The problem of attention scarcity

- “Prime Minister’s portfolio”: everything imaginable
- Division of labor allows governments to do many things simultaneously, unlike individuals
- However, high-level attention remains scarce
  - Prime Minister’s time
  - Space on Page One of newspapers, TV, radio
  - Election platforms of parties and candidates
  - Public concern

- Most policies, most of the time: continue the status quo while attention focuses on more urgent priorities
- Any policy, occasionally: a crisis

A threshold model of attention

- Threshold of “urgency”
  - Determined by space, how many problems can be on the agenda, and competition, how many other problems are already there
- Below the threshold: Under-response
  - No reason to call into question dominant paradigm
  - Status quo policy rubber-stamped
  - Only marginal responses to emerging trends in the severity of underlying problems
- Expectation: Stability, hyper-incrementalism

A threshold model of attention

- Over the threshold: “Alarmed discovery”
  - SQ policy obviously demands reconsideration
  - Core policy assumptions may be challenged
  - “Issue-definitions” can be revised dramatically
    - Pesticides example from above
    - Death penalty: from morality to innocence, DNA, errors
  - Among experts, previously dominant coalition may be discredited, challengers may gain power, credibility
  - No clarity on how rapidly to adjust, but clear need to “do something”
  - Tendency to over-respond

Disproportionality of Inputs to Outputs

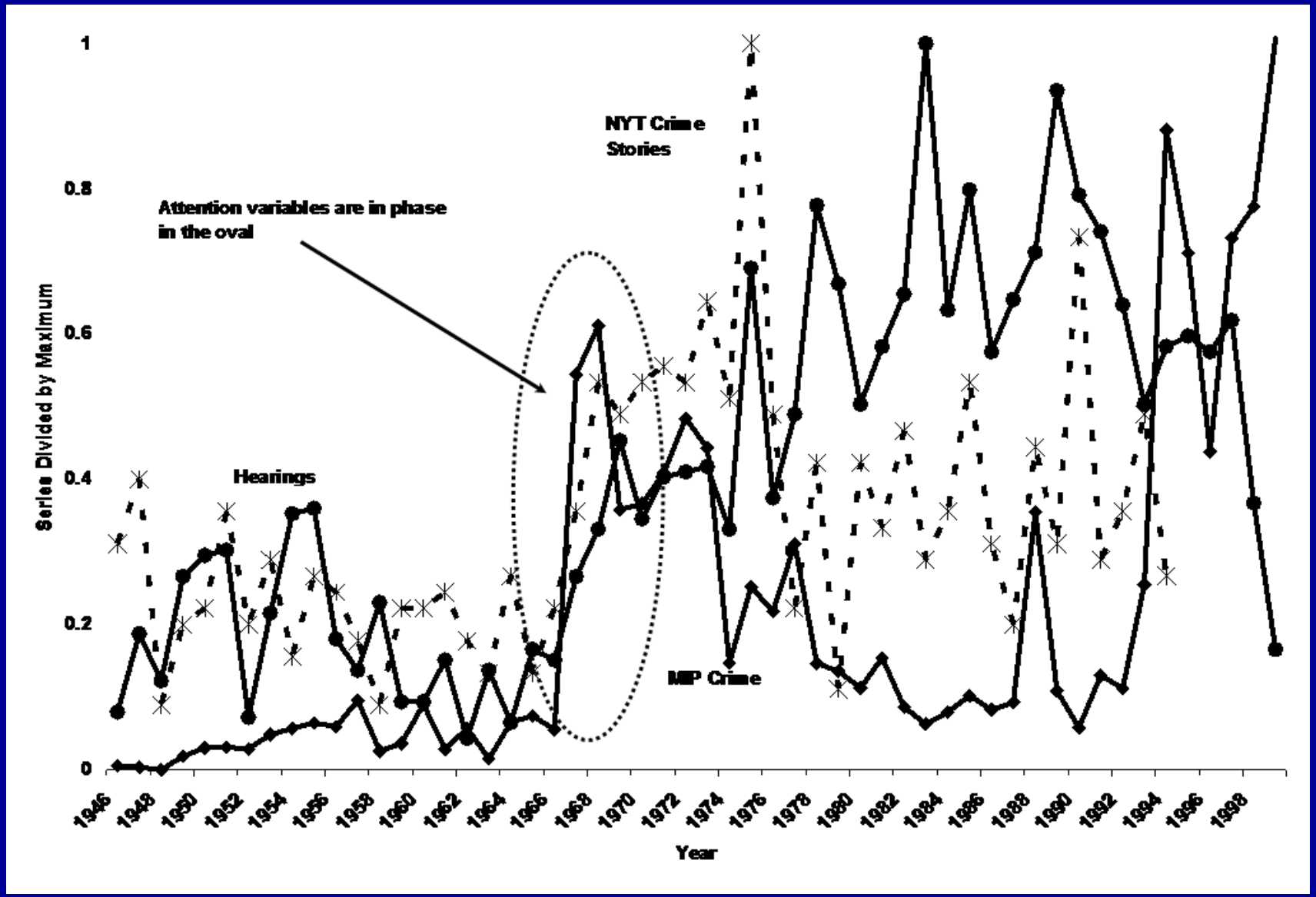
- When a crisis *does* occur, how much of a response is enough?
- Current fiscal crisis is a great example, but it is not uncommon
- Often, it is completely unclear how much one might want to “respond” to some new signal

- Recent example: pornography “scandal” at NSF leads a Member of Congress to propose $1.5B reduction in budget. Why in billions rather than in millions???

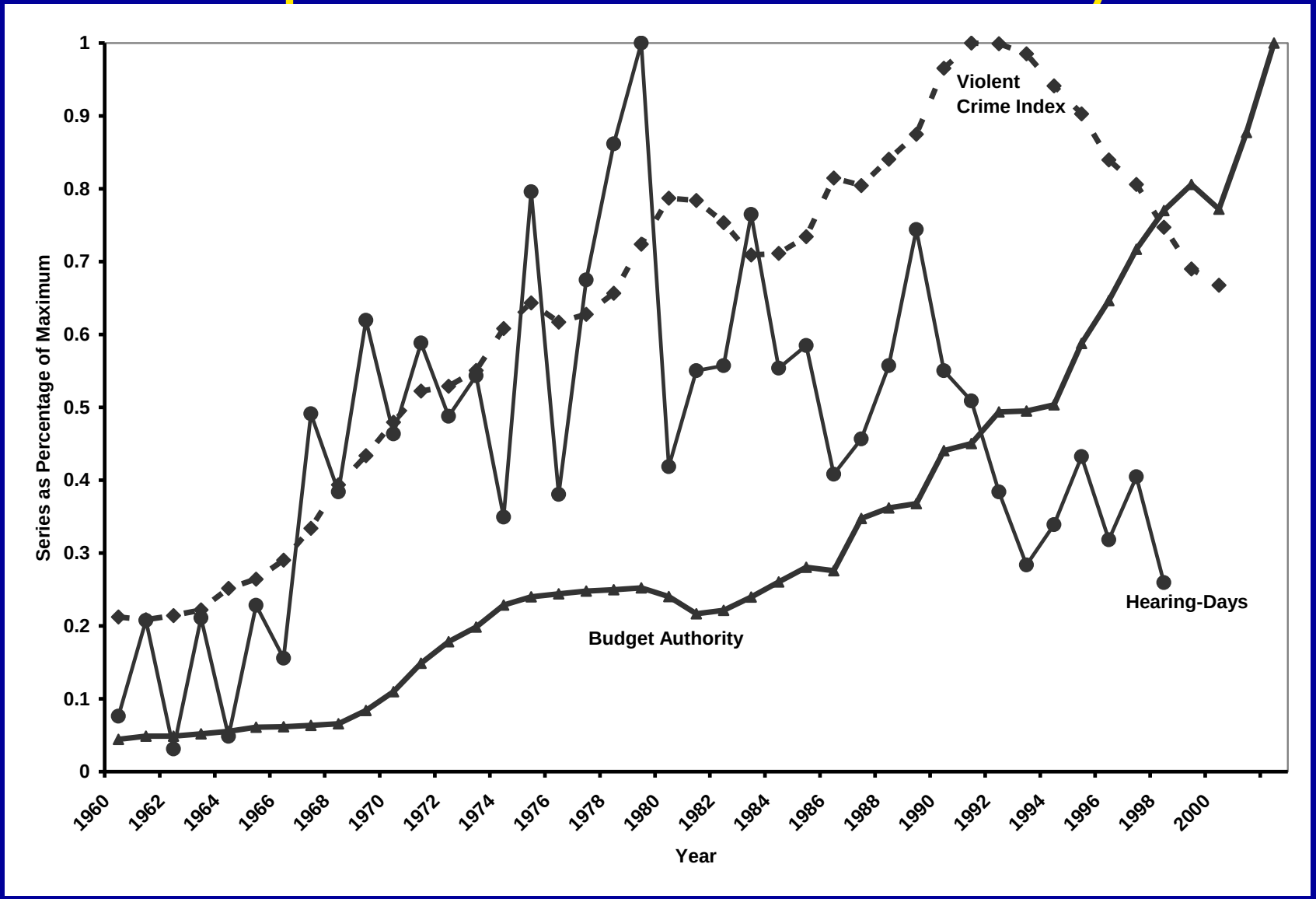
Bounded Rationality

- These ideas of disproportionality should be quite general to many kinds of human decision-making.
- However, they should not apply to “simple” decisions.
- Where is the boundary between simple and complex?
- Government decision-making is clearly well beyond this threshold, and that is our focus.

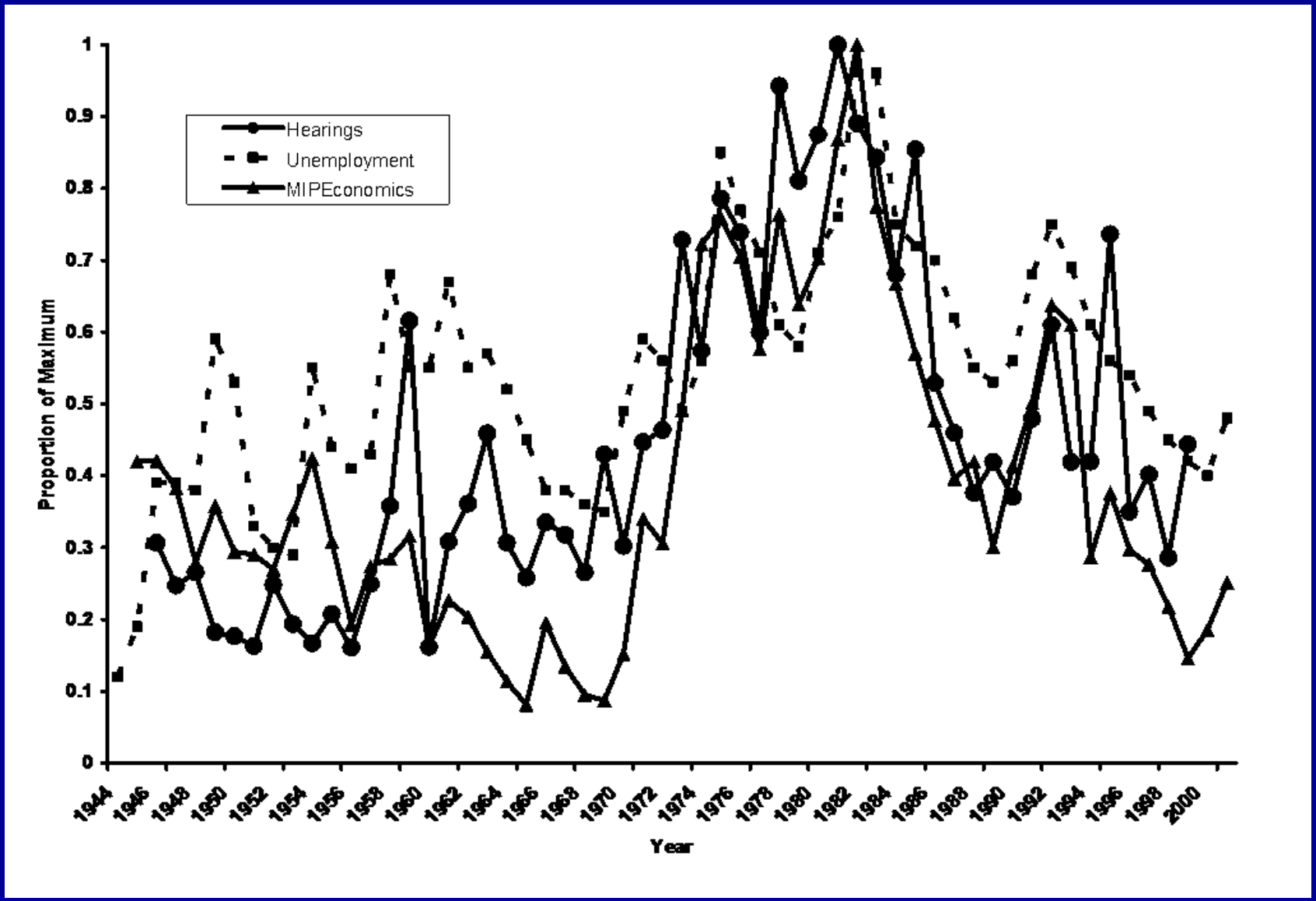
A Policy Chronology: Crime



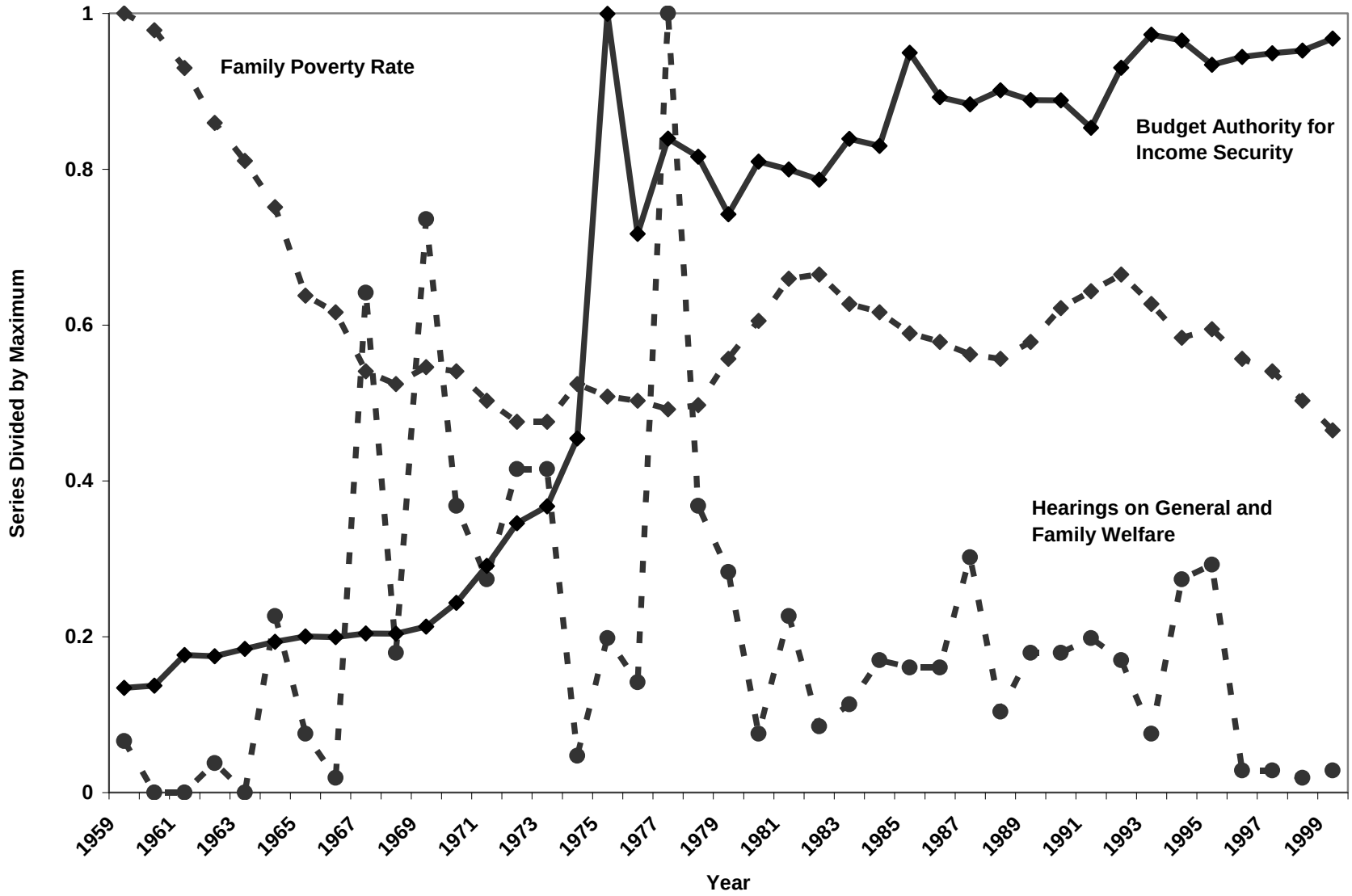
The Actual Rate of Crime only Explains Part of the Story



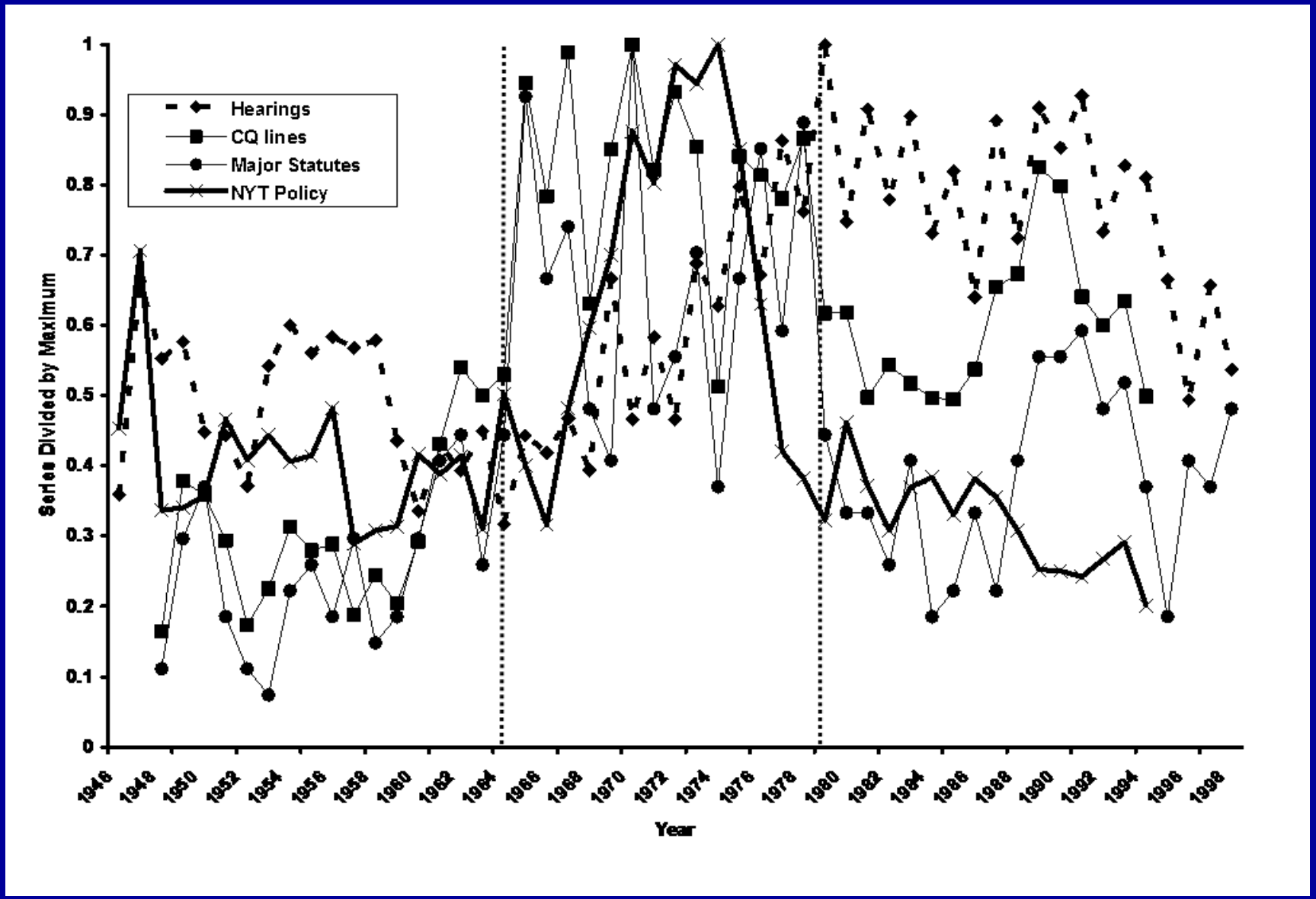
Attention to Unemployment



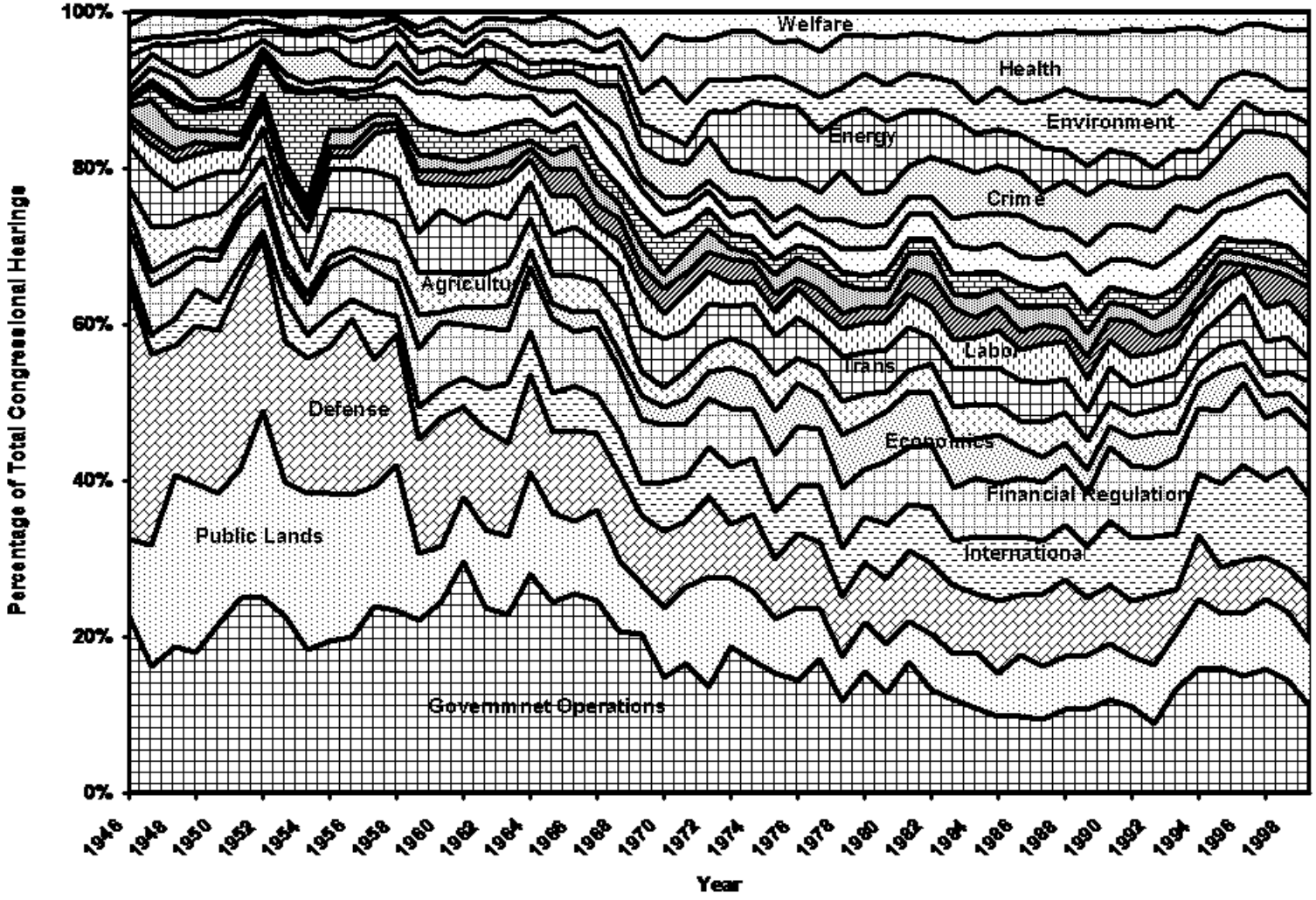
Attention to Poverty



A Chronology of Government Activity



The Increasingly Complex Government Agenda



Some Data

- US Federal Budget, 1800 to Present (one observation per year)
- US Federal Budget, 1947 to present (62 categories of spending, so about 3,000 observations)
- Similarly organized datasets for other systems
  - National-level systems
  - US States
  - Municipalities
  - School Districts in Texas
  - Municipal governments in Benin, national government in South Africa, other developing countries

The US Government, 1801-2000

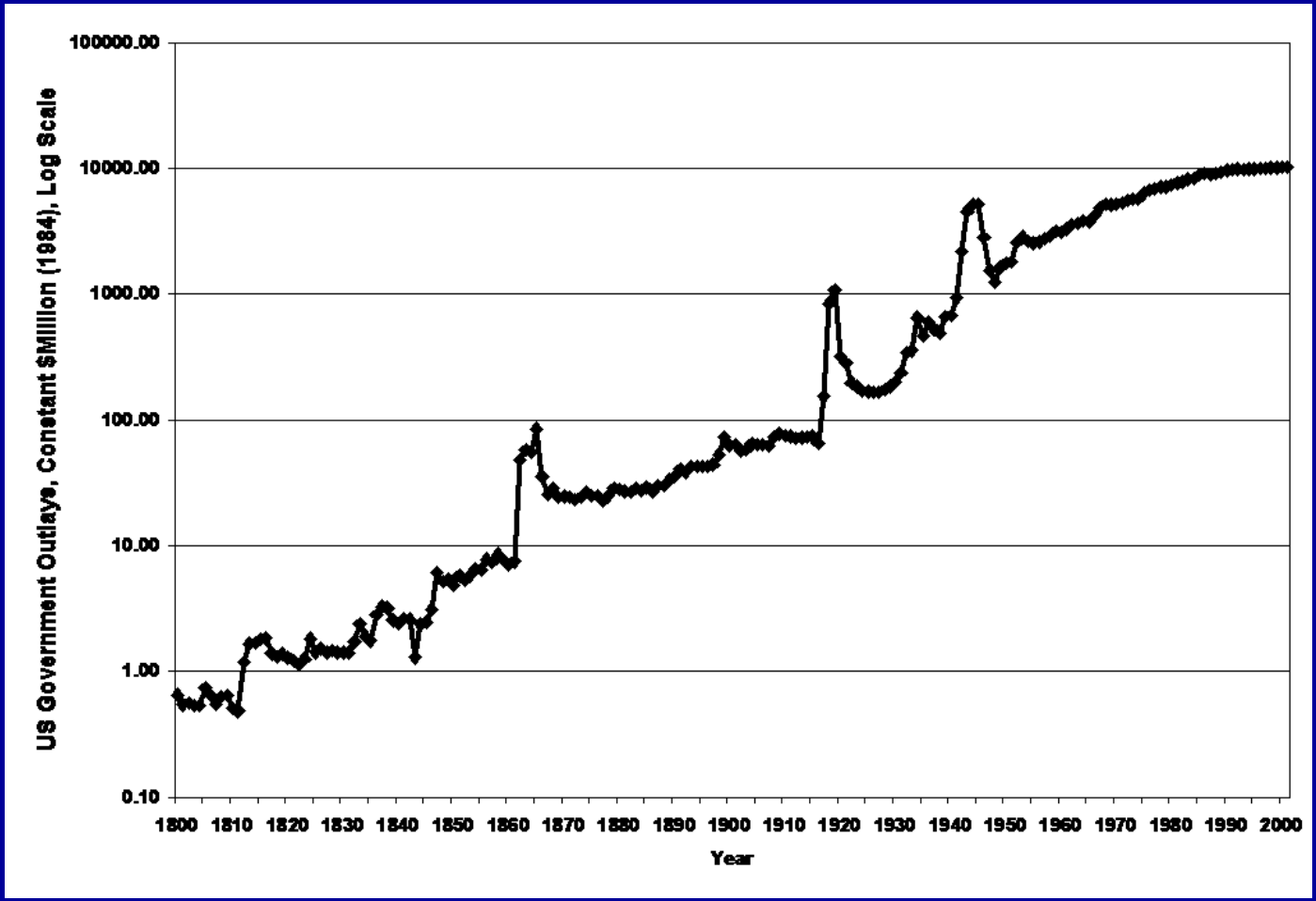


Figure 2.1. US Federal Budget Outlays, Annually from 1801 to 2000 (log scale). Data are corrected for inflation and show a 13,000-fold increase over time.

The US Budget since 1800: A High-Cost Policy Process

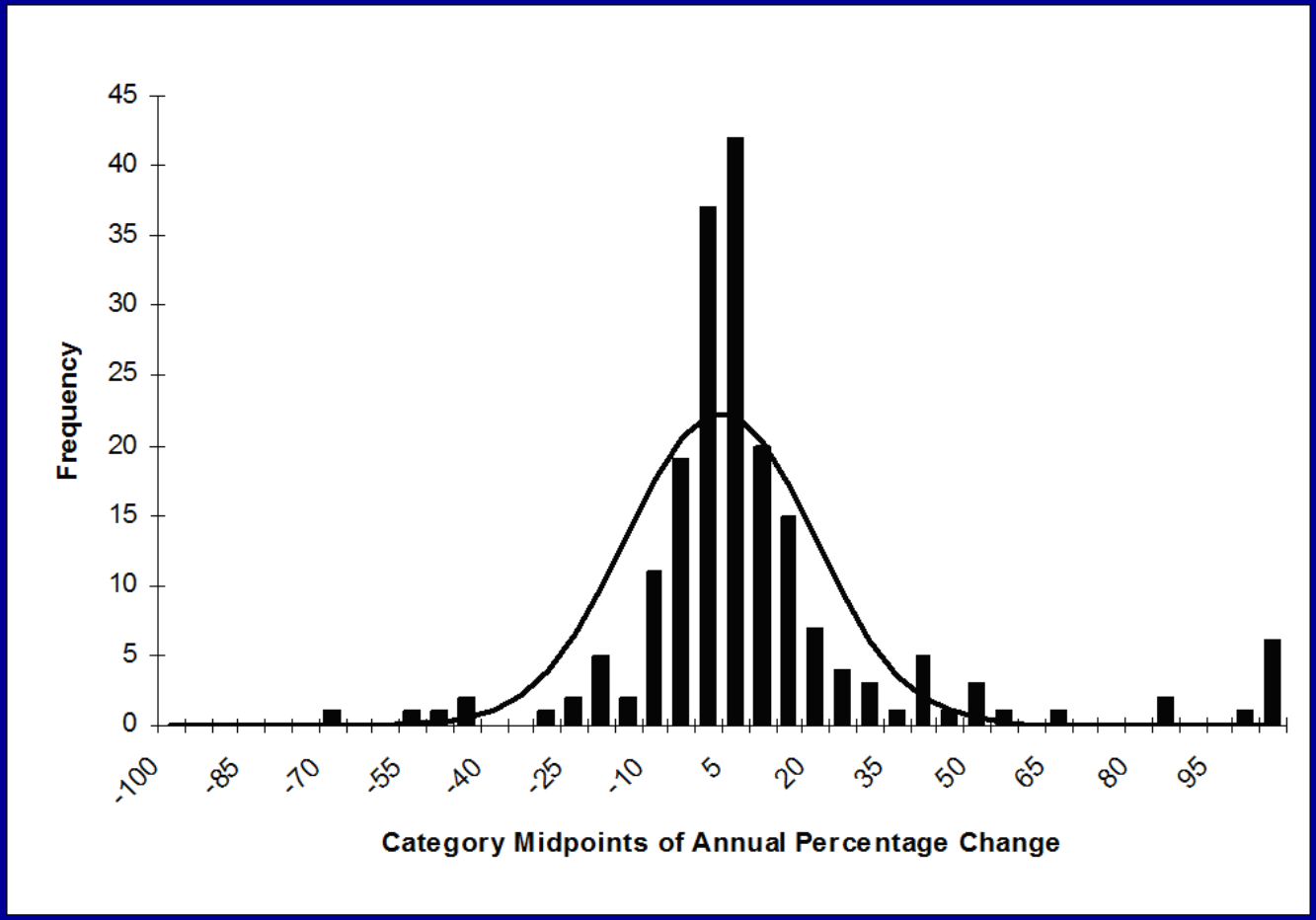


Figure 12.6. Annual change in Real US Budget Outlays, 1800-1994.

The Distribution of Budget Change, Defense and Domestic Outlays, 1800-1988

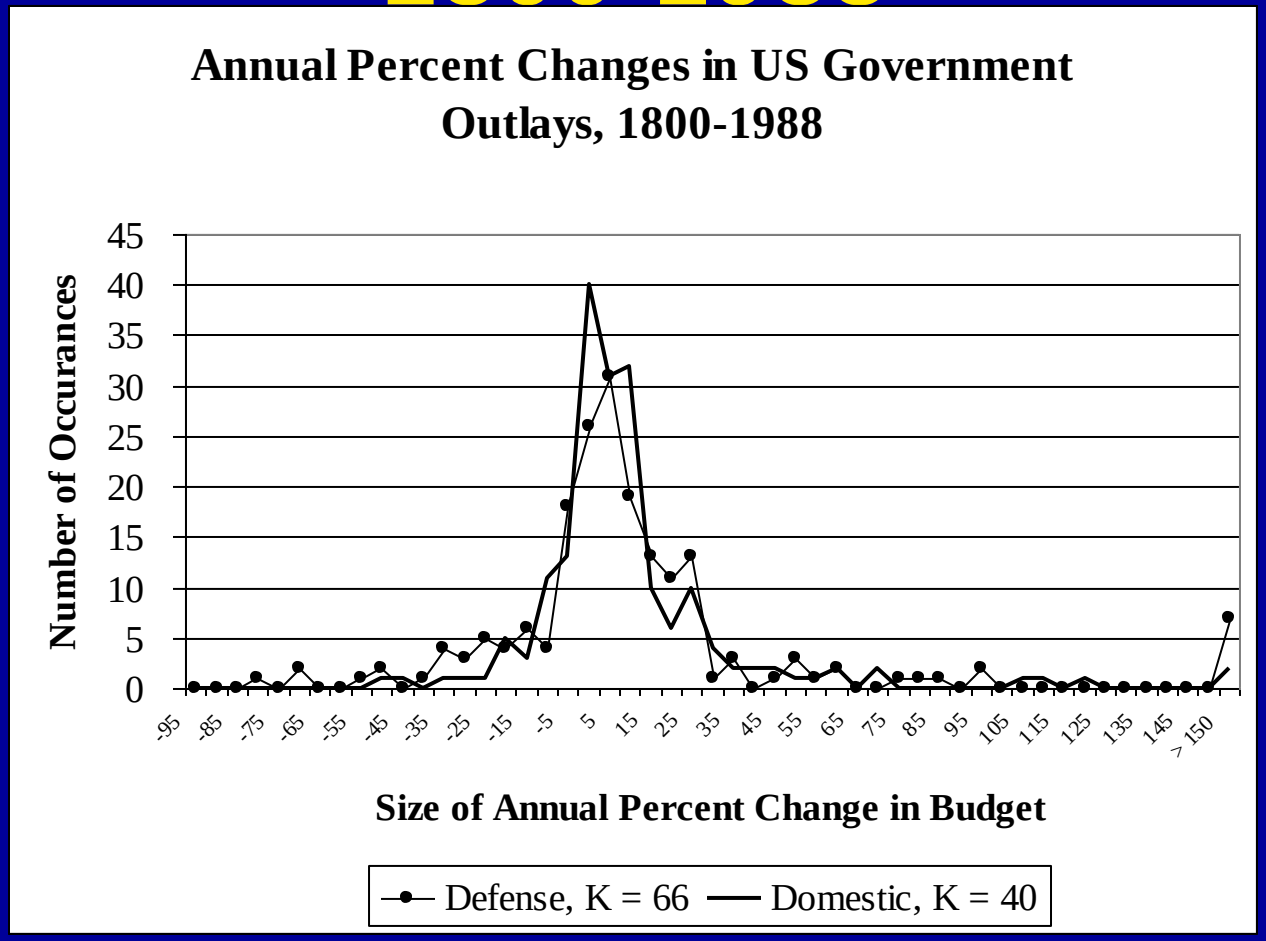
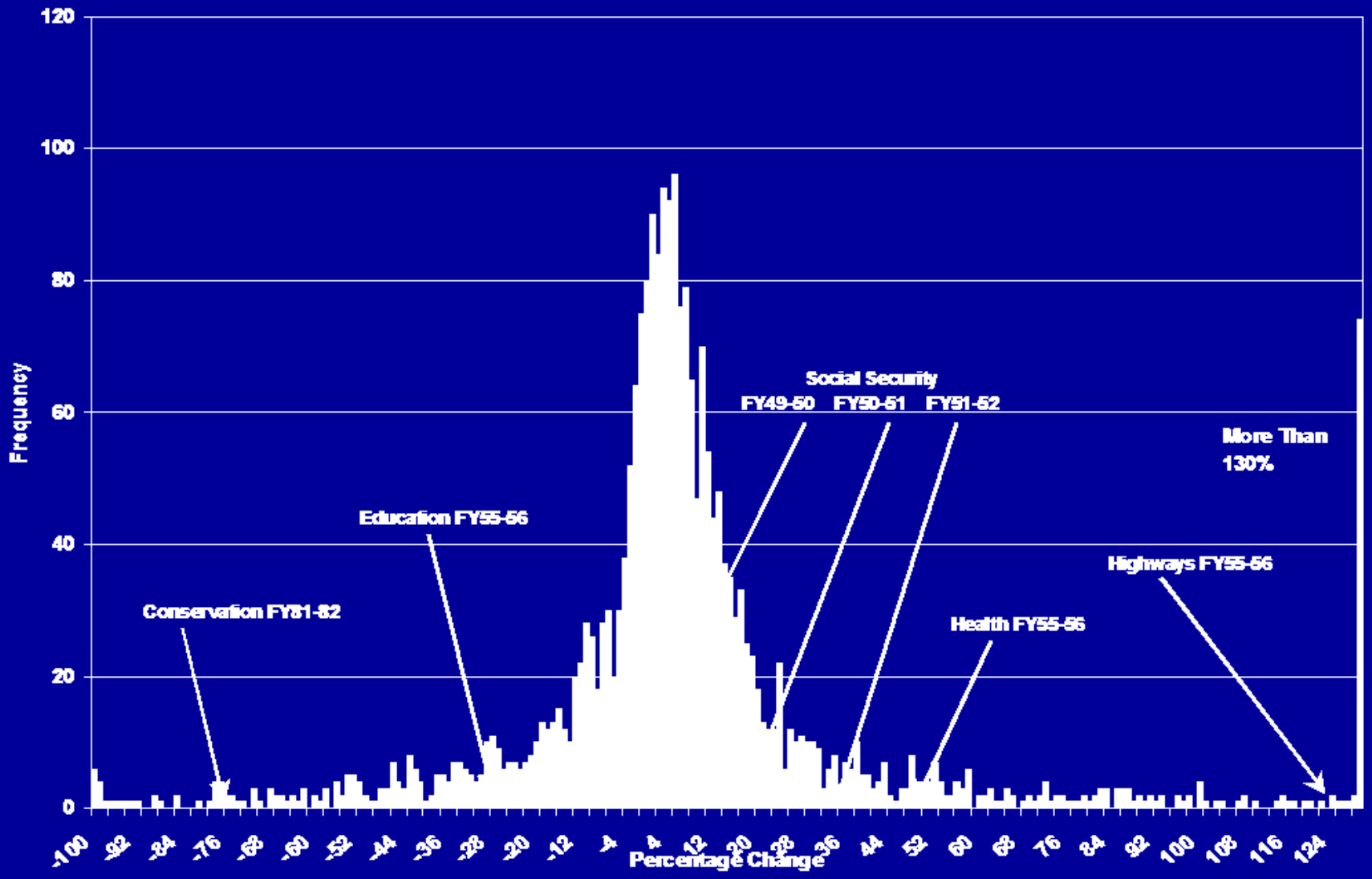
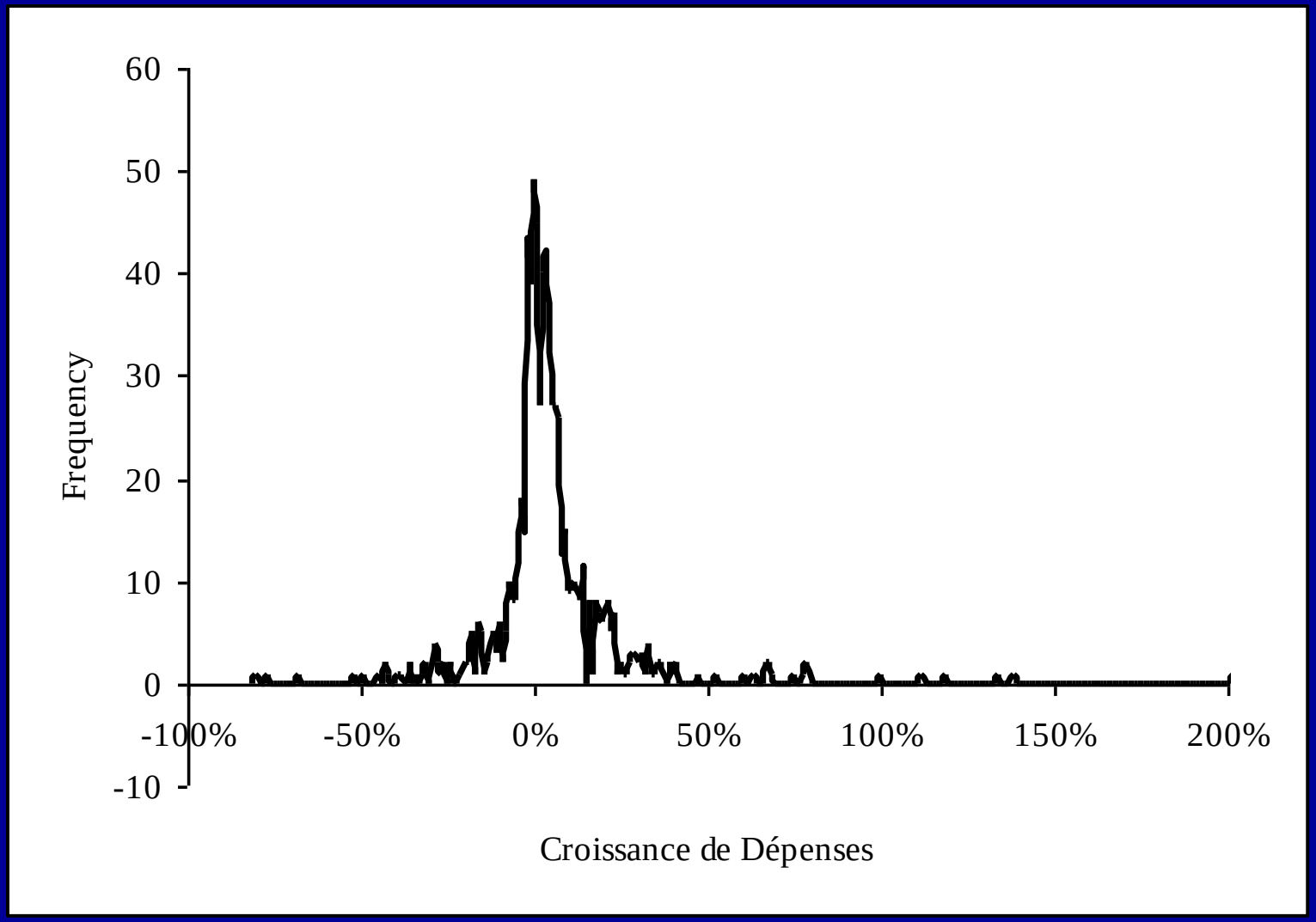


Figure 2.7. Annual Percent Changes in Budget Outlays, 1800 to 1988.

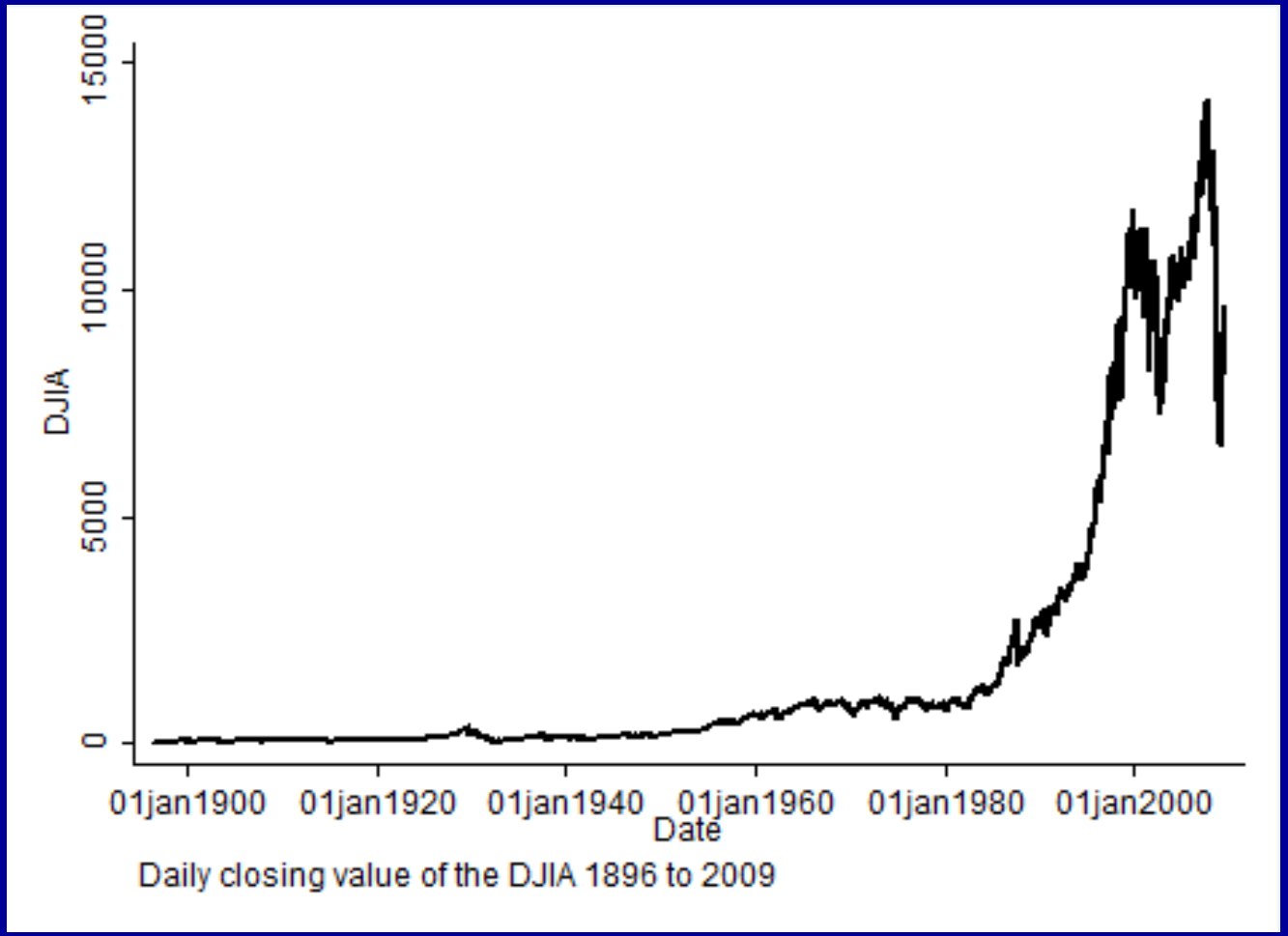
Punctuated Equilibrium in the US Budget: Status Quo AND Radical Changes



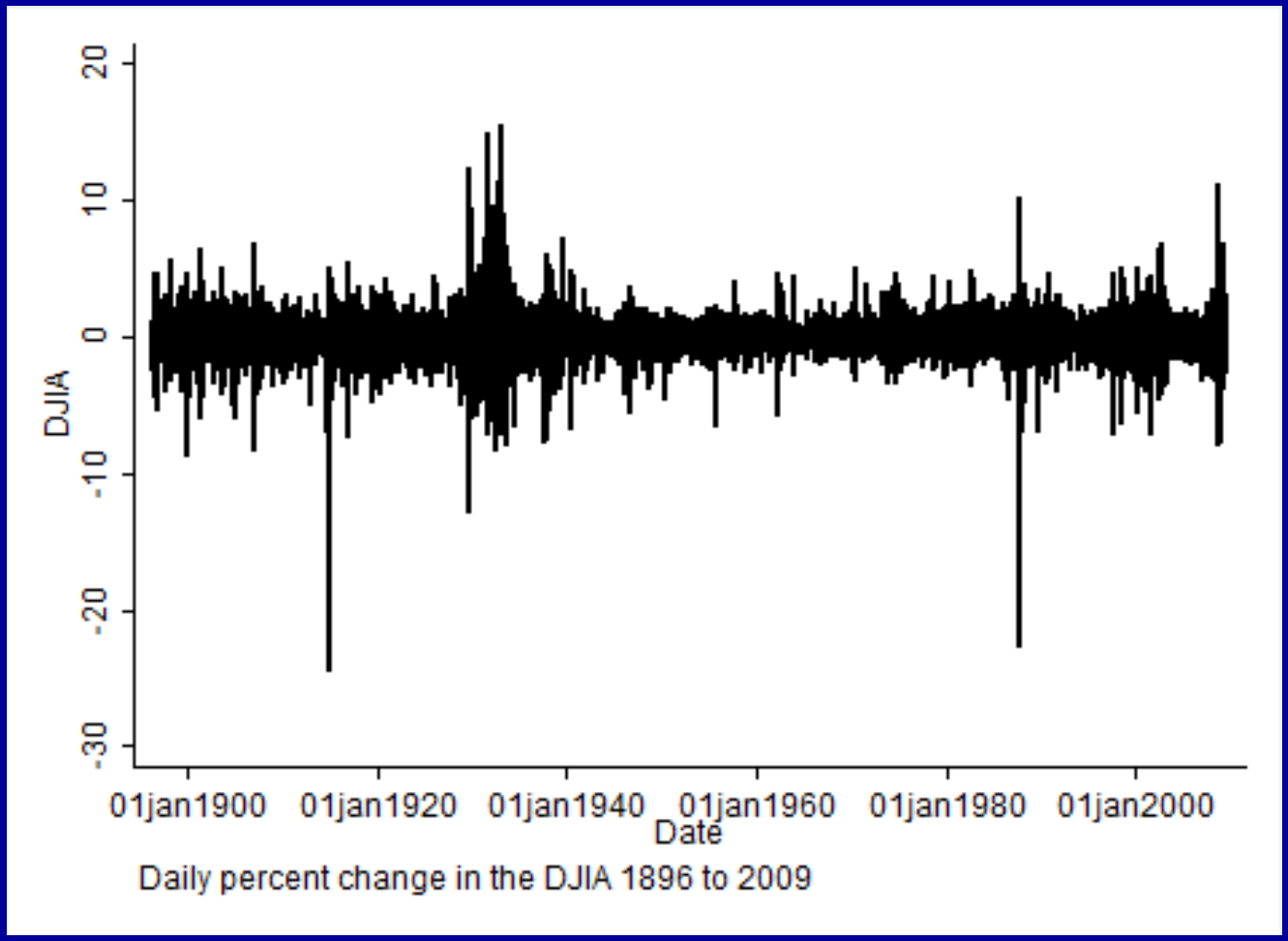
We See the Same Thing Everywhere We Look: France



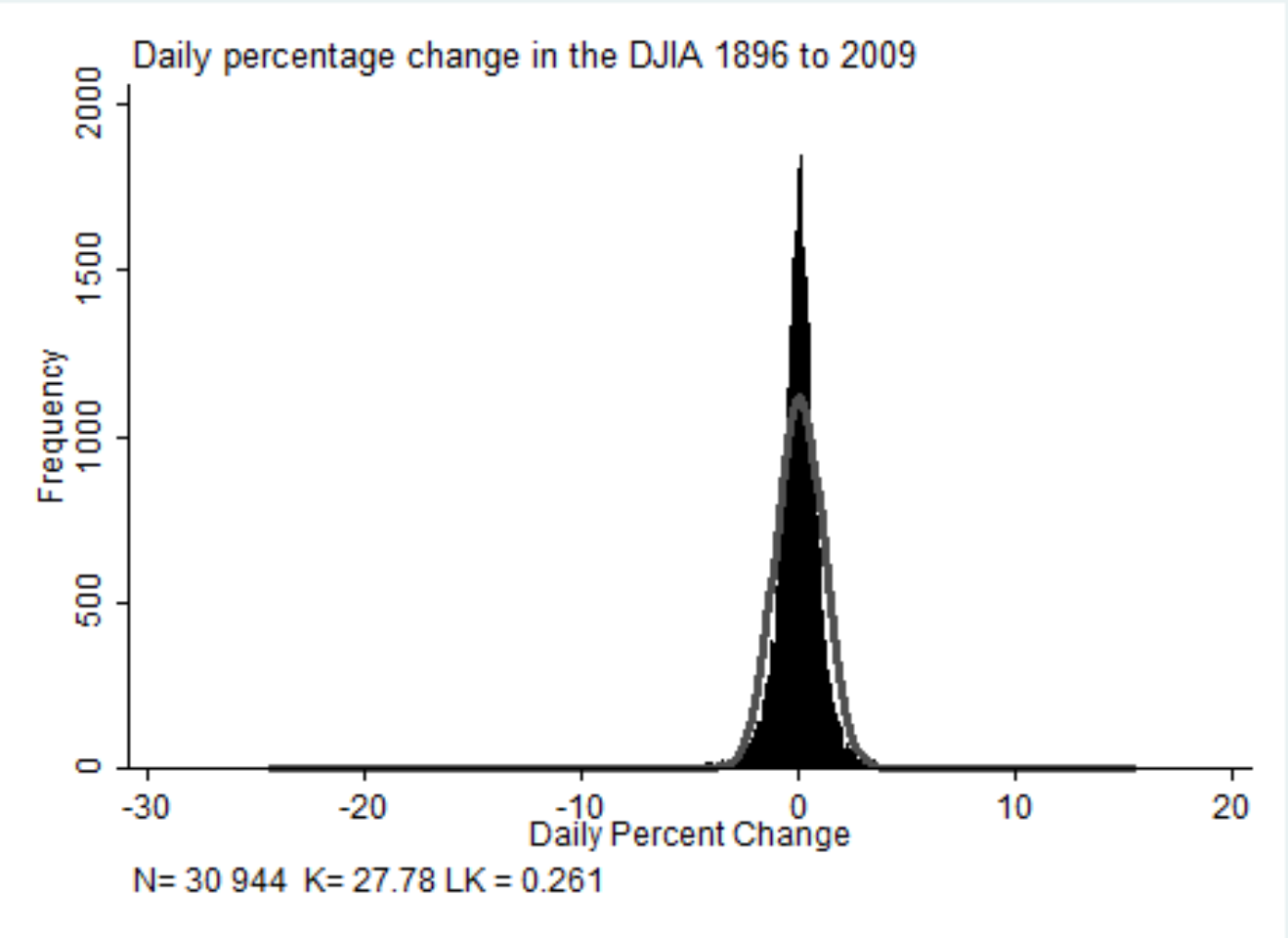
Dow-Jones daily values, 1896 to present (30,000 observations)



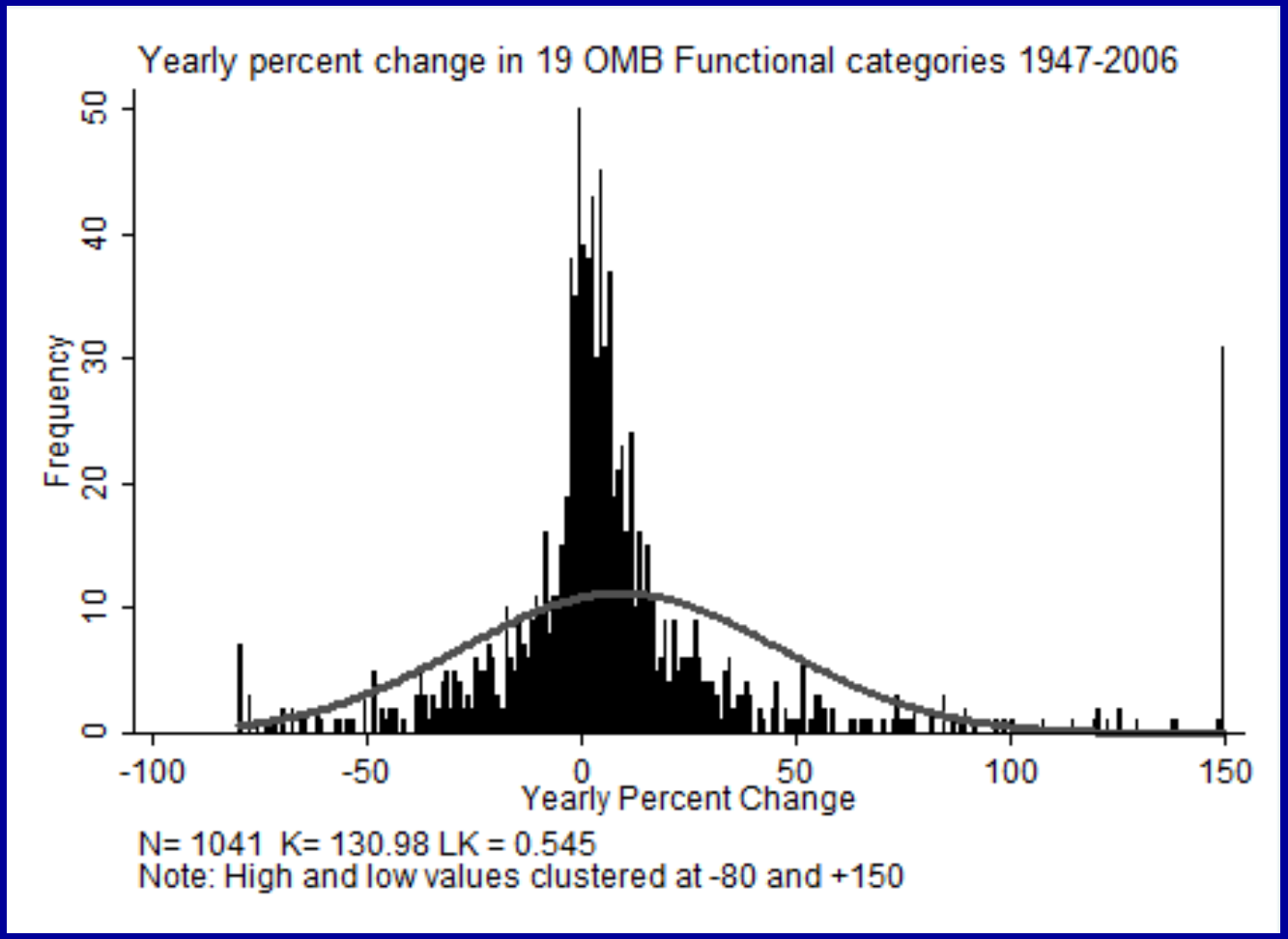
Daily Percentage Changes, DJIA



Distribution of changes: almost normal but a few extreme values



Federal Spending much more disproportionate



A Preliminary Model

$$R_t = \beta S_t \quad \text{if } S_t + \Sigma S_{0<k} > C; \text{ otherwise } R_t = \lambda S_t$$

Where: R_t = Response ; S_t = Input signal

The parameters:

C = Threshold ($0 < C > 1$)

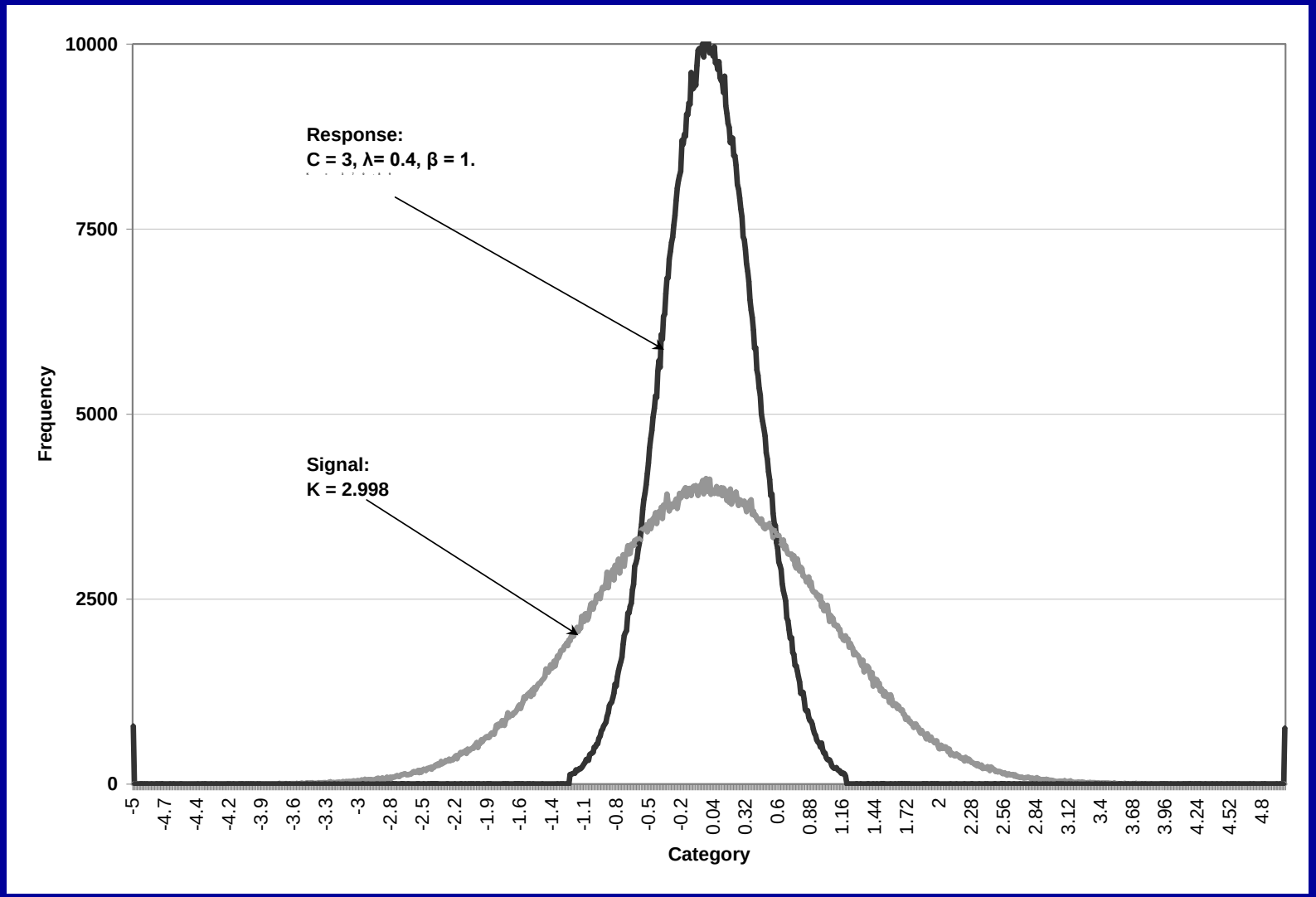
λ= friction ($0 < \lambda > 1$)

β = amplification ($0 < \beta > 1$)

$0 < t > k$ (time varies from zero to k

S_t = N(0,1) (inputs are standard normal)

Sample Model Results



Extending this simple model

Work with Bryan D. Jones, U Texas, Austin;

Péter Érdi Kalamazoo College Center for Complex Systems Studies and Hungarian Academy of Science; and

László Zalányi, Hungarian Academy of Science

Problems (some already fixed):

Left and right tails not symmetrical

“Acceleration” parameter tends to be greater than merely the accumulated signal

(That is, the simulations never produce enough extreme values)

Model improvements

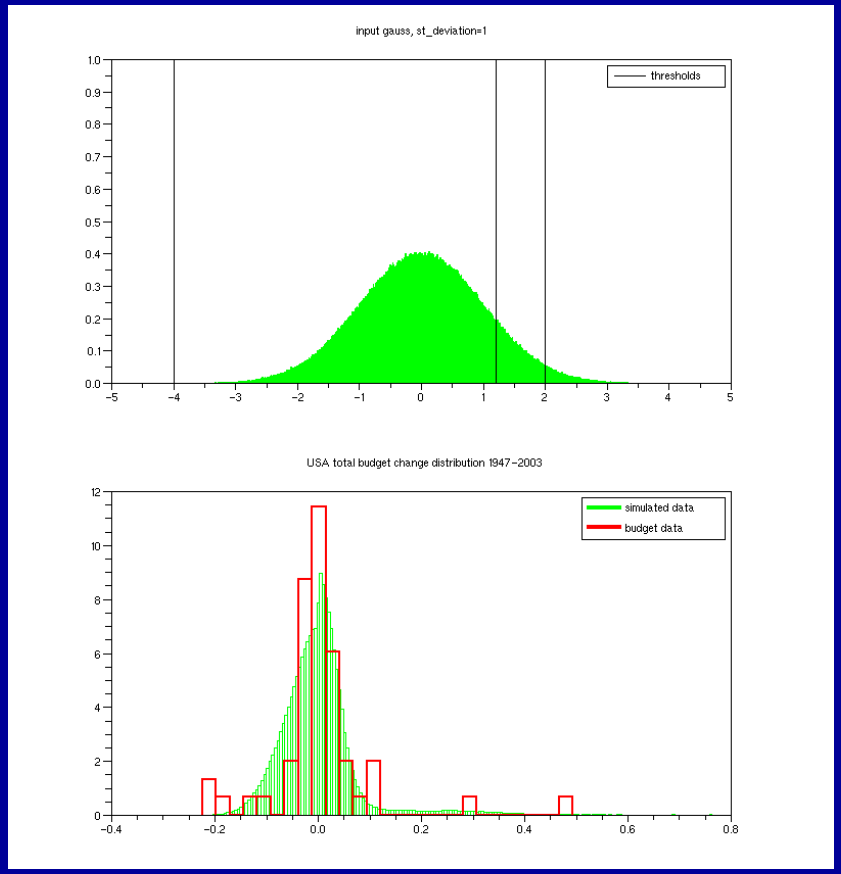
Different thresholds for negative and positive

Two positive thresholds, with a higher acceleration parameter above the second threshold.

Thresholds themselves can be made random, to avoid abrupt breaks in the simulated outputs

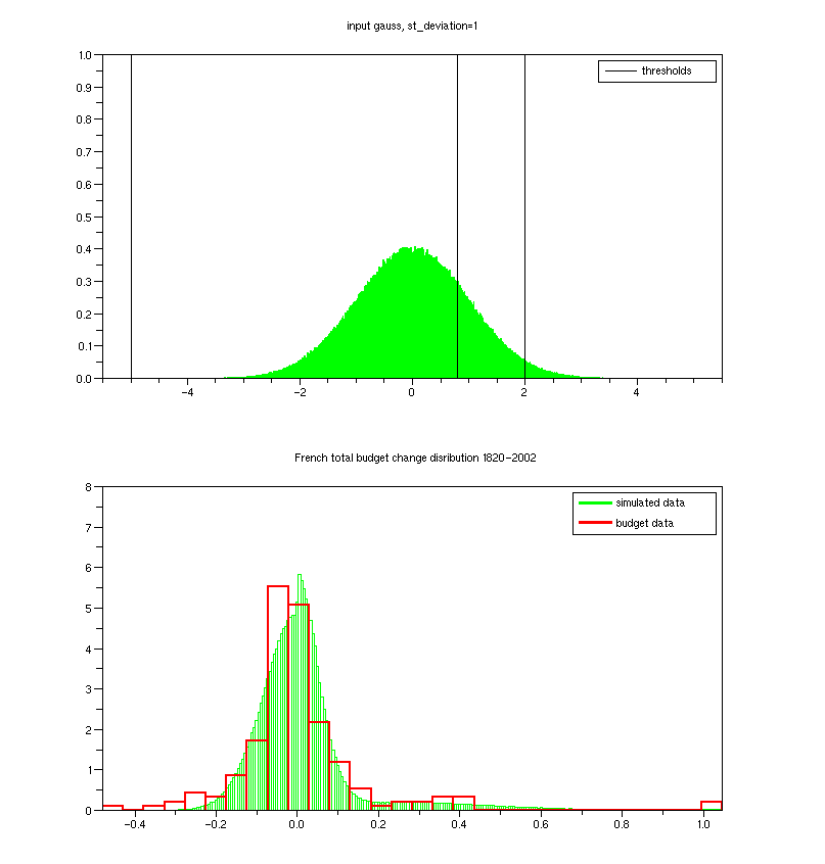
Some results:

Fitting a simulation to the US data



Upper: Gaussian inputs and the 3 thresholds as vertical bars
Lower: Actual US budget distribution (green), simulated data (red bars)

Fitting to the French Data



Upper: Gaussian inputs and the 3 thresholds as vertical bars
Lower: Actual French budget distribution (green), simulated data (red bars)

Government Budgets as Power Laws

Seems a general rule

Seems due to bounded rationality, complexity

Not clear what is the combination of:

a) Friction, or status-quo bias

b) Cascades, mimicking, or preferential attachment that leads to the fat tails

Remaining Issues

What is the line between simple and complex in human decision-making?

Can we design institutions that are more efficient? Do we want to?

Can we get direct measurements of decision making costs?

Why do budgets produce power laws but virtually all other distributions are less extreme?