

Title:

Dividend Policy in a Business Game Environment

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Management Education and Teaching Cases

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Abstract

The objective of this study is to evaluate the effects of dividend policy on the profitability of a close corporation in a business game environment. We carried two studies in laboratory. In the first one, we compared extreme policies of dividend distribution and analyzed the effects of earnings retention adopted by the firm. In the second, we evaluated the existence of statistical relationship between dividend payout and firms' profitability in the industry. The results did not allow us to refute Miller and Modigliani's (1961) hypothesis. However, the literature review has provided a normative by-product of interest to managers.

1. Introduction

Dividend policy is a main topic in financial studies and it has been growing in interest among scholars since the 1950's. Lintner's (1956) paper is a major contribution to the subject, where the author showed evidence that firms partially adapted dividend payment over earning variations and proposed a model to explain the sluggish but changing behavior of dividend decisions. By Lintner's observations, dividend choices were active ones taken by conservative managements that avoided erratic actions.

Miller and Modigliani's (1961) paper is another classic related to the theme and has become a main inspiration for a broad number of subsequent studies. The authors came to conclusions different than Lintner's about the importance of the distribution of earnings, suggesting that dividend policy was irrelevant to a firm's valuation under certain conditions.¹ They have gained influence among researchers, being recurrently quoted in theoretical and applied studies. By the Miller and Modigliani's model, a firm's value does not depend on its decision to retain or distribute profits, but exclusively on the risk and return of its projects. This school of thought relegates a secondary role to dividend policy, finding that the distribution of earnings is a residual decision after investment decisions.

¹ The usual conditions employed by Miller and Modigliani were the existence of a perfect capital market, rational behavior of agents and perfect certainty of future investment programs.

Despite the influence of Miller and Modigliani's work in corporate finance, the recent development of behavioral finance and some empirical findings have suggested that there should be additional efforts to study dividend policies, boosting the idea that dividend is a dynamic and important decision in corporation environments.

Some empirical studies have shown that earnings retention is a significant funding source for corporations of different countries, including Brazil (e.g., Melo & Rodrigues Junior, 1999:29 and Tirole, 2006: 96). Singh (1995), Ferreira and Brasil (1997), Reis, White & Bielchowsky (1997) Eid Junior (1996), Zoneschein (1998), and Rodrigues Junior & Melo (1999), presented some statistics for Brazilian companies indicating that their retained earnings accounted for percentages between 11% and 63% of total funding sources of the country's firms, making the decision to distribute the earnings or to retain them an important one.

The dividend distribution practices among Brazilian firms support that dividend rate and the frequency of distributions are rather discrepant among firms. Between 2012 and 2014, only seventeen out of a hundred and thirty analyzed companies with stocks traded at BM&FBovespa and daily turnover higher than R\$ 1 million rewarded their owners on a quarterly basis, with the remainders paying dividends only once or twice a year (Exame, 2014). Although these figures are not definitive and involve different economic sectors, they suggested that there was a great divergence on dividend policies among firms, reinforcing the importance of further investigations on the topic.²

In this context, this study analyzed the relationship between dividend payout and firms profitability in a theoretical-empirical basis, and summarized important normative conclusions drawn from the literature aiming to give support to management officers and shareholders. We adopted a case study in a business game environment, where experiential learning takes place in a fertile field to learn some complex and dynamic management issues such as dividend policy. In a more specific way, this study accomplishes two analyses on the performance of different dividend strategies taken by corporations in a business game environment. In the first one, we measured the effects of different dividend strategies on the profitability of an specific firm, via Monte Carlo simulations (with the company's figures). In the second analysis, we analyzed industry data to evaluate the statistical relationship between dividend payout and firms' profitability in a

² Dividend distribution decisions usually take place at the annual general meetings (AGM), with proposals to the destination of profits elaborated by the board of directors. In Brazil, firms must have an explicit policy for annual dividend distribution, superior of 25% of their net income, facing a 50% distribution punishment in the case of omission, according to the article 202 of the Law 6.404, that together with Law nº 11,638/ 2007 and Law nº 10,303/2001 form the legal basis of corporations in Brazil.

competitive environment. In summary, the combined analysis focused on testing the hypothesis that dividend policy is irrelevant to firm valuation, associated with Miller and Modigliani's (1961) study.

2. Brief Literature Review

In 1956, Lintner published a now classic study about dividend distribution, where he suggested that the dividends were “seldom a by-product of current decisions regarding the desired magnitude of savings” (1956: 97). His findings were empirical ones based on field interviews and although his model was not derived from any optimization process, surely it has deserved a good deal of attention along the years. Lintner pointed that two thirds of the twenty-eight researched U.S. companies had goals defined as payout ratios between 20% and 80% (Lintner, 1956: 107-109), although flexible to adjustments over time.

Lintner's model can be summarized by equation (1), where $D_t^* = rP_t$, and r is the target payout ratio, P_t is the profit in time t , D_t is the amount of dividend paid in t , and ΔD_t represents a change in D from $t-1$ to t . The term u_t represents a discrepancy between the observed change in dividend, ΔD_t , and the expected value determined by the other terms of the equation. The constant a could be zero but the authors explained that it was generally equals to a positive number, reflecting the greater firms' reluctance to reduce than to raise dividends. Finally, the term c is a parameter of adjustment between target and effective dividend payment. The expression shows a difference equation for dividend and represents the sluggish process relating dividend adjustment over time when there is any profit variation.

$$(1) \quad \Delta D_t = a + c(D^* - D_{t-1}) + u_t$$

The authors implicitly underlined that managements tend to be conservative, avoiding making large changes that could be reverted in a few periods ahead, enabling them to “live more comfortably with its unavoidable uncertainties regarding future developments” (1956: 100). Also, earnings were found to be the main indicator guiding management through their decision-processes, with other aspects such as tight liquidity position or debt payment due to certain dates far from being as important as earnings, considered more generally understood and sympathetically recognized by shareholders.

An opposite perspective was due to Miller and Modigliani (1961), which became a pillar of the modern finance theory. The authors demonstrated that dividend policy does not have effect on the value of firms and, consequently, on their stock

prices. The study relaxed some unrealistic hypotheses along its development and gave important contributions to managers' decisions and shareholders' inquiries. Although it has been criticized along the years, its contribution to finance theory is undeniable. The Miller and Modigliani's model started defining the rate of return from investing in a stock given by the sum of dividend paid and the variation in the stock's price. Rearranging the terms, the authors came with the following expression:

$$(2) \quad p_t = \frac{1}{(1+i)} [d_t + p_{t+1}]$$

where d_t is the dividend paid per share at the end of period t , and i is the opportunity cost or the rate of return from buying a stock in period t and selling it in $t + 1$. The authors wanted to observe the value of the firm as a whole instead of the value of an individual share and introduced more elements to the model:

- n_t is the number of shares of record at the beginning of time t .
- m_{t+1} is the number of shares sold during t .
- $n_{t+1} = n_t + m_{t+1}$
- V_t is the total value of the firm defined as $V_t = n_t \cdot p_t$
- D_t is the total dividends paid during t defined as $D_t = n_t \cdot d_t$

Inserting n_t on both sides of the equation (2), and after some manipulations, it is easier to visualize the impact of dividends in a firm's valuation:

$$(3) \quad V_t = \frac{1}{(1+i)} [D_t + V_{t+1} - m_{t+1} p_{t+1}]$$

Expression (3) shows that a firm's market value depends on the dividend paid at the end of period t , D_t , assumed to be independent from future ex-dividend value D_{t+1} . Firm's market value is also affected by the new ex dividend market value V_{t+1} and, finally, by the value of the new shares sold to outsiders, $m_{t+1} p_{t+1}$. The authors demonstrated that the terms D_t and $m_{t+1} p_{t+1}$ cancel each other out, making the dividends insignificant to the firm's valuation, or the price of its stocks. In this situation, investments decisions in different projects that are relevant to determine returns on capital.

The critics of the irrelevance theory have shown different perspectives from empirical findings and theoretical developments. Allen and Michaely (2003: 341), for example, in an empirical investigation, highlighted that large companies tend to pay a significant share of their profits in the form of dividends and that dividend payments tend to be smoothed over earning variations, in a similar manner described by Lintner (1956). They also suggested growing importance to stocks repurchase as a way to remunerate shareholders. Fudenberg and Tirole (1995), in a theoretical model, suggested possible hidden savings from managers concerned with their career and, therefore, were adopters of income and dividend smoothing practices.

More recently, Tirole (2006) summarized some of the contributions given in this debate in a table that recapitulated situations where a firm should hold large fractions of its earnings.³ The first situation involves greater retention of profits associated with the presence of good chances of growth, which demand resources and investments for its accomplishment. A firm faces costs, frictions and difficulties to access stock markets for funding. Therefore, retentions of earnings for future investment are expected. Under this perspective, firms with good prospects for investments tend to present greater retention and, consequently, lower financial leverage.

The second situation related to large profit retention occurs in the presence of profit serial correlation. Under the perspective of a corporation's life cycle, wherein the initial period there is the attraction of funds and the investments in the projects and, in the period that follows, the intermediate results appear and the dividends are determined. Firms with correlated intermediate and future profits hold back a greater fraction of their earnings. Poterba (1988, *apud* Tirole, 2006) explains to be reasonable that one can expect larger earnings retention if the intermediate profits signal persistent demand, low competition or greater future profitability.

The third situation involving large retention of profits has its reference in Hubbard (1998 *apud* Tirole, 2006), who showed evidence that firms with low financial restriction or access to stock market possess low participation of debt instruments. Thus, financial constraints are a fundamental determinant of profits' retention.

³ Tirole (2006) commented that he did not bring any unprecedented theory and stressed the fact that his list was not exhaustive one, emphasizing there was a possibility that other factors would explain dividends practices. However, the author has been recognized by his binding capacity to summarize and bringing different and complex issues into common conceptual ground.

The fourth and last situation described by Tirole involves the earnings size. He argues that firms with low earnings should distribute smaller fraction of their profit than those with high earnings, although this “theoretical prediction may be less compelling than the others” (2006: 98).

Taniguchi & Sauaia (2008) add other elements to Tirole’s (2006) list, remembering that corporations with the fastest demand growth tend to have higher retention of profits. Table 1 shows the situations discussed and it is considered appropriate for managerial purposes.

Table 1 – Theoretical Views about Earnings Retention		
	Firm should	
	Retain more of its profits if	Pay out more of its profits if
Growth opportunities are	High	low
Earnings are	Small	large
Financial constraints is	Weak	tight
Correlation of t and t+1 profits is	High	low
Growth is	Fast	slow

Sources: Tirole (2006) and Taniguchi & Sauaia (2008)

The discussion we have done so far suggests prescriptive aspects of dividend distribution without specifying its time structure characteristics. Taniguchi & Sauaia (2008) summarized three forms of policies: constant payout, regular dividends, and low and regular dividends with extra and complementary dividends. In the first model, the earnings were distributed with a fixed payout ratio. In the second model the amount of dividends were repetitive in a yearly basis. In the third model, which the authors pointed as a regular practice in Brazil, the dividends were set to a minimum level adjusted for lower retentions with complementary dividend payments.

3. Research Development

Research problem and objectives

A problem faced by corporations is the percentage of earnings that should be paid as dividends to their shareholders. We have seen that Brazilian firms tend to stick to the compulsory minimum level determined by law with complementary distributions that make payout ratios and retained profits heterogeneous among firms in the country. Whether it is good to distribute less or more dividend than the firm’s historical average or previous values is a matter of discussion, topped by the

preliminary question about the existence of a relationship between dividend and firm's value. Due to the complexity and importance of the problem faced by managers and shareholders, this study examined the hypothesis that dividend payout are irrelevant to the profitability of firms. We carried two complementary studies in a laboratory environment pursuing to answer if dividend can contribute to profitability in that setting.

An industry with nine firms was created in a laboratory environment. All the firms began with identical economic conditions and were managed by graduate students, challenged to pursue business accomplishments seeking maximization of the internal rate of return of their companies. The success or failure would then be represented as their grades. One main contribution of business games may be embraced by the participants, who went through a experiential learning with recognized effectiveness along pedagogical dimensions (Li & Baillie, 1993: 336). We pursued a complex business game environment, that have alleged greater gains than less complex one with fewer firm's functions, aiming to enlarge the game's external validity.

In the first study, we analyzed the strategy of earnings retention adopted by a chosen firm (Grupo 4) in the business game, providing ex post elements for its management's decisions. The firm focused had bad performance, making the factual analyses of its dividend strategy impossible. Thus, we analyzed the results of different payouts, ie., 25 %, 35 % and 100 % of the earnings, on its profitability applying a Monte Carlo simulation based on the data of the business game.

In the second study, we searched for the existence of a statistical relationship between the profitability (internal rate of return) of the laboratory firms and the percentage of dividend distributed by them (dividend payout). A statistically significant relation refutes Miller and Modigliani's (1961) idea and gives incentives for efforts in the delimitation of dividend policies of corporations.

Research Method

Business games operate within laboratories or simulators and possess increasing applications in business administration, motivated by larger interests of students to understand how to manage corporations in a complex world (Aaron & Karrieker, 2014). One important characteristic of business games in simulators, computerized or not, is their application in the teaching and learning process, where the practice and experience in business games can assist the assimilation and understanding of different aspects of corporations and its relation to theories constructed (Sauaia, 1997). The similitude with business reality

and the complexity of the situations presented in organizational simulators are appealing, composing distinct scenarios for training, especially in strategic planning, marketing, finance and human resources functions (Silva, 2015).

This study can be defined as a case study applied in a laboratory business game environment. It has a descriptive nature but also a quantitative part which employed some statistical tools. Monte Carlo simulations were accomplished for the analysis of three competing models of distribution of shares (25%, 35% and 100%). Moreover, the study used standard panel data econometric methodology and applied Stata software to evaluate the relationship between dividend payout and firm's profitability in the second study described before.

Data collection

In a preliminary step, we searched the academic literature related to dividend policy. For the two empirical studies, we collected data given by the laboratory after the business game performed four quarters. Data set also included primary data from the management team of the firm called Grupo 4, and its forecasting and analysis reports produced or acquired during the game terms. Furthermore, besides theoretical and empirical studies consulted and analysed, the necessary infrastructure provided by Simulab, as well as Sauaia's (2013) book, in different editions, were useful in the study.

Main business game's results

The laboratory game occurred during the graduate course in business administration school at USP, São Paulo University, in the second semester of 2015. There were nine male students with different profiles of academic training, professional experiences and levels of knowledge in simulators and business games. Each one of them had the control of a company and its six functional areas, i.e. planning, marketing, production, human resources, finance and presidency, forming a competitive industry in the laboratory environment.

There was a great commitment demonstrated by all players, who had to construct a business strategy plan for their companies. Before the start of the game, the laboratory's instructor performed a round-test for players who had no basic understandings of the game dynamics. Just before the beginning of the game the laboratory's instructor said aloud that the game would last four quarters (one year).⁴

⁴ The companies operated in four quarters and had a "surprise" with the realization of an extra round equivalent to a fifth quarter, although this period was left aside by the analysis carried in this paper.

The goods produced and commercialized by all companies were multitasks technological devices, called SET, and the companies started competition with equal shares of the market and identical financial sheet situation. The differentiations between the products would occur along the quarters in accordance with investments in marketing and R&D. The values of dividends were determined by each company at the beginning of each round (or quarter), to the limit of the accumulated profit on balance sheets. After four rounds, all data of Grupo 4 were available for this study. At the end of each quarter, only the values of sales, profits, market-shares, prices and dividends of all companies became public. Other data were private information.

Descriptive analysis of data

Table 2 presents the values that the company Grupo 4 planned to play, disclosed in its business strategy plan, which shows that the proposed dividend payments were relatively steady in the first three quarters, with a moderate fall in the fourth quarter.

Table 2 – Summary of Grupo 4’s Business Strategies

Planned Decisions	Q1	Q2	Q3	Q4
<i>Price</i>	6.39	6.39	6.39	6.39
<i>Marketing expenses</i>	50,000	50,000	100,000	100,000
<i>R&D expenses</i>	100,000	100,000	50,000	50,000
<i>Maintenance expenses</i>	75,000	75,000	75,000	75,000
<i>Planned production</i>	465,502	465,502	465,502	465,502
<i>Investments (machinery)</i>	0.00	0.00	0.00	0.00
<i>Raw resources</i>	738,143	961,014	945,595	1,072,898
<i>Planned dividends</i>	134,561	132,360	123,885	88,582
<i>Other expenses</i>	865,559	894,424	940,245	1,069,583

Source: Grupo 4’s Business Strategy Plan

According to the companies’ business strategy plan, there would be no investments in new machineries and equipment, marketing and R&D. The maintenance expenditures would be reduced to a minimum. The company planned to minimize the adoption of overtime to produce at same level satisfactory mark-up. The cash level was too high at the beginning of the game and the company planned to gradually reduce it to a level between \$500,000 and \$ 1,000,000. A closer observation in Grupo 4’s forecasts made possible to infer a pattern of dividend payout, as a constant 35% in all quarters.

Table 3 –Grupo 4’s Forecasts

Indicator	Q1	Q2	Q3	Q4
Total Revenue	2,974,559	2,974,559	2,974,559	2,974,559
Total Expenses	2,956,800	2,235,210	2,247,305	2,293,870
Net Income	384,461	378,172	353,958	253,091
Dividends	134,561	132,360	123,885	88,582
Total market sales	3,838,000	4,678,522	5,084,383	5,858,481
Market share	12.13%	9.95%	9.16%	7.95%

Source: Grupo 4's Business Strategy Plan

Bringing the theoretical arguments of Tirole (2006) and Taniguchi & Sauaia (2008) to the analyses, Group 4 would have adopted a different dividend strategy. The growth of its sales was null, with rising losses. It did not need funding for new investments and it was common knowledge that there was banking credit available for each firm up to a certain reasonable level.⁵ Thus, the possibility of financial restriction as a motivation for retention of profits could be discarded as an argument to justify a maximum dividend policy. We could not imagine an alternative for a dividend policy that could be much higher than the legal floor of 25%, turning to the conclusion that the choice made by Grupo 4 was rather disconnected with theoretical arguments.

After the four predicted rounds or quarters, the performance of Group 4 was the second worst in the industry. After successive losses, the company paid its planned dividend payout only in the first quarter, as table 4 shows. The results pointed that the planned dividends were not paid, possibly because of Group 4's management choices. The company faced losses in all quarters together with the reduction in its capital in two of four rounds. Besides, there were losses of market shares in percentages superior to the predicted ones, with the exception of the last term when the corporation adopted prices and expenses in marketing completely diverse from it was initially planned.

Table 4 – Grupo 4's Results

		Q1	Q2	Q3	Q4
Total revenues	Forecast	2,974,559	2,974,559	2,974,559	2,974,559
	Realized	2,102,578	1,952,519	1,227,404	1,695,115
	Difference	-29.3%	-34.4%	-58.7%	-43.0%
Total expenses	Forecast	2,956,800	2,235,210	2,247,305	2,293,870
	Realized	2,260,505	2,256,719	1,566,142	2,190,437
	Difference	-23.5%	0,96%	-30.3%	-4.5%

⁵ The bank account credit line was available, however, bearing an incidence of interest rate increasing on value of the credit.

Net Income	Forecast	384,461	378,172	353,958	253,091
	Realized	-157,926	-304,199	-338,738	-495,321
	Difference	-141.1%	-180.4%	-195.7%	-295.7%
Dividends	Forecast	134,561	132,3606	123,885	88,582
	Realized	134,561	0	0	0
	Difference	0.00%	-	-	-

Source: Business Game

In spite of Grupo 4's earning results, it was still possible to evaluate the 35 % payout chosen by the firm. The analysis applied the boundaries of the industry's profit, presented in Table 5, carrying a Monte Carlo simulation.

Table 5 – Industry Earnings – lowest and highest values

	Q1	Q2	Q3	Q4
Highest net income	275,633	322,355	1,014,072	2,309,496
Lowest net income	-648,323	-794,386	-998,146	-748,020

Source: Business Game

The simulation applied a triangular distribution and the boundaries of profits to provide a thousand earning results for each quarter. We calculated the internal rate of return, in each quarter, for each one of dividend policy rule considered, i.e., the minimum that the Brazilian legislation imposes, 25%, the 35% adopted by Group 4, and a model of 100% distribution. The average IRR obtained in the simulations can be observed in Table 6. They indicate higher values for the 25% model in all quarters, although the benefits were rather marginal among different models.

Table 6 – Average IRR – Dividend Models

Dividend Models	Q01	Q02	Q03	Q04
Max (100%)	0.63%	0.72%	1.22%	2.96%
Grupo 4 (35%)	0.62%	0.69%	1.26%	2.87%
Min (25%)	0.79%	0.88%	1.32%	2.98%

Source: the authors

The differences among models were investigated applying standard statistical hypothesis tests with the data generated. The investigation compared all pairs of models, employing an average difference test with samples of different variances. The results were presented in Table 7, showing that the models displayed quite similar IRR results, without refutation of any difference between their means at statistical significance better than 1% in any quarter.

Table 7 – Average Tests Results

		Q01	Q02	Q03	Q04
Div_Min = Div_Grupo4	<i>t</i>	2.016	1.936	1.481	1.225
	(p value)	(0.0440)	(0.0529)	(0.1388)	(0.2208)
Div_Min = Div_Max	<i>t</i>	1.638	1.381	1.969	-0.099
	(p value)	(0.1015)	(0.1674)	(0.049)	(0.9205)
Div_Grupo4 = Div_Max	<i>t</i>	-0.379	-0.529	0.435	-1.265
	(p value)	(0.7042)	(0.5962)	(0.6288)	(0.2058)

Source: the authors

Next, we turned to the second study proposed, adding more industry data into the analysis. The main results are in Table 8, with dividend payout ratios calculated in two different ways. The first one (payout a) took into account the dividend paid in quarter *t*, based on the profit in *t-1*. The second methodology (payout b) accumulated the values along the quarters. For example, the dividend payout in quarter 2 is the ratio of the sum of the dividends distributed in the quarters 1 and 2 by the sum of the initial retained earnings of \$700,000 plus the earnings in quarter 1. In quarter 3, the dividend payout was the ratio between the sum of dividends in quarters 1, 2 and 3 by the sum of the initial retained earnings (\$ 700,000) plus the earnings of quarters 1 and 2.

Three companies had made profits and two had suffered losses in all quarters. The other four companies had alternated periods of profits and losses. Regarding dividends, only the company TREZ established a constant payment in nominal terms, distributing dividends of \$53,000 in all rounds. Two companies, Tecno Infinity and FriArti, had distributed more dividends than the sum of initial retained earnings of \$700,000 and the accumulated profit in all quarters. Two firms, Grupo 4 and MobCel, had ceased distribution of dividends from the third quarter on, mainly because of their negative results. The remainders, BraSet , Oak, Prahalad and XIAOMI, had varied its dividend payment without a clear pattern.

Table 8 – Industry Results

		Q01	Q02	Q03	Q04
TREZ S/A	<i>Net Income</i>	144,419	189,555	342,461	326,126
	<i>IRR</i>	3.21	2.69	2.86	2.88
	<i>Dividends</i>	53,000	53,000	53,000	53,000
	<i>Payout (a)</i>	7.6%	36.7%	28.0%	15.5%
	<i>Payout(b)</i>	7.6%	12.6%	15.4%	15.4%
XIAOMI - CR10 S/A	<i>Net Income</i>	-140,532	62,586	1,000,000	2,300,000
	<i>IRR</i>	0.48	0.67	3.47	7.26
	<i>Dividends</i>	0	0	100,000	600,000
	<i>Payout (a)</i>	0.0%	0.0%	159.8%	59.2%
	<i>Payout(b)</i>	0.0%	0.0%	16.1%	42.8%
Prahalad Elec. S/A	<i>Net Income</i>	207,572	163,046	109,439	-180,754
	<i>IRR</i>	3.81	2.81	2.2	1.23
	<i>Dividends</i>	130,000	140,000	140,000	250,000

	<i>Payout (a)</i>	18.6%	67.4%	85.9%	228.4%
	<i>Payout(b)</i>	18.6%	29.7%	38.3%	55.9%
Grupo 4	<i>Net Income</i>	-157,926	-304,199	-338,738	-495,321
	<i>IRR</i>	0.24	-1.19	-1.91	-2.69
	<i>Dividends</i>	134,561	0	0	0
	<i>Payout (a)</i>	19.2%	0.0%	0.0%	0.0%
	<i>Payout(b)</i>	19.2%	24.8%	56.6%	-133.4%
MobCel S/A	<i>Net Income</i>	275,633	162,265	-531,647	-245,639
	<i>IRR</i>	4.29	2.99	0.35	-0.33
	<i>Dividends</i>	50,000	0	0	0
	<i>Payout (a)</i>	7.1%	0.0%	0.0%	0.0%
	<i>Payout(b)</i>	7.1%	5.1%	4.4%	8.2%
Carvalho S/A	<i>Net Income</i>	76,784	322,355	416,319	368,901
	<i>IRR</i>	2.54	2.93	3.21	3.22
	<i>Dividends</i>	55,000	150,000	100,000	400,000
	<i>Payout (a)</i>	7.9%	195.4%	31.0%	96.1%
	<i>Payout(b)</i>	7.9%	26.4%	27.7%	46.5%
BraSet S/A	<i>Net Income</i>	244,961	136,814	620,649	1,200,000
	<i>IRR</i>	4.09	2.83	3.72	5.27
	<i>Dividends</i>	63,908	66,370	100,000	50,000
	<i>Payout (a)</i>	9.1%	27.1%	73.1%	8.1%
	<i>Payout(b)</i>	9.1%	13.8%	21.3%	16.5%
Tecno Infinity S/A	<i>Net Income</i>	-648,323	-47,287	174,604	339,314
	<i>IRR</i>	-4.34	-2.35	-1.09	-0.14
	<i>Dividends</i>	0	350,000	350,000	350,000
	<i>Payout (a)</i>	0.0%	-54.0%	-740.2%	200.5%
	<i>Payout(b)</i>	0.0%	677.3%	15945.3%	586.6%
FriArti S/A	<i>Net Income</i>	-458,978	-794,386	-998,146	-748,020
	<i>IRR</i>	-2.55	-4.98	-6.84	-7.35
	<i>Dividends</i>	16,562	100,000	80,000	100,000
	<i>Payout (a)</i>	2.4%	-21.8%	-10.1%	-10.0%
	<i>Payout(b)</i>	2.4%	48.4%	-35.5%	-19.1%

Source: the authors

We evaluated if the payout ratios had any statistical relationship with the firm's profitability measured by the IRR indicator, as in the expression (4):

$$(4) \quad IRR_{i,t} = \alpha_{i,t} + \beta Payout_{i,t} + \gamma Profit_{i,t} + u_{i,t}$$

where the profits of the firm i in quarter t ($Profit_{i,t}$) are employed as a control variable and $Payout_{i,t}$, is payout a or payout b explained before. The IRR was the rate that made the initial capital value equal to the sum of dividends and capital discounted for each firm i in each quarter t . The Miller and Modigliani's theory implies a null parameter β for the expression (4), with no impact of dividend policy on firm's profitability. The main results obtained from regressions for fixed and random effect models in a panel data standard methodology are in Table 9.

Table 9 – Econometric Results

	<i>Payout a</i>		<i>Payout b</i>	
	<i>Fixed Effect</i>	<i>Random Effect</i>	<i>Fixed Effect</i>	<i>Random Effect</i>
<i>Payout (a)</i>	-0,032 (0,785)	0,012 (0,923)	-	-
<i>Payout (b)</i>	-	-	0,001 (0,797)	-0,000 (0,922)
<i>Profit</i>	3,23e-06 (0,000)	3,48e-06 (0,000)	3,21e-06 (0,000)	3,47e-06 (0,000)
constant	0,658 (0,000)	0,628 (0,242)	0,645 (0,000)	0,635 (0,252)
F	13,92	82,48	37,68	83,33
(Prob > F)	(0,001)	(0,000)	(0,000)	(0,000)
R² – within	0,735	0,749	0,750	0,749
R² – between	0,854	0,755	0,745	0,755
R² – overall	0,772	0,697	0,691	0,698

Source: the authors

We had observed that two companies paid dividends beyond their retained earnings capacity, Tecno Infinity and FriArti. Thus, we also run the econometric regressions without those firms. The results, not shown, remained the same with no statistically significant impact of *Payout* and the significant impact of *Profit* on IRR.

Discussion of the results

The first part of this study analyzed the behavior of a firm in a business game environment. Group 4 presented recurrent losses in the competition performed in a simulation laboratory. The company did not produce positive earnings, performing the second worst results among its competitors. There are different possible explanations for such a performance. The low expenses in marketing and R&D were insufficient to keep the initial consumer market. Therefore, the company faced losses of potential market and consequent restriction in sales and increased their inventory stocks. The maintenance expenses were also below the historical average (or initial values) and were responsible for an increase in the production costs, in contrast to what was observed in the competition, where other corporations were able to reduce their overheads along the quarters.

The theoretical studies summarized by Tirole (2006) and Taniguchi & Sauaia (2008) to justify an increase in dividend distribution, overall, suggested that Grupo 4 did not follow a dividend policy compatible with its business strategy. Growth opportunities, or a fast sales growth, produce the resource necessity for investments and justifies more earnings retention.

Financial constraints might also trigger larger retention. Both were not identified in Grupo 4's business strategy and effective decisions. In summary, there was no evidence of any reasonable explanation of Grupo 4's decisions by Tirole's (2006) and Taniguchi & Sauaia's (2008) theoretical point of view.

However, the losses of Grupo 4 did not restrain our analysis over different dividend policies. The Monte Carlo simulation and the statistical tests performed suggested that the dividend policy plays a minor role in the profitability of the firm, or rather no role at all, given the statistical indifference of the averages at 1% significance level. The results suggest an alignment with Miller and Modigliani's (1961) theory.

The second study corroborated the idea of the irrelevance of dividend payout as a determinant of the firm's internal rate of return, with quite robust econometric results. It is important to emphasize that the results do not mean that a manager should take, or not take, his or her decision over earnings retention as an irrelevant one. A broad part of the theoretical literature is built focusing on asset prices in stock markets. In the business game evaluated, there was no market for the corporations' stock negotiation. The adoption of different dividend policies is a reality in business corporations and the rationale for some related decisions were presented in the text.

4. Final Considerations

There is an important aspect regarding dividend policy that this study has skipped. The models discussed have ignored the existence of a stock exchange as a market place for trading shares. Otherwise, there would be room for a relevant argument that we have ignored so far. If a company offers, implicitly or explicitly, high and regular dividend payments, it can produce attraction of some risk averse and long term vision investors, pushing its stock prices. There are examples of this effect with some Brazilian stocks, namely Bradesco, Ambev and Itaú, which are high dividend payout companies. Such effect was not taken in consideration in our business game and, with this specificity in mind, the study becomes more appropriate and relevant for close corporations.

The dilemmas faced by managers of close companies, when they have to decide on the distribution of profits, are challenging. Some studies such as Tirole (2006) and Taniguchi & Sauaia (2008) can be used as tools for decision makers. According to the authors, firms tend to pay larger dividends when they are not financially constrained, have small chance of future growth or the pace of growth is slow, have profits in abundance and show low correlation between profits in different

periods. Such situations do not exhaust the list of arguments to distribute more dividends but certainly summarize the most important ones.

For investors, the lessons are subtle, but present. Shareholders can and must monitor the rationale of dividend distribution of their companies. It seems reasonable that managers can have a tendency to suggest larger distribution of profits when they handle a larger proportion of stock options or profit sharing in their total remuneration.

The evaluation of the firms in the laboratory industry disclosed some interesting facts. We observed that two firms adopted irregular dividend distributions, according to the rule of the game. The laboratory's instructor played the role of the government, and did not impose any penalty to those firms. We did not examine whether the other companies had observed the irregular behavior of Tecno Infinity and FriArti, which had distributed more dividends than they had gained along the game, and had decided not to protest because of the costs to elaborate a complaint, or they did not perceive the irregularity.

Like any empirical study, this has its own restrictions. We believe that the evaluation of the Grupo 4's dividend policy by the Monte Carlo simulation could not reflect the interaction between different firms in the laboratory environment, but simply some characteristics of the algorithm applied by the business game design.

Some statistical limitations were present. The micronumerosity was an evident one concerning the statistical inferences, with analysis carried with data contemplating only nine companies in four quarters. We did not apply any formal treatment to accommodate for this deficiency, given the descriptive characteristic of the phenomenon observed in the laboratory. The game could be refined, but they would hardly modify the general conclusions we obtained.

Laboratory environments have the benefit to allow for different setups. Thus, different aspects of earnings distribution could be focused. For example, a negative dividend distribution could be seen as an increase of capital that can be employed from an investment project with high rates of return. Beyond the increase of capital or subscriptions, stock repurchases plans have become more popular over time and could be considered in future studies related to the payment of money to the shareholders of different types of firms, although it should consider an environment where the firms could trade their stocks and a direct rationale for repurchase were present.

The fact that there is a compulsory 25% minimum dividend payout in Brazil could generate a barrier to the increment of investments with subsequent implications on returns of Brazilian firms. This and other legal normative aspects are fertile fields for new studies.

Finally, this study has brought an application example of a business game employed for management teaching. Although the set up adopted made certain simplifications over a real world, the business game were not simple at all, with its complexity representing a challenge for students with recognized pedagogical benefits.

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