

CS112 LBA - Impact of Economic Sanctions on North Korea

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Sanctions have been a popular strategy for attempts at pressuring states and institutions to alter specific policies. But often, assessing the impact of a specific intervention can be difficult, specifically when trying to discriminate between components of the impact that affect different sections of the population. Sanctions can also be applied in diverse ways, carrying different economic and diplomatic costs to the states participating in the initiative, in a way that could be optimized to minimize cost versus impact. It's difficult to run experiments on sanction design, since they are costly and drastic measures that are not taken often. Therefore, I'll be suggesting strategies to perform observational studies of the two problems using synthetic controls and encouragement design.¹

Assessment of Overall Economic Impact of Sanctions Using Synthetic Controls:

North Korea has been affected by many sanctions since 2006 (8 UN resolutions, as well as several unilateral sanctions from the US, EU, Japan and SK), but each can be regarded as a "treatment" that has an immediate effect at its introduction, and remains in effect mostly indefinitely. To assess the impact of such treatment, without access to counterfactual data about the trajectory of the North Korean economy without the sanctions, we can construct a synthetic, hypothetical North Korean economy, and estimate its performance over time.

We can leverage the similarity of the North Korean economy to other east Asian and second-world economies. Given data about central properties of the economies of several countries over time before the introduction of a given sanction of interest, we can construct a model to predict a dependent variable of the North Korean economy given information exclusively about other countries. For example, we collect data about the GDP, public expenditure, education level, private investment, and foreign investment from 1996-

¹ #experimental design: The entire paper is an attempt to design observational studies to use for statistical causal analysis in place of randomized experiments due to limitations. We leverage randomness and correlation strategically to produce external validity from observational studies.

2006 about several countries, and construct a linear model that predicts North Korean GDP using a weighted linear combination of, say, 0.6 times the GPA of China and 0.8 times the GDP of Iran. Then we use data from 1996-2016 and let our model predict the GPA of North Korea using only China and Iran data. We then compare the GPA predicted by our synthetic control to that of the real, treated North Korea to obtain the treatment effect.²

It's imperative we make sure that we have enough pre-treatment data to produce a reliable model of the North Korean economy, and that the model we created closely matches the observed pre-treatment values, proving its validity. We are also advised to try and use our same method to model a different country that was not affected by sanctions, say, Mongolia, as a placebo test. If we found a post-treatment effect on our placebo, we can't trust our model to accurately assess treatment effect on our true case. We should aim to model many other states with synthetic controls and look for a significant difference in post-treatment GDP for North Korea alone.³

Assessment of Target Sanctions Using Encouragement Design

Target sanctions (also known as smart sanctions) are used to influence specific targets as opposed to entire states or populations. Instead of large, diplomatically costly moves such as entirely banning significant exports (such as the Sep 2017 UN resolution against North Korea oil products), a list of individuals or companies is targeted. For example, in Feb 2016, president Barack Obama sanctioned entities found to have contributed to North Korea's weapons of mass destruction program. These are second hand sanctions, imposed on non-NK companies who are found to have collaborated with the banned list of entities.

In this case, it's difficult for the intelligence community to keep track and identify all companies worldwide who have dealt with any of the many North Korean front organizations and straw buyers, and some are

² #modeling: The synthetic control is produced by a predictive model that is restrained to using data from other units to predict the dependent variable for the target unit. I chose to go with simple weighted linear combination as done in the readings, but in essence other modeling methods are just as viable.

³ #significance: Claiming an observed treatment effect to be significant, one has to compare it to a distribution of outcomes from untreated units.

likely to trust the security of their clandestine activity and continue despite the risks. If we try to examine the impact of a North Korean company from severing its connections to foreign collaborators, we thus cannot directly control the treatment assignment. However, we can find an instrumental variable that correlates with treatment.⁴ The list of sanctioned North Korean organizations is subject to significant uncertainty: a company must be connected to a targeted industry, and this must be known to relevant intelligence agencies. We therefore have a random subset of companies that are affected by the sanction “encouragement”. This encouragement is in fact applied to the collaborator companies, but ultimately there is correlation between being on the list and having foreign connections severed. An analysis of the performance of the affected companies would then on average reflect a treatment affect for target sanctions. This can be compared to the treatment affect of large scale sanctions and optimized for economic and diplomatic cost-effectiveness.

⁴ #correlation: Using the instrumental variable method, we’re leveraging a naturally occurring randomness in treatment assignment to find a variable that correlates with treatment assignment to use in place of true treatment assignment.

Annex I – Context

The Asan Institute for Policy Studies is an NGO think-tank in Seoul that's widely respected worldwide for their research on international relations. We were lucky enough to receive a lecture by Dr. Choi Kang, vice president of the institute, on North Korea and challenges to peace and security in the Korean peninsula. After the lecture we all took a picture (on which I have yet to get my hands, but staff member Alexis Shin would confirm my attendance: ashin@minerva.kgi.edu). I approached Mr. Kang and discussed his policy research through the lens of my experience in military intelligence research. I asked him about a problem he observed in the international approach today dealing with North Korea, and he mentioned a huge and longstanding difficulty in assessing the impact of economic sanctions, and referred me to some articles in the subject. Statistical analysis was consistently rudimentary, and discussion revolved around untested hypotheses, and so I retroactively decided to work on this subject for my LBA.