Journal of
Risk and Financial Management

MDPI

Article

An Alignment of Financial Signaling and Stock Return Synchronicity

Tarek Eldomiaty [1,*], Islam Azzam [1], Karim Tarek Hamed Afifi [2] and Mohamed Hashim Rashwan [3]

[1] School of Business, The American University in Cairo, AUC Avenue, P.O. Box 74, New Cairo 11835, Egypt; iazzam@aucegypt.edu
[2] College of Management & Technology, The Arab Academy for Science and Technology, Cairo P.O. Box 2033, Egypt; karim_tarek@aast.edu
[3] Business Administration, Economics and Political Science, The British University in Egypt, P.O. Box 43, Cairo 11837, Egypt; mohamed.rashwan@bue.edu.eg
* Correspondence: tarek_eldomiaty@aucegypt.edu

Abstract: Financial signaling and stock return synchronicity may not be at crossroads. This paper optimizes the signaling effect of firms' financial indicators on stock return synchronicity. The ultimate objective is to align firms' financial signaling and stock return synchronicity, which implies a benefit of hedging against fluctuations in the stock market index. The data cover quarterly periods from June 1992 to March 2022 for the non-financial firms listed in the DJIA30 and NASDAQ100. This paper examines the observed return synchronicity as the dependent variable. The independent variables are classified into six groups namely, Solvency (or Liquidity) ratios, Assets Efficiency ratios, Expense Control ratios, Debt (or Leverage) ratios, Profitability ratios, and Dividend ratios. The analysis is conducted on two different groups. The first group examines the observed firms' financials that affect observed stock return synchronicity. The second group examines optimal firms' financials that help optimize stock return synchronicity. The final results show that (a) current stock return synchronicity is affected positively by cash ratio, and negatively by receivables and historical growth of earnings; (b) optimal stock return synchronicity can be elevated using significant financial indicators namely, Inventory/Current Assets, Net Working Capital/Total Assets, Net worth/Fixed Assets, and Sales Annual Growth; (c) agency conflicts between managers and shareholders can be mitigated by the aforementioned financial indicators, which do not include debt financing being the common source of agency conflicts; and (d) dividends are still insignificant to stock return synchronization.

Keywords: capital structure; dividends policy; signaling theory; stock return synchronicity

JEL Classification: D82; G35; G14; G32

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Citation: Eldomiaty, Tarek, Islam Azzam, Karim Tarek Hamed Afifi, and Mohamed Hashim Rashwan. 2024. An Alignment of Financial Signaling and Stock Return Synchronicity. *Journal of Risk and Financial Management* 17: 162. https://doi.org/10.3390/jrfm17040162

Academic Editor: Justin Y. Jin

Received: 17 March 2024
Revised: 10 April 2024
Accepted: 11 April 2024
Published: 16 April 2024

1. Introduction

The connection between a firm and stock market participants plays an unequivocal role in the survival of the firm. The stock market provides firms with the required financing, without which investments cannot be carried out. This concern has been extensively examined in the related literature under the umbrella of "financial signaling". Therefore, firm-specific factors play a significant role conveying a firm's potential to stock market participants. Nevertheless, "an effective signaling" requires an examination of the extent to which financial signaling is accompanied by high stock return synchronization. In the early beginning, Roll (1988) argued that information about the market would only explain a small part of share prices, and thus information about the company would be important in the estimation of prices. But, later on, Levine and Zervos (1998) and Morck et al. (2000) argued that synchronicity reflects how much private and market information is considered in share prices. In terms of the market model, the smaller the value of explanatory power of systematic risk (synchronicity), the greater the signaling of firm-specific factors (Piotroski and Roulstone 2004; Jin and Myers 2004).

1.1. Objectives

This paper aims at fulling the following objectives.

1. Examine current firm financial indicators that affect stock return synchronicity.
2. Examine optimal financial indicators that help optimize stock return synchronicity.

1.2. The Contribution of Stock Return Synchronicity to the Signaling Theory

As far as stock return synchronicity is inherently associated with co-movements in stock market index returns, firms can adjust financial indicators to hedge against stock market fluctuations. This paper addresses this argument by offering a mathematical algorithm that optimizes current (observed) financial indicators to one period of lag stock market index returns. Therefore, stock return synchronization can be used effectively by firms as an "effective signaling". The latter ensures a close connection between a firm's financial decisions and market dynamism, which is inevitably needed to sustain the firm's business in the market.

2. The Signaling Impacts of Firm-Specific Financial Factors

The underpinnings of signaling firms' financing decisions were introduced through the works of Miller and Modigliani (1958) regarding the irrelevance between firms' capital structure and market value. Later on, when the assumptions were relaxed to fit business reality through the incorporation of market frictions such as taxes, it turned out that the financial structure is a significant determinant of market value (Miller and Modigliani 1963) and, therefore, can be used as a signaling factor.

The key concept of information asymmetry proposed by Jensen and Meckling (1976) has spurred an extended line of research categorized as "Signaling Theory" (Ross 1977). At large, the theory assumes that firms' financial decisions are reflected in stock returns. For example, debt can be used as a signal to distinguish good firms from bad firms. In the case of manager–investor information asymmetry, where managers know the actual distribution of profits, but investors do not, then the firm's ability to obtain financing sources sends a positive signal for the firm's future. That is, higher debt signals an optimistic future. Examination of the signaling effect has been wide spreading, using various financial factors. Du and Dai (2005) conclude that the choice of a risky capital structure in East Asian firms contributes negatively to the value of firms. Eldomiaty (2004) conclude that, in Egypt, capital structure signaling is significant in high-systematic risk firms. Therefore, the first hypothesis can be stated as follows.

H1: *A positive relationship exists between debt financing and stock returns.*

Connelly et al. (2011) claim that a signaler (manager) may convey incomplete information that misleads a signal receiver (shareholder), concluding that the former may benefit at the cost of the latter (Bird and Smith 2005). For example, shareholders benefit from firms with profit prospects, but they incur transaction costs, and signals can be ignored because they are observable. These arguments are based on a sociological analysis of economic capital as "symbolic capital" (Bourdieu 1977; Trigg 2001). The authors of the present paper argue that sociological analysis applies adequately to firms' profits, stock prices, and returns in many perspectives. The first perspective is that profits are usually accruals that do not reflect the real cash flow available to shareholders. The second perspective is that dividends payout is a discretionary decision, as firms tend to preserve a stable dividend policy apart from the reported profits. Therefore, firms' profits may be regarded as symbolic signals. The third perspective is to do with stock prices being subject to manipulation due to diverse reasons (Allen and Gale 1992; Chatterjea et al. 1993; Aggarwal and Wu 2006; John and Narayanan 1997; Goldstein and Guembel 2008). Other empirical considerations, such as transaction costs, personal income taxes, or what is referred to as the clientele effect, may call for reverse impacts between profits and stock returns. Therefore, the second hypothesis can be stated as follows.

H2: *A negative relationship exists between the firm's profits and stock returns.*

Antoniou et al. (2006) conclude that, in France, Germany, and the UK, leverage, liquidity, variability, and firm quality have significant effects on the debt maturity structure. Harris and Raviv (1991) have examined the impacts of tangible assets (usually Fixed Assets ratios) along with liquidation values, concluding that firms with higher liquidation values are more indebted and more likely to default, but have a higher market capitalization (e.g., signaling effect) than comparable firms. Harris and Raviv expound on the argument that higher leverage may be associated with higher goodwill, higher debt relative to expected revenue, and a lower likelihood of post-default restructuring.

Baker and Wurgler (2002) expound on the signaling effects of financing decisions in terms of market timing, concluding that firms exhibit a preference for equity when the relative costs (stock prices) are low; otherwise, debt financing is preferred. Furthermore, the findings of Graham and Harvey (2001) indicate that timing issues are emerging as a prominent concern for corporate executives. Welch (2004) extends the examination of the timing effect, showing the long-run impact of equity price shocks on capital structure. Huang and Ritter (2005) have proposed the theory of market timing, using a composite indicator of market valuation, and have observed the continuous impact of market timing on capital structure. Market timing also signifies the time signaling, which has been examined in many facets including initial public offerings, seasoned equity offerings (Alti 2006), dividend policies (Marsh 1982; Flannery and Rangan 2006; Hovakimian 2006), and duration of debt issuance (Butler et al. 2004; Barry et al. 2009).

Dividends have always been examined within the doctrine of a puzzle in terms of the impact of dividends on stock returns (Lintner 1956; Ambarish et al. 1987; Bhattacharya 1979a, 1979b, 1980; Fama et al. 1969; Miller and Rock 1985; Miller and Scholes 1982). The puzzle is divided into two paradigms. The first paradigm offers evidence for the dividend's irrelevance (Miller and Modigliani 1961). The second paradigm offers evidence for the significance of dividends a source of income, and are referred to as birds-in-the-hand, which implies the use of dividends as signals (Gordon 1959, 1963; Walter 1963; Bhattacharya 1979a, 1979b; Bhattacharya 1980; John and Williams 1985; Jensen and Meckling 1976; Rozeff 1982; Easterbrook 1984; Jensen 1986; Elton and Gruber 1970; Miller and Scholes 1978, 1982; Baker and Wurgler 2002; Baker et al. 2011). Anand (2004) shows that the executives of Indian companies think dividend choices are essential for being able to reflect firm's future looks, which, in turn, affect market value.

Nevertheless, evidence of the dividend puzzle was offered by a sperate strand of literature, concluding that dividend adjustments are not associated with abnormal earnings growth (Watts 1973; DeAngelo et al. 1996, 2006; Benartzi et al. 1997, 2005; Grullon et al. 2002; Lie 2005).

3. Data, Variables, and Statistical Estimation Methods

3.1. Data

The data are obtained from Reuters Financial Center©. The data include the non-financial firms listed in the DJIA30 and NASDAQ100. The data cover quarterly periods from June 1992 to March 2022.

3.2. Dependent Variable

This paper examines observed stock return synchronicity as the dependent variable. Return synchronicity is computed as follows (Roll 1988; Morck et al. 2000; Hutton et al. 2009; Durnev et al. 2003; Li et al. 2014).

$$\text{Stock Return Synchronicity} = \frac{\omega_j}{\sigma_j^2} \quad (1)$$

where ω_j is the systematic component of market risk β_j. The σ_j^2 is the variance of the stock returns. ω_j is calculated as follows (Altman et al. 1974; Bohren 1997; Campbell et al. 1997; Shanken and Zhou 2007; Ben-Horim and Levy 1980).

$$\text{Systematic Risk } \omega_j = \beta_j^2 * \sigma_M^2 \quad (2)$$

The market risk β_j calculates as $\frac{\sigma_{jM}}{\sigma_M^2}$, where σ_{jM} is the covariance between stock returns and stock market index returns and σ_M^2 is the variance in stock market index.

3.3. Independent Variables

The independent variables include firm-specific financials, which are classified into six groups, namely Solvency (or Liquidity) ratios, Assets Efficiency ratios, Expense Control ratios, Debt (or Leverage) ratios, Profitability ratios, and Dividend ratios (Penman 1991, 1996, 2003). In addition, the effect of the size of a firm is captured by the natural log of total assets, and the type of the industry classification (Durnev et al. 2003) is captured by dummy variables (binary values = 1 for a respective industry and = 0 otherwise). The industry classifications are divided into 39 industries.

The analysis in this paper compares the effects of observed and optimized firm financials on stock return synchronicity. The rationale of optimal return synchronization is to show the extent to which firm-specific financials can align stock returns to stock market returns. Eventually, maximum synchronicity is equivalent to minimum white noise or estimation error term. The mathematical algorithm of optimization is as follows (Luenberger and Ye 1984; Vavasis 1991).

- Objective function $f(y) = A$, where y refers to fundamental financial ratios, A refers to the objective function that Implied Stock Return = one period lag stock market index return. The Implied Stock Return is derived in the sections that follow.
- Decision variables are the items in the income statement and balance sheet.
- Constraints include $h_j(x)\text{Total Assets} = \text{Total Liabilities and } \cos\text{t of goods sold} < \text{sales}$ revenue; $x, \in X$.

3.4. The Derivation of Stock Returns Using Firm-Specific Financial Fundamentals

Usually, stock prices are observed. Nevertheless, the optimization of stock return synchronicity with index returns requires an algorithm that incorporates firm financial fundamentals and stock returns. Specifically, the algorithm must incorporate items in the balance sheet, income statement, and stock return. In this sense, the Earning Yield ratio (hereinafter EY_t) offers an empirical connection between firm's stock price and earnings per share. That is, the EY_t can be used to develop an algorithm that connects firm's financial fundamentals and stock returns. This ratio serves as a link between the firm's financial performance company and shareholders. The Earnings Yield ratio has been examined in vast research, although using the inverse which is the Price-to-Earnings ratio (Basu 1977; Aydogan and Gürsoy 2000; Beaver and Morse 1978; Cho 1994; Foster 1970; Kane et al. 1996; Constand et al. 1991; White 2000; Zarowin 1990; Zorn et al. 2009). The Earnings Yield ratio is calculated as follows.

$\mathrm{EY_t} = \frac{\mathrm{EPS_t}}{\mathrm{P_t}}$, where $\mathrm{EPS_t}$ is the Earning per share and P_t is the stock price in the stock market. The decomposition of this ratio can be used to develop a stock return as follows.

The common accounting equations provide a coherent link between a firm's income statement and balance sheet. The generic relationships between both statements can be developed as follows.

The Earnings Yield (EY) is calculated as follows:

$$\mathrm{EY_t} = \frac{\mathrm{EPS_t}}{\mathrm{P_t}} = \frac{\mathrm{EPS_t} \times \mathrm{NSO_t}}{\mathrm{P_t} \times \mathrm{NSO_t}} \quad (3)$$

Equation (3) can be rearranged to solve for P_t as follows:

$$\mathrm{P_t} = \frac{\mathrm{MVE_t} \times \mathrm{EPS_t}}{\mathrm{NI_t}} \quad (4)$$

As the objective is to convert stock prices into returns, both sides in Equation (4) are divided by P_{t-1}, which results in the following:

$$\frac{\mathrm{P_t}}{\mathrm{P_{t-1}}} = \frac{\mathrm{MVE_t} \times \mathrm{EPS_t}}{\mathrm{NI_t} \times \mathrm{P_{t-1}}} \quad (5)$$

Therefore, a stock return is reached by subtracting 1 from both sides, which results in the following:

$$\mathrm{r_j} = \frac{\mathrm{P_t}}{\mathrm{P_{t-1}}} - 1 = \frac{\mathrm{MVE_t} \times \mathrm{EPS_t}}{\mathrm{NI_t} \times \mathrm{P_{t-1}}} - 1 \quad (6)$$

At this stage, the incorporation of a firm's balance sheet requires dividing the numerator and denominator in Equation (6) by Total Assets (TA), resulting in the following:

$$\mathrm{r_j} = \frac{\mathrm{P_t}}{\mathrm{P_{t-1}}} - 1 = \left[\left(\frac{\mathrm{MVE_t} \times \mathrm{EPS_t}}{\mathrm{TA_t}}\right) \div \left(\frac{\mathrm{NI_t} \times \mathrm{P_{t-1}}}{\mathrm{TA_t}}\right)\right] - 1 \quad (7)$$

As Equation (7) incorporates the Net Income (NI) as a representative of a firm's income statement, Equation (7) requires a retreatment of NI_t in a way that combines the income statement and balance sheet as follows:

$$\mathrm{r_j} = \frac{\mathrm{P_t}}{\mathrm{P_{t-1}}} - 1 = \left[\left(\frac{\mathrm{MVE_t} \times \mathrm{EPS_t}}{\mathrm{TA_t}}\right) \div (\mathrm{ROA_t} \times \mathrm{P_{t-1}})\right] - 1 \quad (8)$$

where $\mathrm{ROA_t} = \frac{\mathrm{NI_t}}{\mathrm{TA_t}}$. In Equation (8), the components of income statement can be incorporated by breaking down the ROA using the income statement equation as follows:

$$\mathrm{NI_t} = \mathrm{S_t} - \mathrm{COGS_t} - \mathrm{EXP_t} - \mathrm{Dep_t} - \mathrm{Int_t} - \mathrm{Tax_t} \quad (9)$$

In Equation (9), the $\mathrm{NI_t}$ can be converted into $\mathrm{ROA_t}$ by Dividing both sides in Equation (9) by TA, producing the ROA as follows:

$$\frac{\mathrm{NI_t}}{\mathrm{TA_t}} = \mathrm{ROA_t} = \left(\frac{\mathrm{S_t} - \mathrm{COGS_t} - \mathrm{EXP_t} - \mathrm{Dep_t} - \mathrm{Int_t} - \mathrm{Tax_t}}{\mathrm{TA_t}}\right) \quad (10)$$

Substituting $\mathrm{ROA_t}$ in Equation (8) produces a link between stock returns, the components in the income statement, and the balance sheet as follows:

$$\mathrm{r_j} = \frac{\mathrm{P_t}}{\mathrm{P_{t-1}}} - 1 = \left[\left(\frac{\mathrm{MVE_t} \times \mathrm{EPS_t}}{\mathrm{TA_t}}\right) \div \left(\frac{\mathrm{S_t} - \mathrm{COGS_t} - \mathrm{EXP_t} - \mathrm{Dep_t} - \mathrm{Int_t} - \mathrm{Tax_t}}{\mathrm{TA_t}} \times \mathrm{P_{t-1}}\right)\right] - 1 \quad (11)$$

The rearrangement of Equation (11) produces an Implied Stock Return r_j as follows:

$$\mathrm{r_j} = \frac{\mathrm{P_t}}{\mathrm{P_{t-1}}} - 1 = \left(\frac{\mathrm{MVE_t} \times \mathrm{EPS_t}}{\mathrm{P_{t-1}}(\mathrm{S_t} - \mathrm{COGS_t} - \mathrm{EXP_t} - \mathrm{Dep_t} - \mathrm{Int_t} - \mathrm{Tax_t})}\right) - 1 \quad (12)$$

Equation (12) works as an Implied Stock Return r_j and is used in this paper for optimizing firm-specific financial factors.

4. Results and Discussion

This section reports and discusses the results of the signaling effect of observed versus optimal firm financial performance. That is, the analysis is conducted on two different groups. The first group examines the current corporate financial ratios that affect return synchronicity. The second group examines the corporate financial ratios that help optimize the return synchronicity.

The discussion of Table 1 focuses on firm financials that satisfy two conditions, namely significance and sharing of the same trend in the two groups observed, and optimal firm financials. Three variables satisfy the two conditions. These variables are Cash/Current Assets, Accounts Receivables/Current Assets, and Earnings Annual Growth.

Table 1. The results for the signaling effects of observed and optimal firm financial indicators on stock return synchronicity [1]. The dependent variable is observed stock return synchronicity. The estimation equation of the random effect linear model takes the form of least squares dummy variables (LSDV), which follows: $\mathbf{y}_{tk} = \alpha_k + \sum_{i=1}^{k} \beta_{ik}\mathbf{X}_{itk} + \lambda_k + \upsilon_{tk}$. Here, t = 1, …, n; k = number of firms in each group; $\mathbf{y}_{tk}$ = observed return synchronicity; $\mathbf{X}_{itk}$ = financial indicators classified into six groups namely, Solvency (or Liquidity) Ratios, Assets Efficiency Ratios, Expense Control Ratios, Debt (or Leverage) Ratios, Profitability Ratios, and Dividend Ratios (Penman 1991, 1996, 2003); λ_k = random error term due to the individual effect; υ_{tk} = random error. The estimation method is fully modified least squares (FMOLS). Outliers are detected and removed. Multicollinearity is examined. All variables are associated with VIF < 5. The long-run covariance estimate is the Bartlett kernel, with Andrews bandwidth = 7.00. Model 1 presents the basic model, which includes firm financial fundamentals. Model 2 presents the effect of size of the firm. Model 3 presents the effect of type of industries.

Variables	**Dependent: Observed Return Synchronicity**			**Dependent: Optimal Return Synchronicity**		
Independents	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Solvency, or Liquidity Ratios						
Cash/Current Assets	0.0432 *** (−0.00226)	0.00289 *** (−0.00233)	0.00197 *** (−0.00023)	−0.154 *** (−0.0081)	−0.0159 *** (−0.0019)	−0.0156 *** (−0.0022)
Inventory/Current Assets	−0.0014 (−0.036)	−0.00147 (−0.037)	−0.00092 (−0.0371)	0.268 *** (−0.0296)	0.269 *** (−0.0278)	0.239 *** (−0.0251)
Accounts Receivables/Current Assets	−0.0448 *** (−0.0185)	−0.00282 *** (−0.00186)	−0.00213 *** (−0.00187)	−0.0705 *** (−0.001)	−0.0630 *** (−0.0074)	−0.0675 *** (−0.0072)
Net Working Capital/Total Assets	0.0165 (−0.0386)	0.0229 (−0.0415)	0.0105 (−0.0428)	0.0272 *** (−0.00548)	0.0310 *** (−0.0025)	0.0227 *** (−0.0018)
Assets Efficiency Ratios						
Total Assets Turnover	−0.112 *** (−0.00262)	−0.256 *** (−0.00423)	−0.350 *** (−0.0043)			
Working Capital/Net Sales	−0.00132 ** (−0.000612)	−0.00129 ** (−0.000632)	−0.0119 *** (−0.00064)			
Accounts Payables/Annual Net Sales	0.0301 *** (−0.00019)	0.0191 *** (−0.000208)	0.0220 *** (−0.00021)			
Net Worth/Fixed Assets	0.00422 (−0.00899)	0.00538 (−0.0097)	0.00468 (−0.00999)	0.0212 *** (−0.0048)	0.0163 *** (−0.0008)	0.0498 *** (−0.0009)
Assets Annual Growth	−0.0525 (−0.168)	−0.031 (−0.169)	−0.0846 (−0.171)	−0.0473 *** (−0.0012)	−0.0474 *** (−0.004)	−0.0478 *** (−0.0038)
Sales Annual Growth	0.0939 *** (−0.01)	0.0402 *** (−0.00101)	0.0643 *** (−0.00102)	−0.0229 *** (−0.0012)	−0.0170 *** (−0.0017)	−0.0247 *** (−0.0023)

Table 1. *Cont.*

Variables	Dependent: Observed Return Synchronicity			Dependent: Optimal Return Synchronicity		
Independents	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
			Expense Control			
Gross Profit Margin				0.405 *** (−0.136)	0.374 *** (−0.003)	0.408 *** (−0.0036)
Cost of Sales/Net Sales	−0.137 ** (−0.0567)	−0.155 *** (−0.0591)	−0.151 ** (−0.0594)			
Operating Expense + Cost of Sales/Net Sales	0.0218 *** (−0.00594)	0.0207 *** (−0.00617)	0.0200 *** (−0.00621)			
			Leverage Ratios			
Short-term Debt/Total Debt	−0.0324 (−0.0843)	−0.0558 (−0.0906)	−0.0528 (−0.0918)	0.0260 *** (−0.0017)	0.0244 *** (−0.0039)	0.0411 *** (−0.004)
Long-term Debt/Total Assets	−0.230 *** (−0.0889)	−0.134 *** (−0.0011)	−0.196 *** (−0.00123)			
			Profitability Ratios			
Net Operating Profits/Total Assets	−1.503 *** (−0.46)	−1.209 ** (−0.6562)	−2.126 *** (−0.737)			
Earnings Annual Growth	−0.0249 * (−0.0148)	−0.0794 *** (−0.0261)	−0.0336 *** (−0.00023)	−0.0440 *** (−0.0135)	−0.0566 *** (−0.0048)	−0.0384 *** (−0.0035)
Size Effect (LN Total Assets)		Yes			Yes	
Industry Effect			Yes			Yes
Constant	0.415 *** (−0.134)	0.627 *** (−0.172)	0.609 *** (−0.18)	0.597 *** (−0.154)	0.850 *** (−0.136)	0.173 *** (−0.0547)
Observations	12,428	12,428	12,428	12,428	12,428	12,428
Number of ID	121	121	121	121	121	121
$\overline{R}^2$	0.481	0.633	0.6	0.425	0.427	0.559

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors in parentheses. [1] The stationarity is examined using an augmented Dickey–Fuller approach (Dickey and Fuller 1979, 1981). The F statistics (MacKinnon one-sided) for the stock return synchronicity = −47.23760 ***. Therefore, the data are not subject to unit roots and do not require first differencing. The results of the regression equation specification error test, RESET (Ramsey 1969; Thursby and Schmidt 1977; Thursby 1979; Sapra 2005; Wooldridge 2006), show that observed firm financials are associated with [F(3, 12377) = 4.48, (Prob > F = 0.21776)] and that optimal firm financials are associated with [F(3, 12386) = 1.09, (Prob > F = 0. 35188)]. Therefore, the assumption of linearity fits the data. Fixed random Hausman (1978) and Hausman and Taylor (1981) tests were carried out. The results show that observed firm financials are associated with [χ^2 (28) = 22.57, (Prob > χ^2 = 0.7543)]. The optimal firm financials are associated with [χ^2 (14) = 14.30, (Prob > χ^2 = 0.4273)]. Therefore, random effect estimation fits the data. Breusch–Pagan/Cook–Weisberg test for heteroskedasticity was carried out and the results show that the observed firm financials are associated with [χ^2 (1) = 227074.27 (Prob > χ^2 = 0.0000)] and the optimal firm financials are associated with [χ^2 (1) = 61020.89 (Prob > χ^2 = 0.0000)]. Multicollinearity was examined using VIF. All variables included in the analysis are associated with VIF < 5.

The positive coefficient of the Cash/Current assets ratio with observed return synchronicity indicates efficient management of the firms' operations (Harris and Raviv 1991). However, the negative coefficient of Accounts Receivables/Current Assets indicates that stock returns correspond favorably to firms' liquidity in the short-term, being reflected by cash balances.

The negative coefficients of Earnings Annual Growth indicate, primarily, that investors favor cash over accrual financials such as earnings (Jones et al. 2020).

In the case of optimized firm financials, extended benefits are observed. That is, firms can optimize synchronized stock returns to match lagged stock market index returns using a further number of financials, such as Inventory/Current Assets, Net Working Capital/Total Assets, Net Worth/Fixed Assets, and Sales Annual Growth. A number of studies expound on the benefits of these financials. Widarjo and Setiawan (2009) and Kodongo et al. (2014) conclude that a company's competence is reflected in its sales growth over time. The greater a company's sales growth, the more effectively a firm implements its strategy.

It is worthing noting that although long-term debt financing is negatively associated with synchronized stock return, this variable does not appear in the case of optimal stock return synchronicity. That is, an extended benefit of optimizing a firms' financials can be realized in terms of avoiding the agency costs of having debt (Heinkel 1982; Vilasuso 2001).

It is also worth noting that dividend variables are not statistically significant, which offers further support of the results provided by Watts (1973), DeAngelo et al. (1996, 2006), Benartzi et al. (1997), Grullon et al. (2002), Benartzi et al. (2005), Lie (2005), and Fama and French (2001), regarding very little or no proof that dividend adjustments indicate abnormal earnings growth.

It terms of size effects, the results show that the inclusion of size adds up to the explanatory power increasing from 48.1% to 63.3%. The same increase is also observed in the case of optimized firm financials, in that the inclusion of size increases the explanatory power from 42.5% to 42.7%. The effect of type of industry is actually negligible, since 1 industry (Broadcasting) out of 39 industries is statistically significant.

Testing for Structural Breaks in Observed and Optimal Firm Financial Indicators

The objective of running a structural break test is to examine the extent to which observed and optimal firms' financials capture a structural break, such as the 2008 financial crisis. The Chow test was carried out over the four quarters of 2008.

The results in Table 2 show that both the observed (historical) and optimal determinants of stock return synchronization reflect the structural break of the 2008 financial crisis. It is worth noting this result highlights the quality of the optimized determinants of stock return synchronization as far as the optimized financials are able to reflect the structural break.

Table 2. The results of structural break point (Chow test).

Breakpoints	Observed Stock Return Synchronization	Optimal Stock Return Synchronization
	Wald Statistic [Prob. χ^2 (4)]	Wald Statistic [Prob. χ^2 (9)]
2008 Q1	0.256763 [0.9924]	0.300223 [1.00]
2008 Q2	0.260796 [0.9922]	0.305267 [1.00]
2008 Q3	0.264604 [0.992]	0.308714 [1.00]
2008 Q4	0.267145 [0.9918]	0.311206 [1.00]

5. Conclusions

This paper compares the effects of firms' observed financials on stock return synchronicity, which usually reflects the how firms manage operations to convey signals to shareholders. This paper extends the signaling paradigm from the effects of observed (or historical) financials to optimal financials, where lagged stock market index returns are the target. Eventually, firms can hedge against expected stock market index fluctuations. The data include the non-financial firms listed in the DJIA30 and NASDAQ100. The data cover quarterly periods from June 1992 to March 2022. The final results reveal that a firm's financials help in hedging against observed (historical) as well as expected stock market index fluctuations. Historically, firms have used the percentage of cash to current assets to increase stock return synchronization. This conclusion is further supported by the negative coefficients of accounts receivable and earnings, which indicate that shareholders favor cash over accruals. The optimized financials reveal what firms may focus on increasing stock return synchronization. These financials are Inventory/Current Assets, Net Working Capital/Total Assets, Net Worth/Fixed assets, and Sales Annual Growth. Furthermore, the optimized firms' financials show that debt financing is insignificant for optimizing stock return synchronicity. This final outcome offers a new insight into the fact that the abovementioned financials can be used to mitigate agency conflicts between managers and shareholders. The final outcomes also offer extended evidence of the insignificance of dividends as signals to increasing stock return synchronicity.

It is worth mentioning that stock return synchronicity to index returns offers substantial benefits to firms being listed in an index in terms of conforming cost of equity to market systematic risk. The latter is the quantity of risk investors are compensated for (Jensen 1969; Cochrane 2005). Eventually, when all the firms listed in an index are able to optimize their respective financial fundamentals to synchronize with index returns, firms' cost of equity can be mitigated and reduced, offering extended opportunities for raising low-cost equity financing. Definitely, the latter expands firms' investment opportunities. It is also worth mentioning that the abovementioned benefits can be extended to non-indexed firms. In this case, an optimization of their respective financial fundamentals may confidently lead to those firms being indexed.

Nevertheless, one limitation is worth mentioning as far as synchronicity is tied up to the effects of macroeconomic factors (Robichek and Cohn 1974; Bertrand and Schoar 2003; Hong and Sarkar 2007). That is, the benefits of stock return synchronicity with index returns can be confined by macroeconomic downturns that result in discrepancies in the estimation of firms' cost of equity. This limitation holds as far as an index reflects economic conditions adequately enough in terms of composition and mathematical construction.

Author Contributions: Conceptualization, T.E.; methodology, T.E.; software, K.T.H.A.; validation, I.A. and M.H.R.; formal analysis, T.E.; investigation, M.H.R.; resources, K.T.H.A.; data curation, T.E. and K.T.H.A.; writing—original draft preparation, I.A.; writing—review and editing, M.H.R.; visualization, I.A.; supervision, T.E.; project administration, T.E.; funding acquisition, T.E., M.H.R. and I.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data that support the findings of this study are available from the Reuters Finance Centre (https://www.reuters.com/markets/) (accessed on 25 December 2021).

Conflicts of Interest: The authors declare no conflicts of interest.

References

Aggarwal, Rajesh K., and Guojun Wu. 2006. Stock Market Manipulations. *The Journal of Business* 79: 1915–53. [CrossRef]
Allen, Franklin, and Douglas Gale. 1992. Stock-Price Manipulation. *The Review of Financial Studies* 5: 503–29. [CrossRef]
Alti, Aydoğan. 2006. How persistent is the impact of market timing on capital structure? *Journal of Finance* 61: 1681–710. [CrossRef]
Altman, Edward I., Bertrand Jacquillat, and Michel Levasseur. 1974. Comparative analysis of risk measures: France and the United States. *Journal of Finance* 29: 1495–511.
Ambarish, Ramasastry, Kose John, and Joseph Williams. 1987. Efficient signaling with dividends and investments. *Journal of Finance* 42: 321–43. [CrossRef]
Anand, Manoj. 2004. Factors influencing dividend policy decisions of corporate India, ICFAI. *Journal of Applied Finance* 10: 5–16.
Antoniou, Antonios, Yilmaz Guney, and Krishna Paudyal. 2006. The determinants of debt maturity structure: Evidence from France, Germany and the UK. *European Financial Management* 12: 161–94. [CrossRef]
Aydogan, Kürşat, and Güner Gürsoy. 2000. P/E and Price-to-Book Ratios as Predictors of Stock Returns in Emerging Equity Markets. *Emerging Markets Quarterly* 4: 60–67.
Baker, H. Kent, J. Clay Singleton, and E. Theodore Veit. 2011. *Survey Research in Corporate Finance Bridging the Gap between Theory and Practice*. Oxford and New York: Oxford University Press.
Baker, Malcolm, and Jeffrey Wurgler. 2002. Market timing and capital structure. *Journal of Finance* 57: 1–32. [CrossRef]
Barry, Christopher B., Steven C. Mann, Vassil T. Mihov, and Mauricio Rodriguez. 2009. Interest rate changes and the timing of debt issues. *Journal of Banking & Finance* 33: 600–8.
Basu, Sanjoy. 1977. Investment performance of common stocks in relation to their Price-Earnings Ratio: A Test of the Efficient Market Hypothesis. *Journal of Finance* 32: 663–82.
Beaver, William, and Dale Morse. 1978. What Determines Price-Earnings Ratios? *Financial Analysts Journal* 34: 65–76. [CrossRef]
Benartzi, Shlomo, Gustavo Grullon, Roni Michaely, and Richard Thaler. 2005. Dividend Changes do not Signal Changes in Future Profitability. *The Journal of Business* 78: 1659–82.
Benartzi, Shlomo, Roni Michaely, and Richard Thaler. 1997. Do Changes in Dividends signal the Future or the Past. *The Journal of Finance* 52: 1007–43. [CrossRef]
Ben-Horim, Moshe, and Haim Levy. 1980. Total risk, diversifiable risk and non-diversifiable risk: A pedagogical note. *Journal of Financial and Quantitative Analysis* 15: 289–97. [CrossRef]

Bertrand, Marianne, and Antoinette Schoar. 2003. Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics* 118: 1169–208. [CrossRef]

Bhattacharya, Sudipto. 1979a. Imperfect information, dividend policy and 'the bird in the hand' fallacy. *Bell Journal of Economics* 10: 259–70. [CrossRef]

Bhattacharya, Sudipto. 1979b. An exploration of non-dissipative dividend signaling structures. *Journal of Financial and Quantitative Analysis* 14: 667–68. [CrossRef]

Bhattacharya, Sudipto. 1980. Nondissipative signaling structures and dividend policy. *Quarterly Journal of Economics* 85: 1–24. [CrossRef]

Bird, Rebecca Bliege, and Eric Alden Smith. 2005. Signaling theory, strategic interaction, and symbolic capital. *Current Anthropology* 46: 221–48. [CrossRef]

Bohren, Oyvind. 1997. Risk Components and the market model: A pedagogical note. *Applied Financial Economics* 7: 307–10. [CrossRef]

Bourdieu, Pierre. 1977. *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.

Butler, Alexander W., Gustavo Grullon, and James P. Weston. 2004. Can managers forecast aggregate market returns. *Journal of Finance* 60: 963–86. [CrossRef]

Campbell, John Y., Andrew W. Lo, and A. Craig MacKinlay. 1997. *The Econometrics of Financial Markets*. Princeton: Princeton University Press.

Chatterjea, Arkadev, Joseph A. Cherian, and Robert A. Jarrow. 1993. Market Manipulation and Corporate Finance: A New Perspective. *Financial Management* 22: 200–9. [CrossRef]

Cho, Youn Jang. 1994. Determinants of Earnings Price Ratio: A Reexamination. *Review of Financial Economics* 3: 105–20. [CrossRef]

Cochrane, John H. 2005. *Asset Pricing*. Princeton: Princeton University Press.

Connelly, Brian L., S. Trevis Certo, and Christopher R. Reutzel. 2011. Signaling Theory: A Review and Assessment. *Journal of Management* 37: 39–67. [CrossRef]

Constand, Richard L., Lewis P. Freitas, and Michael J. Sullivan. 1991. Factors Affecting Price Earnings Ratios and Market Values of Japanese Firms. *Financial Management* 20: 68–79. [CrossRef]

DeAngelo, Harry, Linda DeAngelo, and Douglas J. Skinner. 1996. Reversal of Fortune: Dividend Signaling and the Disappearance of Sustained Earnings Growth. *Journal of Financial Economics* 40: 341–71. [CrossRef]

DeAngelo, Harry, Linda DeAngelo, and René M. Stulz. 2006. Dividend policy and the earned/contributed capital mix: A test of the life-cycle theory. *Journal of Financial Economics* 81: 227–54. [CrossRef]

Dickey, David A., and Wayne A. Fuller. 1979. Distribution of the estimators for autoregressive time Series with a unit Root. *Journal of the American Statistical Association* 74: 427–31.

Dickey, David A., and Wayne A. Fuller. 1981. Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica* 49: 1057–72. [CrossRef]

Du, Julan, and Yi Dai. 2005. Ultimate corporate ownership structures: Evidence from East Asian economies. *Corporate Governance* 13: 60–71. [CrossRef]

Durnev, Artyom, Randall Morck, Bernard Yeung, and Paul Zarowin. 2003. Does Greater firm-specific Return Variation Mean More or Less Informed Stock Pricing? *Journal of Accounting Research* 41: 797–836. [CrossRef]

Easterbrook, Frank H. 1984. Two agency-cost explanations of dividends. *American Economic Review* 74: 650–59.

Eldomiaty, Tarek. 2004. Signaling Corporate Market Value in Transition Economies: Perspectives from Egypt. *Journal of Economic & Administrative Sciences* 20: 52–70.

Elton, Edwin J., and Martin J. Gruber. 1970. Marginal stockholder tax rates and the clientele effect. *Review of Economics and Statistics* 52: 68–74. [CrossRef]

Fama, Eugene F., and Kenneth R. French. 2001. Disappearing dividends: Changing firm characteristics or lower propensity to pay? *Journal of Financial Economics* 60: 3–43. [CrossRef]

Fama, Eugene F., Lawrence Fisher, Michael C. Jensen, and Richard Roll. 1969. The adjustment of stock prices to new information. *International Economic Review* 10: 1–21. [CrossRef]

Flannery, Mark J., and Kasturi P. Rangan. 2006. Partial adjustment toward target capital structures. *Journal of Financial Economics* 79: 469–506. [CrossRef]

Foster, Earl M. 1970. Price-Earnings Ratio and Corporate Growth. *Financial Analyst Journal* 26: 96–99. [CrossRef]

Goldstein, Itay, and Alexander Guembel. 2008. Manipulation and the Allocational Role of Prices. *The Review of Economic Studies* 75: 133–64. [CrossRef]

Gordon, M. J. 1959. Dividends, earnings, and stock prices. *Review of Economics and Statistics* 41: 99–105. [CrossRef]

Gordon, M. J. 1963. Optimal investment and financing policy. *Journal of Finance* 18: 264–72.

Graham, John R., and Campbell R. Harvey. 2001. The theory and practice of corporate financing evidence from the field. *Journal of Financial Economics* 60: 187–243. [CrossRef]

Grullon, Gustavo, Roni Michaely, and Bhaskaran Swaminathan. 2002. Are Dividends Changes a Sign of Firm Maturity? *The Journal of Business* 75: 387–424. [CrossRef]

Harris, Milton, and Artur Raviv. 1991. The theory of capital structure. *Journal of Finance* 46: 297–355. [CrossRef]

Hausman, Jerry A. 1978. Specification Tests in Econometrics. *Econometrica* 46: 1251–71. [CrossRef]

Hausman, Jerry A., and William E. Taylor. 1981. Panel Data and Unobservable Individual Effects. *Econometrica* 49: 1377–98. [CrossRef]

Heinkel, Robert. 1982. A theory of capital structure relevance under imperfect information. *Journal of Finance* 37: 1141–50. [CrossRef]

Hong, Gwangheon, and Sudipto Sarkar. 2007. Equity Systematic Risk (Beta) and Its Determinants. *Contemporary Accounting Research* 24: 423–66. [CrossRef]

Hovakimian, Armen. 2006. Are observed capital structures determined by equity market timing? *Journal of Financial and Quantitative Analysis* 41: 221–43. [CrossRef]

Huang, Rongbing, and Jay R. Ritter. 2005. *Testing the Market Timing Theory of Capital Structure*. Working paper. Gainesville: University of Florida.

Hutton, Amy P., Alan J. Marcus, and Hassan Tehranian. 2009. Opaque financial reports, R^2 and crash risk. *Journal of Financial Economics* 94: 67–86.

Jensen, Michael C. 1969. Risk, The Pricing of Capital Assets, and the Evaluation of Investment Portfolios. *The Journal of Business* 42: 167–247. [CrossRef]

Jensen, Michael C. 1986. Agency costs of free cash flow. *American Economic Review* 76: 323–29.

Jensen, Michael C., and William H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3: 305–60. [CrossRef]

Jin, Li, and Stewart C. Myers. 2004. R^2 Around the World: New Theory and New Tests. *Journal of Financial Economics* 58: 215–60.

John, Kose, and Joseph Williams. 1985. Dividends, dilution, and taxes: A signaling equilibrium. *Journal of Finance* 40: 1053–70. [CrossRef]

John, Kose, and Ranga Narayanan. 1997. Market Manipulation and the Role of Insider Trading Regulations. *The Journal of Business* 70: 217–47. [CrossRef]

Jones, Edward A. E., Anthony K. Kyiu, and Hao Li. 2020. Earnings informativeness and trading frequency: Evidence from African markets. *International Journal of Finance and Economics* 26: 1064–86. [CrossRef]

Kane, Alex, Alan J. Marcus, and Jaesun Noh. 1996. The P/E Multiple and Market Volatility. *Financial Analysts Journal* 52: 16–24. [CrossRef]

Kodongo, Odongo, Thabang Mokoaleli-Mokoteli, and Leonard N. Maina. 2014. Capital Structure, Profitability and Firm Value: Panel Evidence of Listed Firms in Kenya. *African Finance Journal* 17: 1–20. [CrossRef]

Levine, Ross, and Sara Zervos. 1998. Stock Markets, Banks, and Economic growth. *American Economic Review* 88: 537–58.

Li, Bin, Shivaram Rajgopal, and Mohan Venkatachalam. 2014. R^2 and Idiosyncratic Risk Are Not Interchangeable. *The Accounting Review* 89: 2261–95. [CrossRef]

Lie, Erik. 2005. Operating Performance Following Dividend Decreases and Omissions. *Journal of Corporate Finance* 12: 27–53. [CrossRef]

Lintner, John. 1956. Distribution of income of corporation among dividends retained earnings and taxes. *American Economic Review* 46: 97–113.

Luenberger, David G., and Yinyu Ye. 1984. *Linear and Nonlinear Programming*. Reading: Addison-Wesley, vol. 2.

Marsh, Paul. 1982. The Choice between Equity and Debt: An Empirical Study. *Journal of Finance* 37: 121–44. [CrossRef]

Miller, Merton H., and Franco Modigliani. 1958. The cost of capital, corporation finance and the theory of investment. *The American Economic Review* 48: 261–97.

Miller, Merton H., and Franco Modigliani. 1961. Dividend policy, growth and the valuation of shares. *The Journal of Business* 34: 411–33. [CrossRef]

Miller, Merton H., and Franco Modigliani. 1963. Corporate taxes and the cost of capital: A correction. *The American Economic Review* 53: 433–43.

Miller, Merton H., and Kevin Rock. 1985. Dividend Policy under Asymmetric Information. *The Journal of Finance* 40: 1118–41. [CrossRef]

Miller, Merton H., and Myron Scholes. 1978. Dividends and taxes. *Journal of Financial Economics* 6: 333–64. [CrossRef]

Miller, Merton H., and Myron Scholes. 1982. Dividends and taxes: Some empirical evidence. *Journal of Political Economy* 90: 1118–41. [CrossRef]

Morck, Randall, Bernard Yeung, and Wayne Yu. 2000. The information content of stock markets: Why do emerging markets have synchronous stock price movements? *Journal of Financial Economics* 58: 215–60. [CrossRef]

Penman, Stephen H. 1991. An evaluation of accounting rate of return. *Journal of Accounting, Auditing, and Finance* 6: 233–55. [CrossRef]

Penman, Stephen. H. 1996. The articulation of price-earnings ratios and market-to-book ratios and the evaluation of growth. *Journal of Accounting Research* 34: 235–59. [CrossRef]

Penman, Stephen. H. 2003. *Financial Statement Analysis and Security Valuation*, 2nd ed. New York: McGraw-Hill Education.

Piotroski, Joseph D., and Darren T. Roulstone. 2004. The Influence of Analysts, Institutional Investors, and Insiders on the Incorporation of Market, Industry, and Firm-Specific Information into Stock Prices. *The Accounting Review* 79: 1119–51. [CrossRef]

Ramsey, James Bernard. 1969. Tests for Specification Errors in Classical Linear Least Squares Regression Analysis. *Journal of Royal Statistical Society* 31: 350–71. [CrossRef]

Robichek, Alexander A., and Richard A. Cohn. 1974. The economic determinants of systematic risk. *Journal of Finance* 29: 439–47. [CrossRef]

Roll, Richard. 1988. R^2. *The Journal of Finance* 43: 541–66.

Ross, Stephen A. 1977. The determination of financial structure: The incentive signaling structure. *Bell Journal of Economics* 8: 23–40. [CrossRef]

Rozeff, Michael S. 1982. Growth, beta and agency costs as determinants of dividend payout ratios. *Journal of Financial Research* 5: 249–58. [CrossRef]

Sapra, Sunil. 2005. A regression error specification test (RESET) for generalized linear models. *Economics Bulletin* 3: 1–6.

Shanken, Jay, and Guofu Zhou. 2007. Estimating and testing beta pricing models: Alternative methods and their performance in simulations. *Journal of Financial Economics* 84: 40–86. [CrossRef]

Thursby, Jerry G. 1979. Alternative Specification Error Tests: A Comparative Study. *Journal of the American Statistical Association* 74: 222–25. [CrossRef]

Thursby, Jerry G., and Peter Schmidt. 1977. Some Properties of Tests for Specification Error in a Linear Regression Model. *Journal of the American Statistical Association* 72: 635–41. [CrossRef]

Trigg, Andrew B. 2001. Veblen, Bourdieu, and Conspicuous Consumption. *Journal of Economic Issues* 35: 99–115. [CrossRef]

Vavasis, Stephen A. 1991. *Nonlinear Optimization: Complexity Issues*. Oxford and New York: Oxford University Press.

Vilasuso, Minkler. 2001. Agency costs, asset specificity, and the capital structure of the firm. *Journal of Economic Behavior & Organization* 44: 55–69.

Walter, James E. 1963. Dividend policy: Its influence on the value of the enterprise. *Journal of Finance* 18: 280–91. [CrossRef]

Watts, Ross. 1973. The Information Content of Dividends. *The Journal of Business* 46: 191–211. [CrossRef]

Welch, Ivo. 2004. Capital structure and stock returns. *Journal of Political Economy* 112: 106–31. [CrossRef]

White, C. Barry. 2000. What P/E Will the U.S. Stock Market Support? *Financial Analysts Journal* 56: 30–38. [CrossRef]

Widarjo, Wahyu, and Doddy Setiawan. 2009. Effect of Financial Ratios on Company Financial Distress Conditions Automotive. *Journal of Business and Accounting* 11: 107–19.

Wooldridge, Jeffrey M. 2006. *Introductory Econometrics—A Modern Approach*. International Student Edition. Mason: South-Western Cengage Learning.

Zarowin, Paul. 1990. What Determines Earnings-Price Ratios: Revisited. *Journal of Accounting, Auditing & Finance* 5: 439–57.

Zorn, Thomas, Donna Dudney, and Benjamas Jirasakuldech. 2009. P/E changes: Some new results. *Journal of Forecasting* 28: 358–70. [CrossRef]