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Degustando La Bombonera de ADRs

(Tasting the ADR chocolate box)

A study on the determinants of the market-adjusted return of Latin American ADRs issued between 1999 and 2014

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ABSTRACT

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Key words: ADR, Latin America, Introduction Puzzle, 3-market-adjusted performance year Performance, Multivariate Regression

Purpose: The purpose of this thesis is to analyze the medium run (defined as 36 months) market-adjusted returns of ADRs of Latin American origin issued since 1999.
Through running a multivariate regression, the authors seek to establish significant relationships between the medium run returns and the seven selected independent variables. The general aim of the study is to provide relevant, recent research on the determinants of Latin American ADR IPOs in the period 1999 to 2014, research that not only reduces the literature gap between ADR and IPO literature but also is useful to the prospective investor.

Methodology: The authors employ a deductive quantitative method, developing hypotheses and conducting an event study. Through the use of multivariate regression and significance tests, the relationships between the accumulated adjusted return (CAR) and several variables cited in IPO literature as potential performance determinants are examined and analyzed.

Theoretical perspectives: Relevant research has mainly been conducted by American researchers on American markets. The theoretical basis of this thesis is primarily concerned with IPOs, and secondly with ADRs.

Empirical foundation: The results are based on a sample of 41 ADRs of Latin American origin, issued between 1999 and 2014, traded on the NYSE and NASDAQ. The data has been retrieved from Thompson Reuters Datastream or from the websites of the underlying firms.

Conclusions: IPO literature can successfully be applied to explain the market-adjusted performance of Latin American ADR IPOs. The authors find the introduction timing, ADR country and ADR industry to be the most important performance determinants.

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DEFINITIONS & TERMINOLOGY

ADR: (American Depository Receipt), A negotiable certificate traded in U.S markets, corresponding to a stated number of shares, in a company not listed on an U.S.-exchange. All ADRs are quoted and settled in U.S Dollars

CAR: Cumulative Adjusted Return

CAAR: Cumulative Average Adjusted Return

IPO: (Initial Public Offering) Is the process of when a non-public company is offering stock to the public for the first time

Latin America: Defined in this study as all countries in South & Central America and Mexico

Market-Adjusted Return: The return of a security as compared to a benchmark

Medium run: Defined in this study as 36 months

Performance: Return on Investment

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1. INTRODUCTION

1.1 Background

Bombonera is Spanish for chocolate box. In many ways, investing in the stock market is like picking pralines from a chocolate box. You are highly aware that although many of the pralines will be sweet treats, the box will inevitably contain bitter surprises. From experience, you have started to learn what tastes you prefer, yet you possess limited ability to identify these. Selfish as you are, you want to be sure to pick the best ones for yourself.

Imagine that it is the holidays, and by tradition, you are designated with buying the family a box of chocolates. However, the usual one selling at the local store has become expensive, and your family doesn't think it is that exquisite. Also, the few additions every year are almost invariably disappointments. Nevertheless, the usual one is the only option. However, this changes when you hear from a good friend that the store now also offers a new, exotic box of chocolates. Though you have been friends since childhood, you know that unfortunately, you cannot trust the taste buds of your friend - the only solution is to try out the box for yourself. But how can you be sure to pick the best pralines and avoid bitter surprises?

For many years, small investors around the world have been confined to only invest in domestic stocks and IPOs. However, due to disappearing transaction costs and increased access to American Stock Exchanges, this is changing, owing much to the existence of American Depositary Receipts.

American Depository Receipts, or *ADR*s are financial instruments that provide non-U.S. companies with access to American equity markets, and in turn, investors on U.S. exchanges with the means to diversify their portfolios through international investment.
By selling a portion of its outstanding shares to a U.S depository Bank, the foreign publicly listed company can raise equity in the U.S markets in the form of ADR certificates that are issued by the U.S Depositary bank. These ADRs are subsequently sold to investors on the AMEX, Nasdaq and the New York Stock Exchange (NYSE), or OTC (over-the-counter). Hence, Non-U.S. stocks that previously were only viable investments to large institutional investors and domestic traders outside the U.S., due to high transaction costs, are now readily available for small global investors. As the number of ADRs continues to grow, global investors can diversify more than ever before.

However, studies suggest that for several reasons, ADRs systemically trade at a premium to their home shares (Esqueda, Luo, Y & Jackson, 2013), (Kim, Szakmary & Mathur, 2000), in the process violating the law of one price. Therefore, investing in ADRs appears to be associated with particular risks, not only the idiosyncratic risk of the underlying stock. Furthermore, similarly to domestic U.S. IPOs, several studies (Schaub, 2013), (Foerster & Karolyi, 2000) have found that ADR IPOs on average underperform the general U.S market in the 36 months that follow introduction. Thus, the well-known IPO Puzzle seems to partly apply to ADR IPOs as well.

1.2 Problem Discussion

The IPO puzzle has been researched extensively, and past studies have consistently found evidence of underpricing, as shown by the on average positive first-day returns. However, this phenomenon ought to be weaker in the case of an ADR IPO, since the underlying security is already priced in its home market. As such, according to the law of one price, the ADR price should equal the exchange-rate adjusted price of the underlying security; yet, research has found that this does not hold. Due to this violation of the law of one price, ADR studies have mainly been concerned with explaining ADR premium, rather than ADR performance.

Nevertheless, some studies have been conducted on ADR performance. With Foerster & Karolyi (2000) as the sole exception, these studies only record the market-adjusted returns and not the actual raw returns. Although raw returns are not as robust results as market-adjusted returns, they are still undeniable relevant to the prospective investor.
Callaghan, Kleiman & Sahu. (1999) as well as Foerster & Karoly, (2000) find considerable short-term market-adjusted returns for ADR IPOs, suggesting that ADRs IPO suffer from mispricing just like a common IPO, in spite of an existing market valuation in the home market. Yet studies by Schaub (2003) and (2013) indicate that ADRs are not subject to this typical positive first-day return. Also, Schaub (2003) find that emerging market ADRs perform worse than developed countries, whereas Callaghan et al. (1999) observe the opposite. Thus, there is a clear conflict in the results of previous studies.

However, previous studies do agree on a number of issues, namely that ADR IPOs too are cyclical and systemically underperform the market in the long-run. As shown by Ritter's important 1991 and 1995 contributions, IPOs systemically have a poor 3-year aftermarket performance. Ritter (1991) and along with Loughran (1995) tried to explain this by mispricing at the time of introduction. As discussed above, this problem should not be as severe in the case of ADRs given readily available market information. Worthy of note is that only a handful of the studies have sampled data from the 2000s, raising questions about the actuality of previous findings. Clearly, there is need for new, robust, research on how ADRs have performed more recently, due to the ambiguous findings of older studies.
Clearly, given the rate of digitalization and globalization of the current economy, factors may have changed from the last time studies were carried out, as suggested by Dodd (2003).
As a consequence, there is not enough recent research that provides satisfactory answers to the issues discussed above.

In spite of suggested disadvantages of ADRs, ADR listings have continued during the 2000s. Of special interest to the authors are ADRs of Latin American origin as:

I. Latin America is a region often neglected by research, meaning there is a research void.
II. Previous studies have found conflicting results. Callaghan et al. (1999) found that Latin American ADRs significantly outperformed Index, interestingly, Schaub (2003) identified the very same group as the poorest performers.

These differences are left largely unexplained, as the aforementioned studies only include industry and country of origin as potential performance determinants. Although, IPO

literature has cited several other factors as potential performance determinants, ADR studies have so far not included these. Moreover, these studies rely on weak statistical support. Thus, there is a research gap between ADR and IPO literature, which this thesis will attempt to fill.

1.3 Research Questions

Given the problem discussed above, this thesis aims to answer the following questions:

1. Have the 36-month aftermarket-adjusted returns of Latin American ADR IPOs issued in the period 1999 to 2014 been positive or negative?

2. Are there significant relationships between the Latin American ADR IPO market-adjusted performance and generally accepted IPO return performance determinants for issues in the period 1999 - 2014?

   b) If there are, does a pattern emerge that separates negative market-adjusted returns from positive ones?

1.4 Purpose

The primary objectives of this thesis are to ascertain and analyze the 36-month market-adjusted performance of Latin American ADRs issued since 1999, as well as to identify significant determinants of that performance. In addition, the authors seek to contribute to ADR research by introducing a multivariate regression and several variables cited in common IPO studies as potential determinants. The seven variables included in the study's multivariate regression are Country, Industry, P/B-ratio, Year of Issue, Number of Days Traded, VIX and Exchange Rate.

As a secondary objective of the study, the authors aim to provide prospective ADR investors with useful insights by identifying patterns that predict on the one hand a positive performance, and on the other hand, a negative one. To be of benefit to prospective investors, the market-adjusted returns will be put into context of the raw returns.

1.5 Limitations

Due to the scarcity of accessible data, and differences in reporting standards, Level 1 (OTC) ADRs are not included in the sample of this study. As differences in reporting standards entail a difference in information asymmetry, the inclusion of level 1 ADRs could adversely affect both the reliability and validity of the study given the current research focus, thus level 1 ADRs are not included in the sub-sample. The sampled ADRs have been issued between the years 1999 and 2014. As the study relies on three years of available data for each ADR, no ADRs issued after 2014 are be included.

Although the costliness of IPOs is an important part of the IPO Puzzle, it is beyond the scope of this thesis. This is due to the amount of qualitative data needed to fully analyze this issue, which the authors do not have sufficient time to compile.

Finally, the thesis has its theoretical base in IPOs and does therefore not study SEOs.

1.6 Outline

The thesis is organized into five main parts, in line with the general structure for quantitative studies suggested by Bryman and Bell (2015)

I. Theory:

This part reviews the most recognized research on IPO phenomena and the performance of ADRs. This is done by detailing the methodologies and most important results brought forward by this research. In order to show why further research is still needed, the most relevant literature contradictions are also discussed. With basis in previous research, the authors conclude this part by developing a set of hypotheses.

II. Data & Methodology:

Following a short introduction, this part is divided into two main sections. The first one is concerned with the sampling criteria and discusses relevant characterisca of the sample. The second section elaborates the research process and methodology, including the study's reliability & validity.

III. Empirical Results:

This part presents and details the results of the multivariate regression and significance tests. The part is concluded by accepting or rejecting the hypotheses.

IV. Analysis

In this part, the research questions are answered by analyzing the empirical test results through the light of the theories described in literature review.

V. Conclusions

This part summarizes the most important insights of the analysis and compliments these with the authors' final remarks.

2. THEORY

2.1 IPO Puzzles

The *IPO puzzle* is the term for four distinct phenomena that have persistently in connection with IPOs and left researchers puzzled (Berk & DeMarzo, 2014)

The four puzzles are:

1. **Cyclicality of Issues**

   I.e. the volume of issues changes substantially from year to year, and is concentrated in periods of increasing valuations.

2. **Short-term underpricing**

   IPOs commonly yield positive first-day returns, indicating that they are underpriced at the time of introduction.

3. **High Issuance Costs**

   The underwriter of an IPO charges its client high fees, that puts the profitability of the IPO into question.

4. **Long/medium-run underperformance**

   IPOs on average return less over time when compared to a benchmark.

The chief focus of the quantitative analysis is the IPO long/medium-run performance, although cyclicality will also be addressed and analyzed.

2.2 Literature Review

2.2.1 Studies on IPO Puzzles

Ibbotson and Jaffe (1975) were the first academic researchers to analyze the relationship between hot markets and the cyclicality of IPOs. They define the hot issue markets as periods in which equity issues experience abnormally high 1-month aftermarket returns, which they examine for 205 issues between 1960 and 1970 (Ibbotson & Jaffe, 1975). The study shows that issuers are able to gauge the market temperature by looking at recent issues, as there is a serial dependency between 1-month returns of equity issues. The question that the study leaves somewhat unresolved is when public should go public. As issuers want to obtain the highest possible valuation, they want to minimize the aftermarket premium. Ibbotson and

Jaffe suggest that although Investment bankers recommend hot periods, cold periods may be better as they see indications that premia are higher in hot periods (Ibbotson & Jaffe, 1975). Important to note is that they only measure the 1-month aftermarket performance.

In 1991, Jay Ritter published "The Long-Run Performance of Initial Public Offerings", arguably the most recognized article published about IPO puzzles. In this article, Ritter provides rigorous evidence in support of previous studies that postulate a systematic short-term underpricing of IPOs. More importantly however, Ritter's article also advances the notion that IPOs clearly underperform index in the long-run, measured as the 36-month market-adjusted (BHAR) aftermarket return. Both conclusions are supported by a sample of 1 526 IPOs conducted between 1975 and 1984 (Ritter, 1991). Furthermore, Ritter (1991) found that factors such as industry and year of issue had substantial effect on the IPO performance, as returns differed markedly across industries as the IPOs of Financial, Pharmaceutical and Airline firms beat the market over a period of 36 months.

Ritter attributes the strong industry effect to the *fad effects* discussed by Schiller (1990) i.e. investor sentiment and other non-economically motivated factors that make certain securities prone to bandwagon-effects, speculation and miss valuations (Schiller, 1990). Another important result in connection to this observation was that issues in the hot years, i.e. IPOs from the years with the highest number of issues, also performed worse than issues from cool years. Ritter (1991) sees this as an indication that generally, firms are successful in timing their IPO and mitigating the IPO premium. Ritter concluded that the high cyclicality in IPOs can be explained by a tendency to go public in times when valuations generally high, driven by the earlier discussed fad effects. Thus, issues in hot years run less risk of high issue premia, but higher risk of being overpriced and incurring negative returns in the following months. Conversely, Ritter also saw indications that the firms that enjoyed the highest first-day returns were the ones that performed poorest on a three year-basis.

The results from Ritter's and Loughran's 1995 study "The New Issues Puzzle", are overwhelmingly in support of the findings from Ritter's 1991 article, as both the sampled IPOs and SEOs significantly underperformed the index for the 5-year period following introduction (Loughran & Ritter, 1995). The sampled IPOs returned 5 % annually (raw return) and the SEOs 7 percent. Ritter and Loughran concluded that that main explanation for this pattern can be provided by the Window-of-Opportunity-theory. According to this theory, firms choose to issue new equity in times when they tend to be overvalued. Consequently, new issues are systemically misvalued. Ritter and Loughran attempted to explain why this pattern remains strong. They suggested that is partly because of investor optimism. Although investors know that the IPO is unlikely to return well, they bet on the long-shot possibility that this IPO turns out to be the next terrific investment, in effect overvaluing the IPO's on average (Loughran & Ritter, 1995). Although the majority of Ritter's articles have been US-centered, his IPO findings appear to hold internationally as well, of major importance for this study.

In the Latin American IPO context, Aggarwal et al. (1993) studied 62 Brazilian, 36 Chilean and 44 Mexican IPOs during the 1980s. The Brazilian firms displayed high first-day returns, 78,5 %, but lagged the market 47 % on a three year-horizon. In comparison, Mexican firms, whose shy first-day returns averaged 2,8 %, lost 19,6 % compared to the market in 3 years. This is line with Ritter's (1991) suggestion that the highest first-day return indicate the worst 3-year return. Aggarwal et al. noted that this was the same pattern as in the U.S, but that the short sample window may have affected the results (Aggawal et al.1993).

"Initial Public Offerings: International Insights", published in 1994 by Ritter, Rydqvist and Loughran also reinforces the view that international IPO behavior differences are small, as short-run underpricing and positive first day-returns were documented in each of the examined 25 countries. Moreover, interestingly, the study provides robust support of the hot market issue theory, as 14 out 15 countries showed a positive correlation between the stock market level and IPO activity, and in 10 out of 14 countries, there is a negative relation between one year's IPO volume and the following year's market return. Hence, these findings suggest that timing is a very important indicator of how well an IPO will fare (Loughran, Ritter & Rydqvist, 1994).

2.2.2 Studies on ADR Premiums

In a study conducted by Esqueda et al. (2015) they seek to explain why ADR premiums occur when in according to the law of one price, they should not. Specifically, the authors test for the investor sentiment's impact on Latin American ADRs using the volatility index (VIX), where low levels indicate an optimistic market outlook and high levels indicate a pessimistic market outlook in the U.S stock market, as a proxy for investor sentiment in the US to see if it impacts the ADR premiums (Esqueda et al., 2015). Furthermore, they find support in previous studies for using the VIX as an indicator for sentiment, and motivate its applicability to ADRs given that it is an instrument mainly used by institutional investors.

Another factor suggested to give rise to ADR premiums is lagged effects. This study however focuses on Latin American ADRs, thus lagged effects attributed to time differences are deemed to be reduced as ADRs trade on similar hours to the U.S. (Esqueda et al., 2015) Further factors, such as transaction costs are significant, and can help explain the deviation from the law of one price to some extent. Most importantly however, the study results show that the VIX can be used as an indicator of ADR premiums and therefore be of help to investors looking to improve their use of ADRs for investing purposes (Esqueda et al., 2015).

2.2.3 Studies on ADR Performance

In an early study of the post-equity offering short-term performance of ADRs, Callaghan et al. (1999), contend that unlike general equity issues, ADRs do not underperform the market. Instead, their results indicate that ADRs are associated with positive market-adjusted returns. From their sample of 66 ADR issues between 1986-1993, Callaghan et al. found that the sampled firms had positive 1-year returns, and were consistently underpriced on the listing day. Moreover, they found that ADRs listed on NYSE return higher than their counterparts listed on AMEX and Nasdaq, and importantly, that ADRs from emerging markets outperform ADRs from developed countries.

The results of Mark Schaub's 2003 study of ADR-performance, based on a sample of 179 ADRs issued 1987-1998, differed to many previous studies of ADR performance. Although earlier studies, such as (Foerster & Karolyi, 2000) found that ADR issues underperformed the U.S. market both in the medium- and long run, they found that ADR IPOs enjoyed considerable positive first-day returns. Schaub did not find any of these, suggesting instead that the issues were fairly priced (Schaub, 2003). Also, in sharp contrast to Callaghan et al. (1999), the sub-sample of developed countries outperformed the emerging markets sub-sample. Of all groups, the Latin American ADRs performed the worst, on average yielding negative returns after one, two and three years after going public in the U.S. Of note though is

that in a z-test, Cumulative average adjusted return (CAR) were only significant at the 10 % level in 8 out 36 months.

Schaub revisited his results in 2013, specifically analyzing the Latin American ADRs issued between 1990 and 2009. Although the results showed that Latin American ADRs indeed underperformed the U.S in the 1990s, their return was about the same as American IPOs and that they outperformed the 2000s U.S. market by nearly 58 % (Schaub, 2003).
Just as suggested about IPOs by Loughran et al. (1994), Schaub also presents evidence that the year of issue does indeed matter, although with questionable statistical support.

As seen from the discussion above, the evidence in ADR IPO performance literature is highly mixed, and relies on z-test which can be considered as weak statistical support when compared to a multivariate regression, as the latter captures causality. A number of in IPO literature factors have been tested through a regression against the market-adjusted returns. Although ADR IPOs are IPOs as well, many of these factors have not been tested by ADR literature. Hence there is a literature gap.

2.3 Hypotheses

With support in the research discussed above, the following hypotheses are formulated:

2.3.1 Country / Home market

ADR research has consistently found that performance performed between regions.
IPO literature in turn has found difference in performance at country level (Loughran, Ritter & Rydqvist, 1994). Although there are many similarities across the Latin American Countries, there are vast differences in market size, level of economic development and there may also exist considerable differences in domestic stock market behaviour and sentiment. The authors hypothesize that this should manifest itself in different adjusted returns. Through the inclusion of country as a variable, they hope to capture these hypothesized differences.

H0: There is not a significant difference in returns between Latin American ADRs due to their domestic country / home market
H1: There is a significant difference in returns between Latin American ADRs due to their domestic country / home market

2.3.2 Industry

Ritter (1991) identifies the issuing firm's industry as a major determinant of aftermarket performance. Given this, and the inherent differences in risks and business models across industries, industry is included as an independent variable in the regression.

H0: There is not a significant difference in returns between Latin American ADRs due to their different industries
H1: There is a significant difference in returns between Latin American ADRs due to their different industries

2.3.3 Market- To Book Ratio of the underlying stock at the time of issue

Ibbotson & Jaffe (1975) as well as Ritter (1991) and Laughran & Ritter (1995) claim that as issuers want to minimize the IPO premium, they seek to issue in times of high valuations, a goal they seem to somewhat accomplish. This pattern appears to hold globally, as shown in Ritter et al. (1994). The market-to-book-Ratio or price to books ratio, (P/B) is a useful measure of the market's willingness to pay for an asset. The higher the ratio the more the market is willing to pay, Corporatefinanceinstitute (2018). By examining the P/B-ratio at the time of issue the authors hope to capture the effect the ratio has on the ADRs subsequent aftermarket performance.

H0: There is no relationship between an Latin American ADR's return and its P/B-ratio
H1: There is a negative relationship between an Latin American ADR's return and its P/B-ratio

2.3.4 Year of issue

The existence of "hot periods" is virtually accepted as truth in IPO literature. The global study conducted by Loughran et al. (1994) in particular indicated that there is a strong link between the timing of an issue and its aftermarket performance.

H0: There is not a significant difference in returns between Latin American ADRs due to year of issue
H1: There is a significant difference in returns between Latin American ADRs due to year of issue

2.3.5 Event Day

Almost all Researchers conducting IPO and ADR research observe clear return patterns within their samples and sub-samples. Generally, the studies, e.g. Aggarwal et al. (1993) Loughran, Ritter, Rydqvist (1994) and Schaub (2003) (2014) observe that the market-adjusted performance worsens with time.

H0: There is no relationship between a Latin American ADRs return and the number of days it has traded in the aftermarket
H1: There is a negative relationship between a Latin American ADRs return and the number of days it has traded in the aftermarket

2.3.7 VIX

As suggested by Esqueda et al. (2015). A high U.S. Volatility index (VIX) signals a bearish market sentiment. Although it might argue that this should affect IPOs adversely, the authors hypothesize that the VIX is a useful indicator of market sentiment.

H0: There is no relationship between a Latin American ADR's returns and the VIX
H1s: There is a negative relationship between a Latin American ADR's returns and the VIX

2.3.8 Exchange-Rate

In the field of ADR Premiums, Esqueda et al. (2015) introduce the exchange-rate between the dollar and the currency of the ADRs home market as a factor that influences ADR premiums. As ADRs trade in dollar however, the author's do not expect an impact on returns. According to the law of one price, the ADR price ought to equal that of the underlying security multiplied by the exchange rate. Thus, a change in the equation rate should explain the change in CAR.

H0: There is no significant relationship between the exchange-rate and ADR Returns
H1: There is a significant relationship between the exchange-rate and ADR Returns

3. METHODOLOGY AND DATA

3.1 Scientific Approach

From the very onset, the study was conducted using a quantitative and deductive method. As the thesis' principal aim was to identify the determinants of market-adjusted returns, it had to infer its conclusions from large volumes of return data, therefore a quantitative method was the natural choice. This choice was further motivated by the fact that previous studies had been primarily quantitative in nature. In order to achieve a high degree of comparability of results, the method had to be similar.

Furthermore, a deductive approach appeared natural as well, given the extensive research conducted on IPOs and introduction puzzles. Finally, the authors settled on developing hypotheses, as they sought to establish relationships between Latin American ADR aftermarket performance and a number of issue characteristics.

3.2 The Sample

The section below discusses the sample criteria and the main features of the sample.

3.2.1 Time Periods

3.2.2.1 Event Window

The study analyzed the 3-year adjusted aftermarket returns of Latin American ADR IPOs issued during the years 1999-2014. The authors chose not to include issues that were delisted before reaching 36 months of trading, as this was assumed to create a negative skewing effect in the already small sample. The decision to set the event window at 36 months was primarily motivated by its application in the highly influential studies by acknowledged scholar Jay R. Ritter. In addition, Foerster & Karolyi (2000) as well as Schaub (2003) measured performance for 36 months. In order to facilitate comparisons with these studies, examining the same period was deemed to result in the most useful research. In accordance with methodology used by Ritter (1991), the returns were computed using the closing price for the first trading day.

The option to expand the event window to 5 years appeared unattractive, as an event window of 5 years would have diminished an already small sample even further.

As for the data frequency, the authors decided that a data set with high frequency was most desirable as this would increase the statistical power (MacKinlay, 1997). Considerable changes can occur during a month, and ignoring these was judged to compromise the usefulness of the study's results. However, it appeared unrealistic to successfully retrieve access intra-day data for all the independent regression variables. Therefore, the authors decided it was suitable to use daily data.

3.2.2.2 Observation Window

As an option to expanding the event window, the authors had the opportunity to expand the observation window backwards into the 1990s. However, it was deemed an unattractive option for three main reasons:

I. The potentially problematic differences in the degree of digitization. As rapid digitalization occurred at the end of 1990s, it was feared that mid-1990s IPO could be subject to much higher information asymmetry than newer IPOs, hence the authors were unwilling to expand the observation range backwards.

II. The study would have been more weighted towards the 90s U.S. bull market. As this period was particularly volatile, the authors thought that including the entire 90s U.S. bull market would have added period-specific volatility that would not have benefited neither the study's reliability nor validity, in spite of a larger sample.

III. Furthermore, the authors also sought to limit sample overlap with previous studies, in order to capture changes that might have occurred during the last decade. For instance, an observation range starting in 1995 would have entailed considerable overlap with Schaub (2003) and Forester & Karolyi (2000).

Naturally, for ab observation window consisting of 18 years, it cannot be expected that there are not periods in which volatility is higher. The authors identify three such periods:

I. The Dot-Com boom & bust (Alam & Morris, 2012)

II. The Sub-Prime Crisis (Demyanyk & Hemert, 2011)

III. The Argentine Great Depression (Kehoe, 2003)

By using dummy variables in the regression however, the effect of these volatile periods is largely neutralized.

3.2.2.3 Trading Hours

MacKinlay (1997) mentions that bias can arise from unsynchronized trading hours. This was not judged to present a problem however, as Latin American time zones are very similar to those of East Coast U.S.A.

3.2.3 Exchanges

The authors chose to study ADRs issued on the New York Stock Exchange (NYSE) and NASDAQ in New York. This due to the fact that these exchanges are regulated and based in the United States. The sample size could have been expanded by adding ADRs traded over the counter (OTC), but this would lead to substantial difficulties in acquiring reliable, comparable, data since the OTCs are not as regulated and transparent as exchange traded ADRs.

3.2.4 ADR Country of Origin

In this study, the authors chose to investigate ADRs issued by companies based in Latin America. The sampled ADRs are from the following countries: Argentina, Brazil, Chile, Colombia, Mexico and Peru. ADRs from other Latin American countries were not included because they did not meet the other criteria.

As shown in appendix I, Brazil was the most represented country in the sample with 18 ADRs, followed by Mexico and Argentina with 9 and 7 issues respectively.

3.2.5 Sector / Industry

The authors did not see any reason to exclude ADRs on the basis of Industry. Particularly given that Industry was early identified as a potential determinant of the aftermarket performance, and was subsequently used as an independent variable. As detailed in appendix **I**, there is a high sample concentration in just a few industries, Banking & Financial services being the most heavily-weighted industry.

3.2.6 Exchange-Rate

The U.S. dollar exchange rate was chosen as an independent variable due to detect the ADR premiums found by previous ADR research. The variable was included as an untransformed time series.

The Sample

After sorting for the criteria, a sample of 41 ADRs was obtained. Appendices I and II provide a breakdown of the sample distribution.

3.3 Data Collection

After formulating the sample criteria, the authors compiled a list of the Latin American ADRs that met the criteria. After this, the authors proceeded to download data from Thompson Reuters' database DataStream. This data was then organized as panel data in an excel-file, which would later serve as the basis for the regression.

Data was almost exclusively retrieved from DataStream, including time-series for ADR Stock Prices, Exchanges-Rates, S&P 500 Composite, VIX as well as P/B Ratios of the ADR's underlying stock. The data for date of issue, country and industry was specified along with each ADR's price data. The only piece of data that had to be retrieved manually were the P/B-ratios of Brazilian ADRs SABESPA and Ultrapar Participações. P/B-ratios for these ADRs were computed manually in excel, using data accessed from the quarterly reports of the underlying firms. After this step, the CARS were computed on a daily basis against the S&P 500 composite.

Next, each ADR was codified in order to facilitate extraction of sub-samples
Each country was given a code of 100 - 600 based on the Alphabet, Argentina being 100, Brazil 200 etc. Within each country the ADRs, were alphabetically sorted and given values X01, X02 etc., as detailed in appendix IX.

Also, the variable industry was codified into numbers 10 - 70.
Due to the high number of industries DataStream sorted these into, industries were grouped into six new classifications, please see table **II**.

The final step consisted of the statistical testing. The regression was conducted using the statistical software Eviews, from which also data histograms and matrices were exported to test the assumptions of OLS. Significance tests were then performed in excel, all data being extracted from the previously mentioned Masterfile. Excel was also used to create tables and visual representations of data.

3.3.1 Excluded variables

The first-day returns have been identified as an important determinant of performance by IPO literature. However, the authors were unable to find offering prices, which are needed for the computation of first-day returns. Therefore, the first-day return was excluded from the analysis.

3.4 Significance Tests

Highly relevant studies such as Ritter (1991) and Schaub (2003) both test an implicit null-hypothesis on the returns of their samples. In order to ensure a high degree of comparability with previous research, the authors chose to include significant testing as part of the study.

3.4.1 Computation of CAR

The long-term performance measure that was used in this study is
Cumulative Adjusted Return, (CAR) also known alternatively as Cumulative Excess Return (Schaub, 2013).

In order to compute the adjusted return, data is needed for the ADR itself as well as a benchmark for the corresponding period (Ritter, 1991). For several reasons, the S&P 500 Composite was considered the most suitable benchmark index.

I. The majority of the sampled ADRs trade on the NYSE
II. The Majority of the ADRs represent large corporations, rather than small ones
III. The VIX is a projection based on the S&P 500 Volatility

The adjusted return for security i in event period t is computed as the security's return subtracted by the market return, as shown in equation I (Ritter, 1991).

$$ar_{it} = r_{it} - r_{mt} \qquad \text{Equation I}$$

As shown in equation II, the sample's average excess returns in event period t equals the sum of the individual securities' returns divided by the N number of firms (Ritter, 1991).

$$\overline{AR}_t = \frac{1}{n}\sum_{i=1}^{n} ar_{it} \qquad \text{Equation II}$$

Equation III shows the computation of a security's CAR from period 1 to period s. The returns accumulate from the first period until period S. In this study, the highest value of S is the last day of trading in month 36. The sample's average CAR (CAAR) is computed by dividing the sum of CARs by N.

$$CAR_{1,s} = \sum_{t=1}^{s} AR_t \qquad \text{Equation III}$$

As in Ritter (1991) the aftermarket returns were computed using the following adjustments:

I. The closing price after day 1 serves as the base price, from which the market-adjusted are computed

II. Each month is defined as 21 days of trading. Consequently, event days 2 through 22 correspond to month 1, days 23 through 43 correspond to month 2 etc.

3.4.2 Significance Tests

As the main sample has N>30, a z-distribution was used for testing the null-hypothesis. As all the sub-samples have N<30 the t-distribution was used instead (Stark, 2016). Whilst the main sample was only tested for the null-hypothesis, i.e. that there no significant adjusted returns at all associated with the sample, the means of the sub-samples were also tested against the main sample for each of the 36 aftermarket months. This was of the authors' interest due to the hypothesized significant impact of industry country and period of issue. The tests were performed with a significance level of 5 %.

3.4.2.1 Sub-Samples

Sub-samples were created on the basis of Country, Industry and year of issue.
Table I below lists all 12 sub-samples.

The table below shows the number of ADRs that constitute each sub-sample

Table **I**

Sub-sample	Number of ADRs
Argentina	7
Brazil	18
Mexico	9
Financial Services	10
Construction & Industrials	7
Consumer Services & Products	7
Electricity & Utilities	5
Chemicals, Gas & Oil	5
Travel & Transport Services	7
1999-2001	15
2002-2008	16
2009-2014	10

As detailed in appendix I, there were very few ADRs from Chile, Colombia and Peru, thus, sub-samples for these countries would not be reliable results given the few observations. The option of grouping them was excluded as there are major economic differences between the three.

A similar problem occurred for the year of issue. As seen in appendix II, there were not ADR IPOs every year between 1999-2014, and issuance activity was concentrated in a few years. Therefore, the issues were grouped into three major issue periods:

- 1999 – 2001
- 2002 – 2008
- 2009 - 2014

The periods were divided in the years above to capture one market correction each i.e. the burst of the dotcom-bubble and the sub-prime crisis. As the correction for the latest bull period was yet to come at the time of writing, the 2009 - 2014 period does not contain an obvious correction.

3.5 Multivariate Regression

The authors believed that significance testing alone, which is standard in ADR methodology (Schaub 2013) would not provide sufficient insight to answer the questions raised in this thesis. The authors believed that further statistical testing was needed, as they sought to explain any significant market-adjusted returns, not simply prove them. Therefore, it was decided that the study should include a cross-sectional regression, which according to MacKinlay (1997), is a well-suited tool when testing abnormal returns against hypotheses.

3.5.1 Ordinary Least Squares

The author's chose to use the Ordinary Least Squares method, or OLS, for the regression analysis as it's widely used within econometric research (Gujarati & Porter 2009). The main working mechanism of the OLS is fitting the regression line to the observations so that the squared sum of residuals, that is residuals that cannot be explained by the regression line are minimized. When these are small, a high degree of the residuals are explained by the regression line. This percentage, or R-squared measures the strength of the regression. (Gujarati & Porter, 2009)

As with any model, there are underlying assumptions that need to be met in order for the model to be accurate. For OLS, there are according to Brooks (2002) a number of criteria that need to be met.

I. The expected average value of errors is equal to zero.

   This criterion is fulfilled if the regression line has an intercept. If this criterion is not fulfilled, R-squared can become negative or subject to coefficient severe biases (Brooks, 2002).

II. Residuals are Homoscedastic.

Homoscedacity means that residuals' variances are constant. When this does not hold, variances are *heteroskedastic*. If heteroscedasticity is present in OLS, the estimations of variance become biased, which compromises the regressions accuracy (Brooks, 2002).

III. Standard-Errors are uncorrelated.

In other words, the data does not contain serial or auto-correlation, meaning it is correlated to itself over time. If this the criterion is not met, R-squared might be overestimated due to confusing correlation with causality (Brooks, 2002)

IV. Variables are non-stochastic.

This is only problematic if the independent variables are correlated with the estimated equations error term. if this assumption does not hold, R-squared erroneously increases due to the correlation between error term and regressor rather than the dependent variable and regressor (Brooks, 2002).

V. Disturbances are normally distributed.

If the data contains outliers that diverge considerably from the other observations the sum of squared residuals will be high, lowering the explanatory precision (Brooks 2002).

VI. There is no multicollinearity.

If independent variables are correlated, they will distort the coefficients between each other and the dependent variable, meaning that the regression loses precision. If the correlation between two independent variables equals +/- 1, they are perfectly collinear. If the correlation is greater than +/- 0.80, they are said to be nearly collinear. (Brooks, 2002)

3.5.2 Model Control & Adjustment

To ensure that the dataset was compliant with the OLS assumptions, a set of graphs, histograms and matrices were exported from Eviews to control for assumptions II, III, V and VI.

Assumption I was assumed to hold as the regression included constant values for variable P/B-ratio. Assumption VI was met as the error term was estimated to be zero.

As for assumption II, it was assumed not to hold, considering the sample distribution, assuming instead that there was heteroscedasticity. This view was further supported by literature, as MacKinlay (1997) claims that econometric data generally should be assumed to be heteroskedastic. In order to adjust for this, the author's chose to run the regression with White Standard Errors. According to Porter and Gujarati (2009) using White standard errors is a conventional and effective way of adjusting for heteroscedasticity, as the standard errors under this correction are much higher than those under OLS, decreasing the risk of misinterpretation. The authors chose to use the White Periods adjustment in Eviews, which was seen as most suitable as it adjusts for period effects (Forssbæck, 2017)

Assumption III was also not assumed to hold, given the inclusion of exchange-rate as a variable. As Gujarati and Porter (2009) observe, data such as stock price indices are correlated between observations. Therefore the authors sought to remedy by transforming non-constant variables using the difference equation, for which the auto correlated variable is transformed into the difference between the given period and the previous period
(Gujarati & Porter, 2009).

Assumption V was tested through examining the histogram and descriptive statistics in appendix III and VIII, respectively. The was some skewness and and a slight kurtosis, but the criterion was deemed to be met due to bell-shaped distribution, indicating there would not be an adverse degree of disturbance in the model.

Assumption VI was tested by creating a multicollinearity table Eviews (appendix IV). No correlations exceeded +/. 0,80, hence multicollinearity could be exckluded.

3.5.3 Independent Variables

For the constant variables Country, Industry and Year of Issue, dummy variables were created to limit the effects of outliers.

3.5.3.1 Country

A dummy variable was created for Brazil. Out of the six countries, Brazil was chosen as a dummy because:

I. It had the highest number of cross-sections (ADRs)
II. It was the country with most even sample distribution across time and industries

3.5.3.2 Industry

For the variable Industry, a dummy variable was created using Construction as the reference industry. The choice of Construction as reference industry was motivated by:

I. Five out of six countries were represented in this sub-sample
II. Although smaller than Financials (10 observations) the issues in Construction were more evenly distributed in time than Financials.

When the data was downloaded from DataStream, the ADRs were initially divided into twelve industries. In order to be able to run the regression, they were grouped into six new classifications, detailed by table II.

Table **II**

Pre-Grouping Classification	Post-Grouping Classification
Aerospace & Defense	Construction & Industrials
Banks	Financial Services
Construction & Materials	Construction & Industrials
Electricity	Electricty & Utilities
Food Producers	Consumer Services & Products
Gas, Water & Multiutlities	Electricty & Utilities
Industrial Transportation	Travel & Transport Services
Industrials Metals & Mining	Construction & Industrials
Oil & Gas Producers	Chemicals, Gas & Oil
Real Estate	Financial Services
Telecommunicaitons	Consumer Services & Products
Travel & Leisure	Travel & Transport Services

3.2.3.3 P/B Ratio of Underlying Stock

The P/B-ratio variable was held constant, as the purpose of its inclusion was to capture a potential relationship between the valuation of the underlying firm at the introduction date and the ADRs CAR. According to Berk & DeMarzo (2013), the P/B-ratio is calculated by dividing the market price (number of shares x share price) by the firm's book value (assets - liabilities). A ratio > 1 means that the market is willing to pay more for shares than the value of net assets, indicating they expect the latter to increase. A ratio < 1 means the opposite, i.e. the market is discounting the price of the firm's net assets.

3.5.3.4 Year of Issue

For the variable Year of Issue, a dummy variable was created using the year 2006.
2006 was chosen because:
I) It was one of the two years with most issues, specifically five ones
II) Although less than the seven issues of 2000, the 2006 IPOs were comparatively more evenly distributed across countries and industries.

3.5.3.5 VIX

The CBOE Volatility index, commonly only referred to as VIX represents the market's 30 day expectation of volatility in the S&P 500. As suggested by (Esqueda et al, 2015), VIX can be used to gauge market fear. This study included VIX as an untransformed time-series variable.

3.6 Methodology Critique

This part discusses some important features of the study's methodology and how this has impacted its reliability and validity.

3.6.1 Market-Adjusted Returns

The authors faced a difficult in choice whether to measure market-adjusted returns whether to as Buy & Hold Adjusted Return (BHAR) or as Cumulative Adjusted Return (CAR). This, primarily because on the one hand, standard IPO methodology chiefly uses BHAR e.g. Ritter, whereas ADR methodology uses CAR e.g. Schaub. The authors concluded that although the thesis' theoretical base has more in common with IPO literature, the choice of CAR would be better as the thesis' contribution is in ADR research, and thus the results must be easy to compare with the results of older ADR studies.

3.6.2 Sources

The study's data sources are DataStream and two quarterly reports from SABESPA and Ultrapar Participações, all of which can be considered reliable sources. Furthermore, the author's hypotheses are based on acknowledged research. Therefore, the study's reliability is not compromised by its sources.

3.6.3 General Remarks on Exclusions

The study's few cross-sections make it difficult to make generalizations about Latin American ADR IPOs. Ideally, the sample would have been more evenly distributed across countries, but this was not possible due to the scarcity and differences in ADR issuance activity shown by the Latin American countries, which was assumed to be related to a country's size and level of economic development.

First-day return is an important determinant of market-adjusted return according to Ritter (1991). The authors originally intended to include this factor as an independent variable in the regression analysis, but were unfortunately not able to find data on introduction prices.

3.6.4 Reliability

According to Bryman & Bell (2015), a reliable economic study is easy to repeat.
The authors recognize that using BHAR instead of CAR as a measurement of market-adjusted returns could have yielded a different result. Nevertheless, the method has been based on established field-specific methodology. (Schaub, 2013). The methodology and data transformations have been clearly detailed, making the study easy to replicate.

3.6.5 Validity

Bryman and Bell (2015) argue that it is hard to evaluate whether the validity of a quantitative research is high or low, as the quality of the measurement and the way of data collection is of high importance but at the same time hard to measure.

The *measurement validity* relates to the discussion on BHAR versus CAR. As previously stated, the authors believed that using the same measurement as earlier literature would mean using the best available measure.

The study's *internal validity*, which is concerned causality (Bryman & Bell, 2015) is generally high. Unlike previous studies ADR studies, it included a multivariate regression, an accurate tool for investigating causality. Furthermore, the high data frequency increased the regression power. Moreover, the inclusion of dummy variables mitigated the effect of period-specific volatility.

The *external validity*, meaning how much the results of a study can be generalized beyond itself is hard to measure (Bryman & Bell, 2015). The author's believe though that the application of regression analysis and the clearly described sample criteria have resulted in a quite high degree of external validity.

4. EMPIRICAL RESULTS

The section below is divided into three sections

I. A breakdown of each sample's 3-year CAAR

II. presentation of the results from the significance tests

III. presentation of the results from the multivariate regression

4.1 Returns

The tables in this section provide details on how the twelve samples performed versus the market after 12, 24 and 36 months.

4.1.1 CAR

The table below details the number of ADRs within the main sample for which the CAR is positive or negative after 12, 24 & 36 months, respectively of trading in the aftermarket. The sample's performance for the corresponding periods are listed to the right.

Table **III**

Main Sample	Positive CAR	Negative CAR	Sample CAAR
12 Months	26	15	12,27%
24 Months	21	20	2,76%
36 Months	23	18	13,58%

Briefly looking at all 41 sampled ADRs, the CAAR was positive for the first 12 months, approximately 63 % of the sample beating the S&P 500. This performance turns negative during the second year to improve again in the last year, beating the S&P 500 by 13,58 %.

The table below details the number of ADRs within each Country sub-sample for which the CAR is positive or negative after 12, 24 & 36 months, respectively of trading in the aftermarket. The country's average performance for corresponding periods are listed to the right.

Table **IV**

Country	Positive CAR	Negative CAR	Sub-sample CAAR
Argentina			
12 Months	5	2	7,73%
24 Months	2	5	-33,14%
36 Months	1	6	-11,86%
Brazil			
12 Months	12	6	20,05%
24 Months	11	7	22,89%
36 Months	12	6	37,91%
Mexico			
12 Months	6	3	14,07%
24 Months	6	3	12,81%
36 Months	6	3	11,70%

On the Country level, there were large differences between the sub-samples, given the 36-month CAAR range of almost 50 %. Brazilian ADRs had clearly outperformed the S&P 500 and the other sub-samples after every year. The single largest difference over 12 months is that of Argentine ADRs from month 24 to 36, 21,28 %, despite that six out of seven ADRs record a negative 36-month CAR.

The table below details the number of ADRs within each Industry sub-sample for which the CAR is positive or negative after 12, 24 & 36 months, respectively of trading in the aftermarket. The industry's average performance for the corresponding periods is listed to the right.

Table **V**

Industry	Positive CAR	Negative CAR	Sub-sample CAAR
Financial Services			
12 Months	5	5	-1,82%
24 Months	3	7	-25,96%
36 Months	4	6	5,43%
Construction & Industrials			
12 Months	4	3	39,51%
24 Months	5	2	22,50%
36 Months	4	3	29,64%
Consumer Services & Products			
12 Months	4	3	-2,96%
24 Months	3	4	-11,81%
36 Months	4	3	-1,38%
Utilities			
12 Months	4	1	20,23%
24 Months	3	2	10,85%
36 Months	3	2	-0,62%
Chemicals, Gas & Oil			
12 Months	4	1	10,27%
24 Months	3	2	23,11%
36 Months	3	2	33,82%
Travel & Transport Services			
12 Months	5	2	19,11%
24 Months	4	3	13,54%
36 Months	5	2	18,26%

There were clear differences between industry CAARs. Financials posted an impressive third year market adjusted-return, beating the market by over 30 %. The distribution within the industry though indicates that four really strong performers compensated for the remaining six industry peers. The intra-sample distribution of Construction & Industrials suggests a similar and more pronounced pattern. The 12-month CAAR of 39,51 % is the highest of any of the study’s samples. Clearly one or more ADRs performed impressively, explaining the high

CAAR. A general trend of negative CAARs during the second year and positive CAARs during the third year can be observed,
with the exception of Electricity & Utilities.

The table below details the number of ADRs within each Issue Period sub-sample for which the CAR is positive or negative after 12, 24 & 36 months, respectively of trading in the aftermarket. The sub-sample's average performance for the corresponding periods are listed to the right

Table **VI**

Issue Period	Positive CAR	Negative CAR	Sub-sample CAAR
1999 - 2001			
12 Months	10	5	18,80%
24 Months	9	6	5,72%
36 Months	10	5	39,89%
2002 - 2008			
12 Months	14	2	27,83%
24 Months	12	4	29,11%
36 Months	12	4	39,68%
2009 - 2014			
12 Months	2	8	-20,32%
24 Months	0	10	-47,16%
36 Months	1	9	-68,73%

Looking at Issue Periods the CAARs are very high for the 1999-2001 and 2002-2008 period while 2009-2014 recorded a massive negative return after three years at -68,73%. All CAARs for the issue periods between year two and three saw continuous development in the same direction as the first year returns. The distribution between number of positive and negative CARs for respectively issue period are quite in line with the sub-sample CAAR which indicates that there are no substantial outliers in the sample skewing the CAAR.

4.1.2 36-Month Raw Return

The table below details the individual 36-month raw return of all the samples included in the study.

Table **VII**

Sample	36-month Raw Return
Main Sample	-0,02%
Argentina	-56,37
Brazil	30,47
Mexico	-9,34%
Financials	-22,45%
Construction & Industry	9,81%
Consumer Services & Products	4,94%
Utilities	18,53%
Chemicals, Mining & Oil	30,68%
Travel & Transport	12,04%
1999 - 2001	22,91%
2002 - 2008	39,24%
2009 - 2014	-40,25%

As for the raw returns after 36 months, they were remarkably close to almost zero. This means that on average, the sampled returned nothing, but that the S&P 500 lost 13.56 %. The starkest contrasts between the raw returns and market-adjusted returns can be seen for Argentina and Financials respectively. Also, issues from 2002 - 2008 returned 16.33 % better in raw returns than those from 1991 - 2001 though 36-month CAARs were almost identical.

4.2 Tests of Significance

4.2.1 Z-Test

The Z-test tested all 41 sampled ADRs against null-hypothesis that there was no significant adjusted return. Thee CAAR follows the earlier mentioned trend of improving during the third year, but is significant for only 5 periods

Table **VIII**

	All ADRs (41 obersvations)	
Month	CAAR %	p-value
1	1,07%	0,189
2	1,27%	0,387
3	3,99%	0,128
4	3,87%	0,158
5	4,94%	0,138
6	5,40%	0,122
7	6,13%	**0,035**
8	7,16%	*0,091*
9	6,69%	*0,096*
10	7,73%	*0,072*
11	11,38%	**0,023**
12	12,27%	**0,015**
13	10,97%	**0,046**
14	9,98%	**0,050**
15	5,11%	0,189
16	5,40%	0,181
17	3,06%	0,310
18	3,86%	0,297
19	4,99%	0,249
20	6,95%	0,184
21	3,87%	0,373
22	2,11%	0,338
23	1,89%	0,465
24	2,76%	0,419
25	1,18%	0,435
26	2,35%	0,353
27	2,84%	0,407
28	3,23%	0,370
29	6,08%	0,328
30	11,04%	0,166
31	14,45%	0,112
32	14,08%	0,114
33	10,55%	*0,083*
34	13,85%	0,122
35	12,46%	0,156
36	13,58%	0,138

4.2.2 Country

Table IX below shows the result of a t-test conducted between the main sample and the sub-Samples sorted by country. Results are listed from month 1 through 36. The panel farthest to the left shows the 36-month performance of the main samples. The remaining panels detail the sub-sample performance and the significance of the t-test. Bold numbers indicate significance at the 5 % level, and Italic numbers indicate indicative significance at the 10 % level.

Table **IX**

	All ADRs	**Argentinean ADRs (7 observations)**		**Brazilian ADRs (18 observations)**		**Mexican ADRs (9 observations)**	
Month	CAAR %	CAAR %	p-value	CAAR %	p-value	CAAR %	p-value
1	1,07%	-2,26%	**0,000**	3,12%	0,882	2,32%	**0,000**
2	1,27%	-4,53%	**0,012**	3,38%	**0,000**	0,32%	0,151
3	3,99%	-10,27%	**0,000**	8,20%	**0,020**	11,52%	**0,000**
4	3,87%	-10,54%	**0,000**	7,73%	**0,000**	11,83%	**0,000**
5	4,94%	-6,74%	**0,000**	8,72%	**0,000**	13,54%	**0,000**
6	5,40%	-0,12%	**0,000**	8,91%	**0,000**	13,80%	**0,000**
7	6,13%	-0,50%	**0,000**	13,77%	**0,000**	12,28%	**0,000**
8	7,16%	0,07%	**0,000**	13,74%	**0,000**	7,59%	**0,011**
9	6,69%	1,58%	**0,000**	13,85%	**0,000**	5,73%	0,858
10	7,73%	-0,06%	**0,000**	14,92%	**0,000**	7,57%	**0,000**
11	11,38%	4,59%	**0,000**	19,08%	**0,000**	14,53%	**0,000**
12	12,27%	7,73%	**0,000**	20,88%	**0,000**	14,07%	**0,000**
13	10,97%	5,76%	**0,000**	20,90%	**0,000**	6,03%	**0,000**
14	9,98%	8,79%	**0,000**	20,66%	**0,000**	5,60%	**0,000**
15	5,11%	-6,58%	**0,000**	16,95%	**0,000**	8,70%	**0,025**
16	5,40%	-7,06%	**0,000**	17,17%	**0,000**	12,14%	**0,000**
17	3,06%	-13,96%	**0,000**	17,58%	**0,000**	5,62%	**0,000**
18	3,86%	-25,34%	**0,000**	20,62%	**0,000**	9,56%	**0,002**
19	4,99%	-29,88%	**0,000**	25,64%	**0,000**	12,30%	**0,000**
20	6,95%	-26,59%	**0,000**	29,81%	**0,000**	15,30%	**0,000**
21	3,87%	-38,79%	**0,000**	26,46%	**0,000**	13,73%	**0,000**
22	2,11%	-25,54%	**0,000**	25,51%	**0,000**	8,95%	**0,000**
23	1,89%	-40,50%	**0,000**	24,51%	**0,000**	11,95%	**0,000**
24	2,76%	-33,14%	**0,000**	22,83%	**0,000**	12,81%	**0,000**
25	1,18%	-27,26%	**0,000**	22,86%	**0,000**	13,10%	**0,000**
26	2,35%	-24,10%	**0,000**	26,81%	**0,000**	12,96%	**0,000**
27	2,84%	-14,02%	**0,000**	27,87%	**0,000**	-0,62%	0,863
28	3,23%	-12,69%	**0,000**	28,20%	**0,000**	3,54%	0,060
29	6,08%	-14,82%	**0,000**	33,57%	**0,000**	1,28%	**0,000**
30	11,04%	-2,89%	**0,000**	40,20%	**0,000**	8,98%	*0,094*
31	14,45%	2,74%	**0,000**	42,02%	**0,000**	15,03%	0,129
32	14,08%	-8,20%	**0,000**	39,75%	**0,000**	18,00%	**0,000**
33	10,55%	-17,80%	**0,000**	40,07%	**0,000**	15,63%	**0,000**
34	13,85%	-18,44%	**0,000**	39,35%	**0,000**	16,85%	**0,000**
35	12,46%	-24,82%	**0,000**	38,63%	**0,000**	16,75%	**0,000**
36	13,58%	-11,86%	**0,000**	37,91%	**0,000**	11,70%	**0,001**

In the t-test above, returns are significant for almost every of the 36 months and provide evidence that despite an overall poor 36-month performance, the Argentine sub-sample beat the S&P 500 by over 35 % from month 23 through 31. The Brazilian sub-sample shows a rather stable increase over all 36 months, whereas the Argentine and Mexican sub-samples are more volatile.

4.2.3 Industry

The table below shows the result of a t-test conducted between the main sample and the sub-Samples sorted by industry. Results are listed from month 1 through 36. The panel farthest to the left shows the 36-month performance of the main samples. The remaining panels detail the sub-sample performance and the significance of the t-test. Bold numbers indicate significance at the 5 % level, and Italic numbers indicate indicative significance at the 10 % level. Due to the length of this table, it is spread out across two pages.

Table **X**

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	All ADRs	Financial Services ADRs (10 observations)		Construction & Industrials ADRs (7 observations)		Consumer Services & Products ADRs (7 observations)	
Month	CAAR %	CAAR %	p-value	CAAR %	p-value	CAAR %	p-value
1	1,07%	-3,86%	**0,000**	7,00%	**0,005**	-1,43%	**0,001**
2	1,27%	-5,68%	**0,000**	11,53%	**0,000**	-9,03%	**0,000**
3	3,99%	-11,33%	**0,000**	18,15%	**0,000**	0,20%	**0,000**
4	3,87%	-11,68%	**0,000**	22,24%	**0,000**	0,60%	**0,000**
5	4,94%	-9,89%	**0,000**	21,46%	**0,000**	0,96%	**0,032**
6	5,40%	-8,01%	**0,000**	22,16%	**0,000**	-0,71%	**0,000**
7	6,13%	-8,56%	**0,000**	23,80%	**0,000**	8,04%	**0,021**
8	7,16%	-4,76%	**0,000**	24,77%	**0,000**	1,94%	**0,000**
9	6,69%	-1,81%	**0,000**	27,86%	**0,000**	-7,51%	**0,000**
10	7,73%	-2,30%	**0,000**	31,54%	**0,000**	-5,24%	**0,000**
11	11,38%	1,06%	**0,000**	31,08%	**0,000**	-0,61%	**0,000**
12	12,27%	-1,82%	**0,000**	39,51%	**0,000**	-2,96%	**0,000**
13	10,97%	-0,38%	**0,000**	37,73%	**0,000**	-0,23%	**0,000**
14	9,98%	-5,72%	**0,000**	37,44%	**0,000**	-0,11%	**0,000**
15	5,11%	-13,50%	**0,000**	24,10%	**0,000**	-2,85%	**0,000**
16	5,40%	-19,41%	**0,000**	21,88%	**0,000**	2,40%	**0,000**
17	3,06%	-21,32%	**0,000**	22,25%	**0,000**	-11,15%	**0,000**
18	3,86%	-25,43%	**0,000**	22,74%	**0,000**	-2,21%	**0,000**
19	4,99%	-21,04%	**0,000**	25,95%	**0,000**	-5,41%	**0,000**
20	6,95%	-22,16%	**0,000**	21,09%	**0,000**	-2,87%	**0,000**
21	3,87%	-27,78%	**0,000**	11,09%	**0,000**	-7,15%	**0,000**
22	2,11%	-22,59%	**0,000**	22,39%	**0,000**	-11,62%	**0,000**
23	1,89%	-30,18%	**0,000**	22,77%	**0,000**	-12,39%	**0,000**
24	2,76%	-25,96%	**0,000**	22,50%	**0,000**	-11,81%	**0,000**
25	1,18%	-23,39%	**0,000**	20,40%	**0,000**	-18,43%	**0,000**
26	2,35%	-19,32%	**0,000**	19,18%	**0,000**	-19,53%	**0,000**
27	2,84%	-11,96%	**0,000**	21,42%	**0,000**	-23,89%	**0,000**
28	3,23%	-12,08%	**0,000**	18,96%	**0,000**	-18,01%	**0,000**
29	6,08%	-8,10%	**0,000**	18,13%	**0,000**	-16,05%	**0,000**
30	11,04%	-2,74%	**0,000**	20,40%	**0,000**	-9,94%	**0,000**
31	14,45%	1,97%	**0,000**	18,43%	**0,000**	0,19%	**0,000**
32	14,08%	0,12%	**0,000**	24,92%	**0,000**	-3,90%	**0,000**
33	10,55%	-2,05%	**0,000**	19,72%	**0,000**	-0,10%	**0,000**
34	13,85%	1,48%	**0,000**	20,02%	**0,000**	2,81%	**0,000**
35	12,46%	0,73%	**0,000**	20,02%	**0,000**	1,07%	**0,000**
36	13,58%	5,43%	**0,000**	29,64%	**0,000**	-1,38%	**0,000**

	All ADRs	Electricity & Utilities ADRs (5 observations)		Chemicals, Gas & Oil ADRs (5 observations)		Travel & Transport Services ADRs (7 observations)	
Month	CAAR %	CAAR %	p-value	CAAR %	p-value	CAAR %	p-value
1	1,07%	-0,64%	0,730	5,89%	**0,001**	2,92%	**0,002**
2	1,27%	-1,13%	**0,000**	1,66%	**0,006**	8,77%	**0,000**
3	3,99%	-0,29%	**0,000**	7,11%	0,818	14,83%	**0,000**
4	3,87%	-3,02%	**0,000**	1,52%	0,928	16,59%	**0,000**
5	4,94%	2,15%	**0,000**	-1,13%	**0,000**	18,70%	**0,000**
6	5,40%	-1,81%	**0,000**	5,15%	0,062	21,23%	**0,000**
7	6,13%	-2,75%	**0,000**	5,53%	**0,000**	17,42%	**0,000**
8	7,16%	-0,49%	**0,000**	4,14%	**0,000**	16,25%	**0,000**
9	6,69%	4,40%	**0,000**	4,15%	**0,000**	15,94%	**0,000**
10	7,73%	-0,06%	**0,000**	3,79%	**0,000**	19,29%	**0,000**
11	11,38%	9,32%	**0,000**	7,97%	**0,000**	20,98%	**0,000**
12	12,27%	20,23%	0,147	10,27%	**0,000**	19,11%	**0,000**
13	10,97%	20,48%	**0,000**	-0,12%	**0,000**	9,71%	**0,000**
14	9,98%	22,32%	**0,000**	8,06%	**0,000**	7,82%	**0,000**
15	5,11%	15,11%	**0,000**	7,57%	**0,007**	13,82%	**0,000**
16	5,40%	22,53%	**0,000**	4,46%	**0,014**	18,62%	**0,000**
17	3,06%	16,25%	**0,000**	9,83%	**0,000**	19,99%	**0,000**
18	3,86%	13,72%	**0,000**	14,92%	**0,000**	17,27%	**0,000**
19	4,99%	5,57%	**0,006**	18,23%	**0,000**	23,08%	**0,000**
20	6,95%	14,29%	**0,002**	27,55%	**0,000**	26,86%	**0,000**
21	3,87%	12,91%	**0,000**	21,43%	**0,000**	27,78%	**0,000**
22	2,11%	12,60%	**0,000**	27,15%	**0,000**	13,76%	**0,000**
23	1,89%	11,51%	**0,000**	19,77%	**0,000**	15,47%	**0,000**
24	2,76%	10,85%	**0,000**	23,11%	**0,000**	13,54%	**0,000**
25	1,18%	7,90%	**0,000**	30,70%	**0,000**	13,24%	**0,000**
26	2,35%	9,12%	**0,000**	35,45%	**0,000**	17,80%	**0,000**
27	2,84%	11,48%	**0,000**	17,85%	**0,000**	12,12%	**0,000**
28	3,23%	14,11%	**0,000**	16,64%	**0,000**	13,59%	**0,000**
29	6,08%	9,46%	**0,000**	29,92%	**0,000**	9,26%	**0,000**
30	11,04%	14,69%	**0,000**	44,24%	**0,000**	14,40%	**0,000**
31	14,45%	14,95%	**0,031**	46,50%	**0,000**	16,42%	**0,000**
32	14,08%	11,04%	**0,025**	41,09%	**0,000**	22,00%	**0,000**
33	10,55%	6,79%	**0,000**	40,03%	**0,000**	18,52%	**0,000**
34	13,85%	6,75%	**0,000**	45,64%	**0,000**	14,57%	**0,000**
35	12,46%	6,00%	**0,000**	33,24%	**0,000**	19,57%	**0,000**
36	13,58%	-0,62%	**0,000**	33,82%	**0,000**	18,26%	**0,000**

The T-test results on the industry sub-sample are highly significant, most of them at the 4-star level, and provide more insight into the volatility of each industry. All industries, including those with near-zero 36 months CAAR were rather volatile. This indicates that there were many opportunities for investors to make losses as well gains. The standout industry was Chemicals, Gas & Oil, recording both the highest top at 46,5 % in month 31, and the highest 36-month return at 33.82 %. Broadly speaking, the sub-sample's best run was over the last 10 months.

4.2.4 Issue Period

The table below shows the result of a t-test conducted between the main sample and the sub-Samples sorted by period of issue. Results are listed from month 1 through 36. The panel farthest to the left shows the 36-month performance of the main samples. The remaining panels detail the sub-sample performance and the significance of the t-test. Bold numbers indicate significance at the 5 % level, and Italic numbers indicate indicative significance at the 10 % level.

Table **XI**

	All ADRs	**1999-01 ADRs (15 observations)**		**2002-08 ADRs (16 observations)**		**2009-14 ADRs (10 observations)**	
Month	CAAR %	CAAR %	p-value	CAAR %	p-value	CAAR %	p-value
1	1,07%	2,72%	0,909	1,52%	*0,071*	-1,80%	**0,045**
2	1,27%	-2,18%	0,974	6,20%	**0,000**	-4,18%	**0,000**
3	3,99%	6,21%	**0,044**	7,92%	**0,000**	-6,70%	**0,000**
4	3,87%	6,92%	**0,000**	8,69%	**0,000**	-9,11%	**0,000**
5	4,94%	13,31%	**0,000**	10,29%	**0,000**	-17,02%	**0,000**
6	5,40%	18,31%	**0,000**	11,37%	**0,000**	-22,12%	**0,000**
7	6,13%	21,33%	**0,000**	12,02%	**0,000**	-23,92%	**0,000**
8	7,16%	17,26%	**0,000**	13,88%	**0,000**	-20,98%	**0,000**
9	6,69%	14,53%	**0,000**	16,82%	**0,000**	-20,85%	**0,000**
10	7,73%	14,83%	**0,000**	17,91%	**0,000**	-19,42%	**0,000**
11	11,38%	17,32%	**0,000**	25,13%	**0,000**	-20,47%	**0,000**
12	12,27%	18,80%	**0,000**	27,83%	**0,000**	-20,32%	**0,000**
13	10,97%	14,93%	**0,000**	26,28%	**0,000**	-21,59%	**0,000**
14	9,98%	13,51%	**0,000**	27,09%	**0,000**	-22,54%	**0,000**
15	5,11%	5,79%	**0,005**	24,76%	**0,000**	-25,90%	**0,000**
16	5,40%	7,11%	**0,002**	26,53%	**0,000**	-28,99%	**0,000**
17	3,06%	2,15%	0,104	27,02%	**0,000**	-32,99%	**0,000**
18	3,86%	4,90%	**0,000**	25,58%	**0,000**	-32,91%	**0,000**
19	4,99%	7,49%	**0,000**	25,73%	**0,000**	31,01%	**0,000**
20	6,95%	12,49%	**0,000**	26,84%	**0,000**	-31,36%	**0,000**
21	3,87%	7,98%	**0,000**	22,82%	**0,000**	-36,89%	**0,000**
22	2,11%	10,47%	**0,000**	25,59%	**0,000**	-42,19%	**0,000**
23	1,89%	4,19%	**0,000**	28,08%	**0,000**	-47,67%	**0,000**
24	2,76%	5,72%	**0,000**	29,11%	**0,000**	-47,16%	**0,000**
25	1,18%	11,53%	**0,000**	27,51%	**0,000**	-54,76%	**0,000**
26	2,35%	11,18%	**0,000**	33,27%	**0,000**	-54,82%	**0,000**
27	2,84%	8,61%	**0,000**	33,93%	**0,000**	-57,73%	**0,000**
28	3,23%	16,72%	**0,000**	29,80%	**0,000**	-59,30%	**0,000**
29	6,08%	19,28%	**0,000**	30,81%	**0,000**	-58,68%	**0,000**
30	11,04%	31,97%	**0,000**	35,66%	**0,000**	-60,88%	**0,000**
31	14,45%	39,30%	**0,000**	39,35%	**0,000**	-64,70%	**0,000**
32	14,08%	36,02%	**0,000**	40,19%	**0,000**	-62,05%	**0,000**
33	10,55%	36,33%	**0,000**	37,93%	**0,000**	-67,12%	**0,000**
34	13,85%	40,88%	**0,000**	36,82%	**0,000**	-66,39%	**0,000**
35	12,46%	37,57%	**0,000**	37,65%	**0,000**	-67,77%	**0,000**
36	13,58%	39,89%	**0,000**	39,68%	**0,000**	-68,73%	**0,000**

The return for the issue period sub-sample were highly significant for the majority of the 36-month period. There were no major fluctuations within each issue period and the sub-sample follow the initial performance trend. However, the 1999-2001 period saw most fluctuation and was the only sub-sample to have a negative and positive CAAR at one point in time during the 36-month period. The first two issue periods experienced almost identical positive CAARs at 39,89 and 39,68% at the end of the period while the third and last issue period saw a staggering -68,73% negative return.

4.3 Regression

Table **XII**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COUNTRY=100	-0.000444	0.000434	-1.022769	0.3064
COUNTRY=300	-0.001255	0.000542	-2.314893	0.0206
COUNTRY=400	-0.001211	0.000592	-2.044692	0.0409
COUNTRY=500	-0.000501	0.000241	-2.079418	0.0376
COUNTRY=600	-0.001933	0.000741	-2.607336	0.0091
EVENT_DAY	2.26E-07	8.98E-07	0.251793	0.8012
D(EXCHANGE_RATE)	-0.000196	6.69E-05	-2.934734	0.0033
INDUSTRY=10	-0.000844	0.000659	-1.281008	0.2002
INDUSTRY=30	-0.001400	0.000481	-2.913005	0.0036
INDUSTRY=40	-0.001490	0.000605	-2.463608	0.0138
INDUSTRY=50	-0.001421	0.000448	-3.172047	0.0015
INDUSTRY=70	-0.000533	0.000461	-1.154826	0.2482
P_B_RATIO	-0.000152	9.19E-05	-1.658813	0.0972
D(VIX)	0.000821	0.000690	1.190232	0.2340
YEAR_OF_ISSUE=1999	-0.000153	0.000541	-0.282364	0.7777
YEAR_OF_ISSUE=2000	0.000885	0.000429	2.061671	0.0392
YEAR_OF_ISSUE=2001	0.001623	0.000497	3.266856	0.0011
YEAR_OF_ISSUE=2002	0.001784	0.000564	3.162810	0.0016
YEAR_OF_ISSUE=2004	0.001630	0.000374	4.353391	0.0000
YEAR_OF_ISSUE=2007	0.000220	0.000672	0.326605	0.7440
YEAR_OF_ISSUE=2008	0.002723	0.000841	3.238035	0.0012
YEAR_OF_ISSUE=2009	-0.001108	0.000273	-4.059630	0.0000
YEAR_OF_ISSUE=2011	-0.000435	0.000363	-1.198068	0.2309
YEAR_OF_ISSUE=2012	-0.000207	0.000387	-0.535451	0.5923
YEAR_OF_ISSUE=2013	0.000227	0.000473	0.480820	0.6306
YEAR_OF_ISSUE=2014	0.000688	0.000757	0.908409	0.3637
C	0.001144	0.000880	1.301011	0.1933

R-squared	0.003840	Mean dependent var	0.000193
Adjusted R-squared	0.003012	S.D. dependent var	0.033503
S.E. of regression	0.033453	Akaike info criterion	-3.956489
Sum squared resid	34.97529	Schwarz criterion	-3.949281
Log likelihood	61906.49	Hannan-Quinn criter.	-3.954181
F-statistic	4.634103	Durbin-Watson stat	2.129505
Prob(F-statistic)	0.000000		

The variables containing dummies are Country, Industry and Year of Issue. For Country the dummy is Brazil and the regression is testing the other countries against Brazil were all countries but Argentina achieve significance carrying negative coefficients. The industries were tested against Construction & Industrials were 3 out of 5 achieved significance also them with a negative coefficient. The two industries not achieving significance were Banks & Financial Services and Travel & Transport. Year of Issue were tested against 2006. The year

of issues that reached significance were between year 2000-2002, 2004 as well as 2008-2009 were every significant year except 2009 carried a positive coefficient.

The variables without dummies were Event Day (number of trading days since issue), exchange rate, P/B-ratio and VIX. Event Day were highly insignificant at the 0,8012 level whereas the VIX also was insignificant at the 0,2340 level. The P/B-ratio showed indicative significance at 0,0972 and the Exchange rate being the only highly significant one at 0,0033 level with a negative coefficient.

The R-squared is low but so is the standard error of the regression at 0,033453. Adjusted for period-specific heteroskedasticity, White periods were used as described in the methodology. Furthermore, to control for autocorrelation the use of the differences equation gives a Durbin-Watson score of 2,129505 suggesting low autocorrelation. As a consequence of the differences equation time-series variables become much smaller as do their coefficients. This, however does not mean that the regression analysis loses explicatory power. The low coefficients result from the day-day differences, however this should not be confused as economic insignificance.

4.4 Hypothesis Outcome

4.4.1 Country

The regression gives p-values $p < 0.05$ for all countries except for Argentina, meaning that there are significant differences between the CARs of Chile, Colombia, Mexico and Peru vs Brazil.

H0: There are no significant differences in CAR due to country, is rejected
HI: There are significant differences in CAR due to country, is accepted.

4.4.2 Industry

The regression gives p-values $p < 0.05$ for all industries except for Financials, and Travel & Transport Services. Thus, a the market-adjusted returns of Construction & Industrials were significantly different to those of Consumer Services & Products, Energy & Utilities as well as Chemicals, Gas & Oil.

***H0*:** There are no significant difference in CAR due to Industry, is partially rejected.
H*I:* There are significant differences in CAR due to industry, is partially accepted

4.4.3 P/B-Ratio

The p-value of 0,0972 > 0,05 is not significant under this study's significance level of 5 %

***H0*:** There is no significant relationship between CAR and P/B-ratio, is accepted.
***HI*:** There is a significant negative relationship between CAR and P/B-ratio, is rejected.

4.4.4 Year of Issue

P < 0.05 for 2001, 2002, 2004 and 2008, meaning issues these years had significantly different returns than those of the reference year 2006.

However, all years are not significant.

***H0*:** There are no significant differences in CAR due to the year of issue, is rejected.
***HI*:** There are significant differences in CAR due to the year of issue,
is accepted.

4.4.5 Event Day

The p-value 0.8012 is not significant under the a significance value of 0.05.
Therefore, the author's hypothesis is not proved.

***H0*:** There is no significant relationship between CAR and the number of trading days spent in the aftermarket, is accepted.
***HI*:** There is no significant relationship between CAR and the number of trading days spent in the aftermarket, is rejected.

4.4.6 VIX

The p-value for VIX exceeds 0.05, and is therefore not significant

***H0*:** There is no significant relationship between CAR and the level of VIX, is accepted.
***H0*:** There is significant negative relationship between CAR and the level of VIX, is rejected.

4.4.7 Exchange Rate

The p-value is well below 0.05, confirming the authors' hypothesis.

***H0*:** There is no significant relationship between CAR and the exchange-rate is rejected.
***HI*:** There is a significant relationship between CAR and the exchange-rate, is accpted.

5. ANALYSIS

Prior to discussing the results, the authors make an important initial remark:
As addressed in the regression results, the regression coefficients are low but have economic significance since they are calculated on the day-to-day differences of the time-series variables. As detailed by appendix VIII, the mean CAR was 0.0066224, or 0,6624 % meaning that for a Construction & Industrials gain of 0,6624 %, Electricity & Utilities only gain 0,1490 %.

The exchange-rate was as expected significant, meaning that CAARs were not adversely affected by high ADR premia. For the 36-month period the CAAR was a positive 13,58 %, in line with Schaub (2013), and Callaghan et al. (1999) though the values are not as extreme, likely due to less statistical noise caused by the volatile U.S. 1990s. With support from the results of the adjusted regression analysis, found in table XII, established IPO-literature theories appear to explain the causality of this positive ADR IPO performance. As hypothesized, there are significant differences between countries and industries. Aggarwal et al. (1993) found considerable differences between common Latin American IPOs from the 1980s. The results from that study however contrast with this one, as Brazilian ADR IPOs performed rather well, as opposed to the -47 % market-adjusted return recorded by Aggarwal et al. (1993) There is statistical support for differences between all the countries and the reference Brazil, except for Argentina. Likely, this is due to higher residuals within the Argentine sub-sample caused by high volatility, as six out of seven Argentine issues entered U.S. capital markets either during the Argentine crisis or shortly before the sub-prime crisis. The t-test performed on the country-sorted sub-sample is significant for almost every 36 month for Brazil, Mexico as well as Argentina. The extraordinary 56,37% raw return loss of Argentine ADRs is somewhat palliated by the negative S&P 500 performance (see Appendix VII), but remains decidedly poor. However, although the t-test produces significant diverging returns for Argentina versus the main samples, the volatility and insignificant regression result prevents the authors from drawing definitive conclusions on the Argentine performance.

The Brazilian positive performance however, has robust statistical support behind it, as there were significant differences between the dummy and all countries except for Argentina. In fact, the Brazilian sub-sample emerges as the second best-performing sub-sample. The t-test indicates that returns grow quickly during the first 12 months and then settles at fairly stable growth rate, clearly beating the market by the end of 36 months. The Brazilian sample is also the most evenly distributed sub-sample, and should as such be cleared for industry-specific effects. Yielding close to 40 % in raw returns, the Brazilian ADR IPOs appear to have been undervalued at the time of introduction and would have been good investments.

The findings of Aggarwal et al. (1993) appear to be partly applicable on the Mexican ADR IPOs, as this study also finds a moderate negative market-adjusted returns and less volatility when compared to other countries. On the basis of both the regression and the significance tests results, Mexican ADRs appear be slightly overvalued at the time of issue. The industry seems to be a performance determinant as well, given significant differences between the dummy Construction & Industrials and the industries Consumer Products & Services, Electricity & Utilities and Chemicals, Gas & Oil. All these have negative coefficients, indicating that they underperform relative to Construction & Industrials which enjoyed a strong market-adjusted performance close to 30 %. However, there were strong intra-industry differences as 3 out 7 ADRs were outperformed by the market by month 36. This, alongside

an impressive CAAR during year one which breaks the main sample's main pattern, indicates that a number of issues in this particular industry were considerably undervalued and quickly increased in value after the time of introduction. Connecting this to the conclusions drawn by Ritter (1991) on fad effects, Latin American Construction & Industrial firms are not subject to fad effects, which likely explain the high early returns. An initial information asymmetry could also explain this pattern, although given the existence of a priced underlying security, the fad effects on American markets is a more likely explanation. The same goes for Chemicals, Gas & Oil, which is the study's best performing category. Remaining industries did not incur heavy early losses, as expected. Consumer products & services ADRs was the worst early performer, losing 9,03 % after 2 months of trading according to the t-test, suggesting a slight initial overvaluation. Apart from Chemicals, Gas & Oil and Construction & Industrials, no sub-samples significantly indicated the presence of considerable fad effects and overvaluation.

The P/B-ratio was included to capture the fad effects, but failed to deliver any significant results. The authors offer a possible explanation for this:
A P/B-ratio close to 1 indicates that the market believes a security is fairly priced. Conversely, a P/B below 1 indicates that the market is not prepared to pay the share price for net assets, indicating perceived as risk or financial distress. Just as very high P/B-ratios might be a sign of overvaluation and a future negative performance, a P/B-ratio below 1 might represent investor fear that is later realized. In other words, extreme P/B-ratio values might increase the risk of a poor market-adjusted return.

The P/B-ratio did not provide evidence of timing importance; however significant results for the issue years 2001, 2002, 2004 and 2009 do this. 2001, 2002 and 2004 have positive coefficient as compared to 2006, indicating issues these year performed better than those from 2006. The 2002-2008 issue period grouping has a market-adjusted and raw return close to 40 %. Looking at the S&P 500 returns for the corresponding years (Appendix VIII), there seems to exist a negative correlation between the Latin American ADRs and the S&P 500. This view is further strengthened by the positive coefficient of VIX, meaning that when fear rises in the U.S. the Latin American ADRs perform better than the S&P 500.

This pattern is well in line with the findings of Ritter (1991), as issues from these cool years outperformed other years of issue. An important implication of this is that similarly to common IPOs, ADR IPOS from cool years are more likely to outperform the market.

Comparing the performance of S&P 500 with the CAAR for the issues in the period 2009 to 2014, the negative correlation also becomes clear. These results are also supported by Schaub (2003), indicating that hot years in the U.S. generally are bad times to invest in Latin American ADRs IPOs.

From the test results, with robust statistical support found in the regression in particular, a pattern emerged, indicating that certain combinations of country, industry as issue year are likely to outperform the market during the initial 36-month aftermarket period.
However, there is one important insight found in the t-test that gives this pattern additional level of insight. That is the strong final year performance across the sample.
Ten out of twelve sub-samples enjoy significant positive runs during the last year, including some of the worst performers. For instance, a negative -25 % market-adjusted performance by financial firms was reversed during the last year to rally and finally beat the S&P 500 after the 36-month period. With these insights, the authors draw their conclusions.

6. CONCLUSIONS

6.1 Concluding Remarks

The authors conclude that factors cited by established IPO literature as determinants of market-adjusted performance explain the market-adjusted performance of Latin American ADR IPOs issued in the period 1999 to 2014 to a high degree. The results contrast with those of earlier ADR and IPO performance studies, as the market-adjusted performance is found to be positive. Nevertheless, the determinants of performance identified in this study's results are the same as those identified by established IPO literature. The results show that an Latin American ADR IPOs performance is primarily predicted by the ADRs country, industry and the timing of the introduction. The authors conclude that timing is of the essence, and observe a negative relationship between the U.S. market performance and Latin American ADR performance. Simply put, Latin American ADR issues from periods characterized by a low S&P 500 level and a high VIX level, respectively, are associated with a high probability of outperforming the general U.S. market.

A clearly defined formula for positive returns cannot be fully established, but there are useful insights for the prospective investor:

I. A successful timing is paramount to success
II. Brazilian ADR IPOs outperform their Latin American Peers on average
III. ADRs in industries that are prone to fad effects run higher risk of incurring negative returns than ADRs in industries that are not prone to fad effects.
IV. The strongest runs generally occur either at the beginning or end of the 36-months that follow the introduction

6.2 Suggestions for further research

This study did not include the first-day return as an independent variable in its regression analysis. The authors encourage future studies to do this in order to achieve a higher reliability and continue to close the research gap between ADR and IPO literature

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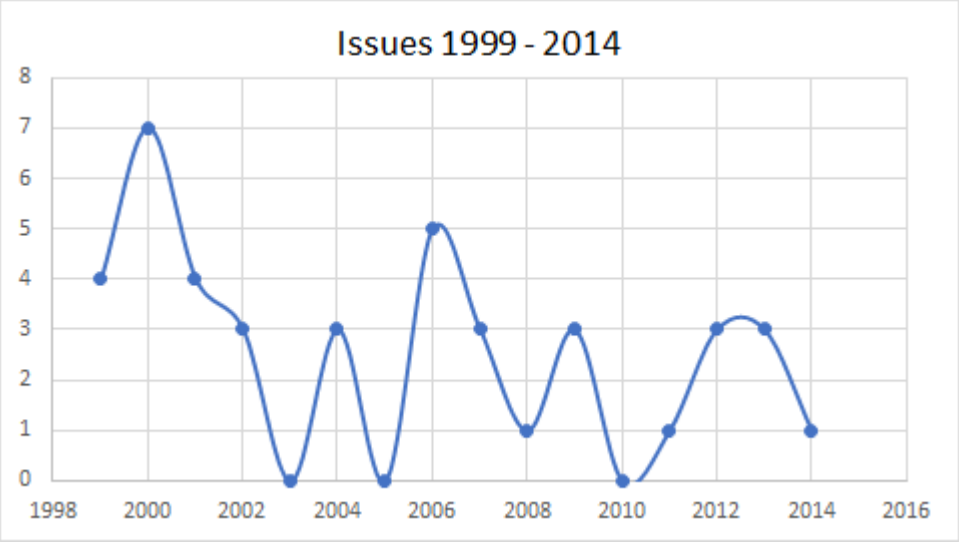
8. APPENDIX

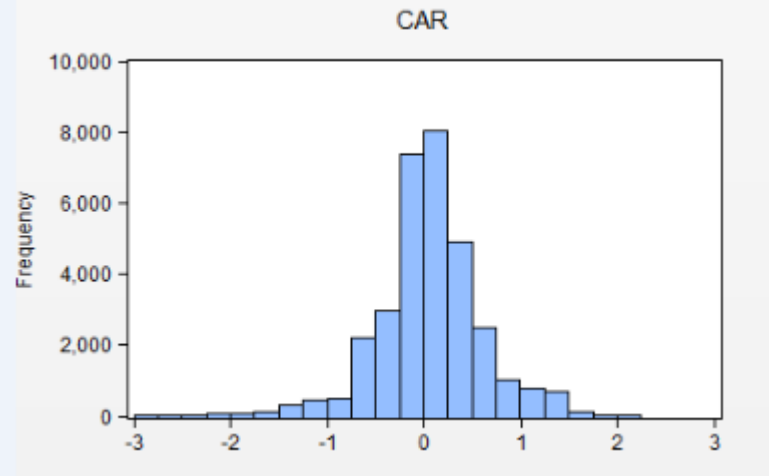
8.1 Appendix I – Sample Distribution

Industry / Country	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Total
Banking & Financial Services	3	3	2	1	1	0	10
Construction & Industry	1	3	0	0	1	2	7
Consumer Services & Products	0	4	0	0	3	0	7
Electricity & Utilities	2	3	0	0	0	0	5
Chemicals, Oil & Mining	1	3	0	1	0	0	5
Travel & Transport	0	2	0	1	4	0	7
Total	7	18	2	3	9	2	41

8.2 Appendix II – Sample Distribution



8.3 Appendix III - Normal Distribution Histogram of CAR



8.3 Appendix IV - Multicollinearity Matrix

Covariance Correlation	CAR	COUNTRY	EVENT_DAY	EXCHANGE...	INDUSTRY	P_B_RATIO	VIX	YEAR_OF_I...
CAR	0.278928 1.000000							
COUNTRY	-9.711466 -0.117016	24693.75 1.000000						
EVENT_DAY	4.922183 0.041233	-8.27E-14 -2.33E-18	51090.67 1.000000					
EXCHANGE_RATE	-64.34167 -0.182841	20465.96 0.195464	2424.799 0.016100	443960.2 1.000000				
INDUSTRY	1.815430 0.162222	605.0000 0.181693	-6.50E-15 -1.36E-18	685.4999 0.048553	449.0000 1.000000			
P_B_RATIO	0.056031 0.097986	26.54319 0.156005	-5.69E-15 -2.33E-17	51.10960 0.070845	3.838340 0.167302	1.172305 1.000000		
VIX	-0.174487 -0.037073	-184.8653 -0.132008	102.6252 0.050947	-607.8114 -0.102361	1.418109 0.007510	-1.513880 -0.156895	79.41902 1.000000	
YEAR_OF_ISSUE	-1.023453 -0.399346	204.6250 0.268345	-4.92E-14 -4.49E-17	1245.524 0.385219	-0.050000 -0.000486	1.142285 0.217411	-12.72488 -0.294252	23.54750 1.000000

8.4 Appendix V - Initial, unadjusted Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COUNTRY=100	-0.233098	0.008068	-28.89199	0.0000
COUNTRY=300	0.086220	0.019366	4.452136	0.0000
COUNTRY=400	1.463818	0.058914	24.84665	0.0000
COUNTRY=500	-0.154977	0.007666	-20.21679	0.0000
COUNTRY=600	-0.716070	0.017016	-42.08092	0.0000
EVENT_DAY	0.000150	9.47E-06	15.86666	0.0000
EXCHANGE_RATE	-0.000701	2.16E-05	-32.40847	0.0000
INDUSTRY=10	-0.421550	0.011079	-38.04965	0.0000
INDUSTRY=30	-0.538808	0.010796	-49.90893	0.0000
INDUSTRY=40	-0.319431	0.011567	-27.61676	0.0000
INDUSTRY=50	-0.396695	0.010330	-38.40140	0.0000
INDUSTRY=70	-0.078771	0.013190	-5.971862	0.0000
P_B_RATIO	0.022705	0.002636	8.612528	0.0000
VIX	-0.010244	0.000281	-36.45872	0.0000
YEAR_OF_ISSUE=1999	0.251128	0.013626	18.43028	0.0000
YEAR_OF_ISSUE=2000	0.081992	0.010173	8.059664	0.0000
YEAR_OF_ISSUE=2001	0.303341	0.013304	22.80080	0.0000
YEAR_OF_ISSUE=2002	0.330585	0.014400	22.95722	0.0000
YEAR_OF_ISSUE=2004	0.242370	0.013196	18.36658	0.0000
YEAR_OF_ISSUE=2007	-0.037663	0.014601	-2.579535	0.0099
YEAR_OF_ISSUE=2008	0.299129	0.031757	9.419288	0.0000
YEAR_OF_ISSUE=2009	-0.405015	0.013067	-30.99562	0.0000
YEAR_OF_ISSUE=2011	-0.165751	0.018598	-8.912295	0.0000
YEAR_OF_ISSUE=2012	-0.106703	0.014143	-7.544708	0.0000
YEAR_OF_ISSUE=2013	-0.621842	0.014993	-41.47507	0.0000
YEAR_OF_ISSUE=2014	-0.084750	0.029317	-2.890796	0.0038
C	0.600857	0.016445	36.53745	0.0000

R-squared	0.493439	Mean dependent var	0.063044
Adjusted R-squared	0.493018	S.D. dependent var	0.528144
S.E. of regression	0.376053	Akaike info criterion	0.882688
Sum squared resid	4425.327	Schwarz criterion	0.889888
Log likelihood	-13795.90	Hannan-Quinn criter.	0.884994
F-statistic	1172.398	Durbin-Watson stat	0.010598
Prob(F-statistic)	0.000000		

8.5 Appendix VI - Regression adjusted for Heteroskedacity

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COUNTRY=100	-0.233098	0.114726	-2.031789	0.0422
COUNTRY=300	0.086220	0.219907	0.392075	0.6950
COUNTRY=400	1.463818	0.432149	3.387299	0.0007
COUNTRY=500	-0.154977	0.113717	-1.362838	0.1729
COUNTRY=600	-0.716070	0.194085	-3.689471	0.0002
EVENT_DAY	0.000150	0.000162	0.927154	0.3539
EXCHANGE_RATE	-0.000701	0.000158	-4.446450	0.0000
INDUSTRY=10	-0.421550	0.157074	-2.683772	0.0073
INDUSTRY=30	-0.538808	0.160575	-3.355499	0.0008
INDUSTRY=40	-0.319431	0.190027	-1.680974	0.0928
INDUSTRY=50	-0.396695	0.168561	-2.353421	0.0186
INDUSTRY=70	-0.078771	0.155357	-0.507034	0.6121
P_B_RATIO	0.022705	0.031731	0.715534	0.4743
VIX	-0.010244	0.002003	-5.113808	0.0000
YEAR_OF_ISSUE=1999	0.251128	0.168976	1.486180	0.1372
YEAR_OF_ISSUE=2000	0.081992	0.124467	0.658743	0.5101
YEAR_OF_ISSUE=2001	0.303341	0.178799	1.696552	0.0898
YEAR_OF_ISSUE=2002	0.330585	0.189279	1.746550	0.0807
YEAR_OF_ISSUE=2004	0.242370	0.139001	1.743662	0.0812
YEAR_OF_ISSUE=2007	-0.037663	0.214122	-0.175898	0.8604
YEAR_OF_ISSUE=2008	0.299129	0.287027	1.042163	0.2973
YEAR_OF_ISSUE=2009	-0.405015	0.182785	-2.215795	0.0267
YEAR_OF_ISSUE=2011	-0.165751	0.165132	-1.003745	0.3155
YEAR_OF_ISSUE=2012	-0.106703	0.157932	-0.675629	0.4993
YEAR_OF_ISSUE=2013	-0.621842	0.155548	-3.997752	0.0001
YEAR_OF_ISSUE=2014	-0.084750	0.275752	-0.307339	0.7586
C	0.600857	0.208861	2.876833	0.0040

R-squared	0.493439	Mean dependent var	0.063044
Adjusted R-squared	0.493018	S.D. dependent var	0.528144
S.E. of regression	0.376053	Akaike info criterion	0.882688
Sum squared resid	4425.327	Schwarz criterion	0.889888
Log likelihood	-13795.90	Hannan-Quinn criter.	0.884994
F-statistic	1172.398	Durbin-Watson stat	0.010598
Prob(F-statistic)	0.000000		

8.6 Appendix VII - 20 year performance of S&P 500 (Yahoo Finance, 2018)

8.7 Appendix VIII - Descriptive Statistics

	CAR	COUNTRY	EVENT_DAY	EXCHANGE_RATE	INDUSTRY	P_B_RATIO	VIX	YEAR_OF_ISSUE
Mean	0.066224	287.8049	392.0000	198.8633	33.65854	34.70490	20.13531	2004.976
Median	0.056947	200.0000	392.0000	3.250250	30.00000	1.830000	18.30500	2004.000
Maximum	2.105891	600.0000	783.0000	3437.635	70.00000	3157.480	80.86000	2014.000
Minimum	-2.957246	100.0000	1.000000	0.987000	10.00000	-4.160000	9.140000	1999.000
Std. Dev.	0.523798	158.0296	226.0360	605.9920	21.04079	218.6611	8.559399	4.795781
Skewness	-0.139274	0.571882	2.34E-18	3.288627	0.549262	8.381166	2.003017	0.386529
Kurtosis	4.842186	1.857607	1.799996	12.74505	1.997955	81.76945	9.782477	1.809590

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8.7 Appendix VIII – Industry/ Country Code Legend

Country	Code	Industry	Code
Argentina	100	Banks & Financial Services	10
Brazil	200	Construction & Industry	20
Chile	300	Food Products	30
Colombia	400	Electricity & Utilities	40
Mexico	500	Mining, Petroleum & Chemicals	50
Peru	600	Telecommunications	60
		Travel & Transport	70