An Interindustry Analysis of Economic Value Added as a Proxy for Market Value Added

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Companies worldwide use the financial metric Economic Value Added (EVA®) to help them assess their financial performance. However, researchers speculate that EVA is better suited to traditional manufacturing businesses than to knowledge-based businesses. This study empirically tests the relation between capital intensity and EVA's ability to serve as an effective proxy of market value added. We find that EVA is no less "at home" in the information economy than it is in traditional manufacturing businesses. However, our results do indicate that in most of the industries studied, the marginal costs of using EVA as a proxy for market value added are not justified by any marginal benefits. [JEL: G30]

Practitioner interest in shareholder value management has increased dramatically over the last decade. The increased interest stems largely from Stern Stewart's promotion of Economic Value Added (EVA®), their trademarked measure of economic profit. As Blair (1997) observes, "The aggressive marketing of EVA hypes it into absurdity from time to time..." Nevertheless, companies such as Coca-Cola, Briggs and Stratton, Monsanto, Equifax, and Unilever in the US, Lloyds and the Burton Group in the UK, and Veba and Siemens in Germany use EVA, or a similar measure, to help them gauge their financial performance.

Although practitioners have embraced EVA, there are few academic studies on its ability to act as a proxy for market-generated numbers. The results of these few studies are mixed, and none of them examine the effectiveness of EVA at the industry level. This paper tests EVA as a proxy for Market Value Added (MVA) across 53 industries.

I. EVA and MVA Defined

A firm's EVA for any year t is equal to the product of its economic book value of capital C at the beginning of the year and the difference between its return on capital r and its cost of capital k:

$$EVA_t = (r_t - k_t) \times C_{t-1} \tag{1}$$

A more intuitive way to think of EVA is as the difference between a firm's net operating profit after taxes (NOPAT) and its total cost of capital:

$$EVA_t = NOPAT_t - (k_t \times C_{t-1}) \tag{2}$$

Stern Stewart reports that when they calculate EVA for their clients, they make up to 164 non-US GAAP adjustments. These adjustments are intended to convert accounting profit into "an estimate of economic profit (Stewart, 1998)." Some examples include removing R&D and advertising expenses from NOPAT and capitalizing them and adding goodwill back to the balance sheet.

While EVA is an accounting-based, single-period measure of corporate performance, MVA is a market-generated number that we calculate by subtracting the capital invested in a firm C from the sum V of the total market value of the firm's equity and the book value of its debt:

$$MVA_t = V_t - C_t \tag{3}$$

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MVA is a cumulative measure of the value created by management in excess of the capital invested by shareholders.[1] Although the calculation of MVA uses the book value of capital, which is subject to inflationary distortions, it provides an excellent measure of a company's ability to create wealth. Stern Stewart's Ehrbar and Hamel (1997) agree, saying, "...there is one measure, Market Value Added (MVA), that captures all the dynamics of corporate performance."

There are many uses for EVA, including compensation, capital budgeting, securities analysis, valuation, and as a measure of corporate and divisional performance. We focus on its ability to act as a proxy for MVA, because it can serve as the proxy for market-generated numbers when none are available, such as at the divisional level. There are numerous consulting firms marketing their own measures of economic profit, such as KPMG Peat Marwick's Economic Value Management (EVM) and Boston Consulting Group's Cash Flow Return on Investment (CROI). However, we focus on EVA because it is the best-known measure of its kind and because its data are readily available, since Stern Stewart & Co. calculates EVA for a sample of 1,000 firms and publishes it annually.

II. Literature Review

As noted earlier, despite the acceptance of EVA among some of the world's largest companies and the widespread coverage of EVA by the business press, few researchers have studied EVA as a proxy for market-generated numbers. Of the studies that have been conducted, most use stock returns as the market-generated variable. For example, Dodd and Chen (1996, 1997) have published several papers that test EVA's ability to track stock returns. They report (1996), that EVA accounts for only 20.2% of the variation in stock returns for a sample of 566 companies, while the return on assets explains 24.5% of market returns. When comparing EVA's ability to explain stock returns (1997), using a sample of 6,683 firm years between the years 1983 and 1992, they conclude that the traditional accounting measures residual income and operating income display a greater ability to explain stock returns than does EVA. In a third study, Clinton and Chen (1998) compare EVA's ability to explain stock returns with a host of other "traditionally reported, residual-based, adjusted, and cash-based" measures. They find that EVA is the only measure that does not consistently reflect stock returns.

Biddle, Bowen, and Wallace (1997), using tests of incremental information content, conclude that earnings better reflect stock returns than EVA. They do not find any evidence to support Stewart's (1991) claims that EVA dominates earnings in relative information content. On the contrary, they find that earnings generally outperform EVA. Lehn and Makhija (1996) examine the correlations for 241 firms over four years. As measures, they use data on stock market returns, EVA, and MVA (expressed as returns on equity), and traditional ROA and ROE. They conclude that EVA has a "slight edge as a performance measure."

In a letter to the editor of *Management Accounting*, Stewart (1998) criticizes studies that evaluate EVA's effectiveness in estimating value added by measuring how it explains stock returns, calling them "meaningless and unimportant for the purposes of validating EVA." Stewart argues that using EVA as a proxy for MVA is what is important.

Stewart (1991) provides the first empirical evidence of EVA's potential as a proxy for MVA. He reports a R^2 of 0.97 between changes in EVA and changes in MVA for 25 groupings of firms over the period 1987-88. Stern, Stewart, and Chew (1995) conclude that changes in EVA over a five-year period explained 50% of the change in MVA over the same period. Thomas (1993) of BCG-Holt, which advocates an alternative measure called cash flow return on investment (CFROI), calculates a R^2 between MVA and EVA of just 4% for the 1,000 firms in the Stern Stewart 1000 database in 1988. After removing 31 "extreme" outliers, he finds that the R^2 increases to 27%.

Kramer and Pushner (1997) compare EVA's effectiveness as a proxy for MVA and changes in MVA to the traditional accounting measure net operating profits after taxes (NOPAT) over 8,855 firm years. They find no clear evidence that EVA is the best proxy for MVA and that the market seems to be more focused on earnings than EVA.

Despite these mixed results, one attribute that all of these papers share is that they are conducted at the aggregate level. To date, no study has compared the effectiveness of EVA across industries. Nevertheless, some researchers speculate that measuring EVA might be less useful in certain types of industries. For example, Barfield (1998) doubts that EVA's focus on the cost of capital is as important in the types of industries common in an information economy:

> *Shareholder value added is much more at home in its heartland of traditional manufacturing businesses with tangible assets, than in today's businesses where intangible assets are king. The powerful engines of shareholder value growth are the intellectual capital, information systems and technology options. These do not appear on the balance sheet. (p. 41)*

Our paper addresses the question: Does the level of

[1]See Stewart's (1991) *The Quest for Value* for a more detailed description of how EVA and MVA are calculated.

capital intensity affect EVA's ability to serve as an effective proxy of market value added? In the process of answering this question, we can test, at the industry level, Stewart's (1991) assertion that EVA is the "...internal measure of operating performance that best reflects the success of companies in adding value to their shareholders investments."

III. Methodology and Results

We use as our database the Stern Stewart 1000 (SS1000) from 1978-1996 purchased from Stern Stewart & Co.[2] The SS1000 contains annual data on EVA, MVA, and various other accounting measures for 1,000 large, non-financial US firms. We group the SS1000 firms into one of 56 industries, using the *Standard & Poor's* industry classification codes provided with the SS1000. Three industries (food distribution, drug distribution, and industrial distribution services) were outside the 95% confidence interval for median fixed asset turnover ratios. We exclude these three extreme outliers from the sample because we could not use them throughout the entire study. Exhibit 1 lists the industries and the number of firms in each industry.

A. Levels of MVA

Since our objective is to determine if the level of capital intensity affects the ability of EVA to serve as an effective proxy for MVA, we first need an industry-level measure of the strength of the relation between EVA and MVA. Using SAS software, we perform ordinary least squares regressions for each firm j over every year t within each industry i. These regressions allow us to determine the strength of the relation between the levels of EVA and MVA for that industry.

$$MVA_{jt} = a + bEVA_{jt} + e \quad (4)$$

The industry-specific $R^2_i s$ from these regressions represent the strength of the relation between EVA and MVA within each industry over the period 1978-1996.

We also regress MVA on NOPAT to see if the results of Kramer and Pushner (1997) hold up at the industry level or if their aggregated results are unduly influenced by a few industries.

$$MVA_{jt} = a + bNOPAT_{jt} + e \quad (5)$$

The resulting test statistics appear in Exhibit 2. We consider that EVA is a superior proxy if $R^2_{MVA/EVA} > R^2_{MVA/NOPAT}$ and the sign of the coefficient on EVA is positive. These criteria are met in only 11 of the 53 industries. Therefore, in most cases, we find no marginal benefit from using EVA as a proxy for MVA instead of a readily available financial measure like NOPAT.

Saint (1995), Thackray (1995), Spero (1997), and Kramer and Pushner (1997) all note that there are significant marginal costs of calculating EVA and educating employees and analysts on its meaning. The results of our study indicate that, in the majority of industries, the marginal benefits of using EVA as a proxy for MVA rather than NOPAT are not great enough to justify the marginal costs. Our industry-level results support the aggregate results reported by Kramer and Pushner.

To see if the level of capital intensity affects EVA's ability to serve as an effective proxy for MVA, we use Compustat PC Plus to find the fixed asset turnover ratio (FAT) of each firm in the SS1000, and then use the FAT ratio as an indicator of capital intensity.[3] A low FAT indicates a more industrial business with more and larger tangible assets, and a high FAT suggests a more knowledge-based business.

These firm-specific FATs are used to calculate the median fixed asset turnover ratio of each industry FAT_i. We also can specify the model using the mean fixed asset turnover (FAT) ratio. The median value is used to avoid any extreme variation caused by one or two companies. Because the fixed assets are booked at their purchase price, their values will skew the mean value of FAT for the entire industry if any one firm has a particularly new or old capital stock.

Next, using ordinary least squares, we regress the industry-specific R^2 against the industry-specific median fixed asset turnover ratios:

$$R^2_i = a + bFAT_i + e \quad (6)$$

This allows us to test for any relation between the ability of EVA (and NOPAT) to serve as proxy for MVA, and the level of capital intensity.

Exhibit 3 shows the results, which indicate that using EVA as a proxy for MVA is not FAT-dependent. Therefore, we find no support for the conjecture that EVA is less likely to capture the performance of knowledge-based businesses. The analysis is repeated excluding industries with negative coefficients on the independent variable. This repetition does not change

[2]The most current year of the SS1000 also appears annually in the *Journal of Applied Corporate Finance*, published by Stern Stewart & Co.

[3]We also use other asset management ratios (total asset turnover, inventory turnover, and before-tax revenue/fixed assets) in our models. The results are similar and do not change our findings.

Exhibit 1. Sample Statistics

Industry Name	Firms	Firm Years	Avg. MVA (in millions)	Avg. EVA (in millions)	Avg. NOPAT (in millions)	Median Fixed Asset Turnover Ratio
Aerospace	11	182	338.31	-72.726	357.08	6.19
Airlines	10	162	241.73	-170.870	176.08	1.91
Aluminum	5	67	-600.28	-204.303	270.22	1.94
Apparel	9	117	837.42	15.859	99.01	11.02
Appliances & Furnishings	26	372	527.47	-15.246	78.62	5.22
Auto Parts & Equipment	19	247	150.82	-62.821	138.79	4.23
Beverages	10	178	4,686.51	69.136	418.77	3.12
Broadcasting	27	200	974.14	-124.660	66.11	1.50
Building Materials	11	189	790.79	-31.569	98.93	2.96
Business Machines and Services	11	151	700.72	14.778	82.23	5.43
Cars & Trucks	5	80	-5,163.20	-651.665	1,765.65	4.51
Chemicals	45	677	558.80	-74.361	249.26	2.40
Coal, Oil & Gas	53	670	641.39	-229.874	619.43	1.08
Computer Software and Services	58	473	1,951.32	12.753	109.76	8.22
Computers & Peripherals	33	364	1,536.61	-78.350	430.64	10.93
Conglomerates	8	126	4,814.32	-57.944	861.07	4.25
Construct. & Eng. Services	5	92	508.81	-123.515	79.17	7.83
Discount & Fashion Retailing	53	514	1,476.29	-121.275	318.08	6.35
Drugs & Research	30	414	4,542.58	129.895	395.85	2.90
Eating Places	14	134	1,381.04	7.694	159.62	1.96
Electrical Products	13	188	1,067.09	-141.284	238.36	4.83
Electronics	17	229	844.25	-12.966	159.56	5.59
Food Processing	30	480	1,451.96	11.448	205.27	3.77
Food Retailing	17	220	985.05	4.979	150.59	5.25
Forest Products	6	95	132.45	-233.394	375.83	1.30
General Manufacturing	18	226	1,314.96	-0.742	180.76	4.26
Glass, Metal & Plastics Containers	4	62	846.88	-41.521	172.31	2.22
Health Care Services	35	254	750.36	-3.007	97.93	3.95
Hotel & Motel	18	155	687.38	-33.452	94.74	0.70
Instruments	10	154	371.68	-47.399	90.31	5.83
Machine & Hand Tools	9	153	995.96	-22.458	113.99	5.58
Medical Products	29	335	1,807.87	11.091	180.86	4.60
Other Leisure	16	206	1,479.01	-63.927	334.80	3.64
Other Metals	17	246	162.68	-45.613	75.46	2.09
Other Services	26	229	565.16	-9.683	46.19	6.82
Paper	17	275	285.53	-41.354	176.85	1.22
Paper Containers	10	116	366.55	-24.955	87.18	1.90
Personal Care	10	135	2,896.16	14.005	335.87	5.06
Petroleum Services	21	260	847.11	-46.300	74.61	1.45
Pollution Control	5	58	2,583.28	-53.645	292.38	1.00
Printing & Advertising	8	78	484.30	7.330	62.01	6.65
Publishing	27	340	1,245.93	-10.300	144.50	3.38
Railroads	8	118	-280.05	-271.777	514.72	0.46
Semiconductors	31	346	1,122.06	7.895	133.57	2.62
Special Machinery	25	381	292.20	-60.541	135.93	5.85
Steel	14	191	-147.81	-225.762	57.94	2.31
Telephone Companies	12	169	2,977.31	-226.180	1,066.73	1.19
Telephone Equipment & Services	35	291	750.84	-155.076	530.71	1.58
Textiles	13	153	320.46	-7.154	70.64	3.89
Tire & Rubber	3	57	73.87	-59.899	218.26	3.20
Tobacco	6	90	5,249.97	238.200	924.28	6.27
Transportation Services	12	144	192.47	-48.594	121.28	2.95
Trucking & Shipping	7	108	190.68	-34.310	70.72	0.96
All Industries	972	11,951	1,015.27	-64.060	269.99	3.64

the results.

To control for any extreme volatility in market values, we conduct weighted least squares regressions using the inverse of the variance of MVA as the weights. EVA still outperforms NOPAT as a proxy for MVA in only 20 of the 53 industries.

Exhibit 2. Ordinary Least Squares: Ranked by Differences in Adjusted R^2

	MVA/EVA			MVA/NOPAT			Difference
Industry	*Coeff.*	*t*	*Adj.R^2*	*Coeff.*	*t*	*Adj. R^2*	*Adj. R^2_{EVA}- Adj. R^2_{NOPAT}*
Personal Care	4.3146	1.391	0.0069	10.7816	22.787	0.7921	-0.7852
Electronics	6.3410	5.164	0.1012	6.9227	28.984	0.7841	-0.6829
Pollution Control	-8.4167	-2.194	0.0627	7.4083	11.022	0.6789	-0.6162
Publishing	4.2636	5.347	0.0753	8.7027	26.431	0.6717	-0.5964
Petroleum Services	5.1570	6.281	0.1293	8.2108	22.162	0.6508	-0.5215
General Manufacturing	13.3602	8.711	0.2497	8.3885	27.283	0.7637	-0.5140
Hotel & Motel	1.3654	1.511	0.0083	6.4244	12.052	0.4741	-0.4658
Eating Places	49.4421	10.39	0.4457	9.1354	33.311	0.8922	-0.4465
Printing & Advertising	15.6785	6.999	0.3839	9.1568	19.04	0.8225	-0.4386
Other Services	3.8655	4.26	0.0699	9.1662	15.439	0.5057	-0.4358
Conglomerates	28.3809	9.568	0.4201	8.7371	26.098	0.8426	-0.4225
Building Materials	12.3305	5.791	0.1475	16.9338	15.043	0.5412	-0.3937
Appliances & Furnishings	1.2793	1.844	0.0064	5.1082	15.137	0.3751	-0.3687
Telephone Companies	-1.1728	-1.064	0.0008	3.5201	9.870	0.3566	-0.3558
Glass, Metal & Plastics Containers	-3.6133	-1.626	0.0263	6.1726	5.878	0.3548	-0.3285
Machine & Hand Tools	31.9106	10.955	0.4392	20.0046	20.842	0.7403	-0.3011
Health Care Services	10.9453	15.209	0.4765	6.0661	27.062	0.7385	-0.2620
Other Leisure	1.4541	1.517	0.0063	3.3336	8.121	0.2380	-0.2317
Medical Products	28.5223	23.631	0.6253	12.2402	44.009	0.8517	-0.2264
Chemicals	-0.5066	-1.979	0.0043	1.9220	13.432	0.2085	-0.2042
Electrical Products	-0.0595	-0.141	-0.0053	3.7931	6.637	0.1863	-0.1916
Paper	5.1470	7.76	0.1777	5.4722	12.292	0.3523	-0.1746
Apparel	21.1231	8.929	0.4043	12.2565	12.737	0.5774	-0.1731
Food Retailing	11.1097	10.127	0.3168	6.6672	14.108	0.4703	-0.1535
Discount & Fashion Retailing	1.6841	4.539	0.0368	3.9071	10.499	0.1739	-0.1371
Textiles	6.641	4.854	0.1292	4.3058	7.440	0.2621	-0.1329
Telephone Equipment & Services	0.2933	0.613	-0.0022	-1.1120	-6.666	0.1291	-0.1313
Instruments	2.0572	4.251	0.1004	2.8355	6.884	0.2292	-0.1288
Drugs & Research	25.3894	34.479	0.742	13.0037	53.016	0.8700	-0.1280
Computer Software and Services	23.3234	24.219	0.5537	19.6183	32.353	0.6814	-0.1277
Coal, Oil & Gas	0.3971	1.61	0.0024	1.1313	9.276	0.1120	-0.1096
Computers & Peripherals	5.1146	13.996	0.3493	3.2096	17.759	0.4580	-0.1087
Construct. & Eng. Services	0.9847	2.181	0.0396	2.9560	3.886	0.1329	-0.0933
Aerospace	-0.3547	-0.622	-0.0034	1.6858	4.269	0.0856	-0.0890
Semiconductors	15.7132	31.892	0.7465	10.4498	41.671	0.8310	-0.0845
Business Machines and Services	23.8594	13.948	0.5634	8.2989	15.512	0.6119	-0.0485
Tobacco	20.3231	25.56	0.8799	6.4796	30.024	0.9091	-0.0292
Airlines	-0.1440	-0.727	-0.0029	0.3952	1.997	0.0179	-0.0208
Transportation Services	1.0210	1.797	0.0154	0.9687	2.496	0.0348	-0.0194
Forest Products	0.1567	0.489	-0.0082	0.2221	0.824	-0.0034	-0.0048
Aluminum	0.6584	1.737	0.0296	-0.5873	-1.818	0.0337	-0.0041
Broadcasting	-2.6432	-9.874	0.3266	3.9566	9.976	0.3235	0.0031
Steel	0.5393	2.474	0.0262	0.4064	1.319	0.0039	0.0223
Special Machinery	1.4097	7.142	0.1163	1.1373	5.874	0.0804	0.0359
Trucking & Shipping	2.0278	3.302	0.0847	2.2143	2.294	0.0380	0.0467
Paper Containers	1.1336	3.031	0.0665	0.4319	1.125	0.0023	0.0642
Railroads	1.5882	3.135	0.0702	-0.2093	-0.577	-0.0057	0.0759
Tire & Rubber	2.9798	3.674	0.1825	-1.2974	-2.423	0.0800	0.1025
Beverages	40.2042	29.025	0.8262	18.9245	20.515	0.7011	0.1251
Auto Parts & Equipment	1.5008	6.264	0.1345	-0.0248	-0.142	-0.0039	0.1384
Other Metals	1.7998	6.474	0.1431	0.2993	1.060	0.0005	0.1426
Cars & Trucks	1.4655	5.645	0.2810	-0.9619	-3.342	0.1091	0.1719
Food Processing	12.4311	19.924	0.4526	3.2568	7.443	0.1012	0.3514

Exhibit 3 shows that weighting does not change our conclusion that EVA's ability to reflect the financial performance of a company does not depend on the company's level of capital intensity.

In the non-standardized models, more weight is given to large firms because of the squaring of the

Exhibit 3. Levels of Market Value Added

	OLS	WLS
Dependent Variable	$R^2_{MVA/EVA}$	$R^2_{MVA/EVA}$
Intercept	0.1080 (1.743) *	0.0926 (3.343) ***
Median FAT	0.0278 (2.054) **	0.0069 (1.136)
R^2	0.0583	0.0055
N	53	53

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

Exhibit 4. Standardized Variables

	OLS	WLS
Dependent Variable	$R^2_{SMVA/SEVA}$	$R^2_{SMVA/SEVA}$
Intercept	0.1994 (4.153) ***	0.1851 (4.5274) ***
Median FAT	0.0056 (0.5356)	0.0012 (0.1479)
R^2	-0.0139	-0.0192
N	53	53

***Significant at the 0.01 level.

error. Therefore, to control for size, we standardized all of our key variables (as advocated by Stewart, 1991):

$$sMVA_{jt} = (MVA_{jt} / C_{jt})x100 \quad (7)$$

$$sEVA_{jt} = (EVA_{jt} / C_{jt-1})x100 \quad (8)$$

$$sNOPAT_{jt} = (NOPAT_{jt} / C_{jt-1})x100 \quad (9)$$

This adjustment improves the performance of EVA. When we control for size, EVA is a superior predictor of MVA in 28 of the 53 industries. Note that, since many firms of various sizes can use EVA, it should be an effective proxy for MVA regardless of size. However, as Exhibit 4 shows, we still find no evidence of a relationship between capital intensity and EVA's ability to proxy for MVA.

B. Changes in MVA

The level of MVA is important because it represents a cumulative measure of wealth creation. However, the changes in MVA (ΔMVA) are also important, especially when practitioners are designing compensation schemes that represent incremental gains or losses in shareholder wealth. Stewart (1991) notes that: "Changes in MVA over a period of time are likely to be as useful as the levels of MVA (if not more so) in assessing a company's performance."

The industry-level results presented in Exhibit 5 show that EVA outperformed NOPAT as a proxy for ΔMVA in only ten of the 53 industries studied. In fact, in 11 cases for EVA (6 for NOPAT), the sign of the coefficient is negative and statistically significant (at the 0.10 level), indicating an inverse relation between EVA and changes in MVA. We also examine the relationship between ΔMVA and changes in EVA (DEVA) and NOPAT (DNOPAT). However, because these two variables differ only by changes in the total cost of capital, they are very highly correlated (0.90). We observe no real difference among these results. We also find no industry bias in using DEVA as a proxy for ΔMVA.

To test for any relation between the level of capital intensity and EVA's ability to serve as proxy for ΔMVA, we regress the industry-specific R-squareds against the industry-specific fixed asset turnover ratios. Exhibit

Exhibit 5. Ordinary Least Squares: Ranked by Differences in Adjusted R^2

	Δ MVA/EVA			Δ MVA/NOPAT			Difference
Industry	*Coeff.*	*t*	*Adj. R^2*	*Coeff.*	*t*	*Adj. R^2*	*Adj. R^2_{EVA} - Adj. R^2_{NOPAT}*
Personal Care	2.1283	2.566	0.0406	2.3819	12.138	0.5258	-0.4852
Machine & Hand Tools	11.2849	8.642	0.3265	6.8311	12.714	0.5138	-0.1873
Construct. & Eng. Services	-0.0893	-0.237	-0.0105	-2.2133	-4.460	0.1719	-0.1824
General Manufacturing	1.0670	2.211	0.0173	1.1657	7.387	0.1951	-0.1778
Printing & Advertising	2.9756	2.871	0.0903	1.7886	5.188	0.2620	-0.1717
Eating Places	6.1518	3.068	0.0635	1.3831	5.732	0.2044	-0.1409
Paper	0.9769	2.772	0.0240	1.6040	6.319	0.1252	-0.1012
Electronics	0.6949	1.386	0.0041	0.9421	4.915	0.0945	-0.0904
Other Services	0.2888	0.660	-0.0027	1.7304	4.495	0.0831	-0.0858
Glass, Metal, & Plastics Containers	-1.2061	-1.067	0.0023	1.5314	2.422	0.0739	-0.0716
Other Leisure	0.1787	0.490	-0.0038	0.6809	3.928	0.0673	-0.0711
Drugs & Research	3.7713	7.215	0.1127	2.2607	9.490	0.1814	-0.0687
Telephone Companies	-0.1660	-0.276	-0.0056	0.8169	3.472	0.0621	-0.0677
Steel	-0.3395	-4.160	0.0806	-0.6155	-5.572	0.1391	-0.0585
Instruments	0.182	0.696	-0.0034	0.7371	3.118	0.0543	-0.0577
Medical Products	5.9241	9.841	0.2316	2.3931	11.165	0.2800	-0.0484
Conglomerates	9.3618	9.380	0.4123	2.1247	10.026	0.4453	-0.0330
Paper Containers	-0.7796	-3.455	0.0889	-0.8886	-4.034	0.1200	-0.0311
Cars & Trucks	-0.1878	-1.162	0.0044	-0.3053	-1.886	0.0313	-0.0269
Food Retailing	1.5839	2.416	0.0218	1.1131	3.471	0.0484	-0.0266
Apparel	7.1066	4.332	0.1380	3.7342	4.695	0.1594	-0.0214
Building Materials	0.1097	0.147	-0.0053	1.0808	2.003	0.0159	-0.0212
Tobacco	3.2361	4.005	0.1459	1.0738	4.277	0.1643	-0.0184
Health Care Services	4.2146	10.495	0.3237	1.9370	10.930	0.3419	-0.0182
Transportation Services	-0.0392	-0.115	-0.0072	-0.2926	-1.246	0.0040	-0.0112
Other Metals	-0.0510	-0.366	-0.0036	-0.2233	-1.671	0.0074	-0.0110
Semiconductors	8.9449	24.337	0.6411	5.6910	24.868	0.6510	-0.0099
Computer Software and Services	8.7132	15.921	0.3656	6.7062	16.202	0.3738	-0.0082
Auto Parts & Equipment	-0.3169	-1.824	0.0096	-0.2372	-2.014	0.0125	-0.0029
Petroleum Services	0.0737	0.176	-0.0039	0.2300	0.767	-0.0016	-0.0023
Appliances & Furnishings	-0.0782	-0.202	-0.0026	-0.1907	-0.796	-0.0010	-0.0016
Hotel & Motel	0.6290	1.160	0.0023	0.5526	1.220	0.0033	-0.0010
Discount & Fashion Retailing	0.0624	0.446	-0.0017	0.0575	0.375	-0.0018	0.0001
Railroads	-0.5165	-1.148	0.0028	-0.3501	-1.125	0.0023	0.0005
Pollution Control	1.8442	1.140	0.0055	-0.4847	-0.990	-0.0004	0.0059
Computers & Peripherals	0.5064	1.967	0.0082	0.1542	1.099	0.0006	0.0076
Electrical Products	-0.4047	-1.686	0.0100	0.3997	1.096	0.0011	0.0089
Coal, Oil & Gas	-0.6166	-4.980	0.0354	0.2775	4.280	0.0260	0.0094
Telephone Equipment & Services	-0.616	-2.005	0.0113	-0.0686	-0.589	-0.0025	0.0138
Chemicals	-0.8462	-6.974	0.0669	0.4666	6.055	0.0509	0.0160
Airlines	-0.2779	-1.948	0.0172	-0.1461	-0.990	-0.0001	0.0173
Textiles	1.4735	1.795	0.0149	0.0645	0.171	-0.0066	0.0215
Trucking & Shipping	0.8353	2.194	0.0350	0.8761	1.436	0.0100	0.0250
Forest Products	-0.6721	-2.925	0.0751	-0.4716	-2.382	0.0479	0.0272
Special Machinery	-0.5265	-4.090	0.0406	-0.1515	-1.205	0.0012	0.0394
Tire & Rubber	-0.9776	-1.590	0.0265	0.0658	0.168	-0.0177	0.0442
Broadcasting	0.6702	3.575	0.0605	-0.5156	-1.795	0.0120	0.0485
Business Machines and Services	5.1856	5.298	0.1555	1.4496	4.295	0.1061	0.0494
Food Processing	1.4983	6.159	0.0721	0.1499	1.078	0.0003	0.0718
Publishing	1.8807	5.851	0.0923	0.1177	0.510	-0.0023	0.0946
Aluminum	-0.4976	-2.546	0.0789	-0.0144	-0.082	-0.0158	0.0947
Aerospace	-1.8932	-5.902	0.1582	0.1428	0.555	-0.0039	0.1621
Beverages	9.6014	15.684	0.5819	4.0476	10.726	0.3932	0.1887

6 presents our results. Again, the OLS, WLS, and standardized results have low explanatory power and do not support the contention that a measure like EVA is less likely to capture the performance of knowledge-based businesses.

IV. Conclusions and Implications

Overall, we find no evidence to support the

Exhibit 6. Changes in Market Value Added

	OLS	WLS
Dependent Variable	$R^2_{\Delta MVA/EVA}$	$R^2_{\Delta MVA/EVA}$
Intercept	0.0620	0.0231
	(1.639)*	(3.148)***
Median FAT	0.0066	-0.0025
	(0.800)	(-1.551)
R^2	-0.0070	0.0263
N	53	53

***Significant at the 0.01 level.
**Significant at the 0.05 level.
*Significant at the 0.10 level.

conjecture that Economic Value Added (EVA) is more "at home" in the realm of traditional manufacturing businesses with large amounts of tangible assets. However, although EVA does not suffer from any industry-specific bias as a proxy for Market Value Added (MVA), it is consistently outperformed by Net Operating Profit After Tax (NOPAT), a readily available measure of financial performance. Therefore, in most of the industries we study, the marginal costs of using EVA as a proxy for Market Value Added (MVA) are not justified by any marginal benefits.

There is a need for further research to determine why MVA is tied more closely to profit than is EVA. Is it the way EVA is being calculated, with the inherent problems of calculating the cost of capital, or is it the result of analysts' tendency to focus on earnings? Birchard (1994) believes that when practitioners consider using EVA as a measure of financial performance: "Wall Street's fondness for traditional analysis is another reason to proceed with care." Brossy and Balkcom (1994) point out: "How many analysts covering a company provided earnings estimates for the year? All. How many of those same analysts provide EVA or even free cash flow estimates? Very few."

Although the strictly quantitative evidence regarding EVA's effectiveness as a proxy for MVA is not encouraging, anecdotal evidence points to the need for further research to determine the behavioral aspects of implementing the EVA management system.■

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