

Empiricism in supply chain management research

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Supply Chain Roundtable – July 2004

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Slide 1

Questions / comments

- What is empirical supply chain management research?
 - It is more than just a collection of anecdotes, case studies or consulting projects.
- Is there a lack of empirical supply chain management research?
 - No debate here, we are pathetic.
- Why is there a woeful lack of empirical research?
 - Plenty of excuses:
 - Hard to collect good data/no standardized data sets.
 - Too risky before tenure.
 - We don't know what we are doing

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Slide 2

There is hope...

- M. Cohen, T. Ho, J. Ren, C. Terwiesch. 2003. Measuring imputed cost in the semiconductor equipment supply chain. *Mgmt Sci* 49. 1653 – 1670.
- Terwiesch, C, J. Ren, T. Ho, M. Cohen. An empirical analysis of forecast sharing in the semiconductor industry.
- Randall. T., K. Ulrich. 2001. Product variety, supply chain structure, and firm performance: analysis of the U.S. bicycle industry. *Mgmt Sci* 47. 1588 – 1604.
- Netessine, S., T. Randall, N. Rudi. 2002. Inventory structure and Internet retailing: an empirical examination of the role of inventory ownership.
- Hendricks, K. V. Singhal. 2003. The effect of supply chain glitches on shareholder wealth. *J Ops Mgmt* 21. 501-522.
- Hendricks, K. V. Singhal. 2003. An empirical analysis of the effect of supply chain disruptions on operating performance. Forthcoming *J Ops Mgmt*.

In search of the bullwhip effect

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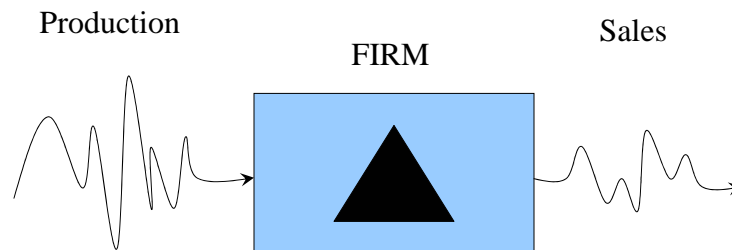
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What do we know, what do we want to know

- Blinder and Maccini (91,92):
 - "... the basic facts to be explained are ... 1) production is more variable than sales".
- More evidence:
 - Sterman (1989); Lee, Padmanabhan and Whang (97); Anderson, Fine, Parker (2000).
- Causes:
 - Caplin (85), Kahn (92), LPW (97)
- Can we find empirical evidence of the bullwhip effect?
- Assuming we find it, what are the driving factors that explain it?

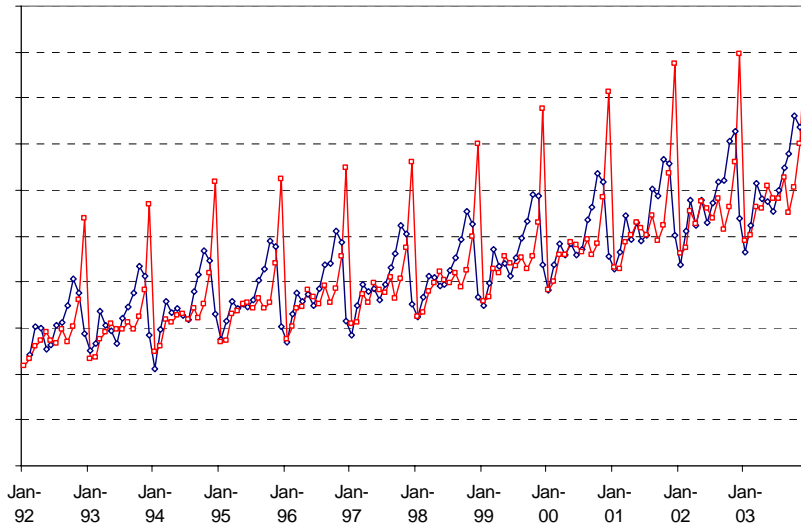
What is the bullwhip effect?

- Quick answer:
 - Bullwhip effect = $\text{variance}(\text{production}) > \text{variance}(\text{sales})$



- But what variability do you measure?
 - Total variability?
 - Variability after removing a growth trend?
 - Variability after removing growth trend and seasonality?

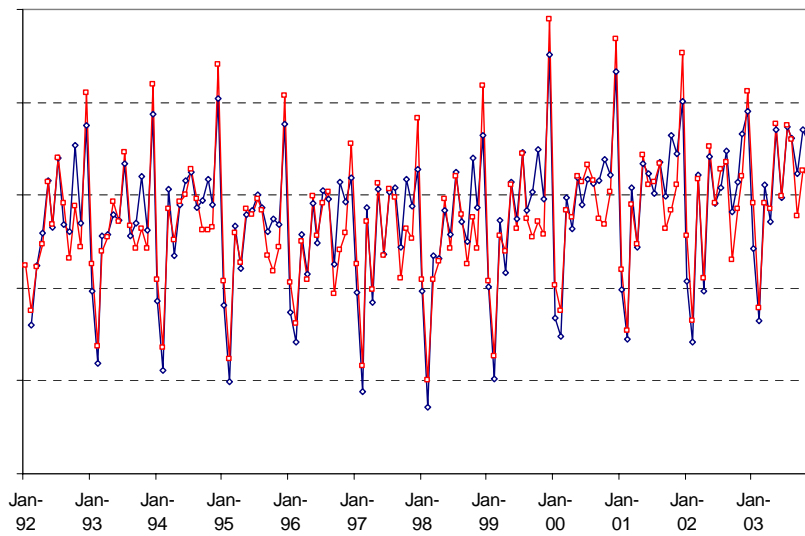
U.S. monthly general merchandise trade sector sales and production



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Slide 7

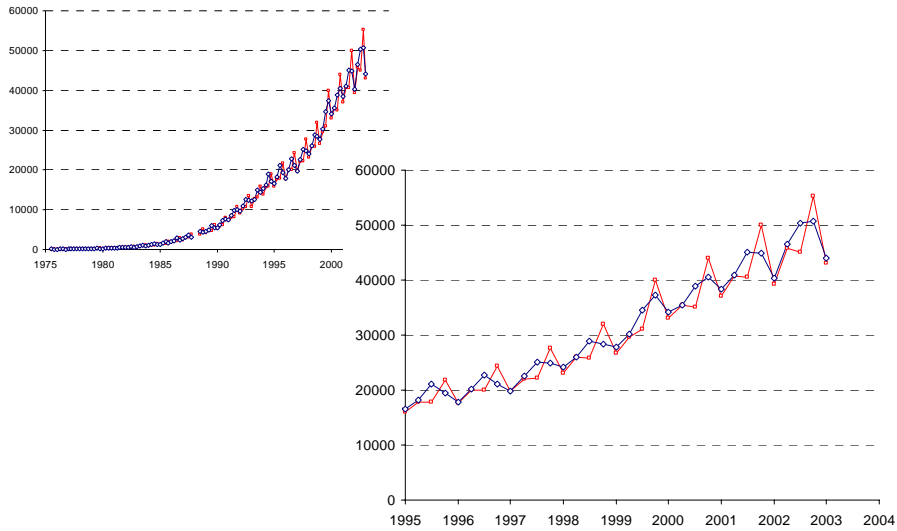
U.S. monthly food trade sector sales and production



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Slide 8

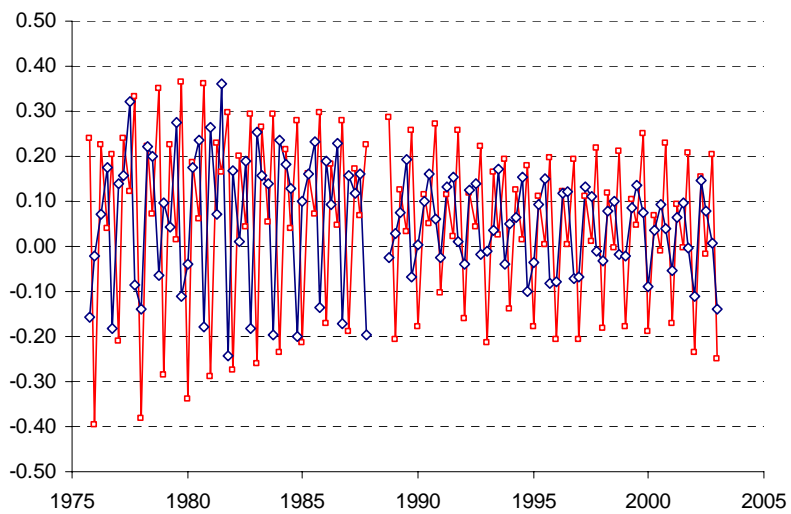
Wal-Mart quarterly sales and production



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Slide 9

Wal-Mart quarterly sales and production – first differences of logs



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Slide 10

Preliminary findings and to-do list

- There is little evidence of the bullwhip effect in retail trade data if you only remove a linear growth trend.
 - After adjusting for seasonality, production is more variable than sales.
- What remains to be done:
 - Look at aggregate wholesale and manufacturing data.
 - Look at firm level data from quarterly filings of publicly traded companies.
 - Get some product level data (e.g., Kellogg cereals)