# Propensity Score Models for Nonresponse and Measurement Error

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# Questions

- This study was data centric, others are more theory driven. Would a mix be more useful?

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- This study treated the underlying constructs as continuous latent variables, others use latent classes. Is there an advantage of one over the other?

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# Nonresponse Bias and Measurement Error

- **Nonresponse bias and measurement error both refer to difficult to measure errors in surveys. Nonresponse bias refers to unmeasured persons, and measurement error refers to an unmeasured construct (which is mis-measured by the survey).**

- **Contact history has the potential to describe the concerns of potential respondents as well as contactability. Those concerns have been found to relate to nonresponse, but little relationship to measurement error.**

# Consumer Expenditure Quarterly Survey

- Household survey provided part of the "market basket" for CPI and other indices.
- 5 quarterly interviews for each household.
- Typically 6160 households a month.
- Nonresponse rate: 15%
- Refusal rate: 13%
- More probing than the similar Diary survey

# Contact History Instrument (CHI) Data

**Contact History Instrument v5.8.5 Created 08/25/2004**
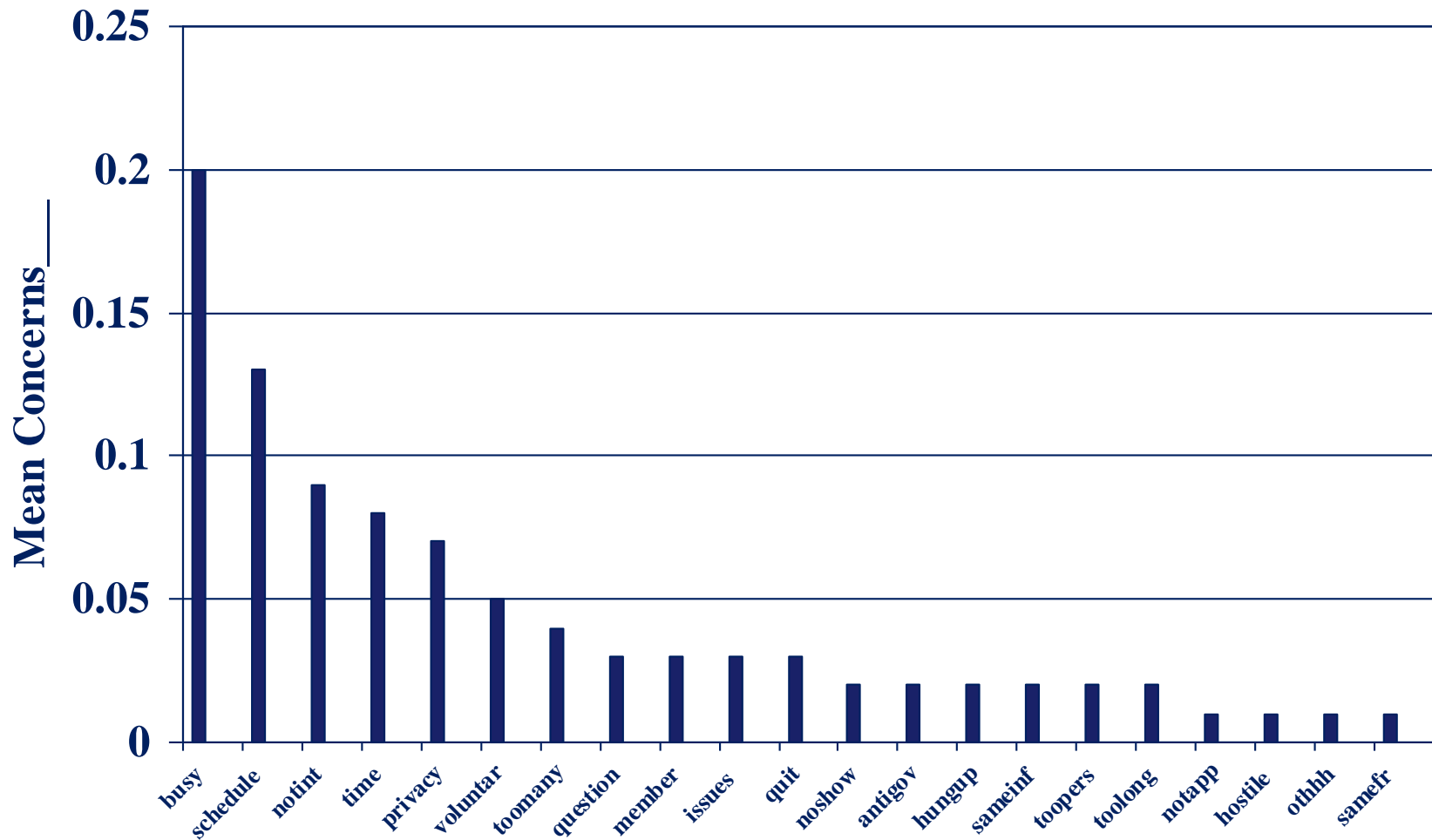
Forms  Answer  Navigate  Options  Help

CHI

- **CONCERN / BEHAVIOR / RELUCTANCE**
- Select the categories that describe respondent concerns, behaviors, or reluctance during this contact attempt.
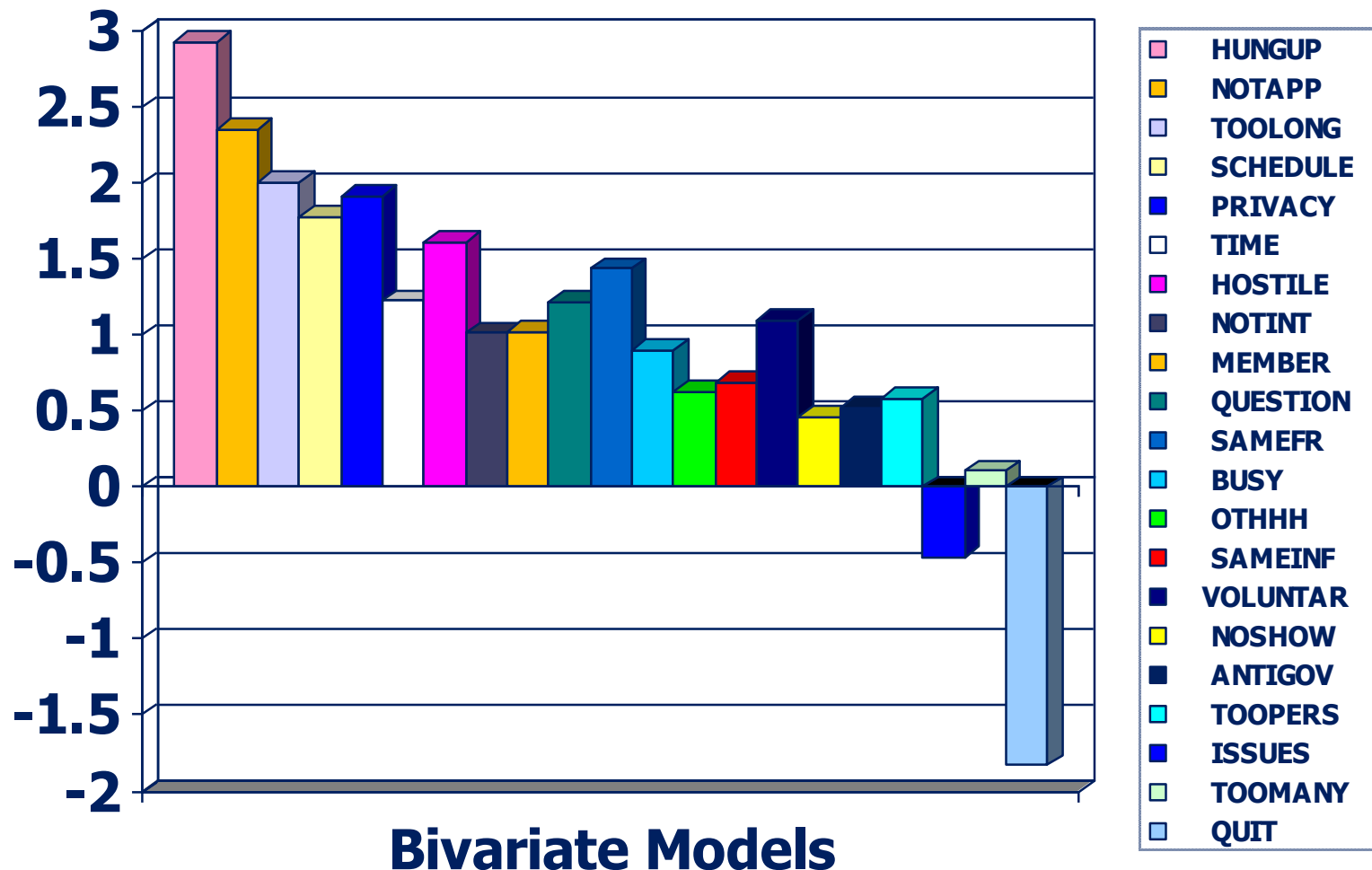- Enter all that apply, separate with commas.

1. Not interested / Does not want to be bothered
2. Too busy
3. Interview takes too much time
4. Breaks appointments (puts off FR indefinitely)
5. Scheduling difficulties
6. Survey is voluntary
7. Privacy concerns
8. Anti-government concerns
9. Does not understand survey /
   Asks questions about the survey
10. Survey content does not apply
    (retired, healthy, no crimes to report)
11. Hang-up / slams door on FR

12. Hostile or threatens FR
13. Other household members tell respondent not to participate
14. Talk only to specific household member
15. Family issues
16. Respondent requests same FR as last time
17. Gave that information last time
18. Asked too many personal questions last time
19. Too many interviews
20. Last interview took too long
21. Intends to quit survey
22. No concerns
23. Other - specify

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# Mean Rates of CHI concerns

# Predicting Nonresponse
# Logistic model Coefficients



**Bivariate Models**

Legend:
- HUNGUP
- NOTAPP
- TOOLONG
- SCHEDULE
- PRIVACY
- TIME
- HOSTILE
- NOTINT
- MEMBER
- QUESTION
- SAMEFR
- BUSY
- OTHHH
- SAMEINF
- VOLUNTAR
- NOSHOW
- ANTIGOV
- TOOPERS
- ISSUES
- TOOMANY
- QUIT

# Predicting Nonresponse
# Logistic Model Coefficients



**Multiple Predictors**

Legend:
- HUNGUP
- NOTAPP
- TOOLONG
- SCHEDULE
- PRIVACY
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- HOSTILE
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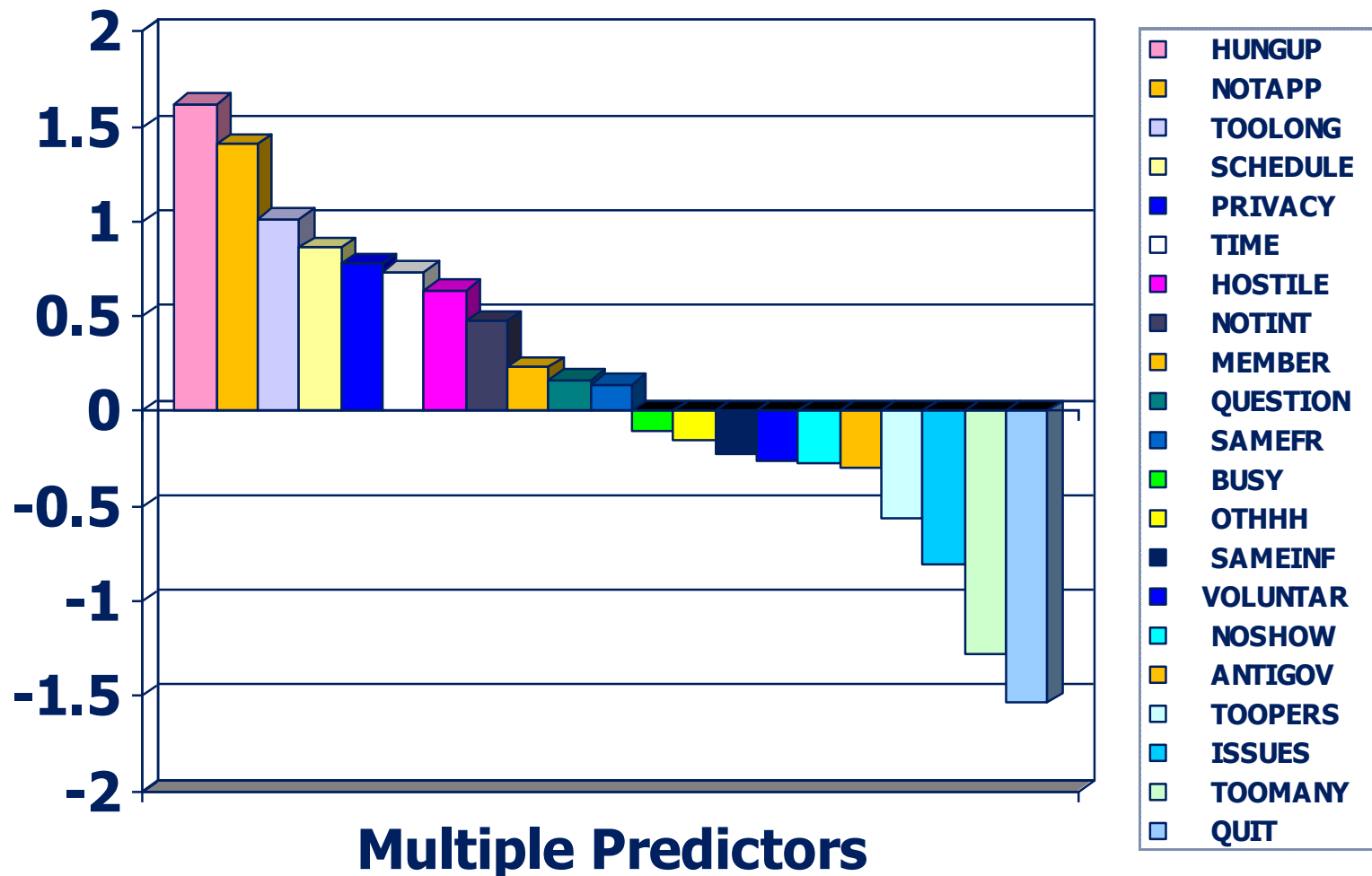
# Factor Pattern for Contact History Concerns
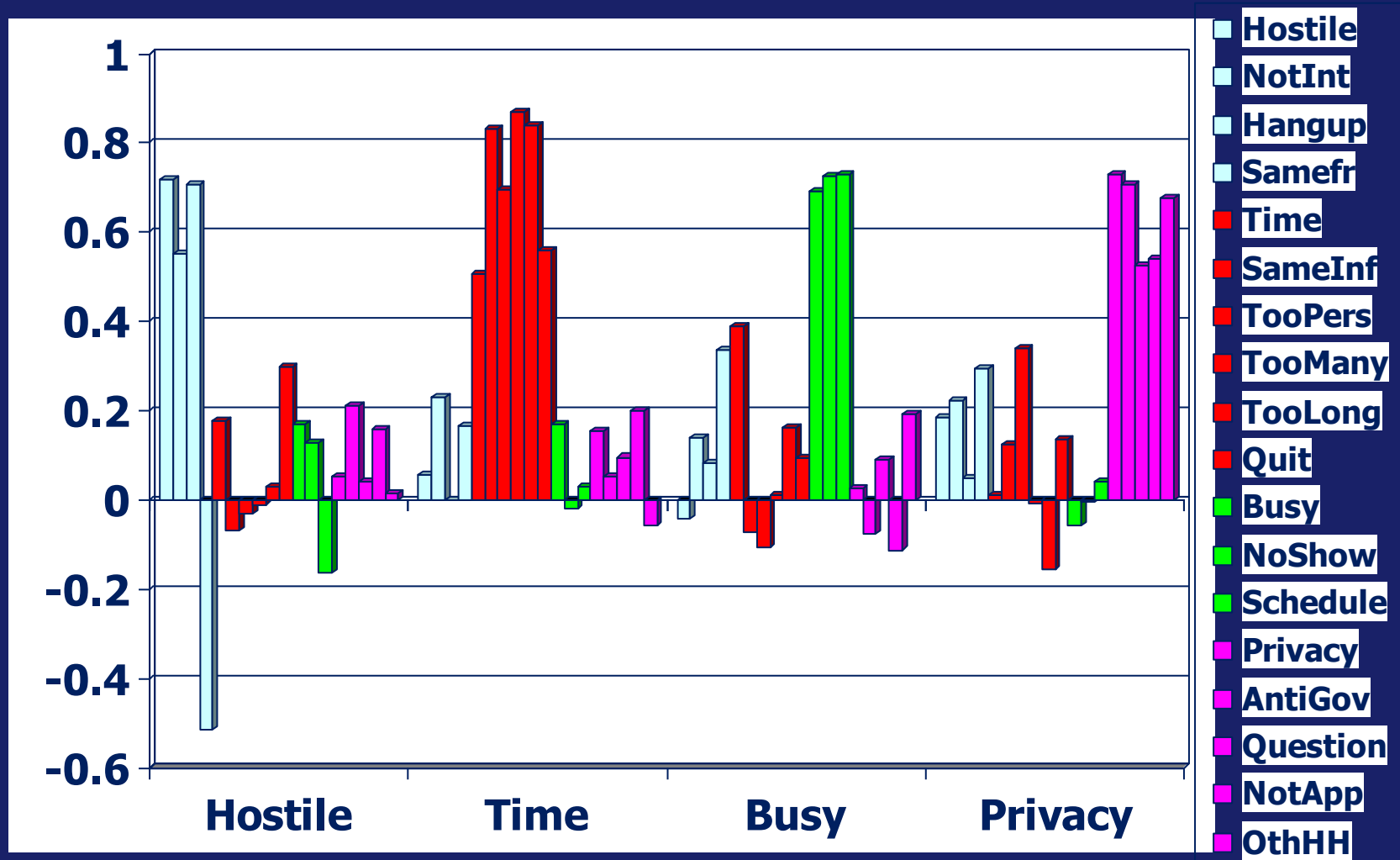
# Factor Pattern for Measurement Error



**Legend:** Telephone, InfoBook, Education, Marital, Sex, BirthYear, Military, Age, Income, Salary, Supplem, GrossPay, Occupat, HoursWrk, Records

**Categories:** Process, Personal, Economic
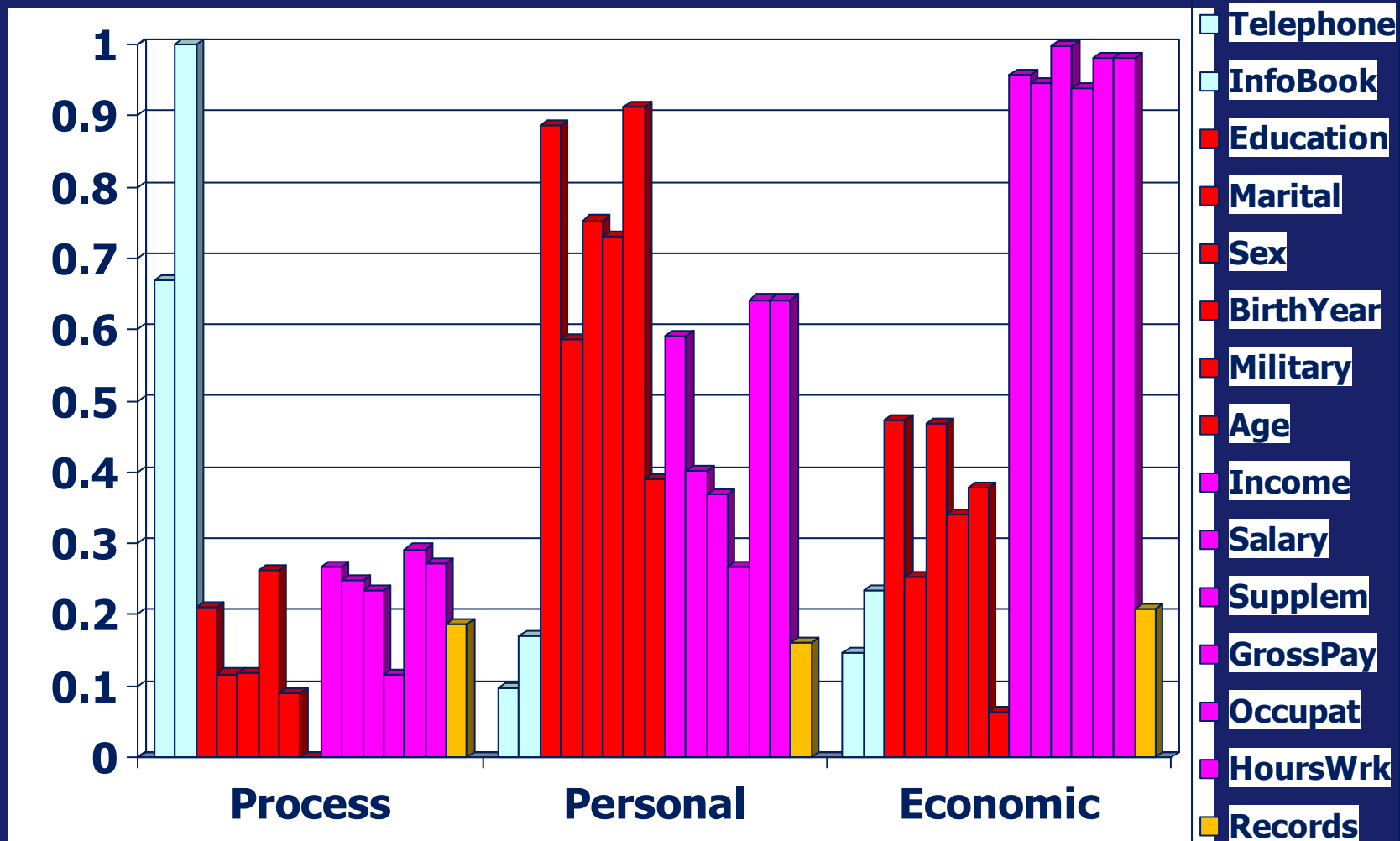
# Noncontact and Refusal Correlated with Measurement Error Indicators

| Variable | Economic | Personal | Process | No Records |
|---|---|---|---|---|
| Noncontact | 0.08294 | -0.00909 | 0.05472 | **0.11020** |
| Ntiming | 0.09642 | 0.00656 | 0.06171 | 0.03250 |
| Nbarrier | -0.00364 | -0.04230 | -0.00216 | 0.16663 |
| Refusal | **0.21429** | 0.05939 | **0.16930** | -0.04461 |
| rhostile | 0.19808 | 0.03860 | 0.13678 | -0.06559 |
| rtime | 0.13350 | 0.06655 | 0.12342 | -0.09529 |
| rbusy | 0.18245 | 0.04086 | 0.13556 | 0.15390 |
| rprivacy | 0.10792 | *0.04955* | 0.08554 | -0.02740 |

# Correlation of Noncontact, Refusal, and Measurement Error Indicators with Measures

| Variable | Employment | earned income | total expenditures |
|---|---|---|---|
| Noncontact | -0.04240 | 0.00055 | -0.07002 |
| -timing | 0.05237 | 0.03150 | -0.03976 |
| -barrier | **-0.16814** | -0.07476 | -0.10836 |
| Refusal | 0.11895 | 0.02281 | 0.04875 |
| -hostile | **0.18225** | 0.10666 | 0.10781 |
| -time | 0.10247 | -0.08299 | -0.03929 |
| -busy | **-0.14175** | -0.09294 | -0.08660 |
| -privacy | 0.05663 | 0.01477 | 0.04610 |
| Economic | 0.04696 | 0.06151 | **0.10524** |
| Personal | 0.03225 | 0.06224 | **0.08880** |
| Process | -0.01586 | -0.03572 | -0.01208 |
| No Records | **-0.33462** | -0.12235 | **-0.17956** |

# Summary

- The CHI data was useful in modeling the relationship between concerns expressed by respondents and refusal/noncontact.

- The CHI data showed factor patterns which could describe broad areas of concern.  They related well in predicting nonresponse.

- **The measurement error indices weren't strongly** related to concerns, or to bias, except the use of records.

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# Limitations and Future Research

- The CHI data is limited in that it only reflects the concerns expressed by respondents. Some of the most common **concerns may mask the real reasons, for example, "busy" may hide concerns about privacy, which weren't expressed** to the interviewer.

- More variables are needed for the measurement error models. Timing variables for sections, comparison of estimates between interviews, particularly when the respondent changes within the household, and edit indicators from other sections.

- Replicating the models with another survey may help make the model more general.

- Put all the pieces into a structural equation model.

# Questions

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# Contact Information

## Propensity Score Models for Nonresponse and Measurement Error

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