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MDB Capital Group LLC

Seeing Value Others Do Not, Creating Value Others Can Not.

PATENTVEST TECH SCORE CORRELATES TO BUSINESS PERFORMANCE AND ALPHA IN MICRO-CAP ASSET CLASS

ABSTRACT

This study examines the correlation of PatentVest's Tech Score to several widely accepted measures of business performance; with the objective of further validating the link between corporate IP and such operating metrics as revenue growth, gross margin, R&D spending and most importantly, risk-adjusted return as measured by alpha. PatentVest Tech Score is a proprietary measure of the impact of a company's patents based upon a quantitative analysis of patent citations relative to a peer group of patents. In order to determine the predictive value of Tech Score, the study examined two separate groups of 100 micro-cap companies. Using PatentVest's Public Company Screener tool, **two cohort groups were segmented solely on the basis of Tech Score**, with one group consisting of companies with High-Tech Score ratings (HTS) and the other group consisting of Low-Tech Score (LTS) ratings. The study found that, although the HTS group of micro-cap companies had nearly identical beta to LTS companies, HTS stocks generated significantly higher alpha; as well as higher revenue growth, higher gross margin and higher R&D spending resulting in higher numbers of patent grants and patent applications than their LTS counterparts.

KEY FINDINGS

- **Superior Risk-Adjusted Returns:** Nearly identical beta for High-Tech Score (HTS) compared to Low-Tech Score (LTS) companies (**mean beta HTS 1.47 vs. 1.45 for LTS**). However, mean market return (52 Week % Price Change) for HTS companies was > 2x higher than LTS companies and nearly 3x the Russell 2000 benchmark (94.84% vs. 43.21% vs. 32.04% respectively). **One-year Alpha for HTS companies was an exceptional +43.78% vs. -7.21% for LTS companies (Δ +50.99%).**
- **High R&D Intensity:** HTS companies demonstrated a strong focus on innovation with notably higher investment in R&D. Specifically, R&D as a percent of Sales was 24.17% for HTS companies vs. 18.03% for LTS companies (+34%). In turn, **patent grants were nearly 2x higher** (57 vs. 30) and patent applications 35% higher (22 vs. 16) for HTS vs. LTS companies.
- **Increased Market Share:** HTS companies were able to increase revenues during a period of essentially flat GDP growth, indicative of market share gains at the expense of their less innovative counterparts. Compared to U.S. GDP growth in 2009 of +0.8%, HTS companies averaged +1.1% revenue growth vs. -9.3% for LTS companies during the same time period, **+38% better than the U.S. economy at large and +112% better than LTS companies.**
- **Increased Pricing Power:** In addition, technology leadership created sufficient differentiation to command a pricing premium, yielding **33% higher gross margins for HTS than LTS companies (gross margin 44.08% vs. 33.15%, Δ +10.93%).**

INTRODUCTION

As risk and return are key components of equity investing, a focus of this study was to explore the relationship between corporate IP and investment risk and risk-adjusted returns or alpha. One of the most popular indicators of risk in equity investing is the statistical measure known as beta which measures individual stock price volatility in relation to the market as a whole. By definition, the market has a beta of 1.0. A stock whose price swings more than the market over time has a beta above 1.0. If a stock's price movement is less than the market, the stock's beta will be less than 1.0. In theory, high-beta stocks carry more risk, but provide the potential for higher returns; conversely low-beta stocks pose less risk but also lower returns. A common market belief is that small-cap companies generally have betas well above 1.0, and as to be expected, micro-cap companies produce higher returns in exchange for even higher risk or volatility. Large-cap stocks, on the other hand, usually have lower betas and subsequently lower returns. The ideal would be to identify stocks with lower risk, therefore able to generate higher risk-adjusted returns or higher alpha.



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In recent years, patent data mining and bibliometric analysis have become increasingly important fields of competitive intelligence for investors seeking to generate excess returns. Landmark studies such as "Market Value and Patent Citation" published by Hall, Jaffe and Trajtenberg (2002) correlate the impact of patent citations on the market value and market premium of stocks. Recently, MDB published a white paper "Companies with Higher Rates of Technology Innovation Correlate with Superior Stock Price Performance Relative to Market Averages" by Byrne, Marlett and Mazzarella (2009). Using PatentVest's IP intelligence tools, this 7-year retrospective study showed companies with the highest compound annual growth rates of patent applications (application CAGR in the 99th percentile) substantially outperformed the major benchmark indices from 2001 – 2007 (PV Top 50 +156% vs. S&P 500 +9%, DJIA +20% , Russell 3000 +5% and Nasdaq Composite +4%).

This white paper seeks to identify any correlation between PatentVest's Tech Score on a company's business performance, as well as on its market risk (beta) and risk-adjusted return (alpha). As a measurement of the impact of a company's patents relative to a peer group of patents, a higher PatentVest's Tech Score is indicative of technology leadership within an industry compared to a company with a lower Tech Score. With technology leadership comes new products, competitive differentiation, gains in market share and pricing power. In general, this superior business performance translates into higher stock market returns over time.

A Tech Score of 1.0 reflects parity with its peer group; while a Tech Score below 1.0 means that the company's patents are not being cited as often as the peer group of patents and, therefore, indicative of a laggard. A Tech Score of 1.8 means a company's patents are cited 80% higher than its peer group of issued patents and would rank in the top quartile of roughly 3,000 public companies rated by PatentVest.

ANALYSIS

In order to understand and visualize the impact of the PatentVest Tech Score on stock performance and market value, this study was based upon an analysis of two cohort groups of publicly traded micro-cap companies segmented solely on the basis of Tech Score: High-Tech Score (HTS) group and Low-Tech Score group of companies. The exact selection criteria used to obtain the two different groups is displayed in the table below and was powered by PatentVest's **Public Company Screener** tool (image at right). The screening process produced 182 HTS public companies and 266 LTS public companies within the selection criteria (see results on table below). In order to get the top 100 for each group, the companies were sorted on an ascending order based on their Tech Score. For this study companies that trade on the NASDAQ Bulletin Board were excluded. In compiling the two groups of companies the HTS group's Tech Scores fell in the range of 27.94 to 1.88. The LTS group's Tech Scores were in the range of 0.80 to 0.00, After the two groups were identified, we computed values for or collected data on the following metrics: **Beta**, **52-Week % change in stock price** (Feb 2 2009 – Jan 25 2010); **Gross Margin** (ttm); **Operating Margin** (ttm); **R&D as a % of Sales**; **Trading Volume** (average 3 months), as well as **Revenue Growth** (ttm).



Mean and Median values were calculated for each set of data.



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PATENTVEST SCREENING CRITERIA

Criteria	For HTS Companies:	For LTS Companies:
Market Cap	< \$200 million	< \$200 million
# Grants	>= 5	>= 5
# Patent Appls.	>= 1	>= 1
Tech Score	>= 1.80	<= 0.80
PatentVest Results: (# companies)	182	266

The following lists show the top 100 HTS and top 100 LTS companies used in this study:

TOP 100 HTS MICRO-CAP COMPANIES

1 (SABA) Saba Software, Inc.	34 (ULGX) Urologix, Inc.	67 (HURC) Hurco Cos Inc.
2 (WAVX) Wave Systems Corp. CI A	35 (BEAT) CardioNet, Inc.	68 (NWK) Network Equipment
3 (IDIX) Idenix Pharmaceuticals, Inc.	36 (PMTI) Palomar Medical Technologies	69 (VRNM) Verenum Corp.
4 (PLUS) ePlus, Inc.	37 (SLTM) Thermage, Inc.	70 (AEHR) Aehr Test Systems
5 (HDIX) Home Diagnostics, Inc.	38 (NMTI) NMT Medical, Inc.	71 (SATC) Satcon Technology
6 (WSTL) Westell Technologies CI A	39 (IMMR) Immersion Corp.	72 (TSEM) Tower Semiconductor Ltd.
7 (PTC) Par Tech	40 (RTIX) RTI Biologics, Inc.	73 (SPIR) Spire Corp.
8 (OPWV) Openwave Systems Inc.	41 (PSID) VeriChip Corp.	74 (PXLW) Pixelworks, Inc.
9 (ACTU) Actuate Corp.	42 (SYNO) Synovis Life Technologies	75 (MSON) Misonix Inc
10 (OPTV) OpenTV Corporation CL A	43 (HNSN) Hansen Medical, Inc.	76 (CDTI) Clean Diesel Technology, Inc.
11 (KEYN) Keynote Systems, Inc.	44 (NANX) Nanophase Technlg	77 (TSON) TranS1, Inc.
12 (NLST) Netlist, Inc.	45 (OCCF) Optical Cable Corp.	78 (NVMI) Nova Measuring Instruments
13 (XNN) Xenonics Holdings, Inc.	46 (CALP) Caliper Life Sciences, Inc.	79 (HYC) Hypercom Corp
14 (ORCH) Orchid Cellmark, Inc.	47 (ABTL) Autobytel, Inc.	80 (SUMR) Summer Infant, Inc.
15 (AUDC) Audio Codes Limited	48 (MOSY) MoSys, Inc.	81 (VSCI) Vision Sciences, Inc.
16 (MGAM) Multimedia Games	49 (SMMX) Symyx Technologies, Inc.	82 (QUIK) QuickLogic Corporation
17 (OSTE) Osteotech, Inc.	50 (VIRC) Virco Manufacturing Corp.	83 (ROCM) Rochester Medical Corp.
18 (VICAL) Vical, Inc.	51 (ARBX) Arbinet - Thexchange, Inc.	84 (DMC) Document Security Systems
19 (FALC) FalconStor Software Inc	52 (EDCI) EDCI Holdings, Inc.	85 (KTOS) Kratos Def&Sec Solution Inc.
20 (IDSY) I.D. Systems Inc	53 (AUTH) AuthenTec, Inc.	86 (ATRO) Astronics Corp.
21 (GSAT) Globalstar, Inc.	54 (USAT) USA Technologies, Inc.	87 (BLDP) Ballard Power Syst
22 (LCRD) LaserCard Corporation	55 (ZHNE) Zhone Technologies, Inc.	88 (VTRO) Vertro, Inc.
23 (PVSW) Pervasive Software, Inc.	56 (SHLO) Shiloh Industries, Inc.	89 (ESYS) Elecsys Corporation
24 (ZIXI) Zix Corp.	57 (HTRN) Health Tronics, Inc.	90 (ARGN) Amerigon, Inc.
25 (UPI) Uroplasty, Inc.	58 (WWW) Website Pros, Inc.	91 (RMTR) Ramtron Internet
26 (ACTI) ActivIdentity Corporatio	59 (SIMG) Silicon Image, Inc.	92 (UIS) Unisys Cp
27 (CASM) CAS Medical Systems, Inc.	60 (RAE) RAE Systems, Inc.	93 (UTMD) Utah Medical Prods
28 (ADGF) Adams Golf, Inc.	61 (TUNE) Microtune Inc.	94 (RIMG) Rimage Cp
29 (VTAL) Vital Images, Inc.	62 (LNET) Lodgenet Entertainment Corp.	95 (TRID) Trident Microsystems, Inc.
30 (SYNM) Syntroleum Corporation	63 (RVP) Retractable Technologies, Inc.	96 (ARCW) Arc Wireless Solutions, Inc.
31 (LAVA) Magma Design Automation, Inc.	64 (VSCP) VirtualScopics, Inc.	97 (EXAS) Exact Sciences Corporation
32 (IPAS) iPass, Inc.	65 (CUTR) Cutera, Inc.	98 (ICAD) icad, Inc.
33 (NMRX) Numerex Cp A PA	66 (BSQR) Bsquare Corporation	99 (NVEC) NVE Corp.
		100 (WRLS) Telular Corp.



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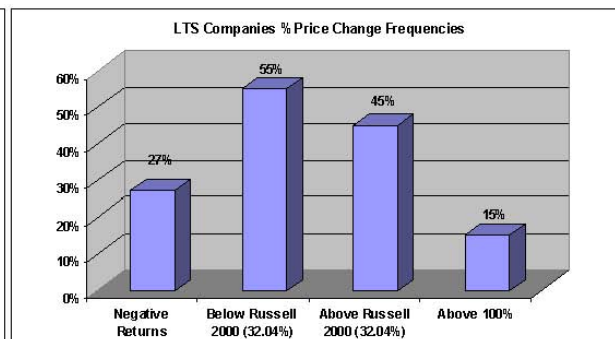
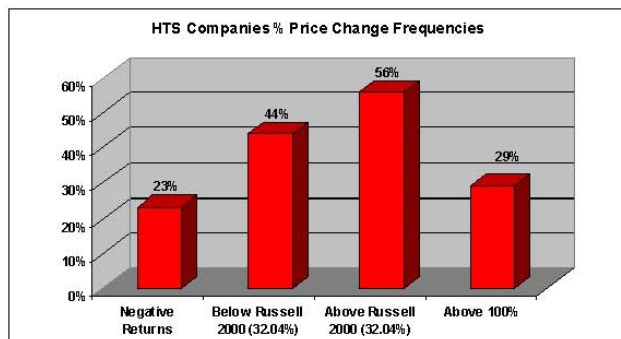
TOP 100 LTS MICRO-CAP COMPANIES

1 (MCZ) Mad Catz Interactive Inc	34 (PMD) Psychemedics Corp.	67 (GMTC) GameTech Intl Inc
2 (SMIT) Schmitt Industries, Inc.	35 (API) Advanced Photonix	68 (ZRBA) Zareba Systems, Inc.
3 (CREL) Corel Corporation	36 (KAI) Kadant Inc	69 (FLML) Flamel Technologs
4 (LYTS) LSI Industries Inc	37 (PKOH) Park Ohio Holdings Corp.	70 (ULBI) Ultralife Corp.
5 (STRC) SRI/Surgical Express, Inc.	38 (ISTA) Ista Pharmaceuticals, Inc.	71 (CBM) Cambrex Corp.
6 (SCMM) SCM Microsystems, Inc.	39 (GRB) Gerber Scientific, Inc.	72 (NEXM) Nexmed Incorporated
7 (FTK) Flotek Industries, Inc.	40 (BOLT) Bolt Technology Corp.	73 (ELSE) Electro-Sensors Inc
8 (NPSP) NPS Pharmaceuticl	41 (FTEK) Fuel Tech, Inc.	74 (PGNX) Progenics Pharm
9 (PXG) Phoenix Footwear Group, Inc.	42 (TACT) Transact Technologies, Inc.	75 (BCON) Beacon Power Corporation
10 (TWMC) Trans World Entertain Corp.	43 (SCX) L.S. Starrett Co. The	76 (MGT) MGT Capital Invtmnts, Inc.
11 (FLOW) Flow International Corp.	44 (MEMS) Memsic, Inc.	77 (ASYS) Amtech Systems, Inc.
12 (WAVE) Nextwave Wireless, Inc.	45 (NYMX) Nymox Pharmaceutical Corp.	78 (ESCA) Escalade, Inc.
13 (GBX) Greenbrier Companies, Inc.	46 (ILI) Interleukin Genetics, Inc.	79 (HLCS) Helicos BioSciences Corp.
14 (STS) Supreme Ind	47 (MTXX) Matrixx Initiatives, Inc.	80 (MOCO) MOCON Inc
15 (TECUA) Tecumseh Products Class A	48 (LABL) Multi-Color Corp	81 (TWIN) Twin Disc Inc
16 (AFOP) Alliance Fiber Optics	49 (PRPX) Portec Rail Products, Inc.	82 (KKD) Krispy Kreme Doughnuts Corp.
17 (GTCB) GTC Biotherapeutics, Inc.	50 (UCTT) Ultra Clean Holdings Inc.	83 (ARRY) Array Biopharma Inc.
18 (MAG) Magnetek Inc	51 (OESX) Orion Energy Systems, Inc.	84 (DXPE) DXP Enterprises Inc.
19 (ODC) Oil-Dri Corporation of Amer	52 (DRAM) Dataram Corp.	85 (SVT) Servotronics
20 (FONR) Fonar Corp.	53 (SPAR) Spartan Motors, Inc.	86 (WVVI) Willamette Valley Vineyards
21 (LCUT) Lifetime Brands, Inc.	54 (THMD) Thermadyne Holdings Corp.	87 (TRIB) Trinity Biotech PLC ADR
22 (MRM) Merrimac Industries	55 (AMIN) American Int'l Industries	88 (SDIX) Strategic Diagnostics, Inc.
23 (OFLX) Omega Flex, Inc.	56 (VIDE) Video Display Corporation	89 (KMGB) KMG Chemicals, Inc.
24 (BLTI) Biolase Technology, Inc.	57 (ADES) ADA-ES Inc.	90 (AEZS) AEterna Zentaris, Inc.
25 (NCS) NCI Building Syst	58 (BTUI) BTU Internat Inc	91 (IKNX) Ikonics Corp.
26 (CBRX) Columbia Labs Inc	59 (CCIX) Coleman Cable, Inc.	92 (OICO) O.I. Corp.
27 (WXCO) WHX Corp.	60 (GENC) Gencor Industries, Inc.	93 (NTIC) Northern Technologies Intl
28 (TRS) TriMas Corp.	61 (DIVX) DivX, Inc.	94 (LVB) Steinway Mus
29 (XRM) Xerium Technologies, Inc.	62 (UUU) Universal Security Instrumnt	95 (ABL) American Biltrite
30 (CTIB) CTI Industries Corp	63 (BLD) Baldwin Tech A	96 (BBW) Build-A-Bear Workshop, Inc.
31 (HYGS) Hydrogenics Corporation	64 (MFRI) MFRI Inc	97 (ENTN) Entorian Technologies, Inc.
32 (TIII) TII Network Technologies Inc	65 (HDNG) Hardinge Inc	98 (GAIA) Gaia, Inc. Class A
33 (HLYS) Heelys, Inc.	66 (CSS) CSS Industries, Inc.	99 (CRWS) Crown Crafts, Inc.
		100 (AERG) Applied Energetics, Inc.

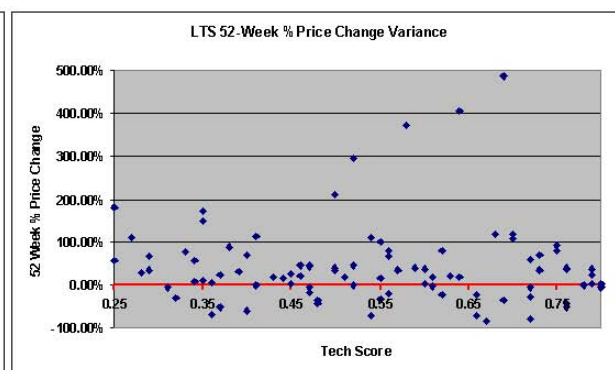
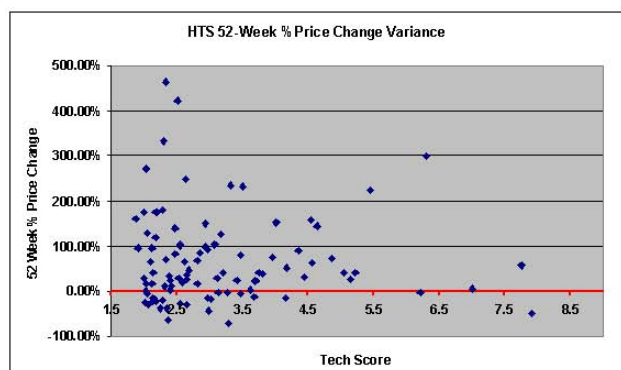
STUDY FINDINGS

By examining the different business/analytical metrics from the two groups of companies, the following results were derived:

- **One-year Alpha for HTS companies was an exceptional +43.78% vs. -7.21% for LTS companies (Δ +50.99%).**
- **Equivalent Beta:** As expected, most micro-cap companies have Beta values > 1.0. Of note is the observation that the mean value of Beta in HTS companies is almost identical to the value of Beta in the LTS grouping of companies (1.47 vs. 1.45).
- **Significantly Higher Returns:** In spite of the same mean value of Beta, the HTS companies demonstrated a 52-Week % Price Change that was 121.82% higher than LTS group of companies (94.84% vs. 43.21%).
- **52-Week % Price Performance:** Employing histograms to analyze the frequencies of the price performance data distribution clearly demonstrates stock price returns that were significantly better for the HTS group of companies. Specifically, 56% of HTS companies reported performance above the return of the Russell 2000 index, compared to 45% of LTS companies. Furthermore, just 44% of HTS companies reported stock price returns below that of the Russell 2000 (32.04%), compared to 56% of LTS companies.

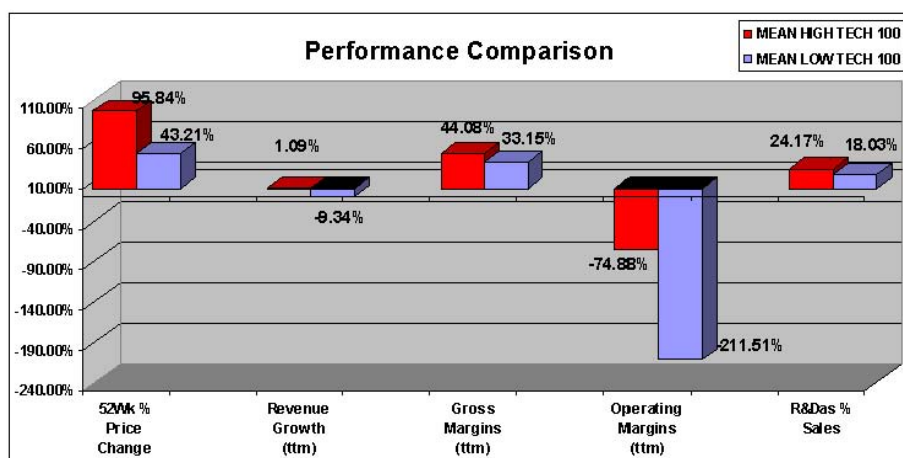


- Additionally, despite the similar Beta values, the variance – in terms of positive and negative returns – in the 52-Week % Price Change of HTS companies appears to be much less than LTS companies. The following graphs illustrate this theory. Notice the distribution in both graphs: the points in the LTS graph appear spread widely over the chart area, swinging from negative to positive y-values (52 Week % change). On the other hand, the points in the HTS graph are highly concentrated above the positive y-axis with only a few points falling below 0 (red line), suggesting more consistency in the price return potential.



Overall Performance Advantage:

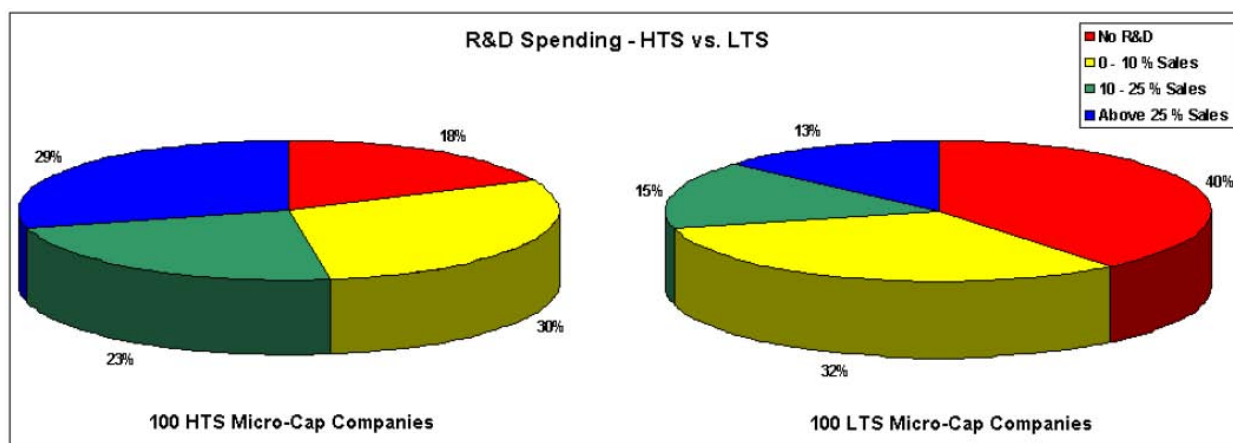
With overall higher Tech Scores, the HTS companies enjoy a technology leadership position which in turn correlates to better performance in other business metrics. Specifically (based on mean values computed for both groups of companies), the HTS companies demonstrated higher investments in R&D (24.17% vs. 18.03%) which logically translates into richer IP portfolios (57 grants vs. 30 grants), higher gross margins (44.08% vs. 33.15%), higher operational margins (-74.88% vs. -211.51%), and higher revenue growth (0.1% vs. -7.9%). Not surprisingly, the market appears to recognize this overall competitive advantage as reflected in the higher stock price performance (94.84% vs. 43.21%).



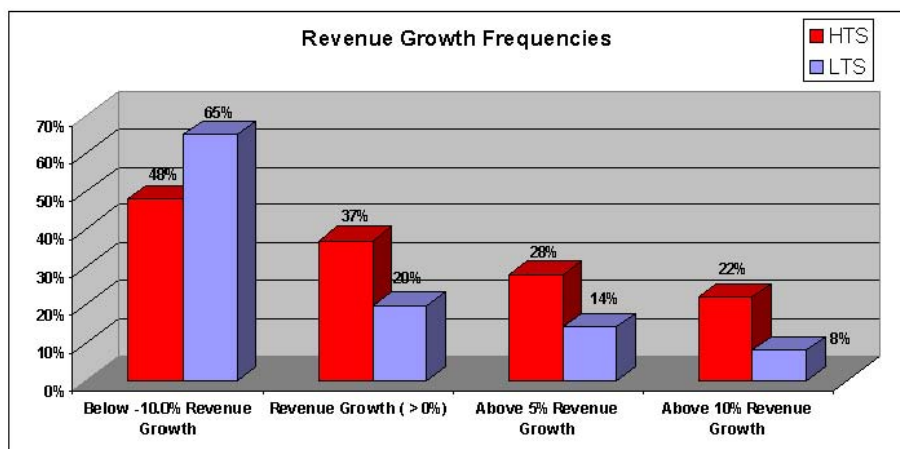
SUMMARY RESULTS

	Tech Score	Grants	Appls.	Market Cap (\$ mm)	Price	Beta	Volume	52Wk % Price Change	Revenue Growth (ttm)	Gross Margins (ttm)	Operating Margins (ttm)	RD % Sales
MEAN HIGH TECH 100	3.49	57	22	116.14	\$5.17	1.47	205,446	95.84%	1.09%	44.08%	-74.88%	24.17%
MEAN LOW TECH 100	0.50	30	16	73.63	\$5.87	1.45	229,648	43.21%	-9.34%	33.15%	-211.51%	18.03%
DELTA	2.99	27	6	42.51	-\$0.69	0.02	-24,201	52.64%	10.43%	10.93%	136.62%	6.14%
PCT % DIFFERENCE	597.20%	88.54%	34.85%	57.73%	-11.81%	1.47%	-10.54%	121.82%	111.66%	32.97%	64.60%	34.03%

- Innovation Focus:** The technology leadership of HTS companies is achieved through strong focus on innovation supported by higher R&D spending. As seen from the picture below, only 18% of HTS micro-cap companies have no R&D spending compared to 40% of LTS micro-cap companies. In addition, 29% of HTS companies have R&D spending as % Sales above 25% compared to only 13% of LTS companies. The superiority of R&D resources in HTS companies is significant.



- LTS Companies Losing Market Share:** In these tough economic times, most companies have experienced a decline in revenues. However, the mean value for Revenue Growth for HTS companies is +1.1%, compared to +0.8% for U.S. GDP and -9.3% for LTS companies, This metric would seem to indicate that the marketplace perceives the HTS companies to have more highly valued products. In addition, as seen from the graph below, 37% of HTS companies reported Revenue Growth (> 0%) compared to only 20% of LTS companies; and 22% of HTS companies demonstrated Revenue Growth above 10%, compared to just 8% of LTS companies.





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CONCLUSION

Micro-cap companies are typically characterized by higher market return potential, accompanied by higher market risk and volatility. However, this study has shown that, although beta values are nearly identical for both HTS and LTS companies, the 52-week market return is significantly higher for HTS companies than both its LTS counterpart and broader benchmark indices.

Most significantly, the one-year Alpha for HTS companies was an exceptional +43.78% vs. -7.21% for LTS companies (Δ +50.99%).

The data from this study also demonstrated that the high level of innovation in HTS micro-cap companies is enabled by a strong focus on R&D investment. This investment, in turn, has been shown to translate into new products, market share gains, pricing power, higher gross margin, as well as greater growth potential.

Certainly, investors and fund managers can improve their investment decision-making process by considering the value of PatentVest Tech Scores metrics; as companies ranking in the top quartile for Tech Score have been shown to be predictive of superior business performance and exceptional risk-adjusted returns.

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