



The effect of increases to concession card income eligibility thresholds on pharmaceutical consumption

Work in Progress

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**Presented at CAER Summer Workshop in Health
Economics 1st Feb 2007**

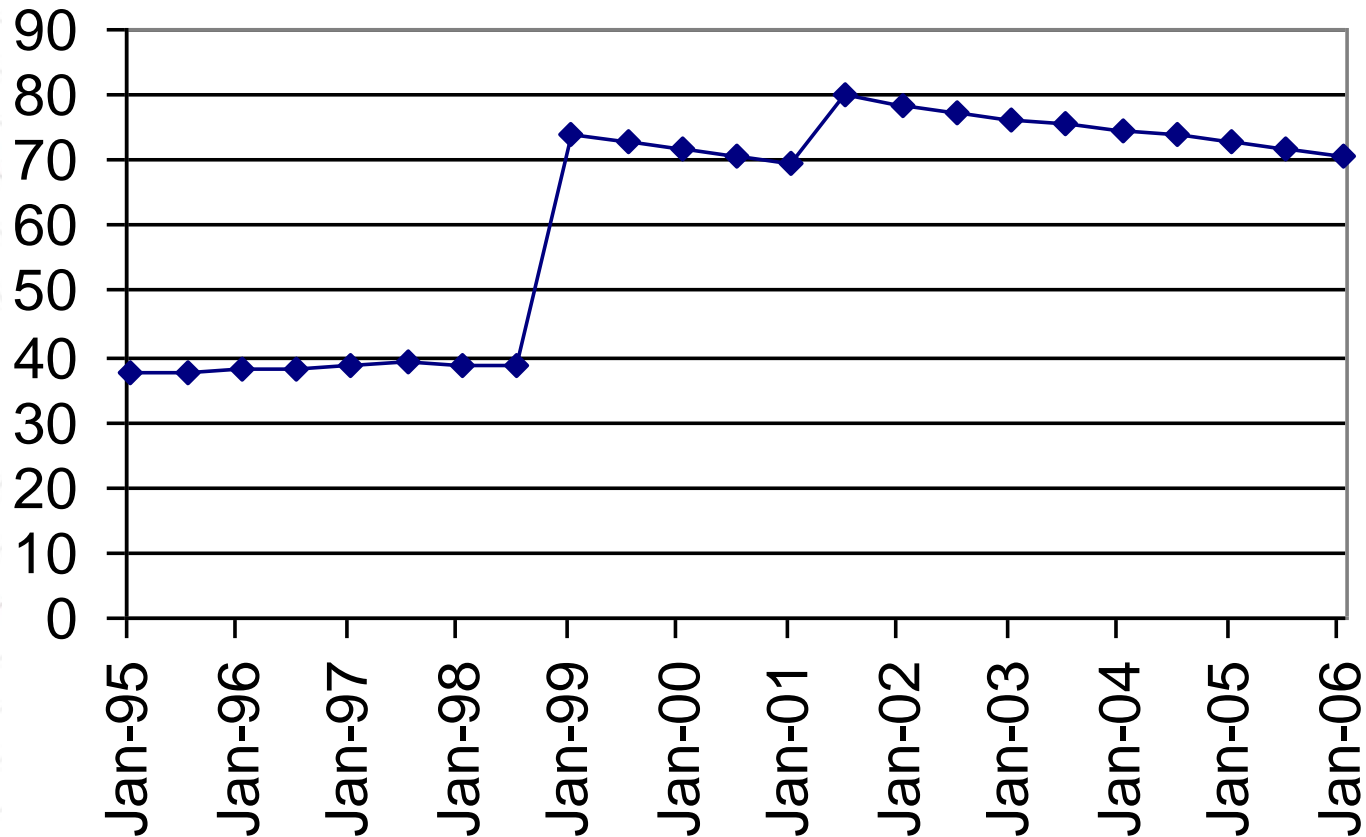
Outline

- A 'natural experiment' – change in eligibility rules for Commonwealth Seniors Health Card (CSHC)
- Methods
 - Diff-in-diff to measure effect on consumption using National Health Surveys
 - Average price decreased by at least 66%
- Results: very low estimated price elasticity

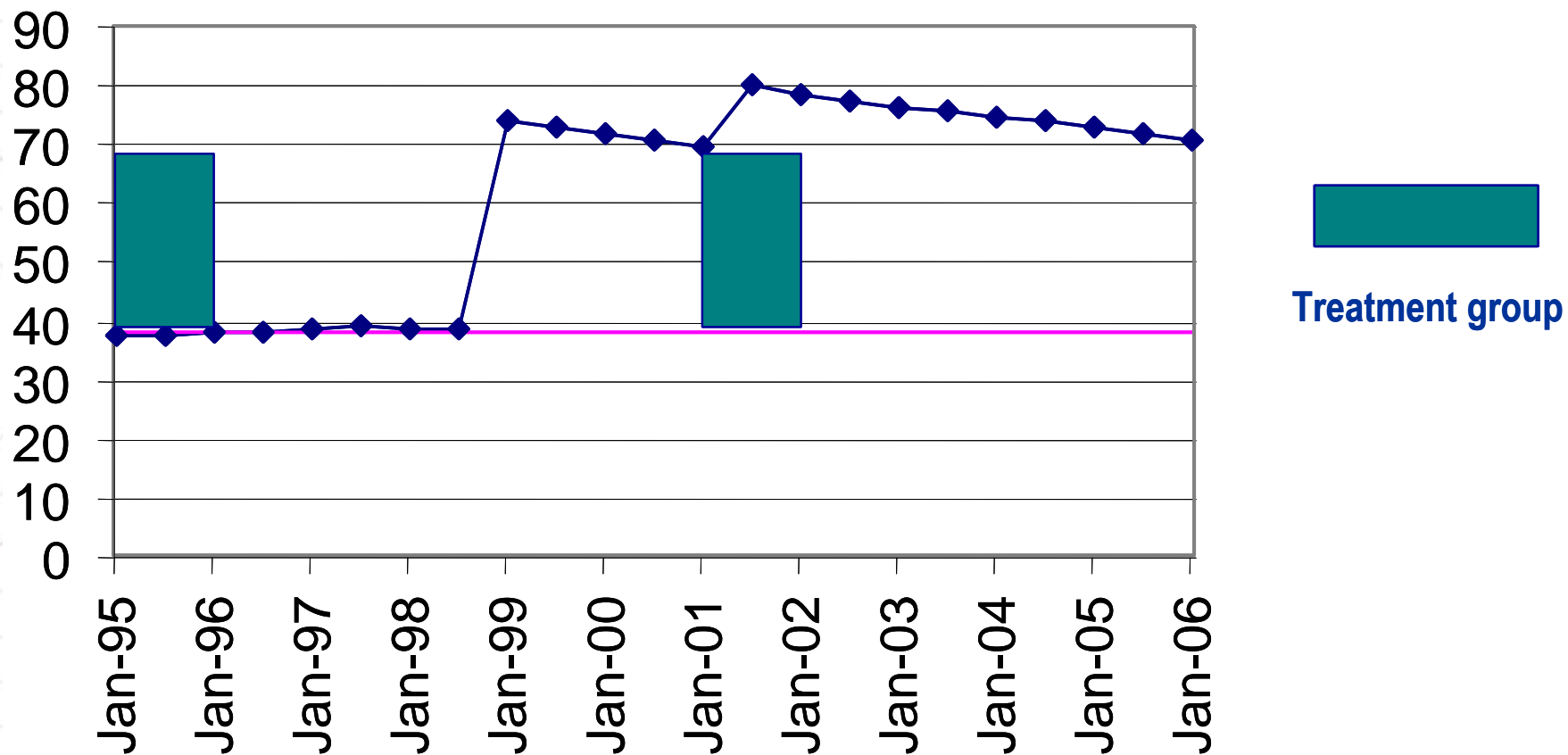
Commonwealth Seniors Health Card (CSHC)

- CSHC -> concession price for PBS drugs for people of age pension age
- Income eligibility threshold for CSHC almost doubled in 1999
- What was impact on PBS consumption for the affected?

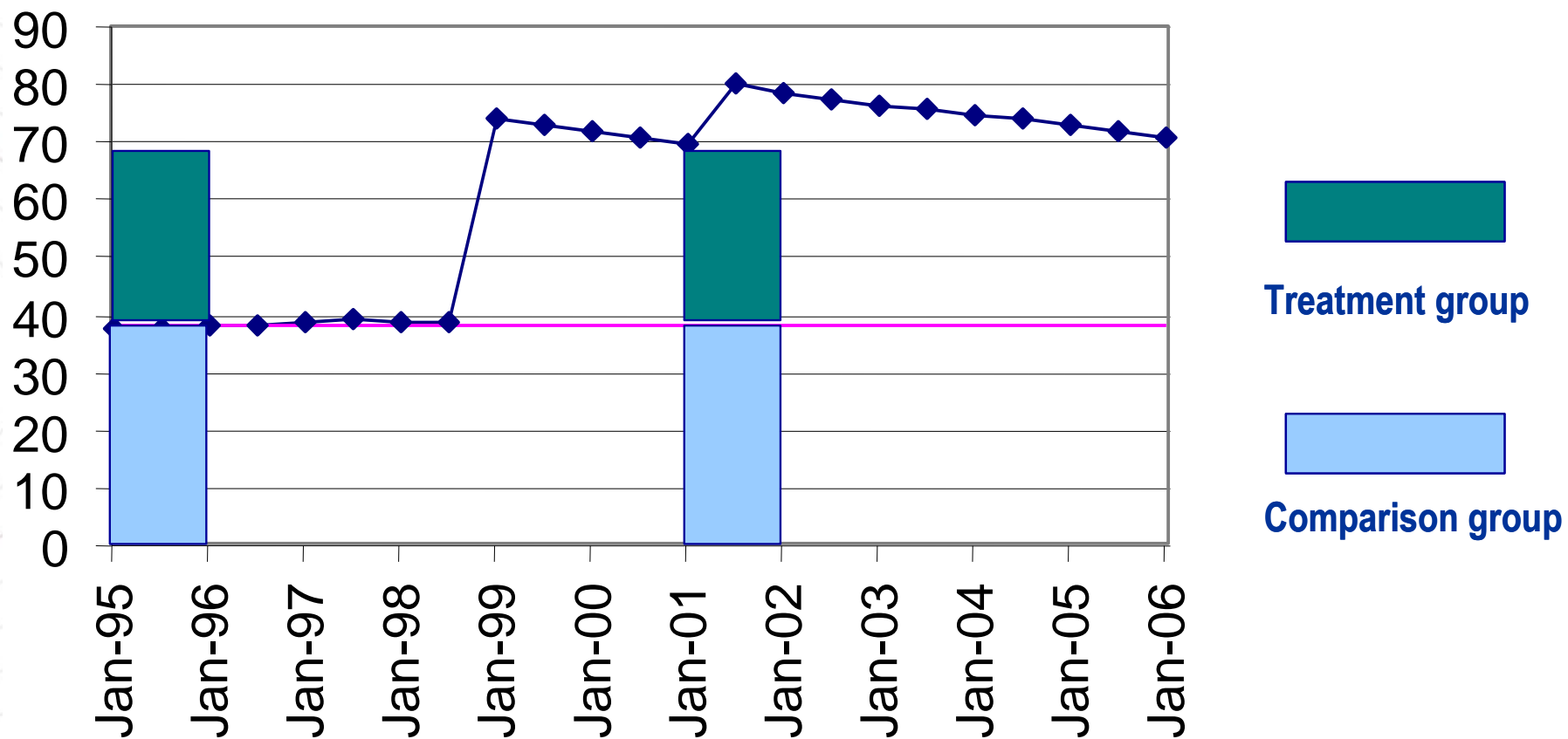
CSHC income eligibility threshold, couples \$2001 \$'000s p.a.



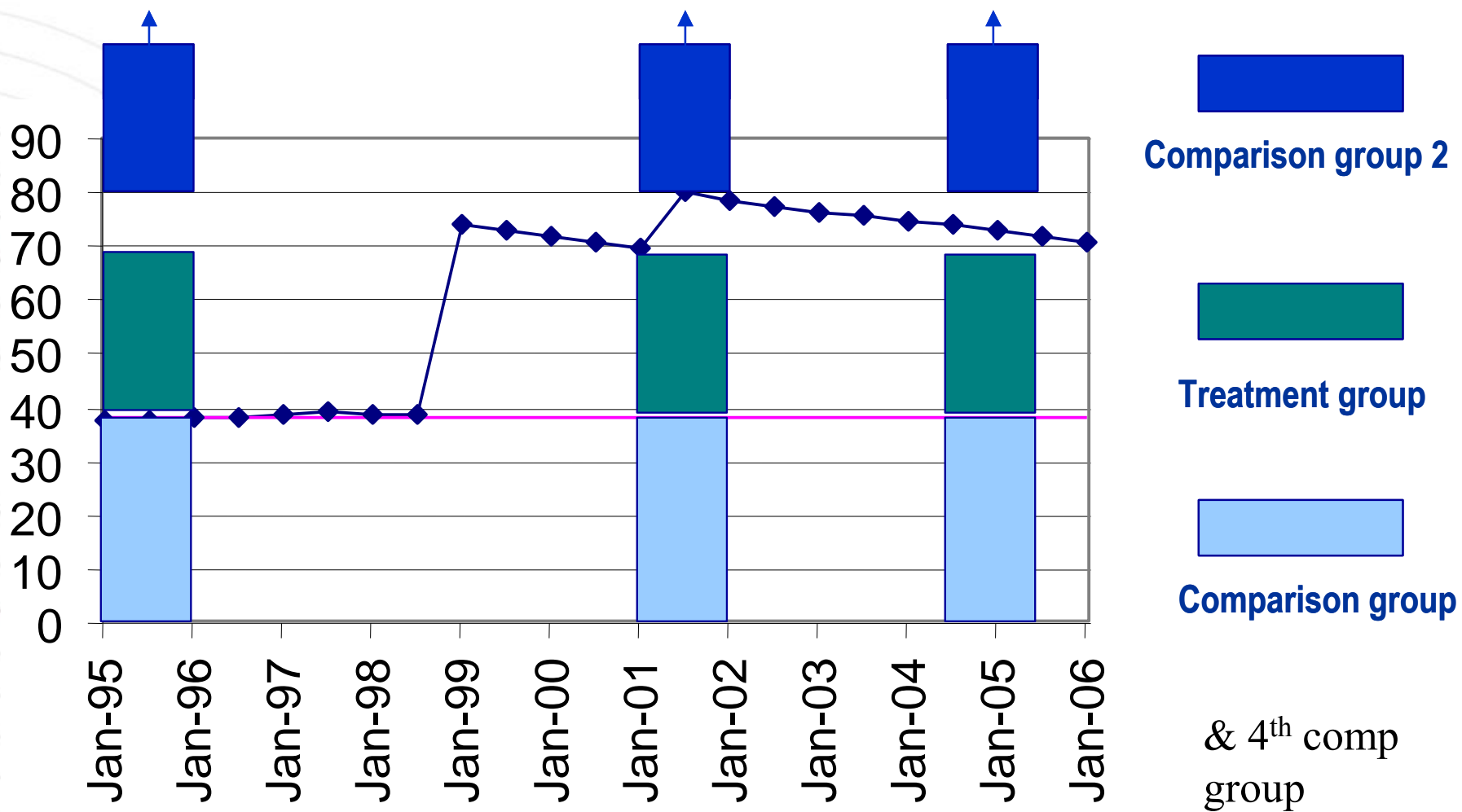
A 'Natural Experiment'



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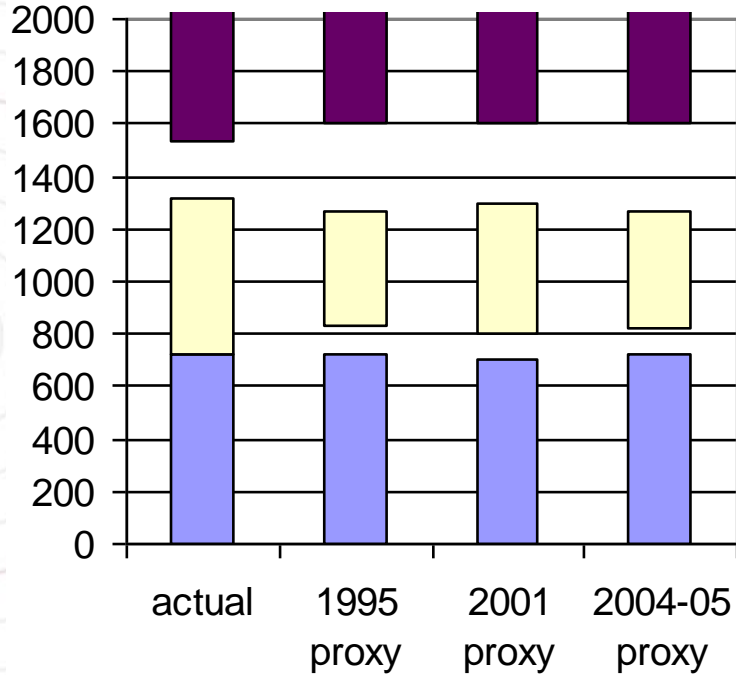


A 'Natural Experiment'

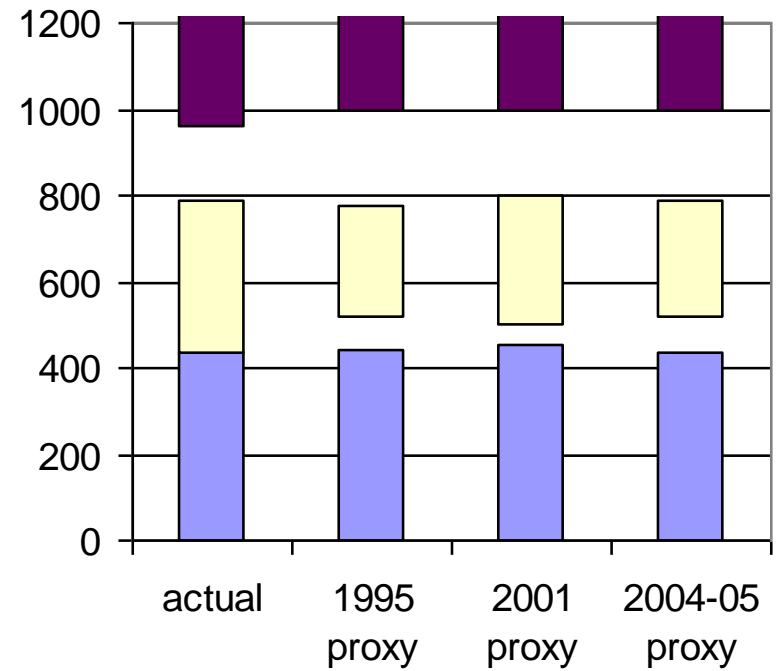


Income Thresholds Used in the Analysis

Couples



Singles

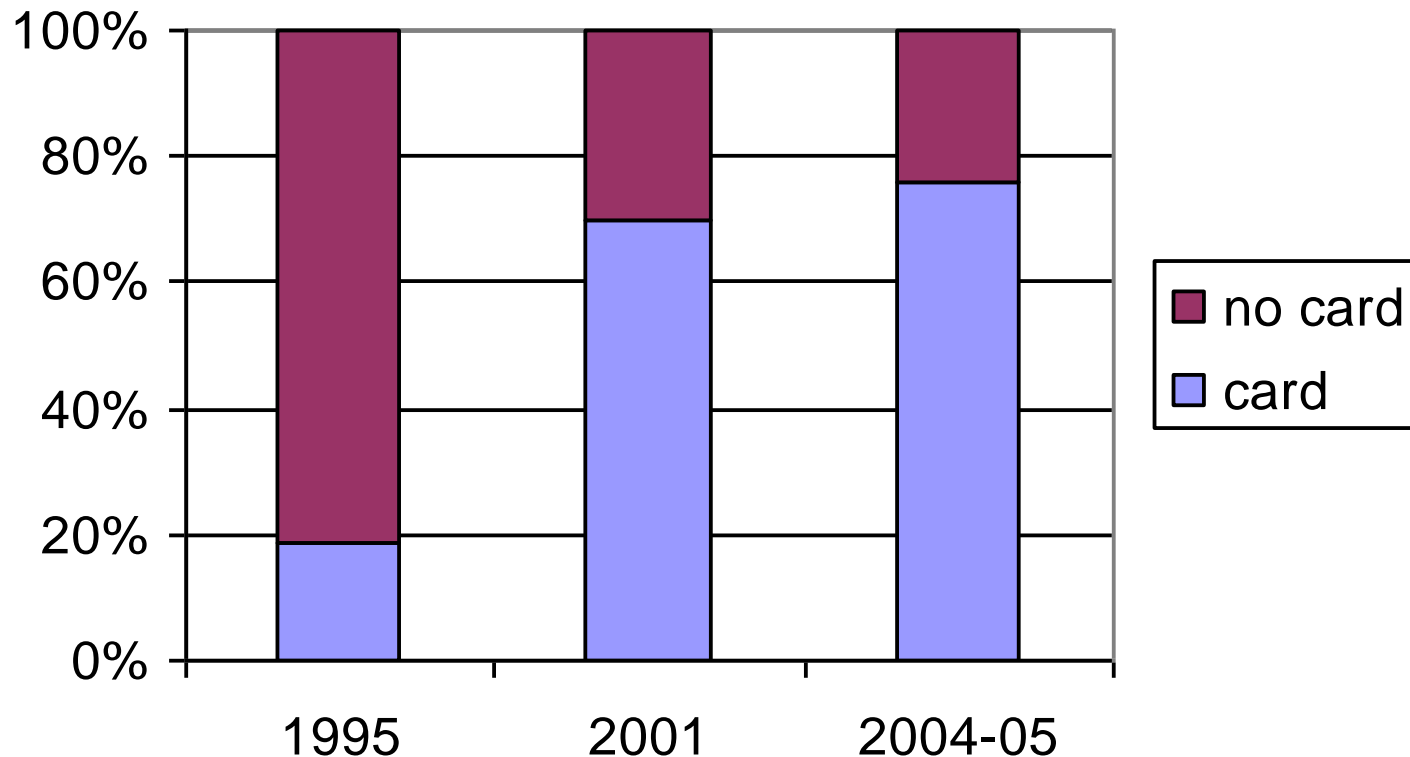


■ Comp Gp 2
■ Treat Gp
■ Comp Gp

Sample Size

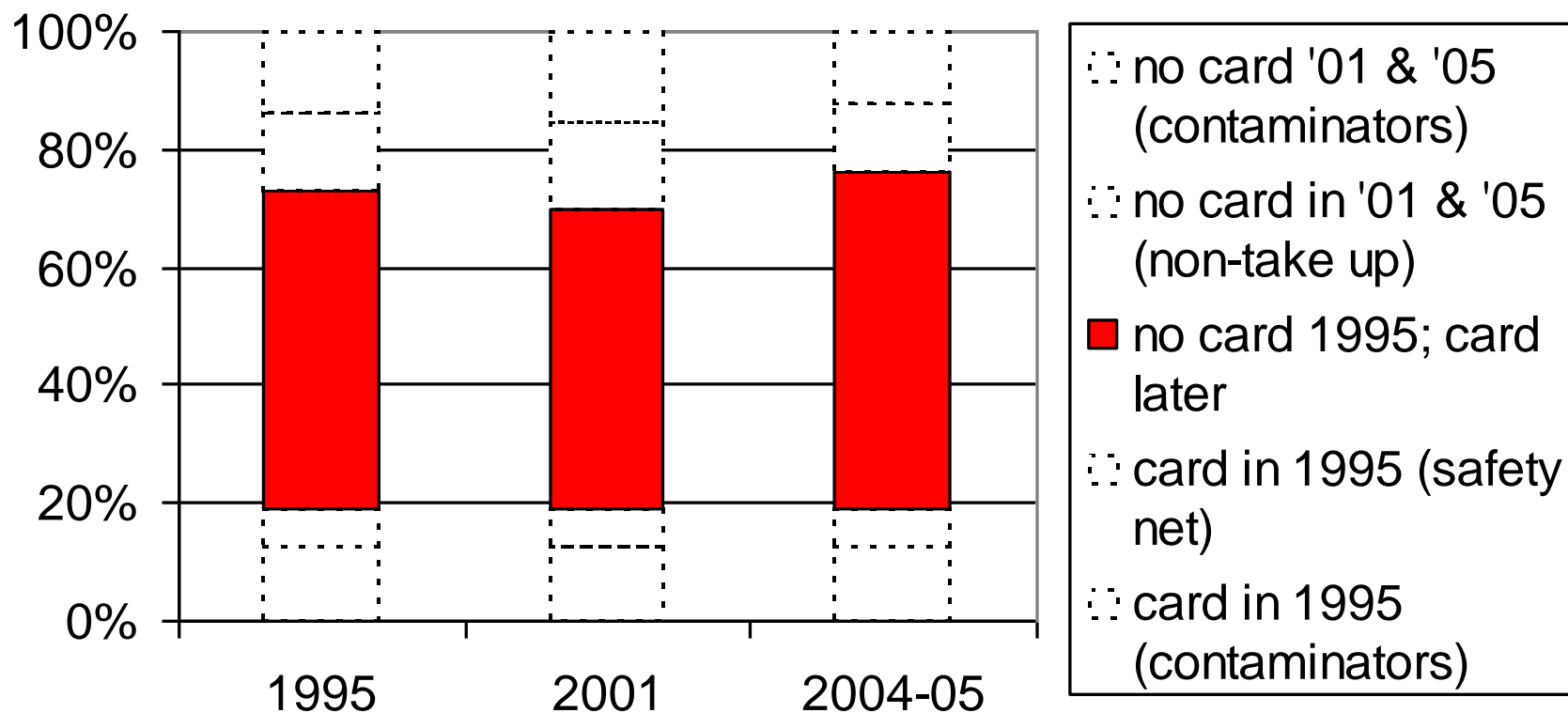
	1995	2001	2004-05	Total
Treatment Group	166	189	203	558
Comp Gp 1 (low income)	3897	2205	2995	9097
Comp Gp 2 (high income)	111	64	92	267
Comp Gp 3 (M 50-64; F 50-59)	5116	2588	3890	11594
Total	9290	5046	7180	21516

A Complication – Treatment Group is Contaminated



Concession card coverage recorded in each year, but CSHC not distinguishable from other cards

Contaminated Treatment Group



Accounting for the contamination

- Contaminators are present in each year and are unaffected by the intervention
- If estimated treatment effect is a change of $x\%$, it can be shown that the effect *on the affected* is

$$\frac{x(p_1d_1 + p_2d_2)}{p_1d_1}$$

Where p_2 is the proportion of contaminators,
 $p_1 = 1 - p_2$ and
 d is mean PBS consumption

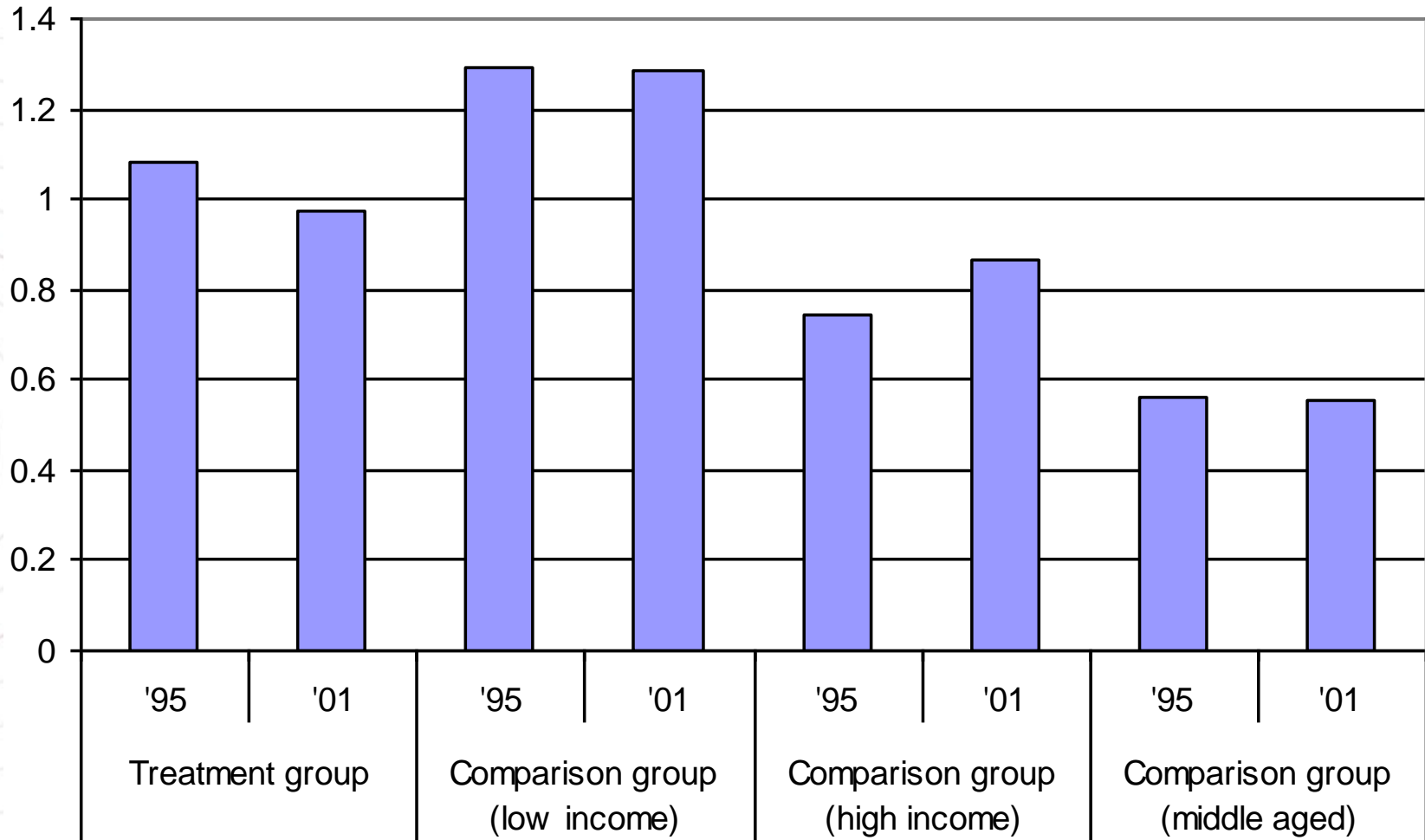
Dependent Variable

- Number of PBS drugs taken for selected conditions in previous two weeks
- As reported by respondent
- Drug data collected inconsistently between years
 - NHS 2001 & 2004-05 recorded if taken for selected conditions
 - NHS 1995 recorded all drugs taken
 - ABS classifies drugs into types commonly used for specific conditions
- Generic drug names checked against PBS Schedule

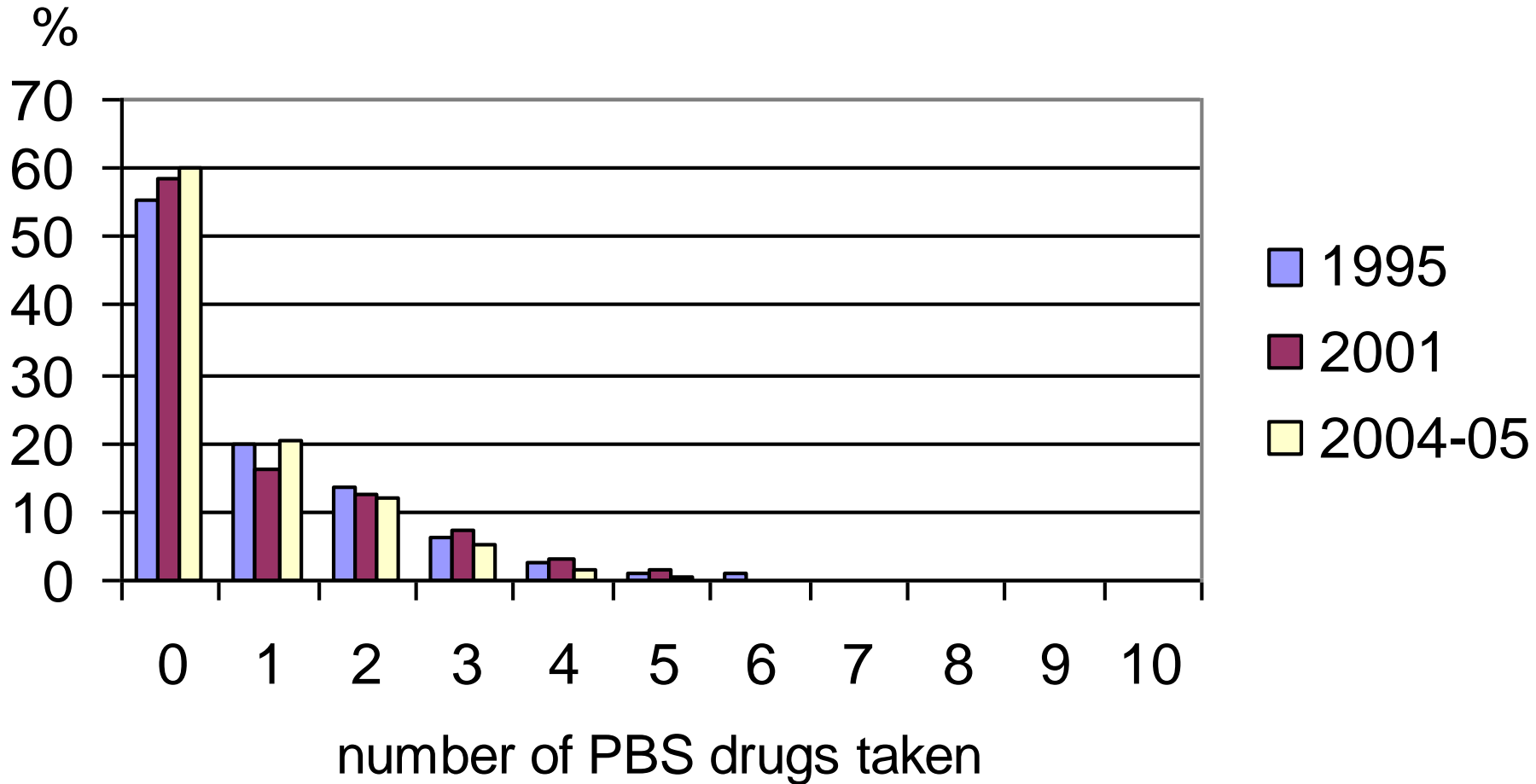
Dependent Variable (Cont.)

- Conditions for which drug data are available in all three surveys
 - Heart and circulatory conditions
 - Asthma
 - Diabetes and high sugar levels
- These account for 41% of all PBS drug consumption in 2001
- NHS 1995 and 2004-05 also have data for
 - Arthritis and osteoporosis
 - Mental wellbeing

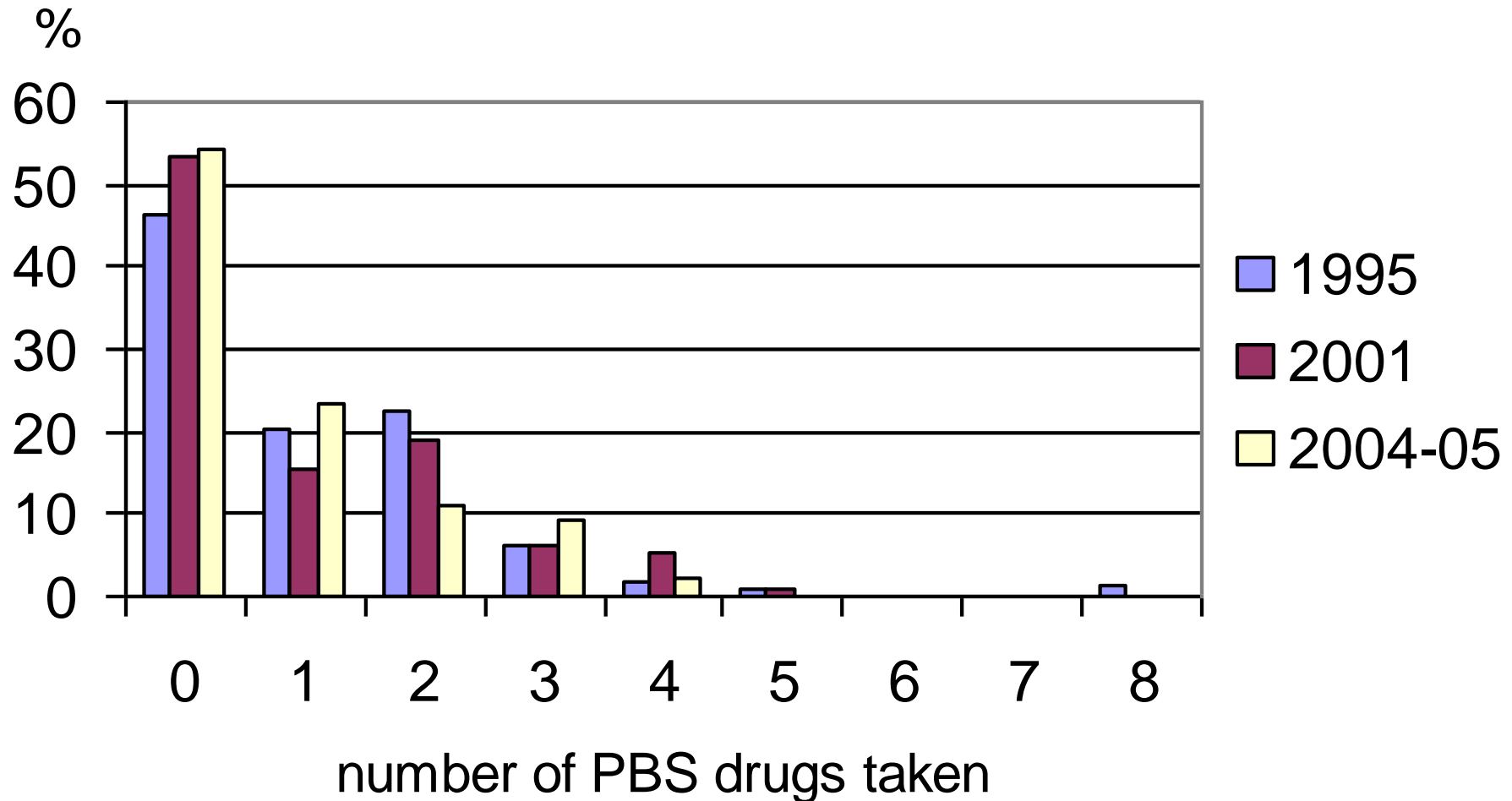
Mean PBS Consumption by Group and Year (excl 04-05)



Distribution of Dependent Variable (all groups)



Distribution of Dependent Variable (Treatment Gp)



Modelling Approach

- Count data models

- Poisson regression model

$$\mu = \exp(\beta_0 + \beta_1 Gr + \beta_2 Yr + \beta_3 Int + \beta X)$$

Where $\mu = E(y | Gr, Yr, Int, X)$

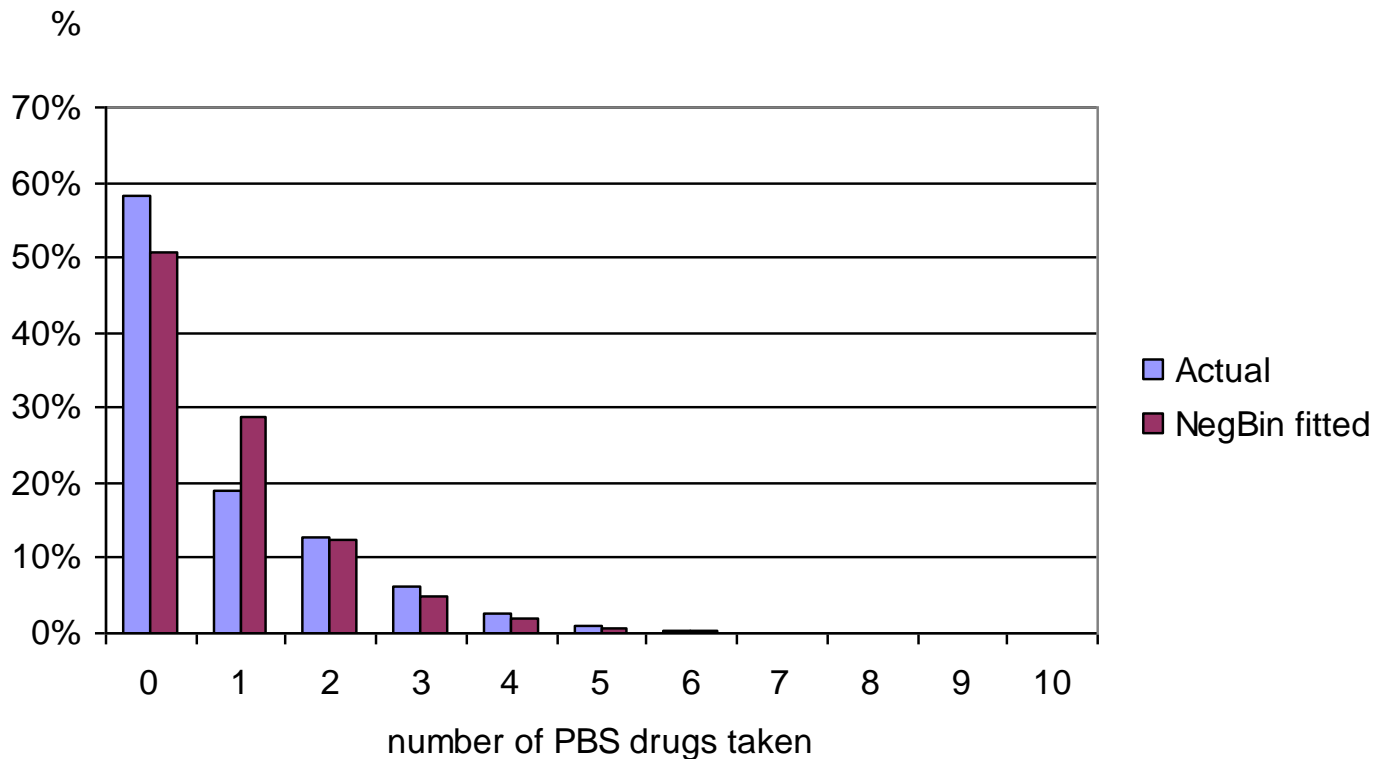
- Negative Binomial regression model (NegBin)

$$\tilde{\mu} = \exp(\beta_0 + \beta_1 Gr + \beta_2 Yr + \beta_3 Int + \beta X + \varepsilon)$$

- Negative Binomial / Logit Hurdle model (not yet implemented)

- Model each combination of year and comparison group separately and then pooled

Goodness of Fit (NegBin)

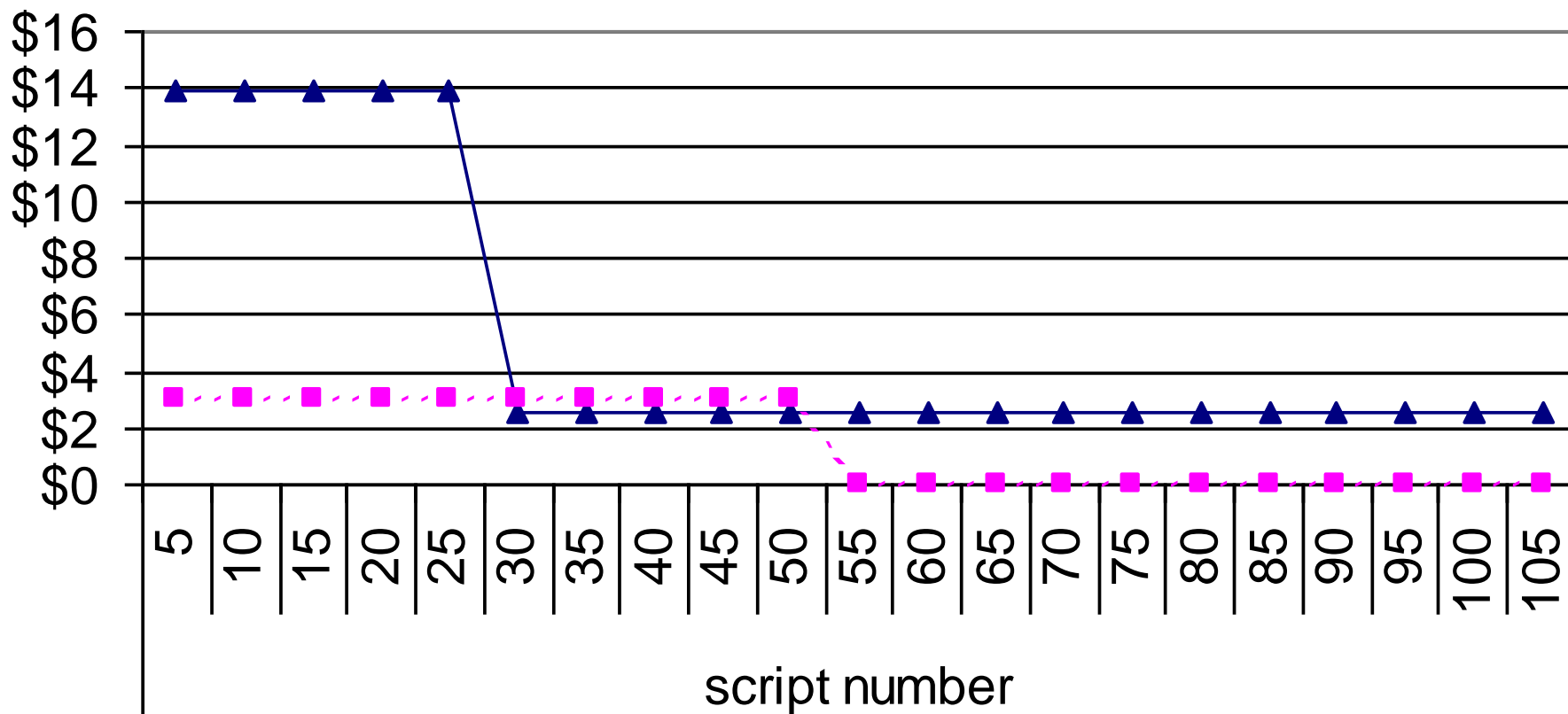


- Formally, NegBin model rejected by Pearson Chi-square test ($p < 0.001$), suggesting misspecification
- Hurdle model might be more appropriate

Main results

- Negbin: $\beta_3 = -0.007$ in pooled model
- -1% change in PBS consumption after adjusting for contaminants (95% CI: -54%, 51%)
- Poisson: -2% change (95% CI: -53%, 49%)

Out-of-pocket Price of PBS Drugs (\$1995)



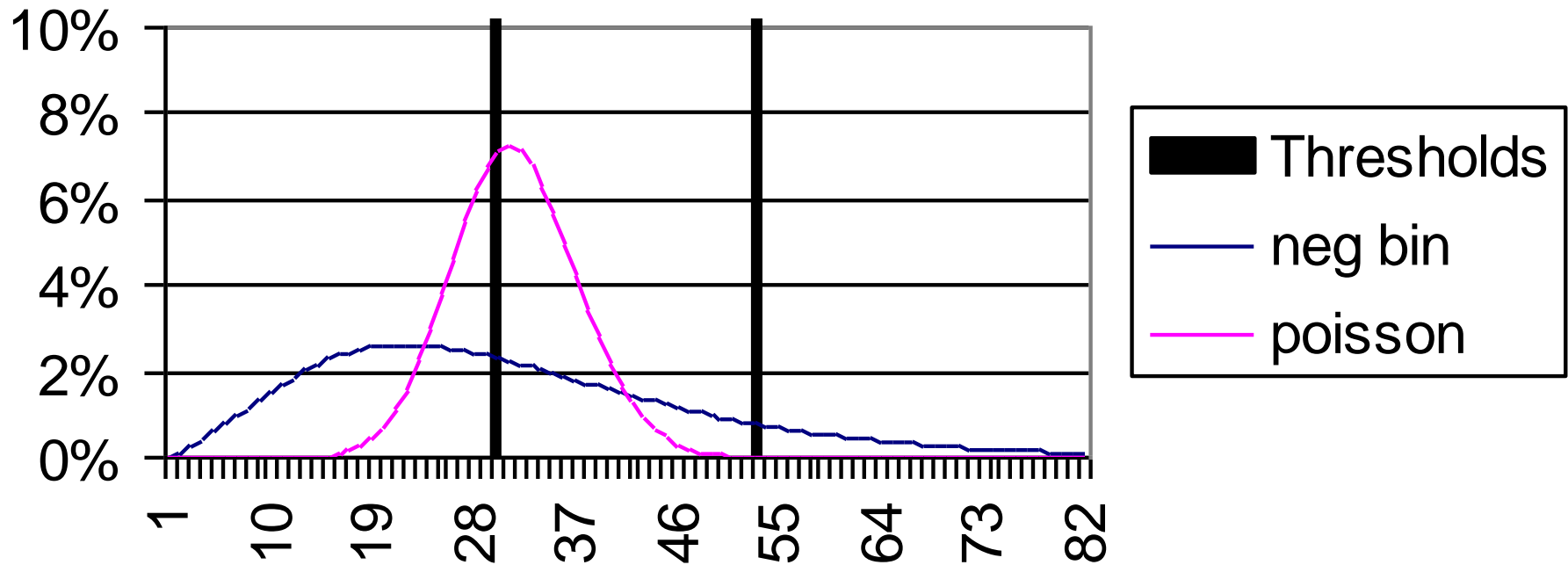
—▲— Treatment group 1995 - - -■- - - Treatment group 2001

What is the average marginal price change?

- Depends on distⁿ of the number of scripts purchased in calendar year prior to interview
- For treatment group average annual consumption estimated to be 30.5 scripts
- Assume over-dispersed count variable distribution (negative binomial)
- Consider a range of possible distributions

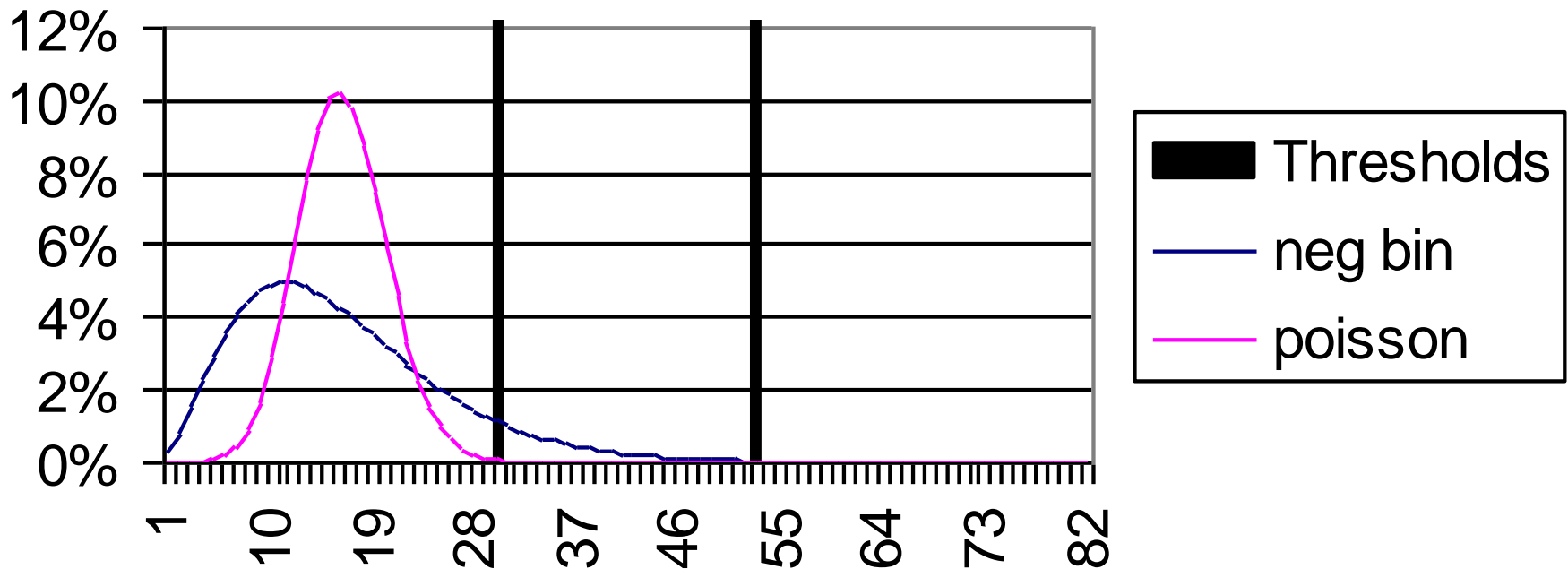
Possible Distributions (Treatment Group) – end of year

mean = 30.5

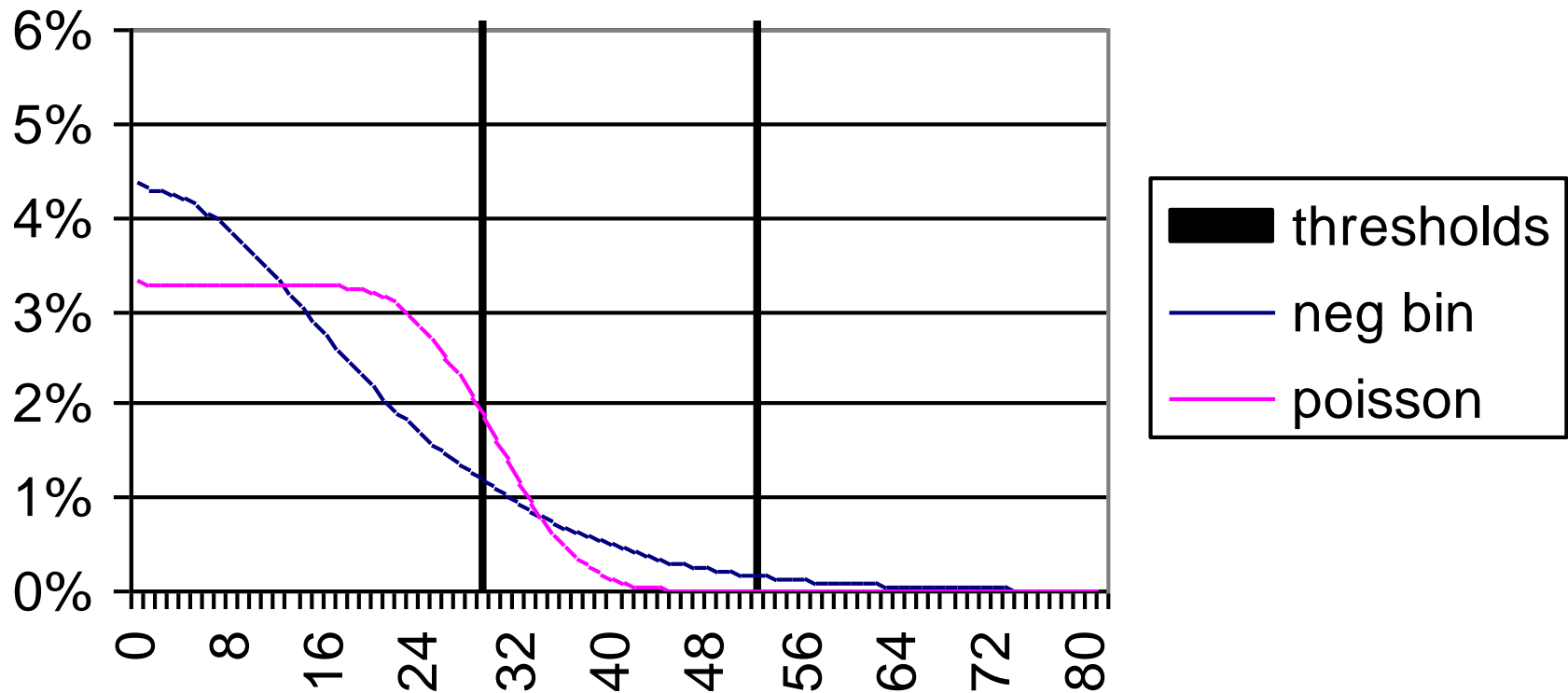


Possible Distributions (Treatment Group) – mid-year

mean = 15.25



Possible Distⁿs (Treatment Group) – throughout year



Price Change (Cont.)

- A maximum of 12.8% of treatment group experienced price increase
- Average marginal price fall was at least 66%
- Similarly, average marginal price increased by at least
 - 15% for comparison group 1
 - 17% for comparison groups 2 & 3
- Modelled price change = -71%
or -119% using midpoint formula

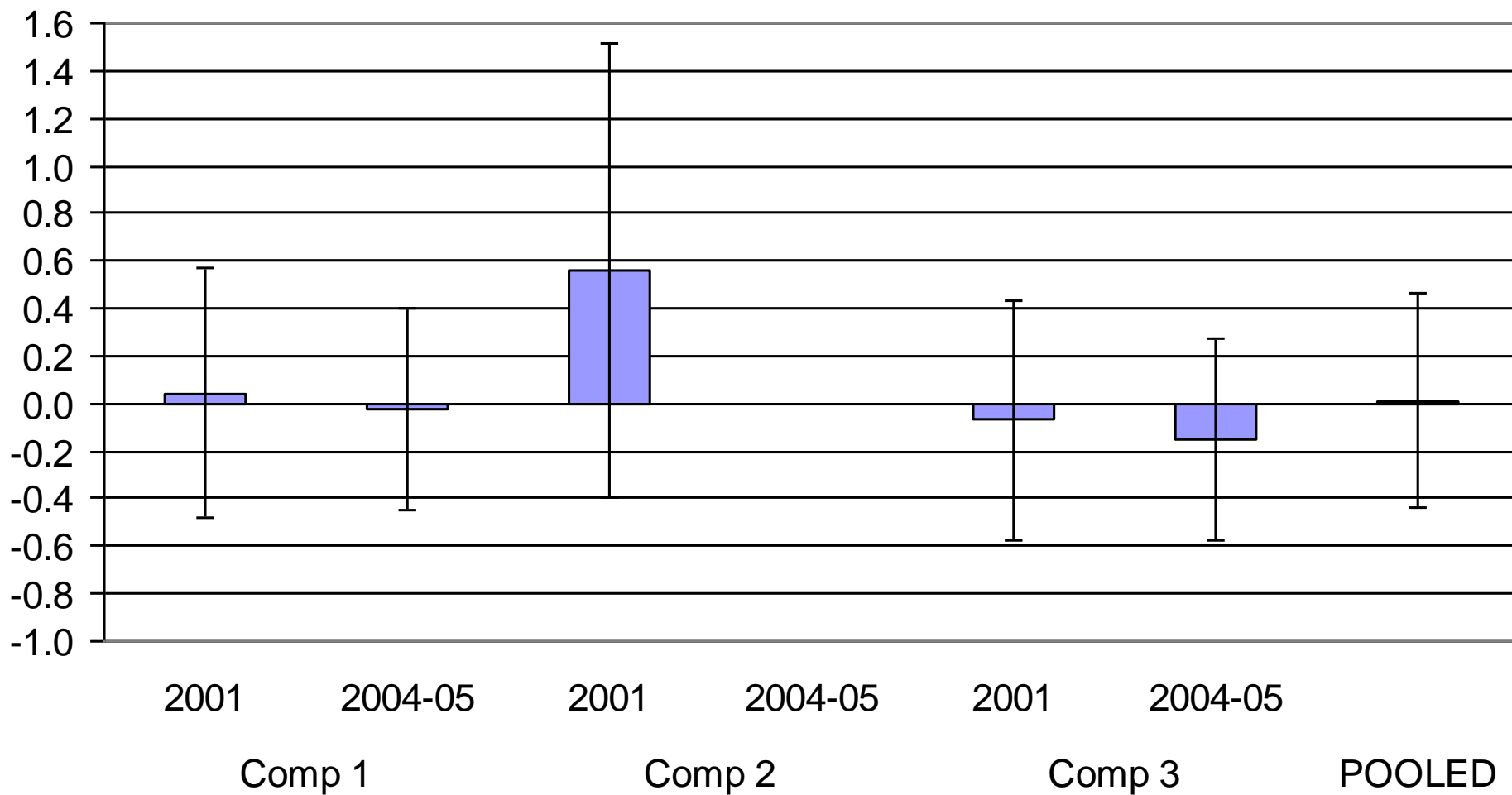
Price Change (Cont.)

- Calculate price elasticity using midpoint formula

$$E = \frac{(C_1 - C_0)}{(C_1 + C_0)/2} \div \frac{(P_1 - P_0)}{(P_1 + P_0)/2}$$

- How important is the price change?
 - Average person in treatment group purchases 30 scripts per year -> saves \$360 p.a. = 1% income
 - Person purchasing 10 times average saves \$1083 p.a. = 3% income
 - consider non-monetary costs + cost of seeing GP

Estimated Price Elasticity



Threats to Validity

- Quantity taken in fortnight might not be proportional to drugs purchased. Price change could lead to:
 - Changes in frequency or dosage of consumption
 - Using out-of-date or substitute medications
 - leads to underestimation of elasticity
- Endogeneity of Health Care Card Status
 - People may reduce income to qualify for card, but unlikely given low relative value of concession
 - leads to overestimation of elasticity
- Possible overestimation of price change:
 - PBS premiums not accounted for
 - Non-monetary costs + costs of GP consultation

Conclusion

- Results are preliminary, next step is implementation of hurdle model.

In the interim:

- Policy is efficient. Does not seem to induce excess consumption
- Recipient value might be higher than govt cost (on average) due to insurance value
- Middle income older people do not need concessions to purchase sufficient quantity of pharmaceuticals