The Impact of Economic Sanctions on Iran's Export: Using the Synthetic Control Method

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Abstract
This study employs the Synthetic Control Method (SCM) as an innovative method in evaluating the effects of a policy to assess the effect of the 2011 economic sanctions on Iran's exports during the period 2001-2018. For this purpose, in addition to Iran, ten other countries have been considered as a donor pool to simulate the trend of Iran's exports before and after the economic sanctions. New Zealand, Turkey, the UAE and China have played the most important roles in this simulation. The results show that while Iran could have achieved more than $ 150 billion in exports for each of the years since the embargo, the sanctions have caused Iran to lose an average of $ 74 billion export income annually. According to the estimated model, the largest export gap is related to 2015, when sanctions caused Iran's export to reach $ 60 billion. While according to the counterfactual export pattern and in the absence of sanctions in this year, the amount of exports could reached $159.7 billion, and the maximum export gap has been recorded $99.7 billion. The placebo test confirms the reliability of the estimates made by extending the SCM to all members of the donor pool. The results of this study show that Iran's export is affected by demand side factors. Developing friendly political relations with business partners, avoiding international disputes, and building sustainable trade relations through business links between firms are among the policy recommendations.
Keyword: Export, Economic Sanctions, Synthetic Control Method, Donor Pool.

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1. Introduction
This study evaluates the effect of 2011 economic sanctions on Iran's export in a new approach, using the synthetic control method as an innovative method in econometrics. With the help of this method, the export process of Iran in the absence of economic sanctions and with the help of a donor pool from other countries is simulated and compared with what actually happened.

2. Literature Review
The main purpose of economic sanctions has historically remained the unchanged; That is, restricting foreign trade, assets, or economic interests of target countries or non-state actors to achieve security or foreign policy goals. In assessing the effectiveness of a sanctions policy, it is necessary to identify its objectives and measurable criteria for determining whether the objectives have been met or not. Economic sanctions can have any of the following objectives: to correct the behavior of the target country, to retaliate or punish the sanctioned country, to send a signal to the target country or to third countries, to destabilize and to carry out only a tokenism. In addition, the rationale for economic sanctions may include promoting military objectives on the one hand and maintaining peace on the other; Or it may be a means of restraint or dialogue. Some of the goals of a tactical policy of sanctions can be to deter or coerce other countries or individuals who are not directly targeted (Zoller, 1984).

3. Research method
3-1. Synthetic control method
In a recent survey of Journal of Economic Perspectives, the synthetic control approach is arguably the most important innovation in the policy evaluation literature in the last 15 years. (Athey and Imbens, 2017).

The synthetic control method moves away from using a single control unit or a simple average of control units, and instead uses a weighted average of the set of controls.

3-2. Configure a synthetic control method to assess the effect of sanctions on Iran's export

The period 2001 to 2018 is considered as the study period, which was chosen in 2001 due to the lack of export value index for selected countries before this year. The dependent variable or the variable under treatment is Iran's export in this period. In order to predict the trend of this variable, the value of export, GDP at constant prices in 2010, the amount of export during 2001, 2008 and 2011 are considered as predictor variables. Statistics are collected from the World Bank and the International Trade Center.

Resource-exporting countries (Canada, New Zealand, Australia, Chile and Norway) Algeria, Saudi Arabia and the United Arab Emirates as OPEC oil exporters, Turkey due to economic similarities with Iran and China as an important trading partner are combined donor pool.

The model is estimated by Stata software, to which the Synth package has been added, and all the results and output forms of this software.

4. Results

Table 1 shows the countries forming the donor pool in Iran's export simulation. New Zealand has the largest share in this simulation, accounting for almost 50% of the weight. After that, Turkey, the UAE and China had the largest weight in creating synthetic export to Iran, respectively.

Table 1: Donor Pool

Country	weight
UAE	0.121
Australia	0
Canada	0
Chile	0
China	0.013
Algeria	0
Norway	0
New Zealand	0.466
Saudi Arabia	0
Turkey	0.4

Figure 2 shows the path of Iran's real export versus its synthetic export. Prior to the sanctions, real and synthetic export trends were almost identical. However, with the imposition of economic sanctions in 2011, there was a significant decline in export and this decline continued until 2015. With the approval of the Joint Comprehensive Plan of Action (CJPOA) in 2015 and the relief of economic sanctions, Iran's export has experienced an upward trend. According to the simulated export trend and in absence of sanctions, Iran's export could have recorded an annual amount of more than $ 150 billion, and in 2014 and 2018 had the potential that the value of Iran's export to reach a 173 a billion dollars record.
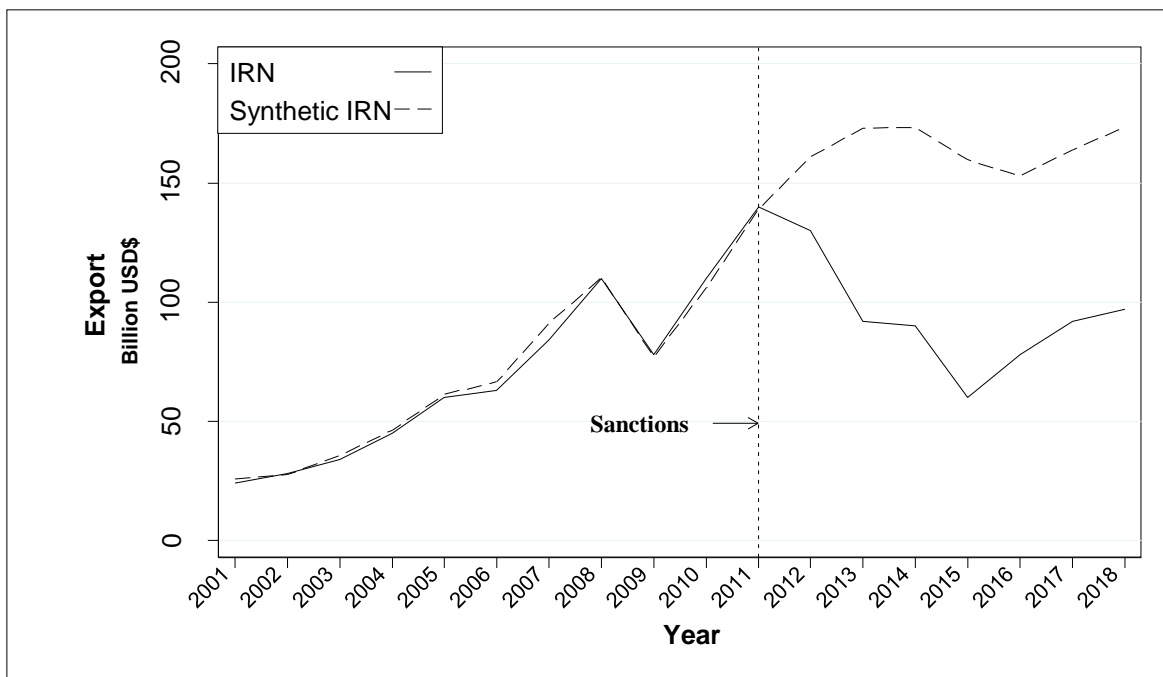

Figure 2: The path of Iran's real export vs. synthetic export (Source: research findings)

From 2012 to 2018, Iran's export experienced an average decrease of $ 74 billion annually compared to the synthetic export. According to the estimated model, the largest export gap is related to 2015, when sanctions caused Iran's export to reach $ 60 billion. According to the synthetic export model, export in the absence of sanctions could have reached $ 159.7 billion, and this year the maximum export gap has been recorded by $ 99.7 billion.

5. Conclusions and policy recommendations

The results show that while Iran could achieve export of more than $ 150 billion for each of the post-sanctions years; Sanctions have caused Iran to lose an average of $ 74 billion a year in export.

Developing friendly political relations with trade partners, avoiding international conflicts and establishing long-term business relationships through inter-firm trade links and striving to integrate into the global value chain are among the policy recommendations that can help adopt trade policies.

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