

# Forecasting USPTO Patent Application Filings

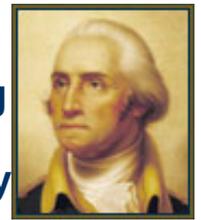
---

Prepared for

**WIPO-OECD Workshop on Statistics in the Patent Field,  
18-19 September 2003, Geneva, Switzerland**

By

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



Benchmark Forecasts

Acknowledgements: This presentation benefited from helpful comments and suggestions by Barry Riordan and Costas Mastrogianis. Any errors or omissions are my own. All opinions are mine and independent of the USPTO.

# 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)



Benchmark Forecasts

# Patent Filings Overview

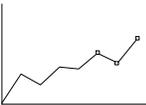
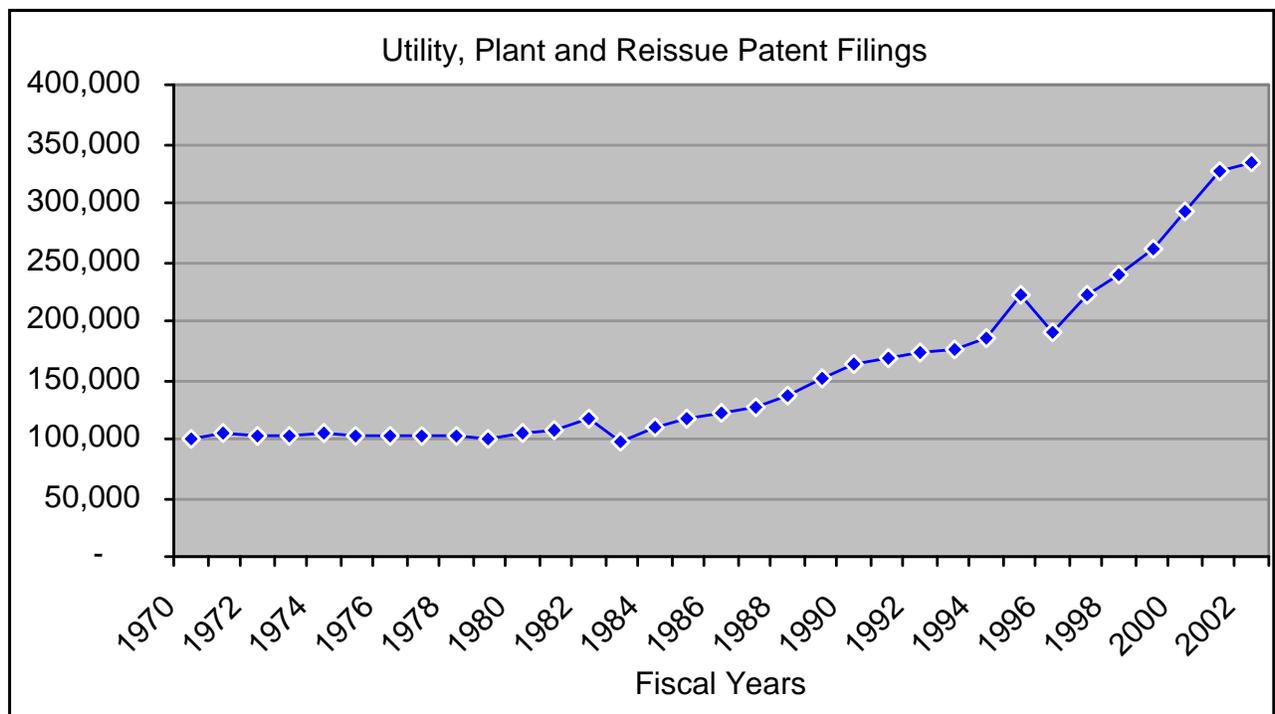
---

- 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



Benchmark Forecasts

# USPTO Patent Filings Since 1970



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.



Benchmark Forecasts

# 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)

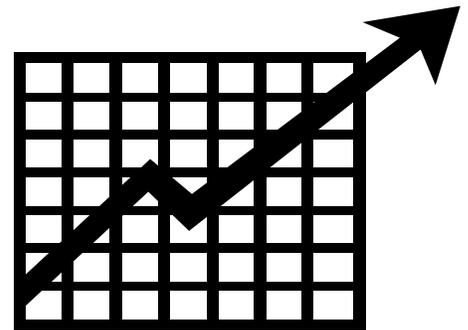


Benchmark Forecasts

# Modeling Historical Statistical Attributes

---

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



Benchmark Forecasts

# 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



Benchmark Forecasts

## Modeling Relationships (cont'd)

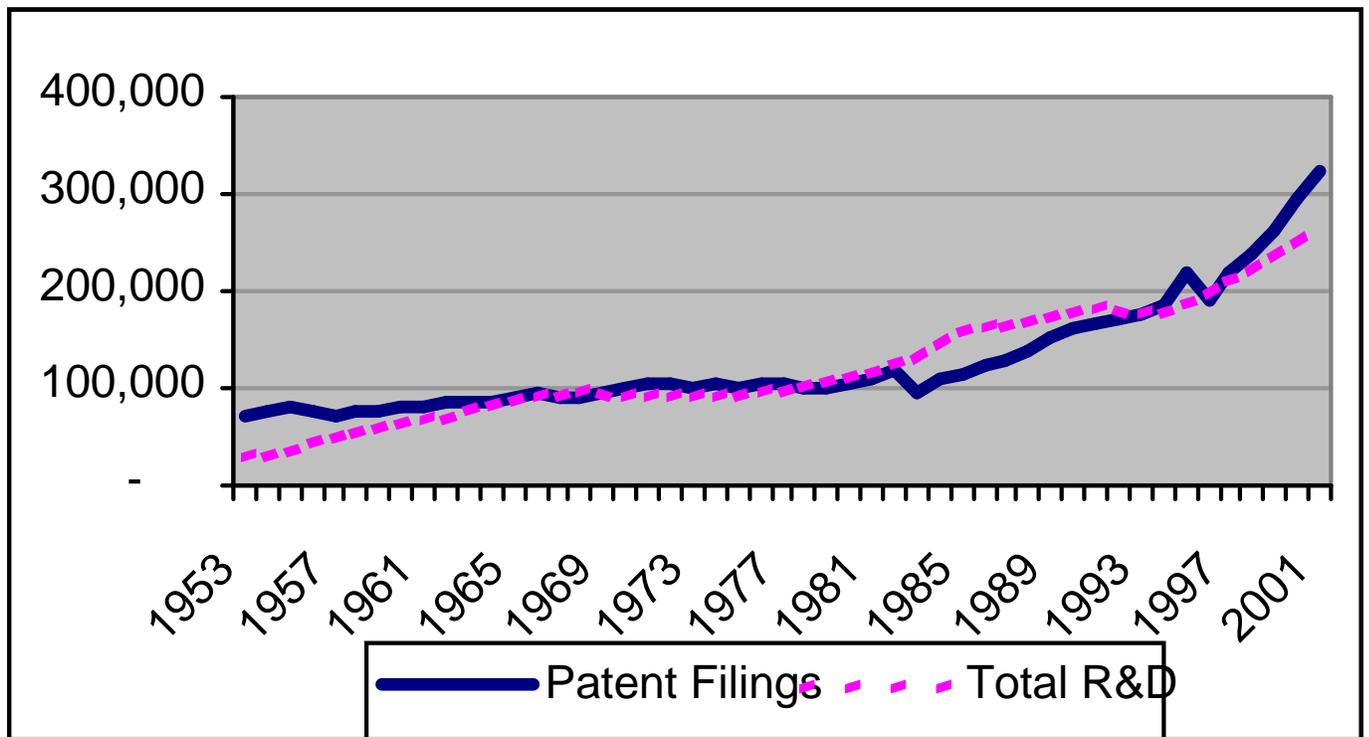
- Stable Long-run and Dynamic Relationships
  - Distributed Lags and Cointegration
  - Error Correction
- Growth in Patents depends on
  - R&D
  - GDP
  - Fees
  - Stock of Knowledge

$$\Delta Pats_t = \beta_0 + \beta_1 * \Delta RD_{t-1} + \beta_2 * \Delta GDP_{t-1} + \beta_3 * \Delta Fee_{t-1} \\ + \beta_4 * KnowStock_{t-1} + \alpha * (Pats_{t-1} - \gamma RD_{t-1}) + u_t$$



Benchmark Forecasts

# Patent Filings and R&D Expenditures

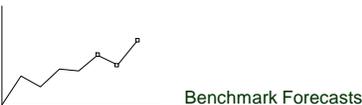


Benchmark Forecasts

# Model Results and Use

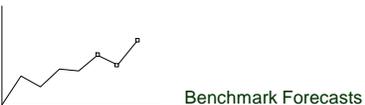
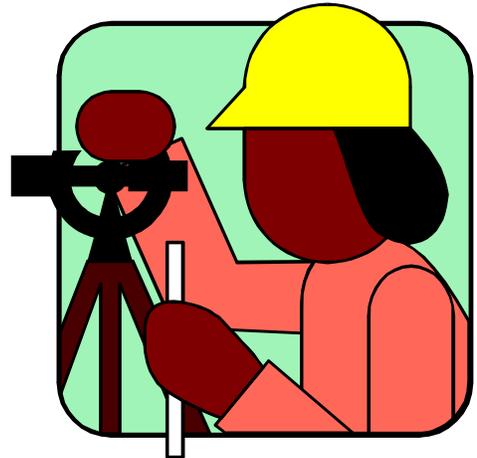
---

- 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

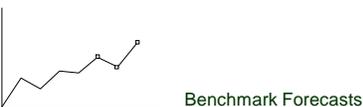


Benchmark Forecasts

# 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**



Benchmark Forecasts

## 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.



Benchmark Forecasts

## Expert Opinion Continued

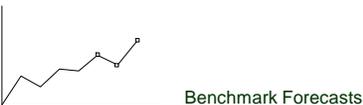
- No one knows these changes better than the **USPTO lawyers** who analyze them, draft them, and interact with customers with regard to them.
- **USPTO technical directors** have an unparalleled view of the technology world in which they are expert.
- In many cases, these individuals can **spot future shifts in demand** that no econometric model or survey could ever hope to incorporate.



Benchmark Forecasts

# 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

