

This academic year I have had the privilege of working with Dr. Legro on his research project, 'Nuclear Weapons and the Global Era'. The project aimed to examine whether nuclear weapons have contributed to the recent trends of increasing economic interdependence and cooperation between states. My research as part of the wider project focused on using statistical methods and large-n data to investigate the possible relationship countries with nuclear weapons or those under the nuclear umbrella and the number of Preferential Trade agreements and International Organisation Memberships the country had.

The hypothesis of the project was that countries with nuclear weapons or those that have extended nuclear deterrence guarantees (where a country has guaranteed protection of a nuclear-armed ally without having nuclear weapons themselves) feel more secure to cut deals from which they may gain less than their partners leading them to sign more Preferential Trade Agreements. Similarly, the security granted by the weapons/guarantees may allow for these countries to join more International Organisations as they are less worried about the potential loss of sovereignty. Moreover, this security is hypothesised to allow for deeper levels of integration than previously seen through the form of deeper trade agreements which encompass more policy areas.

### **Methodology**

Initially, I created two panel datasets for each dependent variable (Preferential Trade Agreements and International Organisation memberships) across two groups of countries – those with nuclear weapons and those with extended nuclear deterrence guarantees. These datasets contained the dependent variables, variables related to nuclear weapon/guarantee acquisition and control variables for GDP, trade, geographic features, regime type and US hegemony.

Subsequently, the datasets were separated into the following time panels in order to examine the whether the potential effect of nuclear weapon/guarantee acquisition happened more immediately or slowly following the acquisition date:

- 5 years before and after acquisition
- 10 years before and after acquisition
- 1960 onwards (for completeness of data)

Panel regressions were then run in order to examine the potential relationship of nuclear weapons/guarantees on the number of preferential trade agreements and international organisation memberships of the country. I also examined the relationship between the nuclear weapon/guarantee acquisition and the deepness of trade agreements but the results of these investigations were not conclusive.

### **Findings**

The results of the regressions suggested that obtaining nuclear weapons or extended deterrence guarantees may have a potential influence on the number of Preferential Trade Agreements and International Organisation memberships that a country partakes in.

In terms of International Organisation membership results:

In the 10-year panel for countries with nuclear weapons the results suggested that in the 10 years after nuclear acquisition having nuclear weapons resulted in the country joining approximately 5 more IOs. In this same period for nuclear umbrella countries the results potentially suggest that gaining the deterrence results in the country joining 8.7 more IOs compared to if they had not gotten the guarantee.

In the 5-year period the effect of nuclear weapons and guarantees is lower implying that countries who gain these assurances may only start to feel the security that allows them to cooperate more with other countries in a longer time period.

In terms of Preferential Trade Agreement results:

In the 10-year panel for countries with nuclear weapons the results possibly suggested that following nuclear weapon acquisition these states join on average 13 more preferential trade agreements compared to if they had not obtained the weapons.

The results for nuclear umbrella countries follows in similar suit with these countries joining on average 6.8 more PTAs in the 10-year period following guarantee acquisition and 5.8 more in the 5-year acquisition as possibly suggested by the results of the regressions.

Within the broader overview of this project the findings of my statistical research will provide a base for further statistical investigation in the wider project. The potential relationships between nuclear weapons/extended deterrence guarantees and international organisations/preferential trade agreements can be examined further using the datasets created from my work via different statistical methods or across differing time panels. This would allow further and deeper investigation to aid Dr Legro's future work on the project.

Working with Dr Legro and the opportunities which have come from being an Undergraduate Research Assistant have been some of the most formative experiences of my university time. Applying my data science skills to a real research project and learning about a field I had no previous knowledge of has been immensely gratifying. One of the highlights of the program was the opportunity to present my ongoing work at the British Conference of Undergraduate Research, where I shared insights from the project with students from a wide range of academic backgrounds. Transitioning from having no prior academic research experience or knowledge of the topic to engaging with leading academics like Dr. Legro and presenting at a conference has been incredibly beneficial for both my academic abilities and personal growth. I am exceedingly grateful for the opportunities and support provided by Dr. Legro and the US Phelan Centre throughout this experience.