The causal effect of free trade for the world's poorest countries

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***Abstract* - We apply a quasi-experimental situation in Switzerland to estimate the causal effect of an improved market access for Least Developed Countries on Swiss' agro-food imports using the Synthetic Control Group Method in combination with Difference-in-Differences analysis. We found out that the average annual causal treatment effect on preferential agro-food exports for an average Least Developed Country is about 800'000 Swiss franc.**

CONTEXT

One of the three main elements of Free Trade Agreements (FTAs) is to improve market access by removing customs duties on goods and restrictions on services (European Commission, 2014). Naturally, policy makers and the society are interested in the potential economic consequences of trade liberalization. However, the seemingly easy question of how much removing customs duties actually increases international trade is plagued by selection issues because countries select themselves into FTAs. We apply a quasi-experimental situation in Switzerland to estimate the causal effect of an improved market access on Swiss' agro-food imports. Switzerland grants unilateral and non-reciprocal preferential market access for Least Developed Countries (LDCs) and Developing Countries (DCs) within the framework of the Generalized System of Preferences (GSP). Since April 1st 2007 Switzerland grants a complete duty-free and quota-free (DFQF) market access for LDCs which is similar to the European Unions' Everything but Arms (EBA) arrangement, whereas the market access for DCs has not been altered (SCA, 2007). We argue that the unilateral and non-reciprocal DFQF market access for LDCs is determined exogenously and therefore can be treated as a quasi- experiment.

RESEARCH QUESTION, STATE OF RESEARCH AND METHOD

We estimate the causal effect of a trade liberalization on Swiss' agro-food imports. In particular we want to investigate to which extent the DFQF market access in 2007 has caused preferential agro-food exports of the LDCs to increase.

The issues of estimating the causal effect of FTAs are stressed in the related literature but are in general neglected in the analysis. To our knowledge Baier and Bergstrand (2009) are the first ones who provide empirical evidence for the causal effect of FTAs. The authors apply matching techniques to estimate the causal effect of FTAs on bilateral trade flows. Similar to Baier and Bergstrand (2009), Magrini et al. (2013) estimate the causal effect of trade preferences granted by the EU to Southern Mediterranean States by means of matching techniques.
While these studies take into consideration the selection bias mainly by using matching techniques, we go one step further by applying methods of causal inference in a quasi-experimental setup.

The main idea of the causal inference is based on the concept of the counterfactual state (Rubin, 1974). In our case study the counterfactual state is the size of the preferential exports of the LDCs if Switzerland would *not* have improved market access for LDCs. The gap between the factual and counterfactual state is the causal effect of the GSP reform in 2007. Since the counterfactual state can never be observed, we instead analyze the gap of the preferential exports between countries which had been affected by the intervention (LDCs) and those countries, which had not been affected by the intervention (DCs). Basically, this gap contains a selection bias. In a randomized and controlled study the allocation of the intervention according to the random principle eliminates the selection bias. In our case study we investigate a quasi-experiment: the GSP reform in 2007. We argue that the GSP reform in 2007 was given exogenous for the market players. In other words: the countries did not select themselves into the status of a LDC or DC at the time of the GSP reform in 2007.

Thus the setup of the GSP reform solves the selection problem. The comparison of the preferential exports of the LDCs (treatment group) with them of the DCs (control group) should be able to identify the causal effect of the GSP reform.
To quantify the causal effect of the GSP reform in 2007, we apply a DiD-analysis. The DiD-analysis can be formalized as an econometric model:

$$Y = \beta_0 + \beta_1 D^{post} + \beta_2 D^T + \beta_3 D^{post} x D^T + \varepsilon \qquad (1)$$

Where Y represents the aggregated annual preferential trade flows. D^{post} is a time related dummy variable which takes the value of one for the years after the intervention, and zero otherwise. D^T is a treatment group dummy variable that takes the value of one in case of the LDCs, and zero in case of the synthetic control group. $D^{post} x D^T$ is a multiplicative

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interaction term. Therefore β_3 is the DiD-estimator which allows us to quantify the average annual causal effect of the GSP reform in 2007. ε represents the residual term for unobserved characteristics of a country-group at time *t*. This term is assumed to fulfil the zero conditional mean assumption.

The DiD method compares the preferential exports of the LDCs to Switzerland before and after the GSP reform with them of the DCs. The gap between the preferential exports before and after the GSP reform eliminates group-specific factors which are constant over time (e.g. geographical characteristics). The difference of the differences eliminates time effects to which both groups are exposed (e.g. financial and food crisis in 2008) and thus, isolates the causal effect of the GSP reform. A well-defined control group (DCs) does not differ from the treatment group (LDCs) in all aspects other than the absence of the treatment. To ensure that both groups do not differ significantly from each other in their observable characteristics, we apply the method of synthetic control groups (Abadie and Gardeazabal, 2003). By means of this method we construct a synthetic control group, which is based on DCs and which does not differ significantly in their observable characteristics from the treatment group (LDCs) before the intervention. The observable characteristics were chosen based on the following three LDC-status criteria: Gross National Income per capita, Economic Vulnerability Index and Human Assets Index (UN-CDP, 2014).

RESULTS AND CONCLUSIONS

Figure 1 shows the development of the preferential exports of the LDCs (treatment group) and the synthetic control group to Switzerland.

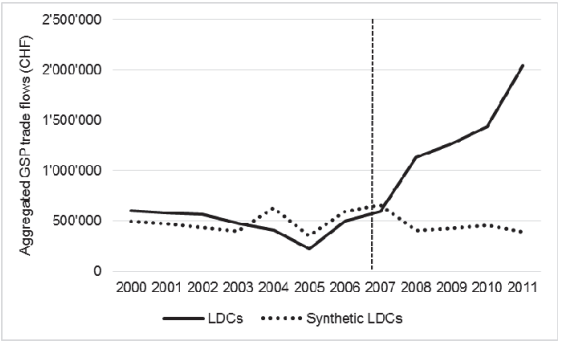

Figure 1. Development of preferential agro-food exports of the LDCs and the synthetic control group.

The preferential exports of the LDCs are in tendency decreasing until 2005. From 2005 on the preferential exports of the LDCs increase constantly until the end of our observation period in 2011. A steeper increase of the preferential exports of the LDCs can be observed with the beginning of the GSP reform in 2007. Though, the gap of the preferential exports of the LDCs and the synthetic control group in 2007 is negative, from 2008 till 2011 the gap of the preferential exports between the LDCs and the synthetic control group is positive. In contrast, the preferential exports of the synthetic control group are relative constant over our observation period and seem to follow a similar trend than those of the treatment group before the GSP reform in 2007.

Table 1 presents results for the DiD regression estimation of equation (1) Ordinary Least Squares (OLS).

Table 1. Results for the DiD-analysis based on the synthetic control group dataset (robust standard errors in parentheses; *** denotes significance at 1% level, ** at 5% level and * at 10% level).

Independent Variable	**OLS**
$\mathbf{D^T \times D^{post}}$	826'000*** (242'596)
$\mathbf{D^T}$	-25.00 (64'000)
$\mathbf{D^{post}}$	-13'000 (62'000)
_cons	483'000*** (39'000)
$\boldsymbol{R^2}$	*0.669*
No obs	*24*

Looking at the estimator of interest β_3 the multiplicative interaction term shows a positive average annual causal effect of the GSP reform in the amount of 800'000 Swiss franc. In other words: If the DFQF market access in 2007 would not have been granted to the LDCs, the average annual preferential exports for an average LDC would have been about 800'000 Swiss franc lower. The positive effect of the GSP reform is statistically significant at the 1% level. In sum, we are able to provide an unbiased and consistent estimate of trade liberalization on imports – something that has been lacking in the literature so far.

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