Volume 28 (1) April 2021 ISSN 0216-423X (Print)
ISSN 2622-2667 (Online)

JABM
JOURNAL *of* ACCOUNTING, BUSINESS and MANAGEMENT

Journal of Accounting, Business and Management vol. 28 no. 1 (2021) 52-62

Impacts of Asset Utilization, Market Competition and Market Distance on Stock Returns

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Abstract

To empirically study the effects of asset utilization, market competition and market distance on stock returns of 1961 US public firms of different industry categories over 2001-2015. The heterogeneous panel data set consists of 23,532 (N= 1961*T= 15) observations. Pedroni's panel co-integration, panel vector error-correction model (PVECM), panel dynamic OLS (PDOLS), and panel generalized method of moments (PGMM) are implemented. Both asset utilization and market competition have short-run and long-run positive effects on stock returns. But the effects of market distance are negative. The evidence for convergence toward the long-run equilibrium is very weak. Firms should be strategic to improve asset utilization, be more competitive and expand market distance to maximize stockholders' wealth.

Keywords: stock return, asset utilization, market distance, market competition, panel co-integration, DOLS, and GMM.

I. INTRODUCTION

Asset utilization measures which assets are capable of contributing to a firm's revenue and profitability. Conversely, asset dis-utilization causes losses in revenue in relation to the investment that may be attributable to the inefficient use of assets. This may increase agency costs because managers do not act in the best interests of the shareholders. Effective asset utilization, as reflected in high total asset turnover ratio, would increase the firm value. In contrast, ineffective asset utilization, as reflected in low total asset turnover ratio, would decrease the firm value. So, the shareholders should monitor internal managerial behavior to ensure that assets are efficiently utilized to increase the shareholder's value (e.g., Jensen, 1986; Ellis, 1998; Ang et al., 2000; Singh & Davidson III, 2003; and Fleming et al., 2005). To add further, decomposing the return on asset (ROA) into asset turnover and profit margin (the DuPont decomposition) allows analysts to probe into a firm's source of profitability and to more precisely estimate the firm value. Total asset turnover, in effect, measures a firm's operating skill, and profit margin reflects a firm's ability to boost sales and to cut costs. In particular, increasing total asset turnover ratio enhances a firm's future stock price (e.g., Fairfield et al., 2003; Soliman, 2004 and 2008).

Firms in competitive environment strategize operations for greater profitability. Consequently, they generate higher stock returns for the shareholders. Management's

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perception about the intensity of competition significantly influences operating and investing decisions. To explain, firms' pricing of products depends on how the threat of substitutes from existing rivals and the threat of new entrants into their market are perceived. Moreover, the pace of investments in assets depends on whether there are many or few rivals, and how contestable are the investments by those rivals. Such realization has obvious bearings for potential payoffs to the operating and investment decisions. In economic theory, the rates of return on investment under competition tend to be equally distributed in all industries. As a result, entrepreneurs will seek to leave relatively unprofitable industries and enter relatively profitable industries (e.g., Stigler, 1963; Healy & Palepu, 2007; Lundholm & Sloan, 2007; and Penman, 2009). The five sources of competitive intensity in an industry includes barriers to entry, threat of substitutes, competitive rivalry, bargaining power of customers and bargaining power of suppliers. Together, they determine a firm's performance (Porter, 1979). High level of competition amplifies asset growth and its anomaly is present only in a subset of firms where the authors' measure of competition is high (Li et al., 2011).

Market share is a key to profitability. Enterprises with a high market share are more profitable than their smaller-share rivals. Market share and return on investment are strongly related. Economies of scale, market power and quality of management help explain why market share is profitable (Buzzell et al., 1975). The profitability premium (the return spread between firms of high and low profitability) is explained by the dividend discount model in conjunction with clean accounting surplus (Fama & French, 2006). A firm's profit maximization implies a positive relation between expected profitability and expected return, both theoretically and empirically (e.g., Cochrane, 1991; Novy-Marx, 2013; Hou et al., 2015; and Kim & Kim, 2017). This finding contradicts those in (e.g., Hou & Robinson, 2006; Bustamante & Donangelo, 2017). This study refers spatial distance to as competitive distance. This is used as a proxy for competition within a market in terms of market share. Conversely, spatial economics proposes that as the distance in market location between companies decreases, competition increases, and equilibrium prices tend to be closer to marginal costs (Hotelling, 1929).

To our knowledge, existing empirical studies involving all these important four variables from company perspective and using the methodologies of this paper in accounting and finance literature is very scant. Therefore, the primary objective of this study is to investigate the impacts of total asset utilization, market competition and market distance on stock prices of US 1961 public firms of all different industry-categories (two-digit SIC) spanning over 2001-2015. A heterogeneous panel data set is created combining the above cross-sectional and time series observations. Pedroni's panel co-integration procedure and the associated vector error-correction model (VECM), dynamic ordinary least squares (DOLS) and generalized method of moments (GMM) are implemented. The balance of the paper is structured as follows. Section II provides a brief review of the related literature. Section III specifies the empirical methodologies. Section IV reports results. Section V offers conclusions and policy implications.

II. LITERATURE REVIEW

Asset utilization measures which assets are capable of producing and what they actually produce (Ellis, 1998). Conversely, asset dis-utilization represents losses in revenue in relation to the investment that may be attributable to the inefficient use of assets. Asset dis-utilization may increase agency costs because managers do not act in the best interests of the owners (Fleming et al., 2005). The presence of free cash flow may lead to inefficient asset utilization, as it allows managers to spend financial resources on activities that reduce shareholders' wealth and generate more agency problems (Jensen, 1986). In the absence of effective monitoring, managers may choose to invest in low or negative net present value projects that reap financial or other rewards. Prior studies show that such opportunistic behavior of managers may be monitored by shareholders to ensure that assets are efficiently utilized to increase the shareholders' value (e.g., Ang et al., 2000; Singh & Davidson III, 2003).

Free cash flow may result in an increase or a decrease of the firm value depending on its utilization (McCabe & Yook, 1997). Effective asset utilization would increase the firm value, whereas ineffective asset utilization would decrease the firm value. Free cash flow creates the desire among managers to use the available funds for various activities that may or may not contribute to an increase in the firm's value (Jensen, 1986). Several studies (e.g., Fairfield & Yohn, 2001; Soliman, 2004) have documented that changes in asset turnover and profit margin help predict stock returns.

Decomposing the return on asset into asset turnover and profit margin (the DuPont decomposition) has allowed analysts to probe into a firm's source of profitability and to estimate the firm value more accurately. Asset turnover measures a firm's operating skill in efficiently utilizing its assets, and profit margin reflects a firm's power to boost their sales and to cut costs. A limited number of studies have documented the effect of the asset turnover for the cross-section of stock returns and have dismissed it as being subsumed by other anomalies (e.g., Fairfield & Yohn, 2001; Fairfield et al., 2003; and Novy-Marx, 2013).

Financial statement analysis commonly recommends starting the evaluation process by considering the firm's competitive environment and its strategy for opening in its environment (e.g., Healy & Palepu, 2007; Lundholm & Sloan, 2007; and Penman, 2009). Stigler (1963) states that "there is no more important proposition in economic theory than that under competition, the rate of return on investment tends toward equality in all industries. Entrepreneurs will seek to leave relatively unprofitable industries and enter relatively profitable industries". Porter (1979) identifies five sources of competitive intensity in an industry that determine a firm's performance (barriers to entry, threat of substitutes, competitive rivalry, bargaining power of customers, and bargaining power of suppliers). Kim and Kim (2017) investigate the interaction between product market competition and profitability on subsequent stock returns. They find that gross profitability premium (a compensation for risk embedded in firm's expected cash flows) is higher among stocks of companies that operate in competitive industries than concentrated industries. Also, competition-return relation is higher for stocks with higher expected profits. Using a conventional double-sorting analysis and regression approach, they find supportive empirical evidence, and the results are robust relative to other potential factors determining expected stock returns.

The profitability premium, defined as the return spread between firms of high and low profitability, is intuitively explained by using the dividend discount model in conjunction with clean surplus accounting (Fama & French, 2006). With all else held equal in the dividend discount model, higher expected profitability implies higher expected returns. Recently, inspired by q-theory (Cochrane, 1991; Hou et al., 2015) have sketched a simple two-period general equilibrium model and prove that the first-order condition of a firm's profit maximization problem implies a positive relation between expected profitability and expected returns.

III. RESEARCH SAMPLE AND METHODOLOGY

3.1. Empirical Methodologies

Heterogeneous panel data as a combination of cross-sectional and time series observations are used in this study. This provides a convenient way to study phenomenon where a statistically adequate number of cross-sectional or time series observations are not obtainable. This augments quality and quantity of data. Otherwise, it would be impossible to use only one of these two dimensions for meaningful analyses (Gujarati, 2003). This study provides an example of such situation where incorporating observations on the variables over successive time periods allows to expand the informational content of the data. Furthermore, since the length of the time series is small compared to the number of cross-sections, the effects of autocorrelation are small, if not negligible. Panel data estimation models include the constant coefficient (pooled), the fixed effects and the random effects regression models.

In order to test for the existence of a long-run equilibrium relationship among variables in a heterogeneous panel consisting of 1961 US companies for a 15-year period from 2001 to 2015, the following model is specified:

$$y_{it} = \alpha_i + \beta_i x_{it} + \gamma_t D_{it} + e_{it} \quad \text{.......} \quad (1)$$

Where:

1). y= stock return, and

2). x= metric of explanatory variables (total asset utilization, market competition and market distance).

Asset utilization is defined as total sales/total assets. Market competition is the difference between a company's market share and the company's closest competitor's market share. Lastly, market distance is the locational apartness/closeness between rival companies in market shares. Market distance is derived from spatial economics and is computed using a company's market share relative to their closest competitor's market share. A company's biggest threat to losing their relative market position is going to be those companies that are located closest to it in market share. A higher competitive distance suggests less competition within a market because the two companies are far apart in terms of market share. Competitive distance is used to proxy competition instead of the Herfindahl index because of the underlying assumptions of Herfindahl index. The Herfindahl index is calculated as the sum of squared market shares of all firms in a market. A larger Herfindahl index signals more concentration. The Herfindahl index assumes that all companies within an industry experience the same level of competition and compete on quality and price in homogeneous markets, which does not always hold true. While all proxies have pitfalls, competitive distance serves as the best measure of competition for this paper. All variables in this study are in levels. i= 1, ..., N (1,961)and t= 1, ..., T (15). Altogether, the panel data set altogether has N*T observations. Annual financial information for companies are obtained from COMPUSTAT, and stock returns are obtained from CRSP. Data collected from these two prominent sources are highly reliable and presumably free of errors. So, winsorization is not necessary, though it is a very common process for accounting data. However, it is not preferred in econometric studies in apprehension of losing data realism (Brownen-Trinh, 2019). For a company to be included in our sample, it must have sales, total assets, and stock return information for all years from 2001 to 2015.

In model (1), α_i shows the possibility of company-specific fixed effects and β_i allows for heterogeneous cointegrating vectors. γ_t represents time-dependent common shocks, captured by common-time dummies (D_{it}), that might simultaneously affect all 1961 US public companies. Model (1) is to be estimated by the proposed Pedroni

(2000, 2001) panel fully-modified ordinary least squares (FM-OLS) co-integration technique, which adjust for the presence of endogeneity and serial correlation in the data. This method is an appropriate technique, if there are endogenous macroeconomic factors that can cause co-movements in the above variables. Before estimating model (1), it is required that the nonstationarity and the order of integration of the variables in levels are determined by using panel unit root tests. If all variables are found to be I (1), then by using the Pedroni panel co-integration tests (1999, 2000, and 2001), it is investigated whether they are co-integrated. These above mentioned tests and techniques are warranted to make sure that no spurious regression phenomenon exists in the estimation of β_i. In order to test for the presence of a unit root in the panel data set under study, panel unit root tests, proposed by Breitung (2000), Levin et al., (2002), and Im et al., (2003) are employed. For all these tests, the null hypothesis is non-stationarity of variables in levels.

Subsequently, the following panel vector error- correction model in the spirit of (Engle & Granger, 1987) is estimated on the evidence of co-integrating relationship among the variables of interest:

$$\Delta y_{it} = \alpha + \sum_{q=1}^{k} \beta \Delta y_{it-q} + \sum_{q=1}^{l} \phi \Delta x_{it-q} + \pi \hat{e}_{it-1} + \mu_{it} \quad \text{.........................} \quad (2)$$

For long-run convergence and causal relationship, the estimated coefficient ($\widehat{\pi}$) of the error-correction term ($\hat{e}_{it-1}$) is expected to be negative. The associated pseudo t-value indicates its statistical significance. The estimated β and ϕ reveal short-run interactive feedback relationships. The appropriate lag-lengths are determined by the Akaike (1969) information criterion (AIC).

When the variables are co-integrated, the short-term deviations from this long-term equilibrium will feed back on the changes in the dependent variable in order to ensure the movement towards the long-term equilibrium. If the dependent variable is driven directly by this long-term equilibrium error, then it is responding to this feedback. If not, it is responding only to short-term shocks to the stochastic environment. The significance tests of the 'differenced' explanatory variables give an indication of the 'short-term' effects, whereas the 'long-term' causal relationship is implied through the significance in terms of the associated pseudo t-value of the one-period lagged error-correction term, which contains the long-term information since it is derived from the long-term co-integrating relationship. The coefficient of the one-period lagged error-correction term, however, is a short-term adjustment coefficient and represents the proportion by which the long-term disequilibrium (or imbalance) in the dependent variable is being corrected in each short period. Non-significance or elimination of the 'lagged error-correction term' affects the implied long-term relationship and may be in violation of the underlying theory.

Next, DOLS is applied following Stock and Watson (1993). The panel DOLS procedure basically involves regressing any I(1) variable on the other I(1) variables, or any I(0) variables with leads or lags. The short-run dynamics also are of interest in the analysis.

Finally, this study also invokes generalized method of moments (GMM), as developed in Hansen (1982), for robust and efficient estimates. GMM is one of the most widely used econometric tools in finance. A set of moment conditions is used to estimate model parameters by GMM. In general, the number of moment conditions is larger than the number of model parameters. A model misspecification for over-identifying restrictions can be tested by GMM J-statistic. GMM does not require strong distributional assumptions for applications in finance. Since this paper employs panel data, GMM dynamic panel estimation is more appropriate than the original GMM estimation. On differencing of the regression equation, unobserved company-specific effects and the use of differenced lagged regressors eliminate parameter inconsistency arising from simultaneity bias (Arellano & Bond, 1991). Monte Carlo simulations of the model offer dramatic improvements in both efficiency and consistency (Blundell & Bond, 1998).

IV. EMPIRICAL RESULTS

To ascertain the normality of data distribution, the standard descriptors are reported as follows:

Table 1
Descriptive Statistics

Variables	SMR	SAT	MDS	COMR
Mean	0.166101	1.029251	0.006227	0.023769
Median	0.094400	0.788874	4.00E-05	0.002760
Std. Dev.	0.655699	3.185823	0.038733	0.066019
Skewness	10.74866	56.29043	12.60817	5.842761
Kurtosis	310.2081	3512.182	204.1052	48.50882
Jarque-Bera	92803840	1.21E+10	40197685	2160233.
Probability	0.000000	0.000000	0.000000	0.000000

As observed above, mean-to-median ratios for the variables are far from unity. Standard deviations are uniformly low. The data distribution of each variable has quite high positive skewness. The numerics of Kurtosis are far above the standard numeric of 3 for normality approximation. However, the Jarque-Bera statistic of each variable suggests to the contrary.

To ascertain nonstationarity/stationarity of each variable in the panel data set, four selected panel unit root tests results are reported as follows:

Table 2
Panel Unit Root Tests*

Method			
Variables (Level)	**LLC**	**Breitung**	**IPS**
SMR	-129.49 (0.002)	-43.3860 (0.004)	-63.9305 (0.003)
SAT	-127.497 (0.002)	-42.3541 (0.004)	-629.582 (0.004)
MDS	-9530.18 (0.004)	-25.9412 (0.005)	-629.582 (0.004)
CMR	-484.669 (0.004)	-31.1612 (0.005)	-121.715 (0.002)
Variables (Difference)	**LLC**	**Breitung**	**IPS**
SMR	-214.257 (0.004)	-59.0305 (0.003)	155.607 (0.003)
SAT	211.658 (0.002)	-58.242 (0.003)	-115.521 (0.004)
MDS	-4467.26 (0.004)	-31.3462 (0.005)	-502.458 (0.004)
CMR	-365.511 (0.004)	-39.6496 (0.004)	-186.362 (0.002)

Notes: *associated P-values are reported within parentheses for the exact levels of significance.

Here, SMR= stock return; SAT= company sale/total asset; MDS= market distance ratio; and CMR= competition ratio. To note, LLC= Levin, Lin, and Chu (2002) test, and IPS= Im, Pesaran and Shin (2003) test. The variables are asymptotically distributed as standard normal distributions with a left hand side rejection area. Associated P-value indicates a failure of rejection of null hypothesis of nonstationarity at the exact level of significance. N= 1961, T= 15 years and (NT)= 23,532.

As observed in Table 2, all three (LLC, Breitung, and IPS) panel unit root tests fail to reject the null hypothesis of nonstationarity of each variable in level either at 1 percent or 5 percent or less than 5 percent level of significance. All associated P-values are also uniformly at 0.005 or less. On first-differencing, all the variables in levels become stationary depicting I(1) behavior in the augmented heterogeneous panel data set consisting of 23,532 observations.

On clear evidence of nonstaionarity of each variable in heterogeneous panel data, seven Pedroni co-integration tests are applied. The results are reported as follows:

Table 3A
Pedroni Panel Co-integration Tests@

Null hypothesis: no co-integration		
	Statistic	**P-Value**
Panel v-Statistic	-44.78797	0.004
Panel rho- Statistic	-26.66662	0.005
Panel PP-Statistic	-94.77889	0.001
Panel ADF- Statistic	-28.18238	0.003

Notes: @significance at the exact level.

Table 3B
The Pedroni Panel Group Co-integration Tests@

Null hypothesis: no co-integration (between dimension)		
	Statistic	**P-Value**
Group rho-Statistic	-44.74836	0.003
Group PP-Statistic	-117.9224	0.001
Group ADF- Statistic	-15.08867	0.005

Notes: @significance at the exact level.

In segment A of Table 3, Panel V-statistic, Panel rho-statistic, Panel PP-Statistic and Panel ADF-Statistic clearly reject the null hypothesis of no-cointegration among variables either at 5 percent or less than this level of significance. In segment B of Table 3, between dimension group rho-statistic, Group PP-statistic and Group ADF-statistic lead to a similar conclusion. In other words, all the variables are found co-integrated, based on the above tests at 5 percent or less than this level of significance.

As the variables are found co-integrated, the relevant panel vector error-correction model (VECM) following Engle and Granger (1987) is estimated. The results are reported as follows:

$$\begin{aligned}\mathbf{\Delta SMR_{it}} &= \underset{(-0.16)}{-0.0009} + \underset{(9.97)}{0.6513}.\Delta SMR_{it-1} + \underset{(5.62)}{0.3190}.\Delta SMR_{it-2} + \underset{(0.27)}{0.0004}.\Delta SAT_{it-1} + \\ &\quad \underset{(0.28)}{0.0004}.\Delta SAT_{it-2} \underset{(-1.74)}{-0.5647}.\Delta MDS_{it-1} \underset{(-2.49)}{-0.5774}.\Delta MDS_{it-2} + \\ &\quad \underset{(2.26)}{0.3308}.\Delta COMR_{it-1} + \underset{(2.56)}{0.3177}.\Delta COMR_{it-2} \underset{(-1.59)}{-0.6405}\hat{e}_{it-1} \quad \ldots\ldots\ldots\ldots (2)'\end{aligned}$$

Notes: $\overline{R}^2$= 0.3210, F= 92.0583, and AIC= 2.1143.

The estimated VECM (2)' corresponds to equation (2). The estimated co-efficient of the error-correction term ($\hat{e}_{it-1}$) has the expected negative sign, though its numerical magnitude is low at 0.6405 with associated pseudo t-value of -1.59. They suggest slow pace of adjustments in the variables for convergence toward long-run equilibrium and long-run causal flows from the lagged changes in the explanatory variables to the current change in the dependent variable.

In the short-run, the two-period lagged effects of changes in total asset utilization and market competition are positive on the current change in stock returns. To be specific, rising competition causes higher risks for firms. Hence, investors demand higher risk premium in market equilibria. In contrast, the short-run two-period lagged effects of changes in market distance on the current change in stock return is negative. However, the net interactive feedback effect of all the variables is positive as sum of all the lagged coefficients. In other words, changes in all the lagged variables reinforce one another in the short run. $\overline{R}^2$ reveals that 32.10 percent of the increase in the stock return is caused by the lagged increases in the explanatory variables, included in (2)'. The F-statistic at 92.0583 affirms overall significance of the estimated VECM. Low AIC value at 2.1143 indicates good quality of the estimated model with optimum lag-selections by mitigating the problem of over-parameterization that is likely to induce inefficiency and bias in the estimated parameters.

To complement the preceding findings, DOLS and GMM estimates are reported in Tables 4 and 5, respectively, as follows:

Table 4
DOLS Estimates

Dependent variable: SMR_{it}			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**
SAT_{it}	0.026388	0.001839	14.35
MDS_{it}	-1.938361	0.279437	-6.94
$COMR_{it}$	1.828445	0.144920	12.62

Notes: Akaike information criterion (AIC)= 2.5213, $\overline{R}^2$= 0.2148.

Table 4 considers the estimates of dynamic OLS with all variables in levels. As observed, both total asset utilization and market competition exert positive influences on stock return in the short run. The coefficients of both have high associated t-values. Again, market distance shows negative impact on stock return due to locational closeness among firms. The associated t-values in absolute term are statistically highly significant. $\overline{R}^2$ shows that 21.48 percent of stock returns is contributed by total asset utilization, market distance and market competition. The AIC value at 2.5213 is quite low to indicate minimum loss of efficiency in the estimated model.

Table 5
Panel GMM Estimates

Dependent variable: SMR_{it}			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**
SAT_{it}	0.013922	0.001322	10.53
MDS_{it}	-1.236339	0.191552	-6.45
$COMR_{it}$	1.299315	0.107729	12.06

Notes: Akaike information criterion (AIC)= 2.042, $\overline{R}^2$ = 0.2215.

The panel GMM estimates in Table 5 reaffirm the findings in the preceding Table 4 that both total asset utilization and market competition positively and significantly impact stock returns. But market distance negatively influences stock returns. Again, the associated t-values are highly significant. $\overline{R}^2$ shows that 22.15 percent of stock returns is contributed by total asset utilization, market distance and market competition in the short run. The AIC-Value at 2.0420 implies the same, as earlier. Thus, both DOLS and GMM estimates lead to the same conclusion by all counts. Finally, they also confirm the short-run findings of the estimated panel VECM.

V. CONCLUSION AND IMPLICATION

The variables in the heterogeneous panel data set are nonstationary in levels depicting I(1) behavior. The variables are also co-integrated among themselves. The estimates of the panel VECM unveil long-run causality and convergence toward long-run equilibrium at a tepid pace. There is evidence of short-run interactive net positive feedback effect of the lagged variables in changes. The short-run effect of total asset utilization and market competition on stock returns are positive, while that of market distance is negative. Similar short-run effects are also confirmed by the estimates of both DOLS and GMM. However, near 80 percent of the stock returns remains to be explained by other omitted variables. Given the nature of this study and the heterogeneous panel data, the numerical values of $\overline{R}^2$'s are quite reasonable.

To boost stockholders' wealth by enhancing stock prices, firms should effectively improve total asset utilization, be more competitive and benefit from higher market distance. For better asset utilization, firms should be able to use physical facility to generate additional income, apply just-in-time approach for cost effective inventory management and expedite collections of account receivables. Additionally, they should reduce the use of assets to generate a certain level of profitable sales. They may also lease physical infrastructure, machinery and equipment to improve total asset turnover ratios, as leased assets are not counted as company assets in their balance sheets.

To be more competitive, firms should reduce both fixed and variable costs in uncertain market environment. They should be innovative in products that consumers prefer, keep pace with technological change and exercise capital discipline. To provide the best sustainable returns to its shareholders, a company should exercise discipline in how much it borrows, raises and spends. At the same time, the Shareholders should ask for stricter capital discipline, emphasizing value over volume. Firms should also enhance productivity and profitable sales in addition to the above.

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