

Revealing of Stockholders' Expectations Using Price-Dividend Dependence in Developed and in Emerging Markets

Sergey Petrov, Oksana Kashina

Lobachevsky State University of Nizhny Novgorod
Institute of Economics and Entrepreneurship, Department of Finance and Credit
Bolshaya Pokrovskaya Street 37
Nizhny Novgorod, 603000
Russian Federation
e-mails: petrov_ss@list.ru, oksana_kashina@mail.ru

Abstract

The paper aims to develop a framework which helps to reveal the shareholders' expectations on the issuing company's growth using comparative analysis of time series of the share price and the dividend per share. A procedure developed in the paper is based on the dividend discount model modification for continuously increasing expected dividends and limited period when investor is going to own the share. The authors have shown that if stockholders expect a constant average rate of the corporation's growth as the classical Gordon's model supposes the price of the firm's shares and their dividends should increase proportionally. Performing the analysis of price-dividend dependence using econometric technologies, one may characterize shares as "Gordonian" or as "speculative" or as "pessimistic". The developed technique is applied for a number of shares which are traded on developed market and, in contrast, on emerging market. The analysis of P/E ratio permits to complete the research and helps to reveal stockholders expectations for "Gordonian" shares.

Keywords: revealing of stockholders' expectations, diagnostics of stock price growth expectations, dividend discount model for common stock pricing, price-dividend time series analysis, discount rate for emerging market

JEL codes: C12, G11, G12, G15, G17

1. Introduction

The attention to the problem of stockholders' expectations diagnostics is supported either by practical needs or by some opportunities to verify several theoretical models of financial economics.

For the practical purposes some relevant questions are of crucial importance, first, for active portfolio management (Graham, 2004). What are the reasons for investors to hold any particular shares? Do investors anticipate rapid price appreciation for the given share (such securities are of speculative interest in practice) or they are attracted by the dividend payments on it (one may characterize the securities as "shares of dividend income")? The decisions on portfolio selection procedure considerably depend on the answers to the questions. Second, the motives of investors' interest in the shares are substantial to their issuers.

With respect to the verifying of asset pricing theory inferences a number of researches have examined, in particular, dividend discount model for common stock (see references in Shiller (2003)). Campbell and Shiller (1988) had shown that stock price volatility can't be explained by variations of the discount rate that reflects stockholders' expectations. Many studies of stock market efficiency (see references in Shiller (2014)) had been analyzing price-dividend dependence for shares; they had been directly referring to the problem of investors' expectations rationality. Stockholders' expectations diagnostics was also conducted using periodic surveys among random sample of investors (Greenwood and Shleifer, 2014).

The aim of the present paper is, in the first instance, to develop a framework for revealing of stockholders' expectations about future share price growth (Section 2). The approach is based on the original version of dividend discount model supposed the constant rate of dividend growth and the limited period of investment (similar method was used by Majanga (2015); however, his analysis is not quite correct, since the author neglects a future sale of share). Following classical philosophy (see, for example, Cochrane (2011)), our method uses co-integrated analysis of price-dividend time series.

Its idea is associated with comparison of the average rate of increase for share price and for dividend per share. Well-known version of dividend discount model developed by Gordon (1959) implicating shareholders' expectations of proportional growth for share price and dividend is considered as a reference point. We test an effectiveness of the framework using price-dividend dependence for shares whose issuer follows a classical principle posited that dividend policy should be more or less stable (Brealey et al., 2010).

In the second instance, we purpose to compare features of stockholders' expectations about future share price growth in developed and in emerging markets (Sections 3 and 4). High volatility in investor sentiment and, as a result, in share prices are a characteristic of emerging markets (Mirza and Afzal, 2012); under those circumstances, revealing of stockholders' expectations based on the market price data is actual and not sufficiently explored problem. American shares are considered both as a reference point and as the best pattern of developed stock market securities; while studied share prices and dividends in Central and Eastern European (including Russian) emerging stock markets we have concentrated on a number of Russian securities whose price-dividend dependence is rather distinct.

2. Research Methodology: Analytical Procedure and Price-Dividend Dependence Modeling

Consider an investor who plans to buy a common stock at the initial time $t = 0$ and to hold it for n years (we assume that time t is a discrete variable); let D_1, D_2, \dots, D_n are the expected annual dividends per share. Besides dividends, the investor may have some income at the end of the period if he will sell the share; let P_n is its appropriate expected price at the time n . The current price of the share P_0 from the investor's point of view in this case (its "intrinsic" value) may be found as a sum of discounted dividends and discounted resale price with discount rate r (see, e.g., Brealey et al. (2010)):

$$P_0 = \sum_{t=1}^n \frac{D_t}{(1+r)^t} + \frac{P_n}{(1+r)^n}, \quad (1)$$

The investor can't know how dividends D_1, D_2, \dots, D_n will vary in the future. In this regard, the hypothesis of the classical Gordon's model (Gordon, 1959) about uniformly increasing dividends looks quite plausible (for example, it is hard to trust that the investor imagines nonmonotonic future dynamics of dividends):

$$D_{t+1} = D_t(1+g), \quad (2)$$

where $t = 0, 1, \dots, (n-1)$, g - constant rate of growth (estimated by the investor). So the present value of dividends in the relation (1) may be summarized as a geometric progression with ratio

$$q = \frac{1+g}{1+r}. \quad (3)$$

In this case the general relation (1) of share evaluating is shaped into

$$P_0 = \frac{D_0(1+g)}{r-g}(1-q^n) + \frac{P_n}{(1+r)^n}, \quad (4)$$

where D_0 - the previous dividend per share. If the investor does not intend to sell a share, we obtain the well-known Gordon's model (Gordon, 1959)

$$P_0 = \frac{D_0(1+g)}{r-g}. \quad (5)$$

We should stress now one substantial feature of Gordon's model, which is the reference point for the further empirical data analysis. As the future price P_t at the moments $t = 1, 2, \dots$ connects with dividend payment D_t by relation similar (5), the formula (2) gives rise to the uniform growth of price with the same rate g :

$$P_{t+1} = P_t(1 + g). \quad (6)$$

So if we will apply the formula (4) for subsequent time moments $t = 1, 2, \dots, (n - 1)$ taking them as datum, both summands in the right-hand side will annually rise proportionally by a factor of $(1 + g)$. In other words, a peculiar kind of time dependence of the share price resulting from Gordon's model (relation (6)) makes relations (4) and (5) equivalent to each other at any n (i.e., the period of investment does not matter). These arguments suggest how to verify the Gordon's model for stock evaluating: dividend and share price should increase proportionally.

The formula (4) is the basis for the further reasoning that allows to reveal shareholders' perception of securities' investment possibilities.

We use the well-known method proposed by Fama (1970). This method (Fama, 1970) allows to verify theoretical "ex-ante" models using historical "ex-post" data. Following Fama, we can expect that if the stock market is efficient the relation (4) between the share price at the beginning of each year and the previous annual dividend should be fulfilled upon the time-average. In other words, it means that investors' expectations are proper upon the average because market price fully reflects all available information.

The procedure of revealing of shareholders' expectations based on the relation (4) so requires historical time series of:

- actual shares' price P_t at the beginning of each $(t + 1)$ year for exception of the calendar effect "end of the year" (Brealey et al., 2010); we have considered averaged price for the first quarter as a price of the beginning of the year;
- dividend per share D_t for the year "t".

In such a way we can represent equation (4) in an equivalent form:

$$P_t = \frac{D_t(1 + g)}{r - g}(1 - q^n) + \frac{P_{t+n}}{(1 + r)^n}, \quad (7)$$

where the moment t is considered as initial.

The first challenge for our research is to test whether equation (7) describes observed price-dividend dependences for shares; next, we intend to use it (if it is possible) for revealing of shareholders' expectations. It is necessary to note that dividend policy of corporations in the countries, whose financial institutions are quite formed, differs essentially from the one in the Central and Eastern European countries. Corporations which have a wealth of experience in financial management aim to pay stable dividend in many circumstances (Brealey et al., 2010); on the contrary, in emerging markets dividend payments of companies fluctuate significantly from year to year (Saleem and Fedorova, 2014). This fact was also pointed out by Bistrova and Lace (2012); it is in agreement with results of our own analysis carried out for Czech, Polish and Hungarian shares. A similar situation is also observed for securities in some developed markets (one can refer to Italian shares as an example). Under those circumstances price-dividend dependence for shares becomes unstable, and our approach is not quite correct.

However, several Russian shares (see below in section 3) were found to have rather stable price-dividend dependences. We use them to realize the developed procedure of revealing of shareholders' expectations in emerging stock market and to comprehend its features of share pricing. To examine the procedure it is reasonable to operate with American shares; high volume of transactions and well-developed financial institutions are the characteristics of stock market in the USA.

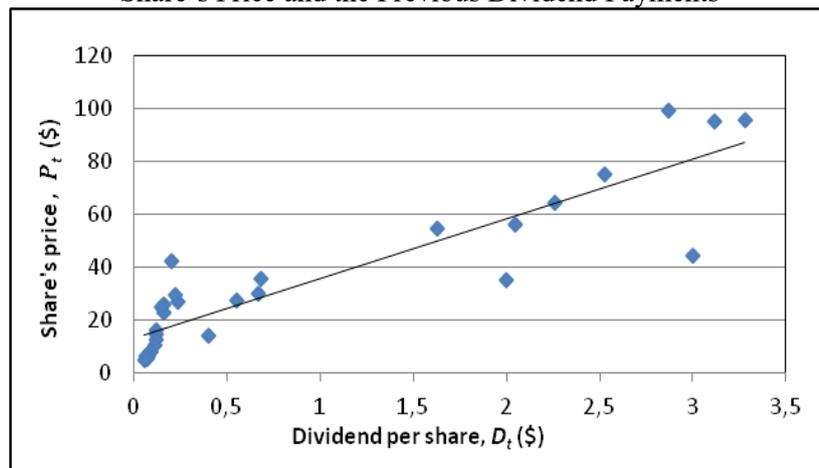
Let's, firstly, take a closer look at a procedure which permits to verify the price-dividend dependence implying by formula (7) using some simple econometric technique. The Figure 1 illustrates the essence of our method. The chart represents price-dividend dependence for McDonald's Corporation's shares (catering industry) from 1986 to 2014. The vertical coordinate of every point shows the average share price P_t (in dollars) for the first quarter of every year, the horizontal coordinate - annual dividend per share D_t (in dollars also) for the same year.

The Figure 1 demonstrates that historical share price and dividend per share are connected by more or less stable dependence; full line in the chart marks its linear trend. Represent the equation of the linear trend in general form

$$P_t = D_t \times \beta + \alpha, \quad (8)$$

where coefficients β and α are calculated with the help of econometric methods. The level of their statistical significance can be measured by the criterion of t -statistics. However, it is impossible to compare their values with parameters of the relation (7), because the second term in the right-hand side of the relation including the expected resale price P_{t+n} is obviously non-stationary. Another problem is associated with hypothetical period of investment; there is no reason to think of this "hidden" parameter as a constant.

Figure 1: The Historical Dependence (1986-2014) between McDonald's Corporation Share's Price and the Previous Dividend Payments



Source: author's calculations based on the data from website: <http://ycharts.com>

Nevertheless, we draw a conclusion from the analysis of the Figure 1 that the McDonald's Corporation's shares are not evaluated by Gordon's model. The fact is that coefficient α of the linear trend is substantially positive (its average value $\bar{\alpha}=13,28$ \$, t -statistic value $t = 4,44$). This argument means that the second term in the relation (7), proportional to the expected price P_{t+n} , have been increased more slowly than the first term, proportional to the dividend D_t . If the share evaluates in accordance with Gordon's model, both terms in the relation (7) should increase proportionally. In this case the trend line should pass through the origin (the coefficient α should be equal to zero within the statistical error of its calculation) as it follows from the relation (5).

In other words, the "representative shareholder" of the McDonald's Corporation had little in common with long-term investor who is present in Gordon's model. His motives were not speculative (expected growth of share price have not generated its current price). However, the extended analysis shows that evaluating of the shares was different in the initial period of time (between 1986 and 2000): their price had increased faster than their dividend. This fact was conditioned by the phenomenon of stock market "bubble" in the USA in 1984 – 1999 (see, e.g., Schiller (2003)). The situation had drastically changed after 2000: the contribution of the expected share price to its current price had been steady declined in comparison with increasing dividends.

3. Analysis of Shareholders' Expectations

The previous arguments reduce to a simple technique of revealing of shareholders' expectations using the analysis of price and dividend time series. It needs to construct a linear regression of the share price as a function of the dividend per share and to analyze coefficients β and α of the equation (8). If the price-dividend dependence is statistically significant one may conclude something about the stockholders' motives.

1. Coefficient $\alpha > 0$. This type of expectations was presented by the example of the shares of McDonald's Corporation. They may be characterized as "pessimistic" because the supposed growth of the share price increment (even if it happens) is relatively behind of changes in dividend. Current share price increases (upon the average) more slow than dividend, and the trend line on the chart similar to Fig. 1 is displaced up from the origin.

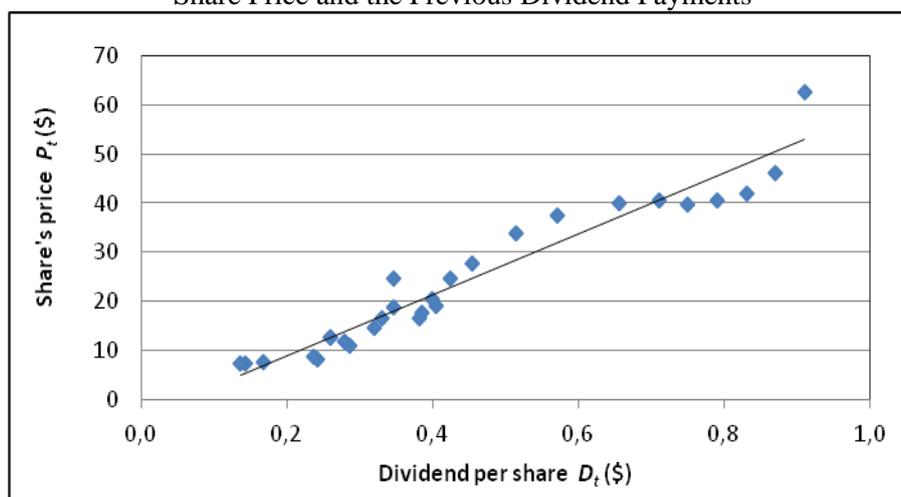
2. Coefficient $\alpha < 0$. In this case current share price increases relatively more rapid than dividend. Price growth is generated by advancing expectations of the future share price increment; these expectations are substantially "speculative". The trend line on the price-dividend chart is displaced down from the origin.

3. Coefficient $\alpha = 0$. Current share price (upon the average), dividend and, as a consequence, supposed share price increment rise proportionally to each other. As we have already noted, this situation is characteristic for classical Gordon's model; such type of shareholders' expectations may be called "Gordonian". The trend line on the price-dividend chart passes through the origin.

We next consider the most typical cases of revealing of shareholders' expectations for a number of American common stock (between 1985 and 2014 predominantly) and for Russian securities (between 2005 and 2014). We have examined the group of shares is owned by corporations from diverse branches. In spite of the stock market boom in the USA in 1989-2000 and its subsequent decline price-dividend dependence for American securities is more or less distinct. However, only a few of them are pricing in accordance with Gordon's model assumptions.

"Gordonian" shareholders' expectations, for example, were revealed for American UMB Financial Corporation's securities (the company's core competence is financial services). The historical dependence (1985-2014) between the share price (was obtained as before) and the previous dividend payment for the company is shown on the Figure 2; we see that the changes in price were closely connected with changes in dividend during the period under review.

Figure 2: The Historical Dependence (1985-2014) between UMB Financial Corporation's Share Price and the Previous Dividend Payments



Source: author's calculations based on the data from website: <http://ycharts.com>

In contrast to McDonald's Corporation' shares the trend line in the Fig. 2 displays the proportional dependence with $\alpha = 0$ (see equation (8)) within the statistical error of its calculation. It

means that “representative stockholder” of the UMB Financial Corporation is essentially close to a long-term investor who is implied in the Gordon’s hypothesis.

It is interesting to note that “Gordonian” type of shareholders’ expectations makes possible to analyze market evaluating of the share in more detail. If we compare the equation (8) of the “ex-post” linear trend bearing in mind that $\alpha = 0$ with “ex-ante” Gordon’s relation (5), under hypothesis of market efficiency we obtain

$$\beta = (1 + g)(r - g)^{-1} \tag{9}$$

and, therefore,

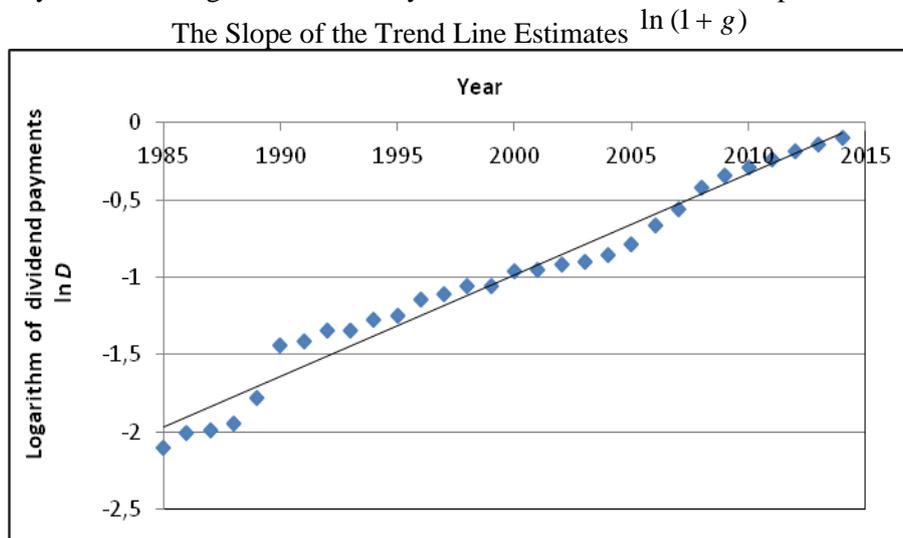
$$r = \beta^{-1}(1 + g) + g . \tag{10}$$

The coefficient β is calculated from the observed data on prices and dividends have been used for the plotting Fig. 2 (<http://ycharts.com>). To estimate the average rate of dividend growth g we note that if dividend increases uniformly according to the relation (2) its logarithm increases linearly:

$$\ln D_t = \ln D_0 + t \cdot \ln(1 + g) \tag{11}$$

So, we should consider time series for the log of dividend payments (see chart on the Figure 3) and study its linear trend (the full line on the chart); the factor $\ln(1 + g)$ may be then determined as a slope coefficient of the trend line. The Fig. 3 shows that model of uniformly increasing dividend approximates real dividend payments quite satisfactorily (criterion $R^2 = 0,97$). Analyzing time series of dividend per share and share price, we obtain $g = 6,8\%$, $r = 8,4\%$.

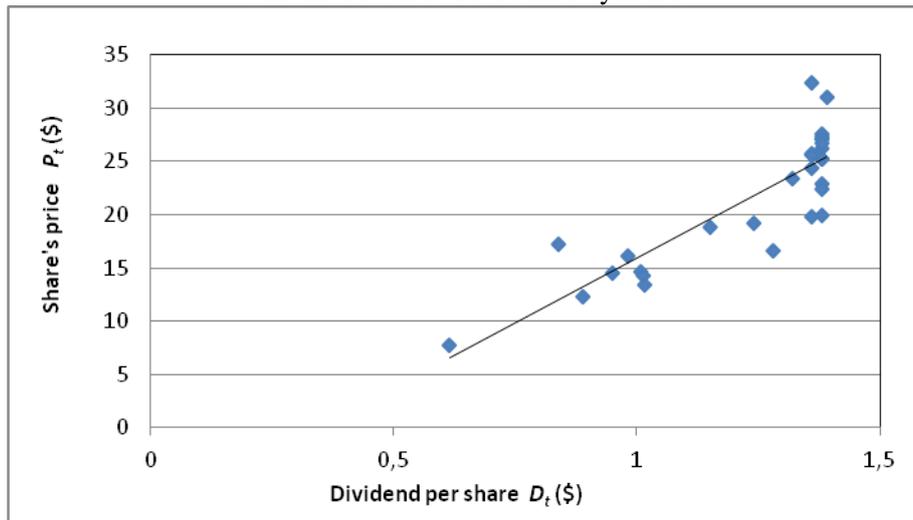
Figure 3: Dynamics of Log of Dividend Payments for UMB Financial Corporation, 1985-2014.



Source: author’s calculations based on the data from website: <http://ycharts.com>

Our research has revealed a speculative type of shareholders’ expectations for a number of American stock. Consider, for example, price-dividend dependence for the shares of UNITIL Corporation – the company supplying electricity and gas in the USA (see Figure 4). We note that the chart’s trend line is displaced down from the origin ($\alpha < 0$); statistical analysis characterizes the result as quite significant. Hence share price has tended to increase relatively faster than dividend; the growing speculative expectations have been the most probable reason of this.

Figure 4: The Historical Dependence (1985-2014) between UNITIL Corporation Share's Price and the Previous Dividend Payments

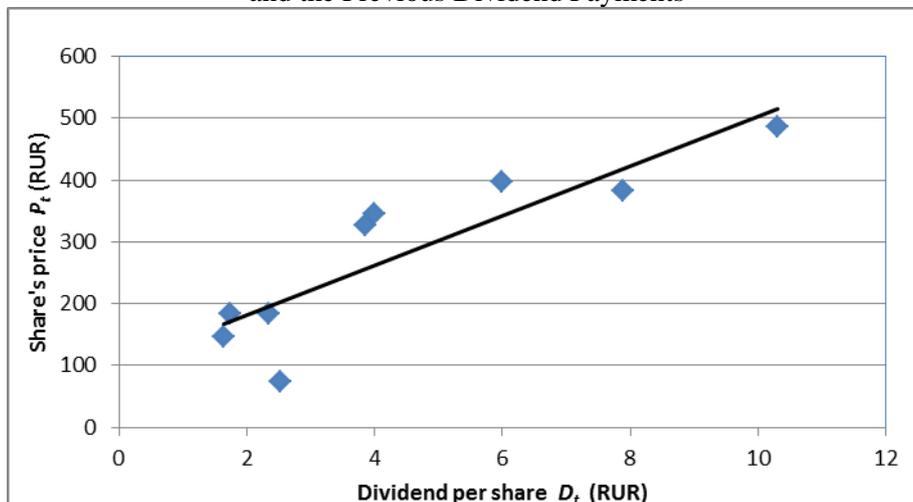


Source: author's calculations based on the data from website: <http://ycharts.com>

However, this result is very “rough”. The more detailed treatment (see <http://ycharts.com>) shows that the company's dividend policy trend had been significantly changed in 1996: the company had almost stopped to increase its dividend per share. In such situation it is more reasonable to study price-dividend dependence separately for the different periods of time (two-stage dividend discount model). The detailed analysis discloses that after 1996 changes in the share price were only affected by changes in investors' “speculative expectations” and had no correlation with the changes in dividend.

In contrast with well-organized markets, stock market in Russia is highly volatile, so observable price-dividend dependence is usually quite fuzzy. Most Russian corporations began to pay relatively stable dividends only after the mid-2000s. Consequently, the available period for revealing of shareholders' expectations for Russian securities is not more than 9-10 years. In general this amount of time is too short for econometric technique; however, particular conclusions of the investigation are of some interest. The analysis of time series of share price and dividend per share has disclosed that only three securities (The Financial Corporation Sistema, The NOVATEK and The Tatneft im. V.D. Shashina) are characterized by statistically significant dependence between key variables. The fourth asset that may be included in the group of our interest is the MICEX index. For the other shares price-dividend dependence is too much chaotic, so the procedure has been developed in the paper is inefficient.

Figure 5: The Historical Dependence (2006-2014) between the NOVATEK Corporation's Share Price and the Previous Dividend Payments



Source: author's calculations based on the data from website: <http://www.investfunds.ru>

Next, revealing of shareholders' expectations for the selected group of four Russian assets has depicted that only NOVATEK Corporation's shares may be approximately classified as "Gordonian" (more exactly, "bear market" of 2013-2014 has turned them to "slightly pessimistic"). Price-dividend dependence and its linear trend for the NOVATEK Corporation's shares are shown in the Figure 5. Shareholders' expectations for the remainder three assets are substantially "pessimistic": calculations of their parameters α (see equation (8)) displace the distinct positive values. Apparently, the reason for the investors' "pessimism" is associated with serious economic problems in Russia.

As for the UMB Corporation's shares (that are also "Gordonian") we have estimated the average rate of dividend growth g and the discount rate r for the NOVATEK Corporation's shares (taking into account, however, that the statistical ensemble of share price and dividend is highly limited for the Russian security). The result of our procedure gives $g = 24,5\%$, $r = 27,4\%$; apparently, either rate of the company's growth (note that the expected "ex-ante" growth is in agreement with the real "ex-post" growth for "Gordonian" securities) or the discount rate for the shares are much greater for the emerging stock market in Russia.

Probably, such difference in the evaluating of shares in well-organized market and in emerging market reflects substantial risk of "emerging" investments. Generally, we can regard the two derived estimations of the discount rate as important and practically useful reference points for long-term financial decisions.

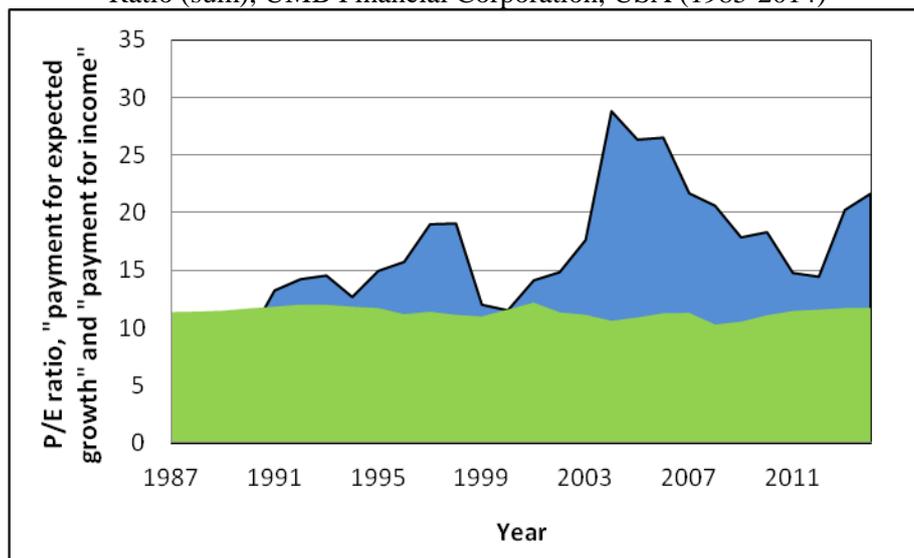
4. Refinement of the Developed Approach for "Gordonian" Shares Using P/E Ratio Analysis

Objective estimation of the discount rate possible for the shares with "Gorgonian" investors' expectations expands the opportunities of P/E -ratio using (see Graham, (2004)). P/E -ratio may be represented as a sum of two components: "payment for the current company's income" (it is equal to $1/r$), and "payment for the expected growth" (see Brealey et al. (2010)):

$$\frac{P}{E} = \frac{1}{r} + \text{payment for the expected growth.}$$

The Figures 6-7 illustrate dynamics of "payment for expected growth" (blue color), "payment for income" (green color) and P/E ratio (sum of the blue and green) for the shares of the UMB Financial Corporation (USA) and the NOVATEK Corporation (Russia) respectively.

Figure 6: Dynamics of "Payment for Expected Growth" (blue), "Payment for Income" (green), P/E Ratio (sum), UMB Financial Corporation, USA (1985-2014)



Source: author's calculations based on the data from website: <http://ycharts.com>

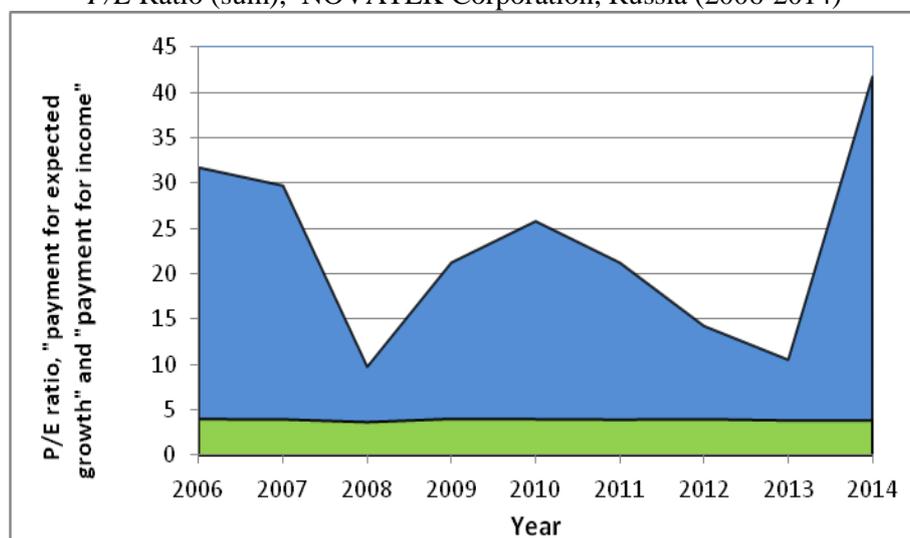
According to the research conducted for UMB Financial Corporation the average P/E ratio is equal to 16,12. Using the estimation for the discount rate (see above in the section 2.3) we find that average “payment for income” is equal to 11,4 (i.e. investors pay for the company’s income about 71% and for the expected growth about 29%).

P/E ratio for the NOVATEK Corporation’s shares is slightly higher: its average value is about 23. The structure of P/E ratio, however, displays more substantial difference between the two shares under study: the fractions of “payment for income” and “payment for expected growth” are about 16% and 84% of the total P/E respectively (see Fig. 7). Thus, the NOVATEK Corporation’s shares may be classified as the pronounced “shares of growth” (Brealey et al. (2010) over the last 9-10 years.

The Figure 7 shows that only in 2012 and 2013 (if we eliminate the recession of 2008) P/E ratio for the NOVATEK Corporation’s shares lay within “the reasonable range” (according to Graham, 2004).

As a result we may conclude that payment for the income is a significant fraction of P/E -ratio for common stock in well-organized market. Payment for the income is more stable than payment for the expected growth because shareholders’ expectations can vary over a wide range. So well-organized markets are usually more sustainable.

Figure 7: Dynamics of “Payment for Expected Growth” (blue), “Payment for Income” (green), P/E Ratio (sum), NOVATEK Corporation, Russia (2006-2014)



Source: author’s calculations based on the data from website: <http://www.investfunds.ru>

Payment for the income is not too large in the emerging market in Russia due to high risk of investment. If it is replaced by the payment for the expected growth stock market becomes high volatile. We observe many of these phenomena for the Russian securities.

5. Conclusions

Price-dividend dependence is quite steady for a lot of common stock in well-developed markets. This dependence allows to reveal shareholders’ expectations of the future share price growth. In emerging markets clearly marked price-dividend dependence for the shares is not typical as a result of large price fluctuations, so the procedure has been developed is correct only for a few securities.

In well-developed markets (and for particular securities in emerging markets also) our method allows to comprehend what is the primary motive for shareholders to evaluate a security: is it the expected growth of its price or the dividend payments on it. As a result of investors’ expectations revealing one may classify shares as “pessimistic” or “gordonian” or “speculative”. These features of share evaluating are of crucial importance, for example, when investor selects his portfolio of securities taking into account either his degree of risk aversion or the current direction of stock market trend (whether it is “bullish” or “bearish”).

Only a few shares may be considered as “Gordonian”. The point of this conclusion is that shareholders’ plans in general have a limited period of investment. “Gordonian” shares are especially convenient for further investigation; analyzing their price-dividend dependence one can determine the discount rate for them. Such approach to the discount rate calculation most closely corresponds to its substance. Just as *P/E* ratio for common stock consists of two components – “payment for income” and “payment for the expected growth” (Brealey et al. (2010)), so the discount rate of “Gordonian” shares may be represented as a sum of the “real” and the “virtual” parts. This virtual part (and so the whole discount rate of a share) is considerably larger in all appearance for the securities in emerging markets; this assertion is in agreement with the idea of their high volatility. The procedure of price-dividend dependence analysis permits to define a concept of “shares of income” and “shares of growth” (Brealey et al. (2010)) more exactly.

The results of our research provide support for the noted idea that the only way to verify some positive asset pricing model concerns with comparison of the share’s current price and it’s following dividends.

Acknowledgement

We would like to thank the Institute of Economics and Entrepreneurship, the Lobachevsky State University of Nizhny Novgorod for financial support.

References

- BISTROVA, J., LACE, N. (2012). Dividend Stability and Sustainability in CEE Region. In *Proceedings of the 2nd World Sustainability Forum*. Basel: SCIFORUM, pp. 1–8.
- BREALEY, R., MYERS, S., MARCUS, A. (2010). *Fundamentals of Corporate Finance*. 10th ed. New York: McGraw-Hill Irwin.
- CAMPBELL, J., SHILLER, R. (1987). Cointegration and Tests of Present Value Models. *Journal of Political Economy*, vol. 95, no. 5, pp. 1062–1088.
- COCHRANE, J. (2011). Presidential Address: Discount Rates. *Journal of Finance*, vol. 66, no. 4, pp. 1047–1108.
- FAMA, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, vol. 25, no. 2, pp. 383–417.
- GORDON, M. (1959). Dividends, Earnings, and Stock Prices. *Review of Economics and Statistics*, vol. 41, no. 2, pp. 99–105.
- GREENWOOD, R., SHLEIFER, A. (2014). Expectation of Returns and Expected Returns. *Review of Financial Studies*, vol. 27, no. 3, pp. 714–746.
- GRAHAM, B. (2004). *The Intelligent Investor*. New York: Harper Collins Publishers Inc.
- MAJANGA, B. (2015). The Dividend Effect on Stock Price-An Empirical Analysis of Malawi Listed Companies. *Accounting and Finance Research*, vol. 4, no. 3, pp. 99–105.
- MIRZA, N., AFZAL, A. (2012). Some Preliminary Evidence on Stock Price Bubbles in an Emerging Market. *The Romanian Economic Journal*, vol. 15, no. 44, pp. 55–86.
- SALEEM, K., FEDOROVA, E. (2014). Transfer of Risk in Emerging Eastern European Stock Markets: A Sectoral Perspective. *International Business Research*, vol. 7, no. 8, pp. 134–145.
- SHILLER, R. (2003). From Efficient Markets Theory to Behavioral Finance. *Journal of Economic Perspectives*, vol. 17, no. 1, pp. 83–104.
- SHILLER, R. (2014). Speculative Asset Prices. *American Economic Review*, vol. 104, no. 6, pp. 1486–1517.