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**Applied Econometrics Take Home Final Exams**

1. Randomized Controlled Trials
   1. Explain to my mom the basic idea behind this identification strategy.

**If we *randomly* assign a treatment to some people and not others, then any difference in their outcomes has to be a result of the treatment, and not any other factor.**

* 1. What are the requirements to use this method to identify causal effects?

**Money, IRB approval, time, treatment needs to be feasible to randomly assign to people**

* 1. What are the advantages of using this identification method?

**It provides a very clean identification of causal effects.**

* 1. What are the limitations of using this method?

**It has a lot of requirements. These requirements are especially hard to meet for economic topics. Additionally, it’s not always clear how generalizable the results are to situations outside of the experiment.**

* 1. Look through the papers in your literature review of your research paper. Which ones use this identification strategy? Briefly explain how they use this identification strategy if any do.

**Example if my topic was related to obesity and health:**

**Carrell, Hoekstra, and West (2011) randomly assigns people to different potential friend groups. They find that people randomly assigned to less fit friends end up being less fit as a result. {** [**https://doi.org/10.1016/j.jpubeco.2010.12.005**](https://doi.org/10.1016/j.jpubeco.2010.12.005) **}**

* 1. If none of the papers in your literature review of your research paper used this identification strategy, why do you think they did not? Be specific about what likely prevented any researchers working on similar topics from utilizing this strategy.

**Example if my topic was related to the effect of oil discovery in Ghana on the country’s development:**

**It is impossible to randomly assign oil discovery to some countries.**

***(Answers for this part will vary based on the topic of your paper and the identification strategy you are writing an answer for. Please don’t hesitate to contact me if you have questions about whether or not your answer is on the right track.)***

1. “Extremely Good” Natural Experiments
   1. Explain to my mom the basic idea behind this identification strategy.

**If we want to observe the effect of a treatment by comparing outcomes from a group, nature randomly assign treatment status to our population and does the experiment for us**.

* 1. What are the requirements to use this method to identify causal effects?

**We need Population for the experiment (people affected by the treatment and those not affected). Apart from the treatment itself, the group affected by the treatment and those not affected should have similar factors.**

* 1. What are the advantages of using this identification method?

**It uses real-world scenario for the experiment, so it becomes easy for us to generalize the findings of the experiment to other people.**

* 1. What are the limitations of using this method?

**Natural experiment is uncommon and difficult to plan. It is very difficult to group people such that you can compare them and that nothing else influences the effect of the treatment in an experiment.**

* 1. Look through the papers in your literature review of your research paper. Which ones use this identification strategy? Briefly explain how they use this identification strategy if any do.

**None of my papers used Natural Experiment as an identification strategy.**

* 1. If none of the papers in your literature review of your research paper used this identification strategy, why do you think they did not? Be specific about what likely prevented any researchers working on similar topics from utilizing this strategy.

**Natural experiments sometimes look like a random assignment hence it is impossible for researchers to use this estimation technique for a study such as mine. The carbon pricing policy from south Africa is a planned policy by government which makes it not to be a good candidate for natural experiment**.

1. Controlling for Observables
   1. Explain to my mom the basic idea behind this identification strategy.

**If you are looking at how something affects another you must make sure that the differences you may see are not because of other factors. An example is that, if you want to know why some students get good grades than others, you should not only think that because they study more than others, there may also be other reasons why they do so well. And so, you want to make sure that in finding your solution to why people do well in exam, there shouldn’t be any other thing else apart from studying, and if there is, factor it in.**

* 1. What are the requirements to use this method to identify causal effects?

**You need to have enough information on the other factors that can influence your outcome.**

* 1. What are the advantages of using this identification method?

**This method helps you to know how other factors are separately having effect on the outcome of a scenario.**

* 1. What are the limitations of using this method?

**We don’t have perfect data or information so it makes it difficult to get the exact factors that can influence our outcome, even if we do, we will have measurement error. Also there may be somethings that can influence an outcome which you cannot see, observe or measure.**

* 1. Look through the papers in your literature review of your research paper. Which ones use this identification strategy? Briefly explain how they use this identification strategy if any do. Do you believe that this paper meets the requirements to use this method to identify causal effects?

**None of my papers used Controlling for Observables as an identification strategy?**

* 1. If none of the papers in your literature review of your research paper used this identification strategy, why do you think they did not? Be specific about what likely prevented any researchers working on similar topics from utilizing this strategy.

**It is impossible to control for all variables that affect carbon emission. A lot of things account for emission, some of these things can be observed and while cannot be observed. This makes it difficult to use controlling for observable as an identification strategy.**

1. Instrumental Variables
   1. Explain to my mom the basic idea behind this identification strategy.

**If we want to know the effect of something on an outcome, we often face difficulties, sometimes we cannot directly measure this thing affecting the outcome because it is mixed up with other things.**

* 1. What are the requirements to use this method to identify causal effects?

**We need something that can strongly affect the other mixed up stuffs that is making us difficult to know the impact on our outcome but not directly affecting it (outcome). In sum we need something that is related to the outcome but through another means.**

* 1. What are the advantages of using this identification method?

**This method helps to clear up the things hiding in our variable and to show us what is indeed influencing our outcome.**

* 1. What are the limitations of using this method?

**It is very difficult to get a variable that can account for the hidden things, even sometimes when we find one, it doesn’t seem to really because it is not perfect and therefor our outcomes are not so good.**

* 1. Look through the papers in your literature review of your research paper. Which ones use this identification strategy? Briefly explain how they use this identification strategy if any do. Do you believe that this paper meets the requirements to use this method to identify causal effects?

**None of my papers used Instrumental Variables as an identification strategy.**

* 1. If none of the papers in your literature review of your research paper used this identification strategy, why do you think they did not? Be specific about what likely prevented any researchers working on similar topics from utilizing this strategy.

**The researcher will need something that can affect the carbon pricing policy and will not affect anything else, and this is always difficult to do. Also, since my research is about comparing the impact of a policy over a time period in different places, it is not necessary to use this method.**

1. Regression Discontinuity Designs
   1. Explain to my mom the basic idea behind this identification strategy.

**If we want to know that giving people money makes them attain a level of happiness, and live long, we need to compare people with just above and below a level of happiness (the threshold) to see if the money really makes a difference their lives**.

* 1. What are the requirements to use this method to identify causal effects?

**First, we need a data to work with. We also need to get a lot of observations near the cutoff (threshold) so that we can make a better comparison. The only thing that can make the outcome to change will be that if the treatment status change.**

* 1. What are the advantages of using this identification method?

**It provides a clear estimated effect on outcome for people close to the cutoff.**

* 1. What are the limitations of using this method?

**People can manipulate their scores by either understating or overstating it. Also, a lot of things can change at the cutoff.**

* 1. Look through the papers in your literature review of your research paper. Which ones use this identification strategy? Briefly explain how they use this identification strategy if any do. Do you believe that this paper meets the requirements to use this method to identify causal effects?

**Gugler, etal., (2023) used RDD to identify the causal effect of Britains carbon tax policy on electricity-related CO2 emissions. They find out that the policy increased the marginal cost of co2-emitting generators which led to discontinuities in emission. Yes this paper meets the requirement to use this method since it looks at the introduction of carbon tax in 2013 and its continuous increase in 20114 and 2015 and how it has impacted emissions as the treatment status changed over the years.{ https://doi.org/10.1016/j.eneco.2023.106655}**

* 1. If none of the papers in your literature review of your research paper used this identification strategy, why do you think they did not? Be specific about what likely prevented any researchers working on similar topics from utilizing this strategy.

1. Fixed Effects
   1. Explain to my mom the basic idea behind this identification strategy.

**If we want to observe a person at two points in time and there exist something about them that does not change. We can isolate just the change that can influence the outcome and ignore what will stay unchanged.**

* 1. What are the requirements to use this method to identify causal effects?

**We need a data that is observed in units and time (panel data). Also, we should include other variables that can change overtime and can affect our outcome variable**.

* 1. What are the advantages of using this identification method?

**It takes care of all variations in time and other things we cannot see or measure. It helps adding more controls to your research work.**

* 1. What are the limitations of using this method?

**There may be some variables that may change over time and influence the outcome variable but this method cannot account for it.**

* 1. Look through the papers in your literature review of your research paper. Which ones use this identification strategy? Briefly explain how they use this identification strategy if any do. Do you believe that this paper meets the requirements to use this method to identify causal effects?

**None of my paper used Fixed effects as an identification strategy.**

* 1. If none of the papers in your literature review of your research paper used this identification strategy, why do you think they did not? Be specific about what likely prevented any researchers working on similar topics from utilizing this strategy.

**It is impossible to use fixed effects as an identification strategy for carbon emissions since all variables that influence emission are not fixed over time.**

1. Difference in Differences
   1. Explain to my mom the basic idea behind this identification strategy.

**If you have two farmers producing a crop for a long time and one decide to use fertilizer and the other farmer continues with the old way of farming. You will want to know the impact of the fertilizer on the yields of the farmer who embraced the use of a fertilizer. You can get the real impact by comparing the changes over time between the two farmers from their yield.**

* 1. What are the requirements to use this method to identify causal effects?

**Before treatment, both the untreated group and treated group should have a similar outcome. Also, all the treatment units are treated at the same time.**

* 1. What are the advantages of using this identification method?

**It provides a simple, practical and straightforward approach to assess the effectiveness of a treatment**

* 1. What are the limitations of using this method?

**If both groups are not similar in outcome before the treatment, the estimates from the treatment will be questionable.**

* 1. Look through the papers in your literature review of your research paper. Which ones use this identification strategy? Briefly explain how they use this identification strategy if any do. Do you believe that this paper meets the requirements to use this method to identify causal effects?

**Dechezlepretre, et al.(2022), used this identification strategy to investigates the impact of the European Union Emissions Trading System (EU ETS) on**

**carbon emissions and economic performance. They grouped the observations into treated ( a company regulated under ETS) and untreated (a company not under the ETS) before and after the implementation of the EU ETS. They find that the introduction of the EU ETS policy led to about 10% reduction in emission but had no significant impact on economic growth. Yes it does since we want to know the impact of the policy on emissions and economic growth.**

**{** https://doi.org/10.1016/j.jeem.2022.102758}

* 1. If none of the papers in your literature review of your research paper used this identification strategy, why do you think they did not? Be specific about what likely prevented any researchers working on similar topics from utilizing this strategy.

1. Matching
   1. Explain to my mom the basic idea behind this identification strategy.

**If we pair people who are similar in all their ways except some have a treatment and others do not, we can see the real impact of the treatment as to whether it had an effect or not.**

* 1. What are the requirements to use this method to identify causal effects?

**You must have information on the individual groups to help you in pairing them. The treatment status is randomly assigned after controlling for the observations. Also, for every value in the observation there should be a chance of it being both in the treated and untreated group. The groups that have been matched should balance and be similar.**

* 1. What are the advantages of using this identification method?

**It provides a clear differences in outcomes that are as a result of the treatment but no other factors.**

* 1. What are the limitations of using this method?

**It is difficult to find a perfect pair to match. Also, it accounts for only the differences that are because of the treatment, it does not account for other factors that can influence the outcome.**

* 1. Look through the papers in your literature review of your research paper. Which ones use this identification strategy? Briefly explain how they use this identification strategy if any do. Do you believe that this paper meets the requirements to use this method to identify causal effects?

**Dechezlepretre, et al.(2022), used this identification strategy to investigates the impact of a firms carbon emissions on their market value with a focus on direct emissions and how it is related to financial performance. They find out that higher direct emissions are related to lower market valuation. Yes it does since the authors used comparable firms across EU to account for the effect of emissions.** {<https://doi.org/10.1016/j.jeem.2022.102758>}

* 1. If none of the papers in your literature review of your research paper used this identification strategy, why do you think they did not? Be specific about what likely prevented any researchers working on similar topics from utilizing this strategy.