sciendo

Financial Internet Quarterly 2022, vol. 18 / no. 4, p. 77-88

10.2478/fiqf-2022-0029

Financial Internet Quarterly

THE MILLER–MODIGLIANI DIVIDEND IRRELEVANCE THEORY AS A WARNING FOR INVESTORS LOOKING FOR QUICK PROFITS FROM INVESTMENTS IN COMPANIES PAYING DIVIDENDS

Mieczysław Kowerski[1], Laura Haniewska[2]

Abstract

In 1961, Miller and Modigliani (M–M) published a dividend irrelevance theory, which shows that the payment of dividends does not make any changes to the value of the company. The assumption about the existence of the perfect market made by M–M became the basis for a common criticism of the theory, and the critics also tried to empirically prove that dividend payments have a positive effect on future stock prices. A different interpretation was presented by Damodaran (2007), who stated that a dividend is a compensation for lost capital gains on the first day without a dividend. The aim of the article is to verify the M-M theory according to the Damodaran approach based on the data of companies listed on the WSE in 2019–2021. For this purpose the calculations of the total rate of return on investments consisting in the purchase of shares at the end of the cum-dividend day and the sale of these shares at the end of the ex-dividend day were carried out. Then, the average values of the total rates of return in each of the three years were calculated and using the Student's t-test it was examined whether the average of one-session rate of return is insignificantly different from zero. If so, it would mean that the dividend irrelevance theory is correct. In 2019 and 2021, the average total rates of return turned out to be statistically insignificant, which supports the M—M theory. The negative significant value of the average in 2020 may result from the COVID-19. The M–M theory perceived in this way can be a warning to investors looking for "quick profits" and trying to apply the strategy of buying dividend stocks at the cum-dividend day and selling them at the ex-dividend day.

JEL classification: G32, G35

Keywords: Miller-Modigliani's dividend irrelevance theory, cum-dividend day, ex-dividend day, Warsaw Stock Exchange

Received: 30.10.2022 Accepted: 18.12.2022

Cite this:

Kowerski M., Haniewska L. (2022) The Miller–Modigliani dividend irrelevance theory as a warning for investors looking for quick profits from investments in companies paying dividends. Financial Internet Quarterly 18 (4), pp. 77-88.

© 2022 Mieczysław Kowerski and Laura Haniewska, published by Sciendo. This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 3.0 License.

[1] Academy of Zamość, Department of Finance and Accounting, Poland, e-mail: mieczyslaw.kowerski@akademiazamojska.edu.pl, ORCID: https://orcid.org/0000-0002-2147-2037.

[2] Academy of Zamość, Department of Finance and Accounting, Poland, e-mail: laura.haniewska@interia.pl, ORCID: https://orcid.org/0000-0001-5740-9649.

Introduction

Alfred Nobel Prize winners Merton Miller and Franco Modigliani (M–M) published a paper in 1961 entitled "Dividend Policy, Growth and Valuation of Shares", in which they presented the dividend irrelevance theory, which gave rise to the ongoing discussion on the impact of dividend payments and the wider dividend policy of public companies on their value (the price of their shares). In their very inspiring article, they showed that the payment of dividends does not affect the value of the company – it is irrelevant from the point of view of the company's value. It is the investments that determine (increase) the value of the company.

As is quite often the case with financial theories (hypotheses), the appearance of the irrelevance theory caused an intensification of work on the part of other scientists and practitioners aiming to challenge them. Questioning M–M's assumptions of the perfect market, other researchers have proposed their own numerous solutions. At the same time, no consensus was reached, as evidenced by the fact that both pro-dividend and anti-dividend theories (hypotheses) were created. According to the former, dividend payments are conducive to the growth of the company's value; according to the latter dividend payments cause a decrease in the company's value (Kowerski, 2011, p. 9). Pro-dividend theories and hypotheses, which were far more numerous, very often were supported by the results of empirical research in various markets. According to their authors, the inaccuracy of the irrelevance results from the assumption about the existence of the perfect market, and, as quite often evidenced by empirical research, a significant relationship between the dividend paid and future rates of return.

It seems, however, that not all critics of the M–M theory have properly understood it. Damodaran (2007, p. 1036) writes: "It is not a question of choosing between a certain dividend today and uncertain capital gains at some indefinite time in the future, but a choice between a dividend today and an almost equivalent increase in the share price also today." Otherwise, according to Damodaran, the dividend is compensation for lost capital gains at the ex-dividend day.

Ang and Ciccone (2009) believe that it does not matter to existing investors whether the dividend is paid and their capital income (share price) is reduced by the value of the dividend, or whether the dividend is not paid and their capital income (share prices) does not change. The value of their portfolio will not change.

If the M–M theory understood in this way were true, it would be a warning to short-term investors looking for "quick profits" and trying to apply the strategy of buying shares of dividend companies at the cum-dividend day and selling them at the ex-dividend day[3].

The aim of this study is to verify the Miller-Modigliani dividend irrelevance theory by calculating the average total rate of return on investment consisting of buying a portfolio of shares of companies paying dividends at the end of the cum-dividend day and selling them at the end of the ex-dividend day (at the next session), taking into account taxes and brokerage fees, and then verifying with the Student's t-test whether the average of total rates of return is insignificantly different from zero. If the test does not reject the null hypothesis, it means that the theory is correct.

The research was conducted for the companies listed on the Warsaw Stock Exchange (WSE) that paid dividends in 2019–2021.

The first part reviews research on the correctness of the dividend irrelevance theory in Poland and worldwide. In the second part, a research hypothesis is formulated. The third part presents the research methodology used in the work. The fourth part presents the results of the calculations.

Literature review

Despite almost a century of research, decisions about dividend payments and their impact on stock prices, and thus the value of the company, still remain a mystery (Frankfurter & Wood, 2002, p. 111). The fact of the existence of three mutually exclusive schools (anti-dividend, neutral, pro-dividend) explaining the impact of dividend payment decisions on the value of the company, as well as many hypotheses and theories, shows how ambiguous this issue is (Czekaj, 1987, p. 1049; Sierpińska, 1999, pp. 131–151; A. Cwynar & W. Cwynar, 2007, pp. 178–181). Brigham (1997, p. 225), summarizing the empirical research conducted in this area, stated that any theory can be correct or that all theories may be incorrect. The dividend irrelevance theory is one of many theories regarding dividend policy. It was published in 1961 by Merton Miller and Franco Modigliani. In formulating this theory, M–M were inspired by their own theory of the capital structure irrelevance, presented in their 1958 article (Modigliani & Miller, 1958), in which they proved that under certain assumptions (see: Czekaj & Dresler, 2001, pp. 93-102) the value of the company does not depend on the structure of its capital (the so-called MM Proposition I). The irrelevance theory is based on the assumption about the existence of the perfect capital market,

[3] The incentive for such strategies may have been observed especially in the end of the second decade of the 21st century by much higher dividend yield ratios than the rates of return on such instruments like deposits, bonds or treasury bills.

theory is based on the assumption about the existence of the perfect capital market, rational behaviour of investors and all investors' absolute certainty about the future investment program and the future profits of every corporation (Miller & Modigliani, 1961, p. 412). According to the irrelevance theory, if the above assumptions are met, the payment of dividends does not cause any changes to the value of the company (the so-called M–M Proposition III). In a perfect capital market, the value of a company depends on investment decisions, and it is not affected by financial decisions (the so-called M–M Proposition II). For the management of companies, it does not matter whether the investments are made from retained earnings or from newly acquired funds (Miller & Modigliani, 1961, p. 412). Assuming a specific investment policy, the dividend policy does not affect either the market value of the company or the total rate of return of shareholders and is therefore irrelevant. Investment plans can be carried out independently of the distribution of profits into dividend and retained earnings. If there is a shortage of capital, it can be supplemented by issuing new shares. Ultimately, the value of the company depends only on the distribution over time of future profits, the size of which results from investment ventures. Sierpińska (1999, p. 144), discussing the dividend irrelevance theory, emphasizes that a company can pay any amount of dividend without affecting its value, because it is the investment policy, not the level of dividends, that determines its value.

Before the publication of the M–M dividend irrelevance theory, it was believed (Gordon, 1959) that dividend payments favored the growth of the value of companies. M–M not only formulated a completely different thesis but also called Gordon's concept quite ironically the "bird in hand theory".

The M–M theory should have put an end to all considerations of dividend policy as insignificant and not affecting the financial situation of the company. However, the opposite happened. The theory inspired researchers to make more detailed analyses, which resulted in criticism of the M–M theory, as well as to formulate new hypotheses and theories.

The main line of criticism was based on questioning the assumptions about the existence of the perfect market, which are the basis of the irrelevance theory. The market is not perfect, and this is the reason why dividends affect the value of shares. Particularly highlighted disadvantages include relatively higher taxes on dividends than on capital gains, which occurred throughout almost the entire twentieth century in the United States and many other countries, the existence of agency costs, information asymmetry, and the clientele effect (Ang & Ciccone, 2009, pp. 104–109).

There were also attempts to support the criticism of the assumptions of the theory empirically. One of the basic directions of the verification of the dividend irrelevance theory was the analysis of the relationship between the future value of the company, most often measured by the rate of return, the decision of whether or not to pay dividends, and the level of payments. The insignificance of this relationship could indicate the correctness of the theory, while the significance of the relationship may be evidence that the theory is untrue.

The occurrence of dependencies was verified by using the Student's t-test on the significance of differences in average rates of return between companies paying and not paying dividends or on the basis of a study of the significance of parameters with variables describing dividend payments in econometric models of rates of return. Many analyses of this type have been carried out for different markets and at different times. They had already been conducted before M–M presented their theory. For example, Collins (1957) showed that in the case of American banks in the 1950s, dividends (next to the banks' book value) have an impact on stock prices.

Subsequent works on the relationship between dividends and shareholder returns was based on data from the New York Stock Exchange (NYSE) and indicated that there was no significant relationship between the categories listed above (Friend & Puckett, 1964), (Black & Scholes, 1974). However, later research shows that dividends can be a good predictor of future returns. Karathanassis and Philippas (1988), using panel data from eight Greek banks listed on the Athens Stock Exchange between 1977 and 1983, concluded that the dividend and size of a company determine its share prices. Irfan and Nishat (2002) showed in a sample of Pakistani companies listed on the Karachi Stock Exchange between 1981 and 2000 that the dividend payout ratio, company size and dividend yield ratio are determinants of stock prices. Visscher and Filbeck (2003) analysed the behaviour of the portfolio of the 10 Toronto35 companies with the highest dividend yield ratio, changing the portfolio structure every year between 1987 and 1997, and showed that over eight years the returns of such portfolios were between 1.2 and 20.4 percentage points higher than the returns of the entire index. This led to the conclusion that dividends are a good tool for forecasting future rates of return and have a positive impact on them.

Sharma and Singh (2006) analysed data from 160 Indian companies from 2001 to 2005 and found that earnings per share, the price-to-earnings ratio, dividend per share, the dividend coverage ratio, dividend payment, book value per share, and company size are all factors of stock prices.

Somoye, Akintoye and Oseni (2009), using information based on Nigerian companies, showed that dividend per share and earnings per share determine stock prices. Nirmala, Sanju, and Ramachandran (2011) found that dividend per share, earnings per share and the price-to-earnings per share ratio are significant determinants of share prices. Van Leeuwen (2018) built panel models of 2,552 companies listed on NASDAQ between 1998 and 2017 and proved that dividends are positively tied to stock prices, with the additional dollar dividend valued at $1.43.

Also in Poland, analyses in this area were carried out. Brzeszczyński and Gajdka (2009) used a methodology consisting in simulating the construction of portfolios of shares composed of companies characterized by the highest dividend yield on the WSE in the years 1997–2007. As a benchmark, the authors adopted the WIG20 index. The assessment of the effectiveness of the simulated investment strategy was made by comparing the rates of return of dividend portfolios with the rates of return of the WIG20 index. In addition, t-Student tests were carried out to examine whether the rates of return on portfolios and the WIG20 index differed from each other in a statistically significant way. The results of the survey indicate that although the portfolio consisting of shares with the highest dividend yield turned out to be a better investment than investments in the WIG20 index, it should rather be seen as a long-term strategy.

Kowerski (2011, p. 245), conducting an analysis of the dividend decisions of companies listed on the WSE in the years 1996–2009 (2263 observations), used the Student's t-test to assess the differences in annual rates of return of companies paying and not paying dividends and found that these differences were insignificant at the level of 0.05 ($p = 0.469$). This may mean that in the analysed period the dividend irrelevance theory worked – decisions to pay or not to pay dividends did not affect the annual rates of return on the shares of listed companies and thus on their value.

In addition to the presentation of research results indicating significant relationships between dividend payments and price changes, criticism of the M–M theory also concerned other issues. Some authors, such as Brennan (1971), think that M–M research has little practical value.

H. DeAngelo and L. DeAngelo (2006, p. 295) launched a scathing attack on the M–M propositions. They wrote that with their theory, Miller and Modigliani ignored researchers. They believe that the assumption of the dividend irrelevance theory that only investment policy affects the value of the company not only reduces the importance of dividend policy but also puts researchers on the sidelines of research into capital market imperfections. In their opinion, it is the dividend policy that affects the value of the company even in a perfect market. While other critics of the irrelevance theory have seen abnormalities in the assumptions about the existence of the perfect capital market, DeAngelo and DeAngelo believe that the main reason for the unreality of the M–M theory is the idea of paying out all free cash each year. Perepeczo (2013, p. 252) joins the critics of the theory, assuming that the dividend policy has no impact on the cost of capital and the share price; therefore, the theory is unrealistic.

There are also theorists and financial practitioners who believe that Miller and Modigliani may have been at least "somewhat" right, and that the widespread criticism stemmed from a misunderstanding of the authors' arguments. A full appreciation of the M–M theory is expressed by Ang and Ciccone (2009, p. 110), who believe that "future researchers will probably see M–M as Aristotle of finance."

In a much more specific manner, the theory is positively evaluated by Damodaran (2007, p. 1036), who points out that it is not a question of choosing between a certain dividend today and uncertain capital gains at some indefinite time in the future but of choosing between a dividend today and an almost equivalent increase in the share price today. Damodaran notes that the decline in the share price at the ex-dividend day is often slightly smaller than the size of the dividend. Thus, the company, by paying a dividend, "brings down" the share price today. In other words, the dividend is an almost perfect substitute for capital gain, and most of the criticism of the dividend irrelevance theory arises from a misunderstanding of it. Such a view is close to the view of the authors of this work.

Damodaran's reasoning leads to the conclusion that the empirical verification of the dividend irrelevance theory should consist of analysing the changes in stock prices at the ex-dividend day compared to the cum-dividend day. Campell and Beranek (1955) were the first to notice that on the NYSE, the average stock price drop-off at the ex-dividend day was 90% of the dividend amount and called it "anomaly at the ex-dividend day". The reasons for this anomaly were first reported by Elton and Gruber (1970). Their analysis of actual data from companies listed on the NYSE showed that between 1966 and 1969 stock prices at the ex-dividend day had fallen by 78% of the size of the dividends paid (and not by 100%, as expected). It was the so-called "tax-effect," consisting of differentiated taxation of dividends and capital gains, that was "responsible" for such a result. If the tax rate applied to capital gains is lower than the tax rate applied to dividends, then, for example, a dollar of capital gains is worth more than a dollar of dividends. So far, this has

been the case in many countries (Kowerski, 2011, pp. 56–66). In the United States, between 1952 and 1953, the difference between maximum taxation of dividends and capital gains was 92 percentage points, falling to 66 points in 1963 and to 42 points in 1980. It was not until 1986 that the maximum rates of taxation of dividends and capital gains were equalized for the first time in the post-war period. Elton and Gruber (1970, p. 69) claimed that when investors were thinking of selling a stock near to its ex-dividend day, they would calculate whether they were better off selling just before it went ex-dividend, at the cum-dividend day, or just after. However, the authors state that, at equilibrium, the marginal investor is indifferent about selling at either the ex-dividend day or the cum-dividend day. This is consistent with the dividend irrelevance theory.

Later, many authors argued that investors selling shares at the ex-dividend day are not marginal but tax-exempt institutions, taking advantage of the difference between the amount of the dividend and the size of the decline in the share price (Damodaran, 2007, pp. 1033–1034). Kalay (1982) presents the short term-trading hypothesis, which states that the transaction costs implicit in the dividend capturing strategy at the short-term have an impact on the stock price variation at the ex-dividend day. Boyd and Jagannathan (1994) emphasize the importance of the presence of transaction costs in the study of the pricing at the ex-dividend day. On the other hand, Heath and Jarrow (1988) prove that in an economy without transaction costs (frictionless economy), there are no arbitrage opportunities, even though the change in the ex-dividend stock price at the ex-dividend day can be different from the dividend value. They demonstrate that short-term traders cannot build such an arbitrage position, unless they are 100% certain before the ex-dividend date that they should buy the stock and capture the dividend or short sell the stock and sell the dividend. It is impossible for traders to know this before the ex-dividend day, unless they know that the stock price drop is always above or below the dividend.

Another piece of evidence for the validity of the dividend irrelevance theory may be the results obtained by Lesfer (1995), who showed that in the United Kingdom the introduction of the 1988 Income and Corporation Taxes Act, which substantially reduced the tax differential between dividend and capital gains resulted in positive and significant returns changing into negative and insignificant ones.

Thirty-five years after their first article, Elton, Gruber and Blake (2005) confirmed that the direction of ex-dividend day price behavior is consistent with a tax explanation and that changes in ex-dividend-day price behavior, as the theory would suggest, are parallel to changes in the tax law.

The irrelevance theory can also be supported by the research of Kreidl (2020), who compared trade around ex-dividend dates of German stocks with tax-free dividend. His empirical results indicate that ex-dividend date prices decline, on average, by the amount of the dividend.

The M–M dividend irrelevance theory was illustrated in a very clear way by Ang and Ciccone (2009, Chapter 6) who say: "Suppose ABC Corporation has $200 cash and $800 of noncash assets on its balance sheet, stated at market value. It also has no debt, leaving equity equalling assets at $1,000. If there are 100 shares outstanding, each share is worth $10 ($1,000/100). The firm needs the $200 cash to fund its investments, but it also wants to reward its shareholders with a $200 cash dividend. Therefore, the firm decides to pay the $200 dividend while subsequently issuing $200 of new equity. If the firm issues new equity, the new shares will dilute the value of the old shares. However, the old shareholders will receive the dividend to compensate for the diluted value. In this case, if the firm declares a $2 dividend per share, it will distribute the cash leaving a total stock value of $8 per share [($1,000 – $200)/100]. Investors holding or buying shares before the ex-dividend day will therefore gain the $2 future dividend plus the $8 of stock value. Their shares are worth $10 as before. On the ex-dividend day, investors will no longer receive the dividend, and the price will correspondingly drop by $2 to $8. The $8 price is equal to the new total market value of assets divided by the number of shares ($800/100). The new equity issued must recoup the $200 cash paid out as a dividend. As the shares sell for $8, the number of new shares issued is 25 ($200/$8). After the firm issues the new shares, the balance sheet looks the same as before, only there are now 125 shares, and each share is worth $8 ($1,000/125). This simple illustration serves to show that investors are indifferent to dividend policy under the M–M assumptions such as no taxes, no transaction costs, and no information asymmetry."

Research hypothesis

As the analysis presented in the previous chapter shows, the verification of the M–M dividend irrelevance theory primarily consisted of questioning its assumptions regarding the perfect market (the theoretical aspect) and showing in an empirical way (on the basis of data from specific markets at a specific time) that the future value of the company (the price of its shares) depends on the dividend policy (the practical aspect). The study of the relationship between the future value and the dividend policy of the company is undoubtedly an important issue but it is not a tool for verifying the M-M theory. According to the authors, the direct way of verification is to use the approach of Ang

and Ciccone (2009), consisting of comparing the value of shares at the end of the cum-dividend day and at the end of the ex-dividend day, taking into account the dividend paid. At the same time, if we want to verify the theory on the basis of data from specific markets, it is necessary to take into account their realities (transaction costs, tax system), giving up some of the assumptions made by M–M. Therefore, the following research hypothesis was formulated: If we take into account the actual situation on the market, the total rate of return (income) from the investment consisting of buying a portfolio of the shares of dividend-paying companies at the end of the cum-dividend day and selling it at the end of the ex-dividend day will be insignificantly different from zero.

The validity of this hypothesis would confirm the validity of the dividend irrelevance theory: it does not matter whether the investor refrains from buying a portfolio of dividend-paying companies at the end of the cum-dividend day or makes such a purchase and sells the portfolio on the next session – in both cases, the value of their portfolio will be the same.

Methodology of the study

The verification of the formulated hypothesis was carried out on the basis of data from companies listed on the Warsaw Stock Exchange (WSE).

Procedure of dividend decisions on WSE

Information about whether or not a company will pay dividends sometimes appears before the end of the financial year (information about the intention and payment of the advance is a separate matter). However, this information usually has the character of "gossip" and is therefore not taken into account.

Below are the following stages of the inflow of significant information on dividend payment:

a) resolution of the Management Board on its intention to pay dividends (sometimes, in the case where the Management Board does not adopt such resolutions the information about such an intention comes from the draft resolutions of the Annual General Meeting (AGM), presented by the company in its announcement on convening the AGM),
b) resolution of the AGM on the distribution of profit, setting the record date and the date of payment,
c) price of the stock at the end of the cum-dividend day (the last moment to buy shares with dividends),
d) price of the stock at the end of the ex-dividend day,
e) record day,
f) dividend payment.

The record day is the date on which the list of shareholders entitled to dividends for a given financial year is published. The record day in a public company and a company that is not a public company, whose shares are registered in the securities depository, is determined by the AGM (CCC Art. 348. § 3)[4]. The dividend record may be set at a date falling not earlier than five days and no later than three months from the date of the adoption of the resolution (CCC Art. 348. § 4). In the case of the listed companies, the record day is 2 sessions later than the day on which investors can last buy shares with a dividend. The dividend payment date for most capital companies is usually set once a year, in accordance with the resolutions adopted at the AGM. However, there are companies that pay dividends in tranches. Payments may also be made quarterly, for example in the form of advances.

Method of the assessment of the impact of the dividend on the value of the company

In the conducted study, two pieces of information are decisive:

a) price of the stock at the end of the cum-dividend day,
b) price of the stock at the end of the ex-dividend day.

A shareholder who will hold a share at the end of the cum-dividend day can sell this share at the price quoted at the next session. They will receive cash for the dividend at the time of dividend payment, which can last up to three months from the dividend record day. The verification of the dividend irrelevance theory as proposed by Ang and Ciccone (2009) should consist of comparing the company's share price at the end of the cum-dividend day with the sum of the share price at the end of the ex-dividend day and the dividend. In essence, it is a comparison between two consecutive sessions. If both values are equal, then the dividend irrelevance theory is true (the fall in price is fully compensated by the dividend).

Of course, the verification of this theory should be based on data from more companies. In this article, all the companies that paid dividends in a given year were used. The real capital market is not perfect (in the sense of M–M assumptions). Capital gains and dividends are taxed, and investors pay commissions on both buying and selling shares. These conditions had to be taken into account in the calculations carried out[5].

The study assumes that investments will be made by individual investors, who usually have not very large amounts. The calculations included the commission on the dividend charged by the brokerage house – 0.375% was assumed, which is used by the PEKAO brokerage

[4] CCC – Polish Commercial Companies Code – Act of 15.09.2000.
[5] In Poland, until 2003, dividends were not taxed at all. Currently, dividends and capital gains are taxed at the same rates.

office for investments below PLN 30,000[6], as well as taxation (PIT) of dividends and capital gains in the amount of 19%. We assume that an investor buys a portfolio of shares of companies paying dividends at the end of cum-dividend day and sells them at the end of ex-dividend day (at the next session).

Bearing in mind the above assumptions, the following sequence of calculations was carried out. The purchase price of the shares at the end of the cum-dividend including commission was calculated for each company:

$$P_{t-1i} = price\ of\ \ purchase\ of\ 1\ stock * 1.00375 \quad (1)$$

The sale price of the shares at the end of the ex-dividend day, including commission, was calculated for each company:

$$P_{ti} = price\ of\ \ sale\ of\ 1\ stock * (1 - 0.00375) \quad (2)$$

A daily (one-session) capital rate of return including commissions was calculated for each company:

$$R_{1i} = \frac{P_{ti}}{P_{t-1i}} * 100 - 100 \quad (3)$$

A daily (one-session) capital rate of return including commissions was calculated for each company:

$$\begin{aligned} R_{2i} &= R_{1i} * 0.81 \quad for\ R_{1i} > 0 \\ R_{2i} &= R_{1i} \qquad\quad for\ R_{1i} < 0 \end{aligned} \quad (4)$$

A dividend yield including income tax was calculated for each company:

$$DY_i = \frac{Div_{ti} * 0.81}{P_{t-1i}} * 100 \quad (5)$$

Where:

Div_{ti}—dividend for year t per share paid by i–th this company.

The daily (one session) total rate of return for each company was calculated:

$$R_i = R_{2i} + DY_i \quad (6)$$

The average daily capital rate of return on share prices between the cum-dividend day and the ex-dividend day was calculated, taking into account commissions and tax for the portfolio of the analyzed companies:

$$\overline{R_2} = \frac{1}{n} \sum_{i=1}^{n} R_{2i} \quad (7)$$

[6]https://www.pekao.com.pl/dam/jcr:cd6ba73a-187e-4fad-96a8-fd1244f4e547/taryfa-prowizji-i-oplat-biura-maklerskiego-pekao-2021.pdf (Accessed: 20.03.2022).

The average total rate of return on share prices between the cum-dividend day and the ex-dividend day for the portfolio of the companies was calculated:

$$\overline{R} = \frac{1}{n} \sum_{i=1}^{n} R_i \quad (8)$$

Using the Student's t-test, we examined whether the average total rate of return differed significantly from zero at the level of 0.05. If $p > 0.05$, there is no basis for rejecting the null hypothesis, the average total rate of return is statistically insignificant, and this means that the M–M dividend irrelevance theory is true.

It can be said that the proposed procedure is a special case of event analysis, often used in the study of financial markets (Ball & Brown, 1968; Fama et al., 1969; Gurgul, 2012). In this case, the event is the dividend "cut–off".

Study period and data

The survey was conducted for domestic companies listed on the WSE, which in 2019-2021 paid a dividend for the previous year. The following information was used to construct the portfolio of the companies:

a) the distribution of net profit for the last financial year and undistributed profits from the previous years, which may be allocated to the payment of dividends [Art. 192 §1, Art. 348 §1 of the CCC] (here called retained earnings) from resolutions of the Annual General Meeting (AGM) and the Extra-Ordinary General Meeting (EGM),
b) advances paid during the last financial year,
c) the actual dates of adoption of resolutions. This applies to breaks in the proceedings of the AGM – if the resolution was adopted after the break, the actual date of the adoption of this resolution and other dates recorded in it (record day, payment date) were adopted,
d) the question of whether, in addition to the decision of the AGM to pay a dividend from the profit for the last year, possibly increased by retained earnings, the company decided by a separate resolution of the EGM to pay an additional (special) dividend or to distribute the part of the profit not divided by the AGM, which meant that both distributions were carried out separately but were recognized as a payment of one company and were analyzed together. This applies to such indicators such as the amount of the dividend and the indicators created on its basis.

If the company, on the basis of a resolution of the AGM for the last financial year, does not pay a dividend and at the same time does not distribute all or part of its profit, leaving it undivided, if it made a division in the same year, such a fact is considered to be

a "completion" of the division (even if the resolution is adopted by the EGM; then, the terms of the record day and the payment day result from the resolution of the EGM). The portfolio includes companies settling for a calendar year and companies settling for a so-called business year if they have made decisions on payment for the last year to June of the following year. However, in the case of counting various indicators, the last day of the financial year was taken as the end of the business year.

For the purposes of this work, the following companies have been removed from the above portfolio:

a) companies paying advances due to different modes of adopting dividend payments. The advance payment means that the company makes decisions on the payment of dividends before the end of the financial year, confirms this fact by the resolution of the AGM and makes decisions regarding the remaining amount of the dividend. In this way, decisions concerning advances are taken within two or more time limits. There is also the problem of the level of payments. Since they are divided, each time the decisions concern smaller amounts, which may cause some investors (e.g. those buying shares "for dividends") to react differently than in the case of one-off decisions regarding the entire payment,
b) companies that have paid only a special dividend (from retained profits). These types of payments are usually very irregular and can interfere with the results of the study,
c) in the case of companies that in one year decided to pay a regular dividend (resolution of the AGM) and a special dividend (resolution of the EGM), the latter have been removed.

Table 1: Results of the selection of companies for the survey

Specification	2019	2020	2021
Companies paying dividends in the current year	149	111	146
Companies paying some or all of the dividends in the form of an advance payment	10	9	10
Companies paying only special dividends	1	0	1
Companies accepted for the survey	138	102	135

Source: Own calculations.

Results

Dividend payments on WSE

In 2019–2021, 149, 111 and 146 companies paid dividends for the previous year, respectively. Applying the criteria described above, 138, 102 and 135 companies were selected for the survey respectively.

Table 2: Dividend payments by domestic companies listed on the WSE in 2019–2021

Specification	All companies paying dividends			Companies accepted for the survey		
	2019	2020	2021	2019	2020	2021
Number of companies	149.00	111.00	146.00	138.00	102.00	135.00
Sum of net profits and net losses in previous year (mln PLN)	31,213.70	12,640.50	18,852.30	27,601.50	12,057.60	18,048.30
Profit to be distributed in previous year (mln PLN)	33,726.10	13,226.90	27,416.70	29,912.50	12,407.50	26,309.90
Dividend paid in current year (mln PLN)	17,359.30	4,955.20	15,290.90	15,905.10	4,412.30	14,375.30
Share of retained earnings in dividend paid (%)	13.87	11.70	34.30	13.89	7.74	34.43
Dividend to sum of net profits and net losses ratio (%)	55.61	39.20	81.11	57.62	36.59	79.65
Dividend payout ratio (%) quotient of dividend and profits to be distributed	51.47	37.46	55.77	53.17	35.56	54.64

Source: Own calculations.

In 2019, the companies covered by the survey accounted for 92.6% of all the companies paying dividends. In 2018, these companies generated 88.4% of the sum of net profits and net losses of all dividend-paying companies. In 2019, they paid 91.6% of the total dividend. The ratio of the dividend to the sum of net profits and losses of the companies in the sample (57.6%) was 2.0 percentage points higher than the value calculated for all companies paying dividends (55.6%). The dividend payout ratio in the surveyed companies (53.2%) was 1.7 percentage points higher than the value calculated for all companies (51.5%).

In 2020, the companies covered by the study accounted for 91.9% of all companies paying dividends. This year, due to the COVID-19 pandemic, fewer companies paid dividends and the dividend payout ratio was much lower compared to 2019 and 2021. In 2019, the companies covered by the study generated 95.4% of the sum of net profits and net losses of all companies paying dividends. In 2020, they paid 89% of the total dividend. The ratio of the dividend to the sum of net profits and losses of the companies in the sample (36.6%) was 2.6 percentage points lower than the value calculated for all companies paying dividends (39.2%). The dividend payout ratio in the studied companies (35.6%) was 1.9 percentage points lower than the value calculated for all companies (37.5%).

In 2021, the companies covered by the survey accounted for 92.5% of all companies paying dividends. In 2020, the companies covered by the survey generated 95.7% of the sum of net profits and net losses of all companies paying dividends. In 2021, they paid 94% of the total dividend. The ratio of the dividend to the sum of net profits and net losses of the sampled companies (79.7%) was 1.5 percentage points lower than the value calculated for all companies paying dividends (81.1%). The dividend payout ratio in the studied companies (54.6%) was 1.2 percentage points lower than the value calculated for all companies (55.8%).

Comparing the individual ratios of the surveyed companies with those of all the companies paying dividends, in 2019-2021 there were slight differences in the ratio of the dividend to the sum of profits and losses and in the dividend payout ratio, which deviated slightly in both directions depending on the year.

Table 3: The total rate of return and its components of surveyed companies in 2019-2021 (%)

Specification	2019	2020	2021
Percentage of companies whose sale price of shares at the end of the ex-dividend day was higher than the purchase price at the end of the cum-dividend day	18.12	13.73	9.63
Average capital rate of return after commissions	-3.56	-4.45	-3.84
Percentage of companies with a positive capital rate of return after commissions	14.49	11.76	6.67
Average capital rate of return after commission and tax	-3.63	-4.53	-3.87
Average dividend yield after tax	3.77	3.67	3.38
Average total rate of return	0.14	-0.86	-0.49
Percentage of companies with a positive total rate of return	44.93	40.20	40.00
Percentage of companies that, 'thanks' to the dividend, changed their total rate of return from negative to positive	30.43	28.43	33.33
Maximum total rate of return	8.63	23.86	17.63
Minimum total rate of return	-5.35	-10.72	-10.20

Source: Own calculations.

In 2019, 18.12% of the surveyed companies recorded a higher share price at the end of the ex-dividend day than at the end of the cum-dividend day. The average capital rate of return, taking into account commissions (0.375% on purchase and 0.375% on sale), was -3.56%. After taking into account commissions, only 14.49% of the companies obtained a positive difference between the end of their ex-dividend and the end of the cum-dividend days, and the owners of shares in these companies had to pay income tax (19%). Hence, the average capital rate of return including commission and tax was -3.63%. The average dividend yield after tax was 3.77%. The average total rate of return in 2019 was 0.14%, with 44.93% of the companies achieving a positive total rate of return. The percentage of the companies that, 'thanks' to the dividend, changed the

total rate of return from negative to positive was 30.4%. In 2019, the highest total daily rate of return (8.63%) was recorded by MOBRUK, with the dividend payment by this company increasing the total rate of return by 2.14 percentage points. MLSYSTEM, on the other hand, recorded the lowest total daily rate of return (-5.35%), but the dividend payment by MLSYSTEM increased the total rate of return by only 0.66 percentage points.

In 2020, 13.73% of the surveyed companies recorded a higher share price at the end of the ex-dividend day than at the end of the cum-dividend day. The average capital rate of return, taking into account commissions, was -4.45%. After taking into account commissions, only 11.76% of the companies achieved a positive difference between their sales and purchases, and the owners of these companies had to pay income tax. For this reason, the average capital rate of return, after taking into account commissions and tax, was -4.53%. The average dividend yield after tax was 3.67%. The average total rate of return in 2020 was -0.86%, with 40.2% of the companies achieving a positive total rate of return. The percentage of the companies that, 'thanks' to the dividend, changed their total rate of return from negative to positive was 28.4%. In 2020, the highest total daily rate of return (23.86%) was recorded by SUNEX, with the dividend payment by this company increasing the total rate of return by only 0.35 percentage points. In turn, the lowest total daily rate of return (-10.72%) was recorded by SYNEKTIK, and the payment of dividends by this company increased the total rate of return by 1.94 percentage points.

In 2021, 9.63% of the surveyed companies recorded a higher share price at the end of the ex-dividend day than at the end of the cum-dividend day. The average capital rate of return, taking into account commissions, was -3.84%. After taking into account commissions, only 6.67% of the companies achieved a positive difference between their sales and purchases, and the owners of these companies had to pay income tax. Therefore, the average capital rate of return, after taking into account commissions and tax, was -3.87%. The average dividend yield after tax was 3.38%. The average total rate of return in 2021 was -0.49%, with 40% achieving a positive total rate of return. The percentage of the companies that, 'thanks' to the dividend, changed their total rate of return from negative to positive was 33.3%. In 2021, QUANTUM recorded the highest total daily rate of return (17.63%), with the company's dividend payment increasing the total rate of return by 4.97 percentage points. In turn, the lowest total daily rate of return (-10.20%) was recorded by EUROTEL, and the dividend payment by this company increased the total rate of return by as much as 8.57 percentage points.

Table 4: Verification of the significance of total rates of return in the years 2019–2021 using the Student's t-test

2019		2020		2021	
Student's t – statistic	p – value	Student's t – statistic	p – value	Student's t – statistic	p – value
0.6418	0.5221	-2.2955	0.0238	-1.9608	0.0520

Source: Own calculations.

In 2019 and 2021, the average total rates of return on investment consisting of the purchase of a portfolio of the shares of the companies paying dividends at the end of the cum-dividend day and its sale at the end of the ex-dividend day turned out to be insignificantly different from zero, which is consistent with the research hypothesis. Thus, in these two years, the dividend irrelevance theory of Miller-Modigliani was confirmed. The situation was different in 2020, when the negative average total rate of return turned out to be statistically significant, which could indicate the possibility of companies incurring a significant loss on a one-session investment, thus being incompatible with the irrelevance theory. However, this result should be approached very carefully. Due to the COVID-19 pandemic, a large number of the companies listed on the WSE stopped implementing their dividend strategies and investor behavior differed from behavior observed previously (Gemra et al., 2021).

Conclusions

As is usually the case when a new financial theory is put forward, there are both supporters and critics of it. It was no different in the case of Miller and Modigliani's dividend irrelevance theory. The criticism mainly concerned its unrealistic assumptions about the existence of the perfect market. However, most critics probably have not properly understood the essence of the theory, which is not about the impact of dividends on future rates of return. We fully agree with Damodaran (2007, p. 1036), who stated that the dividend is compensation for lost capital gains at the ex-dividend day. Therefore, the verification of the theory should be based on the analysis of rates of return at the ex-dividend day, of course, taking into account the real situation on the market (commissions, taxes). Such a methodology is presented in the article. It allowed its authors to conclude that in 2019 and 2021 the average

total rates of return of the portfolio of the analyzed companies were insignificantly different from zero, which confirms the correctness of the M–M theory.

The proposed method of verifying the dividend irrelevance theory does not exclude the possibility that in the case of some companies the investor may obtain extraordinary profits (significant positive rates of return) as well as incur extraordinary losses (significant negative rates of return). However, when we analyze a larger group of companies (e.g. all dividend payers in a given year), the total rate of return is statistically insignificant. There is no doubt that the studies presented here should be repeated for much longer periods.

The results also undermine Brennan's view (1971) that the M–M theory has little practical value. Miller and Modigliani's dividend irrelevance theory is a warning for investors looking for quick profits from 24-hour investments in companies paying dividends. Investments involving the purchase of a portfolio of the companies paying dividends at the end of the cum-dividend day and selling at the end of the ex-dividend day are unlikely to bring quick, significant profits.

References

Ang, J. & Ciccone, S. (2009). Dividend Irrelevance Theory. In: Baker H.K. (Ed.), Dividend Policy (pp. 97-113). John Wiley & Sons: Hoboken.

Ball, R. & Brown, P. (1968). An Empirical Evaluation of Accounting Income Numbers. Journal of Accounting Research, 6(2), 159–178.

Black, F. & Scholes, M., (1974). The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns. Journal of Financial Economics, 1(1), 1–22.

Boyd, J.H. & Jagannathan, R. (1994). Ex-Dividend Price Behavior of Common Stocks. The Review of Financial Studies, 7(4), 711–741.

Brennan, M. (1971). A Note on Dividend Irrelevance and the Gordon Valuation Model, The Journal of Finance, 26(5), 1115–1121, doi.org/10.1111/j.1540-6261.1971.tb01752.x

Brigham, E.F. (1997). Podstawy zarządzania finansami, t. 2, Warszawa: PWE.

Brzeszczyński, J., & Gajdka, J., (2009). Wpływ polityki dywidendy na stopę zwrotu z akcji na polskim rynku kapitałowym. Acta Universitatis Lodziensis, Folia Oeconomica 226(2), 187–197.

Campbell, J., & Beranek, W., (1955). Stock Price Behaviour on Ex-Dividend Dates. Journal of Finance, 10(4), 425–429.

Collins, J. (1957). How to Study the Behavior of Bank Stocks. The Analysts Journal, 13(2), 109–113.

Cwynar, A., & Cwynar, W., (2007). Kreowanie wartości spółki poprzez długoterminowe decyzje finansowe. Łódź: Polska Akademia Rachunkowości.

Czekaj, J. (1987). Spory wokół „problemu dywidend" w amerykańskiej literaturze ekonomicznej. Ekonomista, 5(2), 1091–1101.

Czekaj, J. & Dresler, Z. (2001). Zarządzanie finansami przedsiębiorstw. Podstawy teorii, Warszawa: PWN.

Damodaran, A. (2007). Finanse korporacyjne. Teoria i praktyka. Gliwice: Wydawnictwo Hellion.

DeAngelo, H. & DeAngelo, L. (2006). The Irrelevance of the MM Dividend Irrelevance Theorem. Journal of Financial Economics, 79(2), 293–315.

Elton, E.J. & Gruber, M.J. (1970). Marginal Stockholder Tax Rates and the Clientele Effect. The Review of Economics and Statistics, 52(1), 68-74.

Elton, E.J., Gruber, M.J. & Blake, C.R. (2005). Marginal Stockholder Tax Effects and Ex-Dividend-Day Price Behavior: Evidence From Taxable Versus Nontaxable Closed-end Fund. The Review of Economics and Statistics, 87(3), 579–586.

Fama, E., Fisher, L., Jensen, M. & Roll, R. (1969). The Adjustment of Stock Prices to New Information. International Economic Review, 10(1), 1–21.

Frankfurter, G.M. & Wood, B.G. Jr. (2002). Dividend Policy Theories and Their Empirical Tests. International Review of Financial Analysis, 11(2), 111–138.

Friend, I. & Puckett, M. (1964). Dividends and Stock Prices. The American Economic Review, 54(5), 656-682.

Gemra, K., Kwestarz, P., Rogowski, W. & Lipski, M. (2022). COVID-19 and Dividends: Evidence from Poland, E&M Economics and Management, 25(2), 93–101.

Gordon, M.J. (1959). Dividends, Earnings and Stock Prices. Review of Economics and Statistics, 41(2), 99–105.

Gurgul, H. (2012). Analiza zdarzeń na rynkach akcji. Wpływ informacji na ceny papierów wartościowych. Warszawa: Oficyna Wolters Kluwer.

Heath, D.C. & Jarrow, R.A. (1988). Ex-Dividend Stock Price Behavior and Arbitrage Opportunities. The Journal of Business, 61(1), 95–108.

Irfan, Ch.M. & Nishat, M., (2002). Key Fundamental Factors and Long-run Price Changes in an Emerging Market-A Case Study of Karachi Stock Exchange (KSE). The Pakistan Development Review, Pakistan Institute of Development Economics, 41(4), 517–533.

Kalay, A. (1982). The Ex-Dividend Day Behavior of Stock Prices: A Re-Examination of the Clientele Effect. Journal of Finance, 37(4), 1059-1070.

Karathanassis, G. & Philippas, N. (1988). Estimation of Bank Stock Price Parameters and the Variance Components Model. Applied Economics, 20(4), 497–507.

Kowerski, M. (2011). Ekonomiczne uwarunkowania decyzji o wypłatach dywidend przez spółki publiczne, Wydawnictwo Konsorcjum Akademickie, WSE w Krakowie, WSIZ w Rzeszowie, WSZiA w Zamościu.

Kreidl, F. (2020). Stock-Market Behavior on Ex-Dates: New Insights from German Stocks with Tax-Free Dividend. International Journal of Financial Studies, 8(3), 58.

Lasfer, M.A. (1995). Ex-Day Behavior: Tax or Short-Term Trading Effects. The Journal of Finance, 50(3), 875–897.

Miller, M. & Modigliani, F. (1961). Dividend Policy, Growth and Valuation of Shares. The Journal of Business, 34(4), 411–433.

Modigliani, F. & Miller, M. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. American Economic Review, 48(3), 261–297.

Nirmala, P.S., Sanju, P.S. & Ramachandran, M. (2011). Determinants of Share Prices in India. Journal of Emerging Trends in Economics and Management Sciences, 2(2), 124–130.

Perepeczo, A. (2013). Reakcja Akcjonariuszy na zmiany polityki dywidend – przegląd wyników badań. Zeszyty Naukowe Uniwersytetu Szczecińskiego, Finanse, Rynki finansowe, Ubezpieczenia, 60(2), 251–261.

Sharma, S. & Singh, B. (2006). Determinants of Equity Share Prices in Indian Corporate Sector: An Empirical Study, The ICFAI Journal of Applied Finance, 12(4), 21–38.

Sierpińska, M. (1999). Polityka dywidend w spółkach kapitałowych. Warszawa – Kraków: PWN.

Somoye, R., Akintoye, I. & Oseni, J. (2009). Determinants of Equity Prices in the Stock Markets. International Research Journal of Finance and Economics, 30(2), 177–189.

Van Leeuwen, B.J. (2018). The Value of R&D and Dividends for NASDAQ Firms. University of Groningen.

Visscher, S. & Filbeck, G. (2003). Dividend-Yield Strategies in the Canadian Stock Market. Financial Analysts Journal, 59(1), 99–106.