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Calendar anomalies in stock returns: Evidence from South America

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Bachelor's thesis
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1. INTRODUCTION

The efficient market hypothesis suggests that all securities are priced efficiently to fully reflect all the information of the intrinsic value. An efficient market is one where all unexploited returns are eliminated by arbitrage. However, in a context of financial markets and especially in the case of equity returns several seasonal effects that create higher or lower returns depending on the time have been noted. They are called anomalies because they cannot be explained by traditional asset pricing models. Examples of such patterns include e.g. the January effect, the Day-of-the-week effect and the week of the month effects. The appearance of such anomalies violates the weak form of market efficiency, because asset prices are not random, but predictable based on some calendar effect. This allows investors to develop trading strategies which makes abnormal profits on the basis of such anomalies. For example, investors may be willing to sell securities on Fridays and willing to buy on Mondays in order to take the advantage of these effects.

An extensive literature has documented these calendar anomalies on stock markets. Gibbons and Hess (1981) found that stock returns on US stock markets are significantly lower on Mondays and higher on Fridays. Jaffrey and Westerfield (1985) found some international evidence of similar patterns. Afterwards more international evidence on stock markets is found by e.g. Condoyanni et al. (1987) and e.g. Ajay & al. (2004) on emerging markets. In addition to studies presented before e.g. Kato and Schallheim (1985) presented evidence of so called January effect. Existing empirical evidence shows similar patterns also on bond markets. Jordan and Jordan (1991) found the Day of the week effect on corporate bond returns and later e.g. Nippani & Arize (2007) have reported similar results.

However, most of the former studies have mainly and extensively concentrated on the US market or on another developed market like Japan and the UK. Little attention is paid to the emerging equity markets. The emerging markets have been a hot topic among the investors during the last years and because of their attractiveness in international finance it is interesting to study if those kinds of anomalies appear also on those markets.

In this bachelor thesis we study, if there exist seasonal patterns in stock returns on emerging stock markets in Latin America including Argentina, Mexico, Chile and Brazil. The purpose of this thesis is to analyse day of the week effects and monthly patterns during a time period from 1997 to 2006 and to provide some sort of evidence if these patterns appear also there. Another objective is to study whether those effects have declined or disappeared over the years by splitting the whole data to two sub-periods. Some studies have documented that seasonal patterns might be time varying and that they are declining at least on some more developed market. Therefore it is interesting to try to find some evidence how it is on these markets which we can consider at least a bit undeveloped. The declining of the seasonal patterns may be one sign of a trend toward more efficient capital markets.

This bachelor thesis is organised as follows. The next chapter gives the empirical background of the market efficiency, introduces the main seasonal patterns and covers the former empirical studies and the results. In chapter 3 we describe the data and its properties. Chapter 4 presents the empirical results. Finally chapter 5 concludes this thesis and gives some topics for further research.

2. THEORETICAL BACKGOROUND

2.1 Efficient market hypothesis

Financial markets are allocationally efficient when all the firms with the most promising investment opportunities have access to the needed funds. But in order that the markets are allocationally efficient they need to be both internally and externally efficient. An externally efficient market means that information is quickly and largely disseminated allowing each security's price to adjust rapidly to new information so that it reflects investment value. An internally efficient market refers to markets where brokers and dealers compete fairly so that transaction costs are low and the speed of transactions is high. (Sharpe et al. 1999)

When someone refers to efficient capital markets, they mean that security prices reflect fully all the information that is available and investors incorporate new information immediately and fully in securities prices. This information has to be something new and surprising, anything that is not predictable. And because all the information is incorporated in prices, investors are not able to make any excess returns. In a perfectly efficient market price changes are random and asset prices follow so called random walk model and that the returns are identically distributed over time. Because returns are identically distributed there should not exist such patterns like the day of the week effect. Or if such patterns do exist, they should be eliminated when investors trade their securities. (Elton-Gruber, 1995)

There are three forms of market efficiency. These forms are distinguished by the degree of information reflected in security prices. In the first level securities prices reflect all the information contained in the record of past security prices. This form of efficiency is called weak form of efficiency. If market meets the weak form criteria, it is not possible to make superior profits by studying the past returns and e.g. the calendar anomalies should not exist. So prices should follow the random walk. (Sharpe et al. 1999)

The second form of efficiency requires that securities prices reflect both past prices and all other published information. This form is better known as the semi strong

form of market efficiency. If markets meet the semi strong criteria, then the prices will immediately adjust for public announcements.

The third form of efficiency is called a strong form of efficiency. This means that the prices reflect all both public and private information of the certain security. All these three forms are transparent. It means that if a certain market meets the semi strong criteria it also meets the weak form criteria.

2.2 Different time patterns in security returns

A number of studies have documented different time patterns in security returns. Returns are systematically higher or lower depending on e.g. the time of the day, the day of the week, the week of the month and month of the year. (Elton-Gruber, 1995)

One pattern that has been studied extensively is so called Day of the week effect. Several papers have shown that the distribution of common stock returns is not identical for all days of the week but instead it might vary depending on the day. The main findings have been that returns on Mondays tend to be lower compared with the other days of the week[1]. On the other hand there exists also evidence that returns on Fridays tend to be higher compared with other days of the week creating the Friday effect. However, a number of studies have shown that this pattern can vary from one country to another. For example strong negative Tuesday effect has been found in several countries, particularly in Europe and Asia[2]. Some papers have also documented of so called reversal Day of the week effect. This means that highest returns tend to occur at the beginning of the week and the lowest returns at the end of the week[3].

[1] When it comes to Day of the week effect, some researchers talk about the weekend effect. This refers to a fall in some stock returns between the Friday closing and Monday opening (Cuthbertson 2000, 167)
[2] The negative Tuesday effect is documented e.g. by Jaffe and Westerfield (1985), Condoyanni et al. (1987) and Martikainen and Puttonen (1996).
[3] E.g. Mehdian and Perry (2001) documented some evidence of reversal Monday effect on US markets.

In addition to daily patterns in security prices, some researchers have also documented evidence of monthly patterns. A number of papers have reported so called January effect[4]. This means that returns on January are higher compared with other months of the year. Besides the January effect other monthly patterns have been discovered. They include for example, Intra month or Turn of the month effects. This means that on average, positive returns exist only during the first half of the month beginning from the last few days of the previous month. Average return is also significantly higher in the first half of the month[5]. (Elton-Gruber, 1995)

2.3 Previous studies

As it was mentioned before, several papers have studied time patterns in asset prices. At first studies focused mainly on the US stock markets. Gibbons and Hess (1981) studied the Day of the week effect in US stock returns. The sample period was 1962-1978 and the data covered S & P 500 and CRSP indices. They first tested time patterns for overall sample period and then divided that data to sub-periods. They found that for the overall sample period, the average annual return for Monday ranges from -33.5% (S & P 500) to -26.8% (the equally weighted CRSP). When they divided the data to sub periods they found that for all periods except one the hypothesis of equality was rejected for each index and lowest returns appeared on Mondays. Only for the period from November 1974 to December 1979 the negative returns occurred on Tuesdays. In addition Gibbons and Hess reported significantly higher returns on Wednesdays and on Fridays. Later e.g. Lakonishok and Smidt (1988) documented similar results with negative Monday returns on US stock market.

More recently, Mehdian and Perry (2001) restudied the Monday effect on US equity markets using returns from three large-cap indices and two small-cap indices over a period of 1964-1998[6]. Their results showed that in the full sample period and in the sub-period from 1964 to 1987 returns for all indices were significantly lower on

[4] January effect is sometimes known as the turn of the year effect. To be more exact, this refers to the phenomena that the highest returns appear during the first week of the January.
[5] Also so called Holiday effect is discovered. This means higher positive returns just before holidays.
[6] The Dow Jones Composite (DJCOMP), the New York Stock Exchange Composite (NYSE) and the S&P 500 indices represented large-cap stocks and the Russel 2000 and the Nasdaq indices represented the small-cap stocks, respectively.

Mondays compared with other days. Instead in the second sub-period from 1987 to 1997 they found that the Monday returns were significantly positive for the large-cap indices but for the small-cap indices Monday returns remained negative and significantly lower compared with the other days. Therefore, they documented that the Monday effect had declined over time and that it had also been partly reversal of the traditional Monday effect e.g. documented by Gibbons and Hess (1981).

Besides the weekday anomalies, Mehdian and Perry (2001) investigated also monthly patterns on the same market during the same time period. For the full sample period the found that January returns were positive and significant in all three indices. In the first sub-period (1964-1987) the returns in January were also significantly positive, but in the second sub-period (1987-1998) there did not appear any significant January effect and therefore it had disappeared[7].

Jaffe and Westerfield (1985) studied the Day of the week effect on four international stock markets. Their study was the first to provide some international evidence of this anomaly. Their paper examined stock returns in the U.K, Japan, Canada and Australia. The indices and time periods were: Japan- the Nikkei Dow from 1970 to 1983, Canada- the Toronto stock exchange index from 1976 to 1983, Australia- the Statex actuaries index from 1973 to 1982 and the U.K- The Financial Times ordinary share index from 1950 to 1983.

Their results clearly documented similar time patterns on international stock markets as well. For the returns in the UK and Canada the lowest returns occurred on Mondays, but in contrast of the earlier studies based on US stock market, they found that the lowest mean returns for both Japanese and Australian stock market occurred on Tuesdays. These results are partly similar with the results documented by Gibbons and Hess (1981). However Jaffe and Westerfield documented new evidence of the negative Tuesday effect.

Schallheim and Kato (1985) reported more evidence of the anomalies in the Tokyo Stock Exchange over the period 1952-1980. They documented a positive January

[7] Haugen and Jorion (1996) found also that the January effect has disappeared on US markets.

effect but in addition they found statistically significant positive returns for June as well. Shallheim and Kato suggested that there might have been some relation between the firm size and the positive June returns because it appeared mainly for small firms.

More international evidence has been documented e.g. by Condoyanni & al. (1987) when they studied six national stock exchanges in Canada, UK, Australia, France, Japan and Singapore during a period from 1969 to 1984. The results for Canada and the UK showed that negative returns occurred on Mondays. On the other hand the results for France, Japan, Australia and Singapore showed negative returns on Tuesdays. These results were partly similar with the results documented by Jaffe and Westerfield (1985) on the same markets. However, Condoyanni et al. proved that these patterns are not necessarily similar across the markets on the same continent e.g. within Europe. At least results were different between France and the UK.

Arsad and Coutts (1997) reexamined security price anomalies in the London international stock exchange over a 60 year period from roughly 1935 to 1994 by using the FT 30 index[8]. Their results broadly supported the former studies e.g. made by Jaffe and Westerfield. They found that for both the whole sample period and the sub-periods the Monday return was significantly negative compared with the other days. When it comes to monthly patterns they also documented significantly positive returns on January for the whole time period. In addition they found positive returns also in the months of April and December. For the sub-periods the month of April was the only month which displayed positive returns for the all periods.

Gu (2006) studied the January effect in major equity indices of Canada, France, Germany, Japan and the United Kingdom roughly during 1970-2000. His results confirmed the January anomaly for all market returns before the 1990. After the 1990 there was a declining trend in every country. He also reported that the anomaly was weaker during the period of weak real GDP and vice versa. The effect

[8]FT 30 index is also known as Financial Times Industrial Ordinary Shares Index.

was also less apparent for the years of high inflation and more apparent for the years with lower inflation.

Martikainen and Puttonen (1996) investigated the day-of-the-week phenomenon in the Finnish stock markets. They used the FOX-index and the time period was from 1989 to 1990. They documented that the average return was negative and statistically significant on Tuesdays and Wednesdays. Therefore, their results are similar to the results documented by Jaffe and Westerfield with negative Tuesday returns (1985)[9].

2.2.1 Studies on the Emerging Markets

Brooks and Persand (2001) examined the evidence for the Day of the week effect in five Southeast Asian stock markets including Taiwan, South Korea, the Philippines, Malaysia and Thailand. The time period was from 1989 to 1996 and indices used in the study were the main stock index in each country.

They found that neither South Korea nor the Philippines had significant calendar effects. Instead both Thailand and Malaysia had significant positive average returns on Monday and significant negative average returns on Tuesday. In addition they also documented a significant negative Wednesday effect in Taiwan.

Demirer and Baha Karan (2002) examined the possible existence of the calendar effects in the Istanbul Stock Exchange. The time period was from 1988 to 1996. Although all returns seemed to be consistently high, they could not find any supporting evidence of the Day of the week effect. Only significant finding was when they tested the autoregressive model that the lag variable was consistently highly significant. This implicated that yesterday's return was a signal for today's return and therefore implicated the market inefficiency.

Ajayi & al. (2004) found more evidence of the Day of the week effect on emerging markets. Their paper covered eleven major stock market indices on Eastern Europe

[9]Martikainen and Puttonen studied also the day of the week affect on the Finnish derivatives markets. They found that there was also a strong negative Monday effect on both options and futures markets.

during the time period roughly from the mid-1990s to 2002. Their empirical results indicated negative Monday returns in six of the twelve markets and positive Monday returns in the remaining five. However, two of the six negative Monday returns (Estonia and Lithuania) and only one of the five positive Monday returns (Russia) were statistically significant.

Al-Saad and Moosa (2005) studied monthly patterns on Kuwait stock markets using the Global Market Index of the Kuwait Stock Exchange. They found that over a sample period from 1984 to 2000 returns were significantly higher on July compared with the other months, therefore creating a July effect rather than January effect.

Kumari and Mahendra (2006) studied day of the week effect and other market anomalies in the Indian Stock Market over a period from 1979 to 1998 both in The Bombay Stock Exchange and in the National Stock Exchange. They found that the Monday returns were higher compared with the other days of the week but on the other hand the returns on Tuesday were negative. In the case of monthly returns they documented that the returns in April were significantly higher and different from the rest of the months.

More empirical evidence of day of the week effect on emerging stock markets is documented e.g. by Basher and Sadorsky (2006) when they investigated 21 emerging stock markets around the world[10]. The data covered the period 1992-2003. However, they documented little evidence of the time patterns. They found that there was the Day of the week effect only in three counties (Philippines, Pakistan and Taiwan) out of all 21 countries. Taiwan had a positive Friday effect, Pakistan had a negative Tuesday effect and the Philippines had a positive Tuesday effect. These results differ from those documented by Brooks and Persand (2001) because they did not document any anomaly for the Philippines. Chen et al. (2001) studied the Day of the week anomaly in the stock markets of China over a period from 1992 to 1997. Their results showed only a negative Tuesday effect after 1995.

[10] For more detailed information of the countries see Basher, S. A. – Sadorsky, P.: "Day-of-the-week effects in emerging stock markets". Applied Economics Letters, 2006, no. 13, 621-628.

2.2.2 Other studies

There are some papers that have documented calendar patterns on bond markets as well. Gibbons and Hess (1981) tested the Day of the week effect on US Treasury bill market during 1962-1968. They found similar patterns to stock returns. The returns on Mondays were on average lower and the returns on Wednesdays were on average higher than other days of the week.

Jordan and Jordan (1991) studied calendar effects in corporate bond returns using the Dow Jones Composite Bond Average. The research covered a time period from 1963 to 1986. They documented similar results to Hess and Gibbons (1981) with lower Monday returns and higher Wednesday returns. In addition they studied the returns behavior across the month and noted that the highest returns occurred in week 2 and the week 4 had the lowest returns.

They documented also some evidence of the January effect. Based on analyses of different sub periods they found that, the seasonal patterns were weaker in the later years of the sample. Actually the only significant exception against the general weakening of seasonal effects was the week-of-the-month behavior of the bond index.

Recently Nippani and Arize (2007) reexamined U.S. corporate bond market for calendar anomalies using three different indices. The sample period was 1982-2002. Their analysis covered the entire corporate bond market and also two broad industry classes, utilities and industrials. They found that the Monday returns were significantly lower compared with the average returns for the rest of the week which was different to the results of earlier research made by Jordan and Jordan (1991).

Maxwell (1998) studied the strength and causes of the January effect in the US corporate bond market over the period of roughly from 1987 to 1997. The data covered noninvestment-grade category and the lowest investment-grade category bond indices. He documented a statistically significant January effect for noninvestment-grade bond indices. He also found a positive excess return in January for the lowest investment grade category, but the results were not

statistically significant. In addition he documented that the excess returns of the bonds in January increased as the credit quality decreased.

As we can see from the previous studies calendar effects have existed already many years in international finance. These effects are found across the equity markets and across the other assets like bonds as well. In addition, several papers have documented shifts or changes in these traditional patterns. On the other hand, we have also seen some evidence that at least on some more developed markets these anomalies have declined or even disappeared over time. However, a number of researchers have tried to explain these patterns and in the next section we will take a closer look at some of these explanations.

2.3 Possible factors explaining the time patterns

It is difficult to give an exact explanation why these kinds of patterns exist in security returns. Elton and Gruber (1995) suggest that because hundreds of researchers study the same data, it is possible that patterns will be found and these patterns are random. On the other hand, if this is true then similar patterns should not exist on other markets. Another possible explanation is that markets are inefficient because we could expect patterns to disappear as investors exploit them. In some of the cases the explanation might also be the transaction costs. Tong (2000) suggests that the negative Monday effect is probably a response of individual investors to bad news received on Friday.

Keef and McGuinness (2001) propose that the settlement procedures might cause the negative Monday effect. They discovered this when they studied weekday returns of the New Zealand market. This explanation is later supported also by e.g. Kumari and Mahendra (2006). However, it is good to bear in mind that this suggestion overlooks the fact that settlement procedures may differ across the countries.

Rystrom and Benson (1989) suggest that one explaining factor behind the Day of the week effect might be investor psychology. They point out that investors may sometimes act irrationally and therefore their economic decisions may be influenced

by moods, emotions etc. And if these moods differ across the days of the week it can very well produce differing degrees of optimism and pessimism across the days of week, hence differing returns to assets. Rystrom and Benson argue that if investors feel more pessimistic on Mondays than on other days of the week, they sell their securities and depress prices. In contrast, on Fridays optimistic investors buy securities and create upward pressure in prices.

Pettengill (2003) provides a similar explanation which arises also from the behavior of individual investor. He suggests that investors avoid buying securities on Mondays because they are afraid of the potential loss from trading with well informed traders who might be selling based on unfavorable information they have received during the weekend.

Condoyanni & al. (1987) have used the time-zone theory to explain the Tuesday effect. They pointed out that the information on US equity markets may affect to the other markets after US market has closed on Mondays. Therefore, they assume that the negative Tuesday effect in some countries is a reflection of the US Monday effect[11]. Also Jaffe and Westerfield (1985) used this theory to partly explain their findings.

The existence of January effect has been explained by the tax-selling hypothesis. It suggests that investors choose to sell some of their securities right before the end of the year in order to realize capital losses for tax purposes. This pressure causes that the prices go down at the end of the year. In January when this downward pressure is relieved securities rise back up to their equilibrium values creating higher returns. (Elton-Gruber, 1995) According to this explanation Ritter (1988) suggests that investors save some proceeds from the sales at the end of the year and they are not immediately reinvested. Instead investors wait until January and invest their money then creating upward pressure on the prices.

Another similar explanation for January effect is given by Sharpe & al. (1999). They suggest that the reason for high returns in January is so called “window dressing”.

[11]Because of the time zones trading occurs at different hours on US markets, therefore the returns in European markets cannot be influenced by the behavior of the US markets at the same day.

This means that at the end of the year some professional fund managers decide to sell those stocks that have performed badly during the year in order to avoid their existence in annual reports. At the beginning of the year managers buy a lot of stocks that have performed extremely well in order to make their fund attractive for investors.

Schallheim and Kato (1985) suggest that at least on the Japanese stock markets the January effect can be partly explained by bonus payments for employees[12]. They argued that most Japanese companies pay large bonuses in December and they assumed that a great part of the bonuses is still available for investing in January. The explanation suggested by Kato and Schallheim is a bit similar to the one suggested by Ritter previously. As another explanation they suggested the release of information might also partly cause the January effect. For example, year-end financial reports might create the January effect. This explanation sounds rational because if the news has been good then it should affect the prices and the returns in a positive way.

[12] Schallheim and Kato found that there were a positive correlation between the January effect and the bonus payments.

3. DATA AND METHODOLOGY

3.1 Index descriptions

For testing the seasonal patterns we use the main stock market indices in each country. The IPC Index is the main index for the Mexican Stock Exchange. It has compounded since 1978 and it reliably portrays the stock market situation. At the moment it covers the 35 biggest and most traded companies on the market.

For Argentina we use the Merval Index which is the main indicator in the Buenos Aires Stock Exchange. It consists of the 24 most liquid companies on the stock exchange. In Brazil we use the Bovespa Index. That is the main indicator of the Brazilian stock market. The Bovespa Index uses 50 most liquid companies of the market and altogether they account for around 70% of the whole market capitalization. Finally, the IGPA Index which covers majority of the market is used to measure the stock market performance in Chile in the Santiago Stock exchange.

3.2 Data and its features

The data for this thesis is collected from DataStream system. It covers the main stock market indices in Latin America including the following four markets: Brazil, Mexico, Argentina and Chile. All the values of the indices are in local currency[13]. The full sample period in our analysis covers the period from 1.1.1997 to 31.12.2006. The first sub-period means the period of 1.1.1997-31.12.2001 and respectively the second sub-period is from 1.1.2002 to 31.12.2006.

We use daily returns for testing the Day of the week effect and monthly returns for testing the January effect, respectively. Based on the data of each index, we calculate continuously compounded returns for each index. For example Vaihekoski (2004, p.194) suggests that continuously compounded returns follow better the normal distribution. Both daily and monthly returns for the indices are computed as follows:

[13] Argentine Peso, Brazilian Real, Chilean Peso and Mexican Peso are considered.

$$R_{it} = \ln\left[\frac{P_t}{P_{t-1}}\right] \quad (1)$$

where R_t is the return of stock index *i* at time *t* and P_t and P_{t-1} are the closing values at time *t* and *t-1* for the same index.

Table 1 presents the descriptive for the daily data covering first the whole time period from 1996 to 2006 and the both sub-periods first from 1997 to 2001 and then from 2002 to 2006. In general every equity index has a positive daily mean return but all of them are quite low. Standard deviation ranges from 0.5% to around 2%. The first sub-period from 1997 to 2001 seemed to be a bit more volatile than the second one. The returns in Argentina appeared to be the most volatile for all periods. One reason for this could the economical crisis that took place in Argentina at the turn of the 21st century. In general volatility seemed to be quite low because there would be reason to suspect that on emerging markets return volatility is high. However, this does not seem to be the case in these countries.

Returns seem to be quite negatively skewed. This implicates that those indices have had more negative values than positive ones. However, Vaihekoski (2004, 197) points out that negative skewness is a common feature for equity indices. When we take a look at the kurtosis we note that it is quite high for every index. This might implicate that majority of the returns is close to the mean (Vaihekoski 2004, 197). We tested the normality of each series by applying the Bera-Jarque test which is commonly used method in normality testing. The test shows that the null hypothesis, which suggests that the series are normally distributed is rejected at 0.01 significance level for each index for all time periods[14]. One explanation might be the high kurtosis in each series. Autocorrelation and its statistical significance are measured by Box-Ljung-test. Table 1 indicates that during almost all the periods there appears positive autocorrelation in returns for Argentina, Chile and Mexico at 1% risk level. This positive autocorrelation means that yesterday's positive return

[14] The critical Chi-Square value at 0.05 level with 2 degrees of freedom is 5.991 and the critical value at 0.01 level is 9.210 respectively.

follows again positive return and vice versa. One reason for autocorrelation might be thin trading, at least in the case of Chile and in Argentina during the crisis.

Table 1. Descriptive statistics for daily data

Descriptive statistics are for daily returns on the whole sample period and then for both sub-periods. In the table are shown number of observations (N), mean, standard deviation, skewness and kurtosis. Series normality is tested by Bera-Jarque test (B-J). Autocorrelation (Autoc.) is tested by Box-Ljung-test. * Indicates statistical significance at 0.01 level.

Country	N	Mean	Std.Dev	Skewness	Kurtosis	B-J	Autoc.	Ljung-Box
Argentina 1997-2006	2608	0.0004	0.0225	-0.1127	8.5671	3373.41*	0.073	13.896*
Brazil 1997-2006	2608	0.0007	0.0226	0.4324	18.3484	25680.34*	0.033	2.822
Chile 1997-2006	2608	0.0003	0.0065	-0.0373	7.0835	1812.70*	0.302	237.94*
Mexico 1997-2006	2608	0.0007	0.0157	-0.0439	10.5255	6155.04*	0.094	23.033*
Argentina 1997-2001	1304	-0.0006	0.0244	-0.1530	8.6673	1750.24*	0.061	3.797
Brazil 1997-2001	1304	0.0005	0.0273	0.5573	16.7801	10384.97*	0.028	1.036
Chile 1997-2001	1304	0.0001	0.0076	0.0770	6.5891	701.19*	0.232	134.16*
Mexico 1997-2001	1304	0.0004	0.0190	-0.0156	9.0920	2016.52*	0.091	12.820*
Argentina 2002-2006	1304	0.0015	0.0204	0.0245	7.5935	1146.61*	0.082	9.596*
Brazil 2002-2006	1304	0.0009	0.0166	-0.2265	3.7938	45.39*	0.045	2.676
Chile 2002-2006	1304	0.0006	0.0052	-0.2065	4.7108	168.29*	0.251	86.689*
Mexico 2002-2006	1304	0.0010	0.0115	-0.0166	5.4421	324.10*	0.078	4.979

Table 2 presents the descriptive statistics for monthly returns first covering the whole sample period from 1997 to 2006 and the both sub-periods from 1997 to 2001 and from 2002 to 2006. Again we can see that on average the returns have been positive on all periods but on the second sub-period they have been at the highest. Standard deviation ranges from 3 % to almost 14% when we take a look at all periods.

The second sub-period seems to be the most volatile. Again we can note that the returns have been the most volatile in Argentina during all the time periods. In general returns seem to be quite negatively skewed like on the daily data. Table 2 shows also that the monthly returns are in general less kurtosis compared to daily returns. Bera-Jarque test shows again that either the monthly returns are not so normally distributed. Only the returns for Brazil, Chile and Mexico on the second sub-period seem to be normally distributed at 1% level. Again, one reason for non-normality could be the kurtosis. On monthly basis returns does not seem to be auto correlated.

Table 2. Descriptive statistics for monthly data

Descriptive statistics are shown for monthly returns on the whole sample period and then for both sub-periods. In the table are shown number of observations (N), mean, standard deviation, skewness and kurtosis. Series normality is tested by Bera-Jarque test (B-J). Autocorrelation (Autoc.) is tested by Box-Ljung-test. * Indicates statistical significance at 0.01 level.

Country	N	Mean	Std.Dev	Skewness	Kurtosis	B-J	Autoco.	Box-Ljung
Argentina 1997-2006	120	0.0097	0.1169	-0.2837	6.4090	59.71*	0.061	0.573
Brazil 1997-2006	120	0.0153	0.1050	-1.3269	7.0857	118.68*	0.052	0.369
Chile 1997-2006	120	0.0077	0.0477	-1.0789	8.5874	179.38*	0.071	0.712
Mexico 1997-2006	120	0.0171	0.0773	-1.0660	6.0977	70.70*	0.070	0.600
Argentina 1997-2001	60	-0.0131	0.1317	-0.3279	6.0029	23.61*	-0.047	0.138
Brazil 1997-2001	60	0.0109	0.1288	-1.2948	5.8607	37.22*	0.068	0.288
Chile 1997-2001	60	0.0016	0.0587	-1.0308	6.8061	46.84*	0.012	0.008
Mexico 1997-2001	60	0.0106	0.0980	-0.8130	4.3961	11.48*	0.120	0.902
Argentina 2002-2006	60	0.0326	0.0957	0.4501	5.2442	14.61*	-0.082	0.471
Brazil 2002-2006	60	0.0197	0.0750	-0.4788	2.9542	2.29	-0.019	0.021
Chile 2002-2006	60	0.0138	0.0328	0.3961	3.0854	1.58	0.206	2.687
Mexico 2002-2006	60	0.0237	0.0488	-0.7909	3.1603	6.32	0.056	0.200

3.2 Methodologies

According to the Day of the week effect there appear some systemic patterns in the stock returns depending on the day. Therefore we test if the daily returns are statistically different from each other. Basically we do this by using Eviews program and the linear regression model and the ordinary least squares-method (OLS). Brooks (2002) suggests several assumptions for the classical linear regression model. They include e.g. that the residuals are homoscedastic and that there is no autocorrelation in residuals. If these assumptions are not filled the more appropriate method could be to use for example GLS procedure[15]. However, in this thesis we leave these assumptions and we use the OLS-method, because it has been largely used in anomalies testing. For example Gibbons and Hess (1981) and Ajay et al. (2004) used this method. Also Brooks (2002, 537-539) suggests that this is the basic method for studying calendar anomalies. To examine whether there exist any Day of the week effect, we employ the following model:

$$R_{it} = \alpha_{1i} D_{1t} + \alpha_{2i} D_{2t} + \alpha_{3i} D_{3t} + \alpha_{4i} D_{4t} + \alpha_{5i} D_{5t} + v_{it} \quad (2)$$

In the model R_{it} is the return of the index on day *t,* D_{1t} is a dummy variable for Monday taking the value of 1 for all Monday observations and zero otherwise. D_{2t} is a dummy variable for Tuesday taking the value of 1 for all Tuesday observation and zero otherwise and so on. The α is the coefficient that is estimated for each day of the week from Monday through Friday. V_{it} is the disturbance term.

We want to study, if the stock returns vary of each others depending on the day of the week and if they are statistically significant. Therefore we can consider the null hypothesis (H_o) as follows:

$$H_o = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = (0) \quad (3)$$

As we can see, our assumption is that returns for each day of the week do not statistically differ from each others. Therefore the estimates for alpha should be 0 or

[15] For more information about regression analysis see e.g. “Introductory to econometrics in Finance” by Chris Brooks, 2004.

close to 0. In addition the F-value should not be statistically significant[16]. If we reject the null hypothesis then the stock returns have to exhibit some form of day of the week seasonality and the F-value becomes statistically significant.

Similarly for testing the monthly patterns we construct almost an identical model. This model has been used e.g. by Mehdian and Perry (2001). Therefore, we employ the following regression:

$$R_{it} = \alpha_{1i} D_1 + \alpha_{2i} D_2 + \alpha_{3i} D_3 +,...,+\alpha_{10i} D_{10} + \alpha_{11i} D_{11} + \alpha_{12i} D_{12} + v_{it} \quad (4)$$

where R_{it} is the monthly return of the index *i* as defined earlier in equation 1, D_1 through D_{12} are dummy variables for each month of the year such that D_1 takes a value of 1 for all January observations and zero otherwise and so on. The coefficients from α_1 through α_{12} are estimates of the return for each month from January through December. V_{it} is the disturbance term. Again we can consider our null hypothesis as follows:

$$H_0 = \alpha_1 = \alpha_2 = \alpha_3,...,= \alpha_{10} = \alpha_{11} = \alpha_{12} = (0) \quad (5)$$

Again, we want to test if stock returns in e.g. January differ from the returns in other months. We reject the null hypothesis if we find some form of monthly seasonality that is statistically significant.

[16] F-test is used for testing multiple hypotheses.

4. RESULTS

In this section we present the empirical results of our analysis. First we cover the results based on daily data for the full sample period and then separately for each sub-period. Then we show the results based on monthly data, again at first for the whole time period and then finally for both sub-periods.

4.1 Results for daily data for the full sample period

Table 3 presents the results of the regression analysis based on the daily data for the full sample period. Our results indicate that there has not been any statistically significant day of the week pattern in stock returns during 1997-2006 in Argentina. For example the coefficient for Monday is negative but it is far away from being statistically significant. Therefore the null hypothesis of the equal return distribution can not be rejected.

Instead for Brazil we can see the daily return for Friday has been statistically higher compared with the other days of the week at 1% risk level. The F-value and its p-value also indicate that all coefficients are not zero. Therefore we can reject the null hypothesis at 1% level and confirm the positive Friday effect in Brazil during the full sample period.

For Chile we see that the negative coefficient for Monday returns is statistically significant at 1% risk level. In addition we can also note positive and statistically significant coefficients at 1% risk level for Wednesday and Friday as well. The F-value for the all coefficients confirms that they are not all zero and again we can reject the null hypothesis for all coefficients being equal at 1% risk level for Chile.

When it comes to Mexico our results indicate positive coefficient for Wednesday at 1% risk level. When we take a look at the F-value and its probability we can reject our null hypothesis at 1% level and document statistically significant Wednesday return for Mexico.

Table 3. Results for daily data on the full sample period 1997-2006

Results of the regression analysis are shown on the full sample period 1997-2006. For each index are shown the estimated coefficient, t-value and p-value. The existence of the Day of the week effect is measured by F-value. * Indicates statistical significance at 0.01 level and ** at 0.05 level.

Country		Monday α_1	Tuesday α_2	Wednesday α_3	Thursday α_4	Friday α_5	F-value	p-value
Argentina	coefficient	-0.0005	0.0006	0.0009	-0.0001	0.0014	0.7511	0.5851
	t-value	-0.6026	0.6247	0.9329	-0.1389	1.4534		
	p-value	0.5468	0.5322	0.3509	0.8895	0.1462		
Brazil	coefficient	-0.0006	0.0015	0.0016	-0.0017	0.0027	3.3601	0.0050*
	t-value	-0.6899	1.5334	1.6799	-1.7784	2.8262		
	p-value	0.4903	0.1253	0.0931	0.0754	0.0047*		
Chile	coefficient	-0.0009	0.0001	0.0007	0.0005	0.0012	8.2315	<0.0001*
	t-value	-3.1874	0.3786	2.6987	1.8199	4.5002		
	p-value	0.0015*	0.7050	0.0070*	0.0689	<0.0001*		
Mexico	coefficient	-0.0003	0.0010	0.0017	0.0008	0.0005	2.2700	0.0045*
	t-value	-0.4447	1.5867	2.5153	1.2971	0.7907		
	p-value	0.6565	0.1127	0.0120**	0.1947	0.4292		

4.2 Results for daily data for the sub-periods

Table 4 presents the results for the first sub-period 1997-2001. Again we can see that there is not any sign of the Day of the week effect in Argentina during the first sub-period. All coefficients and their p-values and F-value are too low for being statistically significant.

For Brazil the coefficients for Tuesday, Wednesday and again for Friday seem to be all positive and statistically significant at 1% risk level. Based on the F-value for Brazil we can again reject our null hypothesis because it seems to be significant at 5% risk level and confirm these anomalies.

For Chile the coefficient for Friday seems to be positive and statistically significant at 1% risk level. The F-value also indicates that we can reject again our null hypothesis for Chile at 1% level. For Mexico we can see that the positive coefficient for Wednesday is just statistically significant at 5% risk level. However, based on the F-value, we can not reject our null hypothesis. Therefore, there did not appear any day of the week anomaly in Mexico during the first sub-period.

In table 5 we present the results for the second sub-period 2002-2006. In Argentina the coefficient for Friday seems to be significant at 5% risk level. The F-value also allows us to reject our null hypothesis at 10% risk level.

For Brazil we can see that the coefficient for Wednesday is statistically significant at 5% level and the coefficient for Friday is statistically significant at 1% level. The F-value is also statistically significant and we can reject our null hypothesis. Compared with the results from the first sub-period the positive Wednesday and Friday effects still remained in Brazil. But instead it seems that the Tuesday effect documented earlier seems to have disappeared during the second sub-period.

When it comes to Chile at first we can note the negative coefficient for Monday that is statistically significant at 5% risk level. In addition there are also positive and statistically significant coefficients for Thursday and Friday, both at 1% level. The F-

value rejects our null hypothesis at 1% risk level and we can confirm the anomalies for Chile. Compared with the results from the first sub-period the Friday effect still exists but in addition we also found the negative Monday effect and the positive Thursday effect on the second sub-period. These results for Chile, from the second sub-period are almost similar to the results from the full sample period. Therefore we can say that the second sub-period has effected more on the full sample period.

Finally for Mexico the coefficient for Thursday is statistically significant at 5% risk level. The F-value is also statistically significant at 5% level and therefore we can reject our null hypothesis the equality of the coefficients and document the Thursday anomaly. This differs from the results we documented for the first sub-period because then we did not find any evidence of Thursday anomaly. It is also possible that it has changed over time.

As a conclusion we can think what these a bit mixed findings might mean. For Argentina we found the Friday anomaly only during the second sub-period. One explanation could be again that the capital markets were less efficient during 2002-2006. This might be possible for example because of the economic crisis that took place in Argentina during the early years of 21st-century. This crisis had serious implications on the Argentinean capital markets as well. In Brazil the markets seemed to be a bit more efficient during the second sub-period because the Tuesday effect seemed to disappear. In Chile, there appeared three different anomalies mainly during the second sub-period. Well, again we can think that the markets are inefficient. But on the other hand we can think that the markets in Chile are smaller compared with the other markets studied in this paper. Therefore, one factor causing the daily anomalies in Chile might be the low liquidity. Also the crisis in Argentina might have had implications in Chile. In Mexico markets might have been a bit more inefficient during the second sub-period. Because for the second sub-period we found the Thursday effect but on the first sub-period there did not exist any time pattern.

Table 4. Results on the first sub-period 1997-2001

Results of the regression analysis are shown on the period 1997-2001. For each index are shown the estimated coefficient, t-value and p-value. The existence of the Day of the week effect is measured by F-value. * Indicates statistical significance at 0.01 level and ** at 0.05 level.

Country		Monday α_1	Tuesday α_2	Wednesday α_3	Thursday α_4	Friday α_5	F-value	p-value
Argentina	coefficient	0.0010	0.0020	0.0017	<-0.0001	0.0023	0.6345	0.6763
	t-value	0.5023	1.0025	0.8731	-1.5838	1.1698		
	p-value	0.6155	0.3162	0.3827	0.1135	0.2423		
Brazil	coefficient	0.0037	0.0059	0.0047	<0.0001	0.0068	2.2629	0.0461**
	t-value	1.6217	2.5989	2.0793	-1.5302	3.0147		
	p-value	0.1051	0.0095*	0.0037*	0.1150	0.0026*		
Chile	coefficient	-0.0007	0.0006	0.0005	<0.0001	0.0018	3.3042	0.0057*
	t-value	-1.1981	0.1022	0.8909	-0.7118	2.8602		
	p-value	0.2311	0.9186	0.3731	0.4767	0.0043*		
Mexico	coefficient	-0.0006	0.0015	0.0031	<-0.0001	0.0009	1.2714	0.2735
	t-value	-0.3804	0.9783	1.9685	-0.7148	0.5864		
	p-value	0.7037	0.3281	0.0492**	0.4748	0.5567		

Table 5. Results on the second sub-period 2002-2006

Results of the regression analysis on the second sub-period 2002-2006. For each index are shown the estimated coefficient, t-value and p-value. The existence of the Day of the week effect is measured by F-value. * Indicates statistical significance at 0.01 level, ** at 0.05 level and *** at 0.10 level.

Country		Monday α_1	Tuesday α_2	Wednesday α_3	Thursday α_4	Friday α_5	F-value	p-value
Argentina	coefficient	-0.0007	0.0013	0.0022	0.0014	0.0025	1.9269	0.0871***
	t-value	0.0586	1.0370	1.7576	1.1499	2.0357		
	p-value	0.9532	0.2999	0.0079	0.2504	0.0420**		
Brazil	coefficient	-0.0012	0.0009	0.0024	-0.0001	0.0025	2.8451	0.0146**
	t-value	-1.2406	0.8813	2.3796	-0.1076	2.4970		
	p-value	0.2150	0.3783	0.0175**	0.9143	0.0012*		
Chile	coefficient	-0.0008	0.0004	0.0012	0.0012	0.0010	10.1093	<0.0001*
	t-value	-2.5446	1.3129	1.0094	4.0364	3.1530		
	p-value	0.0110**	0.1894	0.3219	0.0001*	0.0017*		
Mexico	coefficient	0.0006	0.0013	0.0011	0.0014	0.0008	2.4553	0.0317*
	t-value	0.9091	1.8342	1.5435	2.0479	1.2285		
	p-value	0.3635	0.0669	0.1229	0.0408**	0.2195		

4.3 Results for monthly data for the full sample period

Table 6 shows the results based on monthly data for the full sample period. For Argentina the coefficients in January and in December seem to be statistically significant at 10% risk level. Other months does not seem to have any statistically significant coefficients. However, based on the F-value we can not reject our null hypothesis and therefore we are not able to confirm January and December anomalies in Argentina during the full sample period.

Similarly, in Brazil the coefficients for November and December are statistically significant. In November at 5% risk level and respectively in December, at 10% level. However, again based on the F-value we can not reject our null hypothesis. When we take a look at Chile, we note that there do not appear any statistically significant coefficients during the full sample period. In Mexico the coefficient for December is significant at 5% risk level. But again we can not reject our null hypothesis because the F-value is not statistically significant. Therefore we do not document any monthly anomaly during the full sample period.

Table 6. Results on the full sample period 1997-2006

Results of the regression analysis are shown for monthly data on the full sample period 1997-2006. For each index are shown the estimated coefficient for each month, t-value and p-value. F-value measures the equality of coefficients. ** Indicates significance at 0.05 level and *** at 0.1 level

Month		Argentina	Brazil	Chile	Mexico
Jan	coefficient	0.0731	0.0296	0.0004	0.0204
	t-value	1.9822	0.8949	0.0282	0.8348
	p-value	0.0500***	0.3728	0.9775	0.4056
Feb	coefficient	0.0178	0.0423	0.0211	0.0275
	t-value	0.4829	1.2782	1.3672	1.1234
	p-value	0.6301	0.2039	0.1744	0.2637
Mar	coefficient	0.0030	0.0221	0.0156	0.0214
	t-value	0.0820	0.6693	1.0104	0.8765
	p-value	0.9348	0.5047	0.3145	0.3827
Apr	coefficient	0.0082	-0.0002	0.0090	0.0135
	t-value	0.2240	-0.0088	0.5839	0.5516
	p-value	0.8232	0.9930	0.5605	0.5823
May	coefficient	-0.0538	-0.0161	0.0077	-0.0136
	t-value	-1.4586	-0.4863	0.5025	-0.5576
	p-value	0.1476	0.6277	0.6163	0.5782
Jun	coefficient	0.0044	0.0135	0.0039	0.0342
	t-value	0.1195	0.4097	0.2581	1.3955
	p-value	0.9050	0.6828	0.7968	0.1657
Jul	coefficient	-0.0022	-0.0037	0.0144	-0.0007
	t-value	-0.0609	-0.1117	0.9337	-0.0320
	p-value	0.9515	0.9112	0.3525	0.9745
Aug	coefficient	-0.0515	-0.0456	-0.0111	-0.0359
	t-value	-1.3980	-1.3754	-0.7202	-1.4670
	p-value	0.1650	0.1718	0.4729	0.1453
Sep	coefficient	0.0265	-0.0087	-0.0043	0.0277
	t-value	0.7184	-0.2628	-0.2821	1.1307
	p-value	0.4740	0.7932	0.7784	0.2607
Oct	coefficient	0.0181	0.0145	0.0067	0.0259
	t-value	0.4907	0.4399	0.4335	1.0561
	p-value	0.6246	0.6608	0.6655	0.2932
Nov	coefficient	0.0061	0.0783	0.0287	0.0318
	t-value	0.1658	2.3630	1.8586	1.2994
	p-value	0.8686	0.0199**	0.0658	0.1966
Dec	coefficient	0.0671	0.0580	0.0002	0.0539
	t-value	1.8208	1.7494	0.0158	2.2000
	p-value	0.0714***	0.0831***	0.9874	0.0299**
F-value		1.0349	1.1749	0.7220	1.363872
p-value		0.4227	0.3102	0.7272	0.1945

4.4 Results for monthly data for the sub-periods

Table 7 shows the results based on the first sub-period 1997-2001. They are somewhat similar to the results from the full sample period. For Argentina none of the months show statistically significant coefficients. In Brazil the coefficient for August is negative and statistically significant at 5% risk level. However, based on the F-value the null hypothesis still remains and therefore the negative August is not an anomaly. Similarly in Chile the coefficient in November is positive and statistically significant at 10% risk level. But again the F-value indicates that all the coefficients are quite close to zero and therefore the null hypothesis is not rejected. The same holds with Mexico. Even though the negative coefficient for August is statistically significant at 5% level, we can not reject our hypothesis based on the F-value.

Table 8 documents the results for the second sub-period 2002-2006. In Argentina we can note that the coefficient in January is positive and statistically significant at 1% risk level. In addition the positive coefficient for September is also statistically significant at 5% level. Both of the coefficients seem to be quite high. The F-value for Argentina indicates also that the coefficients are different from zero at 5% level. Therefore we can reject our null hypothesis and confirm the positive January and September anomalies. In Brazil only the coefficient in November is significant at 5% risk level. But again the F-value indicates that we can not reject the null hypothesis for Brazil and there does not exist November anomaly during the second sub-period.

When it comes to Chile none of the months have statistically significant coefficients. Also for Mexico the positive coefficient in November is statistically significant at 5% risk level. The F-value shows also that the coefficients are not zero at 10% level and therefore we can reject the null hypothesis. All in all there appeared months with statistically significant coefficients during the all three periods. However, only during the second sub-period the coefficients were statistically different from zero so that we see them as monthly anomalies. Again the markets in Argentina seemed to be a bit more inefficient during the second sub-period.

Table 7. Results for the first sub-period 1997-2001

Results of the regression analysis are shown for monthly data on the first sub-period 1997-2001. For each index are shown the estimated coefficient for each month, t-value and p-value. F-value measures the equality of coefficients. ** Indicates significance at 0.05 level and *** at 0.1 level

Month		Argentina	Brazil	Chile	Mexico
Jan	coefficient	0.0153	0.0688	0.0094	0.0012
	t-value	0.2491	1.2174	0.3592	0.0281
	p-value	0.8043	0.2294	0.7210	0.9777
Feb	coefficient	0.0164	0.0483	0.0125	0.0419
	t-value	0.2662	0.8546	0.4764	0.9464
	p-value	0.7912	0.3970	0.6359	0.3487
Mar	coefficient	0.0057	0.0484	0.0242	0.0262
	t-value	0.0935	0.8563	0.9194	0.5920
	p-value	0.9258	0.3961	0.3624	0.5566
Apr	coefficient	0.0345	0.0061	0.0045	0.0076
	t-value	0.5606	0.1088	0.1738	0.1733
	p-value	0.5777	0.9138	0.8628	0.8631
May	coefficient	-0.0465	-0.0244	0.0173	-0.0125
	t-value	-0.7556	-0.4317	0.6559	-0.2839
	p-value	0.4536	0.6679	0.5150	0.7777
Jun	coefficient	-0.0239	0.0476	-0.0031	0.0573
	t-value	-0.3888	0.8419	-0.1184	1.2945
	p-value	0.6991	0.4040	0.9062	0.2017
Jul	coefficient	-0.0294	-0.0111	0.0002	-0.0155
	t-value	-0.4773	-0.1972	0.0077	-0.3500
	p-value	0.6353	0.8444	0.9938	0.7278
Aug	coefficient	-0.1024	-0.1401	-0.0468	-0.0944
	t-value	-1.6623	-2.4774	-1.7749	-2.1334
	p-value	0.1030	0.0168**	0.0822	0.0380**
Sep	coefficient	-0.0343	-0.0198	-0.0269	0.0197
	t-value	-0.5568	-0.3500	-1.0216	0.4454
	p-value	0.5802	0.7278	0.3121	0.6580
Oct	coefficient	-0.0365	-0.0312	-0.0094	0.0213
	t-value	-0.5929	-0.5517	-0.3588	0.4828
	p-value	0.5560	0.5837	0.7213	0.6314
Nov	coefficient	-0.0297	0.0854	0.0530	0.0074
	t-value	-0.4827	1.5107	2.0104	0.1692
	p-value	0.6314	0.1374	0.0500***	0.8663
Dec	coefficient	0.0733	0.0531	-0.0158	0.0674
	t-value	1.1899	0.9395	-0.6003	1.5238
	p-value	0.2399	0.3521	0.5511	0.1341
F-value		0.540	1.1351	0.8667	0.8741
p-value		0.8773	0.3556	0.5846	0.5776

Table 8. Results for the second sub-period 2002-2006.

Results of the regression analysis are shown for monthly data on the second sub-period 2002-2006. For each index are shown the estimated coefficient for each month, t-value and p-value. F-value measures the equality of coefficients. * Indicates significance at 0.01 level ** at 0.05 level and *** at 0.1 level

Month		Argentina	Brazil	Chile	Mexico
Jan	coefficient	0.1309	-0.0095	-0.0086	0.0397
	t-value	3.2193	-0.2842	-0.5641	1.7607
	p-value	0.0023*	0.7774	0.5752	0.0846
Feb	coefficient	0.0192	0.0363	0.0296	0.0131
	t-value	0.4728	1.0843	1.9467	0.5847
	p-value	0.6385	0.2836	0.0574	0.5615
Mar	coefficient	0.0002	-0.0040	0.0069	0.0167
	t-value	0.0071	-0.1212	0.4566	0.7437
	p-value	0.9944	0.9040	0.6500	0.4607
Apr	coefficient	-0.0180	-0.0067	0.0134	0.0193
	t-value	-0.4428	-0.2009	0.8827	0.8593
	p-value	0.6598	0.8416	0.3818	0.3944
May	coefficient	-0.0610	-0.0078	-0.0017	-0.0147
	t-value	-1.5018	-0.2329	-0.1168	-0.6552
	p-value	0.1397	0.8168	0.9075	0.5155
Jun	coefficient	0.0327	-0.0204	0.0111	0.0111
	t-value	0.8061	-0.6099	0.7283	0.4926
	p-value	0.4242	0.5447	0.4700	0.6245
Jul	coefficient	0.0249	0.0037	0.0286	0.0139
	t-value	0.6125	0.1118	1.8791	0.6177
	p-value	0.5431	0.9114	0.0663	0.5396
Aug	coefficient	-0.0007	0.0489	0.0245	0.0225
	t-value	-0.0182	1.4594	1.6124	0.9994
	p-value	0.9855	0.1510	0.1134	0.3226
Sep	coefficient	0.0873	0.0023	0.0182	0.0357
	t-value	2.1472	0.0708	1.1966	1.5847
	p-value	0.0369**	0.9438	0.2373	0.1196
Oct	coefficient	0.0727	0.0603	0.0228	0.0304
	t-value	1.7888	1.7993	1.4998	1.3489
	p-value	0.0800	0.0782	0.1402	0.1837
Nov	coefficient	0.0419	0.0712	0.0043	0.0562
	t-value	1.0322	2.1214	0.2873	2.4942
	p-value	0.3071	0.0391**	0.7751	0.0161**
Dec	coefficient	0.0610	0.0628	0.0163	0.0404
	t-value	1.5010	1.8721	1.0713	1.7923
	p-value	0.1399	0.0673	0.2894	0.0794
F-value		2.0995	1.2607	1.3902	1.7126
p-value		0.0349**	0.2723	0.2034	0.0936***

5. CONCLUSIONS

In this bachelor's thesis we studied calendar anomalies in South America over a period roughly from 1997 to 2006. Our objective was to provide some sort of evidence the existence Day of the week effects and the monthly patterns in Argentina, Brazil, Chile and Mexico and also to provide some information of the market efficiency.

In our analysis based on the daily data we found that for the full sample period 1997-2006 there was the traditional positive Friday effect in Brazil. For Chile we found that the returns had been lowest on Mondays. In addition, we also documented positive returns on Wednesdays and Fridays. In Mexico we also found that the highest returns appeared on Wednesdays. For Argentina we did not document any day of the week anomaly.

When we split the data to two sub-periods we found that during the first sub-period there had not appeared any patterns in Argentina. For Brazil we found again the positive Friday effect but also we documented positive effects for Tuesday and Wednesday. In Chile we found that highest returns appeared on Fridays during the first sub-period. For Mexico we did not report any statistically significant weekday anomaly. During the second sub-period 2002-2006 we found the positive Friday effect in Argentina. For Brazil we documented the positive Wednesday and Friday effects just like on the first sub-period but the Tuesday effect had disappeared. In Chile we reported the negative Monday effect and positive Thursday and Friday effects and finally for Mexico we documented the positive Thursday effect.

When it comes to monthly patterns we found little evidence. For both the full sample period and for the first sub-period we did not document any statistically significant monthly pattern in any of our countries. Only on the second sub-period we found that there was the traditional positive January effect in Argentina and also positive returns seemed to appear in the month of September. In addition, for Mexico we reported the positive November effect during the second sub-period.

In general we can say that the stock markets were a bit more inefficient during the second sub-period in all countries except in Brazil where one anomaly had disappeared during the second sub-period. Some of the results might be explained by market inefficiency. Another factor partly explaining these patterns might be the economical crisis that hit extremely hard Argentina in the beginning of the 21st-century. In Chile where the markets are relatively small the lack of liquidity might have caused partly these patterns. Our results indicate that on daily basis investors can not really make high profits based on these anomalies, because the coefficients for each day were quite low. However, based on monthly basis it could be possible to take advantage of these monthly anomalies. Especially this could be possible in Argentina, where the coefficients for January and September were high on the second sub-period.

Our purpose was to provide some form of evidence of the time patterns in South America and we managed to do it. For further research there are several suggestions. At first, it would be interesting to take a bit longer sample period and include more countries. However, the limitation might be the lack of suitable data. Secondly, it would also be interesting to study more generally known anomalies like the Holiday effect. Thirdly it could be of interest to test if these patterns can be explained somehow. For example, it would be reasonable to test if at least some of these patterns can be explained by asset pricing models.

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