

Extended Abstract

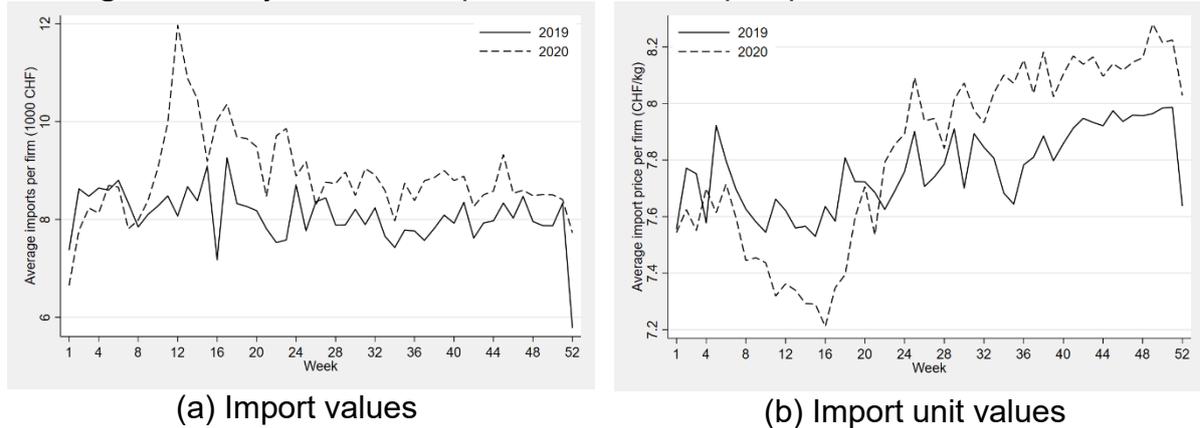
Paper/Poster Title	COVID-19, agricultural trade and import prices: evidence from weekly firm-level data
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Abstract prepared for presentation at the 96th Annual Conference of the Agricultural Economics Society, K U Leuven, Belgium

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Abstract	200 words max
<p>A rapidly growing body of scientific literature examines the impacts of COVID-19 on trade values. Yet, all existing works have used country-level data on a monthly basis. However, the effect of the corona pandemic may affect firms differently. The assumption of a representative firm in this aggregate country analyses imply that they miss the heterogeneous effects across firms within a country. Furthermore, existing works have only focused on the direct trade effects of the pandemic ignoring in large part the import price effect. In this paper, we use weekly firm-level import data to analyze the effect of COVID-19 incident rates on firm-level import values and prices. For this purpose, we estimate structural gravity models and linear models that exploit the within-firm-product variation. In general, we estimate that COVID-19 reduced agricultural trade by 0.5% - 0.7%, and increased agricultural import prices by 0.1% at the firm-product level.</p>	
Keywords	COVID-19; Food prices; Imports; Switzerland; Firms
JEL Code	F14; Q17; Q18
Introduction	100 – 250 words
<p>Global agricultural trade in 2020 was described as resilient to the impacts of the COVID-19 pandemic. However, the size and channels of its quantitative impacts at the firm level are not yet clear. This is important because while countries as an aggregate may have survived the pandemic, this is not necessarily the case for individual firms. Secondly, COVID-19 incident rates occur daily yet publicly available trade data are only available on a monthly basis. This means existing studies exploit the pandemic incident rates at a more aggregated monthly level. Our work is thus novel in two ways: (i) we provide the first ex-post quantitative analysis of the COVID-19 and trade effect at the firm-level (ii) using trade and COVID data on a weekly basis.</p> <p>For this purpose, we use Switzerland as a case study. Switzerland has a low food self-sufficiency ratio of approximately 60%, and is therefore highly dependent on agro-food imports. To depict observed trade patterns prior to and during the pandemic, Figure 1 shows weekly firm-level import values and import prices in Switzerland. In both cases, average values in 2020 are mostly higher than in 2019. In this paper, we assess the role that the COVID-19 pandemic played in the patterns we observe. Empirically, we estimate structural gravity models that regress trade values or unit values on COVID-19 incident rates, and a host of multi-way fixed effects. We find that the pandemic had a negative effect on trade values and a positive effect on import prices.</p>	

Fig. 1: Weekly firm-level import values and import prices in 2019 and 2020



Methodology

100 – 250 words

For the empirical analysis, we estimate the following baseline equation:

$$\log X_{fopwt} = \beta_0 + \beta_1 \log \text{Covid19}_{owt} + \theta_{fpwt} + \lambda_{opt} + \varepsilon_{fopwt} \quad (1)$$

where X is a measure of the import values in CHF or unit values in CHF/kg of firm f importing from origin o of HS8 digit product p in week w of year t ($t = 2019, 2020$). Our variable of interest is the severity of COVID-19 cases measured either as the cumulative number of (i) confirmed cases or (ii) deaths reported in exporting country o in week w in 2020. θ_{fpwt} are firm-product-week-year fixed effects which control for all observable and unobservable firm-specific effects such as firm size and productivity. By including this term, our analysis exploits the within-firm-product variation in our dataset. We cluster the error terms at the firm-product-origin level. The parameter β_1 in equation (1) is the coefficient of interest. It measures the effect of an additional COVID-19 case or death in the exporting country on import values and the import prices paid by Swiss agro-food firms. We estimate equation (1) using ordinary least squares (OLS). However, for the trade effect, we will also use the PPML estimator as a robustness check.

To test our hypotheses, we use daily firm-level import data on Swiss agricultural and food importing firms in 2019 and 2020. The data comes from transaction-level declarations filed by importing firms with the customs in Switzerland. It contains information on HS8-digit product codes, import values in Swiss Francs (CHF), trade volumes in kilograms, import destinations, and date for every shipment within the HS01 to HS24 category. COVID-19 indicators are assessed from an online database maintained by the Johns Hopkins University (<https://github.com/CSSEGISandData/COVID-19>).

(Preliminary) Results**100 – 250 words**

The estimation results are in Table 1. The columns differ in either the dependent variables (i.e., import values and unit values), the estimator (i.e., OLS or PPML), or the measure of COVID19 incident rate (i.e., cases per million or deaths per million). In columns (1) – (4), we estimate structural gravity models that regress COVID-19 incident rates on trade values. In Columns (5) and (6) the dependent variable is firm-level import unit values. In all cases, our coefficient estimates are elasticities. Our findings show that a 10% increase in the number of COVID-19 cases and COVID-19 deaths decreased firm-level imports by 0.05% and 0.07%, respectively. The estimates from the PPML are similar to those in the OLS but are smaller in magnitude. On unit values, a 10% increase in COVID-19 cases or deaths increase firm-level prices by 0.01%. To put these magnitudes in perspective, the average firm imports a value of CHF 8501 per week with a CIF unit value of 7.84 CHF/kg. Thus, a doubling of COVID-19 incident rates in the producing country decreases Swiss firm-level imports by about 595 CHF per week and increases import prices by 0.08 CHF/kg per week.

Table 1: The effect of COVID-19 on firm-level import values and unit values

	Import values				Unit values	
	(1)	(2)	(3)	(4)	(5)	(6)
log Covid cases pm_{owt}	-0.005*** (0.001)		-0.003*** (0.001)		0.000 (0.000)	
log Covid deaths pm_{owt}		-0.007*** (0.001)		-0.002** (0.001)		0.001* (0.000)
Firm-product-week FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin-product-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	978409	978409	978409	978409	827297	827297
Estimator	OLS	OLS	PPML	PPML	OLS	OLS

Notes: Standard errors in parentheses are clustered at the firm-product-origin levels. ***, **, * denote statistical significance at 1%, 5% and 10% respectively. The dependent variable in model variants (1) – (4) are trade values. The dependent variable in model variants (5) – (6) are unit values. Constants included but not reported. The PPML is estimated on a non-zero sample.

Discussion and Conclusion**100 – 250 words**

The agricultural and food sector is highly integrated into the global economy. As a result, the sector is not immune to shocks to the global economy. In this paper, we assess the resilience or otherwise of agricultural imports to the COVID-19 pandemic. We use Switzerland as a case study given that it is a small open economy that is heavily dependent on food imports. Our contributions are two folds: we contribute the first set of firm-level analysis of the pandemic effect on trade and our weekly analysis uses data a frequency higher than existing works. Estimating structural gravity equations, we find that COVID-19 negatively affected the import values of Swiss agro-food firms while also increasing the average prices (i.e., unit values) that firms pay for their imports. What mechanisms explain the effects we observe? Trade costs significantly increased in 2020 due to the COVID-19 pandemic. Major sources of increased trade costs inter alia (i) transport and travel restrictions, (ii) trade policy barriers and regulatory differences, (iii) uncertainty and risk aversion, explain our findings.

Going forward, we seek to focus our analysis on specific sub-sectors of the agricultural sector and explore the heterogeneity of our results to firms of different sizes.