

Impact Analysis of Exceptionally High Equal Initial Investments on the Wealth of Two Competing Investors in the Stock Exchange: Implication for the Socio-Economic Development in Nigeria

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Abstract

This work studies the effects of changes in the initial investments on the dividends of two competing investors in the stock exchange undergoing competition. The ODE 45 numerical scheme was used. The results of our analysis showed that with exceptionally high equal initial investment values of the two investors competing over some specific trading periods, the dividends of the first investor were dominantly higher than that of the second investor. Our results will be useful in the stock exchange investment planning. This has great implication for the socio-economic development of the country.

Keywords: Initial Investment, dividends, ODE 45, Competing Investors, trading period, stock exchange, socio-economic development

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I. Introduction

The optimal performance of a set of investors trading in a competitive environment over a continuous time depends on a number of factors, both intrinsic and extrinsic (Nafo (2016)). One key factor which to a great extent, can cause a differential effect on the dividends of competing investors in the stock exchange is the value of the initial investment of a trader.

In this work, in the events of both unchanging values of our model parameters and other exogenous variables which can affect the dividends of investors, we have particularly investigated the effect of changes in the initial capital on the dividends of the competing investors in the stock exchange.

II. Mathematical Formulation

In our unique method of investigation of the proposed problem, we have used a model typical of Lotka-Volterra formulation with deterministic parameter values. (Lakka et al (2013), Tang and Zhang (2005), Khamis et al (2008), Khodabin and Chekarabi (2016), Lee et al (2005), Modis (1999), Alessandre (2014), Cajueior et al (2009), Shiller (1981)). This model is compatible with dynamical systems and involves a system of continuous non linear first order ordinary differential equations which does not have a closed form solution.

It is given by:

$$\frac{dw_1(t)}{dt} = w_1(t)(\alpha_1 - \beta_1 w_1(t) - \gamma_1 w_2(t)) \quad (1)$$

$$\frac{dw_2(t)}{dt} = w_2(t)(\alpha_2 - \beta_2 w_2(t) - \gamma_2 w_1(t)) \quad (2)$$

$$w_1(t) > 0, w_2(t) > 0$$

Where

$w_1(t)$ represents the dividend of the first of investor at time t

$w_2(t)$ represents the dividend of the second of investor at time t

α_1 is the intrinsic growth rate of the dividend of the first investor

α_2 is the intrinsic growth rate of the dividend of the second of investor

β_1 is the intra-competition coefficient which is the inhibiting factor on the dividend of the first of investor due to its interaction with itself.

β_2 is the intra-competition coefficient which is the inhibiting factor on the growth of the dividend of the second of investor due to its interaction with itself.

γ_1 is the inter-competition coefficient which is the inhibiting factor on the growth of the dividend of the first of investor due to the interaction of the second investor.

γ_2 is another inter-competition coefficient which is the inhibiting factor on the growth of the dividend of the second investor to the interaction of the first investor.

$w_1(0)$ and $w_2(0)$ are the initial dividend of the first and second investor respectively.

Method of Analysis

As already stated in our previous section, the system of equations (1) and (2) does not have a closed form solution. Hence we resorted to employing some numerical methods to conduct a simulation analysis of the problem. With assumed investment values of 1.2 million naira and 1.4 million naira for the first and second investors respectively, the system of continuous nonlinear equations were simulated over trading periods (TP) of 1 month, 40 months, 45 months, 50 months, 55 months, 60 months, 65 months and 70 months. Other scenarios witnessed variation (decrease and increase) in initial investment values for the two competing investors over the same trading periods. The results are presented in the following tables and discussed.

III. Results

Table 1: Old $w_1(0) = 1.2$ million naira, old $w_2(0) = 1.4$ million naira, new $w_1(0) = 1.4$ million naira and new $w_2(0) = 1.4$ million naira

TP in Months	dfinv (old)	Dfinv (new)	Effect (%)	Dsinv (old)	Dsinv (new)	Effect (%)
1	1.2000	1.4000	16.67	1.4000	1.4000	0.00
40	3.9830	4.5578	14.43	3.7750	3.7288	1.22
45	4.5416	5.1766	13.98	4.2176	4.1558	1.47
50	5.1433	5.8377	13.50	4.6891	4.6082	1.73
55	5.7826	6.5339	12.99	5.1861	5.0824	2.00
60	6.4520	7.2557	12.46	5.7045	5.5741	2.29
65	7.1420	7.9922	11.90	6.2390	6.0782	2.58
70	7.8420	8.7315	11.34	6.7839	6.5890	2.87

Here, TP means trading period

dfinv (old) means old dividend of the first investor

dfinv (new) means new dividend of the first investor

dsinv (old) means old dividend of the second investor

dsinv (new) means dividend of the second investor

Table 2: Old $w_1(0) = 1.2$ million naira, old $w_2(0) = 1.4$ million naira, new $w_1(0) = 1.45$ million naira and new $w_2(0) = 1.45$ million naira

TP in Months	dfinv (old)	Dfinv (new)	Effect (%)	Dsinv (old)	Dsinv (new)	Effect (%)
1	1.2000	1.4500	20.83	1.4000	1.4000	3.57
40	3.9830	4.6813	17.53	3.7750	3.8386	1.69
45	4.5416	5.3086	16.89	4.2176	4.2733	1.32
50	5.1433	5.9765	16.20	4.6891	4.7327	0.93
55	5.7826	6.6775	15.47	5.1861	5.2131	0.52
60	6.4520	7.4017	14.72	5.7045	5.7099	0.10
65	7.1420	8.1380	13.95	6.2390	6.2179	0.34
70	7.8420	8.8742	13.16	6.7839	6.7314	0.77

Table 3: Old $w_1(0) = 1.2$ million naira, old $w_2(0) = 1.4$ million naira, new $w_1(0) = 1.5$ million naira and new $w_2(0) = 1.5$ million naira

TP in Months	dfinv (old)	Dfinv (new)	Effect (%)	Dsinv (old)	Dsinv (new)	Effect (%)
1	1.2000	1.5000	25.00	1.4000	1.5000	7.14
40	3.9830	4.8028	20.58	3.7750	3.9472	4.56
45	4.5416	5.4379	19.74	4.2176	4.3892	4.07
50	5.1433	6.1121	18.84	4.6891	4.8553	3.54
55	5.7826	6.8172	17.89	5.1861	5.3415	3.00
60	6.4520	7.5432	16.91	5.7045	5.8430	2.43
65	7.1420	8.2787	15.92	6.2390	6.3544	1.85

70	7.8420	9.0114	14.91	6.7839	6.8701	1.27
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IV. Discussion of Results

In our previous paper, we were able to show from the analysis of our results that when the initial investment of both investors are equal and mildly high, there is a dominant increase in the dividend of the first investor over the dividends of the second investor.

Now, from Table 1 of this work, when initial investments of both investors are much higher and the same i.e (1.4 million naira, 1.4 million naira), the first investor still has dominant increase of dividends compared to the second investor.

In Table 2 and 3, where we have exceptionally high equal initial investment intervals of (1.45 million naira, 1.45 million naira) and (1.5 million naira, 1.5 million naira) for both investors, the dividends of the first investor still remain dominantly high in relation to that of the second investor. This can be seen in columns 3 and 6, over trading periods of 40 months, 45 months, 50 months, 55 months, 60 months, 65 months and 70 months.

V. Conclusion

In this paper, the effects of changes in the initial investments on the dividends of two competing investors in stock market have been quantified using a simulation method. The results of our analysis showed higher increases in the dividends of the first investor when compared to that of the second investor. Though increase or decrease in initial investment has a resultant positive change in the dividends of both investors, the differential effect may be due to some special trading strategies on the part of one investor or the role of other exogenous factors which are capable of affecting (ie either encourage or discourage) the efficient performance of an investor.

VI. Recommendation

From the results of our analysis, we recommend that high financial appropriation should be encouraged among competing investors to reduce competitive advantage of one over the other.

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