Are Relevant Statistics for Patent-related Matters Difficult to Analyze ?

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Trends Analysis and Projections
Geneva : Sept 17, 2003

CHI Research is a Highly Specialized Citation Research Consultancy

TRACES Study: Precursor to CHI
Science Indicators since 1970's
Technology Indicators since 1980's
Linkage Indicators since 1990's

Published 140+ research papers
Featured in the New York Times, Business Week
MIT Tech. Review, and other media

Investor Tech-Line®
Financial Application of Technology Indicators

U.S. Patent No. 6,175,824
"Method and Apparatus for Choosing a Stock Portfolio, Based on Patent Indicators"

Patent Statistics are *not* inherently difficult to analyze

- If they are properly *normalized,*
- If the underlying data are properly cleaned up (*unified*),
- If the indicators are properly *validated.*
- *Normalization* and *Unification* are very difficult in databases primarily designed for searching and information retrieval.

Normalization

- Patent properties vary widely across different technologies

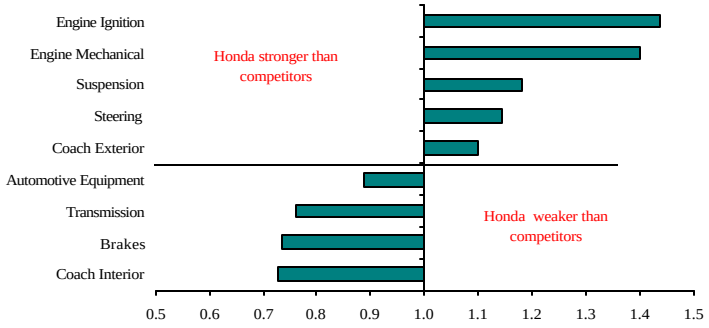
  Example : Science Linkage is

  0 to 1 Auto Mechanical Technologies
  5 to 10 in Pharmaceuticals
  20 or higher in Genetic Engineering

- Patent citation distributions are highly skewed
- Inventor Productivity is highly concentrated in a few individuals

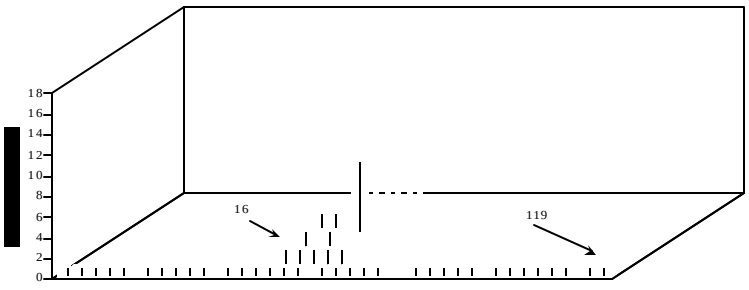
Figure 1
Competitor Assessment Key Result

Honda citation impact benchmarked against 11 competitors



Ratio of citation impact 1986-1990 - Honda/11 competitors

A Few Key Inventors Drive an Entire Lab.
Xerox Semiconductor Inventors 1981-87



Each stick represents 1 Xerox Inventor: the height is the number of his/her patents in the 7 year period.

Data Unification -

- Company Names
- Inventor Names
- Inventor and Company Locations
- Science Reference Unification
- Citation Matching – especially in patents with external system priority and references

Assignee Names must be Unified

- We track all patenting organizations, but clean and unify the top 1,800+ patenting organizations.
- These 1800 organizations patent under

  25,000 different names currently
  40,000 different names since 1980

- Aventis patents under 300 or so different names

Aventis has 29,000+ Patents; About 1% have "Aventis" in the Assignee Field.

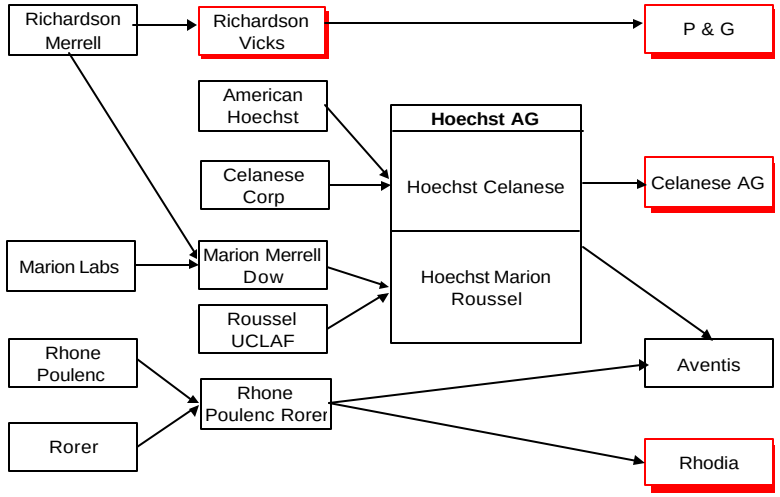


Figure modified from Edlyn Simmons Figure:PIUG 2000 Meeting

Indicator Validation

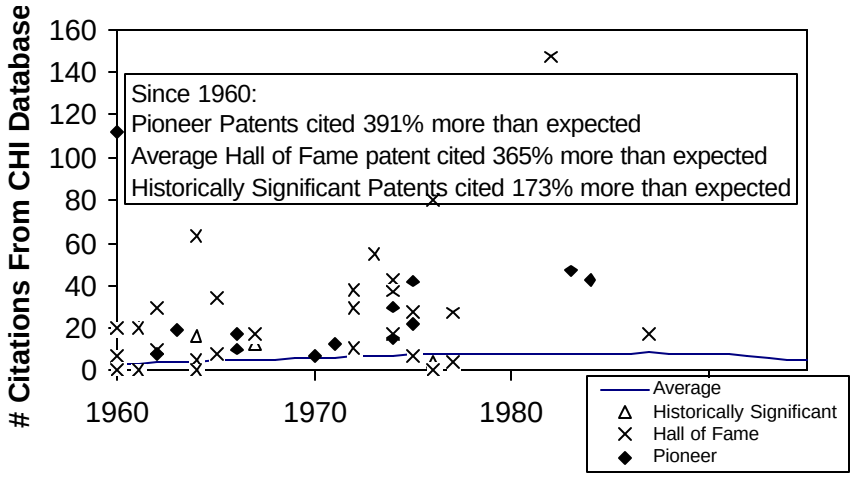
Because there is no absolute standard for quality in technology, or in science , validation must be done by

- **Comparing patent based indicators with external measures of quality, or**
- **Comparing the performance of companies with their patent quality and quantity indicators, or**
- **by other comparative analyses of patent vs. non-patent measures.**

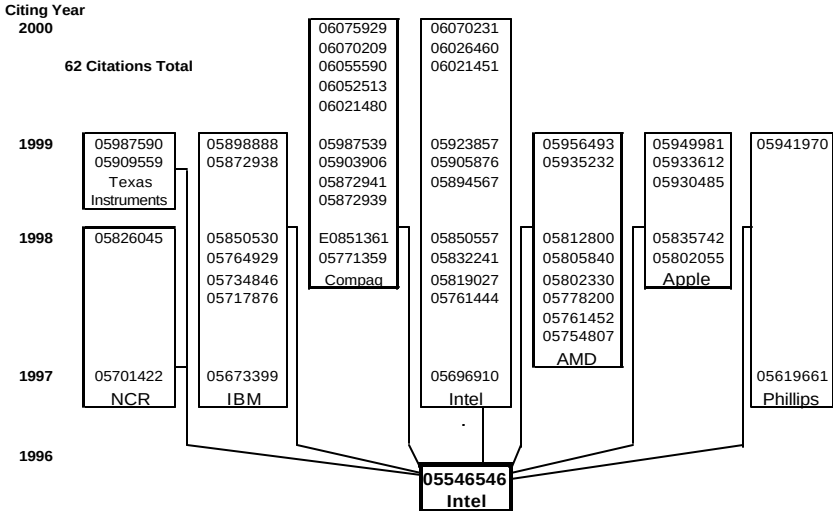
Validation Studies

- Science Intensive patent categories cite to research papers
- Highly cited patents and clusters identify important discoveries
- Patents associated with various awards are far more highly cited than expected
- Patents making important contributions are more highly cited

Outstanding Patents are Very Highly Cited

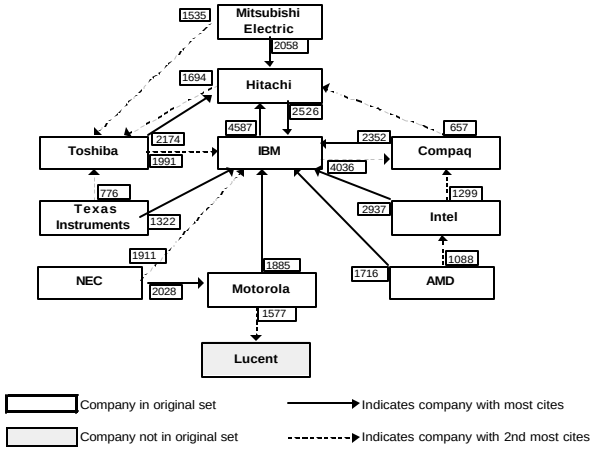


A Highly Cited Patent from Intel; Citers include Compaq, IBM, AMD and others

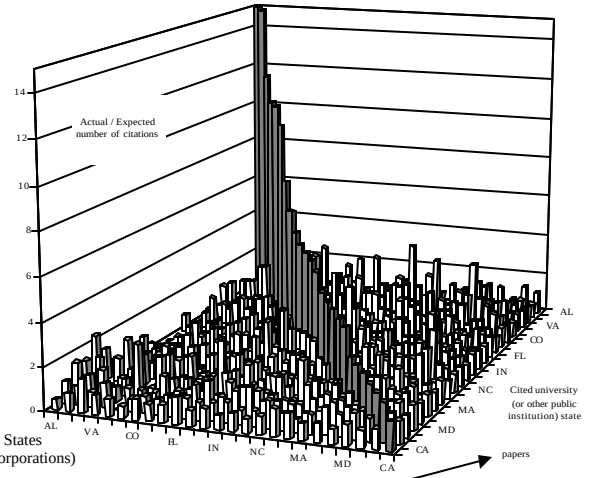


14 Citing Patents from Toshiba, Sun, National Semiconductor etc. removed for space considerations.

Example:Everyone is Building Upon IBM's Semiconductor Technology



- **Companies preferentially cite in-state public sector science in their patents (Cites from Industry Patents to Public Sector Papers)**



Citing Patent States (Inventors from Corporations)

Expected # of citations = patent state's # of citations to all states multiplied by paper state's share of cites received from all states

Quality Technology is Valuable

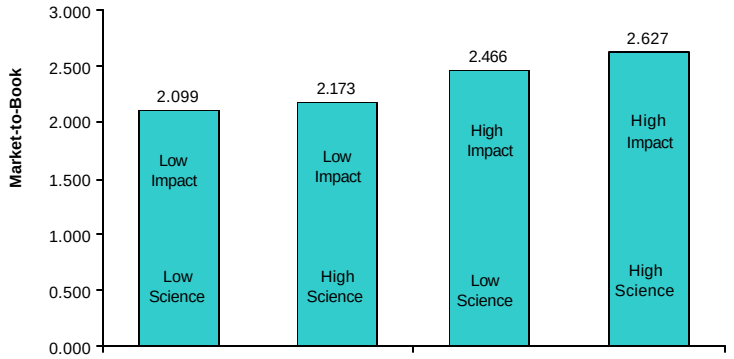
Patent citation indicators can identify
technologically strong companies
which are undervalued by the market

A portfolio built of these undervalued companies will far outperform <u>any</u> standard index.

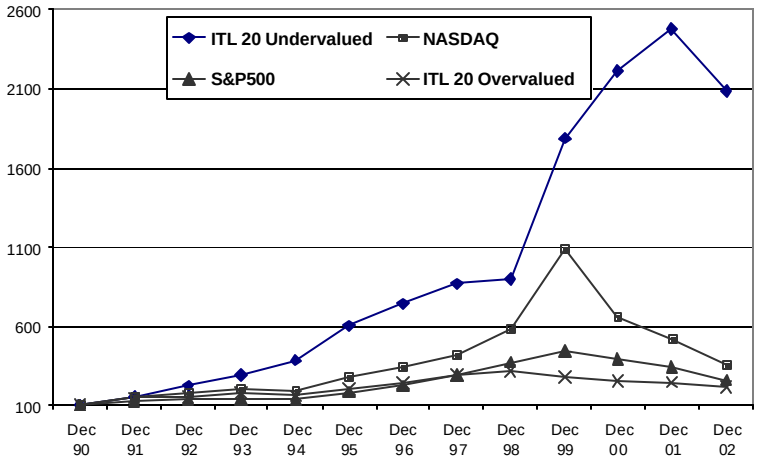
The number of patents a company has is <u>not</u> significant in the regression – it is the citation indicators that count.

Background: 1999 Financial Analysts Journal Paper by Deng, Lev and Narin

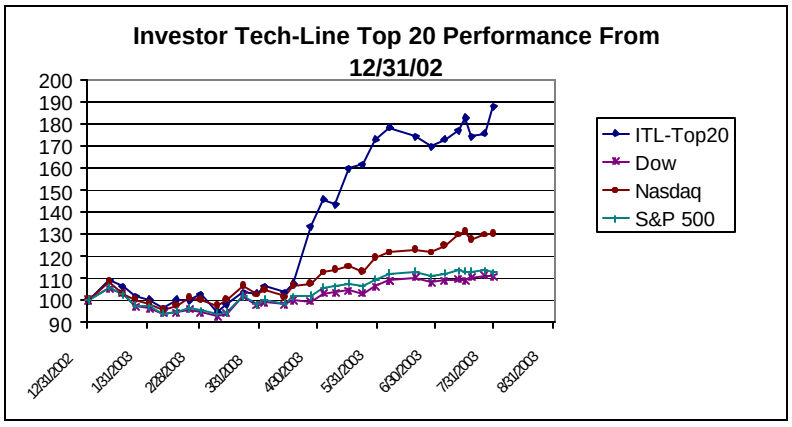
Median Market-to-Book Ratios of Chemical Companies Classified by Patent Impact & Science Linkage in the Previous 3 Years



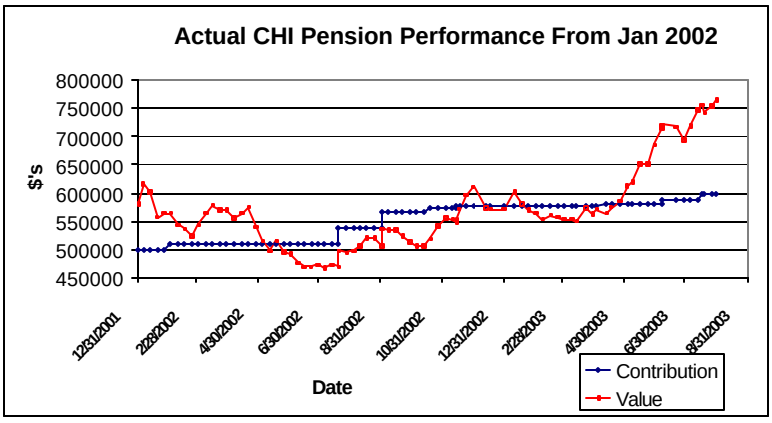
Investor Tech-Line® Performance



2003 Investor Tech-Line Performance



Real Performance With Top Investor Tech-Line Stocks



Summary of Key Points

Normalization make indicators meaningful.

Unification make indicators accurate.

Validation makes indicators acceptable.

Doing all 3 requires a lot of data infrastructure and maintenance.

But, when all 3 are done, the resulting indicators are not difficult to analyze.