Alleged Libor Conspiracy and Manipulation: The Role of Screens

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What is a Screen?

- **A screen is a statistical test designed to identify:**
  - Whether collusion or manipulation exist in a particular market
  - Who is involved

- **Screens use commonly available data such as prices, bids, spreads, costs or volumes. They compare suspected patterns against appropriate benchmarks**
  - Abrantes-Metz and Bajari (2009, 2010)
  - Abrantes-Metz (2011a, 2011b)

Presentation Outline

- **Multiple Uses of Screens**
- **Golden Rules, Design and Implementation**
- **Libor Manipulation?**
  - Unusual Patterns in the Libor
  - Factors Influencing the Libor
  - Other Explanations?
  - Key Role of the Effects Analysis
- **Benford's Law and Libor**
- **Conclusion**
  - Screens after *Twombly*?
  - Screens in Antitrust Compliance?

Multiple Uses of Screens

- **Detection**
  - Competition authorities
  - Market regulators

- **Litigation**
  - Effects analysis: evidence of collusion or manipulation (or lack thereof)
  - Motions to dismiss
  - Class certification
  - Damages estimation

Multiple Uses of Screens

- **Pre-Litigation**
  - Leniency application decision

- **Corporate counsel**
  - For internal monitoring, auditing and increased compliance robustness
  - For due diligence process, during mergers and acquisitions

Examples of Screens

- **Screens have been developed and used to test:**
  - High correlations between auctions bids
  - High average price
  - Low price variance
  - Structural breaks in price series
  - Low pass through rates
  - Market shares stability among alleged cartel members
  - Negative serial correlation of market shares for alleged cartel members
  - Price distributions violating mathematical laws (Benford's Law)
  - Market manipulation of commodities prices and stock prices

Examples of Screens

- **Screens have started to be used by multiple agencies worldwide in detection, and by plaintiffs and defendants**
- **Some large companies have also started to use screens for antitrust compliance**

(Proof of Conspiracy under Federal Antitrust Laws, ABA publications, 2010, Chapter 8, on the role of the economic expert)

Powerful but not a Panacea

- **Like any other tool, screens can be (and have been) misused. We cannot say they lack robustness just because they do not deliver the same result when:**
  - Testing levels versus growth rates
  - Using alternative benchmarks and time periods
  - Controlling or not for key relevant factors

- **Many of the criticisms raised against screens are truly problems of conception and implementation, not problems of the screening methodology itself**

Powerful but not a Panacea

- **Screens have to be properly developed and implemented to be powerful**
  - Screens isolate outcomes that are improbable or anomalous under the assumption of no cheating
- **Even when properly developed and applied, screens will present type I and II errors, just like any statistical test**
- **No purely empirical or statistical approach can ever prove of disprove the existence of a conspiracy or manipulation**
  - Screens can provide valuable circumstantial evidence on both sides of litigation

Evidence *for* and *against*

- **When properly developed and applied, screens can provide valuable evidence *against* the existence or materiality of alleged anticompetitive behavior, every bit as much as they can provide evidence *for* it**

Golden Rules of Screens

1. **One size does not fit all**
   - Screens should not be blindly applied in the same way to every industry at any moment in time

2. **If you put garbage in, you get garbage out**
   - Using a "good" demand equation for bread to estimate the demand for cars will likely be nonsensical
   - That is not a failure of "econometrics;" rather it is a failure of the particular design and implementation of the demand model for cars

Design & Implementation

- **To develop a proper screen requires:**

  1. **An understanding of the market and industry at hand, including its key drivers and the nature of competition**

  2. **A theory on the nature of the agreement among colluders or a theory of manipulation**

  3. **A theory on how such agreement will affect observable market outcomes, for example, prices, bids or market shares**

Design & Implementation

4. **Design of a statistic delivered by an econometric model capable of capturing the key market drivers and the key factors of the theory of collusion or manipulation, consistent with the market structure**

5. **Empirical and/or theoretical support for the screen**

6. **Identification of an appropriate non-tainted benchmark against which the theory of collusion or manipulation and empirical results will be compared**

Power of Screens to Trigger Investigations

- **Screens have flagged potential anticompetitive behavior in several industries and countries**

- **Most recently:**
  - The Alleged Manipulation and Conspiracy of the Libor Rate
    - Wall Street Journal, April 2008
    - Abrantes-Metz, Kraten, Metz and Seow, "Libor Manipulation?," First Draft August 2008, published Journal of Banking and Finance, 2011
    - Other press coverage

Libor Manipulation?

- **What is the Libor and how is it set?**
  - The British Banker's Association (BBA)'s website states that the Libor is the primary benchmark for short term interest rates globally
  - It is used as the basis for settlement of interest rate contracts on many of the world's major futures and options exchanges, as well as most over the counter and lending transactions ($350 trillion worth of contracts referencing the Libor)

Libor Manipulation?

- 16 banks provide daily quotes on the Libor, and the "middle 8" quotes are converted into Libor through a simple arithmetic mean calculation

- The Libor quotes are supposed to reflect the rate at which large banks can borrow unsecured funds from other banks, by answering the question "*At what rate could you borrow funds, were you to do so by asking for and then accepting inter-bank offers in a reasonable market size just prior to 11am London time?*"

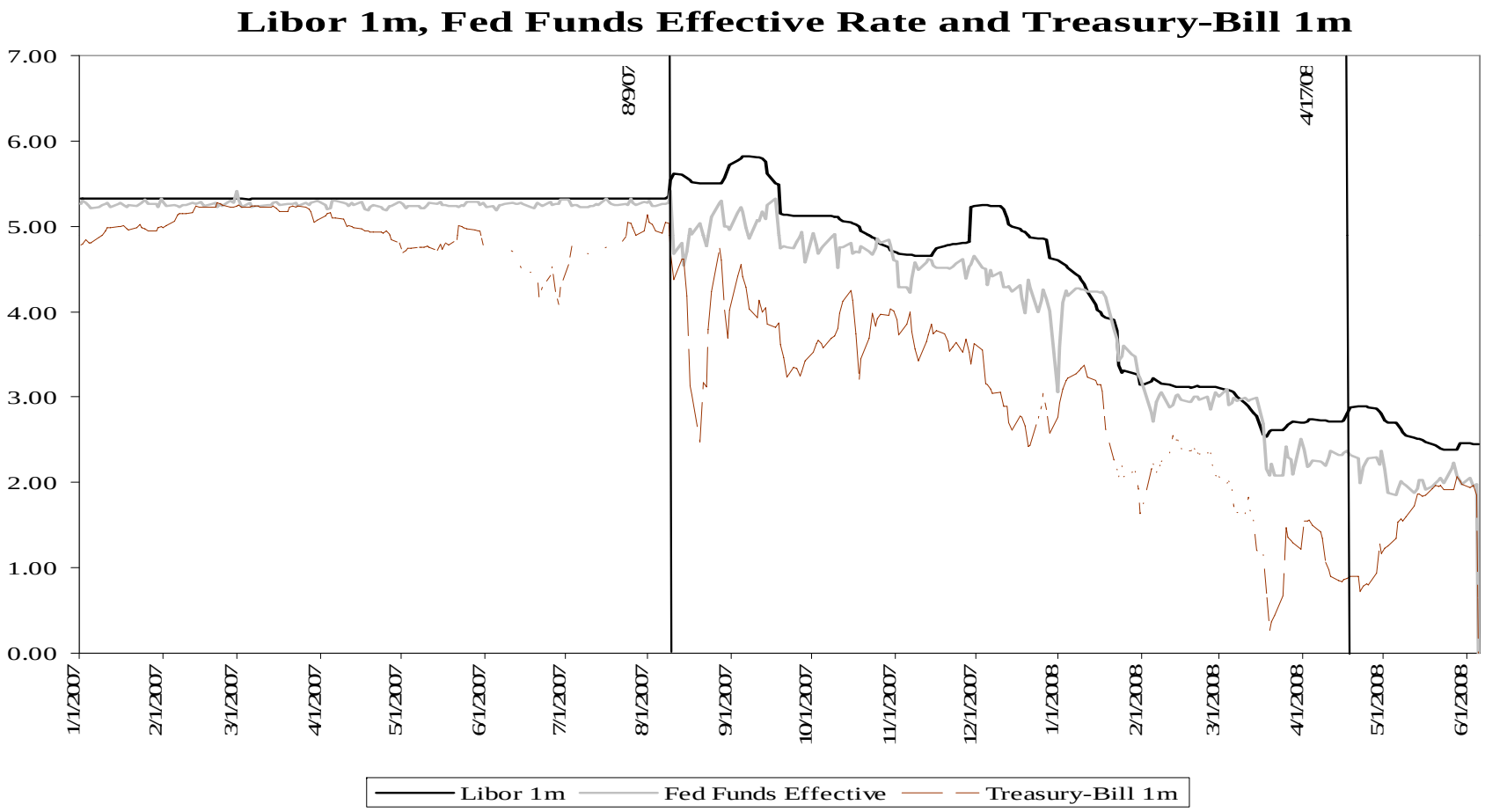
Libor Unusual Patterns

- **WSJ analysis:**
  - The Wall Street Journal article alleged that beginning January 2008, several global banks were reporting unjustifiably low borrowing costs for the calculation of the daily Libor benchmark
  - These banks may "have been low-balling their borrowing rates to avoid looking desperate for cash"
  - The WSJ estimated the but-for individual bank Libor quote using the bank's Credit Default Swap spread

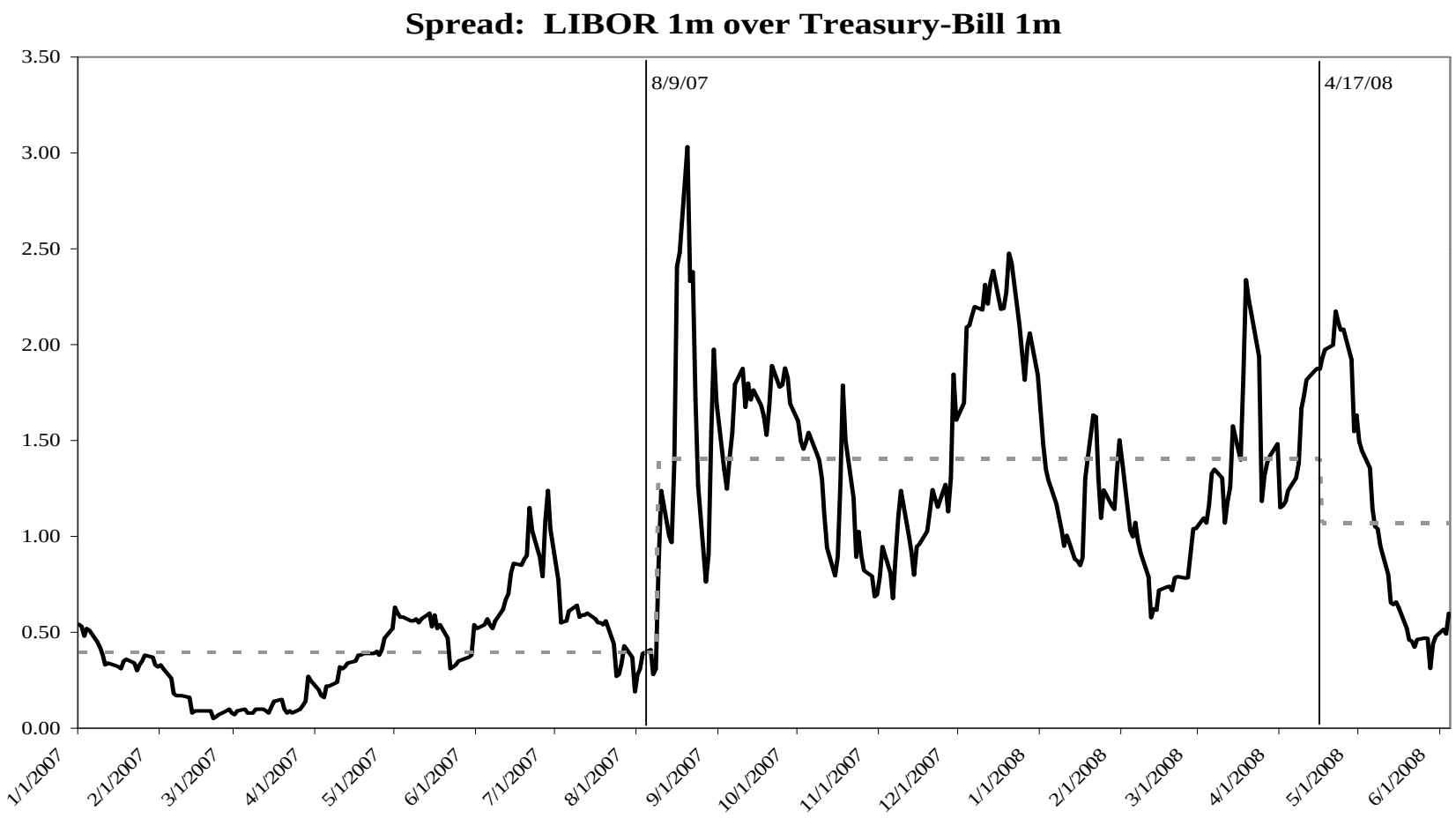
Libor Unusual Patterns

- **Abrantes-Metz et al (2008) extend the WSJ analysis:**
  - Compared Libor with other rates of short-term borrowing costs
  - Evaluated the individual bank quotes that were submitted to the BBA for a longer period of time
  - Compared these individual quotes to individual CDS spreads on an ordinal basis, and to market capitalization data

Libor: January 2007 through May 2008



Libor Spreads



Three Periods Considered

	Time Periods
Period 1	January 2, 2007 - August 8, 2007
Period 2	August 9, 2007 - April 16, 2008
Period 3	April 17, 2008 - May 30, 2008

- **August 9, 2007: Major news on realization of a liquidity and subprime crisis**
  - There was a "coordinated intervention" by the European Central Bank, the Federal Reserve Bank, and the Bank of Japan
  - AIG warned that defaults were spreading beyond the subprime sector
  - BNP Paribas suspended three funds that held mortgage backed securities

Three Periods Considered

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Period 1	January 2, 2007 - August 8, 2007
Period 2	August 9, 2007 - April 16, 2008
Period 3	April 17, 2008 - May 30, 2008

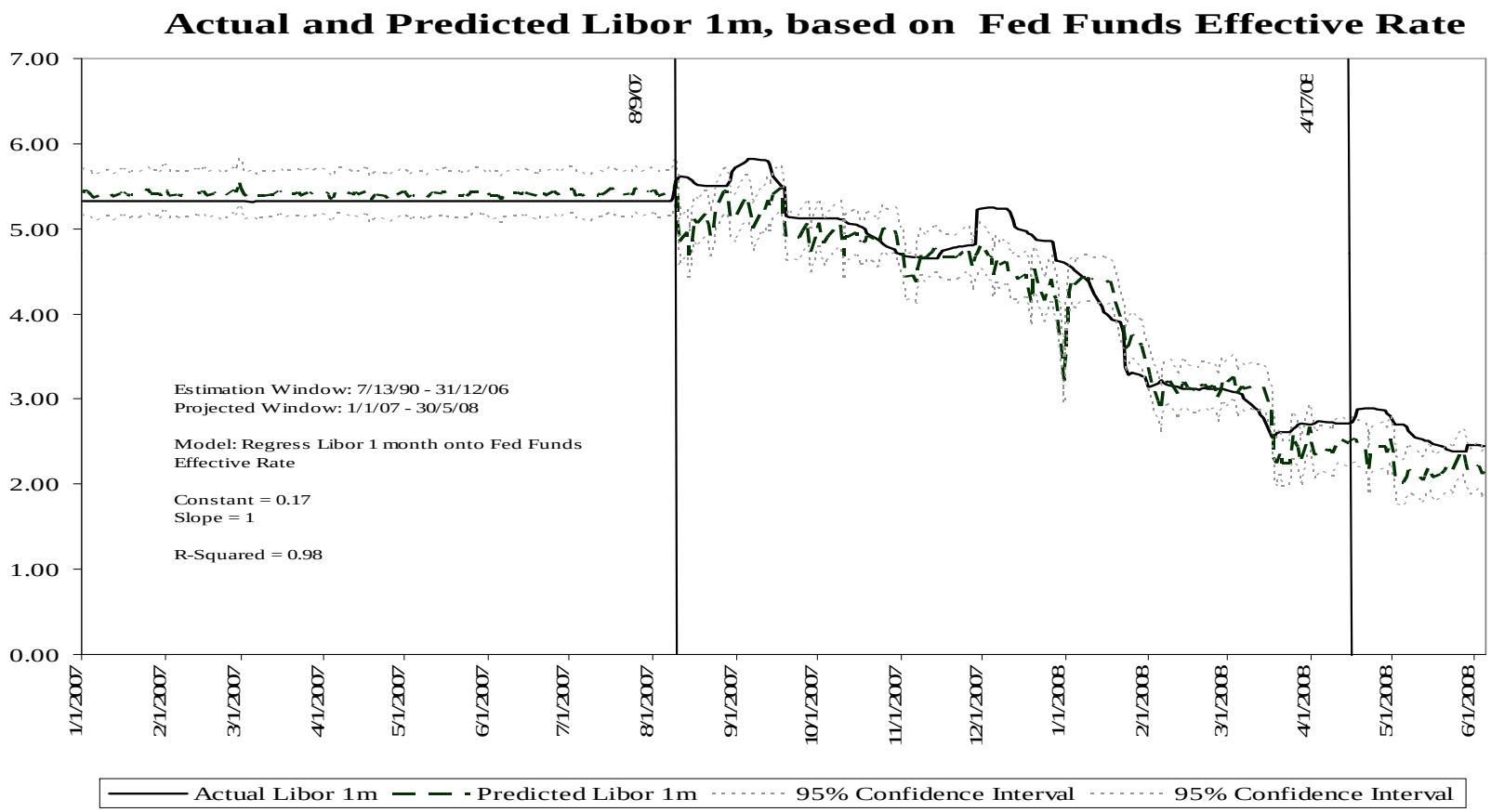
- **April 17, 2008: WSJ first news on potential manipulation of the Libor since January 2008**

Main Findings

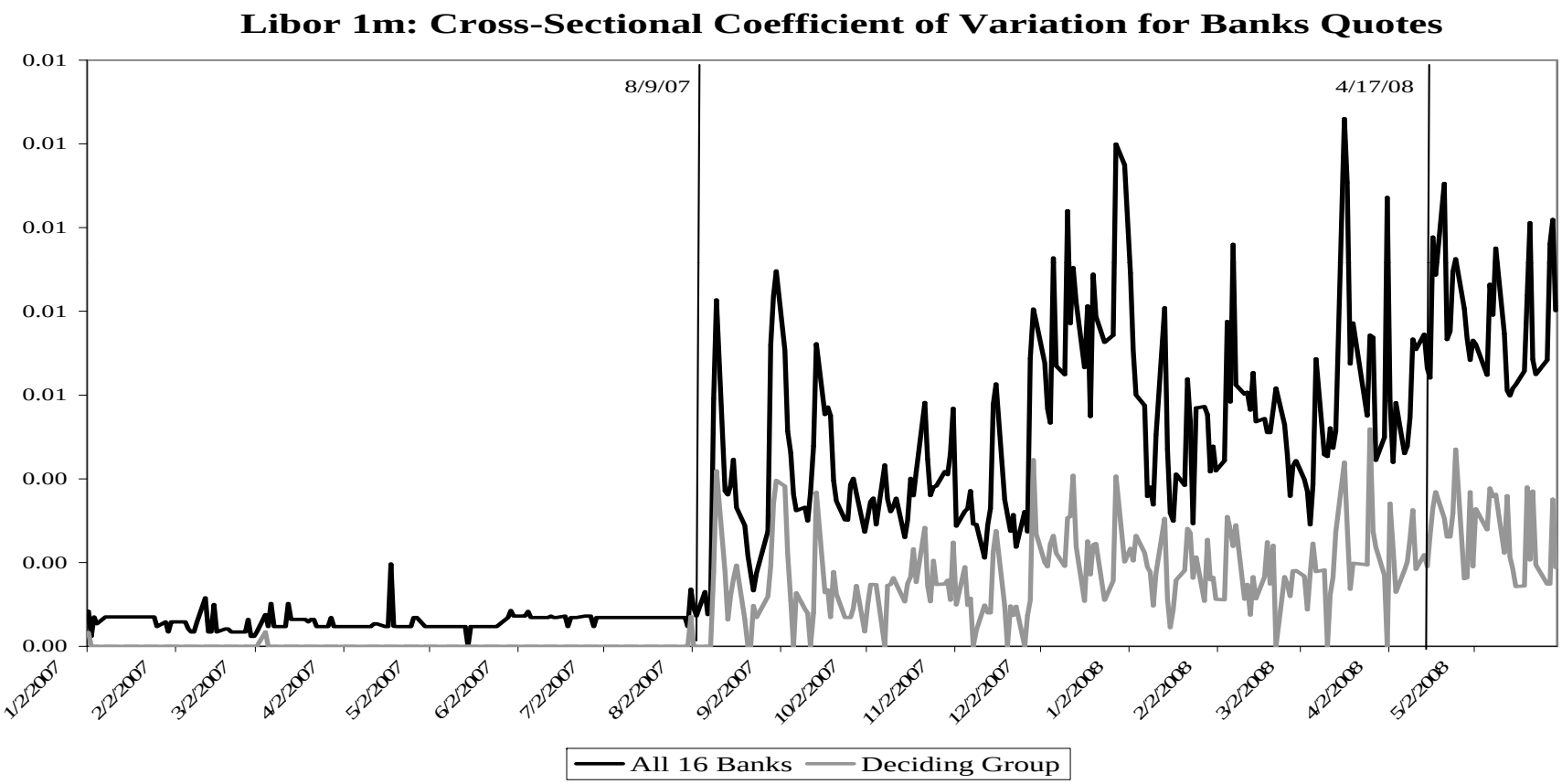
- **Overall Libor level**
  - Results are inconsistent with a material conspiracy and manipulation of the Libor for the entire period studied (January 2007 through May 2008)

- **Individual quotes**
  - However, some questionable patterns exist with respect to the banks' daily Libor quotes, especially for the period ending on August 8, 2007, for which the intraday variance for banks quotes is not statistically different from zero

Inconsistent with Material Manipulation



Intraday Quotes Coefficient of Variation

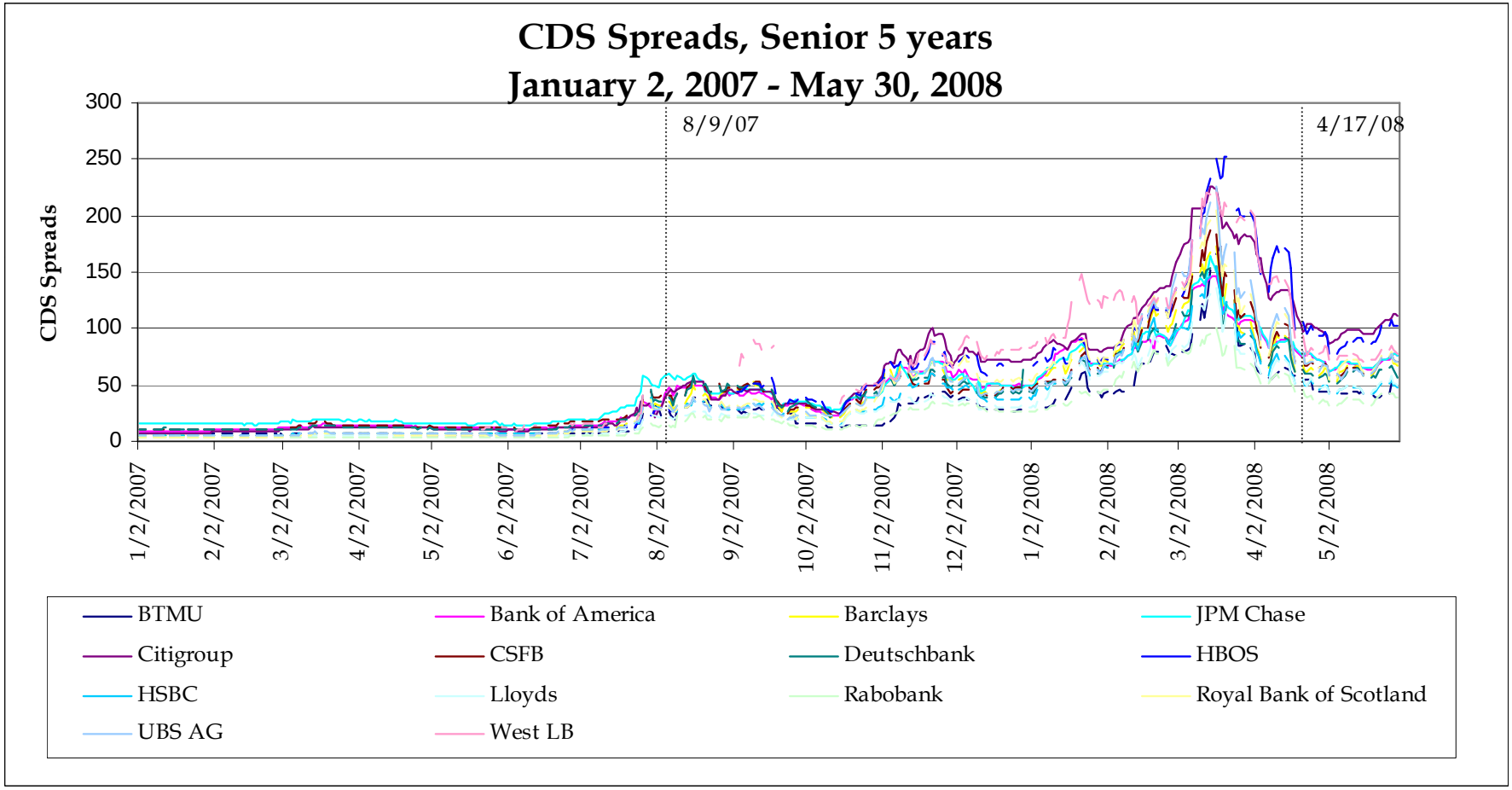


Note: In the first period, 13 out of 16 banks are in the deciding group at least 95% of the times.

Credit Default Swaps

- **Credit Default Swap (CDS) is a credit derivative contract between two counterparties:**
  - The buyer or fixed rate payer makes periodic payments to the "seller" or "floating rate payer" in exchange for the right to a payoff if there is a default or "credit event" associated with a third party reference entity
  - Higher CDS spreads reflect higher default risk, but also higher systemic risk
  - See for example Abrantes-Metz & Niden (2008) on the information content of CDS

Credit Default Swaps: Evolution



Libor Quotes and Credit Default Swaps

- **Our experiment:**
  - Since CDS contracts are presumed to be a function of financial strength, one might expect that banks with higher CDS spreads (which correspond to riskier banks) will have higher costs of borrowing, *ceteris paribus*

    $\Rightarrow$ would expect a positive correlation between CDS spreads and Libor rates, *ceteris paribus*

Libor Quotes and Credit Default Swaps

- **Our experiment:**
  - For each of the 3 periods considered, and for each individual bank, we compute the % of times that each bank's quote is less than or equal to the median quote, and the % of times that its CDS spread is less than or equal to the median CDS spread
    - This represents an *ordinal* rather than *cardinal* relationship, as was the estimated by the WSJ
  - We search for outliers

Libor Quotes and Credit Default Swaps

- **For example, there are banks whose Libor quote is frequently below the median quote (90% of the time or more) but whose CDS spreads are rarely below the median CDS spread (10% of the time or less):**
  - Period 1: JPM Chase, Credit Swiss First Boston, Deutsche Bank, Bank of America
  - Period 2: Citigroup, HBOS, JPM Chase

Other Factors Influencing the Libor

- **Three reasons have been put forth as to why the Libor rate was constant in the 1st Period**
  1. Member banks expected other relevant market rates would be nearly constant
     - Counter-argument: although other benchmark rates were *stable*, they were not as constant as the Libor. Why should we expected the Libor to be constant if none of the other rates was?

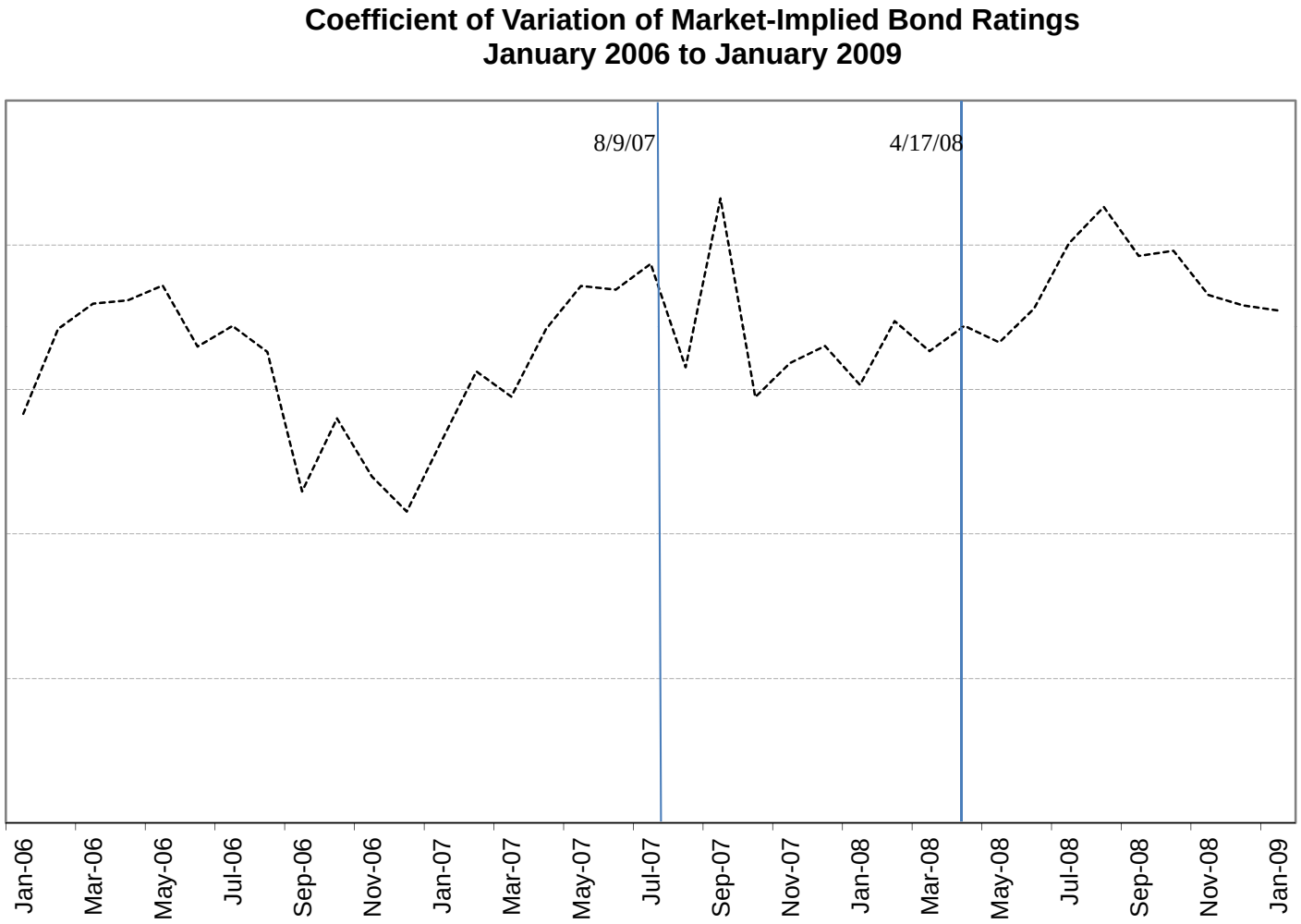
Other Factors Influencing the Libor

2. Minimal liquidity and risk premia in financial markets up to August 2007 supported a low and highly stable Libor
   - Counter-argument: while it is true that some derivatives markets did not show signs of high risk through the first half of 2007, many others did
     - Mizrach (2008) shows increased risk level associated with investment-grade ABX Indices beginning February 2007 (indices for asset backed subprime, home equity credit default swap and CME housing futures)
   - Counter-argument: the CDS spreads of participating banks started increasing as early as June 2007, but the Libor rate and quotes did not respond

Factors Influencing the Libor

3. The participating banks had nearly identical fundamental credit risk
   - Counter-argument: there was variation in the (bond) market-implied ratings of the member banks, and this variation increased throughout 2007
   - Counter-argument: while there was a sudden increase in the variation of Libor quotes after August 9, 2007, there was no corresponding sudden increase in the variation in their market-implied ratings

Implied Market Bond Ratings



Other Explanations of Libor Quotes

- **Are CDS spreads appropriate benchmarks for short-term borrowing costs?**
  - Market segmentation
  - Systemic risk
  - Better benchmark: commercial paper

- **Does size matter?**
  - Could large banks get volume discounts?
  - Also reflecting systemic risk?

Other Explanations of Libor Quotes

- **Tacit collusion during the 1st period?**
  - The mechanism through which the Libor is set facilitates tacit coordination among the participating banks
- **During the 2nd period Libor quotes decreased while CDS spreads increased, but could the Libor quotes have simply been following other market rates?**
- **Possibility of individual employees acting by themselves?**

Hard to Disentangle Empirically

- **The increase in Libor spreads beginning the summer of 2007 is not necessarily evidence of illegal behavior**
  - Spreads increased for most assets due to increased market volatility (higher uncertainty and risk)

- **Even if banks significantly profited from a decreasing Libor during the 2nd period, that is not necessarily evidence of illegal behavior**
  - The appropriate but-for profits need to be estimated
  - Had the Libor been higher, other rates may also have been higher – by how much? Difficult estimation in high volatility world
  - Banks' net positions vary within the group – differing incentives

Effects Estimation is Key

- **The panel of banks certainly had the *power* to alter the Libor**

- **Therefore, a finding of *no material effect* would represent strong evidence against a conspiracy to manipulate the Libor**

EFFECTS ESTIMATION IS KEY

Materiality?

- **But how should materiality be measured when a "minimal" change in the Libor has the capability of producing major effects?**

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Benford's Law and Libor

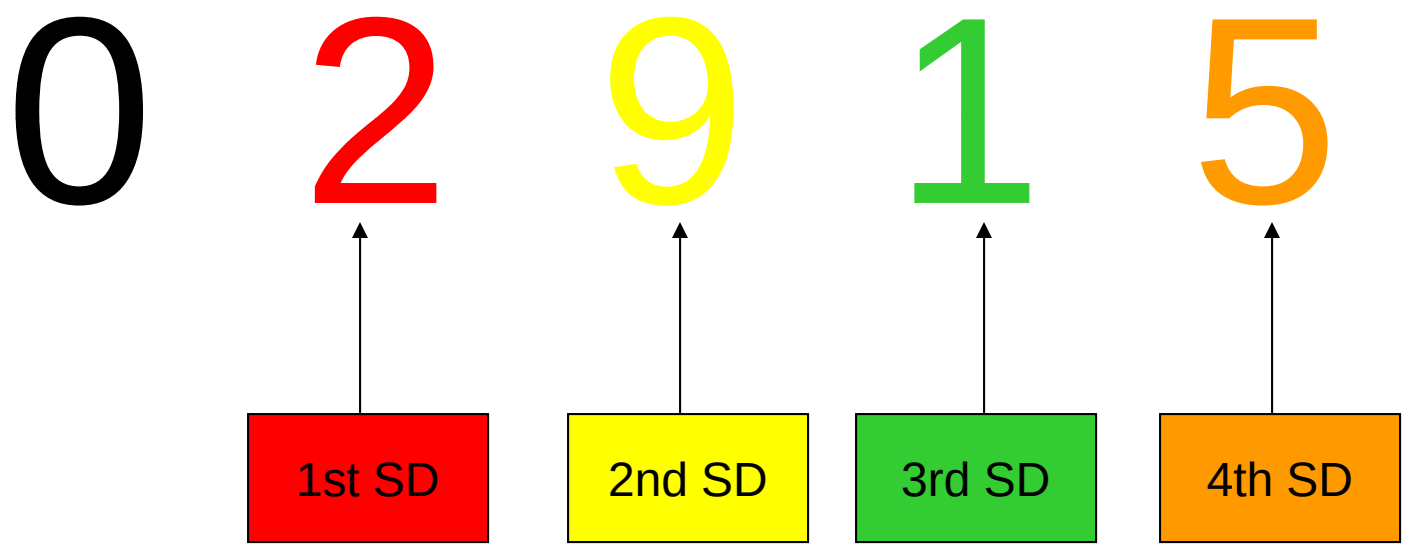
- **Abrantes-Metz, Villas-Boas and Judge, Tracking the Libor Rate, Journal of Applied Economics, 2011**

- **Series of joint papers with George Judge and Sofia Villas-Boas, University of California at Berkeley, using Benford's Law to flag unusual patterns**
  - (Alleged) Libor Manipulation
  - (Alleged) Oil Prices Manipulation
  - Various Price-Fixing Conspiracies (e.g., Perch, Vitamins, Lysine, Citric Acid, Gasoline and Diesel in Italy)
  - Various commodities prices manipulations (e.g., Silver and Copper)

Benford's Law: Background

- **Identify tampering and human influence on market processes based on the numerical phenomenon known as Benford's Law (1938)**
  - According to this law, in many naturally occurring numerical data sets the leading significant digits are not uniformly distributed but instead follow a logarithmic weakly monotonic distribution
  - Benford's law is successfully used to detect accounting manipulations for decades
  - We are testing the law's application in markets

Benford's Law: Background



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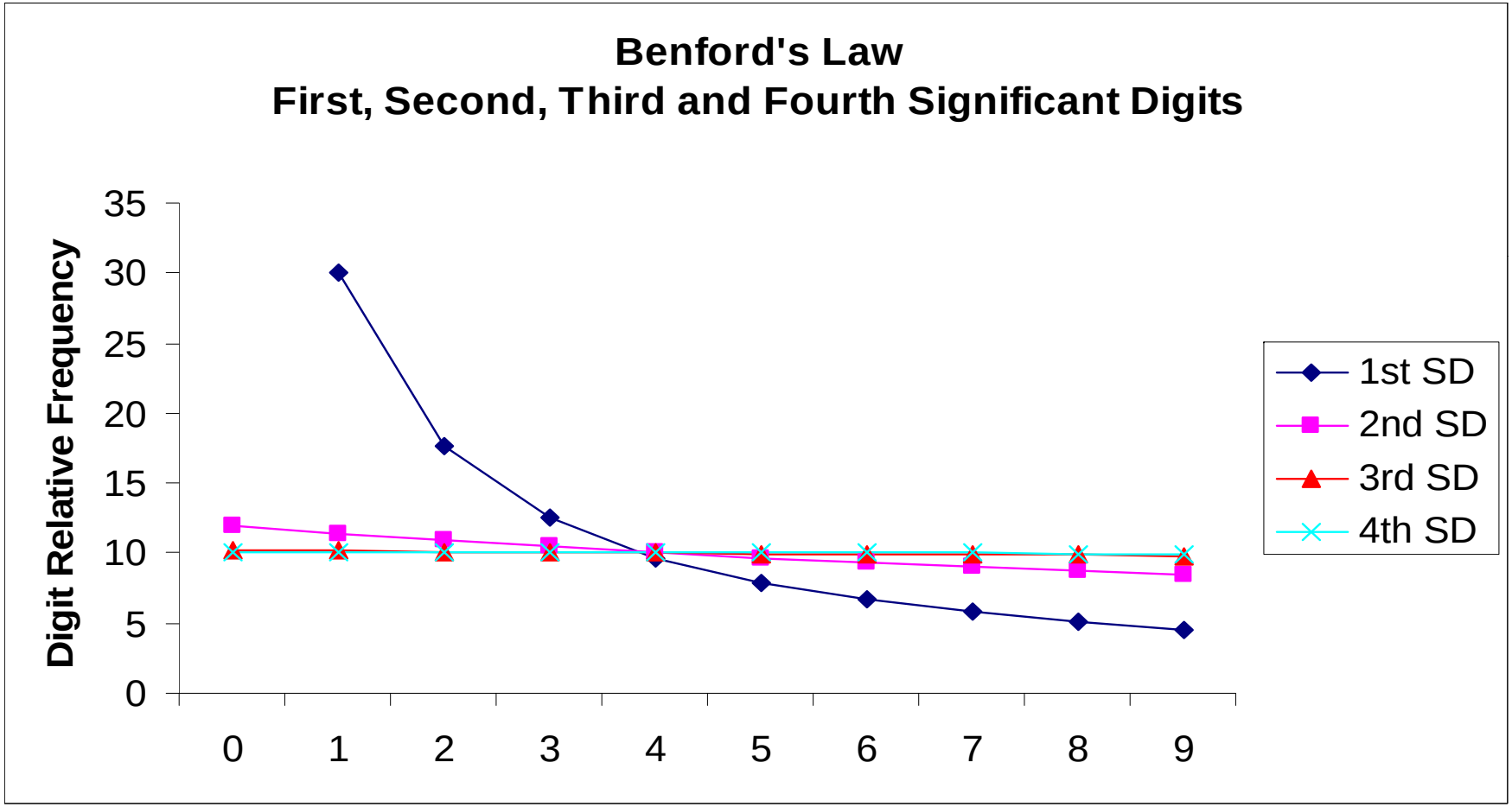
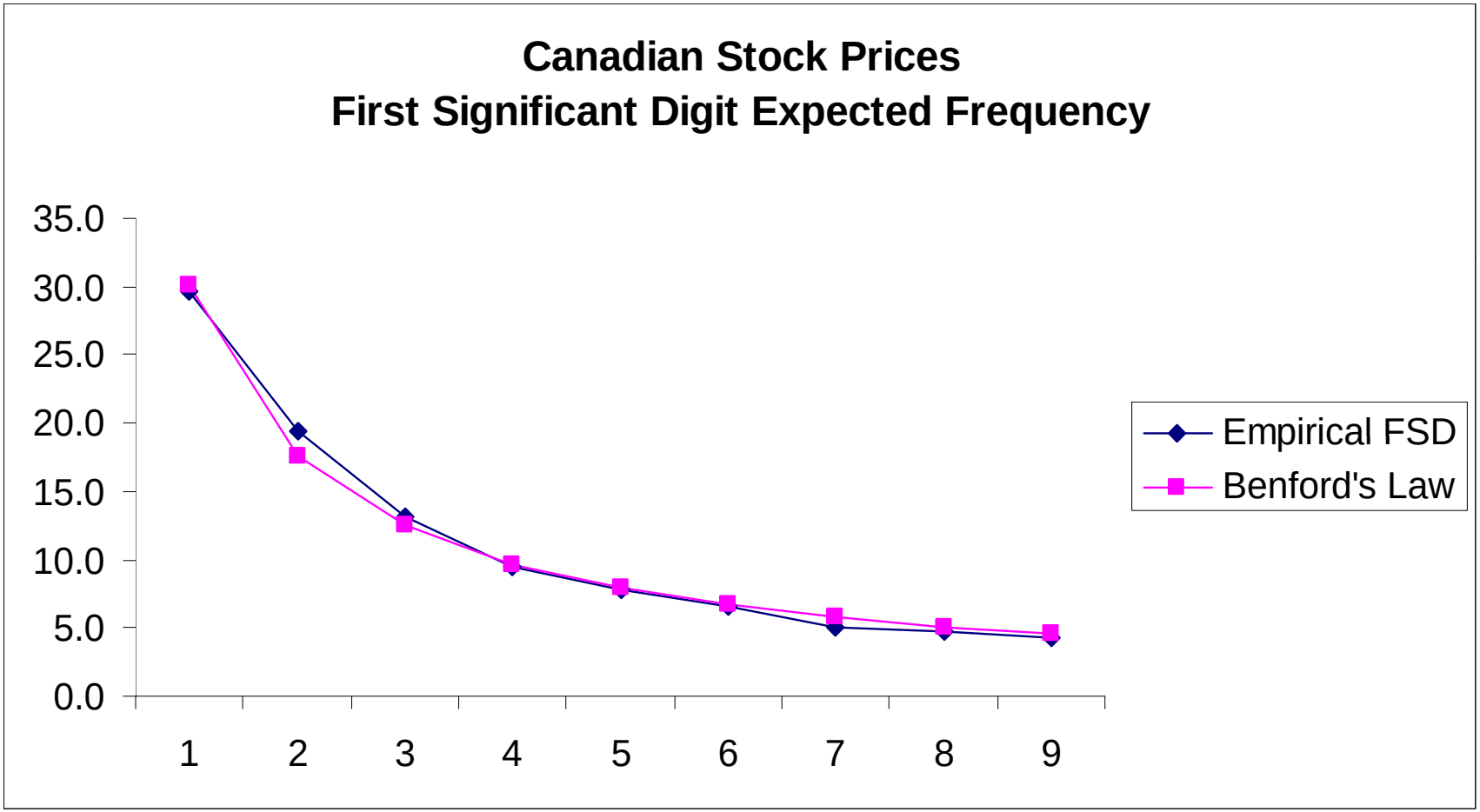
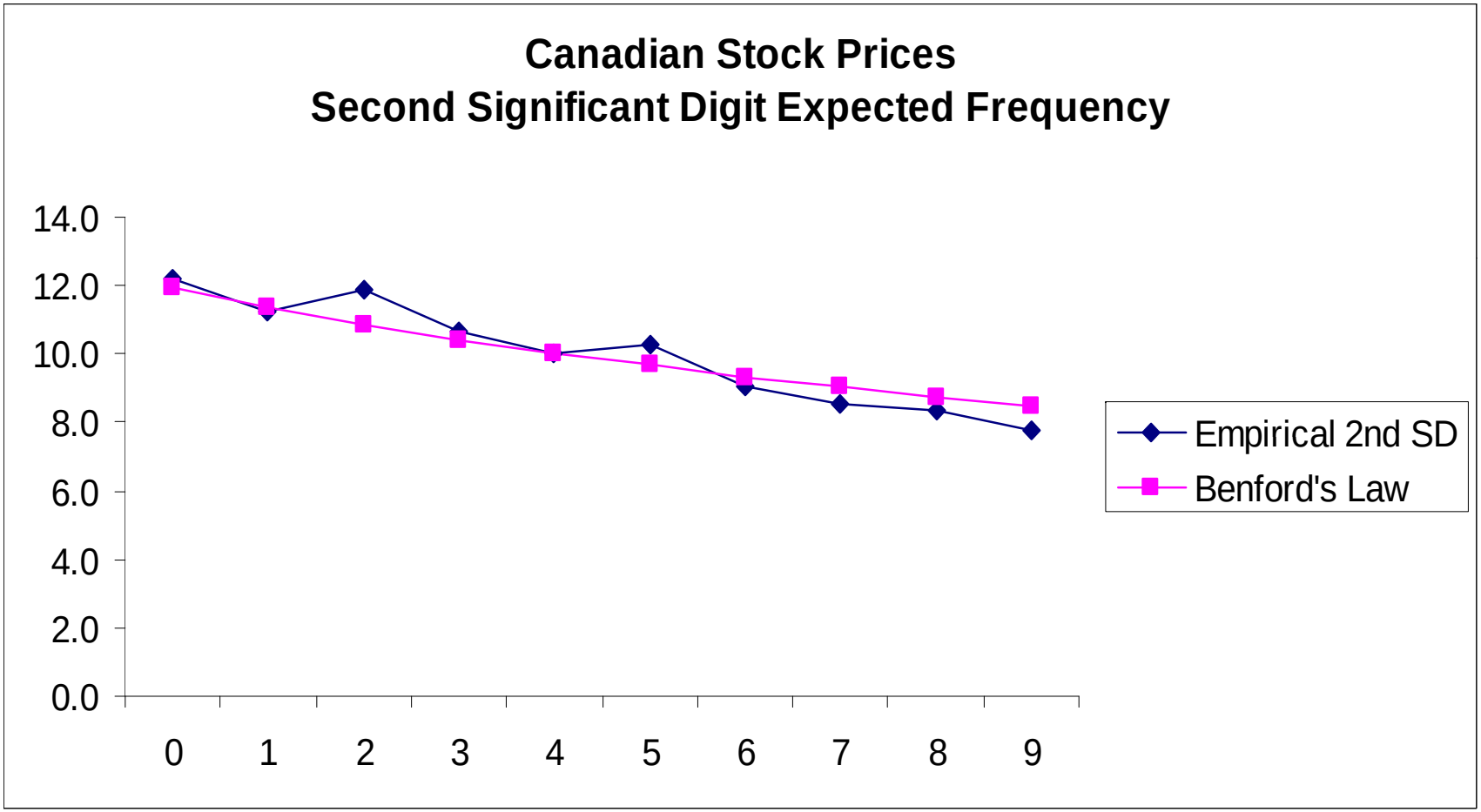


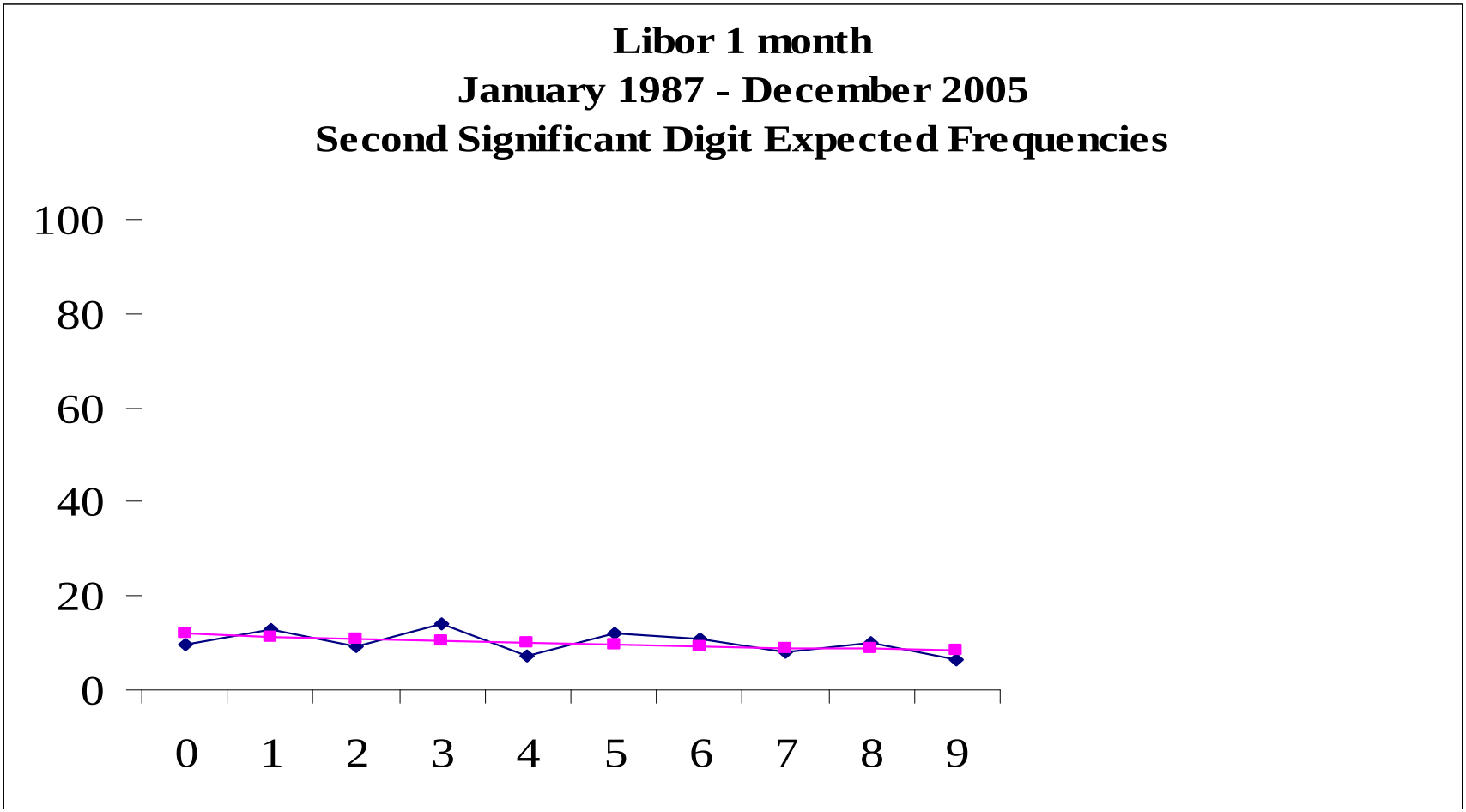
Benford's Law & Stock Prices



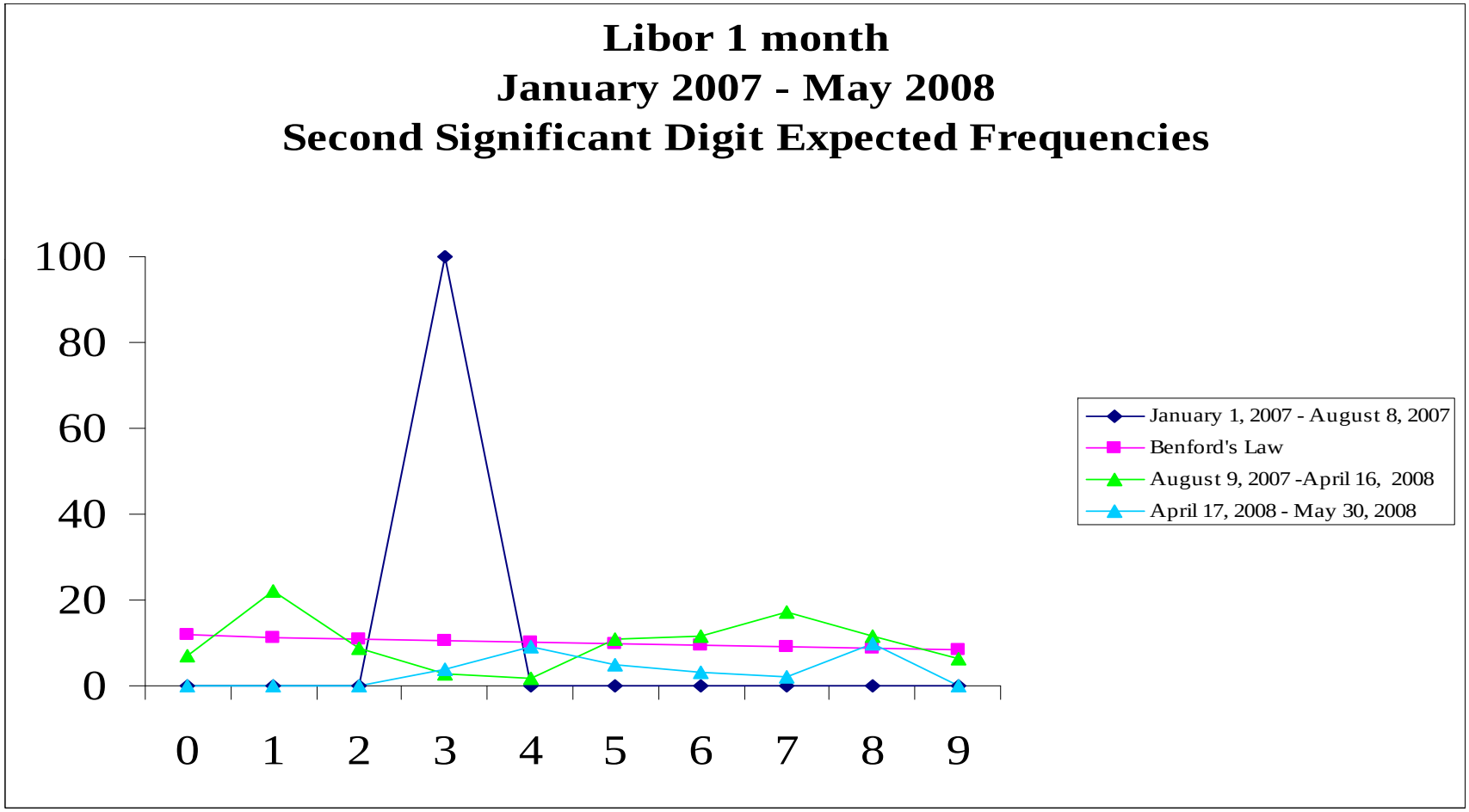
Benford's Law & Stock Prices



Benford's Law & Libor



Benford's Law & Libor



Benford's Law & Libor

- **Results between the two Libor studies are not necessarily incompatible**
  - Exploratory analysis: though Benford's Law has been observed in many circumstances, one would need to prove why it should be verified for the Libor under competitive settings
  - But it could also be that the variance of the Libor may have been lower than predicted (flagged by the Benford's Law analysis), while its average value might not have been affected (as estimated in the first paper)

Conclusion

- **Screens can be very powerful when properly designed and implemented, but they are not a panacea**

- **The Libor litigation presents a fruitful example of the uses of screens:**
  - For detection
  - For plaintiffs
    - In providing evidence *for*, and in estimating effects *of*
    - Particularly important after *Twombly*?
  - For defendants
    - In providing evidence *against* and in estimating effects *of*
    - Future role in compliance?

Conclusion

- **Having proven their usefulness, the use of screens will continue to expand in litigation**

Thank you very much!

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Dr. Rosa M. Abrantes-Metz's experience includes work in consulting and banking, as well as in government. Her main areas of specialization are econometrics, financial economics, monetary economics, and applied industrial organization. Dr. Abrantes-Metz is an Adjunct Professor at Leonard N. Stern School of Business, New York University, where she teaches industrial economics and econometrics for MBAs, and undergraduate money and banking. She has taught econometrics at the department of economics at the University of Chicago, and various other fields of economics at Universidade Católica Portuguesa, in Lisbon, Portugal.

Since working as a staff economist at the Federal Trade Commission, Dr. Abrantes-Metz continued serving as a consultant for special projects with the Commission's Bureau of Economics. She is also a consultant for the World Bank. Dr. Abrantes-Metz is the author of several articles on econometric methods, conspiracies and manipulations, gasoline, pharmaceuticals and health care, and event studies; she has published in peer-reviewed journals such as the *International Journal of Industrial Organization*, the *Journal of Pharmaceutical Finance, Economics and Policy, Applied Economics Letters*, the *Journal of International Arbitration*, and the *Journal of Banking and Finance,* with forthcoming publications in the *Journal of Futures Markets* and the *Journal of International Money and Finance*. Her work has also appeared in trade publications including the *ABA Economics Committee Newsletter*, *The Antitrust Source*, *The Antitrust Magazine, The Antitrust Counselor, The Competition Policy International Journal and Antitrust Chronicle*, *Derivatives Litigation Reporter,* and *Securities Litigation Report.* Dr. Abrantes-Metz is a co-drafter of the chapter on the role of the economic expert in proving conspiracy cases under federal antitrust laws in a recent volume by the American Bar Association. In addition she has contributed to other books on international arbitration with a focus on event studies, and has co-authored the chapter on corporate governance and compliance forthcoming in the next Handbook on Antitrust Economics.

Rosa M. Abrantes-Metz, PhD

Dr. Abrantes-Metz has developed numerous empirical screens for conspiracies and manipulations, and is a pioneer in the field, contributing to the further development and increased adoption of these methods. Her screens are used by competition authorities, defendants and plaintiffs worldwide. In pharmaceuticals, she has co-developed a model to estimate the likelihood of drugs failing and succeeding each of the clinical stages of the Food and Drug Administration, and their expected durations in each of these phases. This model has become one of the two most used by industry analysts to value pharmaceutical and biotechnology pipelines. Her research on pharmaceuticals and conspiracies has been discussed in books on how to value pharmaceutical and biotechnology companies, and on publications pertaining to health care, intellectual property and cartels. She has presented her work all over the world. Dr. Abrantes-Metz's work has been featured in the press such as the *Wall Street Journal*, *Financial Times* and *Investor's Business Daily*. Dr. Abrantes-Metz has provided testimony related to alleged bid-rigging and price-fixing, and in international arbitration on the valuation of expropriated assets.

Dr. Abrantes-Metz holds a Ph.D. and a Masters in Economics from the University of Chicago. She also holds a Masters in Economics from the Universitat Pompeu Fabra in Barcelona, Spain, and a *Licenciatura* in Economics from Universidade Católica Portuguesa. She is a member of the *Who's Who* of Competition Lawyers & Economists.