STRATEGY AND INTEGRATED FINANCIAL RATIO PERFORMANCE MEASURES: A LONGITUDINAL MULTI-COUNTRY STUDY OF HIGH PERFORMANCE COMPANIES

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ABSTRACT

Purpose – *This study investigates the links between strategy, execution, and financial performance with particular attention to the underlying performance drivers that describe how a company executes strategy to create financial value.*

Methodology – *This study empirically investigates companies in the United States and 22 other countries over a 20-year period (11 successive 10n-year periods: 1988–2007): (1) to compare financial performance characteristics of HPC versus non-HPC; (2) to study the sustainability of performance in HPC; and (3) to identify the companies that exit or*

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enter the HPC classification and the performance drivers and performance measures that characterized the change in HPC classification.

Findings – *The 20-year longitudinal results confirm the results of prior studies as to the long-term superior performance of HPC over other companies (Objective 1). For sustaining HPC, results were consistent as to total asset management, profitability, financial risk, and liquidity (Objective 2). Declining HPC companies fail at total asset management, profitability, and operating asset management and significantly increase their financial risk. Emerging HPC companies improve liquidity through improved operating asset management and cash flows (Objective 3).*

Practical implications – *To become a HPC management must generate increased cash flows from income, manage receivables and inventory vigorously, and reduce its debt in relation to equity. Thereafter, management must concentrate on maintaining its asset turnover and growth in revenues while maintaining its profit margin and not increasing its debt to equity.*

Value of the paper – *The results provide direction for management of companies that aspire to HPC status and to maintain HPC status.*

INTRODUCTION

A recent article published by a Big-Four accounting firm questioned the ability of companies to sustain or even have predictable high performance. The authors maintain that total stockholder return (TSR) at any time may be rising, falling, flat-high, flat-low, or random (no distinguishable pattern). The latter characteristic is most common, as represented by the following quote:

> Few firms … ever change their performance enough to be distinguishable from the roar of white noise arising from the volatility endemic in a dynamic and unpredictable marketplace. (Raynor, Ahmed, & Henderson, 2009)

These authors assert that high performance is mainly a result of random occurrence. However, prior research has shown that a small percentage of companies can sustain high performance over extended periods of time (Frigo, Needles, & Powers, 2002; Needles, Frigo, & Powers, 2004, 2006, 2008; Needles, Powers, Shigaev, & Frigo, 2007; Frigo & Litman, 2008). These studies link strategy, execution, and financial performance with

particular attention to the sustainability of high-performance companies (HPC). They identify the performance drivers associated with five key performance objectives and link them to the performance drives and to common performance measures in the financial performance scorecard (FPS). Further, patterns of these variables for HPC versus other companies in contrasting economies and economic periods were studied.

The present study turns attention to the question of what factors do companies improve upon to become HPC and what variables tend to deteriorate when companies cease to be HPC. Specifically, HPC and integrated financial ratio analysis are empirically investigated for companies in the United States and 22 other countries over a 20-year period (1989–2007) in successive 10-year performance periods with the following objectives: (1) to compare financial performance characteristics of HPC versus non-HPC over 11 successive 10-year periods, (2) to study the sustainability of performance in HPC over multiple 10-year periods, and (3) to identify the companies that exit or enter the HPC classification and the performance drivers and performance measures that characterized the change in HPC classification. The results provide direction for management of companies that aspire the HPC status and for those that want to maintain HPC status.

PREVIOUS RESEARCH

Financial statements provide important information about a company's ability to achieve the strategic objective of creating value for its owners. The intelligent user of financial statements will be able to discern how well the company has performed in achieving this objective. Financial analysis provides the techniques to assist the user in this task. In short, the financial statements reflect how well a company's management has carried out the strategic and operating plans of the business. The marketplace, in turn, evaluates this performance, and a value is placed on the company. Analysts have traditionally conducted ratio analysis by examining ratios related to various aspects of a business's operations. Previous research related to financial statements, financial analysis, and ratio analysis has been conducted by, among others, Nissim and Penman (1999, 2001), Brief and Lawson (1992), Fairfield and Yohn (1999), Feltham and Olsson (1995), Fera (1997), Jansen and Yohn (2002), Lev and Thiagarajan (1993), Ohlson (1995), Penman (1991), Piotroski (2000), Selling and Stickney (1989), and Burns, Sale, and Stephan (2008). Soliman (2008) provides a thorough review of financial statement analysis literature.

Initial research into the link between strategy and value creation began with an examination of the relation between three contrasting strategies: efficiency, innovation, and customer service by Needles, Frigo, and Powers (2002a), which the authors (2002b) then extended to the emerging economy of India. These studies found that different strategies are characterized by exceptional performance on different measures, that efficiency and innovation are better differentiators of high performance than customer service, and finally that developing and the emerging economy of India displays similar links among strategies and performance.

These early studies were followed by a more comprehensive examination of the links between strategy and integrated financial performance measurement by Needles et al. (2004). The objectives of this study were first to identify the financial characteristics of HPC over a test period (1990–1999) and then to observe the sustainability of these measures over contrasting test periods (1997–2000 and 2001–2003). Selection of HPC relied on a decade of research by Frigo and Litman (2002, 2008) that emphasized and defined a "Return Driven Strategy" framework under which business activities are highly aligned with ethically achieving maximum financial performance and shareholder wealth creation. According to Return Driven Strategy (Frigo & Litman, 2002, 2008; Frigo, 2003a, 2003b; Litman & Frigo, 2004), the pathway to superior financial value creation is through the customer, by fulfilling unmet needs in increasing market segments. The Return Driven Strategy framework describes the strategic activities of HPC in various industries. It describes the underlying "strategic performance drivers" that have been shown to lead to sustainable shareholder wealth creation. It is robust in its ability to also explain the decline of companies where by charting how the tenets of Return Driven Strategy were neglected or could not be executed. Meanwhile, the rise of these companies' performance and the sustainability of high performance can be attributed to attention to these tenets. Companies with mediocre or poor performance demonstrate significant gaps in their business models when viewed through the lens of Return Driven Strategy. This work provided the strategic underpinnings of our research.

Selected companies determined by Frigo (2002, 2003a, 2003b) according to the following three criteria during the period 1990–1999:

- Cash flow return on investment (Madden, 1999) at twice or more the cost of capital
- Growth rates in assets exceeding average gross domestic product growth
- Relative total shareholder returns above the S&P 500 average or other relevant indices.

Also included in the HPC group were 10 additional companies identified by Collins (2001), for a total of 48 companies that demonstrated superior performance in returns and growth over a sustained period.

Comparisons of HPC and other companies served to identify a set of ratios that were statistically independent of each other and a set of ratios that interact in integrated financial ratio analysis (Appendices A–C). This research resulted in the development of the FPS. The FPS is a structure or framework for considering the interaction of financial ratios, with particular emphasis on the drivers of performance and their relationship to performance measures. These performance measures are reflected ultimately in a return that is compared with a benchmark cost of capital. If the return exceeds cost of capital, value has been created. If the return is less than cost of capital, value has been destroyed. The "spread" between return on investment and the cost of capital was used as a criterion for selecting the leading companies; however, for purposes of evaluating the FPS, it is assumed that the cost of capital is determinable and given (Adman & Haight, 2002; Gebhardt, Lee, & Swaminathan, 2001).

The FPS is based on the premise that management must achieve certain financial objectives in order to create value and that these financial objectives are interrelated. Further, underlying the performance measures that analysts and the financial press commonly use to assess a company's financial performance are certain independent financial ratios, called performance drivers, that are critical to achieving the interrelated performance measures. While HPC uniformly excel on the basis of performance measures, they will not display uniform characteristics when it comes to performance drivers, because these measures are more a function of the various strategies that the companies may employ to achieve high performance (Needles et al., 2004).

Specifically, the previous research investigated (1) evidence with regard to the components of the FPS – in particular, the relationships between the performance drivers and the performance measures and (2) the relationships between the performance of the HPC and that of their respective industries. The empirical results confirmed the basic propositions of the FPS and the criteria for choosing HPC. These results are summarized as follows:

1. The performance drivers and performance measures are independent of each other, as shown by low correlation among each other or low rank correlation. This proposition held true for all companies, for selected industries, and for industry leaders, all of which show independence among the ratios, with low correlations among performance drivers (except asset turnover and profit margin) and performance measures.

2. The criteria for choosing HPC were validated by the performance measures in the FPS model. The HPC exceed the industry averages across all performance measures and across all industries.
3. The HPC show mixed results with regard to performance drivers when compared with industry drivers. HPC excel on profit margin, are lower on cash flow yield, have lower financial risk, and have variable results for asset turnover. These results are due in part to the different strategies that companies may employ.

Subsequently, Needles et al. (2006) replicated the above study with refinements that focused on the sustainability of performance by HPC and on operating asset management performance drivers and measures. The goal of liquidity is closely related to the goal of operating asset management. Operating asset management is oriented toward the management control of the cash conversion cycle, which is the time required to make or buy products, finance the products, and sell and collect for them. Operating asset management is the ability to utilize current assets and liabilities in a way that supports growth in revenues with minimum investment. The drivers of operating asset management are the turnover ratios, and the performance measures are the days represented by each turnover measure. Taken together, the performance measures give an indication of the net cash cycle or financing period. The financing period represents the amount of time during which a company must provide financing for its operating activities. (Financing period = days' receivable + days' inventory on hand − days' payable).

The hypothesis was that HPC would have a shorter financing period than S&P companies because their superior financial performance would be a reflection of their operating efficiency. The results confirmed this expectation, as follows:

1. The financing period for HPC compared to S&P companies was shorter in almost all cases by about 28 days for the 1997–2001 period and 30 days for the 2002–2003 period, which equates to fewer days that need financing, thus lowering the financing costs for HPC relative to S&P companies.
2. The operating asset turnover ratios, however, showed more variability among industries and between HPC and S&P companies. We expected HPC to outperform S&P companies on receivables turnover, and this was generally the case; however, overall, the HPC advantage was non-significant. This result could be accounted for by the fact that HPC have less need to sell receivables and take advantage of off-balance-sheet financing than S&P companies. Further, HPC are better able to take advantage of trade creditors.

3. Inventory turnover ratios were in line with our expectations that the HPC would outperform the S&P companies. Inventory turnover for HPC exceeded that of S&P, which represents fewer days of financing needed, more than offsetting the shortfall from receivables.

HPC had a slightly lower payable turnover than S&P companies. Strong operating results and low debt loads of HPC enable these companies to obtain longer terms than average from their trade creditors, which accounted for most of the difference. Thus, the HPC' deficiencies noted above in receivables and inventory are overcome, so that these companies outperform their industry on the financing period.

In an extension of HPC research to the developing country of India and to the natural resource-rich country of Australia (Needles et al., 2007), the relationships among performance drivers and performance measures observed in the Western economies were found to hold with the exception of asset turnover in India and payables turnover in both countries. The low asset turnover ratios in Indian companies were attributed to the preponderance of asset-intense infrastructure companies among the HPC. The existence of higher payables turnover in Western developed countries reflects more willingness to rely of the credit of suppliers in these countries.

RESEARCH QUESTIONS

As noted above, previous research addressed issues of on what measures do HPC excel and can they sustain high performance over contrasting future periods. This study focuses first in the long-term nature and sustainability of high performance as represented by the variables in the FPS and then on the issue of which performance drivers and measures are most important when a company attains HPC status and which are most likely to lead falling from HPC status. Specifically, this investigation of HPC and integrated financial ratio analysis by empirically investigating companies in the United States and 22 other countries over a 20-year period (1988–2007) in successive 10-year performance periods with the following objectives:

Objective 1: To compare financial performance characteristics of HPC versus non-HPC over 11 successive 10-year periods.
Objective 2: To study the sustainability of performance in HPC over multiple 10-year periods.

Objective 3a, 3b: To identify the companies that exit or enter the HPC classification and the performance drivers and performance measures that characterized the change in HPC classification.

The long period of study from 1988 to 2007 provides contrasting economic conditions in which the companies operate. The period reflects a period of global growth in the 1990s and a period of great volatility after 2000.

EMPIRICAL SAMPLE

Data for this study came from the CompuStat database. The analysis focuses on two groups of companies: companies in the MSCI World index, and HPC. In the benchmark group, we started with companies in the MSCI World index for which data exist consecutively from 1987 to 2007. Based on this condition, data for 1,446 companies existed (589 companies from USA and 857 companies from other countries). The current countries and industries that make the MSCI World Index are shown in Appendix D.

The following adjustment was made to the benchmark group of MSCI World companies: we excluded several industries whose financial structures typically depart from industrial, retail, and service businesses. These industries are banks, savings institutions, credit institutions, other financial institutions, financial services (broker) companies, insurance companies, real estate agents and operators of buildings, real estate investments trusts, hotels, personal services, miscellaneous recreation services, health services, hospitals, educational services, and child day-care services. In total, 172 companies (144 companies from USA and 28 companies from other countries) were excluded from the benchmark group. This adjustment improved the comparability of the benchmark group with the HPC. After that screen, our sample had 1,287 MSCI World companies (446 companies from USA and 841 companies from other countries).

Companies included in the HPC group were removed from the MSCI World sample in each of the 11 ten-year periods. After all screens, the largest size of the benchmark group (1,235 companies) was in 1997–2006 time period, the smallest size of the benchmark group (1,087 companies) was in the first test period 1988–1997.

HPC were identified from the HOLT database from Credit Suisse. In determining Global HPC, we identified 11 samples of HPC for 11 consecutive

10-year periods (from 1988–1997 to 1998–2007) where data were available from 1987 to 2007 according to the following criteria:

- Cash flow return on investment (CFROI) at twice or more the cost of capital or greater than 5% discount rate for 10 consecutive years
- Cumulative growth rate in total assets over 10-year period exceeds cumulative growth rate of World GDP over the same 10-year period
- Cumulative TSRs over 10-year period above the MSCI World cumulative return over the same 10-year period

METHODOLOGY

The performance of the HPC was compared to that of their respective industries and were expected to excel above their industry peers on performance drivers and measures which are overall indicators of success or failure in achieving the financial objectives of total asset management, profitability, financial risk, liquidity, and operating asset management.

Appendix C contains the formulas used to calculate ratios in this study. Ratios were calculated for each company for each year for years 1988–2007 (Year 1987 was used to calculate averages that were used in the formulas). The next parts of the study examined the performance of sustaining, declining, and emerging HPC.

In the analyses, HPC were grouped in three categories:

- Sustaining: Companies that appeared in four or more 10-year periods for years 1988–2007 including both early (first three 10-year time periods) and late (last three 10-year periods) periods.
- Declining: Companies that appeared in at least three of the first eight 10-year periods but did not appear at all in the last three 10-year periods.
- Emerging: Companies that did not appear at all in the first three 10-year periods but appeared in at least three of the last eight 10-year periods.

Companies were also grouped by the first two digits of the SIC code. In the benchmark sample, 51 industries were identified based on this grouping. In some industries, there were not enough HPC to derive reliable industry averages and discuss industry-specific results. We provide test data for industries in which we had at least three HPC (with two-digit SIC indicator).

For sustaining HPC, the means for each ratio were calculated for the entire period 1988–2007. For declining HPC, the means for each ratio were calculated for two periods: 1988–2004 and 1996–2007. The first period

(1988–2004) is the period in which certain companies were HPC, and the second period (1996–2007) is the one in which these companies were not HPC. For emerging HPC, the means for each ratio were calculated for the following two periods: 1988–1999 and 1991–2007. No one emerging HPC held the HPC status in the first period, but all emerging HPC were HPC in at least three 10-year periods during 1991–2007.

The next part of the study examined the relative performance of the HPC in relation to the mean performance of their peers among MSCI World index constituents for each of the abovementioned test periods (1988–2007 for sustaining HPC, 1988–2004 and 1996–2007 for declining HPC, and 1988–1999 and 1991–2007 for emerging HPC). We expect "high-performance" companies to excel above their industry peers on performance drivers and measures in periods when they held the HPC status. As to the periods when declining and emerging HPC did not hold the HPC status, we expect more variation in their performance.

The results are shown both with and without outliers. In order to detect and eliminate outliers in the samples, we applied the Grubbs' test (NIST/SEMATECH). The Grubbs' test detects one outlier at a time. The outlier is expunged from the dataset and the test is iterated until no outliers are detected. There are no outliers at the specific significance level if the Grubbs' test statistic is less than the upper critical value for the Grubbs' test statistic distribution corresponding to that specific level. To get better results on the *t*-test, we eliminated outliers for various ratios. In all cases, outliers represent less than 5% of the sample, usually much less than 5%. The elimination of outliers did not change the conclusions reached in examining the full set of data, but did affect the significance level on some ratios. In most cases, the results improved with the elimination of outliers. In the following sections, we will discuss the results with outliers eliminated, unless otherwise noted.

FINDINGS

Descriptive Data

Tables 1 and 2 display descriptive data on HPC for the 11 ten-year periods from 1988–1997 to 1998–2007. Table 1 shows the three screens for HPC beginning with CFROI and followed by asset growth and TSR. The number of HPC generally increased over time and ranged from 13 in the 1988–1997 period to 84 in 1996–2005. Table 2 shows countries from which the HPC come. While USA companies dominated each of the 10-year periods, all

Table 1. The Number of Companies Selected by the Consecutive Application of Each Screen.

Time Period	1988–1997	1989–1998	1990–1999	1991–2000	1992–2001	1993–2002	1994–2003	1995–2004	1996–2005	1997–2006	1998–2007
CFROI screen	115	135	154	192	193	182	189	222	267	286	279
Asset growth screen	35	50	58	87	104	101	109	133	181	192	191
TSR screen	13	17	19	29	42	54	56	66	84	77	76

periods had firms from other countries. The number of countries containing HPC generally increased over time. The fewest countries other than the USA were in 1991–2000 with two from France and four from Germany. The 1988–1997 period was represented by the fewest non-USA companies with one each from France, Germany, Japan. The 1996–2005 period was represented by the most non-USA companies and countries. This period had companies from Australia, Canada, Denmark, Spain, Finland, France, Germany, Ireland, Japan, and Sweden. One company represented each of these countries except Germany (11) and Ireland (2). The distributions of HPC by industry for each 10-year period, which are shown in Appendix E, display distributions' considerable diversity among industries. As noted above, industries represented by more than three HPC are tested in analyses below.

Objective 1: HPC Compared: 1988–2007

Table 3a addresses the first objective of this paper, to compare financial performance characteristics of HPC versus non-HPC over 11 successive 10-year periods. It provides an overview of HPC performance versus other MSCI companies on performance drivers and performance measures. Columns in Table 3a compare performance drivers and performance measures for all 11 ten-year year periods from 1988 to 2007. These 20-year longitudinal results confirm that the results of prior studies as to the long-term superior performance of HPC over other companies. In achieving the objectives of total asset management, profitability, and financial risk, HPC exceed other MSCI companies the significance differences at the 0.05 level or better in more than 98% of the cases for both performance drivers and performance measures. All differences in performance drivers for total asset management, profit margin, financial risk, and liquidity were significant at the 0.0001 level. This robust result enables HPC to produce growth in

Table 2. Distribution of HPC by Country for Each 10-Year Period: MSCI World.

1988–1997		1989–1998		1990–1999		1991–2000	
Country	Quantity of companies	Country	Quantity of companies	Country	Quantity of companies	Country	Quantity of companies
FRA	1	GBR	3	FRA	1	FRA	2
GBR	1	JPN	1	GBR	3	GBR	4
JPN	1	SGP	1	JPN	1	USA	18
USA	7	USA	9	SGP	1		
				USA	10		
Total	10	Total	14	Total	16	Total	24

1992–2001		1993–2002		1994–2003		1995–2004	
Country	Quantity of companies	Country	Quantity of companies	Country	Quantity of companies	Country	Quantity of companies
FRA	3	DEU	1	CHE	1	DEU	1
GBR	6	FRA	4	DEU	1	DNK	1
JPN	1	GBR	7	ESP	1	ESP	1
SGP	2	SGP	1	FIN	1	FRA	1
USA	24	USA	33	FRA	3	GBR	6
				GBR	6	SGP	1
				SGP	1	SWE	1
				USA	31	USA	34
Total	36	Total	46	Total	45	Total	46

1996–2005		1997–2006		1998–2007	
Country	Quantity of companies	Country	Quantity of companies	Country	Quantity of companies
DNK	1	AUS	1	AUS	1
ESP	1	BEL	1	BEL	1
FIN	1	DNK	1	CHE	3
FRA	1	GBR	6	DNK	1
GBR	6	IRL	1	FIN	1
IRL	1	JPN	1	FRA	1
JPN	1	SWE	1	GBR	7
SWE	1	USA	40	HKG	1
USA	44			IRL	1
				JPN	1
				SWE	1
				USA	40
Total	57	Total	52	Total	59

Table 3. Global HPC Performance Compared with MSCI World – All 10-Year Periods.

(a) Global HPC: 1988–2007 – Total asset management, profitability, and financial risk

Industry	Performance Drivers			Performance Measures		
	Asset turnover	Profit margin	Debt to equity	Growth in revenues	Return on assets	Return on equity
1988–1997	28.35%	68.60%	−175.19%	50.61%	71.42%	62.91%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1989–1998	23.42%	75.82%	−62.25%	55.32%	73.13%	70.71%
T-test	0.000000	0.000000	0.001688	0.000000	0.000000	0.000000
1990–1999	17.66%	78.30%	−81.45%	74.11%	74.34%	69.01%
T-test	0.000039	0.000000	0.000000	0.000000	0.000000	0.000001
1991–2000	21.05%	70.81%	−90.04%	82.34%	73.04%	62.41%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1992–2001	26.14%	63.10%	−69.86%	73.43%	68.87%	57.62%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1993–2002	24.75%	63.48%	−32.98%	74.49%	67.77%	60.10%
T-test	0.000000	0.000000	0.000021	0.000000	0.000000	0.000000
1994–2003	21.43%	65.87%	−58.30%	77.24%	66.10%	55.85%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1995–2004	29.28%	63.23%	−71.95%	76.62%	66.07%	58.98%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1996–2005	33.13%	59.80%	−52.29%	75.63%	62.17%	60.31%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1997–2006	32.96%	54.86%	−48.18%	75.57%	60.86%	59.53%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1998–2007	33.24%	49.86%	−42.64%	72.42%	59.29%	58.81%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

(b) Global HPC: 1988–2007 – Liquidity

Industry	Performance Driver		Performance Measures	
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
1988–1997	−127.16%	49.36%	27.96%	88.76%
T-test	0.000000	0.000000	0.001021	0.000000
1989–1998	−91.05%	53.82%	50.06%	87.98%
T-test	0.000000	0.000000	0.049298	0.000000
1990–1999	−77.58%	60.36%	45.93%	90.55%
T-test	0.000000	0.000000	0.007932	0.000000
1991–2000	−91.28%	55.61%	37.59%	87.68%
T-test	0.000000	0.000000	0.006334	0.000000
1992–2001	−76.48%	48.51%	28.51%	79.59%
T-test	0.000000	0.000000	0.000880	0.000000
1993–2002	−86.73%	46.97%	21.42%	80.37%
T-test	0.000000	0.000000	0.003469	0.000000

Table 3. (*Continued*)

(b) Global HPC: 1988–2007 – Liquidity

Industry	Performance Driver		Performance Measures	
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
1994–2003	−93.96%	44.64%	18.34%	79.16%
T-test	0.000000	0.000000	0.000116	0.000000
1995–2004	−95.72%	45.16%	24.57%	78.59%
T-test	0.000000	0.000000	0.000000	0.000000
1996–2005	−87.79%	41.94%	24.42%	76.35%
T-test	0.000000	0.000000	0.000288	0.000000
1997–2006	−81.14%	42.39%	35.80%	71.64%
T-test	0.000000	0.000000	0.000475	0.000000
1998–2007	−83.67%	39.37%	28.99%	68.61%
T-test	0.000000	0.000000	0.000000	0.000000

(c) Global HPC: 1988–2007 – Operating asset management

Industry	Performance Drivers			Performance Measures			
	Receivables turnover	Inventory turnover	Payables turnover	Average days' sales uncollected	Average days' inventory on hand	Average days' payable	Financing period
1988–1997	13.07%	4.23%	12.72%	−15.04%	−4.42%	−14.58%	−5.25%
T-test	0.000485	0.296459	0.086716				
1989–1998	10.06%	8.94%	15.96%	−11.19%	−9.82%	−18.99%	−4.23%
T-test	0.000162	0.106696	0.017797				
1990–1999	26.62%	29.48%	−10.68%	−36.28%	−41.79%	9.65%	−318.63%
T-test	0.031139	0.008284	0.043212				
1991–2000	9.85%	18.85%	11.27%	−10.92%	−23.23%	−12.70%	−21.39%
T-test	0.028273	0.021447	0.007793				
1992–2001	40.38%	15.04%	18.40%	−67.72%	−17.70%	−22.55%	−47.35%
T-test	0.007602	0.008665	0.000001				
1993–2002	37.02%	20.32%	11.39%	−58.77%	−25.51%	−12.85%	−83.27%
T-test	0.009208	0.009351	0.000526				
1994–2003	−5.10%	25.09%	11.59%	4.85%	−33.49%	−13.11%	−10.91%
T-test	0.009795	0.008217	0.007955				
1995–2004	32.40%	35.23%	16.94%	−47.94%	−54.40%	−20.39%	−127.79%
T-test	0.008145	0.001329	0.000003				
1996–2005	44.75%	19.96%	19.53%	−81.00%	−24.93%	−24.27%	−106.24%
T-test	0.000000	0.009709	0.000000				
1997–2006	63.35%	−16.97%	21.56%	−172.84%	14.51%	−27.48%	−26.04%
T-test	0.000000	0.009255	0.000000				
1998–2007	48.75%	−31.19%	15.44%	−95.12%	23.77%	−18.27%	−14.37%
T-test	0.000000	0.009887	0.000000				

revenues, return on assets, cash flow return on assets, and free cash flow at significant levels above other MSCI companies. Further, HPC are able to accomplish these results with significantly lower financial risk as represented by the debt to equity ratio. The importance of both asset turnover and profit margin to achieving high performance was recently confirmed by Soliman (2008). The only performance driver or performance measure that does not show significant differences at the 0.05 level is cash flow return on stockholder's equity. This result results from the lower level of stockholders' equity by non-HPC companies generally due to lower profitability and higher debt to equity.

Table 3b displays mixed results for operating asset management. Generally, HPC excel on receivables and inventory management with differences at the 0.05 level or better over other MSCI companies in over 80% of the cells. This result is in line with prior studies. However, payables management generally does not show significantly better performance by HPC. Prior studies of USA companies showed superior (lower) payables turnovers for HPC but showed the opposite effect in India and Australia. These differences were attributed to different approaches to supplier financing in the USA compared to other countries (Needles et al., 2007; Needles, Powers, & Shigaev, 2009).

Objective 2: Sustainability of HPC: Multiple 10-Year Periods

Turning to the next objectives of this paper, Table 4 addresses the sustainability of performance in HPC over multiple 10-year periods. Table 4a–c shows the performance of sustaining HPC. As noted above, these are HPC that appear in a majority, or at least 6 of the 11 time periods including both early and late periods. The tests were conducted for all time periods to test the sustainability of performance even for periods in which the companies do not qualify for HPC status. Industry statistics are shown when an industry (based on the first two SIC classification digits) is represented by more than three HPC. The following observations may be made:

Total asset management, profitability, and financial risk: All performance drivers and performance measures are significant at the 0.05 level, except profit margin (very close − 0.053885). These companies are very strong on asset turnover, growth in revenues, and return on assets with much less debt. These results also reflect the performance in the four industry groups. Return on equity shows consistent results as in Table 3.

Table 4. Sustaining HPC Performance Compared with MSCI World: 1988–2007.

(a) Sustaining HPC: 1988–2007 – Total asset management, profitability, and financial risk

Industry	Performance Drivers			Performance Measures		
	Asset turnover	Profit margin	Debt to equity	Growth in revenues	Return on assets	Return on equity
28	33.54%	105.88%	25.24%	76.43%	64.31%	72.59%
T-test	0.000003	0.000000	0.082269	0.000001	0.000000	0.000002
36	−8.74%	81.24%	−116.52%	64.31%	72.91%	72.29%
T-test	0.018438	0.000000	0.000024	0.000000	0.000000	0.000000
38	4.84%	47.44%	−83.68%	85.38%	46.58%	34.12%
T-test	0.091846	0.000000	0.000000	0.000000	0.000000	0.000000
73	−3.39%	73.43%	−39.34%	61.10%	64.97%	56.34%
T-test	0.292957	0.000000	0.005188	0.000000	0.000000	0.000514
All	22.34%	67.80%	−76.73%	79.02%	69.01%	61.51%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
With outliers						
All	21.07%	394.27%	−95.47%	1016.22%	70.87%	48.20%
T-test	0.000000	0.053885	0.000016	0.000000	0.000000	0.043067

(b) Sustaining HPC: 1988–2007 – Liquidity

Industry	Performance Driver		Performance Measures	
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
28	−64.82%	47.14%	52.79%	78.44%
T-test	0.000000	0.000000	0.000077	0.000103
36	−93.57%	55.76%	41.41%	86.31%
T-test	0.000000	0.000000	0.000012	0.000000
38	−59.80%	31.71%	11.22%	58.07%
T-test	0.000000	0.000000	0.014918	0.000000
73	−54.71%	45.68%	26.00%	63.70%
T-test	0.000000	0.000000	0.000268	0.000000
All	−86.23%	49.89%	29.28%	80.84%
T-test	0.000000	0.000000	0.000000	0.000000
With outliers				
All	−177.29%	52.18%	6.68%	83.63%
T-test	0.000000	0.000000	0.442002	0.000000

Table 4. (*Continued*).

(c) Sustaining HPC: 1988–2007 – Operating asset management

Industry	Performance Drivers			Performance Measures			
	Receivables turnover	Inventory turnover	Payables turnover	Average days' sales uncollected	Average days' inventory on hand	Average days' payable	Financing period
28	37.40%	−17.97%	−19.56%	−59.75%	15.23%	16.36%	−26.33%
T-test	0.000000	0.006416	0.000246				
36	33.24%	−10.57%	23.26%	−49.79%	9.56%	−30.31%	−1.13%
T-test	0.000000	0.017200	0.000007				
38	7.06%	15.73%	29.91%	−7.60%	−18.66%	−42.66%	−5.18%
T-test	0.028375	0.013916	0.000000				
73	24.34%	38.49%	−134.33%	−32.17%	−62.57%	57.33%	−716.87%
T-test	0.000020	0.000033	0.000000				
All	6.25%	16.38%	18.64%	−6.67%	−19.59%	−22.91%	−4.64%
T-test	0.001033	0.003643	0.000000				
With outliers							
All	13.92%	−179.41%	−11.65%	−16.18%	64.21%	10.44%	69.88%
T-test	0.386981	0.010381	0.303432				

Liquidity: A prior study (Needles et al., 2006) examined the apparent anomaly of generally lower cash flow yields for HPC. This analysis showed that weak companies tend to have lower incomes and more non-cash adjustments such as restructurings and losses on sales of assets that produce very high artificial cash flow yields. HPC tend to have very consistent cash flow yields in the range of 1.0–3.0. The results in Table 4b are consistent with these prior findings. HPC had lower cash flows yields than other companies and the differences are significant. HPC exceed other MSCI companies by significant amounts (0.0001 level) in cash flow return on assets and free cash flow.

Operating asset management: Contrary to prior research, sustaining HPC do not have significant differences when compared to other MSCI companies on the performance drivers related to operating asset management. The differences in receivable turnover and payables turnover are not significant and inventory turnover is lower. There are some exceptions to this generalization among the industries, especially in receivables turnover and payables turnover.

Objective 3a: Characteristics of Companies that Exit HPC Status (Declining HPC)

The third objective of this paper examines companies that enter or exit the HPC classification. This section examines declining HPC (Tables 5 and 6), which are defined as HPC that appear in at least three of the first eight 10-year periods but did not appear at all in the last three 10-year periods.

Total asset management, profitability, and financial risk: During the period 1988 to 2004, declining HPC showed expected results by excelling across all performance drivers and performance measures for this objective. In the three following periods when none of these companies were HPC (Table 5b), the former HPC did not achieve significant differences from other HPC on any of the performance drivers or performance measures (except return on assets). Asset turnover fell to a level almost equal (+4.23%) to other MSCI companies, which led to significantly lower growth in revenues (−67.11%) as compared to the other MSCI companies. Further, they increased debt to a level that now exceeds the debt to equity level of other MSCI companies by 28.34%.

Liquidity: In Table 5c, cash flow yield for HPC in the HPC period 1988–2004 was as expected – less than other MSCI companies. Also, cash flow return on total assets and free cash flow continued to exceed those of the other companies. In the following period 1996–2007 (Table 5d), the same relationships continued to hold even though the declining HPC no longer qualified as HPC.

Operating asset management: Declining HPC excelled over other MSCI companies in the 1988–2004 period (Table 5e) on receivable turnover but had a lower inventory turnover. Payable turnover for declining HPC had a slight edge (+8.35%). Overall, the declining HPC had a longer financing period by 63.54% indicating good operating asset management during this period. In the subsequent 2005–2007 period (Table 5f), both receivables turnover and payables turnover turned negative lowering the financing to only a 16.96% advantage over the other MSCI companies.

To summarize, Table 6 compares declining HPC in their HPC period to their non-HPC period across all performance drivers and performance measures. When HPC began to fail to achieve HPC status the objectives of total asset management, profitability, and operating asset management suffered relative to other MSCI firms. The declines in asset turnover and growth in revenues may be seen in Table 6a and in receivable and payables turnover in Table 6c. Further, these companies significantly increased their

Table 5. Declining HPC Performance Compared with MSCI World: 1988–2004 and 2005–2007.

(a) Declining HPC: 1988–2004 – Total asset management, profitability, and financial risk

Industry	Performance Drivers			Performance Measures		
	Asset turnover	Profit margin	Debt to equity	Growth in revenues	Return on assets	Return on equity
36	9.91%	88.03%	−366.03%	72.76%	78.14%	75.00%
T-test	0.143812	0.000000	0.000000	0.000003	0.000000	0.000000
73	35.18%	67.92%	−121.17%	66.93%	69.37%	59.90%
T-test	0.000008	0.000000	0.000002	0.000023	0.000000	0.007373
All	14.30%	73.35%	−182.97%	84.87%	70.90%	54.88%
T-test	0.001003	0.000000	0.000000	0.000000	0.000000	0.000000
With outliers						
All	12.82%	150.86%	−171.51%	2,587.59%	73.25%	62.47%
T-test	0.002768	0.000001	0.000001	0.000001	0.000000	0.000007

(b) Declining HPC: 1996–2007 – Total asset management, profitability, and financial risk

Industry	Performance Drivers			Performance Measures		
	Asset turnover	Profit margin	Debt to equity	Growth in revenues	Return on assets	Return on equity
36	−2.88%	85.52%	−304.79%	−32.79%	69.43%	69.27%
T-test	0.424316	0.002355	0.000000	0.303925	0.000167	0.006055
73	15.90%	−3.58%	−120.41%	−311.58%	−2.90%	−228.12%
T-test	0.161063	0.464609	0.000011	0.006939	0.462993	0.061167
All	−8.42%	66.92%	−179.23%	−124.15%	49.47%	20.67%
T-test	0.181817	0.000001	0.000000	0.001166	0.000000	0.075614
With outliers						
All	−5.72%	475.98%	−20.31%	7,385.32%	55.17%	57.52%
T-test	0.278002	0.068450	0.387008	0.000001	0.000000	0.160190

(c) Declining HPC: 1988–2004 – Liquidity

Industry	Performance Driver		Performance Measures	
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
36	−176.15%	53.94%	27.53%	89.71%
T-test	0.000000	0.000000	0.000252	0.000000
73	−70.60%	53.10%	20.12%	69.00%
T-test	0.000000	0.000000	0.252205	0.000008

Table 5. (*Continued*)

(c) Declining HPC: 1988–2004 – Liquidity

Industry	Performance Driver		Performance Measures	
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
All	−115.04%	49.74%	9.91%	82.23%
T-test	0.000000	0.000000	0.151154	0.000000
With outliers				
All	−234.61%	52.81%	25.20%	85.24%
T-test	0.000000	0.000000	0.122561	0.000000

(d) Declining HPC: 1996–2007 – Liquidity

Industry	Performance Driver		Performance Measures	
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
36	−132.64%	42.78%	20.56%	75.84%
T-test	0.000000	0.029210	0.210261	0.020126
73	39.88%	31.55%	−55.43%	55.03%
T-test	0.067484	0.000101	0.157374	0.000014
All	−30.17%	23.47%	−47.54%	67.57%
T-test	0.047270	0.002417	0.003151	0.000001
With outliers				
All	−16.45%	24.53%	59.60%	70.36%
T-test	0.342193	0.001671	0.224105	0.000000

(e) Declining HPC: 1988–2004 – Operating asset management

Industry	Performance Drivers			Performance Measures			
	Receivables turnover	Inventory turnover	Payables turnover	Average days' sales uncollected	Average days' inventory on hand	Average days' payable	Financing period
36	31.36%	−0.63%	24.56%	−45.69%	0.63%	−32.56%	−8.66%
T-test	0.000000	0.471736	0.007070				
73	31.13%	17.07%	23.98%	−45.21%	−20.58%	−31.54%	−40.54%
T-test	0.000031	0.234730	0.073140				
All	−6.82%	−29.85%	17.18%	6.39%	22.99%	−20.74%	38.31%
T-test	0.009095	0.009525	0.045772				
With outliers							
All	−72.30%	−121.78%	9.52%	41.96%	54.91%	−10.52%	82.54%
T-test	0.000000	0.000000	0.208238				

Table 5. (*Continued*).

(f) Declining HPC: 1996–2007 – Operating asset management

Industry	Performance Drivers			Performance Measures			
	Receivables turnover	Inventory turnover	Payables turnover	Average days' sales uncollected	Average days' inventory on hand	Average days' payable	Financing period
36	35.20%	−48.15%	17.96%	−54.32%	32.50%	−21.89%	22.54%
T-test	0.007738	0.023912	0.248667				
73	18.25%	81.26%	35.45%	−22.33%	−433.58%	−54.92%	−65.95%
T-test	0.060075	0.005619	0.013646				
All	−14.14%	49.21%	26.80%	12.39%	−96.88%	−36.61%	−11.92%
T-test	0.008343	0.049997	0.030252				
With outliers							
All	−75.66%	−21.92%	−21.91%	43.07%	17.98%	17.98%	67.63%
T-test	0.000003	0.355733	0.260270				

financial risk as represented by the increase in debt to equity (Table 6a). Liquidity in the form of cash flow yield declined but not significantly (Table 6b). As a result, cash flow return on assets, and free cash were not as strongly affected.

Objective 3b: Characteristics of Companies that Enter HPC Status (Emerging HPC)

This section examines emerging HPC (Tables 7 and 8), which are defined as companies that did not appear at all in the first three 10-year periods but appeared in at least three of the last eight 10-year periods.

Total asset management, profitability, and financial risk: During the period 1988–1999, emerging HPC showed results that would be expected of HPC by excelling across all performance drivers and performance measures for this objective except for debt to equity. This was true across the six industries except that five of the six industries did not have a significant difference in asset turnover and five did not in growth in revenues (Table 7a). In the following period 1991–2007 when these companies achieved HPC status (Table 7b), the HPC increased its advantage across all performance drivers and performance measures including debt to equity, which decreased their financial risk.

Table 6. Declining HPC Performance: 1988–2004 Compared to 1996–2007.

(a) Declining HPC: 1988–2004 to 1996–2007 – Total asset management, profitability, and financial risk

Time period	Performance Drivers			Performance Measures		
	Asset turnover	Profit margin	Debt to equity	Growth in revenues	Return on assets	Return on equity
1988–2004	1.17	0.16	0.82	0.15	0.15	0.22
1996–2007	0.88	0.16	0.80	0.04	0.10	0.15
Difference	−0.2861	−0.0039	−0.0183	−0.1091	−0.0501	−0.0682
% Difference	−24.45%	−2.43%	−2.23%	−75.22%	−34.11%	−31.57%
T-test	0.001943	0.426542	0.437614	0.000000	0.000002	0.002160

(b) Declining HPC: 1988–2004 to 1996–2007 – Liquidity

Time period	Performance Driver	Performance Measures		
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
1988–2004	1.38	0.20	0.30	0.10
1996–2007	2.12	0.13	0.18	0.07
Difference	0.7388	−0.0676	−0.1108	−0.0300
% Difference	53.41%	−33.90%	−37.46%	−28.55%
T-test	0.027805	0.000006	0.004493	0.014698

(c) Declining HPC: 1988–2004 to 1996–2007 – Operating asset management

Time period	Performance Drivers			Performance Measures			
	Receivables turnover	Inventory turnover	Payables turnover	Average days' sales uncollected	Average days' inventory on hand	Average days' payable	Financing period
1988–2004	7.63	6.00	8.76	47.85	60.86	41.67	67.05
1996–2007	8.07	15.54	10.06	45.25	23.49	36.28	32.46
Difference	0.4392	9.5402	1.2999	−2.6053	−37.3724	−5.3838	−34.5940
% Difference	5.76%	159.09%	14.84%	−5.44%	−61.40%	−12.92%	−51.59%
T-test	0.191187	0.022151	0.217587				

Liquidity: In Table 7c, cash flow yield for HPC in the non-HPC period 1988–1999 was as expected – not significantly different from other MSCI companies. Only free cash flow showed an advantage for emerging HPC. These conclusions hold for all six industries with the exception of industry 56.

Table 7. Emerging HPC Performance Compared with MSCI World: 1988–1999 and 1991–2007.

(a) Emerging HPC: 1988–1999 – Total asset management, profitability, and financial risk

Industry	Performance Drivers			Performance Measures		
	Asset turnover	Profit margin	Debt to equity	Growth in revenues	Return on assets	Return on equity
28	34.26%	229.05%	42.48%	65.66%	39.35%	64.15%
T-test	0.001907	0.000182	0.061189	0.001068	0.012035	0.013347
35	39.35%	14.46%	−33.94%	76.40%	33.23%	72.85%
T-test	0.003258	0.358477	0.009454	0.013437	0.200397	0.057933
36	−0.05%	−20.46%	38.98%	55.81%	32.61%	10.54%
T-test	0.498268	0.342434	0.104764	0.020335	0.130826	0.418015
38	23.04%	50.84%	−51.74%	62.98%	60.17%	50.72%
T-test	0.000001	0.000186	0.000447	0.000180	0.000000	0.000000
56	−15.79%	31.10%	18.59%	4.65%	30.41%	−61.28%
T-test	0.101198	0.088767	0.305533	0.477096	0.065961	0.291412
73	−29.21%	73.31%	−9.99%	66.97%	36.19%	40.32%
T-test	0.020933	0.000175	0.314582	0.000266	0.066274	0.021074
All	28.00%	44.50%	−31.00%	64.77%	53.04%	48.04%
T-test	0.000000	0.000003	0.001503	0.000000	0.000000	0.000000
With outliers						
All	29.03%	115.67%	14.73%	608.18%	53.33%	54.73%
T-test	0.000000	0.000002	0.263174	0.009646	0.000000	0.154259

(b) Emerging HPC: 1991–2007 – Total asset management, profitability, and financial risk

Industry	Performance Drivers			Performance Measures		
	Asset turnover	Profit margin	Debt to equity	Growth in revenues	Return on assets	Return on equity
28	36.80%	98.26%	−25.91%	63.89%	59.02%	68.88%
T-test	0.000000	0.000000	0.001263	0.000038	0.000000	0.000135
35	45.64%	43.16%	31.74%	63.53%	60.84%	70.72%
T-test	0.000000	0.002158	0.002877	0.000098	0.000008	0.001071
36	16.03%	77.59%	−105.49%	63.59%	72.53%	73.34%
T-test	0.001445	0.000000	0.000000	0.000096	0.000000	0.000000
38	14.30%	42.08%	−35.43%	77.49%	49.56%	54.96%
T-test	0.000005	0.000000	0.000128	0.000000	0.000000	0.000007
56	−3.77%	45.52%	−29.62%	28.83%	45.30%	52.87%
T-test	0.237880	0.000000	0.063096	0.003591	0.000000	0.000063
73	−3.34%	63.32%	−69.26%	60.00%	49.50%	53.01%
T-test	0.266246	0.000000	0.000000	0.000150	0.000000	0.000075
All	34.33%	56.56%	−82.53%	76.68%	64.56%	62.21%
T-test	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
With outliers						
All	34.97%	504.76%	−67.63%	1,168.27%	67.10%	56.41%
T-test	0.000000	0.068641	0.001361	0.000276	0.000000	0.000000

Table 7. (*Continued*).

(c) Emerging HPC: 1988–1999 – Liquidity

Industry	Performance Driver		Performance Measures	
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
28	18.88%	14.09%	57.47%	170.77%
T-test	0.181282	0.192206	0.037864	0.008682
35	7.22%	−3.33%	−109.59%	66.39%
T-test	0.463555	0.468291	0.350863	0.287761
36	−113.78%	2.43%	7.38%	−89.08%
T-test	0.000017	0.462263	0.383580	0.293030
38	−69.70%	42.69%	14.44%	79.97%
T-test	0.000047	0.000003	0.077093	0.000004
56	–	–	–	–
T-test	–	–	–	–
73	−56.92%	−80.24%	−41.52%	−225.20%
T-test	0.008531	0.003971	0.022947	0.061612
All	−62.57%	14.68%	−0.41%	84.85%
T-test	0.000000	0.015313	0.486649	0.000010
With outliers				
All	−52.26%	13.29%	−302.66%	95.53%
T-test	0.016231	0.057724	0.118328	0.000251

(d) Emerging HPC: 1991–2007 – Liquidity

Industry	Performance Driver		Performance Measures	
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
28	−66.49%	36.81%	50.99%	60.88%
T-test	0.000000	0.000000	0.000111	0.000000
35	−34.43%	56.80%	66.97%	79.52%
T-test	0.001668	0.000071	0.001262	0.000046
36	−128.84%	49.82%	35.61%	85.16%
T-test	0.000000	0.000000	0.000029	0.000000
38	−64.36%	31.98%	31.06%	57.31%
T-test	0.000000	0.000000	0.000298	0.000000
56	−16.64%	41.57%	54.67%	57.97%
T-test	0.009793	0.000000	0.000236	0.004390
73	−74.39%	23.05%	15.35%	48.96%
T-test	0.000000	0.000670	0.017206	0.000050
All	−90.78%	42.52%	32.10%	76.72%
T-test	0.000000	0.000000	0.000000	0.000000
With outliers				
All	−184.58%	43.93%	28.91%	80.51%
T-test	0.000000	0.000000	0.009931	0.000000

Table 7. (*Continued*).

(e) Emerging HPC: 1988–1999 – Operating asset management

Industry	Performance Drivers			Performance Measures			
	Receivables turnover	Inventory turnover	Payables turnover	Average days' sales uncollected	Average days' inventory on hand	Average days' payable	Financing period
28	35.64%	−21.47%	−9.24%	−55.37%	17.67%	8.46%	−14.13%
T-test	0.001860	0.111564	0.222846				
35	34.35%	−0.06%	11.62%	−52.31%	0.06%	−13.15%	−22.78%
T-test	0.000765	0.498630	0.227239				
36	8.61%	−87.23%	−2.53%	−9.42%	46.59%	2.47%	39.24%
T-test	0.057223	0.000837	0.455240				
38	22.24%	−17.54%	38.46%	−28.60%	14.92%	−62.50%	16.52%
T-test	0.000000	0.012931	0.000002				
56	−1267.93%	−2.67%	−66.45%	92.69%	2.60%	39.92%	58.89%
T-test	0.000000	0.373327	0.000000				
73	−32.55%	–	49.18%	24.55%	–	−96.78%	–
T-test	0.002989	–	0.027964				
All	−28.39%	−113.63%	24.47%	22.11%	53.19%	−32.39%	68.14%
T-test	0.000000	0.000000	0.000019				
With outliers							
All	−15.12%	−218.85%	16.47%	13.13%	68.64%	−19.72%	84.56%
T-test	0.144357	0.000000	0.004374				

(f) Emerging HPC: 1991–2007 – Operating asset management

Industry	Performance Drivers			Performance Measures			
	Receivables turnover	Inventory turnover	Payables turnover	Average days' sales uncollected	Average days' inventory on hand	Average days' payable	Financing period
28	26.35%	−21.88%	−57.83%	−35.77%	17.95%	36.64%	−51.00%
T-test	0.000001	0.006062	0.000000				
35	34.99%	79.58%	−10.00%	−53.83%	−389.82%	9.09%	
					−3,054.20%	*T*-test	0.000027
0.000132	0.200496						
36	30.42%	7.82%	17.72%	−43.72%	−8.48%	−21.53%	−23.67%
T-test	0.000000	0.139892	0.000854				
38	13.05%	−7.15%	18.39%	−15.01%	6.67%	−22.53%	6.50%
T-test	0.000000	0.100099	0.000007				
56	50.92%	19.43%	36.06%	−103.75%	−24.12%	−56.41%	−17.28%
T-test	0.001949	0.000952	0.000000				
73	−10.28%	55.13%	−56.41%	9.32%	−122.86%	36.07%	−117.49%
T-test	0.111622	0.007822	0.000002				
All	52.80%	−20.42%	17.04%	−111.87%	16.96%	−20.53%	−42.78%
T-test	0.000015	0.032518	0.000000				
With outliers							
All	48.74%	−82.44%	−10.12%	−95.09%	45.19%	9.19%	−231.32%
T-test	0.022442	0.071466	0.335232				

Table 8. Emerging HPC Performance: 1988–1999 Compared to 1991–2007.

(a) Emerging HPC: 1988–1999 to 1991–2007 – Total asset management, profitability, and financial risk

Time period	Performance Drivers			Performance Measures		
	Asset turnover	Profit margin	Debt to equity	Growth in revenues	Return on assets	Return on equity
1988–1999	1.44	0.06	1.82	0.14	0.09	0.20
1991–2007	1.50	0.11	1.24	0.14	0.13	0.30
Difference	0.0539	0.0438	−0.5795	0.0064	0.0385	0.0983
% Difference	3.73%	69.18%	−31.91%	4.76%	41.15%	49.50%
T-test	0.232970	0.000000	0.001409	0.303765	0.000000	0.000001

(b) Emerging HPC: 1988–1999 to 1991–2007 – Liquidity

Time period	Performance Driver	Performance Measures		
	Cash flow yield	Cash flow return on total assets	Cash flow return on stockholders' equity	Free cash flow
1988–1999	1.68	0.12	0.26	0.05
1991–2007	1.45	0.18	0.40	0.10
Difference	−0.2337	0.0548	0.1404	0.0523
% Difference	−13.92%	44.96%	53.41%	111.44%
T-test	0.053853	0.000000	0.000064	0.000000

(c) Emerging HPC: 1988–1999 to 1991–2007 – Operating asset management

Time period	Performance Drivers			Performance Measures			
	Receivables turnover	Inventory turnover	Payables turnover	Average days' sales uncollected	Average days' inventory on hand	Average days' payable	Financing period
1988–1999	6.68	3.94	9.41	54.61	92.65	38.78	108.48
1991–2007	17.99	9.38	8.79	20.29	38.93	41.54	17.68
Difference	11.3071	5.4358	−0.6253	−34.3247	−53.7164	2.7593	−90.8004
% Difference	169.18%	137.98%	−6.64%	−62.85%	−57.98%	7.12%	−83.70%
T-test	0.000000	0.000000	0.141631				

In the following HPC period 1991–2007 (Table 7d), all measures of cash flows for HPC are strongly differentiated from non-HPC. Cash flow yield is lower, as is now expected (see discussion above), and cash return on total assets and free cash flows are strongly positive. Further, all industry groups

are differentiated on cash flow measures with one exception (cash flow yield for industry 56). As noted earlier, cash flow return on stockholders' equity is not a differentiator.
Operating asset management: In the 1988–1999 period when they did not have HPC status (Table 7e), the emerging HPC scored significantly less on receivables and inventory turnover but had a greater payables turnover than other MSCI companies in the 1988–1999 period. There were few significant differences among the industry groups. In the HPC period 1991–2007 (Table 7f), the HPC improved both in receivable turnover and payables turnover but still fell short in inventory turnover. More significant differences showed up in the industry groupings.

To summarize, Table 8 compares emerging HPC in their HPC period to their non-HPC period across all performance drivers and performance measures. When HPC began to achieve HPC status, the objectives of total asset management, profitability, and operating asset management improved relative to other MSCI firms. The increases in asset turnover and profit margin and the decrease in debt to equity may be seen in Table 8a. All cash flow performance measures showed increases with cash flow return on total assets, cash flow return on equity, and free cash flow, as usual, being at a significant level. Cash flow yield declined in the latter period but was not significantly different from the earlier period when they were non-HPC companies. Operating asset management (Table 8c), especially receivables turnover and inventory turnover improved dramatically when HPC status was achieved, increasing 169.18 and 137.98%, respectively.

CONCLUSION

This paper began with three objectives:

Objective 1: To compare financial performance characteristics of HPC versus non-HPC over 11 successive 10-year periods.
Objective 2: To study the sustainability of performance in HPC over multiple 10-year periods.
Objective 3a, 3b: To identify the companies that exit or enter the HPC classification and the performance drivers and performance measures that characterized the change in HPC classification.

It investigated these issues by studying HPC and integrated financial ratio analysis empirically for companies in the United States and 22 other

countries (represented by the MSCI Index) over a 20-year period (1988–2007) in 11 successive 10-year performance periods by quoting an article that suggests that much high performance is achieved randomly.

With regard to objective 1, the 20-year longitudinal results confirm with few exceptions the results of prior studies as to the long-term superior performance of HPC over other companies. With regard to objective 2, companies that were sustaining HPC over at least 6 of the 11 ten-year periods, results were consistent for measures related to total asset management, profitability, financial risk, and liquidity. Operating asset measures were not consistent with prior research. With regard to objective 3a, companies who fail to maintain HPC status fail at total asset management, profitability, and operating asset management. Further, they significantly increase their financial risk. With regard to objective 3b, companies achieving HPC status usually have previously improved profitability but they significantly improve liquidity and cash flows when they become HPC. Further, they improve operating asset management and lower financial risk.

The implications for management are clear. In short, when a company becomes highly profitable, to become a HPC management must concentrate on generating cash flows from income, manage receivables and inventory vigorously, and reduce debt in relation to equity. When a company achieves HPC status, management must concentrate on maintaining asset turnover and growth in revenues while maintaining profit margin while not increasing debt in relation to equity.

LIMITATIONS AND FUTURE RESEARCH

Although it is intended to be broadly representative of global financial markets, the MSCI Index used in this study is weighted toward large companies in developed countries. We have not taken into account the effects of many countries that adopted IFRS or a variation thereof during the past five years. Future studies can address a broader population and examine the effects of IFRS.

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APPENDIX A. EXPANDED VIEW OF FINANCIAL PERFORMANCE OBJECTIVES

Financial Performance Objectives	Links to Financial Performance
Total asset management	Ability to utilize all the assets of a company in a way that maximizes revenue while minimizing investment
Profitability	Ability to earn a satisfactory net income
Financial risk	Ability to use debt effectively without jeopardizing the future of the company
Liquidity	Ability to generate sufficient cash to pay bills when they are due and to meet unexpected needs for cash
Operating asset management	Ability to utilize current assets and liabilities to support growth in revenues with minimum investment

APPENDIX B. COMPONENTS OF THE FINANCIAL PERFORMANCE SCORECARD

Financial Performance Objectives	Performance Drivers	Performance Measures
Total asset management	Asset turnover	Growth in revenues
Profitability	Profit margin	Return on assets
Financial risk	Debt to equity	Return on equity
Liquidity	Cash flow yield	Cash flow returns
		Free cash flows
Operating asset management	Turnover ratios:	Cash cycle:
	Receivables turnover	Days' sales uncollectible
	Inventory turnover	Days' inventory on hand
	Payables turnover	Days' payable
		Financing period

APPENDIX C. FORMULAS FOR RATIO COMPUTATIONS IN THE FINANCIAL PERFORMANCE SCORECARD

Performance Drivers

$$\text{Asset turnover} = \frac{\text{Net sales}}{\text{Average total asset}}, \quad \text{Profit margin} = \frac{\text{Net income}}{\text{Net sales}}$$

$$\text{Debt to equity} = \frac{\text{Cash flows from operating activities}}{\text{Stockholder's equity}}$$

$$\text{Cash flow yield} = \frac{\text{Cash flows from operating activities}}{\text{Net income}}$$

In the analysis, if either the numerator or denominator of the cash flow yield was negative, the ratio was excluded.

Valuation Performance Measures

$$\text{Growth in revenues} = \frac{\text{Changes in net sales}}{\text{Net sales}},$$

$$\text{Return on equity} = \frac{\text{Net income}}{\text{Average stockholder's equity}}$$

$$\text{Return on assets} = \frac{\text{Net income}}{\text{Average total assets}}$$

$$\text{Cash flow returns} = \frac{\text{Cash flows from operating activities}}{\text{Average total assets}}$$

$$\text{Cash flow returns} = \frac{\text{Cash flows from operating activities}}{\text{Average stockholder's equity}}$$

$$\text{Free cash flow} = \text{Cash flows from operating activities} - \text{Dividends} + \text{Sales of capital assets} - \text{Purchase of capital assets}$$

In the analysis, to adjust for size of company, free cash flow was divided by average total assets.

Operating Asset and Financing Ratios

$$\text{Receivables turnover} = \frac{\text{Net sales}}{\text{Average accounts receivable}}$$

$$\text{Average days' sales uncollected} = \frac{365}{\text{Receivables turnover}}$$

$$\text{Inventory turnover} = \frac{\text{Cost of sales}}{\text{Average accounts inventory}}$$

$$\text{Average days' inventory on hand} = \frac{365}{\text{Inventory turnover}}$$

$$\text{Payables turnover} = \frac{\text{Cost of sales} \pm \text{Change in inventory}}{\text{Average accounts payable}}$$

$$\text{Average days' payable} = \frac{365}{\text{Payables turnover}}$$

$$\begin{aligned}\text{Financing period} = {} & \text{Average days' sales uncollected} \\ & + \text{Average days' } \textit{inventory on hand} \\ & - \text{Average days' payable}\end{aligned}$$

APPENDIX D. MSCI INDEX – 2008 COMPOSITION

MSCI World Countries		MSCI World Industries	
Country	Quantity of companies	Industry group	Quantity of companies
AUS	51	13	41
AUT	10	15	31
BEL	15	16	17
CHE	26	20	67
DEU	40	26	21
DNK	16	27	26
ESP	25	28	109
FIN	21	29	23
FRA	52	32	21
GBR	107	33	33
GRC	11	34	17
HKG	28	35	91
IRL	11	36	93
ITA	18	37	54

APPENDIX D. (*Continued*)

MSCI World Countries		MSCI World Industries	
Country	Quantity of companies	Industry group	Quantity of companies
JPN	316	38	62
NLD	18	44	17
NOR	21	45	18
NZL	7	48	69
PRT	8	49	79
SGP	22	50	24
SWE	34	53	17
USA	589	54	17
Total	1,446	56	16
		59	16
		60	31
		63	36
		67	24
		73	89
		79	16
		99	15
		Other	256
		Total	1,446

APPENDIX E. HPC BY 10-YEAR PERIOD, COUNTRY, AND INDUSTRY (INDUSTRIES IDENTIFIED IN APPENDIX D)

1988–1997				1989–1998				1990–1999			
Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies	
20	USA		1	20	USA		1	27	SGP		1
30	USA		1	26	USA		1	28	USA		1
37	FRA	1		27	SGP		1	35	USA		1
	USA	1		28	GBR	1		36	USA		1
37: Sub-total			2		USA	1		37	USA		1
39	JPN		1	28: Sub-total			2	38	USA		1
52	USA		1	30	USA		1	39	JPN		1
73	GBR	1		37	USA		1	48	FRA	1	
	USA	3		39	JPN		1		GBR	1	
73: Sub-total			4	52	USA		1	48: Sub-total			2
Total			10	73	GBR	2		53	USA		1
					USA	3		73	GBR	1	
				73: Sub-total			5		USA	4	
				Total			14	73: Sub-total			5
								87	GBR		1
								Total			16

APPENDIX E. (*Continued*)

1991–2000				1992–2001				1993–2002			
Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies	
28	FRA	1		23	USA		1	20	USA		1
	USA	2		27	SGP		1	23	USA		1
28: Sub-total			3	28	FRA	1		28	FRA	1	
35	USA		1		USA	2			USA	7	
36	USA		4	28: Sub-total			3	28: Sub-total			8
37	USA		1	35	USA		2	31	FRA		1
38	USA		2	36	SGP	1		35	USA		3
39	USA		1		USA	3		36	SGP	1	
48	FRA	1		36: Sub-total			4		USA	4	
	GBR	1		37	USA		1	36: Sub-total			5
48: Sub-total			2	38	USA		4	37	FRA	1	
52	USA		2	39	JPN		1		USA	1	
73	GBR	2		48	FRA	1		37: Sub-total			2
	USA	5			GBR	1		38	USA		3
73: Sub-total			7	48: Sub-total			2	48	GBR		1

87	GBR		1	50	GBR		1	50	GBR	1	
Total			24	51	USA		1		USA	1	
				52	USA		2	50: Sub-total			2
				53	FRA	1		51	USA		1
					USA	1		52	USA		1
				53: Sub-total			2	53	FRA	1	
				56	GBR		1		USA	1	
				57	USA		1	53: Sub-total			2
				73	GBR	2		56	GBR		1
					USA	5		57	USA		1
				73: Sub-total			7	73	DEU	1	
				87	GBR	1			GBR	3	
					USA	1			USA	6	
				87: Sub-total			2	73: Sub-total			10
				Total			36	87	GBR	1	
									USA	1	
								87: Sub-total			2
								99	USA		1
								Total			46

APPENDIX E. (*Continued*)

1994–2003				1995–2004			
Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies	
23	FRA	1		15	USA		1
	USA	1		27	USA		1
23: Sub-total			2	28	USA		3
27	USA		1	30	USA		1
28	FRA	1		31	FRA		1
	USA	6		35	ESP	1	
28: Sub-total			7		USA	3	
31	FRA		1	35: Sub-total			4
35	ESP	1		36	SGP	1	
	USA	3			USA	4	
35: Sub-total			4	36: Sub-total			5
36	FIN	1		37	USA		1
	SGP	1		38	DNK	1	
	USA	4			GBR	1	
36: Sub-total			6		USA	4	

37	USA		1	38: Sub-total			6
38	GBR	1		39	USA		1
	USA	3		44	USA		1
38: Sub-total			4	47	USA		1
39	USA		1	48	GBR		1
48	GBR		1	50	USA		1
50	USA		1	51	USA		1
52	USA		1	52	GBR	1	
53	USA		1		USA	1	
56	GBR		1	52: Sub-total			2
57	USA		1	53	USA		1
59	USA		1	56	GBR		1
73	CHE	1		57	USA		1
	DEU	1		73	DEU	1	
	GBR	2			GBR	1	
	USA	5			SWE	1	
73: Sub-total			9		USA	7	
87	GBR	1		73: Sub-total			10
	USA	1		87	GBR	1	
87: Sub-total			2		USA	1	
Total			45	87: Sub-total			2
				Total			46

APPENDIX E. (*Continued*)

1996–2005				1997–2006				1998–2007			
Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies	
15	USA		2	15	GBR	1		15	GBR	2	
20	USA		1		USA	1			USA	1	
27	USA		1	15: Sub-total			2	15: Sub-total			3
28	FRA	1		20	USA		2	20	CHE	1	
	USA	2		21	GBR		1		USA	1	
28: Sub-total			3	23	USA		1	20: Sub-total			2
30	USA		1	27	USA		1	21	GBR		1
34	IRL		1	28	USA		2	28	USA		5
35	ESP	1		34	IRL		1	31	FRA		1
	USA	4		35	USA		2	34	CHE	1	
35: Sub-total			5	36	USA		4		IRL	1	
36	FIN	1		37	USA		1	34: Sub-total			2
	USA	3		38	AUS	1		36	FIN	1	
36: Sub-total			4		DNK	1			USA	4	
37	USA		1		JPN	1		36: Sub-total			5

38	DNK	1			USA	6		37	USA		4
	JPN	1		38: Sub-total			9	38	AUS	1	
	USA	8		39	USA		1		CHE	1	
38: Sub-total			10	47	USA		1		DNK	1	
39	USA		1	50	USA		1		GBR	1	
44	USA		1	51	USA		1		JPN	1	
47	USA		1	52	GBR	1			USA	7	
48	GBR		1		USA	1		38: Sub-total			12
50	USA		1	52: Sub-total			2	39	USA		1
51	GBR	1		53	USA		4	47	USA		1
	USA	3		54	BEL		1	49	USA		1
51: Sub-total			4	55	USA		1	50	HKG	1	
52	GBR	1		56	GBR	1			USA	1	
	USA	1			SWE	1		50: Sub-total			2
52: Sub-total			2		USA	1		51	GBR	1	
53	USA		2	56: Sub-total			3		USA	2	
56	GBR	1		57	USA		1	51: Sub-total			3
	SWE	1		73	GBR	1		52	USA		1
	USA	1			USA	7		53	USA		1

APPENDIX E. (*Continued*)

1996–2005				1997–2006				1998–2007			
Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies		Industry group	Country	Quantity of companies	
56: Sub-total			3	73: Sub-total			8	54	BEL		1
57	USA		1	87	GBR	1		55	USA		1
73	GBR	1			USA	1		56	GBR	1	
	USA	8		87: Sub-total			2		SWE	1	
73: Sub-total			9	**Total**			52		USA	1	
87	GBR	1						56: Sub-total			3
	USA	1						57	USA		2
87: Sub-total			2					73	USA		5
Total			57					87	GBR	1	
									USA	1	
								87: Sub-total			2
								Total			59