

Trends in the Use of Chaos and Complexity Theories and Computer Simulation for Social Science Researchers

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Science and Technology Policy Institute Conference

Complex Systems and Policy Analysis

Washington, D.C. Sept 27-28, 2000



Citation Study

- ◆ ABI/Inform

Citations and abstracts for articles in 1000 journals from 1971 to the present on business, management, economics.

- ◆ PsychINFO

Citations and abstracts for articles in 1300 psychology journals, conference proceedings, books, and dissertations from 1887 to the present.

- ◆ EconLit

Citations include coverage of over 400 major journals as well as articles in collective volumes.

- ◆ Sociological Abstracts

Citations are from an international selection of 2,700 journals and other serials publications.



Keyword Search

Theory

Nonlinear

Chaos theory

Complexity theory

Method

Computer Simulation

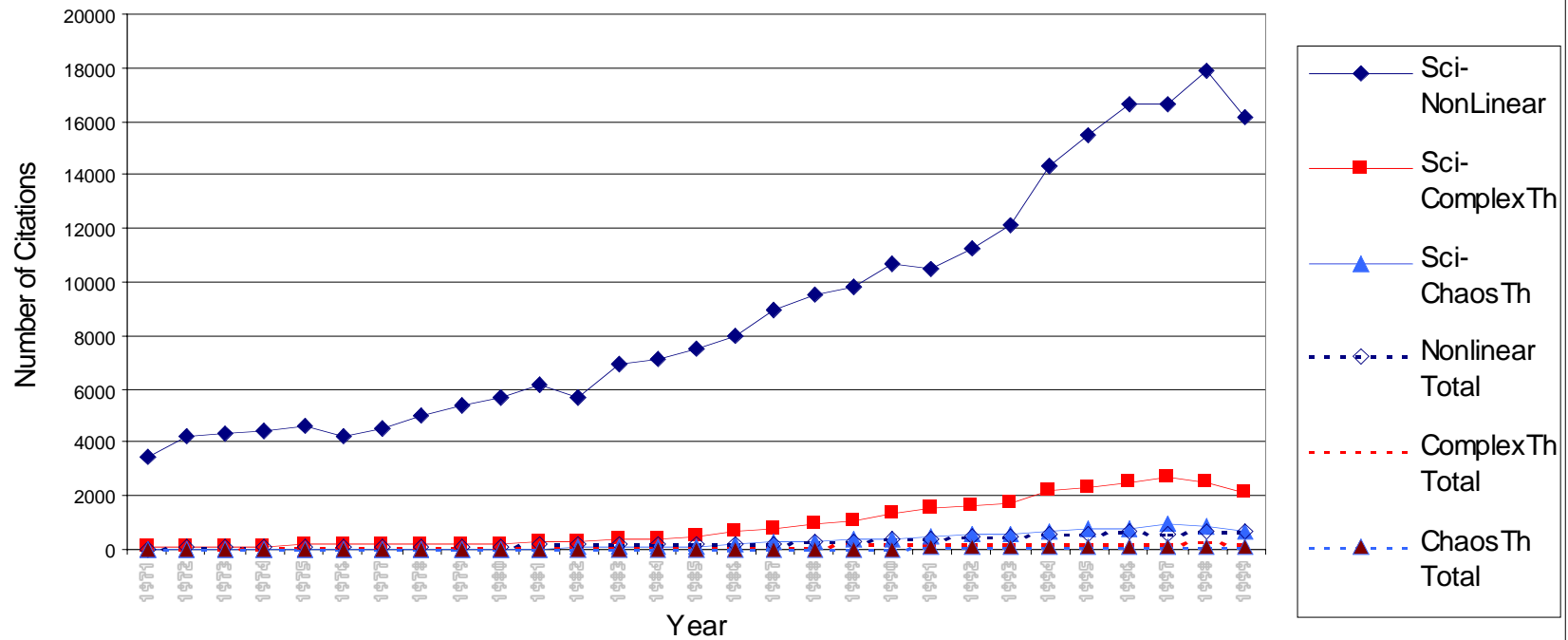
Complex adaptive system

neural network

genetic algorithm

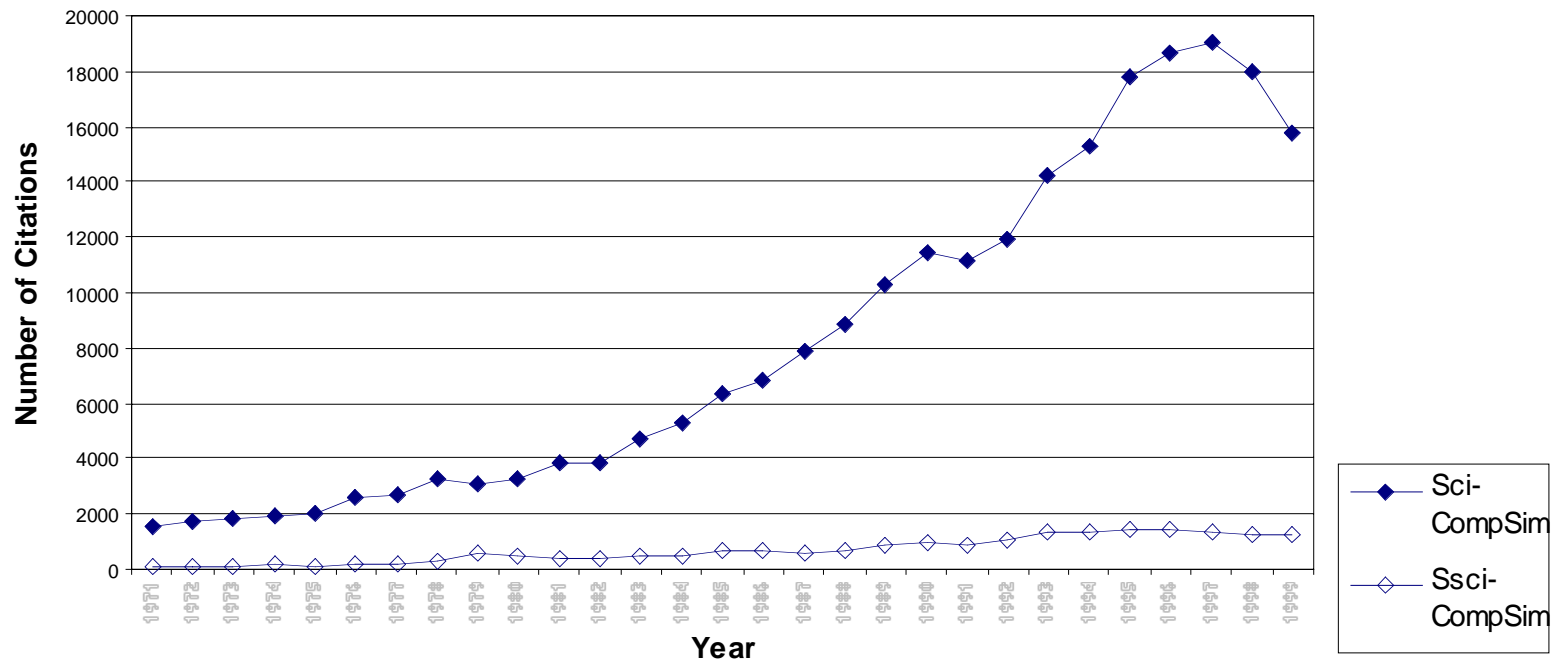
Physical Science vs Social Science Theory Citations

Chart 1. Physical Sciences vs Social Sciences Theory Terms, Total Search, 1971-1999



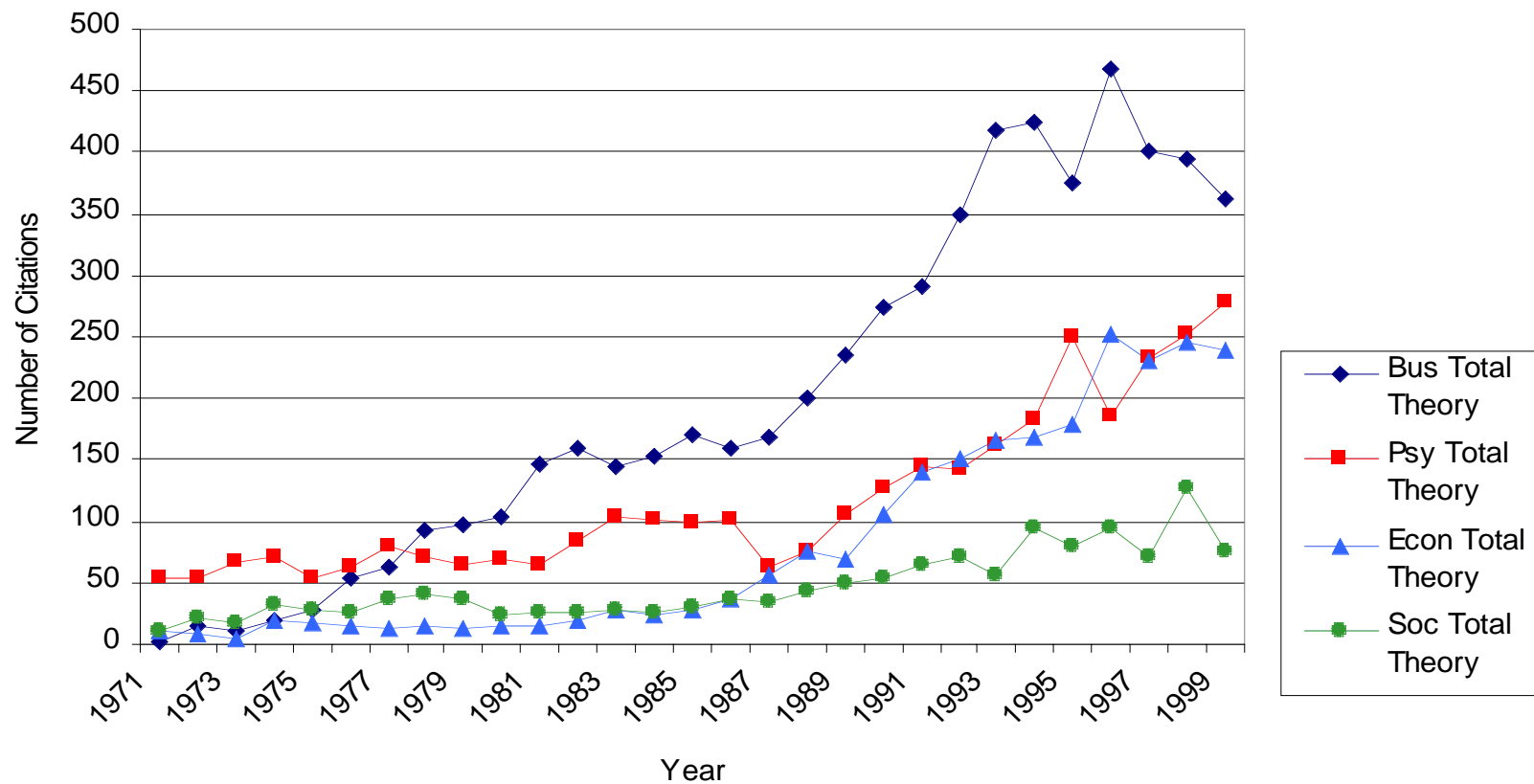
Physical Science vs Social Science Method Citations

Chart 2. Physical Sciences vs Social Sciences Method, Total Search, 1971-1999



Disciplinary Composites - Theory

Chart 3. Disciplinary Composites, Theory, 1971-1999



Disciplinary Composite – Method Computer Simulation

Chart 4. "Computer Simulation" by Discipline
Total Search, 1971-1999

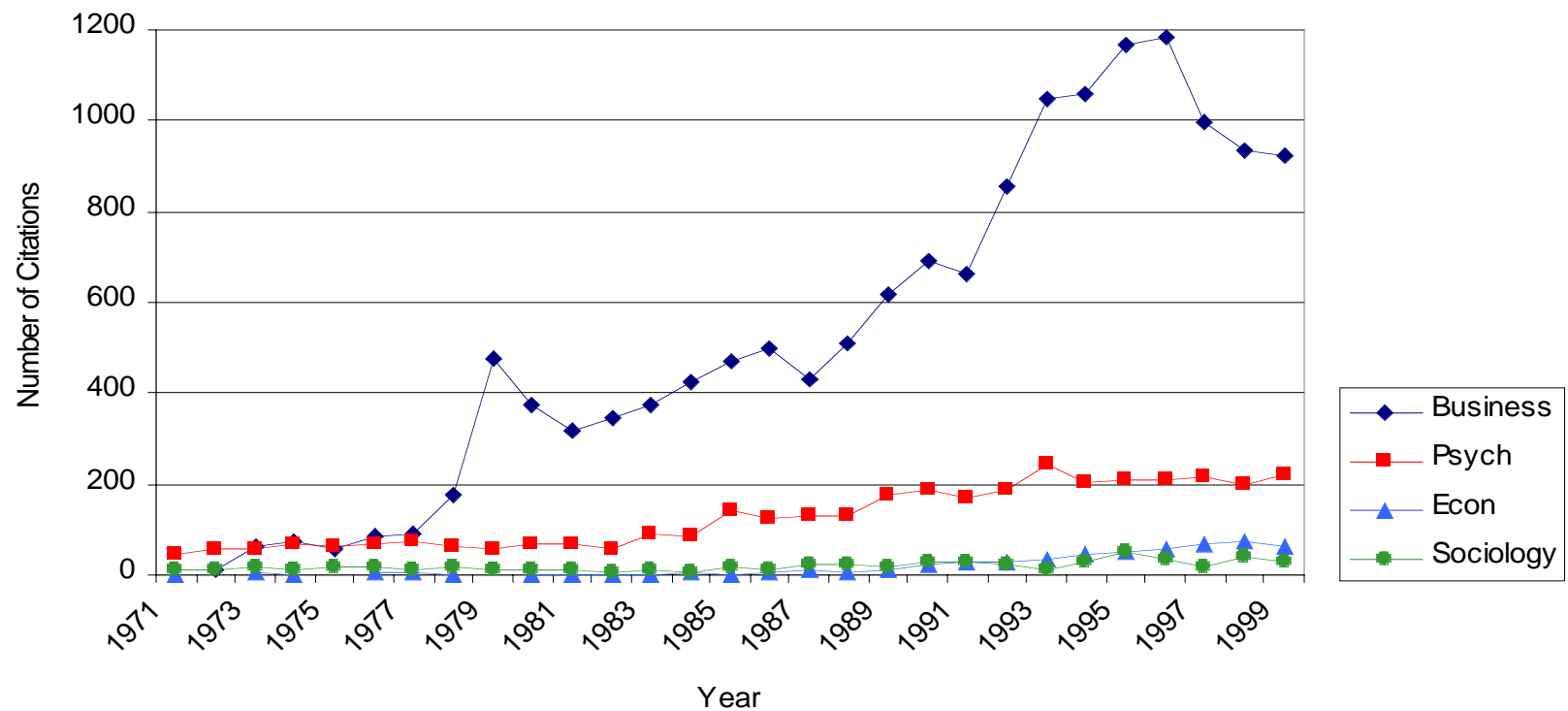
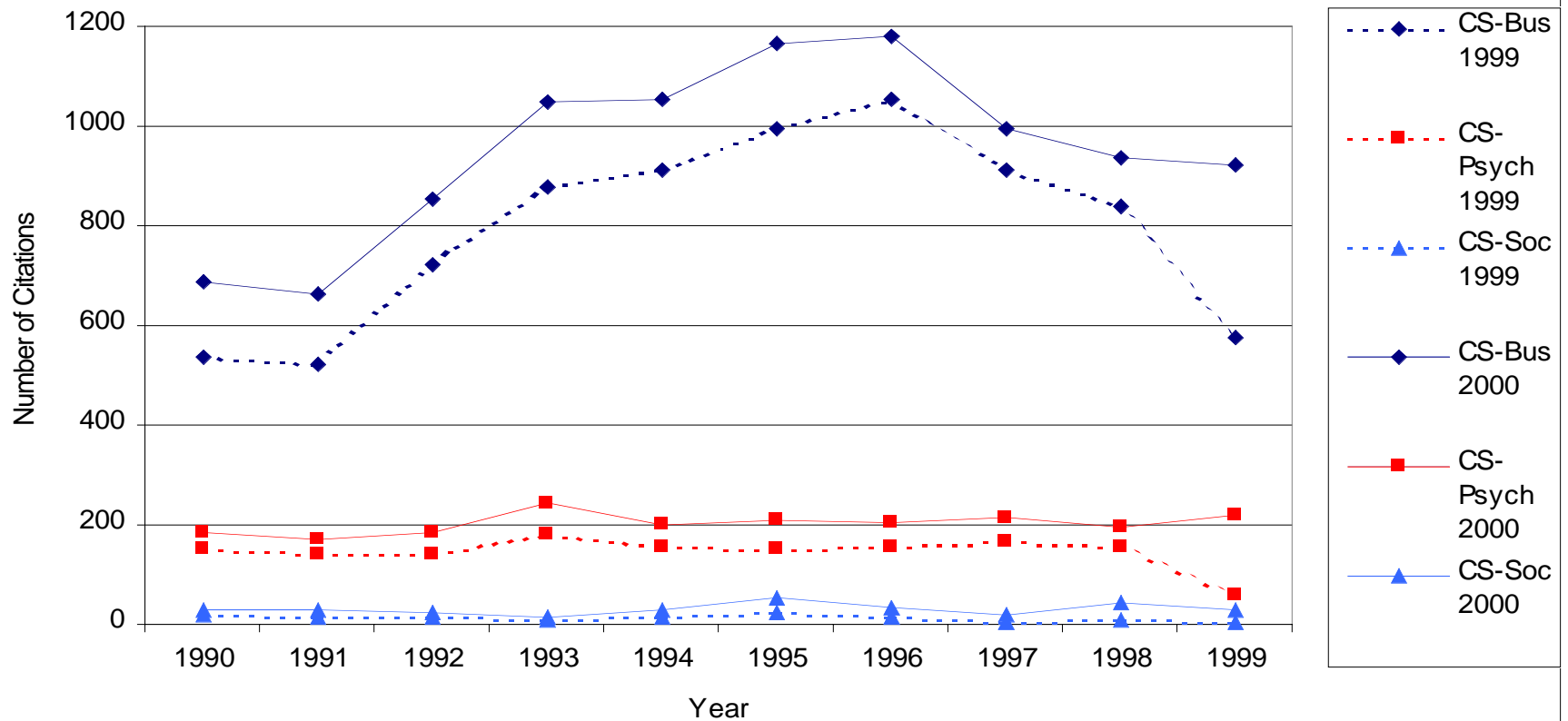


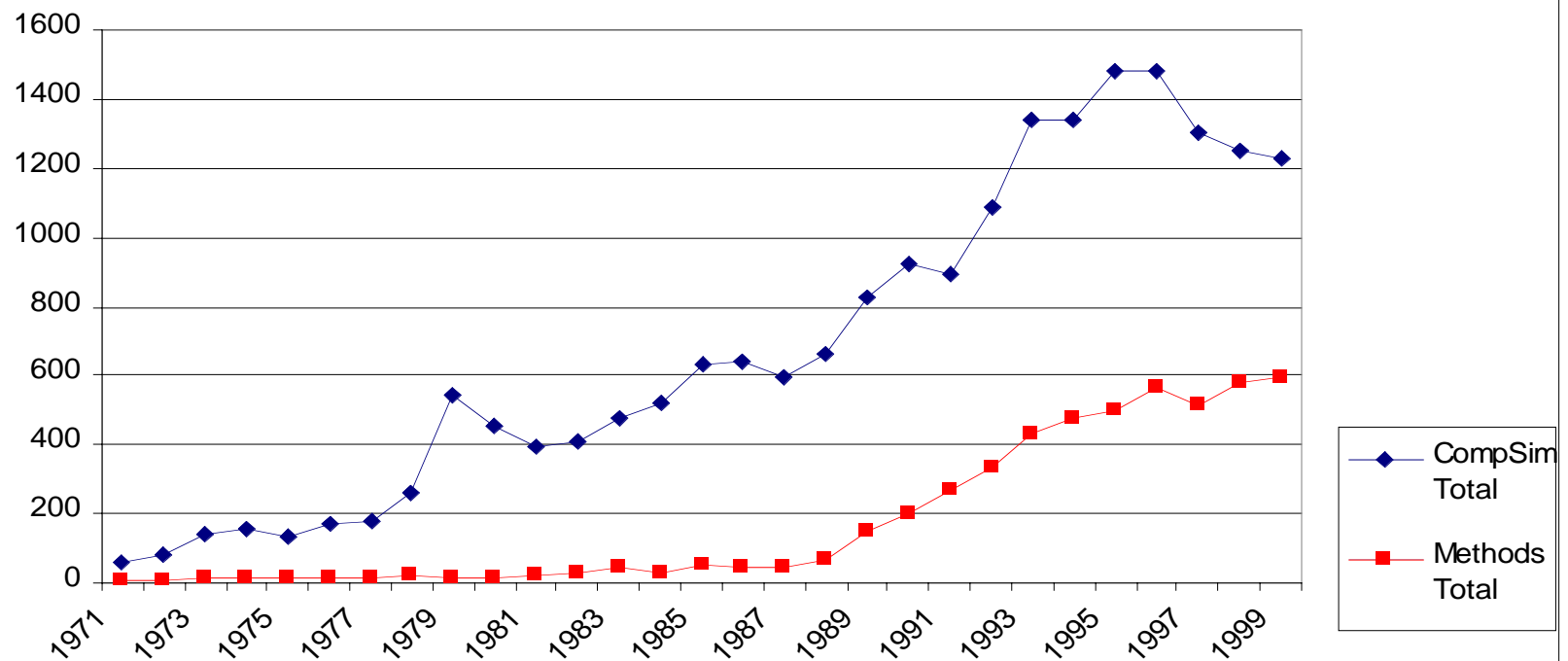
Chart A. 1999 vs 2000

Chart A. 1999 vs 2000 Citation Search Results by Discipline



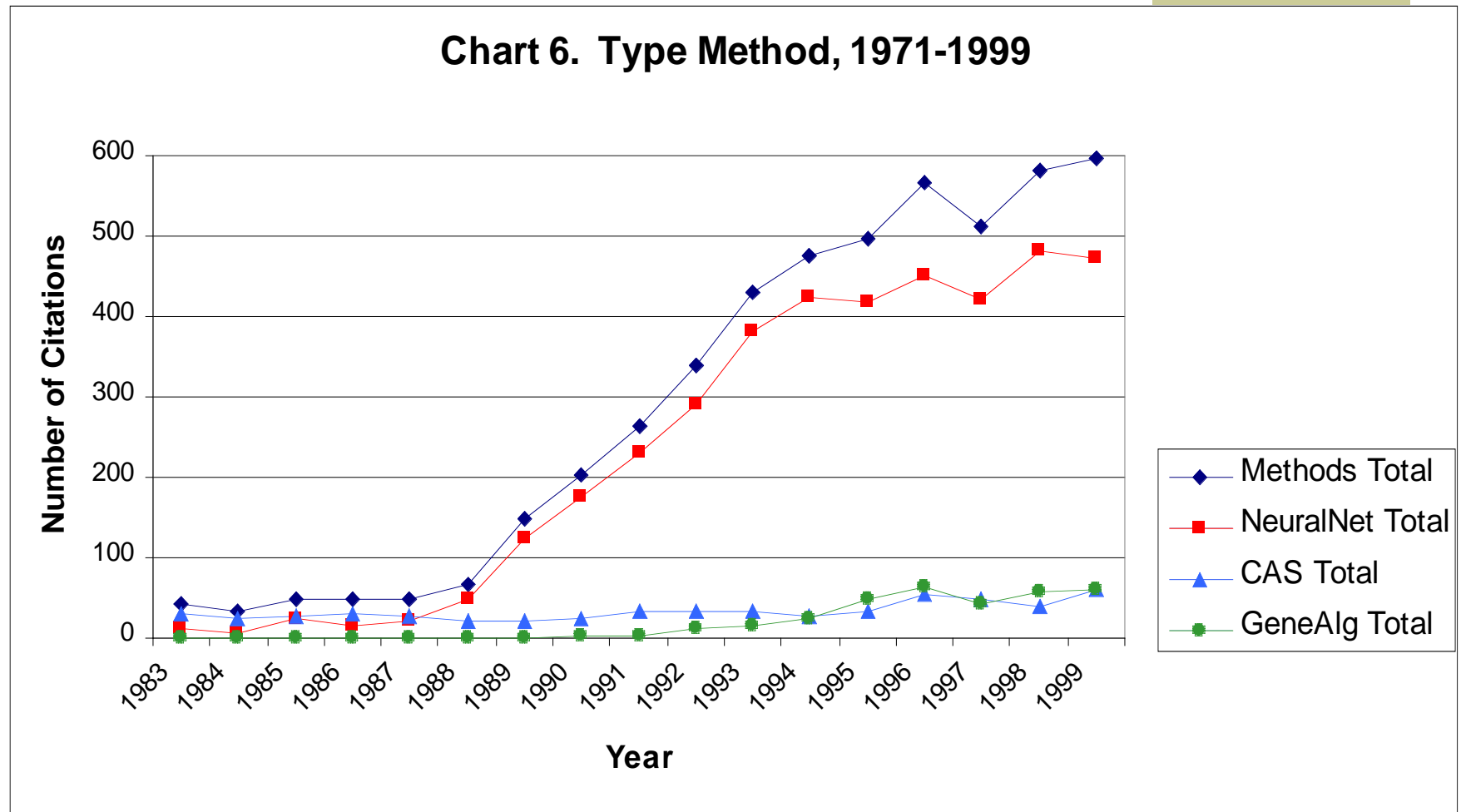
Computer Simulation and Methods Total

Chart 5. "Computer Simulation" and Method Type Total, 1971-1999



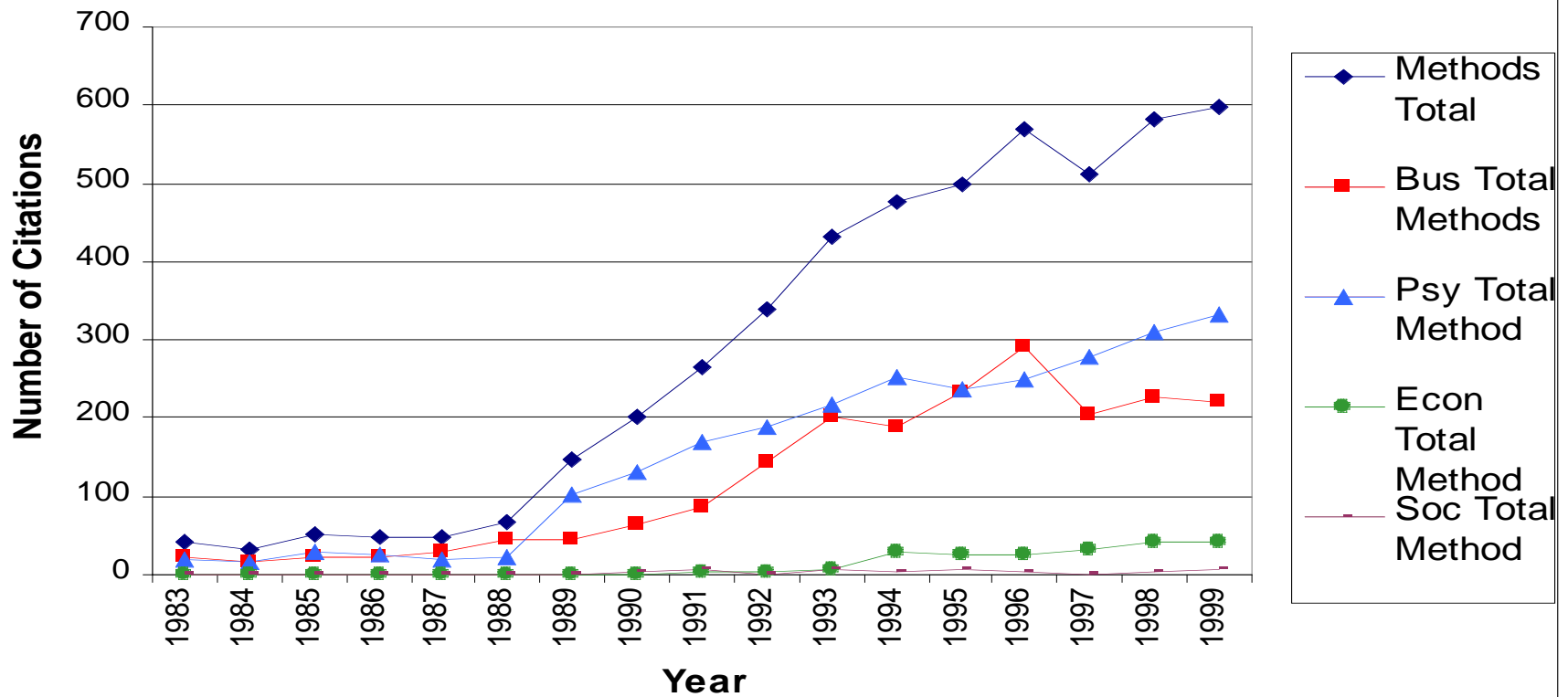
Type Method – NN, CAS, GA

Chart 6. Type Method, 1971-1999



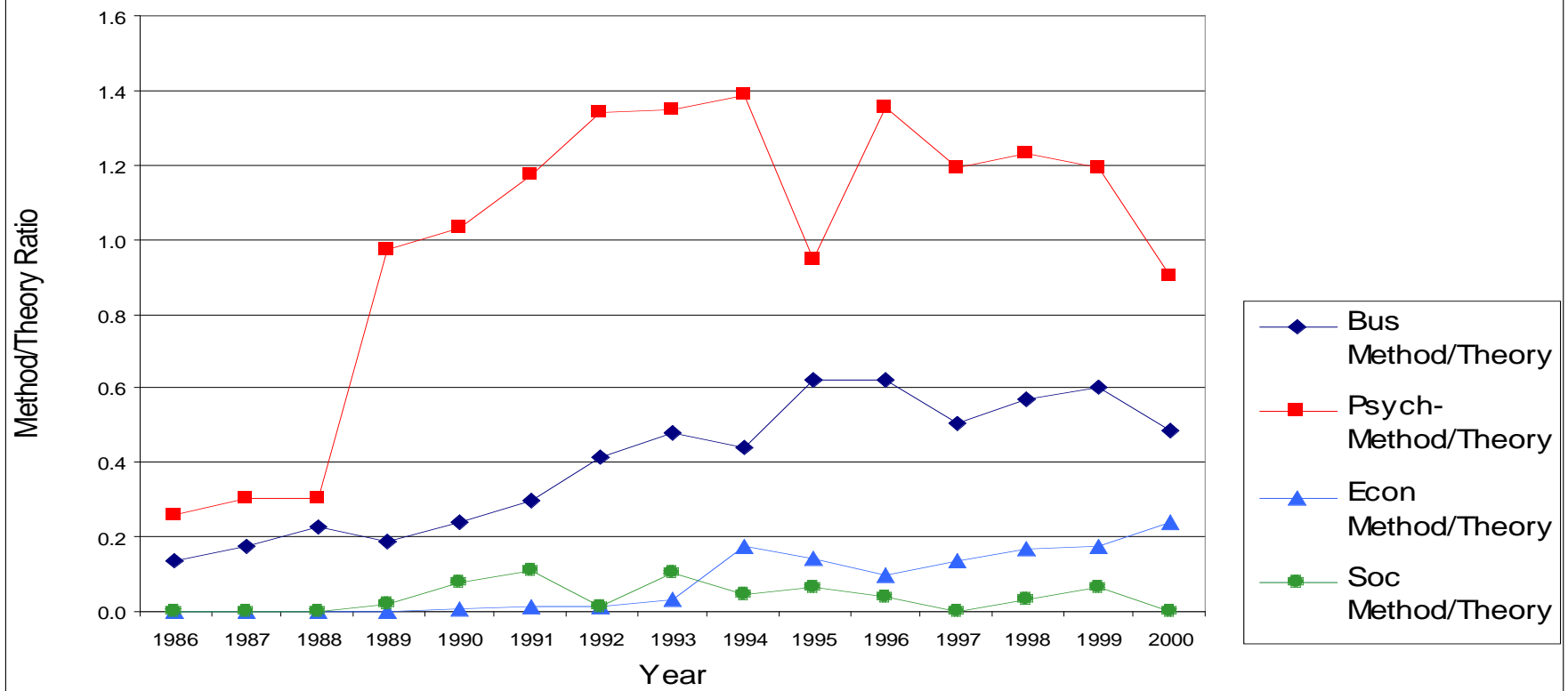
Methods by Discipline

Chart 7. Method by Discipline, 1983-1999



Disciplinary Composites - Ratio

Chart 8. Method/Theory Ratio by Discipline, 1986-1991



Quantitative Research, Percent, 1996-1998

	Theory (nonlinear dynamics)	Method (neural network)
Business	44	60
Psych	57	78

Quantitative Research, Topics, 1996-1998

	Theory	Method
Business	60% Mgmt DSS, stock market, consumer consumption/satisfaction 20% Manufacturing process control 10% Organization learning, change 10% Other – HR, datamining	37% NN performance optimization 26% Mgmt DSS, stock market, forecasting risk 20% Manufacturing, process control 17% Other-robotics, path analysis, rank
Psych	35% Social dynamics – therapy, organizations, social contagion 24% Brain Dynamics, EEG 12% Perception, speech acquisition 12% Learning – development, adapt. 10% Motion, locomotion 7% Other – overview, software	51% Perception, speech acquisition 21% Learning – strategy, development, memory, behavior development 10% NN performance optimization 10% Motion, locomotion control 8% Other – robotics



Summary



- ◆ Citation trends increased noticeably about 1988
- ◆ There is differential adaptation in the social sciences of chaos and complexity theories and methods: Business leads and dominates citation output from 1988 to the present
- ◆ There is a noticeable drop-off in citations 1996-1998 in business and sociology, a constant rate in economics and slight increase in psychology
- ◆ Theory and method citations have mixed qualitative and quantitative approaches
- ◆ Psychology is more quantitative than business



Policy Implications



- ◆ These results show trends and categorizations of research types in the social sciences
- ◆ Trends and tracking are useful policy tools
- ◆ Increased role of public policy and increased use of computer simulation for policy analysis require decision making tools such as these to make best social decisions under conditions of risk
 - Having a cross-disciplinary topology of problem types and solutions can be an efficient tool used by public policy analysts, a way to introduce innovation into the policy process
- ◆ Diffusion is not whole-sale adoption but adaptation to theories and methods already existing in the social sciences. It will be important to track similar changes, problems, solutions in other social sciences.
 - For example, application of complexity in education about globalization and technology