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DOES STOCK MISPRICING AFFECT THE CORPORATE INVESTMENT DECISIONS? EVIDENCE FROM CATERING EFFECT

O Mispricing de Ações afeta as Decisões de Investimento Corporativo? Evidências do Efeito Catering

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Abstract: Current study finds out the effect of stock mispricing, through catering effect, on corporate investment decisions by taking the sample of firms listed on Pakistan Stock Exchange during the period of 2007-2014. This study uses the methodology of Rhodes-Kropf et al (2005) to measure the stock mispricing who used market to book decomposition methodology to find out different components of mispricing and relate it to corporate investment activity that is measured by capital expenditures. Stockholder investment horizon is measured by share turnover ratio. Panel regression methodology is used to determine the relationship between stock mispricing and corporate investment decisions. Results of the study show that Firms with short horizon investors have significantly higher mispricing sensitivity than the firms with long horizon shareholder. Both sides of mispricing affect the investment but the impact of overvaluation is more than undervaluation because the firms issue shareholder equity more than stock repurchase.
Key words: Stock mispricing, corporate investment, Investment horizon

Resumo: Este estudo analisa o impacto da precificação de ações, através de efeito de catering, em decisões de investimento corporativo, a partir de uma amostra de empresas listadas na Bolsa de Valores do Paquistão durante o período de 2007-2014. O estudo utiliza a metodologia de Rhodes-Kropf et al (2005) para medir a precificação de ações que usou o mercado para registrar metodologia de decomposição para descobrir diferentes componentes de precificação e relacioná-la à atividade de investimento corporativo que é medida por investimentos. O horizonte de investimento dos acionistas é medido pela taxa de rotatividade de ações. A metodologia de regressão de painel é usada para determinar a relação entre a precificação de ações e decisões de investimento corporativo. Os resultados do estudo mostram que as empresas com investidores de horizonte curto têm sensibilidade à apropriação de preços significativamente mais alta do que as empresas com acionista de horizonte longo. Ambos os lados do preço errado afetam o investimento, mas o impacto da supervalorização é mais do que a desvalorização, porque as empresas emitem mais capital acionário que a recompra de ações.
Palavras-chave: Mispricing de ações, investimento corporativo, horizonte de investimento

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INTRODUCTION

The study is aimed to find out whether the stock mispricing affects the corporate investment decisions. Current study tests a "catering" channel, through which deviations from fundamentals may affect investment decisions directly. According to this channel, market put pressure on firms to cater the shareholder's opinion in order to make the investment decisions. Managers make the investment decisions that are consistent to shareholder horizon. There are two types of investors, short horizon and long horizon; Short horizon investors (like mutual fund) are those who are interested in current stock price and short term cash flows. They trade frequently to meet the liquidity need while the long horizon investors (like pension fund) do not trade frequently because they have long term liabilities and concerns about the long term cash flows.

In efficient market, there is no deviation between market price and fundamental value, so shareholders' investment horizon has no effect on investment decisions. Managers make investment decisions that maximize the fundamental value of firm and investors can sell their shares to meet the liquidity need before the investment payoff. But the deviation of firm value from its fundamental value creates the problem between the investors of different investment horizons because the long horizon investor does not care about the mispricing and they can wait until the mispricing is corrected. But it does matter for short horizon investors because they might sell the share if the stock is still mispriced.

So when the manager has short horizon investors, he will be more interested in maximizing current market price rather than long run fundamental value. When the firm is overvalued, manager will increase the investment to justify the current high price or package the asset in such a way which gives optimistic view regarding growth even he will continue to make the investment in negative NPV projects as long as this approach increases the share price in short run. When the firm is undervalued, manager will avoid investing in undervalued project because shareholder demands high rate of return on such investment. It is assumed that without issuing the equity, managers can focus on the current market price while making the investment decisions to cater the shareholders.

Polk and Sapienza (2008) argued that when shareholders have relatively short investment horizon and mispricing prevailed for longer time then chances of misallocation of invested capital increase. To test the relation between stock mispricing and corporate investment, the data of Non-financial firms from PSX 100 index, previously KSE100 index, from the period of 2007 to 2014 is used. Dependent variable is capital expenditure (purchase of property, plant and equipment) and independent variable is mispricing.

This study relates to other studies that find out the impact of stock mispricing on corporate investment through equity issuance channel (Baker et al, 2003). Stein (1996) finds out that when the stock price is above the fundamental value, manager will issue the equity to take the advantage of low cost of capital and do not invest when the stock price is below the fundamental value because this investment requires the issuance of equity at very low price. Further, Baker et al, (2003) test this relationship and provide evidence that stock mispricing affect the investment through equity channel. This study asks another question: Is there is any alternative channel that effects the firm investment decisions, one which is not directly linked to equity issuance? This channel is important because firms listed on Pakistan stock exchange mostly use debt and retained earning rather than equity issuance. So it is important to evaluate whether the firms adjust their investment policies according to their stock valuation even if they are not issuing equity to finance these investment projects. In order to differentiate between equity issuance and catering effect, this study control the effect of equity issuance to check the impact of deviation from fundamental value on investment.

Furthermore, this study contributes towards literature in several ways. Firstly, to the best of my knowledge there is no such research in context of Pakistan that finds out the impact of stock mispricing on corporate investment through the catering effect. Secondly, this study also finds out this investment distortion in both overvalued and undervalued firms separately. Thirdly, previous studies showed the importance of stock market for the development and growth of economy as it provides the capital and they induce the developing economies to move towards the development of capital markets. So the policy maker should also consider how this stock market distorts the investment through catering channel. This study also suggest the private investors to be careful while investing their social security savings in sentimental effected economy because these private investors are not experts and they may enrich the arbitragers and those firms who are involved in catering the current sentiment.

THEORETICAL REVIEW

Stock mispricing is becoming very important phenomena in finance literature and has been a subject of considerable debate from last many years. Stock mispricing is basically difference between the observed market price and its predicted intrinsic value or fundamental value (Alzahrani and Rao, 2014; Toeh et al. 2007 and Kaplan 2012). Within this debate, whether the stock mispricing affects the investment has become an interesting and important question. This theme of research can be traced back to early work of Keynes (1936) who found that stock prices show mispricing component that makes the cost of equity different from other sources and affect the investment decisions. On the one hand, Morch et al. (1990) and Blanchard (1993) argued that stock market plays little role in driving investment after controlling the fundamentals. On the other hand, several empirical studies suggest that stock market plays an important role in affecting the investment decisions (chang et al., 2007; Alzahrani and Rao, 2014)

There are two important theories that explain how the stock mispricing affects the investment decisions. First, equity channel which is proposed by Baker et al. (2003) who links the mispricing to investment through market timing hypothesis. According to this channel, overvalued firms issue equity and invest the proceed even in negative NPV projects while undervalued firms ignore the positive NPV projects because they don't want to issue equity at very low price. Secondly, what if the firm does not issue the equity? Is there any alternative channel that affects the investment? Polk and Sapienza (2009) proposed the catering effect which is different from equity channel. According to this channel, market put pressure on manager to cater the shareholder's opinion in order to make investment. Managers make investment decisions that are consistent with investor horizons and there is more investment mispricing sensitivity when this mispricing is strong and firm has short horizon investors.

When the short horizon investors are optimistic and manager does not invest in new projects that is favored by these investors, they may sell their shares that cause the decline in stock price, then manager choose to increase the investment in those projects to maximize the share price in short time to cater the short horizon investors and to earn the high salary and compensation. Stein (1996) argued that when manager has incentive to maximize the current stock price then he might invest in value destroying projects. Camanho (2012) said that manager invest in value destroying projects because he knows that before the quality of project is released to shareholder that causes a fall in share price, short horizon investors would have sold their stocks.

Similarly when the firms are undervalued and investors are pessimistic about the quality of project then the firm with short horizon investors issues less equity to finance the investment and pay more to shareholders, holding other sources of finance constant because they give more value to one dollar in cash flow today than the claim on present value of one dollar of future cash flow. On the other side, long horizon investors ignore the effect of mispricing. Firms with long horizon investors issue more equity, make more investment and pay less to shareholders when they are undervalued (Thesmar et al, 2012).

Moreover, Jenson (2005) argued that manager caters the opinion of shareholder because of the fear of being fired or taken over and he wants to protect his job. If the stock prices are used as manager's competence in making investment decisions then manager will be more concerned about the current stock price and reluctant to lower the stock price. Ka, et al, (2004) found that agency theory explains manager's tendency to listen the market. Firms with smaller boards, pay performance tied with stock prices and more outside monitors are less likely to engage in value reducing acquisition.

Gaspar, et al (2004a) logically explains the effect of investor horizon on investment. They argued that investors with short horizons have fewer incentive to spend resources to monitor the manager activities because they do not have to remain in firm long enough to reap the benefit and this weak monitoring encourages manager to tradeoff the shareholder benefit for the personal interest that ranging from job security to empire building at the expense of shareholder return. Another effect is weak bargaining power; manager with short horizon investor has weak bargaining power in merger and acquisition.

Qiu (2004) found that large mutual fund shareholders that provide weak monitoring and encourage the manager to engage in value reducing activities of acquisition while on the other hand large mutual public pension fund that are active in their monitoring activities, discourage manager from empire building acquisition. Results show that pension fund ownership performs better than mutual funds ownership in post acquisition era.

Toeh et al. (1998) found that high discretionary accruals have lower stock return. Polk and sapienza (2009) found positive relation between stock mispricing and abnormal investment by using discretionary accruals as a proxy of mispricing. They found that investment relation is more sensitive to discretionary accruals among the firms that have high research and development expenditures and the firms that have shorter horizon investors. They also found that firms with high abnormal investment have low stock return and this relation is stronger among firms that have short horizon investors. Chan et al. (2001) argued that firms with high discretionary accruals perform poorly in the coming year because managers manipulate the earning to artificially increase the current stock price.

Chung, et al, (1998) found that firms with high growth opportunities experience positive abnormal return around the capital expenditure announcement while the firms that increase the capital expenditure experience negative abnormal return in low growth opportunities. Titman et al, (2004) found that positive response to increase in capital expenditure reflects favorable capital expenditure while the increase in stock prices around the capital expenditure announcement is due to the market timing rather than positive response from market.

Camanho (2012) examined the impact of mispricing by using the mutual fund flow price pressure on corporate investment. He found that high price pressure with high investment generate lower stock return and lower future operating performance than high price pressure firms with low investment. This investment mispricing sensitivity is stronger among the less financially constrained firms with high turnover rate and the firms with high research and development expenditure. He also found that this investment mispricing sensitivity remain positive and strong for the firms that do not offer seasonal equity which suggest that there is channel between price pressure and investment that is independent from equity issuance.

These studies show the existence of catering effect and the logic behind this effect. But it's important to differentiate the catering effect from capital structure arbitrage view. According to capital structure arbitrage view, firm exploit the temporary mispricing to transfer the value to new share holders while the catering effect means firms make decision like investment, financing and dividend payment only to cater the short horizon investors. According to market timing hypothesis, firms issue equity to exploit the mispricing. In case of capital structure arbitrage view, firm transfer the value to new shareholders by issuing the overvalued equity and retain the proceed rather than making the investment and shares are repurchased to transfer the value to long horizon investors while the catering effect hold that firms not only issue the equity but also make the investment to please the short horizon investors who overvalue the firm investment opportunities and decrease the investment and increase the payout to short horizon investors in case of undervaluation. This shows that firms make suboptimal investment decisions only to cater the short horizon investors which shows that investment is more sensitive to mispricing when the investors have shorter investment horizon

METHODOLOGY

The population of the study includes all the firms listed on Pakistan Stock Exchange. The sample consists of non financial firms on then PSX 100 index from the period of 2007 to 2014. The sectors having one or two firms are excluded from the sample. The final sample contains 80 firms. Data is collected from annual reports of companies.

In order to test the relationship between stock mispricing and corporate investment, fixed and random panel regression methodology is used. Fixed effect model and random effect model is chosen by using the Hausman (1978) test. Normality and linearity of data is also checked. Breusch pagan test is applied to test the presence of heteroscedasticity in data. Some models have the problem of heteroscedasity, so in the final estimation, the problem of heteroscedasticity is adjusted by applying the GLS weights. Through the Durbin-Watson test, the lack of serial correlation among residuals is analyzed.

To remove the biasness of the results, multi co-linearity is assessed by Variance Inflationary Factor (VIF). To check the stationary of data, unit root test is applied. E-views is used for analysis of data.

The basic methodology involve regressing the measure of corporate investment that is measured by capital expenditure (purchase of plant, property and equipment) on measure of mispricing component, equity financing and cash flow. To measure the mispricing, Rhodes-Kropf et al, (2005) market-to-book decomposition methodology is used. M/B is decomposed into three components; these three components are firm level mispricing Dev_i^{firm}, Aggregate level mispricing Dev_{it}^{Agg} and growth component (G_{it}). Firms are said to be overvalued if the value of Dev_{it}^{firm} is positive and undervalued if the Dev_i^{firm} is negative.

Mispricing is the deviation of market value from the fundamental value. Fundamental value of firm i at time t is calculated in two steps.

$$ln(M)_{it} = \alpha_{0jt} + \alpha_{1jt} ln(B)it + \alpha_{2jt} ln(|NI|_{it}) + \alpha_{3jt} (ln\ |NI|_{it}) \times D_{(NIit<0)} + \alpha_{4jt} LEV + \varepsilon_{it} \quad (1)$$

First, this model is calculated annually for each sector where m is market value of firm, B is book value of Total asset, NI is net income, D is dummy variable that is equal to zero if net income is negative otherwise it is 1, Lev ratio is calculated by dividing total liabilities by total debt and equity. Secondly, after estimating the multiples, fundamental value v (0_{it}; α_t) is predicted by using these multiples and accounting data.

Mispricing at aggregate level DevitAgg is measured by taking the difference between the fundamental value of firm and market value of firm. It is denoted by (v $\mathbf{(0_{it}; \alpha_t)}$ - v $\mathbf{(0_{it}; \alpha)}$). These long term multiples are obtained by taking the averages of multiples over time period. Mangers use stock price as guide to make investment decisions. When manager makes the investment decisions based on this market information and cannot filter the error in its prediction then this market mispricing affects the investment (Morck et al. 1990).

Third component of decomposition is growth, it is the difference between fundamental values based on long run multiples and book value. This component shows the growth opportunities of firm. Corporate investment is measured by the capital expenditure. (Baker et al. 2003, john et al, 2006, Polk and sapienza, 2008).

Other independent variables are the cash flows and net equity. Cash flows are measured by net income plus the depreciation and amortization. Net equity is measured by equity issued minus equity repurchased.

In order to find the shareholder's investment horizon, share turnover ratio is used as a proxy for the amount of time the investors hold the stock, following stein (1996); Gaspar et al.(2005) and Polk and sapienza (2009). It is calculated as an average of monthly ratios of shares traded to total share outstanding during a year. Firms that have short (long) investment horizon have high (low) turnover ratio.

RESULTS AND DISCUSSION:

Variables	Symbol	Mean	Median	Std.Dev
Firm level mispricing	DEV_{it}^{firm}	0.0124	0.0004	0.77
Aggregate level mispricing	DEV_{it}^{Agg}	-0.16	-0.076	1.15
Growth	G_{it}	2.666	2.9670	1.16
Cash flow to total assets	$CF/A_{i\,(t-1)}$	0.860	0.1200	7.66
Net Equity to total asset	$Net\ eq_{it}/A_{it}$-1	1.434	0.4367	15.03
Net debt to total asset	$Net\ debt_{it}/A_{it-1}$	1.45	0.042	127.82
Capital expenditure to total asset	$CAPX_t/A_{t-1}$	0.300	0.0363	1.744
Degree of finance constrained	Z	-5.261	0.5194	37.50
Investor horizon	H	6.738	0.0412	40.29

The table above reveals the descriptive stats of variables. The mean value of DEV_{it}^{firm} is 0.0124, it indicates that on average firms listed on PSX are overvalued when we consider the firm level mispricing while the mean value of DEV_{it}^{Agg} is -0.16, this shows that on average firms are experiencing undervaluation because of the negative sentiments in market. This negative sentiment is due to the fact that Pakistan stock exchange was experiencing the downfall from the period of 2007 to 2011 because of global financial crisis and internal economic conditions. (Mushtaq et al.2014). Likewise, the mean value of Growth is 2.66 and the mean of cash flow to total asset and capital expenditure to total asset is 86% and 30 % respectively. Furthermore, the mean value of investor horizon is 6.378, illustrate that on average firms have short horizon investors because investors in Pakistan pay more attention on fluctuation of stock prices rather than earning components. They are risk takers and get benefit from capital gains instead of dividends (Haque and Sarwar, 2013).

To measure the catering effect, we perform direct and indirect test of catering effect. The indirect test of catering effect involves measuring the relationship between stock mispricing and corporate investment. After controlling the net equity issuance activities, it is assumed that the remaining effect is due to managerial catering. Results in table 2 show value of firm's mispricing component; Devfirm that shows the significant relationship between mispricing and investment. This shows that equity issuance is not the only cause of mispricing investment sensitivity.

To find out the direct impact of catering effect, the study examines the difference between the firms that have shorter investment horizon and longer investment horizon. Shareholder's investment horizon is measured by shares turnover ratio being calculated as turnover ratio for each firm year by taking the average of monthly ratio of traded shares relative to shares outstanding during the fiscal year. After calculating the turnover ratio for each firm year, firms are sorted into different quartiles based on their average turnover ratio. Firms in top quartile are those firms that have highest trading volume and have shortest investment horizon while bottom quartile consists of the firms having longer investment horizon. The following regression equation for each quartile is obtained after dividing the firms into quartiles.

$$CAPX_{it}/A_{it-1} = \beta_0 + \beta_1 CF_{it}/A_{it-1} + \beta_2 Dev_{t-1}^{firm} + \beta_3 Dev_{t-1}^{Agg} + \beta_4 Growth_{it-1} + \varepsilon$$

The results reveal that firm mispricing coefficient is increasing from bottom to top quartile. Results are shown in table 2 where firms mispricing coefficient β2 among different quartiles are presented along with their significance values:

Table 2 Firm Mispricing β2

Dependent variable	Bottom quartile	2nd quartile	3rd quartile	Top quartile	Top-bottom
$CAPX_{it}/A_{it-1}$	0.0373(0.06)	0.143(0.01)	0.155(0.006)	1.89(0.02)	1.85(0.02)

The Coefficient value of bottom quartile is 0.037 with p-value 0.06 .The coefficient value in second quartile is 0.143 with p-value 0.01. In the same way, coefficient value in third and top quartile is 0.155 and 1.89 with the p-value 0.006 and 0.02 respectively. The firm mispricing coefficients follow the pattern that is consistent with catering effect which means firms with shortest investment horizon have higher investment mispricing sensitivity. The coefficient value in top quartile is 1.9 times higher than bottom quartile. These findings are consistent with study of Polk and Sapienza (2009) and Jensen (2005). According to them, when the manager has shorter horizon investors who are more concerned about current stock price, sensitivity of mispricing investment is higher. When the manager issues equity, investors perceive that stocks are overvalued and this will lead to decline in stock price because investors are not excited about the quality of project. So manager increases the investment to give the growth view or justify the high value. In case of undervalued equity, manager repurchase the equity more that is not optimal but repurchasing always respond positively by investors. According to Jensen (2005), managers have to cater the shareholder's opinion because they have the fear of being fired or firms being taken over. Results also support the findings of (Haque and Sarwar, 2013) who found that managers of Pakistani companies highly manipulate their earnings. They change their earnings to cater the share prices because investors in Pakistan pay more attention to the fluctuating stock prices rather than earning components. So these results support hypothesis that shorter the investor horizon, there is more impact of stock mispricing on corporate investment.

Moreover, Mispricing has two aspects; undervaluation and overvaluation. Some researchers take into account only overvaluation (baker et al. 2003) and some works with undervaluation only (Gilchrist et al, 2005). But both the aspects are important as both undervaluation and overvaluation and their effect are important (Polk and sapienza (2009). Both aspects have their special effects as being taken in this study. Firms are divided into two groups: overvalued firms and undervalued firms and this division is made to find out the separate effect of these two types of mispricing on corporate investment. Table 3 and 4 are very important as showing the following results.

Table 3 Overvaluation and investment decisions

Dependent variable	CF/A^{t-1}	Dev_{t-1}^{firm}	Dev_{t-1}^{Agg}	G_{t-1}	Net equity/A_{t-1}
Capx/ A_{t-1}	0.29(0.000)	0.35(0.008)	0.92(0.000)	0.488(0.000)	
Capx/ A_{t-1}	0.204(0.000)	0.249(0.01)	0.507(0.00)	0.160(0.05)	0.03(0.00)

Table 3 shows the relationship between mispricing and investment decisions in overvalued firms. First row shows the relationship between market variables and investment in overvalued firm. These three components have positive relationship with investment which means that overvalued firms increase investment when there is positive wave in industry and when there is a high growth prospect. Overvalued firms are more likely to issue equity to respond this overvaluation that leads to overinvestment. The cause of this overinvestment is the issuance of overvalued equity or by catering to shareholders or combination of both. The effect of overvalued equity issuance is measured by the coefficient value of equity and effect of catering is measured by firm mispricing component after controlling the equity.

Second row in table 3 shows that overvalued firms increase investment when it is overvalued by issuing equity. This shows that overvalued firms increase the investment by issuing overvalued equity. The coefficient value of firm mispricing component is higher than the coefficient value of equity issuance that means overvalued firms increase investment to cater the shareholders. Coefficient value 0.507 of aggregate component of mispricing also shows that firms increase investment more when the industry is overvalued. These results also support the findings of dong et al (2013). They found that in case of overvalued stock when there is equity overvaluation it increases both equity issuance and total financing. The firms having more potential growth opportunities and high share turnover are more sensitive to equity issuance as well to mispricing.

Table 4 Undervaluation and investment decisions

Dependent variable	CF/A^{t-1}	Dev_{t-1}^{firm}	Dev_{t-1}^{Agg}	G_{t-1}	Net equity/A $_{t-1}$
Capx/ A $_{t-1}$	0.0016(0.00)	-0.244(0.002)	0.214(0.000)	-0.016(0.53)	
Capx/ A $_{t-1}$	0.183(0.00)	-0.167(0.022)	-0.128(0.00)	-0.15(0.000)	0.032(0.000)

Table 4 shows the result of stock mispricing on investment decisions in undervalued firms. The firm mispricing component $\mathbf{Dev}^{firm}$ and growth $\mathbf{G}_{t-1}$ shows that undervalued firms decrease their investments. Undervalued firms decrease the investment because the cost of issuing equity is very high. Negative value of Gt-1 component also shows that these firms decrease investment even when the potential projects have positive NPV or there are growth opportunities. The cost of issuing equity for undervalued firms is more than the benefit of investment and that is reason why the undervalued firms have to pass the projects that have positive NPV. These results are consistent with the study of Lia and Hau (2012) who found that firms experiencing the undervaluation decrease the investment of approximately 20% before the recovery of market price relative to the industry peers.

CONCLUSION

This study finds out the impact of stock mis-valuation on corporate investment decisions by taking the sample of firms from PSX 100 index for the period of 2007-2014. To measure the mispricing, market to book decomposition methodology of Rhodes-Kropf et al, (2005) is used to find out different components of mispricing and relate it to the corporate investment activity that is measured by capital expenditures. Stockholder investment horizon is measured by shares turnover ratio. Fixed and random effect panel regression methodology is used to measure the relationship between stock mispricing and corporate investment decisions.

This study focus on framework based on stein (1996) in which firm investment decision is affected by stock mispricing of the firm even if the investment projects are not financed by new equity. According to this channel, shareholder investment horizons affect the investment decisions because managers cater the shareholders opinion in order to make investment decisions. When the manager has short horizon investors interested in maximizing current market value of stock by rationally choosing to invest in projects that are overvalued and avoid projects that are undervalued.

In the empirical part, when we control the impact of investment opportunities, we find that as we move from lower quartile (firms having lowest turnover ratio) to upper quartile (firms having highest turnover ratio), the sensitivity of investment mispricing is increasing. The difference between bottom and upper quartile is 1.8 that is almost 2 % which shows that I% change in mispricing brings 2% change in investment as we move from long horizon to short investment horizon. This shows that the effect of investment mispricing sensitivity is more pronounced for the firms that have shorter investment horizon as compared to longer investment horizon firms.

In addition, both sides of mispricing affect the investment but the impact of overvaluation is more than undervaluation because the firms issue shareholder equity more than stock repurchase. This impact is checked by controlling the equity issuance, growth opportunities and financial slack.

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