

DO STRUCTURAL BREAK TESTS IDENTIFY CAPITAL INCREASE?

Maria-Lenuța CIUPAC-ULICI, PhD
„Babeş-Bolyai” University, Cluj Napoca

1. Capital increases and stock price behaviour

In recent years, most researchers have focused on the study of capital increases. More specifically, the purpose of these studies was to measure the impact of the capital increase announcement on the stock asset price, and hence on the market value of the issuing company.

Such studies or researches have been conducted on U.S. capital markets by Myers and Majluf (1984), which showed that an increase in capital will result in a drop in stock price. After them, a capital increase will be feasible only if the securities' market value exceeds the fair value and therefore the announcement impact must be negative on stock price. Masulis and Korwar (1986), and Asquith and Mullins (1986) support this view, showing that on U.S. market, the announcement of a capital increase results in an average decrease of 3% of stock price. However, on French market, Jacquillat Hamon (1992) does not confirm the same result.

Negative reaction of stock price to the announcement of capital increase is explained by information asymmetry between managers of enterprises and investors. If the senior leaders will delay to transmit information to the market, so this asymmetry will be greater. Dierkens (1991) shows that there are more or less appropriate times to issue shares. Favorable periods are called windows of opportunity and are those in which the reaction of stock price is minimum to the announcement. According to the author these periods are

immediately after the announcement of results but by other authors [Berkovitch and Narayanan (1993), respectively Choe et al. (1993)] can be linked to a number of macroeconomic variables.

The four sizes which she used to measure information asymmetry are:

- ✓ market reaction to periodical publish the results of the company;
- ✓ residual variance of returns of last year after issue implementation;
- ✓ number of press releases published on a certain period;
- ✓ intensity of transactions.

Lucas and McDonald (1990) have shown that information asymmetry between company managers and investors may explain the increase of stock price before the date announced [Korajczyk et al. (1989)], the decrease at the announcement date, respectively a grouping of capital increases by a generalized increase in stock price. Assumptions behind this model are:

- managers know more about the value of a company than outside investors;
- the delay of an increase is costly;
- the market assesses in average the fair value of companies, but there are some companies that are undervalued.

As the market receives new information, the undervalued companies tends to increase, while the value of overvalued companies tends to decrease. Based on these assumptions, two companies are taking into account that for some reasons the want to make a capital increase. One of these companies are undervalued, while the other is overstated. Undervalued company expects the market to assess a positive

value of the company, so there is interest in the capital increase to be deferred until the stock price is higher. Overvalued companies, on the other hand, believes that the market will find the true value of society, and therefore made the capital increase in the shortest time.

This policy, on both companies, means that the capital increase will be done after an abnormal increase in share price. Undervalued companies expect to increase the share price before making a capital increase, because the average price before the increase to be found on an ascending path. Overvalued firms do not expect. If the appearance of opportunities which require a capital increase is not correlated with the share price history, the average price curve prior to the announcement is flattened.

The same results were reached by Korwar Masulis (1986) and Asquith and Mullins (1986) who showed that on the U.S. market the announcement of capital increase leads to an average decrease of 3% of stock price.

Asquith and Mullins (1986) provides additional information for the connection between share price increase, before the announcement, and decrease, after announcement. They found that the extent of the fall price to the announcement date of capital increase is less than the magnitude of price increase before the announcement. They suggest that if there is a positive correlation between price increase and reduction of information asymmetry, firms that have price increases will record lower declines to the announcement and thus are more likely to achieve the increase.

We can see that a higher attention was given to the price after the date announcement, than the price increase before the announcement date. Other explanations for price increases may be:

- *Market inquires about projects with positive net present value.* An alternative that shows interest for information

asymmetry, if the price increase, is based on the fact that if the market can see the arrival of new investment projects, the firms will experience a price increase. One reason for the realization of a capital increase is the funding of these valuable projects. The earlier observed prices announcement increase will tends to increase if the increase purpose is the funding for these projects. This hypothesis is empirically distinguished from informational asymmetry hypothesis;

- *Naive trading without strategy.* This means that managers and shareholders believe that the share price may fall after having a period of positive abnormal rentabilități. The capital increase will take place after the price increase, and the trading rule is not adversely affected, except for possible waste of sources involved in the distribution of shares.

On the other hand, there are some explanations for lower prices:

- *Pressure's price.* Issue of new shares is an increase in market share. So the price will fall if demand for shares is not perfectly elastic, and the decrease should be proportional to the amount of issued shares. Although the final impact of price pressure is on the announcement issue, the price falls to date announced in anticipation of lower price at this time;

- *Issue costs.* This explanation argues that the issue of capital is costly for the issuing company (due to administrative costs and subscription fees) and the price drops because society bears these costs.

According to Myers and Majluf's opinion after a company announces a share issue, a security price is reduced because the effect of "adverse selection", which means that the announcement is a signal that the quality of the company is below average. In this context, adverse selection cost means that some companies abandon worthwhile projects which require capital market financing. Because of the variation in information asymmetry, so if the company want to

control the cost of adverse selection, it has to make the issue when information asymmetry is minimal. However, deferred issue can be expensive if we consider that the funded project can lose his value in time (the market entry of a competitor for example) or funding price increases. The empirical results show that firms tend to focus issues of new shares after the company's results were made public (in this case positive results) even if this means postponing certain costs related to the delay of project financing. However, some companies make the best share issues regardless of timing. Also, the decrease price of a title after announcement depends on the period since the last publicreport, so, since this period is higher the more important the effect will be.

Usually, there are two possibilities:

- there is no possible opportunity evaporation of funding the project, that delay has no impact on project value. If all companies would issue shares in the moment of appearance of a new project financing, the market price will be the real of average company. Above-average quality firms will find it optimal to wait until market shares issued will reflect its real value. Thus, the issue of shares before publication of periodic reports is perceived negatively by investors. Following this reason, the equilibrium, all firms will expect the information to be made public and then start the issue;

- it is possible for companies to lose the project if they don't have necessary funds, so things will get complicated. Firms will choose to issue shares based on several factors: the asymmetry of information, its asset quality and time to publish the next report on its activities. The problem of adverse selection is

canceled while the issue takes place immediately after the publication of company results as the information asymmetry is minimal. In time, it is considered that managers receive a series of signals that are not reflected inside the market, and a issue in this subject is initially submissive to the effect proposed by Myers and Majluf. The net effect is that the issue of shares is concentrated after the time of publication of results.

Eckbo and Masulis (1992) attempts to explain the share price reaction to the type of issue, while making a comparison between different types of issues. Ellis and Dunkelberg (1995) highlight the impact of choice of brokerage company on the stock price.

2. Methodology research

A common problem testing conventional unit root test, the ADF and PP, is that these tests do not allow the existence of structural breaks. Assuming when rupture occurs as an endogenous phenomenon, Perron showed that the power to reject a unit root decreases when the stationary alternative is true and structural failure is omitted. Zivot and Andrews (1992) have proposed a variation of Perron's initial test, they assumed that the exact moment in which the structural break happens is unknown. Thus to determine the breaking points it is used an algorithm which is dependent of data as a proxy for Perron's subjective procedure. Following the characterization made by Perron for structural break framework, Zivot and Andrews continued with three models to test the unit root:

➤ model A that allows one change over time in the series

$$\Delta Y_t = c + \alpha Y_{t-1} + \beta t + \gamma DU_t + \sum_{j=1}^k d_j \Delta Y_{t-j} + \varepsilon_t$$

➤ model B that allows a single change in the slope related to trend function:

$$\Delta Y_t = c + \alpha Y_{t-1} + \beta t + \theta DT_t + \sum_{j=1}^k d_j \Delta Y_{t-j} + \varepsilon_t$$

➤ model C combines changes over time in both level and slope in the function corresponding to trend series:

$$\Delta Y_t = c + \alpha Y_{t-1} + \beta t + \theta DU_t + \gamma DT_t + \sum_{j=1}^k d_j \Delta Y_{t-j} + \varepsilon_t$$

where:

DU_t - A dummy variable for a change in the average which appears on every possible break date (T_B)

DT_t - variable corresponding to change in trend.

Thus we have:

$$DU_t = \begin{cases} 1, t > TB \\ 0, t \leq TB \end{cases}$$

$$DT_t = \begin{cases} t - TB, t > TB \\ 0, t \leq TB \end{cases}$$

Assumptions related to the three models of Zivot-Andrews test:

$H_0: \alpha = 0$ (which implies that the series Y_t contains a unit root with an amendment that includes any structural break);

$H_1: \alpha < 0$ (which implies that the series is a stationary process with trend and shows a structural break that occurs at a time unknown).

Zivot - Andrews test looks every point t as a potential breaking point in the data (T_B) and set one regression for each

sequence possible data break. From all possible breakpoints (T_B), the procedure selects as a breaking point date the date (\bar{T}_B) that minimizes unilateral t-statistic for testing $\hat{\alpha} = \alpha - 1 = 1$. According to Zivot and Andrews, the presence of the final points causes the asymptotic distribution of statistics to diverge to infinity.

3. The data used

Zivot-Andrews test was applied to see if the calendar date corresponding to capital increase of a listed company is a structural break in the evolution of stock. We use daily closing share price of 21 companies listed on Bucharest Stock Exchange (Table no. 1). Analyzed time begins with the first day of listing (we chose companies that were publicly traded in 1997) and ends on January 30, 2012. All their closing values titles are collected on site www.bursanoastra.ro with MetaStock program.

Table no. 1. The sample of companies analyzed

Ticker	Company name	Category BSE	Number of operations capital increases
ATB	Antibiotice S.A.	1	8
ALR	Alro S.A.	1	5
ARM	Armatura S.A.	2	2
TLV	Banca Transilvania S.A.	1	21
SPCU	Boromir Prod SA Buzau (Spicul)	2	2
CBC	Carbochim S.A.	2	3
CMP	Compa S. A.	2	4
COFI	Concefa SA Sibiu	1	7
ELJ	Electroaparataj S.A.	2	1
ELGS	Electroarges SA Curtea de Arges	2	3
MEF	Mefin S.A.	2	4
OLT	Oltchim S.A. Rm. Valcea	1	9
PREH	Prefab SA Bucuresti	1	5
PPL	Prodplast S.A.	2	2
ROCE	Romcarbon SA Buzau	2	3
COTR	SC Transilvania Constructii SA	2	6
STZ	Sinteza S.A.	2	2
MPN	Titan S.A.	2	4
VESY	Ves SA	2	7
APC	Vostalpine Vae Apcarom SA	2	1
ZIM	Zimtub SA	2	6

Source: www.bvb.ro

4. Empirical results

Based on stock prices I calculated daily logarithmic values using the closing prices of each trading day.

The main descriptive statistics of daily logarithmic series corresponding to the 21 analyzed companies for the period from the first day of listing until 30 January 2012 are presented in Table no. 2.

We can see that average values of the series are positive only for 8 analyzed companies, other companies showing negative values, at the extremes being placed COTR, respectively VESY. An argument that the series do not follow a normal distribution law is given by the value of Jarque-Bera test. However, Kurtosis coefficient has higher value of 3 to 5 companies, while other companies have lower values of 3.

Table no. 2. Descriptive statistics

Ticker	No. obs.	Avg.	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque - Bera	Prob.
ALR	3047	1.3109	1.26694	3.1780	-0.099	0.6535	0.394574	2.61504	97.8781	0
APC	2779	-1.617	-0.99425	0.2776	-4.327	1.2394	-0.30341	1.51415	298.275	0
ARM	2543	-1.433	-1.36649	0	-3.296	0.8423	-0.3882	1.9614	178.168	0
ATB	3562	-0.911	-0.8539	0.7654	-2.733	0.9287	0.035285	1.89576	181.708	0
CBC	2126	0.9338	1.02061	3.1986	-0.916	1.1227	0.260782	1.72005	169.22	0
CMP	3452	-1.159	-1.21571	0.8329	-3.310	1.1212	0.014288	1.83438	195.537	0
COFI	1522	-1.577	-1.83258	2.8273	-4.199	1.4133	0.759892	3.46563	160.225	0
COTR	981	3.6624	3.56104	6.2441	-2.659	1.7331	-0.94555	4.61136	252.311	0
ELGS	1640	-1.353	-0.99142	0.2623	-3.912	1.1616	-0.53082	1.82278	171.716	0
ELJ	2255	-1.736	-1.82635	0	-2.813	0.5407	0.638941	2.71778	160.915	0
MEF	1783	0.4853	0.69314	1.9021	-1.386	0.7858	-0.36229	1.91018	127.241	0
MPN	1839	-1.640	-1.34515	-0.371	-3.381	0.7749	-0.31075	1.60312	179.11	0
OLT	3453	-1.651	-1.56065	0.7934	-3.830	1.0187	0.135233	2.13199	118.923	0

PPL	2203	1.2073	1.11185	3.6888	-0.342	0.8355	1.222671	4.41753	733.333	0
PREH	2109	0.8504	0.74193	3.3322	-2.207	1.2418	0.296504	2.00778	117.414	0
ROCE	2076	0.1924	0.09531	4.5325	-1.846	1.2206	0.737531	3.37266	200.220	0
SPCU	2959	-1.562	-1.60944	2.9957	-4.605	1.3747	0.406099	3.29087	91.7630	0
STZ	2756	-2.028	-1.81708	0.0198	-3.922	1.1513	-0.06108	1.58862	230.460	0
TLV	3366	-0.600	-0.40048	0.8754	-2.002	0.7831	-0.06423	1.68286	245.624	0
VESY	1571	-2.087	-2.08747	-0.597	-3.036	0.6034	0.399994	2.20825	82.9257	0
ZIM	1871	0.4723	0.39204	1.5260	-0.916	0.5994	-0.08087	1.72353	129.062	0

Source: Own processing in Eviews

Of the three models of Zivot-Andrews test we chose the model C (model with a break in the constant and trend). Table 3 shows the values of Zivot-Andrews test. The critical values of this test, respectively model C are: -5.57 (significance level of 1%), -5.08 (significance level of 5%) and -4.82 (significance level of 10%). Only 5 companies from analyzed logarithmic stock prices series generate significant amounts of t statistics in relation to

critical values, which means that the nonstationary nul hypothesis is rejected. Identified break date test does not coincide with the date of capital increase related analyzed companies. The only exception is the company PPL (Policolor). For the stock prices of four companies the identified data of the Zivot-Andrews test coincides with the onset of the crisis or bankruptcy of Lehman-Brothers.

Table no. 3. Test results zivot-Andrews

Ticker	Structural break date	T-stat
ALR	11-Aug-00	-5.08649*
APC	4-Oct-01	-4.49967
ARM	14-Aug-00	-4.32144
ATB	6-Oct-04	-2.84723
CBC	11-Sep-08	-3.88565
CMP	10-Jun-08	-3.63866
COFI	9-Mar-04	-4.54385
COTR	15-Nov-06	-4.0231
ELGS	9-Sep-03	-4.06831
ELJ	9-Jul-04	-4.04854
MEF	19-Sep-00	-4.51794
MPN	10-Jun-03	-6.44909**
OLT	16-Jun-99	-2.89746
PPL	17-Nov-05	-5.71161**
PREH	16-Oct-02	-3.91531
ROCE	26-Jul-07	-5.66782**
SPCU	9-Sep-05	-5.12661*
STZ	3-Dec-03	-3.30899
TLV	10-Nov-03	-4.33095
VESY	10-Aug-06	-4.59126
ZIM	11-Jun-08	-4.17144

Source: Own processing in WinRats

5. Conclusions

Zivot - Andrews test was applied to see if the structural break date coincides with the official date of the share capital increase. Identified break

date does not coincide with the test date for any of the analyzed companies.

As a research perspective I propose to use other tests with structural breaks, such as Lee-Strazicich and Bay-Perron, to determine whether the two dates coincide.

REFERENCES

Asquith P., D. W. Mullins	<i>Equity issues and stock price dilution</i> , Working Paper, Harvard Business School, 1983;
Berkovitch, E. & Narayanan, M.P.	<i>Motives for Takeovers: An Empirical Investigation</i> , Journal of Finance and Quantitative Analysis, vol. 28, pp. 347-362, 1993;
Choe, H., Masulis, R., Nanda, V.	<i>Common stock offerings across the business cycle: theory and evidence</i> , Journal of Empirical Finance, issue 1, pp. 3-31, 1993;
Dierkens, N.	<i>Information asymmetry and equity issues</i> , The Journal of Finance and Quantitative Analysis, vol. 26, pp. 181-198, 1991;
Eckbo, B., Masulis, R.	<i>Adverse selection and rights offer paradox</i> , Journal of Financial Economics, vol. 31, pp. 293-322, 1992;
Ellis, M.E.; Dunkelberg, J.	<i>The effect of the prestige of the investment banker on stock returns</i> , Mid-Atlantic Journal of Business, 1995;
Hamon, J., Jaquillat, B.	<i>Le marché français des actions : Etudes empiriques 1977-1991</i> , 1ière Edition Finance, ch.4,5,6,7, Edition PUF, 1992 ;
Korajczyk R. A., Lucas D., McDonald R. L.	<i>Understanding stock price behaviour around the time of equity issues</i> , NBER Working Paper Series, Working Paper No. 3170, Cambridge University, noiembrie 1989;
Lucas, D., McDonald, R.	<i>Equity issues and stock price dynamics</i> , The Journal of Finance, vol. 45, pp. 1019-1043, 1990;
Masulis, R., Korwar, A.	<i>Seasoned equity offerings</i> , Journal of Financial Economics, vol. 15, pp. 91-118, 1986;
Myers, S. C., & Majluf, N. S.	<i>Corporate Financing and Investment Decisions When Firms Have Information Those Investors Do Not Have</i> , Journal of Financial Economics, vol. 13, pp. 187-221, 1984;
Zivot, E. & Andrews, D.W.K.	<i>Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis</i> , Journal of Business & Economic Statistics, Vol. 10, No. 3: 251-270, 1992;
*****	www.bvb.ro ;
*****	www.bursanoastra.ro .