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Trade liberalization and child mortality: A Synthetic Control Method

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ABSTRACT

We study the effect of trade liberalization on child mortality using data from emerging and developing countries over the 1960–2010 period. To capture possible heterogeneity of effects, we use the Synthetic Control Method (SCM) for comparative case studies. The SCM allows to compare the trajectory of post-reform health outcomes of treated countries (those which experienced trade liberalization) with the trajectory of a combination of similar but untreated countries. On average, trade liberalization significantly reduced child mortality. The average reduction is around 9% ten years after the liberalization. But there is significant heterogeneity in the impact. For the cases for which the SCM could provide a reliable counterfactual, trade liberalization significantly reduced child mortality in approximately half the cases. In most other cases there was no significant effect. In the majority of the significant cases, the reduction in child mortality was more than 20%. On average, trade liberalization reduced child mortality more (a) in democracies compared to autocracies, (b) when incomes were higher and (c) when it reduced taxation of farmers.

1. Introduction

The impact of globalization and trade liberalization on welfare and poverty remains controversial (Harrison, 2006; Ravallion, 2003). While several economic studies show that open trade enhances economic growth (e.g. Billmeier & Nannicini, 2013; Dollar, 1992; Giavazzi & Tabellini, 2005; Sachs & Warner, 1995; Wacziarg & Welch, 2008), the impact on poverty and inequality is much less clear (e.g. Anukriti & Kumler, 2014; Goldberg & Pavcnik, 2007; Topalova, 2010;). In an elaborate review of the evidence, Winters, McCulloch, and McKay (2004) conclude that "there can be no simple general conclusions about the relationship between trade liberalization and poverty". In a recent update, Winters and Martuscelli (2014) argue that this conclusion still holds.[1]

In this paper we study the impact of trade liberalization on health, and more specifically child mortality. While children's health is an important indicator of welfare and poverty (Deaton, 2003), it is also an important end in its own right (Sen, 1999). Moreover child health is also itself important for economic growth and development (Levine & Rothman, 2006).

There is an extensive literature addressing the issue and the mechanisms through which trade may affect health, and in particular child mortality (see Blouin, Chopra, & van der Hoeven, 2009 for a survey). These include the impact on economic growth, poverty and inequality (Deaton, 2003; Pritchett & Summers, 1996), public health expenditures (Filmer & Pritchett, 1999; Kumar, Ram, & Singh, 2013), knowledge spillovers (Deaton, 2004; Owen & Wu, 2007), dietary changes (Cornia, Rosignoli, & Tiberti, 2008; Chege, Andersson, & Qaim, 2015; Oberländer, Disdier, & Etilé, 2016), food prices (Fledderjohann, Vellakkal, Khan, Ebrahim, & Stuckler, 2016; Headey, 2014), fertility and the labour market (Anukriti & Kumler 2014). Not only are there many ways that trade may affect people's health, the impact may be both positive and negative.

Some studies have tried to quantitatively assess the impact of trade (or globalization more generally) on health using cross-country data (e.g. Martens, Akin, Maud, & Mohsin, 2010; Mukerjee & Kreckhaus, 2011). However, while they find a correlation, most studies do not convincingly deal with endogeneity bias, due to omitting variables and/or simultaneity between globalization indicators and the health variables, to identify causal effects.

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[1] See also Goldberg and Pavcnik (2004, 2007) for extensive reviews on the poverty and distributional effects of trade liberalization in developing countries; as well as Wade (2004) and a special issue of this Journal edited by Nissanke and Thorbecke (2006).

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Two studies Levine and Rothman (2006) and Owen and Wu (2007) are more careful in their econometric identification strategy and dealing with causality issues. Levine and Rothman (2006) use a cross-country analysis to measure the (long-run) effect of trade on life expectancy and child mortality. Because trade can be endogenous to income and health, they follow Frankel and Romer's (1999) approach by exploiting the exogenous component of trade predicted from a gravity model. They find that trade significantly improves health outcomes, although the effect tends to be weaker and often insignificant when they control for countries' income levels and some other covariates. The authors conclude that one of the main channels through which trade openness improves health is through enhanced incomes. Owen and Wu (2007) use panel data econometrics. Controlling for income and other observed and unobserved determinants of health through fixed effects, they find that trade openness improves life expectancy and child mortality in a panel of more than 200 developed and developing countries. They also find evidence suggesting that some of the positive correlations between trade and health can be attributed to knowledge spillovers – an hypothesis previously advanced by Deaton (2004). However, also in their analysis the impact is not always robust. For example, when the authors work with the subsample of only developing countries, the trade effect on health is weaker, and not significant when child mortality is considered.

Given the fact that trade can affect health, and in particular child mortality, through different channels, and that the impact of trade liberalization can be different under different economic and institutional conditions, the average effect as measured by previous cross-country studies may hide important heterogeneity among countries and regions (Bardhan, 2006; Nissanke & Thorbecke, 2006; Ravallion & Chen, 2007; Winters, McCulloch, & McKay, 2004).

To explicitly capture this potential heterogeneity we use a different methodology than previous studies, namely the Synthetic Control Method (SCM) recently developed by Abadie and Gardeazabal (2003) and by Abadie, Diamond, and Hainmueller (2010). We follow the approach of Billmeier and Nannicini (2013) and Cavallo, Galiani, Noy, and Pantano (2013) who applied the SCM to study the relationship between trade liberalization, economic growth and natural catastrophes, respectively. The SCM allows choosing the *best* comparison units in comparative case studies. Using this approach, we compare the post-reform child mortality of countries that experienced trade liberalization – *treated* countries – with child mortality of a combination of similar, but *untreated* countries.

The SCM methodology allows flexibility and transparency in the selection of the counterfactual, and thus improves the comparability between treated and untreated units. Importantly, the SCM also accounts for endogeneity bias due to omitted variables by accounting for the presence of *time-varying* unobservable confounders. Moreover, it allows separating short-run versus long-run effects, an issue not formally addressed by previous studies but of particular relevance when the focus of the analysis is the effect of trade reforms (Billmeier and Nannicini, 2013).

We use data from 41 cases of trade liberalizations in developing and emerging countries which occurred during the 1960–2010 period. Not all cases satisfy the SCM methodological properties. Among the cases that satisfy the SCM criteria, we find significant heterogeneity in the effects. On average, trade liberalization significantly reduced child mortality, but in several cases there was no significant impact, and in a few cases child mortality increased after trade liberalization. In the second part of the paper we discuss potential factors (including interactions of trade liberalization with taxation structures, the level of development, the spread of diseases, etc.) which may explain these heterogeneous effects.

The remainder of the paper is organized as follows. In the next section the methodology – the synthetic control approach – will be presented and discussed. Section 3 presents the data on trade policy reforms, child mortality and other covariates used in the empirical exercise. In Section 4 the main results will be presented and discussed. Section 5 presents robustness checks and some extensions, while in Section 6 we further investigate potential mechanisms. Section 7 concludes.

2. Methodology

The empirical identification of the causal effect of trade policies on health outcomes is difficult because trade policies tend to be correlated with many other social, political and economic factors. Moreover, the effect of trade policies on inequality and poverty tends to be country-, time- and case-specific (see Goldberg & Pavcnik, 2004, 2007).

Previous quantitative studies do not fully account for all these issues simultaneously. The instrumental variable approach of Levine and Rothman (2006), relies on the assumption that the estimated trade share from gravity model is not correlated with other factors, such as institutions or growth, that by themselves could affect child mortality (see Nunn & Trefler, 2014). The panel fixed effects approach proposed by Owen and Wu (2007) assumed that in absence of trade reforms, health outcomes for the treated and control groups would have followed parallel trajectories over time, an assumption often violated and sensitive to the fixed effects specification (Bertrand, Duflo, & Mullainathan, 2004; Ryan, Burgess, & Dimick, 2015).[2] In addition, both these approaches do not provide insights on the potential heterogeneity of the trade reforms effects on poverty and inequality.

To overcome the identification problem we use the synthetic control method (SCM) proposed by Abadie and Gardeazabal (2003) and Abadie, Diamond, and Hainmueller (2010). The SCM is an approach for programme evaluation, developed in the context of comparative case studies, that relaxes the parallel trends assumption of the difference-in-difference method.[3] The SCM, besides accounting for time varying unobserved effects, is particularly suitable for those contexts where the effect of the policy under investigation is supposed to be heterogeneous across the investigated units. Moreover, as the SCM offers a dynamic estimate of the average effects, its results add additional insights on the dynamic effect of trade policy reforms on health outcomes, as some of the effects may require time to emerge (Billmeier & Nannicini, 2013). Finally, the SCM estimator is both externally and internally valid, as it combines properties of large cross-country studies, which often lack internal validity, and of single country-case studies, that often cannot be generalized.

In what follows we summarize the SCM approach following Abadie, Diamond, and Hainmueller (2010) and Billmeier and Nannicini (2013) who studied the relation between trade liberalization and growth. We also discuss the problem of aggregation of the units of investigation based on Cavallo, Galiani, Noy, and Pantano (2013).

2.1. The synthetic control method

Consider a panel of $I_C + 1$ countries over T periods, where country I changes its trade policy at time $T_0 < T$, while all the other countries of I_C remain closed to international trade, thus

[2] In fact, Owen and Wu pooled together developed and developing countries in the same fixed effects regression. In so doing, as an effect of the Preston curve (see Preston, 1975) in the relation between health and income, the probability that the parallel assumption inherent in fixed effects model is violated, appears high in this context.

[3] See Ryan, Burgess, and Dimick (2015) for an in depth discussion about the plausibility of the parallel assumption of the difference-in-difference (DiD) estimator, and Kreif et al. (2016) for a comparison of DiD with the synthetic control method in the context of health policy.