

Randomization & Pseudo-Randomization

Lecture 4 Part II

Rebecca B. Morton

NYU

Exp Class Lectures

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Auction experiments are particularly interesting cases of noncompliance

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Auction experiments are particularly interesting cases of noncompliance
- First, some are sequential experiments in order to evaluate whether experience in previous auctions leads to less overbidding in a subsequent experiment.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Auction experiments are particularly interesting cases of noncompliance
- First, some are sequential experiments in order to evaluate whether experience in previous auctions leads to less overbidding in a subsequent experiment.
- Have found that indeed experienced subjects, when they return for a second auction experiment, are less susceptible to the winner's curse.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Auction experiments are particularly interesting cases of noncompliance
- First, some are sequential experiments in order to evaluate whether experience in previous auctions leads to less overbidding in a subsequent experiment.
- Have found that indeed experienced subjects, when they return for a second auction experiment, are less susceptible to the winner's curse.
- But subjects that show up for the second experiment could be ones that did well in the first & that the ones who did not do well did not choose to show up.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Second, subjects an go bankrupt & exit experiment before finished.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Second, subjects an go bankrupt & exit experiment before finished.
- Subjects given a cash balance & then participate in a series of auctions.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Second, subjects can go bankrupt & exit experiment before finished.
- Subjects given a cash balance & then participate in a series of auctions.
- However, because of overbidding some go bankrupt.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Second, subjects can go bankrupt & exit experiment before finished.
- Subjects given a cash balance & then participate in a series of auctions.
- However, because of overbidding some go bankrupt.
- Once bankrupt, subjects unlikely believe will demand money from them at end & may change risk behavior, so typically not permitted to participate.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Second, subjects can go bankrupt & exit experiment before finished.
- Subjects given a cash balance & then participate in a series of auctions.
- However, because of overbidding some go bankrupt.
- Once bankrupt, subjects unlikely believe will demand money from them at end & may change risk behavior, so typically not permitted to participate.
- Does learning occur during the experiment; are subjects less susceptible to the winner's curse in later rounds than in earlier rounds?

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Second, subjects can go bankrupt & exit experiment before finished.
- Subjects given a cash balance & then participate in a series of auctions.
- However, because of overbidding some go bankrupt.
- Once bankrupt, subjects unlikely believe will demand money from them at end & may change risk behavior, so typically not permitted to participate.
- Does learning occur during the experiment; are subjects less susceptible to the winner's curse in later rounds than in earlier rounds?
- Evidence subjects overbid less in later rounds, but may be simply a selection effect.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Casari, Ham, and Kagel (2007) varied both starting balance & incentives to show up for second session.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Casari, Ham, and Kagel (2007) varied both starting balance & incentives to show up for second session.
- When subjects had a greater incentive found those who made poorer choices in first session were more likely to show-up, demonstrating that selection effects do occur in sequential auction experiments & that estimates of effect of experience overstated.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Casari, Ham, and Kagel (2007) varied both starting balance & incentives to show up for second session.
- When subjects had a greater incentive found those who made poorer choices in first session were more likely to show-up, demonstrating that selection effects do occur in sequential auction experiments & that estimates of effect of experience overstated.
- Furthermore, when subjects had higher initial balances & were less likely to go bankrupt during a session, subjects at the end of a session made poorer choices than when bankruptcy was more likely, demonstrating that selection effects also occur & that estimates of learning during a session were previously overstated as well.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Finally, Casari, Ham, and Kagel found that standard econometric estimators designed to identify selection effects did not find these effects in their data from the experiment.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Finally, Casari, Ham, and Kagel found that standard econometric estimators designed to identify selection effects did not find these effects in their data from the experiment.
- They argue that the sample sizes in experiments such as theirs, although relatively large compared to many other laboratory experiments, are not large enough for the econometric techniques.

Dealing with Other Types of Noncompliance

In the Laboratory: Using Financial Incentives & Other Motivation Techniques & Sequential Experiments

- Finally, Casari, Ham, and Kagel found that standard econometric estimators designed to identify selection effects did not find these effects in their data from the experiment.
- They argue that the sample sizes in experiments such as theirs, although relatively large compared to many other laboratory experiments, are not large enough for the econometric techniques.
- Their results suggest that if a researcher is worried about noncompliance in a laboratory experiment, design solutions such as Casari, Ham, and Kagel's are much more likely to yield useful answers than econometric or statistical techniques after the experiment.

Dealing with Other Types of Noncompliance

In the Field

- In the field can try to avoid problems of noncompliance that occurs when collaborating with nonacademics through education, extensive training, & close monitoring.

Dealing with Other Types of Noncompliance

In the Field

- In the field can try to avoid problems of noncompliance that occurs when collaborating with nonacademics through education, extensive training, & close monitoring.
- When aware of potential cross-effects within social or professional groups, can attempt to choose subjects who are unlikely to have interactions with each other or use a multi-layered randomization strategy as advocated by Sinclair (2009).

Dealing with Other Types of Noncompliance

In the Field

- In the field can try to avoid problems of noncompliance that occurs when collaborating with nonacademics through education, extensive training, & close monitoring.
- When aware of potential cross-effects within social or professional groups, can attempt to choose subjects who are unlikely to have interactions with each other or use a multi-layered randomization strategy as advocated by Sinclair (2009).
- Consider an example in which there are just 2 levels at which individuals interact & cross-effects might occur, household & neighborhood.

Dealing with Other Types of Noncompliance

In the Field

- Assume conducting one manipulation & choosing other subjects to serve as a baseline (not manipulated).

Dealing with Other Types of Noncompliance

In the Field

- Assume conducting one manipulation & choosing other subjects to serve as a baseline (not manipulated).
- First, randomly assign neighborhoods to be either manipulated or serve as baselines, then repeat random assignment by household within non-baseline or manipulated neighborhoods, & finally randomize again by individual within non-baseline or manipulated households.

Dealing with Other Types of Noncompliance

In the Field

- Assume conducting one manipulation & choosing other subjects to serve as a baseline (not manipulated).
- First, randomly assign neighborhoods to be either manipulated or serve as baselines, then repeat random assignment by household within non-baseline or manipulated neighborhoods, & finally randomize again by individual within non-baseline or manipulated households.
- Only those chosen for manipulation in final randomization actually manipulated, but create baselines at each level that these individuals interact.

Dealing with Other Types of Noncompliance

In the Field

- Assume conducting one manipulation & choosing other subjects to serve as a baseline (not manipulated).

Dealing with Other Types of Noncompliance

In the Field

- Assume conducting one manipulation & choosing other subjects to serve as a baseline (not manipulated).
- First, randomly assign neighborhoods to be either manipulated or serve as baselines, then repeat random assignment by household within non-baseline or manipulated neighborhoods, & finally randomize again by individual within non-baseline or manipulated households.

Dealing with Other Types of Noncompliance

In the Field

- Assume conducting one manipulation & choosing other subjects to serve as a baseline (not manipulated).
- First, randomly assign neighborhoods to be either manipulated or serve as baselines, then repeat random assignment by household within non-baseline or manipulated neighborhoods, & finally randomize again by individual within non-baseline or manipulated households.
- Only those chosen for manipulation in final randomization actually manipulated, but create baselines at each level that these individuals interact.

Dealing with Other Types of Noncompliance

In the Field

- Sinclair contends allows for identification of both spillover effects & true treatment effect while removing potential bias associated with spillover.

Dealing with Other Types of Noncompliance

In the Field

- Sinclair contends allows for identification of both spillover effects & true treatment effect while removing potential bias associated with spillover.
- **Must assume:**

Dealing with Other Types of Noncompliance

In the Field

- Sinclair contends allows for identification of both spillover effects & true treatment effect while removing potential bias associated with spillover.
- Must assume:
 - there exists a level at which no subjects interact,

Dealing with Other Types of Noncompliance

In the Field

- Sinclair contends allows for identification of both spillover effects & true treatment effect while removing potential bias associated with spillover.
- Must assume:
 - there exists a level at which no subjects interact,
 - each lower level group is a subset of a next higher level group (that the groups are nested),

Dealing with Other Types of Noncompliance

In the Field

- Sinclair contends allows for identification of both spillover effects & true treatment effect while removing potential bias associated with spillover.
- Must assume:
 - there exists a level at which no subjects interact,
 - each lower level group is a subset of a next higher level group (that the groups are nested),
 - there is no intersection between groups at the same level of hierarchy.

Dealing with Other Types of Noncompliance

In the Field

- Sinclair contends allows for identification of both spillover effects & true treatment effect while removing potential bias associated with spillover.
- Must assume:
 - there exists a level at which no subjects interact,
 - each lower level group is a subset of a next higher level group (that the groups are nested),
 - there is no intersection between groups at the same level of hierarchy.
- Sinclair discusses some strategies for conducting such a randomization.

Dealing with Other Types of Noncompliance

In the Field

- Sinclair contends allows for identification of both spillover effects & true treatment effect while removing potential bias associated with spillover.
- Must assume:
 - there exists a level at which no subjects interact,
 - each lower level group is a subset of a next higher level group (that the groups are nested),
 - there is no intersection between groups at the same level of hierarchy.
- Sinclair discusses some strategies for conducting such a randomization.
- Points out can avoid household level randomization issue by selecting only one subject per household, & reduce some complications of design.

Dealing with Other Types of Noncompliance

In the Field

Definition (Multi-level Experiment)

An experiment in which subjects are randomly assigned to manipulations using a layered approach in which subjects are viewed as interacting in definable separate groups in a hierarchy of groups such that lower level groups are nested. Randomization occurs within groups by layer.

Designing an Experiment with Noncompliance

- Gaines & Kuklinski (2008) argue many cases relevant question is effect of treatment on those who choose to comply

Designing an Experiment with Noncompliance

- Gaines & Kuklinski (2008) argue many cases relevant question is effect of treatment on those who choose to comply
- Suppose interested in effects of negative campaign advertising on voter turnout

Designing an Experiment with Noncompliance

- Gaines & Kuklinski (2008) argue many cases relevant question is effect of treatment on those who choose to comply
- Suppose interested in effects of negative campaign advertising on voter turnout
- Suppose some unobserved factor strongly affects whether or not people see negative ads

Designing an Experiment with Noncompliance

- Gaines & Kuklinski (2008) argue many cases relevant question is effect of treatment on those who choose to comply
- Suppose interested in effects of negative campaign advertising on voter turnout
- Suppose some unobserved factor strongly affects whether or not people see negative ads
- Some people conceivably strive to avoid being exposed to any behavior or rhetoric that smacks of conflict or incivility.

Designing an Experiment with Noncompliance

- Gaines & Kuklinski (2008) argue many cases relevant question is effect of treatment on those who choose to comply
- Suppose interested in effects of negative campaign advertising on voter turnout
- Suppose some unobserved factor strongly affects whether or not people see negative ads
- Some people conceivably strive to avoid being exposed to any behavior or rhetoric that smacks of conflict or incivility.
- **Suppose that conflict-avoiders, in event subjected to negative advertising, react strongly; probability of voting falls by 10 % points.**

Designing an Experiment with Noncompliance

- Gaines & Kuklinski (2008) argue many cases relevant question is effect of treatment on those who choose to comply
- Suppose interested in effects of negative campaign advertising on voter turnout
- Suppose some unobserved factor strongly affects whether or not people see negative ads
- Some people conceivably strive to avoid being exposed to any behavior or rhetoric that smacks of conflict or incivility.
- Suppose that conflict-avoiders, in event subjected to negative advertising, react strongly; probability of voting falls by 10 % points.
- Negative ads slightly demobilize conflict-neutral types; intention to vote falls by 5 points.

Designing an Experiment with Noncompliance

- Gaines & Kuklinski (2008) argue many cases relevant question is effect of treatment on those who choose to comply
- Suppose interested in effects of negative campaign advertising on voter turnout
- Suppose some unobserved factor strongly affects whether or not people see negative ads
- Some people conceivably strive to avoid being exposed to any behavior or rhetoric that smacks of conflict or incivility.
- Suppose that conflict-avoiders, in event subjected to negative advertising, react strongly; probability of voting falls by 10 % points.
- Negative ads slightly demobilize conflict-neutral types; intention to vote falls by 5 points.
- Conflict lovers become slightly more likely to vote (rises by 5 points).

Designing an Experiment with Noncompliance

- In a world in which conflict-averse people do not choose to see ads (select out of receiving treatment) & all conflict-lovers & half conflict-neutral people choose to see the ads (select in to receive treatment), effect of negative advertising is to mobilize voters in the aggregate.

Designing an Experiment with Noncompliance

- In a world in which conflict-averse people do not choose to see ads (select out of receiving treatment) & all conflict-lovers & half conflict-neutral people choose to see the ads (select in to receive treatment), effect of negative advertising is to mobilize voters in the aggregate.
- Gaines & Kuklinski argue that an experiment in which all are forced to view ads could suggest that negative ads have opposite effect & thus results misleading as to effects of neg ads observationally.

Designing an Experiment with Noncompliance

- In a world in which conflict-averse people do not choose to see ads (select out of receiving treatment) & all conflict-lovers & half conflict-neutral people choose to see the ads (select in to receive treatment), effect of negative advertising is to mobilize voters in the aggregate.
- Gaines & Kuklinski argue that an experiment in which all are forced to view ads could suggest that negative ads have opposite effect & thus results misleading as to effects of neg ads observationally.
- **Contend allowing subjects to “noncomply” or self select into treatment gives a better measure of causal effects of treatment as applied to many political science research questions.**

Designing an Experiment with Noncompliance

- In a world in which conflict-averse people do not choose to see ads (select out of receiving treatment) & all conflict-lovers & half conflict-neutral people choose to see the ads (select in to receive treatment), effect of negative advertising is to mobilize voters in the aggregate.
- Gaines & Kuklinski argue that an experiment in which all are forced to view ads could suggest that negative ads have opposite effect & thus results misleading as to effects of neg ads observationally.
- Contend allowing subjects to “noncomply” or self select into treatment gives a better measure of causal effects of treatment as applied to many political science research questions.
- Suggest conduct experiments in which subjects are both forced (to extent possible) to comply & ones in which subjects can choose whether or not to comply to treatment as a way of measuring effects of treatments in situations where self selection is prevalent in observational world.

Designing an Experiment with Noncompliance

- However, Gaines & Kuklinski note that in many cases in which subjects are not revealed true treatment, allowing for self selection may change nature of experiment & might be difficult to operationalize.

Designing an Experiment with Noncompliance

- However, Gaines & Kuklinski note that in many cases in which subjects are not revealed true treatment, allowing for self selection may change nature of experiment & might be difficult to operationalize.
- Consider for example a laboratory experiment in which subjects are randomly assigned to watch campaign ads, some of which are negative.

Designing an Experiment with Noncompliance

- However, Gaines & Kuklinski note that in many cases in which subjects are not revealed true treatment, allowing for self selection may change nature of experiment & might be difficult to operationalize.
- Consider for example a laboratory experiment in which subjects are randomly assigned to watch campaign ads, some of which are negative.
- To give subjects a choice whether to watch a negative ad before shown would make subjects more aware than is typically the case that negative nature of the ad is the experimental treatment.

Designing an Experiment with Noncompliance

- However, Gaines & Kuklinski note that in many cases in which subjects are not revealed true treatment, allowing for self selection may change nature of experiment & might be difficult to operationalize.
- Consider for example a laboratory experiment in which subjects are randomly assigned to watch campaign ads, some of which are negative.
- To give subjects a choice whether to watch a negative ad before shown would make subjects more aware than is typically the case that negative nature of the ad is the experimental treatment.
- If subjects are not told in advance, technically subjects are always able to cease their participation in an experiment at any time.

Designing an Experiment with Noncompliance

- However, Gaines & Kuklinski note that in many cases in which subjects are not revealed true treatment, allowing for self selection may change nature of experiment & might be difficult to operationalize.
- Consider for example a laboratory experiment in which subjects are randomly assigned to watch campaign ads, some of which are negative.
- To give subjects a choice whether to watch a negative ad before shown would make subjects more aware than is typically the case that negative nature of the ad is the experimental treatment.
- If subjects are not told in advance, technically subjects are always able to cease their participation in an experiment at any time.
- Yet, because subjects have already agreed to participate & are physically at the laboratory, less likely to choose not to watch the ads than they might outside the lab.

Designing an Experiment with Noncompliance

- In some field experiments, noncompliance may be more likely to be similar to that in an observational study given that subjects have greater opportunities to select out of treatments.

Designing an Experiment with Noncompliance

- In some field experiments, noncompliance may be more likely to be similar to that in an observational study given that subjects have greater opportunities to select out of treatments.
- To some extent, experimentalists already measure the effect of assignment to treatment, which measures causal effect allowing for some endogenous selection to treatment as an arguably better measure of the causal effect of interest (discuss shortly).

Designing an Experiment with Noncompliance

- In some field experiments, noncompliance may be more likely to be similar to that in an observational study given that subjects have greater opportunities to select out of treatments.
- To some extent, experimentalists already measure the effect of assignment to treatment, which measures causal effect allowing for some endogenous selection to treatment as an arguably better measure of the causal effect of interest (discuss shortly).
- Agree Gaines & Kuklinski have useful point that in some cases interested in causal effect of treatment only on those who would self select into treatment if no intervention by an experimentalist had occurred.

Designing an Experiment with Noncompliance

- In some field experiments, noncompliance may be more likely to be similar to that in an observational study given that subjects have greater opportunities to select out of treatments.
- To some extent, experimentalists already measure the effect of assignment to treatment, which measures causal effect allowing for some endogenous selection to treatment as an arguably better measure of the causal effect of interest (discuss shortly).
- Agree Gaines & Kuklinski have useful point that in some cases interested in causal effect of treatment only on those who would self select into treatment if no intervention by an experimentalist had occurred.
- Believe that to understand why it is that someone might choose not to select the treatment observationally it is useful to understand more fully effect of treatment if they were forced to receive treatment.

Designing an Experiment with Noncompliance

- Such information can help us understand why they may choose not to select treatment & to better evaluate effects of treatment on those who do select treatment.

Designing an Experiment with Noncompliance

- Such information can help us understand why they may choose not to select treatment & to better evaluate effects of treatment on those who do select treatment.
- If we restrict our experiments to situations that are only those that would occur without intervention, then we limit our ability to think abstractly about possibilities that can occur in counterfactual situations.

Designing an Experiment with Noncompliance

- Such information can help us understand why they may choose not to select treatment & to better evaluate effects of treatment on those who do select treatment.
- If we restrict our experiments to situations that are only those that would occur without intervention, then we limit our ability to think abstractly about possibilities that can occur in counterfactual situations.
- For instance, if discover voters who are conflict-averse are demobilized by neg ads but voters who are conflict-loving are mobilized, by studying effects of campaign advertising on both types of voters we better understand how campaign advertising works to mobilize those voters who select to watch ads, conflict-loving voters.

Designing an Experiment with Noncompliance

- Such information can help us understand why they may choose not to select treatment & to better evaluate effects of treatment on those who do select treatment.
- If we restrict our experiments to situations that are only those that would occur without intervention, then we limit our ability to think abstractly about possibilities that can occur in counterfactual situations.
- For instance, if discover voters who are conflict-averse are demobilized by neg ads but voters who are conflict-loving are mobilized, by studying effects of campaign advertising on both types of voters we better understand how campaign advertising works to mobilize those voters who select to watch ads, conflict-loving voters.
- In absence of an experiment that considers effects of neg ads on conflict-averse voters, do not have good evidence about relationship between conflict preferences, mobilization, & neg ads.

Missing Data

When Might Data be Missing?

- Have assumed can accurately measure treatment effects; that there is no missing data on choices made.

Missing Data

When Might Data be Missing?

- Have assumed can accurately measure treatment effects; that there is no missing data on choices made.
- Missing data is rarely a problem in lab exps unless there is a serious computer failure or a researcher loses data, events that are rare.

Missing Data

When Might Data be Missing?

- Have assumed can accurately measure treatment effects; that there is no missing data on choices made.
- Missing data is rarely a problem in lab exps unless there is a serious computer failure or a researcher loses data, events that are rare.
- In field exps, however, it may not be possible to observe all choices made by the units of observation in the population of interest.

Missing Data

When Might Data be Missing?

- Have assumed can accurately measure treatment effects; that there is no missing data on choices made.
- Missing data is rarely a problem in lab expts unless there is a serious computer failure or a researcher loses data, events that are rare.
- In field expts, however, it may not be possible to observe all choices made by the units of observation in the population of interest.
- For example, some subjects given treatment may fail to respond to post-treatment surveys or other measurement instruments as GKB discovered when only 55.8 percent of their subjects participated in their post-treatment survey.

Missing Data

When Might Data be Missing?

- Also a problem with nonexperimental data where nature is conducting the manipulation.

Missing Data

When Might Data be Missing?

- Also a problem with nonexperimental data where nature is conducting the manipulation.
- For example, in Lassen's study only 55 percent of those surveyed responded & simple examination of information contained in responses with respect to turnout in elections as compared with census data in Copenhagen suggested that response was not representative of the population that had been subject to the manipulation.

Missing Data

When Might Data be Missing?

- Also a problem with nonexperimental data where nature is conducting the manipulation.
- For example, in Lassen's study only 55 percent of those surveyed responded & simple examination of information contained in responses with respect to turnout in elections as compared with census data in Copenhagen suggested that response was not representative of the population that had been subject to the manipulation.
- **Is Missing Data a Problem?**

Missing Data

When Might Data be Missing?

- Also a problem with nonexperimental data where nature is conducting the manipulation.
- For example, in Lassen's study only 55 percent of those surveyed responded & simple examination of information contained in responses with respect to turnout in elections as compared with census data in Copenhagen suggested that response was not representative of the population that had been subject to the manipulation.
- Is Missing Data a Problem?
- Frangakis & Rubin (1999) show that under some general assumptions missing data can be a problem for estimating causal effects when there is also a compliance or selection bias in the data.

Missing Data

When Might Data be Missing?

- Also a problem with nonexperimental data where nature is conducting the manipulation.
- For example, in Lassen's study only 55 percent of those surveyed responded & simple examination of information contained in responses with respect to turnout in elections as compared with census data in Copenhagen suggested that response was not representative of the population that had been subject to the manipulation.
- Is Missing Data a Problem?
- Frangakis & Rubin (1999) show that under some general assumptions missing data can be a problem for estimating causal effects when there is also a compliance or selection bias in the data.
- In field experiments, where noncompliance is likely to occur, then missing data can be a problem as well.

Using Experimental Design to Reduce Missing Data

- As with noncompliance, incentives provided to subjects in the design of the experiment can help reduce the problem of missing data.

Using Experimental Design to Reduce Missing Data

- As with noncompliance, incentives provided to subjects in the design of the experiment can help reduce the problem of missing data.
- In particular, evidence on increasing survey responses can be helpful in reducing missing data in field experiments.

Using Experimental Design to Reduce Missing Data

- As with noncompliance, incentives provided to subjects in the design of the experiment can help reduce the problem of missing data.
- In particular, evidence on increasing survey responses can be helpful in reducing missing data in field experiments.
- Evidence suggests prepaid monetary incentives tends to have positive effects on survey responses – increasing response rates for face-to-face interviews, mail, & telephone surveys [see references in book].

Using Experimental Design to Reduce Missing Data

- As with noncompliance, incentives provided to subjects in the design of the experiment can help reduce the problem of missing data.
- In particular, evidence on increasing survey responses can be helpful in reducing missing data in field experiments.
- Evidence suggests prepaid monetary incentives tends to have positive effects on survey responses – increasing response rates for face-to-face interviews, mail, & telephone surveys [see references in book].
- There is also evidence that these prepaid incentives increase quality of data generated [see references in book].

Manipulation and Time

- There are two obvious advantages to exploiting sequence with manipulation:

Manipulation and Time

- There are two obvious advantages to exploiting sequence with manipulation:
 - 1) we can observe the same units in both treated and untreated states as in the between subjects design used in within subjects designs and discussed earlier)

Manipulation and Time

- There are two obvious advantages to exploiting sequence with manipulation:
 - 1) we can observe the same units in both treated and untreated states as in the between subjects design used in within subjects designs and discussed earlier)
 - 2) we can compare treated units with untreated ones, who formerly were both untreated.

Manipulation and Time

- There are two obvious advantages to exploiting sequence with manipulation:
 - 1) we can observe the same units in both treated and untreated states as in the between subjects design used in within subjects designs and discussed earlier)
 - 2) we can compare treated units with untreated ones, who formerly were both untreated.
- In this fashion a researcher both exploits manipulation to avoid confounding and panel data for control of observables that are suspected or known to confound.

Manipulation and Time

- There are two obvious advantages to exploiting sequence with manipulation:
 - 1) we can observe the same units in both treated and untreated states as in the between subjects design used in within subjects designs and discussed earlier)
 - 2) we can compare treated units with untreated ones, who formerly were both untreated.
- In this fashion a researcher both exploits manipulation to avoid confounding and panel data for control of observables that are suspected or known to confound.
- The advantages of using time coupled with manipulation to establish causal effects are well known. Heckman and Robb (1985, 1986, and 1988) present an excellent review of this literature and the approaches involved with observational data.

Manipulation and Time

- A recent example of using manipulation and time is the study of the effect of the introduction of television on voter turnout by Gentzkow (2005).

Manipulation and Time

- A recent example of using manipulation and time is the study of the effect of the introduction of television on voter turnout by Gentzkow (2005).
- **Gentzkow method is called a Difference-in-Differences approach.**

Manipulation and Time

- A recent example of using manipulation and time is the study of the effect of the introduction of television on voter turnout by Gentzkow (2005).
- Gentzkow method is called a Difference-in-Differences approach.
- As our focus is more explicitly on experiments and less on estimation of causal effects over long periods of time, we do not review the literature on these methods in its entirety here.

Manipulation and Time

- A recent example of using manipulation and time is the study of the effect of the introduction of television on voter turnout by Gentzkow (2005).
- Gentzkow method is called a Difference-in-Differences approach.
- As our focus is more explicitly on experiments and less on estimation of causal effects over long periods of time, we do not review the literature on these methods in its entirety here.
- Furthermore, many of the issues involved are similar to those discussed previously where observations may be separated by time if we assume that the asymptotic properties of cross-sectional methods are applicable (that is the number of observations per period is much larger than the number of periods).

- Table 5.1 provides a summary of methods discussed in Lecture 4, what problems each helps alleviate, and the assumptions underlying each method.