Forecasting USPTO Patent Application Filings

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By
Frederick L. Joutz
Research Program on Forecasting
Department of Economics
The George Washington University
Washington, DC 20052
bmark@gwu.edu

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Overview of the USPTO

- Fully-fee funded Government agency
- 6,939 Federal employees
- Total earned revenue - $1.1 Billion in FY 2002
- Two major business lines
  - Patents
    - 86% of total revenue
  - Trademarks
    - 14% of total revenue
- Patent filings is a major variable affecting revenue and other key forecasts and planning decisions (e.g., hiring)
Patent Filings Overview

- Annual Filings Growth Rates by Decade
  - No growth in the 1970s
  - About 4.1% annual growth in the 1980s
  - About 5.3% annual growth in the 1990s

- Key events affecting the patent filings trend
  - Fiscal Year 1983 fee increase
    - Filing fees increased by more than 100% and reduced fees offered for small entities (500 employees or less)
  - Fiscal Year 1995 patent term change
    - 20 year patent term replaced 17 year patent term
USPTO Patent Filings Since 1970

Utility, Plant and Reissue Patent Filings

Fiscal Years

Benchmark Forecasts
Three Basic Approaches to Forecasting

- **Quantitative Modeling**
- **Customer Survey**
- **Expert Opinion - (Delphi Method)**

- Because of the importance attached to filing rate forecast accuracy, the USPTO approaches this task using different forecasting methods.
- Each method has its strength and weakness.
- **Scenarios** are developed by combining these methods. The USPTO attempts to use all available information to balance the weakness of one methodology with the strength of another methodology.
1) Quantitative Modeling

- Two Modeling Approaches
- **Modeling Historical Statistical Attributes**
  - Trend
  - Growth rates
  - Breaks or Structural Changes
- **Modeling Historical Relationships**
  - Economic indicators
  - Other patenting factors (e.g., fees, institutions)
Modeling Historical Statistical Attributes

- Averages and Simple Trends
- Holts Exponential Smoothing
- Winters Exponential Smoothing
- Box-Jenkins (ARIMA and Intervention)
Modeling Relationships

- **Econometric Modeling of Key Indicators**
  - Combine Economic Theory and Time Series
  - **Supply Side Determinants**
    - R&D effort and expenditures
    - Stock of “Knowledge”
  - **Demand Side Determinants**
    - Real GDP
    - USPTO patent filing fees
  - **Other Variables to be Explored**
    - Standard and Poor’s 500 Index
    - Venture Capital Investment
Modeling Relationships (cont’d)

- Stable Long-run and Dynamic Relationships
  - Distributed Lags and Cointegration
  - Error Correction

- Growth in Patents depends on
  - R&D
  - GDP
  - Fees
  - Stock of Knowledge

\[
\Delta \text{Pats}_t = \beta_0 + \beta_1 \Delta \text{RD}_{t-1} + \beta_2 \Delta \text{GDP}_{t-1} + \beta_3 \Delta \text{Fee}_{t-1} + \beta_4 \Delta \text{KnowStock}_{t-1} + \alpha (\text{Pats}_{t-1} - \gamma \text{RD}_{t-1}) + u_t
\]
Patent Filings and R&D Expenditures
Model Results and Use

- The newest R&D model utilized since fiscal year 2000 includes the one-year lag of industry R&D investment and a one-year lag of USPTO filings.
- From fiscal year 2000 through 2002, the one-year ahead forecasts errors have been less than five percent.
- Models must be used in conjunction with other methodologies given limited factors.
- This year, it appears the model will be off by about 7.9 percent.
- Refine models over time with new factors and technology.
2) Survey

- Initiated in fiscal year 2001

- Goal
  - To develop workload forecasts with input from a sample of industry and the inventor community

- Sample U.S. customers only
Groups Sampled

- **Domestic patent customer groups:**
  - **Large Entities**
    - Largest 209 application generating entities
  - **Small Entities**
    - Randomly selected from a USPTO data base
  - **Independent Inventors**
    - Nationally representative sample of independent inventors maintained in-house by USPTO
  - **Universities/Non-Profit**
    - Largest 50 application-generating entities
Latest Survey Results

- Survey conducted between late October 2002 and January 2003
- 1,831 questionnaires distributed
- Response rates varied widely by group
  - Large corporations -- 41%
  - Small businesses -- 9%
  - Universities/Non-profits -- 31%
  - Independent inventors -- 14%
2003-2004 Activities -- Integrative Phase

- **Objectives**
  - Integrate lessons learned from past surveys
  - Coordinate more closely with EPO and JPO annual surveys
    - Ensure that agreed-upon common queries are included
    - Develop method of integrating results
  - Complete within 12 months
3) Expert Opinion

- The USPTO endeavors to gather pertinent information within the agency and bring it to bear in a disciplined manner.
- Changes in procedures and rules can, for example, increase or decrease the attractiveness of patent protection.
Expert Opinion Continued

- No one knows these changes better than the **USPTO lawyers** who analyze them, draft them, and interact with customers with regard to them.

- **USPTO technical directors** have an unparalleled view of the technology world in which they are expert.

- In many cases, these individuals can **spot future shifts in demand** that no econometric model or survey could ever hope to incorporate.
Constructing a Forecast based on a Scenario

- Assemble forecast-relevant information
- In many instances the three methodologies’ forecasts are similar
- However, the methodologies’ forecast diverged in FY 1995 and FY 2003
- Integrate and Develop Scenarios
- This is as much an art as a science.
- Select a most likely Scenario.
Conclusion

- Forecasting USPTO patent filings is a major undertaking, considering that major cyclical turns, structural changes, and the accompanying uncertainty must be taken into account.

- The USPTO relies on different forecasting methodologies.

- The final forecast is obtained from combining formal models, the survey information, and the judgmental views of experts.

- Combining different methodologies improves the overall forecasting accuracy.

- Questions and Answers

- Thank you