A Note on the Synthetic Control Method and Its Application
to the Study of the European Union and European Countries

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Abstract:

This paper presents a rather new methodology, called the synthetic control method, which can be used to analyze the effect of an event or policy intervention when the units of analysis are aggregate entities, such as a region or a country. This method provides a data-driven approach to choosing comparative units in comparative case studies. After presenting the methodology, I summarize the nascent literature which applies the synthetic counterfactual technique to the analysis of European integration or some country-specific policies.

Social scientists, like European Union (EU) scholars, are often interested in assessing the effects of an event or policy intervention on aggregate entities, such as countries or regions. Despite the vast literature on the EU, few papers have been able to rigorously quantify for instance the economic impact of EU membership, or of the Economic and Monetary Union (EMU). This dearth of empirical evidence stems from a major problem that policy analysis suffers from in social sciences: the missing counterfactual, or the difficulty in identifying a satisfactory benchmark. The researcher would then typically have to choose between conducting a comparative case study or using large-sample quantitative methods which allow for the use of traditional statistical inference tools.

Both empirical approaches have their benefits and disadvantages. While the case study allows the researcher to present an in-depth-analysis of the policy implication for one or a few entities, the selection of the comparative units is not always well justified, and quantitative inferences are hard to make. Large-sample quantitative method (such as regression analysis) would provide estimate of the average impact of a policy or event, which could hide significant cross-unit disparities. While difference-in-difference analysis, and randomized control trials are often used in microeconomic research as an alternative to a counterfactual analysis, these techniques are not very useful to study macroeconomic policies (such as a currency devaluation, or debt default) or event (such as Brexit). The synthetic control method (SCM) developed by Abadie and Gardeazabal (2003) offers a bridge between qualitative and quantitative methodologies, as it provides a systematic way to choose comparison units in comparative case studies (Abadie et al. 2015). After briefly describing the synthetic control method, I will present few recent papers which have applied this novel methodology to European issues.

Instead of comparing the outcome in countries subjected to a specific policy (the "treatment") and other countries that were not, the synthetic control methodology is based on the construction of a counterfactual group which is obtained as a weighted combination of non-treated countries (called the "donor pool"). The advantage of building this counterfactual unit is that "the pre-intervention

characteristics of the treated unit can often be much more accurately approximated by a combination of untreated units than by any single untreated unit" (Abadie et al. 2015). These non-treated countries are chosen to match as closely as possible the pre-treatment characteristics of the treated country. The countries used to obtain the synthetic control (those in the "donor pool") must not be affected by the treatment.

Abadie et al (2010) propose to choose the weights assigned to the non-treated countries used to build the synthetic unit so as to minimize the mean squared error of pre-treatment outcomes. The choice of the pre-treatment characteristics should include variables that can approximate the path of the treated country, but should not include variables that anticipate the effects of the intervention. The identification assumption of the synthetic control method is that if the synthetic control unit provides a good approximation of the outcome for the treated unit in the pre-treatment period, then any subsequent difference between the treated and control units can be attributed to the effect of the intervention (policy) on the outcome. Abadie, Diamond, and Hainmueller (2010) have developed a script, Synth package for MATLAB, R, and Stata, available at http://web.stanford.edu/~jhain

In the remainder of this article, I will outline three papers which have used the synthetic control approach to study the impact of various facets of the European integration, or a major European political event. First, Campos et al. (2014) focus on measuring the effects of EU membership on the countries' per capita income and labor productivity. Their analysis focuses on the 1973, 1981, 1986, 1995 and 2004 enlargements. Because the period they cover ends in 2008, their study cannot include more recent enlargements. The donor pool includes the remaining 11 non-EU members OECD countries and 24 additional middle-income countries. They find that in the absence of the European Union (i.e. without economic and political integration) per capita income in EU member countries would have been on average 12% lower. This average however hides substantial disparities across countries. The benefits from EU membership (measured for 10 years of treatment) are higher for the 1986 enlargement countries (Spain and Portugal) and for the 2004 Central and Eastern European enlargement. EU membership has only been a detriment to per capita income in Greece, where per capita GDP would have been 17% higher, had Greece not joined the EU in 1981.

Saia (2014) applies SCM analysis to the impact of the euro on trade flows. More specifically, using the example of the United Kingdom, the paper assesses what would have happened to trade flows between Eurozone member countries and non-member countries, had the latter adopted the common currency. Using bilateral trade data over the 1980-2012 period for the UK and the 10 first countries to adopt the euro starting in 1999, the author finds that overall trade flows between the UK and Eurozone countries would have been 13% higher if the UK had adopted the euro. Gains in trade would have been larger with Finland, France, Italy, Spain, and Portugal. Using the same methodology, Saia also finds that the adoption of the euro has fostered trade among EMU member countries (increase in trade flows that ranges from 28% to 53%), as well as trade flows among members and non-member countries.

This technique has also been applied to the analysis of country-specific event. While Abadie and Gardeazabal (2003) study the economic effect of conflict and terrorism on the Basque country, Abadie et al. (2015) analyze the impact of the German reunification on West Germany's per capita income. Using data for the 1960-2003 period and 16 OECD countries in their donor pool, they find that over the 13 years that followed the German reunification, West Germany's GDP per capita would have been $1,600 higher each year, had the reunification not taken place.

To summarize, the SCM allows researchers to add quantitative rigueur to qualitative comparative studies by providing an appealing data-driven procedure to select the comparison units when no single

untreated unit provides a good comparison for the unit affected by the policy or event of interest. The difficulty in identifying a satisfactory control group often arises when the treatment or event affects large aggregates like regions or countries for which a limited number of untreated units are available. As illustrated by the very recent applications of this methodology to the analysis of the European integration, the synthetic control method has a promising future in the tool kit of EU scholars.

References:

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