offer better returns than ADRs issued by firms from developed countries. What is absent from these prior research is that researchers did not investigate individual ADRs performance from a long-term buy-and-hold perspective, and thus the gap this research intends to fill.

We propose that there are situations that portfolio managers will buy-and-hold pharmaceutical ADRs for longer than 3 years. In such case, we argue that based on Merton's (1987) investor recognition hypothesis, pharmaceutical ADRs will continue to engage with investors by attracting media attention and analyst reporting. In this long-term buy-and-hold situation, we propose that pharmaceutical ADRs will over-perform when compared to U.S. stock indices and U.S. pharmaceutical stocks. More formally, we hypothesize

H1. Ceteris Paribus, the Buy-And-Hold Returns of pharmaceutical ADRs, U.S. Pharmaceutical companies, and S&P500 Index will differ. In particular, based on investor recognition hypothesis, the longer-term buy-and-hold returns of ADRs will perform better than U.S. pharmaceuticals and U.S. stock indices.

3. METHOD

In the past, Schaub and colleagues measured excess return of an individual ADR by subtracting the return of the S&P 500 index from the return of the individual equity. The average daily excess return of all ADRs was taken as the arithmetic average of the excess returns of all ADRs. For example, Schaub and Highfield (2004) added the daily average excess returns of all ADRs for twenty-one days and determined the cumulative average excess returns of all ADRs treating it as a single entity. In their approach, they did not show the buy-and-hold return of any individual ADR. As these authors gathered the ADRs together and reported cumulative return as an aggregate measure, it was not clear whether the overall performance of pooled ADRs was dominated by a few selective ADRs. In addressing the limitations of measurements used in past research, we introduce individual ADR buy-and-hold return and its measurements.

R_{at}: Calendar- year total return for ADR a during the year t, such as, t=2000,…,2016

Each security's calendar year total returns is calculated by obtaining the prices from Bloomberg's web site (https://www.bloomberg.com/markets/stocks).

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$BHTR_a$: Buy-and-hold total return of ADR a for the entire time period, 2000-2016

$$BHTR_a = (1+R_{a,\,2000})(1+R_{e,\,2001})(1+R_{e,\,2002})\ldots.(1+R_{e,\,2016})$$

$RABHTR_a$: Risk-adjusted buy-and-hold total return for ADR a.

$$RABHTR_a = BHTR_a/\text{Standard deviation of ADR a}$$

The risk-adjusted buy-and-hold total return of an ADR shows how much an investor can expect to earn per unit risk taken. Here standard deviation of the return of an ADR is taken as a measure of the risk in investing in that ADR.

Parametric hypothesis tests usually assume normal distributions and iid (independent and identically distributed random variables) of financial returns (Sharifzadeh and Hojat, 2012, Nandy, 2014). Harwell (1988) demonstrated that using non-parametric hypothesis tests would reduce the chances of Type I error, especially when sample sizes were small.

In this paper, we choose to use *Kruskal-Wallis* non-parametric hypothesis test, thereby assuming that the risk-adjusted buy-and-hold returns of ADRs, stocks of US pharmaceutical companies and S&P 500 index are independent of each other. A 5% level of significance (risk of type I error) will be used to conduct the hypothesis test. The test statistic used for *Kruskal-Wallis* test is designated by H, where,

$$H= [12/n(n+1)][\sum(R_1)^2/n_1 + \sum(R_2)^2/n_{2+}\ldots.. +\sum(R_k)^2/n_k]-[3(n+1)]$$, with k-1 degrees of freedom

k = number of populations (k=17 in this work.)

$\sum R_k$= sum of the ranks of ADRs, stocks of US pharmaceutical companies and S&P 500 index,

n_k= size of population k, and $n=n_1+n_2+\ldots +n_k = 277$

The distribution of the sample H statistic is very close to that of the chi-square distribution with k-1 degrees of freedom when every sample includes at least five observations. This situation is true on this analysis. The *p*-value of H is calculated using the chi-square distribution with *k*-1 degrees of freedom.

4. RESULTS

In the past, researchers used medium- or small-sized firms (Schaub, 2010, 2016), which were not comparable to the larger-sized firms in S&P 500. To correct this imbalance, we select only larger-sized pharmaceutical ADRs. Data on eleven pharmaceutical ADRs listed on NYSE have been gathered. The majority of the data were from 2000 to 2016. These ADRs are: Glaxo Smith Kline (ticker symbol: GSK, country of incorporation: UK) Astra Zeneca (ticker symbol: AZN, country: UK),

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Novaratis (ticker symbol: NVS, country: Switzerland), Novo Nordisk (ticker symbol: NVO, country: Denmark), Valeant Pharmaceuticals (ticker symbol: VRX, country: Canada), Taro Pharmaceuticals (ticker symbol: TARO, country: Israel) Teva Pharmaceuticals (ticker symbol: TEVA, country: Israel), Sanofi (ticker symbol: SNY, Country: France), Protalix Biotherapeutics (ticker symbol: PLX, country: Israel), Dr. Reddy's Lab (ticker symbol: RDY, country: India), and Aoxin Pharmaceutical (ticker symbol: AXN, country: China). Note that a few of the pharmaceutical ADRs have been listed in NYSE for a shorter period, such as AXN - which has been listed since 2006, RDY - since 2001, and SNY- since 2003. We also collected the top five US pharmaceutical companies listed in NYSE for comparison: Johnson and Johnson (ticker symbol: JNJ), Pfizer (ticker symbol: PFE), Merck (ticker symbol: MRK), Eli Lilly (ticker symbol: LLY) and Bristol Myers Squib (ticker symbol: BMY). Data for S&P 500 index for the corresponding years were also collected.

Table 1 shows the descriptive statistics. In Table 1, the mean annual returns of some of the ADRs are different from the mean annual returns of large US pharmaceutical companies. For example, the mean annual returns of VRX, PLX, TARO are higher than the mean annual returns of US pharmaceutical companies – JNJ, PFE, MRK, LLY and BMY. The standard deviations of ADRs, US pharmaceutical companies and S&P 500 index are quite variable in nature.

Table 1: Descriptive Statistics of Selective Pharmaceutical ADRs and Equities of Large US Pharmaceutical Companies Traded on NYSE

Time Period	Security/Equity	Country	Mean Annual Return	Standard Deviation of Return	Skewness of Return
2000-2016	S&P 500	US	0.047	0.183	-0.841
2000-2016	GSK	UK	-0.009	0.129	-0.056
2000-2016	AZN	UK	0.012	0.239	-0.513
2004-2016	SNY	France	0.047	0.180	0.168
2000-2016	NVS	Switzerland	0.025	0.176	-0.238
2000-2016	NVO	Denmark	0.087	0.426	-0.511
2000-2016	VRX	Canada	0.128	0.571	0.773
2000-2016	PLX	Israel	0.870	4.651	3.549
2000-2016	TEVA	Israel	0.029	0.311	-0.139
2002-2016	TARO	Israel	0.261	0.592	0.555
2002-2016	RDY	India	0.142	0.501	1.736
2007-2016	AXN	China	0.010	0.624	0.643
2000-2016	JNJ	US	0.025	0.138	-1.444
2000-2016	PFE	US	-0.030	0.190	-0.176
2000-2016	MRK	US	0.014	0.227	-0.475
2000-2016	LLY	US	0.022	0.167	0.289
2000-2016	BMY	US	0.009	0.221	-0.355

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Table 2: Compounded Year-to-Year Returns of Pharmaceutical ADRs

Year	VRX	PLX	TARO	GSK	NVS	TEVA	AZN	NVO	SNY	RDY	AXN
2000	**1.734**	0.375	**2.429**	0.996	0.692	**1.215**	**1.169**	**1.612**			
2001	**1.884**	0.460	**2.226**	0.914	0.560	**1.398**	**1.237**	0.577			
2002	**1.165**	0.220	**2.414**	0.735	0.599	0.866	0.904	0.443		0.912	
2003	0.890	0.800	**4.285**	0.834	0.730	**1.411**	**1.270**	0.646	**1.333**	**1.461**	
2004	0.652	0.400	**2.063**	0.845	0.774	0.648	0.989	0.863	**1.391**	0.824	
2005	0.908	**7.880**	**1.020**	0.971	0.891	0.859	**1.280**	0.901	**1.720**	1.249	
2006	0.817	**24.920**	0.631	**1.026**	0.932	0.707	**1.442**	**1.386**	**1.648**	0.823	
2007	0.549	-3.565	0.515	0.898	0.821	0.928	**1.075**	**1.013**	**1.529**	0.679	0.375
2008	0.438	-2.139	0.635	0.668	0.667	0.825	0.993	0.858	**1.053**	0.441	0.200
2009	0.582	-6.234	0.687	0.740	0.865	**1.129**	**1.198**	**1.089**	**1.376**	**1.157**	0.250
2010	**1.465**	-8.855	**1.006**	0.689	0.903	**1.088**	**1.260**	**1.827**	**1.286**	**1.743**	0.538
2011	**1.944**	-5.169	**2.180**	0.844	0.879	0.898	**1.241**	**1.924**	**1.388**	**1.666**	0.098
2012	**2.659**	-4.651	**3.202**	0.865	**1.096**	0.756	**1.241**	**2.976**	**1.820**	**1.753**	0.075
2013	**5.439**	-3.868	**7.002**	0.977	**1.278**	0.888	**1.636**	0.640	**1.828**	**2.035**	0.063
2014	**6.415**	-1.820	**11.433**	0.834	**1.574**	**1.132**	**1.830**	0.719	**1.723**	**2.462**	0.090
2015	**3.618**	-0.774	**10.012**	0.783	**1.260**	**1.224**	0.830	0.902	**1.557**	**2.192**	0.173
2016	0.553	-0.573	**7.175**	0.736	**1.172**	0.665	0.702	0.580	**1.533**	**2.205**	0.113
Buy-and Hold Annual Average	**1.865**	-0.153	3.466	0.844	0.923	0.979	**1.194**	**1.115**	**1.513**	**1.440**	0.198
Std. Dev.	1.705	7.219	3.300	0.106	0.264	0.235	0.270	0.633	0.215	0.607	0.146
Median*	1.165	-0.774	2.226	0.844	0.879	0.898	1.237	0.901	1.531	1.461	0.143

*Medians are used for non-parametric tests

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Table 2 shows the compounded year-to-year returns and the buy-and-hold average returns of pharmaceutical ADRs from 2000 through 2016. The last three rows of this table show the mean, the standard deviation, and the median values of the compounded year-to-year buy-and-hold returns. The values of the mean of the compounded year-to-year buy-and-hold returns of ADRs – such as, VRX (Vertex Pharmaceuticals, Canada), TARO (Taro Pharmaceuticals, Israel), AZN (Astra Zeneca, United Kingdom), NVO (Novo Nordisk, Denmark), SNY (Sanofi, France), RDY (Dr. Reddy's Lab, India) are greater than 1. This indicates that a financial manager, who would have remained invested in these ADRs from 2000 through 2016, on the average would have earned amounts more than the original investment sums.

Table 3 shows the results of the compounded year-to-year returns and the buy-and-hold average returns of US pharmaceutical equities and S&P 500 index from 2000 through 2016. The last three rows of this table show the mean, the standard deviation, and the median values of the buy-and-hold returns. The mean values of the compounded year-to-year buy-and-hold return values of all US pharmaceuticals are less than 1. However, the mean buy-and-hold return of S&P 500 is greater than 1. This indicates that a financial manager, who would have remained invested in US pharmaceutical equities from 2000 through 2016, on the average would have earned less than the original investment sum. However, by investing in S&P 500 index in the same period, a financial manager would have earned more than the original invested sum.

Table 3: Compounded Year-to-Year Returns of US Pharmaceutical Equities and S&P 500 Index

Year	JNJ	PFE	MRK	LLY	BMY	S&P 500
2000	**1.082**	**1.248**	**1.045**	**1.178**	0.934	0.98
2001	0.668	**1.152**	0.753	**1.123**	0.685	0.81
2002	0.623	0.839	0.704	0.901	0.356	0.614
2003	0.621	**1.012**	0.605	**1.017**	0.423	0.811
2004	0.729	0.668	0.357	0.811	0.354	0.847
2005	0.648	0.71	0.439	0.847	0.344	0.918
2006	0.753	0.725	0.569	0.809	0.435	**1.031**
2007	0.711	0.646	0.586	0.768	0.347	0.989
2008	0.65	0.403	0.363	0.551	0.323	0.592
2009	0.703	0.516	0.486	0.526	0.368	0.77
2010	0.669	0.503	0.422	0.52	0.38	0.922

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2011	0.738	0.591	0.487	0.594	0.487	0.941
2012	0.827	0.464	0.55	0.803	0.546	**1.074**
2013	0.99	0.416	0.674	0.808	0.754	**1.278**
2014	**1.121**	0.428	0.767	**1.077**	0.91	**1.431**
2015	**1.169**	0.439	0.644	**1.183**	0.938	**1.391**
2016	**1.267**	0.421	0.788	**1.152**	0.742	**1.619**
Buy-and Hold Annual Average	0.822	0.658	0.602	0.863	0.549	**1.001**
Std. Dev.	0.208	0.257	0.172	0.223	0.221	0.275
Median*	0.729	0.591	0.586	0.811	0.435	0.991

*Medians are used for non-parametric tests

Table 4 shows the results of the Kruskal Wallis non-parametric hypothesis testing of the medians of the risk-adjusted buy-and-hold returns of pharmaceutical ADRs, US pharmaceutical companies, and S&P 500 index. In essence, the results suggest that the null hypothesis that the risk-adjusted buy-and-hold returns of pharmaceutical ADRs, securities of US pharmaceutical companies, and of S&P 500 index are the same can be rejected at 5% level of significance, supporting H1. The results reported earlier in Tables 2 and 3 found two ADRs – TARO, RDY buy-and-hold returns at the end of 2016 higher than that of S&P 500, three ADRs – TARO, RDY, SNY performed better than JNJ in the U.S and all their returns are larger than 1. Four ADRs out-perform LLY, MRK, and BMY in the U.S. and all their returns are larger than 1. Nine ADRs out-perform PFE but PFE returns is less than 1. Two ADRs of PLX and AXN are the worst performers in the pool with returns of -.57 and .11 respectively.

There are nuanced results from our compounded year-to-year calculation. In Tables 2 and 3, the returns that are larger than 1 were highlighted in bold meaning the investors had positive return from their investment since 1999 (except SNY started in 2002, RDY in 2001, and AXN started in 2006). Overall, ADRs have more buy-and-hold returns larger than 1 with every year having at least one ADR buy-and-hold returns higher than 1. The same was not found in U.S. pharmaceutical stocks. In fact, most years most of the five stocks buy-and-hold returns were lower than 1. For the U.S. pharmaceutical, only six out of the seventeen years under investigation have one stock's buy-and-hold return larger than 1. The best year for ADRs are 2010, 2012, and 2014 with seven out of eleven ADRs returns higher than 1. The best year for U.S. pharmaceutical stocks was 2000 with four out of five stocks returns higher than 1. In the U.S. from 2004 to 2013, all U.S. pharmaceuticals in our dataset had returns under 1. For S&P 500, only six out of the seventeen years had return larger than 1. From the

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hypothesis that ADRs would have higher returns than U.S. pharmaceuticals, these nuanced results support the hypothesis partially.

Table 4: Results from Kruskal Wallis Hypothesis Test

	N	Mean Rank
VRX	17	102
PLX	17	12
TARO	17	147
AXN	10	21
RDY	15	102
GSK	17	229
NVS	17	186
SNY	14	257
TEVA	17	113
AZN	17	183
NVO	17	89
LLY	17	185
BMY	17	85
JNJ	17	208
PFE	17	125
MRK	17	93
S&P	17	194
Total	277	

Chi-Square	184.359
df	16
p-value	0

5. DISCUSSION

The non-parametric comparisons of the buy-and-hold returns of pharmaceutical ADRs, U.S. equities of major pharmaceuticals, and S&P 500 index revealed that there are differences in returns among these three groups of investments. While our results are different from those obtained from prior research that continuously found ADRs perform differently than S&P500 Index or NASDAQ, our results shed new light on how the buy-and-hold returns on various groups of investments may differ. Another explanation of our results could be due to the longer-term of 17 years performance that we measured. It is also possible that the risk of investing in ADRs or U.S. companies in the pharmaceutical industry is similar as these companies are perceived as equally global.

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Prior research work did not determine the buy-and-hold returns to compare the performances of ADRs. Comparing information from Tables 2 and 3 it is observed that the mean buy-and-hold returns of certain ADRs – such as, VRX (Vertex Pharmaceuticals, Canada), TARO (Taro Pharmaceuticals, Israel), AZN (Astra Zeneca, United Kingdom), NVO (Novo Nordisk, Denmark), SNY (Sanofi, France), and RDY (Dr. Reddy's Lab, India) are greater than mean buy-and-hold return of S&P 500 index. One of these companies, Sanofi (SNY, France) was identified by Riboldazzi (2015), as one of the six main originator companies of pharmaceutical products. Our research shows that financial managers need to be selective in choosing equities of pharmaceutical ADRs for steady long-term performance.

6. CONCLUSIONS

In this research, the financial returns of ADRs of all foreign pharmaceutical companies listed in NYSE, equities of US pharmaceutical companies and S&P 500 index are compared for a period of seventeen years, from 2000 through 2016. A non-parametric test has been conducted to compare their risk-adjusted buy-and hold returns. The result of this hypothesis test indicates that the null hypothesis that the risk-adjusted buy-and-hold returns are the same is rejected. There are some limitations of this study as we attempted to investigate a longer time frame of 17 years rather than the average 3-year timeframe in previous research. Future research should consider a range of timeframe such as 5-year, 10-year, and 15-year to add more nuanced time dimension to the performance of ADRs. We introduced an extended term perspective by using buy-and-hold returns in this article for pharmaceutical industry only ADRs; future research should consider applying buy-and-hold returns for another industry. We have followed most of the previous research and used S&P 500 Index for comparison, future research should consider using buy-and-hold returns and compare ADRs against NASDAQ Index.

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