Received: 16 January 2025 | Accepted: 31 October 2025

DOI: 10.1111/ajae.70030

ARTICLE

Global agricultural value chains and food prices

Bernhard Dalheimer[1] | **Marc F. Bellemare**[2]

[1]Department of Agricultural Economics, Purdue University, West Lafayette, Indiana, USA

[2]Department of Applied Economics, University of Minnesota, Saint Paul, Minnesota, USA

Correspondence
Bernhard Dalheimer, Department of Agricultural Economics, Purdue University, West Lafayette, IN, USA.
Email: bdalheim@purdue.edu

Funding information
DFG, Grant/Award Number: 509105465.; USDA National Institute of Food and Agriculture, Grant/Award Number: MIN-14-184

Abstract
We study the relationship between the extent of participation in global agricultural value chains (GAVCs) and food prices at the country level. Using longitudinal data on a sample of 138 countries for the period 2000–2015 and a shift-share instrumental variable design, we study how the extent of a country's participation in GAVCs in a given year relates to food price levels and volatility in that same country and in the same year. We document a mean–variance trade-off, finding that on average, participation in GAVCs is associated with a decrease in consumer food price levels but an increase in food price volatility. Looking at a country's upstream (i.e., closer to producers) or downstream (i.e., closer to consumers) positioning in GAVCs, we find that food price volatility is associated more strongly with downstream participation than with upstream participation.

KEYWORDS
agricultural value chains, food prices, global value chains, price risk, price volatility

JEL CLASSIFICATION
F14, Q17, O19, E31

1 | INTRODUCTION

In recent years, some of the emergencies induced by the global COVID-19 pandemic and the Russian attack on Ukraine seemed to be amplified by historically high degrees of market integration and participation in global value chains (GVCs). In 2022, Ukraine was not able to ship wheat out because of the Russian blockade on the Black Sea, and worries about a stark global supply shock led to surging prices on global grain markets. That same year, a COVID cluster in the port of Los Angeles put many stevedores out of commission and led to backed-up supply chains on the import side for a few weeks.

Given that, it is natural to ask: Do longer GVCs and a greater dependence on international trade mean more or less exposure to global shocks? A substantial body of literature, both theoretical and empirical, shows that trade reduces long-term consumer prices in both exporting and importing regions—those gains from trade are well-known—and helps reduce price volatility because of the buffering function of trade (e.g., Alessandria et al., 2021; Solingen et al., 2021; Sposi et al., 2021; Melitz & Redding, 2014; Arkolakis et al., 2012). But another strand of theoretical (e.g., Batra & Russell, 1974; Feder et al., 1977; Newbery & Stiglitz, 1984; Turnovsky, 1974) and empirical (e.g., Appelbaum, 1998; Novy & Taylor, 2020) literature argues that trade can fuel domestic price uncertainty, emphasizing the exposure-increasing effect.[1] Thus, while the effects of international trade on exposure to global shocks are likely to be country- and commodity-specific, whether trade increases or decreases price volatility overall remains an empirical question.

Using country-level aggregate data on 138 countries for the period 2000–2015, we study the relationship between country-level participation in global agricultural value chains (GAVCs) and food prices—both food price levels and food price volatility, or respectively the mean and the variance of the food price distribution in each country year.

To do so, we focus on the agricultural and food sectors because food is (i) a necessity, (ii) traded by all countries, (iii) often perishable or with limited storage potential, and (iv) the subject of widely available data.[2]

For our analysis, we rely on data from FAOSTAT for food prices and from the Eora database for GAVC participation. We calculate annual within-country real food price levels and the coefficient of variation of consumer food price indices as measures of the first and second moments of the food price distribution—food price levels and food price volatility, respectively.

Our empirical strategy exploits the longitudinal nature of the data and further adopts a shift-share instrumental variable to examine the relationship between the extent of participation in GAVCs by a given country in a given year and food price levels and volatility in the same country-year. This allows studying (i) the overall relationship between participation in GAVCs and food prices, but also (ii) the relationship between different types of GAVC positioning (i.e., upstream or downstream) and food prices, and (iii) how those relationships vary among groups of countries (i.e., low-, lower middle-, upper middle-, and high-income countries) and regions (i.e., East Asia and the Pacific, Eastern and Central Africa, Latin America and the Caribbean, the Middle East and North Africa, and sub-Saharan Africa).[3]

Three distinct findings emerge from our analysis. First, and unsurprisingly, we find that participation in GAVCs is associated with lower food prices in our full sample. This is consistent across the upstream or downstream nature of GAVC participation, across regions, and across income groups. Second, participation in GAVCs is associated with higher food price volatility,[4] a finding driven by upper middle-income countries, perhaps because they are developed enough to participate extensively in global trading networks, but not developed enough to have the myriad of volatility-mitigating policies found in high-income countries. Third, countries with agri-food sectors that are more downstream (i.e., activities closer to consumers such as food processing) in nature are much more likely to see lower food price levels.

Our contribution is thus fivefold. First, while previous theoretical contributions (Batra & Russell, 1974; Feder et al., 1977; Newbery & Stiglitz, 1984; Turnovsky, 1974) suggest that trade and market instability may correlate both negatively or positively, there are only a few empirical

[1]For the remainder of this paper, we use the terms "price volatility" and "price uncertainty" interchangeably to denote unexpected departures from the mean of the food price distribution. In practice, we use the coefficient of variation of the food price distribution (i.e., the standard deviation divided by the mean food price in a given country-year) to measure food price volatility.

[2]While the recent literature has referred to the two sectors—agriculture on the one hand, and food and beverages on the other hand—combined as "agri-food" (Barrett et al., 2022), we use "agricultural value chains" to refer to value chains encompassing both sectors.

[3]The literature also uses "backward linkages" to discuss upstream activities in a value chain and "forward linkages" to discuss downstream activities in a value chain. We opt for the simpler and more intuitive upstream–downstream terminology, which we use in lieu of the backward–forward linkages terminology for the remainder of this paper.

[4]As one reviewer noted, there is a difference between (i) volatility that can be addressed by consumers, producers, and policy makers (i.e., akin to insurable risk), and (ii) volatility that cannot be addressed (i.e., akin to basis risk). While that is undeniably true, our focus here is on documenting that greater participation in GAVCs is associated with increases in food price volatility. How much of those increases are insurable versus basis risk is beyond the scope of this paper.

applications in the trade uncertainty literature. Allen and Atkin (2022), for instance, find trade-offs between farm income and price volatility and trade openness in rural India. Our approach documents a similar finding at the country level, highlighting that these trade-offs are markedly different between lower- and higher-income countries.

Second, while previous applied work on trade and uncertainty focuses on aggregated trade flow levels (e.g., Appelbaum & Kohli, 1997; Novy & Taylor, 2020), we conduct a more granular empirical analysis by using data at the country level to assess the relationship between global sourcing and country-level food prices.

Third, we add to an emerging body of literature on GVCs in the agricultural and food sectors (Balié et al., 2019; Fiankor et al., 2024; Lim & Kim, 2022; Montalbano & Nenci, 2022; Ndubuisi & Owusu, 2021; Van den Broeck et al., 2017).

Fourth, because our application uses data on food and agriculture, we add to the literature on trade policy and food market stability (Anderson et al., 2013; Berger et al., 2021; Dalheimer et al., 2021; Gouel, 2016; Jayne et al., 2006; Josling & Tangermann, 1999; Kiloes et al., 2024; Larch et al., 2024; Luckstead, 2024; Pieters & Swinnen, 2016; Rude & An, 2015).

Fifth, and finally, while the agricultural economics literature on agri-food value chains has more often than not focused on studying smallholder farmers (Barrett et al., 2022; Bellemare & Bloem, 2018), we look at global agricultural value chains, that is, at agricultural value chains at the country level, and through the lens of international trade. This is especially important given existing limitations to the study of agri-food value chains at the micro level (Posey et al., 2024).

The remainder of this paper proceeds as follows. Section 2 presents our empirical framework, discussing in turn the details of our estimation and identification strategies. In Section 3, we present the data we use in our empirical analysis, whose results we present in Section 4 along with the results of a number of robustness checks. Section 5 discusses the potential mechanisms behind our findings and the policy implications of our results. We summarize and offer concluding remarks in Section 6.

2 | EMPIRICAL FRAMEWORK

Our aim is not to structurally estimate a full input–output model of GAVCs under risk. Rather, we use the tools of causal inference (i.e., a reduced-form approach) to provide an empirical characterization of the association between (i) GAVC participation and food price levels, and (ii) GAVC participation and food price volatility. The reader interested in theoretical work should consult for instance Allen and Atkin (2022), Baqaee and Farhi (2024), and Elliott et al. (2022), who offer theoretical insights on how price shocks propagate through international input–output networks. In essence, openness to international trade reduces the correlation between domestic agricultural productivity shocks and country-level prices but exposes those same country-level prices to international idiosyncratic shocks (Allen & Atkin, 2022). These linkages are amplified and propagate upwards and downwards as well as horizontally across the multiple locations of the production process across multiple countries, driven by supply and demand shocks (Baqaee & Farhi, 2024).

In what follows, we first discuss the estimation strategy we adopt to study the link between participation in GAVCs and food prices. We then turn to the identification strategy we rely on to mitigate the bias stemming from the endogeneity of the relationship between participation in GAVCs and food prices, either their level or their volatility.

2.1 | Estimation strategy

We estimate the relationship between the extent of participation in GAVCs by a country in a given year and (i) food price levels as well as (ii) volatility in the same country-year. To do so, we estimate the following baseline equation:

$$\Delta p_{it} = \beta_1 \Delta GAVC_{it} + \gamma_1' \Delta X_{it} + \eta_{1t} + e_{1it}, \tag{1}$$

where p_{it} is the real consumer price level for food in county i in year t, $GAVC_{it}$ is the extent of GAVC participation by the same country in the same year, and X_{it} is a vector of control variables that includes the time-variant country-level characteristics listed in Appendix Table A1. We also include year fixed effects η_t to control for shocks affecting all countries in each given year. Lastly, e_{1it} is an error term with mean zero.

In this case, the parameter of interest is β_1 which, in Equation (1), captures the association between participation in GAVCs and the real food price level. We estimate Equation (1) by first-differencing for two reasons. First, as suggested by Christian and Barrett (2024), we do so to avoid spurious results stemming from serially correlated errors when using an instrumental-variable design with longitudinal data. Second, because Millimet and Bellemare (2025) have shown the first differences estimator to be less biased than the fixed effects estimator under broad circumstances with longer panel data sets.

Similarly, to estimate the relationship between participation in GAVCs and food price volatility at the country-year level, we estimate the following equation

$$\Delta CV_{it}^{p} = \beta_2 \Delta GAVC_{it} + \gamma_2' \Delta X_{it} + \eta_{2t} + e_{2it}, \tag{2}$$

where CV_{it}^{p} is the within-year coefficient of variation of monthly prices calculated as the mean-normalized standard deviation in a given year t (i.e., $CV_{it}^{p} = \frac{\sigma_{it}^{p}}{\mu_{it}^{p}}$), which we use as our measure of price volatility, and every other variable is as in Equation (1).

Here, the parameter of interest is β_2, which captures the relationship between participation in GAVCs and food price volatility in Equation (2). Again, we estimate Equation (2) by first differencing, for the same reasons as above.

The hypothesis tests of interest have to do with β_1 and β_2, and respectively test the null hypothesis $H_0: \beta_1 = 0$ against the alternative hypothesis $H_A: \beta_1 \neq 0$, and the null hypothesis $H_0: \beta_2 = 0$ against the alternative hypothesis $H_A: \beta_2 \neq 0$.

Our empirical specifications assume linear relationships because we are interested in the relationship between participation in GAVCs and food prices, either food price levels or volatility. Given that, linear regressions are sufficient, and there is no need to model potential nonlinearities. In other words, following the logic of causal inference methods, if all of the backdoor paths are blocked, the coefficient of interest is nonparametrically identified, meaning that the precise functional form does not matter. In yet other words, even $Y = f(X)$ is in theory nonlinear, $E(Y|X)$ will still return an unbiased coefficient for the average effect if that coefficient is identified. This is consistent with the approach used in counterfactual simulations by Aichele and Heiland (2018). As in their framework, the core mechanism is the amplification of trade shocks through production networks, which we test directly with reduced-form methods by associating GAVC intensity with observed volatility outcomes.

Although our baseline estimation strategy helps to account for potential sources of endogeneity by means of first differences, year-fixed effects, and a number of control variables, participation in GAVCs likely remains endogenous to both food price levels and food price volatility. In the next section, we explain the identification strategy we adopt in an effort to reduce bias in the relationship between participation in GAVCs and food prices.[5]

2.2 | Identification strategy

When analyzing the impact of trade on food prices, endogeneity poses a significant challenge. One issue could be reverse causation, where changes in food prices influence trade patterns instead of

[5]Because the first-difference estimator also differences out the error term, it takes care of serial correlation in the error term, and so we do not cluster standard errors since in that case, clustering would generate standard errors that are too conservative.

being solely driven by them. For instance, rising food prices in a country might lead to higher imports to meet demand, creating a feedback loop between trade and prices that complicates causal inference.

Omitted variables present another problem, as external factors like extreme weather events, economic policies, or political instability can simultaneously affect both trade volumes and food prices. For example, a natural disaster in an exporting region may disrupt trade while also driving up global prices. Ignoring such variables could result in misleading estimates of the trade–price relationship.

Finally, data limitations and structural market features can introduce additional biases. Inaccuracies in trade or price data, along with complexities such as market concentration or price-setting behaviors, can obscure the true effects. One specific concern in our analysis is potential measurement error in the construction of our GAVC indicators, which we derive from the Eora database. In countries without official input–output tables, Eora constructs proxy IO matrices using macroeconomic data and templates from major economies. Countries that do not provide official input–output tables might also experience higher food price volatility giving rise to non-classical measurement error. Moreover, the proportionality and production assumptions in Eora likely understate sectoral and firm-level variation in trade structure, introducing another source of measurement error.

Against that backdrop, our empirical strategy mitigates the risk of biased inference in two key ways. First, by estimating the model in first differences, we address time-invariant unobserved confounders and eliminate time-invariant measurement error tied to stable national accounting practices for each pair of consecutive years for each country. Per Millimet and Bellemare (2025), this is better than the practice of incorporating country fixed effects for the whole period, which assumes that unobserved heterogeneity is time-invariant for long periods of time.

Second, to mitigate the remaining bias, which stems from time-variant unobserved confounders and from time-variance measurement error as sources of endogeneity in the relationship between participation in GAVCs and food prices, we use a shift-share instrumental variable (SSIV) or Bartik IV design (Bartik, 1991). Bartik SSIV designs help mitigate endogeneity concerns in panel-data settings with unit and time fixed effects. These designs draw on the sub-dimension (here, country) specific measure of exposure at a given point in time (i.e., the "share") and the overall variation in a sub-dimension specific variable over time (i.e., the "shift") to predict treatment variation.[6]

Our research design thus decomposes country-level participation in GAVCs into sub-dimensions of the two sectors we study, viz. agriculture as well as food and beverages, the former pertaining to activities closer to raw materials, the latter pertaining to value generation at the processing stage. We thus exploit the identity whereby shocks to GAVCs are the sum of individual country- and sector-level shocks. To do so, we modify Equations (1) and (2) by using the SSIV to instrument for $GAVC_{it}$. Our SSIV is such that

$$\widehat{GAVC}_{it} = \frac{1}{exp_{it}} \sum_{k} \left(\omega_{ik,1999} \times g_{kt} \right), \tag{3}$$

where $\frac{1}{exp_{it}}$ weights the instrument by gross exports from country i at year t. The variable $\omega_{ik,1999}$ represents the initial sector-specific share ($\omega_{ik,1999} \geq 0$), which defines the exposure of each observation i to global shocks in sector g_{kt}. It is calculated as the ratio of sector-specific GAVC for observation i to the sum of GAVC across all observations in 1999, that is, $\omega_{ik,1999} = \frac{GAVC_{ik,1999}}{GAVC_{k,1999}}$. This value represents the share of the sector's contribution by country i within the total GAVC.

Regarding the validity of our IV, Goldsmith-Pinkham et al. (2020) show that the Bartik IV can be expressed as a GMM estimator where the shares are used as instrumental variables. We argue that dynamics at the global level in the *Agriculture* and the *Food and Beverages* sectors are exogenous to

[6]See Borusyak et al. (2022) and Goldsmith-Pinkham et al. (2020) for a review of the Bartik IV and SSIV methods. For notable examples of its application, see Card (2009); Autor et al. (2013); David et al. (2013); Nakamura and Steinsson (2014); Acemoglu and Restrepo (2020).

country-level prices and GAVC participation. Yet, endogenous shares could compromise the validity of the instrument in case the variation in global shifts is not sufficient. The initial global distribution of agricultural as well as food and beverages sectors is driven by climate, soil quality, land availability, and other natural endowments that are exogenous to future food prices and sector developments. Brazil, for instance, is relatively more exposed to GAVC participation in the agricultural sector (e.g., ethanol) because of its relative abundance of arable land, which helps it attract processing industries for grain and oilseed crops. Conversely, Switzerland is relatively more exposed to GAVC participation in the food and beverages sector because of its relative scarcity of arable land, favoring processing industries with low land intensity (e.g., confectionery, cheese). In the Appendix, we show that the sector shares are independent from a host of observable confounders, supporting the validity of this instrument.

3 | DATA

We use data on the extent of participation in GAVCs, food prices, and control variables for 138 countries for the period 2000–2015. The data come from three sources. Data on GAVCs come from the Eora Global Value Chain Database. Consumer food prices come from FAOSTAT; to obtain real food price levels by country and compute the coefficient of variation of food prices by year, we multiply these indices by purchasing power parity exchange rates obtained from the World Development Indicators (WDI) database. Our control variables also come from the WDI database.

3.1 | Global agricultural value chains

The Eora multi-region input–output (MRIO) database offers country-level tracking of participation in GVCs for 26 sectoral classifications for the period 2000–2015. Using an MRIO table, it provides national estimates of value-added in trade (Casella et al., 2019).[7] Borin and Mancini (2019) use MRIO tables to construct GVC participation data, capturing all sources of value-added activities across multiple countries. In doing so, they introduce an empirical method to extract value-added exports from gross exports, allowing researchers to account for each value-added activity using cross-country input–output data.[8]

The foregoing allows measuring participation in GAVCs across countries. The data developed by Borin and Mancini (2019) provide an important advantage compared to other country-level GVC data sources, such as the Trade in Value Added (TiVA) data set and the World Input–Output Database, which only cover a subset of high-income countries. The Eora MRIO data set offers coverage of the largest number of countries compared to other data sets. For example, the TiVA data set covers 64 countries and the World Input–Output Database covers 43 countries, respectively. Moreover, the data allow decomposing GVC participation into upstream and downstream linkages.

More specifically, gross exports can be disaggregated into three primary value-added activities: domestic value-added (DVA), foreign value-added (FVA), and domestic value-added embedded in exports from other countries (DVX) (Belotti et al., 2020; Koopman et al., 2014; Los & Timmer, 2018; Wang et al., 2017). The variable DVA represents the value of a country's exports that is generated by domestic production factors that contribute to its GDP. The variable FVA refers to the value of a country's exports that originate from imported inputs, or the use of imported intermediate inputs in the production process of exported products. Thus, FVA serves as a measure of upstream GAVC positioning within the production network. Lastly, DVX signifies the domestic value-added in intermediate goods that are further reexported by a trading partner country. It represents exported raw

[7]MRIO tables provide a comprehensive overview of all value-added activities across industries within a country that participate in global production (Hummels et al., 2001; Johnson, 2018; Johnson & Noguera, 2012). This distinguishes them from national input–output account data, which primarily depict value chain linkages within industries confined to a country's boundaries.

[8]For similar analytical frameworks that have been developed to measure intermediate sourcing contributions of countries and sectors in GVC network, see Koopman et al. (2014); Los and Timmer (2018); Wang et al. (2017).

materials that are subsequently used in another country and then exported again to a third country, and thus measures downstream GAVC positioning.

We follow Borin and Mancini (2019), where these three value-added activities yield our GAVC participation measure for country i in year t:

$$GAVC_{it} = \frac{DVX_{it} + FVA_{it}}{Gross\ Export_{it}}. \tag{4}$$

We use the "Agriculture and Fishing" classification to assess participation in agricultural-sector GVCs and the "Food and Beverage" classification to measure participation in food-sector GVCs, respectively. The agricultural sector encompasses production related to agriculture, hunting, forestry, and fishing, as defined by the International Standard Industrial Classification, Rev. 3, divisions 01, 02, and 05. The food sector encompasses activities related to food and beverages, as specified by ISIC, Rev. 3, divisions 15 and 16.

By incorporating both the agricultural and food sectors, we construct a comprehensive measure of (total) participation in GAVCs, defined as

$$GAVC_{it}^{Total} = \frac{DVX_{it}^{agr} + DVX_{it}^{food} + FVA_{it}^{agr} + FVA_{it}^{food}}{Gross\ Export_{it}^{agr} + Gross\ Export_{it}^{food}}, \tag{5}$$

where *agr* and *food* respectively denote the agriculture and food and beverage industries.

Lastly, we measure upstream participation, $\frac{FVA_{it}^{j}}{Gross\ Export_{it}^{j}}$, and downstream participation, $\frac{DVX_{it}^{j}}{Gross\ Export_{it}^{j}}$, where $j \in \{agr, food\}$. The range of all GVC participation is between 0 and 100. Again, we do this for 138 countries for the period 2000–2015.[9]

3.2 | Food prices

Food price data are obtained from the FAOSTAT monthly food consumer price index database.[10] The FAOSTAT monthly food CPI data capture the change in the cost of food overall over time (i.e., annual year-over-year inflation relative to the corresponding month of the previous year). The FAO food CPI data set contains a complete set of time series from January 2001 to December 2015 which matches the span of our GAVC data.

To obtain real food price levels, we weigh the food price data with PPP exchange rates from the WDI database. We measure the annual food price level by averaging the monthly food price levels in a year. For the price variability measure, we calculate the coefficient of variation (CV) of monthly consumer food price indices in a calendar year.

3.3 | Control variables

We include an extensive set of country-level, time-varying covariates to control for (i) features of the agricultural sector, (ii) socio-economic conditions, (iii) demographic conditions, and (iv) trade policy.[11] For the first three categories, we use data from the WDI database, spanning the period 2000–2015. For trade policy variables, we use Mario Larch's Regional Trade Agreements Database which

[9] We exclude 47 countries from the UNCTAD-Eora dataset due to inadequate GVC data availability and a significant absence of national employment data from the WDI database.

[10] Data are from https://www.fao.org/faostat/en/#data/CP.

[11] A potential confounding factor is exchange rate policy; Kim and Park (2023) for instance show that changes in real effective exchange rates (REER) can affect GVCs. Exchange rate policy is unlikely to affect our estimates because our measure of food prices is in PPP terms. In the Appendix, we test the robustness of our results by including REER as a control variable, using data from the World Bank's Global Economic Monitor.

includes all multilateral and bilateral regional trade agreements as notified to the World Trade Organization (WTO) from 1950 to 2019 (Egger & Larch, 2008). Appendix Table A1 provides detailed descriptions of all variables included in our empirical analysis.

4 | RESULTS

We first present results for Equations (1) and (2) and a number of robustness checks on those core results. We then present results by sector and by type of GAVC positioning (i.e., upstream or downstream) before presenting results that explore treatment heterogeneity by region and by income level.

4.1 | Baseline

Table 1 shows estimation results for Equation (1). We find evidence that increased participation in GAVCs is associated with lower real food prices—a relationship that is robust to including control variables as well as to instrumenting participation in GAVCs with our shift-share variable. In terms of economic significance, the estimated coefficients imply that a 1 percentage point increase in the extent of participation in GAVCs is associated with a decrease in real food prices of about 2–7 percentage points.

Table 2 shows estimation results for Equation (2). Here, we find evidence that increased participation in GAVCs is associated with more price volatility once the endogeneity of participation in GAVCs is dealt with using our SSIV. In terms of economic significance, the estimated coefficient implies that a 1 percentage point increase in participation in GAVCs is associated with an increase in food price volatility of about 0.35 percentage points.

The association between participation in GAVCs and lower food prices is in line with the trade and GVC literatures and constitutes additional evidence in favor of the gains from trade hypothesis (Alessandria et al., 2021; Antràs, 2020; Antràs & de Gortari, 2020; Arkolakis et al., 2012; Melitz & Redding, 2014). Moreover, the magnitude of the association is reasonable considering real food price differentials among countries. For instance, in high-income countries, which usually host agricultural and food sectors that are more integrated into GAVCs, consumers spend less than 15% on their income on average while the national average of food expenditure in less GAVC-integrated economies can be above 50% (Roser & Ritchie, 2021).

TABLE 1 Participation in GAVCs and food price level.

Dependent variable	Δ log food price		
	OLS		SSIV
FD	(1)	(2)	(3)
Δ GAVC share	−0.0243***	−0.0237***	−0.0695***
	(0.0048)	(0.0048)	(0.0175)
Agriculture		✓	✓
Demography		✓	✓
Trade policy		✓	✓
F-test (1st stage)			215.58
Observations	1885	1885	1885
Year fixed effects	✓	✓	✓

Note: Standard errors in parentheses. ***: 0.01, **: 0.05, *: 0.1. Appendix provides a full list of controls.

TABLE 2 Participation in GAVCs and food price volatility.

Dependent variable	Δ food price volatility		
	OLS		SSIV
FD	(2)	(3)	(4)
Δ GAVC share	0.0448	0.0485	0.3500**
	(0.0718)	(0.0732)	(0.1649)
Agriculture		✓	✓
Demography		✓	✓
Trade policy		✓	✓
F-test (1st stage)			216.42
Observations	1885	1885	1888
Year fixed effects	✓	✓	✓

Note: Standard errors in parentheses. ***: 0.01, **: 0.05, *: 0.1. Appendix provides a full list of controls.

That reduction in food price levels, however, seems to come at the cost of increased price volatility. Indeed, our other core finding is that participation in GAVCs is associated with more food price volatility. This result may seem counterintuitive given the notion that global sourcing enables diversification and risk reduction.

A potential explanation could lie in the industrial organization of agri-food value chains. While sourcing from multiple countries may reduce idiosyncratic risks, input prices across countries are often positively correlated due to global market integration, limiting the effectiveness of diversification. Supply chains, moreover, tend to be highly concentrated rather than diversified, particularly for agricultural inputs. This implies that shocks to a small number of suppliers can propagate through the entire chain. While we cannot empirically investigate this mechanism here because of data limitations, recent studies suggest that agri-food supply chains are indeed concentrated and that supplier adjustment is limited due to sector-specific constraints such as perishability, seasonality, and infrastructure dependencies (e.g., Beck et al., 2024; Hadachek et al., 2023; Ma & Lusk, 2021).

4.2 | Robustness checks

Appendix assesses the robustness of our core result that greater participation in GAVCs is associated with lower but more volatile food prices. Here, we provide a brief summary of the evidence in that Appendix.

Instrument relevance

On the instrument relevance front, the seeming price-decreasing and volatility-increasing effects of participation in GAVCs hinge upon the relevance of the Bartik SSIV. The large *F*-statistics we observe across all specifications support the hypothesis that the instrument is relevant.

Instrument validity

While instrument relevance is testable, instrument validity is considerably more difficult to test in a convincing manner. So on that front, with regards to the exclusion restriction, recall that our identifying assumption is that we argue that the global sector shocks are exogenous to country-level prices, GAVC participation, and other confounders. We perform several tests and robustness checks to buttress that claim, following the recommendations in Goldsmith-Pinkham et al. (2020).

First, we estimate the model by limited information maximum likelihood (LIML) (Anderson & Rubin, 1949) and a modification of bias-corrected two-stage least squares (Kolesár et al., 2015), and cross-check our inference against Ecker–Huber–White heteroskedasticity robust standard errors (SEs) and information matrix-based SEs (IM-SE). Both the estimators and standard errors are similar, providing no reason to suspect that the models are misspecified.

Second, we run a Sargan overidentification test where we use industry shares as instruments. If the industry shares are exogenous, the validity of the instrument could be compromised in case of insufficient variation in exogenous shocks. Moreover, Goldsmith-Pinkham et al. (2020) show that for the exclusion restriction to hold, the industry shares are required to be exogenous. The test provides evidence that the error term is not correlated with the industry-share IVs.

Third, we examine the correlation between our observable country correlates and initial industry shares. The results are depicted in Appendix Table A3. These specifications explain between 36% and 52% of the variation, which is relatively low given the extensive set of country-level controls. We observe large coefficients and strong correlations between initial industry shares and variables relating to land and cereal production which supports our identifying assumption. Moreover, one trade policy variable also correlates with industry shares, which constitutes the mechanism under investigation. We find no indication of pathways for other supply-side or demand-side confounders to drive initial sector shares.

Fourth, we estimate specifications that rely on industry shares from different time points covering the per-analysis period from 1991 to 1999 as well as one time-varying share-assumption ($t-1$). We observe peak IV relevance in 1999, but the estimates are not substantially different when we go back further in time, providing more evidence that sector distributions are indeed constant over time and driven by natural endowments.

Fifth, to address concerns that large (i.e., in terms of their proportion of global trade) countries may influence the global shocks in our shift-share IV, we implement a leave-one-out (LOO) version of the instrument. Under the caveats about that kind of instrumental variable noted by Betz et al. (2018), our core results remain robust to using the LOO (see Appendix), suggesting that our estimates are not driven by individual country-level shocks.

Sixth, our results are robust to alternative definitions of food price volatility. The Appendix presents estimates using standard deviation (SD), interquartile range (IQR), and realized volatility (RV), which support our main findings and highlight the importance of aligning volatility measures with structural exposure to GAVCs.

Finally, our results are also robust to controlling for macroeconomic policy by including the real effective exchange rate (REER) in the model, which could confound our analysis (Appendix).

4.3 | Positioning in GAVCs

We have documented that participation in GAVCs is associated with more volatile food prices. To shed more light on this result, we estimate our core equations by GAVC positioning type (i.e., upstream vs. downstream) and split the sample by sector (i.e., agriculture vs. food and beverages). Appendix Table A9 provides further evidence that our estimated relationship is similar across sectors for food price levels, but that it is driven by the food and beverages sector for food price volatility.

Table 3 presents results for Equations (1) and (2), in which the treatment variables are country-level changes in upstream-ness and downstream-ness, that is, two standard indicators of positioning in global value chains (GVCs) adapted from Antràs et al. (2012) and Antràs and Chor (2013). Following the approach detailed in Mancini et al. (2024), upstream-ness reflects a sector's average distance from final demand (or its proximity to primary inputs), while downstream-ness reflects proximity to final demand (or its distance from primary inputs). For this analysis, we aggregate both measures across agriculture and food and beverage sectors to construct country-level indicators of GAVC positioning.

We find that greater downstream participation in agri-food value chains is significantly associated with lower food price levels (column 2). This result is consistent with the intuition that countries more embedded in the final stages of agri-food processing and distribution—that is, closer to final demand and to consumers—tend to benefit from improved market access, more stable sourcing, and potentially stronger price competition. Conversely, the coefficient on upstream-ness (column 1) is positive but not statistically significant, suggesting that moving closer to raw commodity production may not yield comparable price-lowering effects.

We find no statistically significant results for either positioning variable in relation to food price volatility (columns 3–4). This indicates that the volatility effects of GAVC participation may not follow a simple linear gradient along the value chain and could depend on other structural features, such as storage capacity, trade frictions, or institutional quality.

Overall, the results highlight that where countries are positioned within GAVCs matters for price levels, and that the benefits of GAVC integration may be strongest for countries downstream in the chain. These findings complement the earlier results in Table 1, underscoring the importance of structural positioning—not just participation—in shaping food price outcomes.

4.4 | Treatment heterogeneity by income group

In Table 4, we split the sample by region. For the relationship between participation in GAVCs and the food price level, we observe consistently negative coefficients across all income groups. While the coefficient for low-income is not significantly different from zero, the coefficients for other groups (i.e., lower middle-income, upper middle-income, and high-income) are all significantly different from zero, and the magnitude of the coefficient increases monotonically with income. This suggests that, on average the gains from trade are higher for consumers the higher the average income in a country—at least when it comes to price levels. These subsample results should be interpreted with

TABLE 3 Effects of upstream and downstream GAVC participation on food prices and food price volatility (SSIV).

	Δ log food price		Δ food price volatility	
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**
Δ upstreamness	3.807		−16.98	
	(2.716)		(19.93)	
Δ downstreamness		−4.955*		23.37
		(2.980)		(14.48)
Agriculture	✓	✓	✓	✓
Demography	✓	✓	✓	✓
Trade policy	✓	✓	✓	✓
F-test (1st stage)	10.282	10.237	10.282	0.237
Observations	1885	1885	1885	1885
Year fixed effects	✓	✓	✓	✓

Note: Standard errors in parentheses are clustered at the region. ***: 0.01, **: 0.05, *: 0.1. Outcome variables are the first differenced log of the real food price level and within-year coefficient of variation of the FCPI. The first-differenced treatments are upstreamness and downstreamness. The models include 13 control variables relating to demography, agriculture, and trade policy. Appendix provides a full list of the controls.

TABLE 4 GAVC participation and food prices by income group.

Income group	Full sample (1)	Low (2)	Lower-middle (3)	Upper-middle (4)	High (5)
I: Δ log food price					
Δ GAVC share	−0.0695***	−0.0101	−0.0520*	−0.0935***	−0.1000***
	(0.0175)	(0.0554)	(0.0290)	(0.0232)	(0.0220)
Agriculture	✓	✓	✓	✓	✓
Demography	✓	✓	✓	✓	✓
Trade policy	✓	✓	✓	✓	✓
F-test (1st stage)	215.58	11.378	81.594	44.946	62.730
Observations	1885	300	494	551	540
Year fixed effects	✓	✓	✓	✓	✓
II: Δ food price volatility					
Δ GAVC share	0.3292**	−0.3228	0.3335	0.8112*	0.2549
	(0.1594)	(1.014)	(0.2137)	(0.4582)	(0.1621)
Agriculture	✓	✓	✓	✓	✓
Demography	✓	✓	✓	✓	✓
Trade policy	✓	✓	✓	✓	✓
F-test (1st stage)	215.58	11.378	81.594	44.946	62.730
Observations	1885	300	494	551	540
Year fixed effects	✓	✓	✓	✓	✓

Note: Standard errors in parentheses. ***: 0.01, **: 0.05, *: 0.1. Appendix provides a full list of controls.

caution, however, as limited statistical power and weaker instrument strength in some groups may not allow us to identify the coefficient of interest, particularly in low-income countries.

If the observed heterogeneity reflects structural differences, one plausible explanation is that upper-middle income countries are sufficiently integrated into GAVCs to experience upstream and downstream price transmission, but may lack the stabilizing mechanisms—such as futures markets, targeted subsidies, or robust food reserve systems—more common in high-income countries. Conversely, food systems in low-income countries may be less exposed to global value chains, potentially muting potential volatility effects. For high-income countries, many of which are very involved in the agri-food trade, this could be explained by the presence in those countries of futures and options markets whose existence helps smooth the prices of agri-food commodities (Bellemare et al., 2013).

These results are in line with recent findings of heterogeneous channels of the impact of GVCs across countries at different levels of development (Montalbano & Nenci, 2022; Ndubuisi & Owusu, 2021) and further corroborated by sample split models by region which are reported in the Appendix, which suggest that while our core result for food price levels holds in all regions except for East Asia and the Pacific and sub-Saharan Africa, our core results for volatility only hold in the full sample, and nowhere at the regional level, possibly due to low statistical power when conducting regional-level analyses (indeed, standard errors nearly always more than double when moving from the overall sample to sub-samples defined at the regional level).

Finally, split-sample results that estimate the relationship between positioning in GAVCs and food prices (Tables A11 and A12, Appendix) suggest that downstream participation is associated with lower food prices particularly in lower-middle-income countries, while upstream participation is linked to higher prices in upper-middle and high-income countries. Effects on food price volatility are generally imprecise, with some evidence of increased volatility from downstream integration in lower-middle-income countries.

To summarize, our key findings are twofold: participation in GAVCs is associated with (i) lower food prices, and (ii) higher food price volatility in our overall sample. This suggests that, on average, countries are facing a mean–variance tradeoff as a result of increased participation in GVCs when it comes to food prices. This trade-off is particularly pronounced for downstream-type GAVCs, that is, in sectors closer to consumers, as opposed to upstream-type GAVCs, which are closer to producers.

4.5 | The affordability-volatility tradeoff in GAVCs

Trade theory suggests that integration into global markets—whether via openness to trade or participation in GVCs—yields gains from specialization. But specialization introduces exposure to foreign shocks (Feder et al., 1977; Newbery & Stiglitz, 1984; Novy & Taylor, 2020). These vulnerabilities are compounded in GAVCs, where the sequencing of production stages implies that shocks at one stage reverberate throughout the chain.

While one might expect that GAVC participation enables greater diversification and thus more stable prices, our results challenge this view. Instead, we find that greater GAVC participation is associated with higher food price volatility. Recent network literature offers explanations for uncertainty effects which dominate the gains-from-trade effects Baqaee and Farhi (2024); Melitz (2003). One explanation could be that intermediate inputs are positively correlated across countries and stages, which limits the scope for risk. When firms in a value chain face synchronized price fluctuations across sources, the benefits of input diversification are diminished, and volatility is transmitted forward along the chain.

A possible explanation for the coexistence of lower food prices and limited diversification in GAVCs is that firms gain access to highly efficient, low-cost suppliers through specialization, even if those suppliers are few. While diversification enhances flexibility and resilience to shocks, efficiency gains from sourcing at scale may dominate cost considerations, driving down average prices despite increased exposure to volatility. This reflects a trade-off between cost efficiency and supply resilience, well established in the literature on global sourcing and value chains (e.g., Antràs & de Gortari, 2020; Jones, 2000; Miroudot, 2020).

Our findings support these two effects and suggest a trade-off between lower consumer food prices and higher price volatility as countries integrate more deeply into global agri-food value chains (GAVCs).

4.6 | Distributional implications: Who gains, who loses?

While we explore and discuss treatment effect heterogeneity by sector, by region, by income group, and by positioning, there remains the question of treatment effect heterogeneity within a given country in a given year. Because our data are at the country–year level, it is not possible to estimate what treatment effects are for specific groups within a given country in a given year. But we can certainly use the tools of microeconomic theory to guide our thinking.

In the Appendix, we sketch a political-economy model that does just that.[12] In that model, there are three agents, viz. consumers of food and agricultural commodities, producers (more specifically, households who also happen to be producers) of those same commodities, and the government. Both consumers and producers have preferences defined over both the price level and the volatility of food and agricultural commodities. The government then must decide on the degree of trade openness of its economy. While we do not model precisely how the government does so, we assume that the government has access to a number of policy instruments that allow it to set the degree of its economy's integration in agri-food value chains.

[12]We do not solve that model, as that is beyond the scope of this paper.

Our political economy model relies on a theoretical framework that leads to the following conclusions. Recall that our empirical results are that in the absence of market power or other frictions, deeper GAVC integration tends to reduce food prices for both consumers and producers. This benefits consumers, who pay less for food, but harms producers, who receive lower prices for their output (e.g., Swinnen & Squicciarini, 2012). When it comes to volatility, however, the effects are a bit more nuanced. While the effect is unambiguously negative for food producers, who often have to make production decisions well ahead (e.g., at planting time for farmers) of realized prices (e.g., at harvest time for the same farmers) and whose production decisions are made sub-optimal by the presence of price risk (Baron, 1970; Bellemare et al., 2013; Sandmo, 1971), the effect for consumers is not as clear. Turnovsky et al. (1980) show that the welfare impacts of food price volatility for consumers depend on a number of deeper parameters (e.g., price and income elasticities of demand, the budget share of the good considered, relative risk aversion). Empirically, however, consumers have been shown to not care about food price volatility (Bellemare, 2015). Taken together, this implies that (i) producers are adversely affected by greater integration in GAVCs, since they face the dual burden of lower average prices and greater price instability, but that (ii) consumers are positively affected by greater integration in GAVCs, since they face lower prices and are not ostensibly affected by price volatility.

Given that, the distribution of welfare effects within an economy is dependent on how many households are net buyers versus net sellers of food. In high-income countries, where very few households are net sellers of food as a result of the structural transformation, we would expect most households to benefit from greater integration into GAVCs. By contrast, in low- and middle-income countries, where the economy is often much more agrarian and there are relatively many more net sellers of food, it stands to reason that we would expect many more households to be hurt by greater integration into value chains. As a result, we would expect governments in high-income countries to incentivize greater integration into GAVCs, and we would expect governments in low- and middle-income countries to do the exact opposite. This may help explain why the latter group of countries has often opposed the liberalization of agricultural trade while the former group has lobbied for greater agricultural trade liberalization.

How about other distributional impacts? First, following Aichele and Heiland (2018), trade cost changes at upstream nodes in GAVCs can propagate through sectoral linkages and lead to volatility in final goods prices, especially where inter-sectoral and international production fragmentation is high. Our empirical finding that downstream GAVC participation is associated with higher food price volatility is consistent with such second-round effects.

A second type of distributional impact is across countries at different levels of development. In low-income countries, the share of the population engaged in food production is higher, and households spend a larger proportion of their income on food. This amplifies the consequences of both lower prices and higher volatility. A political economy implication is that while consumers in high-income countries may benefit overall from GAVC participation, producers and households in low-income economies may find themselves disproportionately harmed (Swinnen, 2010). This helps explain the persistent reluctance of many low-income countries to liberalize their agricultural trade.

4.7 | Policy implications

From a policy perspective, the foregoing results imply (i) weighing the gains-from-trade effect of lower food prices against the external shock-exposure effects of higher food price volatility, and (ii) minimizing this trade-off by minimizing supply-chain risks.

More precisely, contracts and agreements between buyers and suppliers could be strengthened with regard to risk sharing to minimize supply chain back-ups and related volatility costs (e.g., Guo et al., 2017; Zhao et al., 2010). One reason why prices become unstable is when demand is price-inelastic, as in the case of goods such as food and energy, buyers begin hoarding during an upward market shock and sellers try to sell at the highest possible prices. Such events can be planned for in binding legal agreements, and contracts can have similar provisions, perhaps in the form of quotas that need to be fulfilled before free market price trade.

Governments may also consider measures to support domestic supply in strategically important commodities (e.g., Blumenschein et al., 2017; Solingen et al., 2021), although such policies often involve trade-offs with efficiency Clapp (2017).

Furthermore, managing trade relationships to reduce exposure to countries with high institutional risk may improve supply stability. This could include fostering long-term contracts, partnerships, or preferential access arrangements that prioritize reliability over short-term cost savings.

Moreover, information may have a role to play in mitigating food price volatility. To some extent, information or expectations about future prices is what speculators act on, with the end result that those speculators' actions may help reduce the extent of food price volatility in an economy by smoothing out possible price spikes. But those some actions by speculators, however, may also cause food price pikes. Von Braun and Tadesse (2012) discuss the evidence on speculation.

Finally, policies aimed at improving the resilience of GAVCs should be mindful of heterogeneity in impacts. The same degree of GAVC participation may generate very different outcomes across countries, sectors, and income groups. This points to the need for context-specific strategies that consider both the benefits and the risks of integration.

5 | CONCLUSION

Recent disruptions in GVCs and price volatility have had serious consequences on welfare and trade policy. While the trade literature predicts that increased GVC participation drives down the prices of traded commodities, ever-increasing numbers of trade ties and shipment legs are also likely to increase market and price uncertainty in value chains because of uncertainty in various parts of the world.

We have empirically analyzed the relationship between participation in GAVCs and (i) food prices price levels and (ii) food price volatility. Our main results suggest that participation in GAVCs involves a tradeoff between the mean and variance of the food price distribution. That is, greater participation in GAVCs is associated with lower food prices, but it is also associated with more food price volatility. While lower food prices are a reflection of the gains from trade, greater volatility reflects the vulnerability of internationally fragmented supply chains to shocks. Moreover, the mean–variance trade-off in food prices is heterogeneous across regions, income groups, and value chain types.

These heterogeneous effects carry important distributional consequences. Consumers tend to benefit from lower prices, while producers face adverse effects from both lower average prices and greater volatility. In low-income countries, where a larger share of the population engages in agriculture and a greater share of income is spent on food, the negative consequences of price volatility are particularly pronounced. This helps explain the persistent reluctance of many such countries to liberalize agricultural trade.

The results of this paper suggest that trade-offs between efficiency and stability in GAVCs must be more explicitly accounted for in both empirical research and policy design. While efficiency gains from trade are well documented, policymakers may need to consider interventions that enhance supply chain reliability—especially in essential sectors such as food. Examples include risk-sharing contracts, stockpiling, long-term supplier agreements, or strategic support for domestic supply capacity in key inputs.

Ultimately, our findings underscore that the food security implications of GAVC participation are not uniform. International cooperation and national policy must account for these structural asymmetries if the goal is to make food systems more stable and inclusive in the face of global shocks.

ACKNOWLEDGMENTS

We are grateful to Rudy Nayga and three anonymous reviewers for comments which have led to a substantially improved version of this manuscript. We also thank Sunghun Lim for his help with the data. We thank Chris Barrett, Michele Mancini, Daria Taglioni, Aleks Schaefer, and Andrew Schmitz as well as seminar audiences at Göttingen, Iowa State, Kiel, OARES, and USDA-ERS, as well conference participants at the 2022 IATRC meeting, the 2023 Economics and Management of Risk in Agriculture and Natural Resources meeting, the 2023 CAES annual meetings, and the 2023 AAEA annual meetings for useful comments. All remaining errors are ours.

FUNDING INFORMATION

Dalheimer acknowledges funding from DFG - project number 509105465 before joining Purdue University. Bellemare is grateful to the USDA's National Institute of Food and Agriculture for supporting this work through grant MIN-14-184.

REFERENCES

Acemoglu, D., and P. Restrepo. 2020. "Robots and Jobs: Evidence From US Labor Markets." *Journal of Political Economy* 128: 2188–2244.

Aichele, R., and I. Heiland. 2018. "Where Is the Value Added? Trade Liberalization and Production Networks." *Journal of International Economics* 115: 130–144.

Alessandria, G., H. Choi, and K. J. Ruhl. 2021. "Trade Adjustment Dynamics and the Welfare Gains From Trade." *Journal of International Economics* 131: 103458.

Allen, T., and D. Atkin. 2022. "Volatility and the Gains From Trade." *Econometrica* 90: 2053–92.

Anderson, K., G. Rausser, and J. Swinnen. 2013. "Political Economy of Public Policies: Insights From Distortions to Agricultural and Food Markets." *Journal of Economic Literature* 51: 423–477.

Anderson, T. W., and H. Rubin. 1949. "Estimation of the Parameters of a Single Equation in a Complete System of Stochastic Equations." *The Annals of Mathematical Statistics* 20: 46–63.

Antràs, P. 2020. "Conceptual Aspects of Global Value Chains." *The World Bank Economic Review* 34: 551–574.

Antràs, P., and D. Chor. 2013. "Organizing the Global Value Chain." *Econometrica* 81: 2127–2204.

Antràs, P., D. Chor, T. Fally, and R. Hillberry. 2012. "Measuring the Upstreamness of Production and Trade Flows." *American Economic Review* 102: 412–16.

Antràs, P., and A. de Gortari. 2020. "On the Geography of Global Value Chains." *Econometrica* 88: 1553–98.

Appelbaum, E. 1998. "Import-Price Uncertainty, Production Decisions, and Relative Factor Shares." *Review of International Economics* 6: 345–360.

Appelbaum, E., and U. Kohli. 1997. "Import Price Uncertainty and the Distribution of Income." *Review of Economics and Statistics* 79: 620–630.

Arkolakis, C., A. Costinot, and A. Rodríguez-Clare. 2012. "New Trade Models, Same Old Gains?" *American Economic Review* 102: 94–130.

Autor, D. H., D. Dorn, and G. H. Hanson. 2013. "The China Syndrome: Local Labor Market Effects of Import Competition in the United States." *American Economic Review* 103: 2121–68.

Balié, J., D. Del Prete, E. Magrini, P. Montalbano, and S. Nenci. 2019. "Does Trade Policy Impact Food and Agriculture Global Value Chain Participation of Sub-Saharan African Countries?" *American Journal of Agricultural Economics* 101: 773–789.

Baqaee, D. R., and E. Farhi. 2024. "Networks, Barriers, and Trade." *Econometrica* 92: 505–541.

Baron, D. P. 1970. "Price Uncertainty, Utility, and Industry Equilibrium in Pure Competition." *International Economic Review* 11: 463–480.

Barrett, C. B., T. Reardon, J. Swinnen, and D. Zilberman. 2022. "Agri-Food Value Chain Revolutions in Low-and Middle-Income Countries." *Journal of Economic Literature* 60: 1316–77.

Bartik, T. J. 1991. *Who Benefits From State and Local Economic Development Policies?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Batra, R. N., and W. R. Russell. 1974. "Gains From Trade Under Uncertainty." *The American Economic Review* 64: 1040–48.

Beck, A., S. Lim, and D. Taglioni. 2024. "Understanding Firm Networks in Global Agricultural Value Chains." *Food Policy* 127: 102689.

Bellemare, M. F. 2015. "Rising Food Prices, Food Price Volatility, and Social Unrest." *American Journal of Agricultural Economics* 97: 1–21.

Bellemare, M. F., C. B. Barrett, and D. R. Just. 2013. "The Welfare Impacts of Commodity Price Volatility: Evidence From Rural Ethiopia." *American Journal of Agricultural Economics* 95: 877–899.

Bellemare, M. F., and J. R. Bloem. 2018. "Does Contract Farming Improve Welfare? A Review." *World Development* 112: 259–271.

Belotti, F., A. Borin, and M. Mancini. 2020. *icio: Economic Analysis With Inter-Country Input–Output Tables in Stata*. Washinton, D.C: The World Bank.

Berger, J., B. Dalheimer, and B. Brümmer. 2021. "Effects of Variable EU Import Levies on Corn Price Volatility." *Food Policy* 102: 102063.

Betz, T., S. J. Cook, and F. M. Hollenbach. 2018. "On the Use and Abuse of Spatial Instruments." *Political Analysis* 26: 474–79.

Blumenschein, F., J. Wieland, A. Berger, J. Blankenbach, C. Brandi, U. Dadush, D. Navarro, A. Neligan, I. Jandeisek, and L. Johnson. 2017. *Fostering the Sustainability of Global Value Chains (GVCs)*. Berlin: G20 Insights.

Borin, A., and M. Mancini. 2019. *Measuring What Matters in Global Value Chains and Value-Added Trade*. Washington, D.C: The World Bank.

Borusyak, K., P. Hull, and X. Jaravel. 2022. "Quasi-Experimental Shift-Share Research Designs." *The Review of Economic Studies* 89: 181–213.

Card, D. 2009. "Immigration and Inequality." *American Economic Review* 99: 1–21.

Casella, B., R. Bolwijn, D. Moran, and K. Kanemoto. 2019. "Improving the Analysis of Global Value Chains: The UNCTAD-Eora Database." *Transnational Corporations* 26: 115–142.

Christian, P., and C. B. Barrett. 2024. "Spurious Regressions and Panel IV Estimation: Revisiting the Causes of Conflict." *The Economic Journal* 134: 1069–99.

Clapp, J. 2017. "Food Self-Sufficiency: Making Sense of It, and When It Makes Sense." *Food Policy* 66: 88–96.

Dalheimer, B., H. Herwartz, and A. Lange. 2021. "The Threat of Oil Market Turmoils to Food Price Stability in Sub-Saharan Africa." *Energy Economics* 93: 105029.

David, H., D. Dorn, and G. H. Hanson. 2013. "The Geography of Trade and Technology Shocks in the United States." *American Economic Review* 103: 220–25.

Egger, P., and M. Larch. 2008. "Interdependent Preferential Trade Agreement Memberships: An Empirical Analysis." *Journal of International Economics* 76: 384–399.

Elliott, M., B. Golub, and M. V. Leduc. 2022. "Supply Network Formation and Fragility." *American Economic Review* 112: 2701–47.

Feder, G., R. Just, and A. Schmitz. 1977. "Storage With Price Uncertainty in International Trade." *International Economic Review* 18: 553–568.

Fiankor, D. D. D., B. Dalheimer, and G. Mack. 2024. "Pesticide Regulatory Heterogeneity, Foreign Sourcing, and Global Agricultural Value Chains." *American Journal of Agricultural Economics* 107: 611–634.

Goldsmith-Pinkham, P., I. Sorkin, and H. Swift. 2020. "Bartik Instruments: What, When, Why, and How." *American Economic Review* 110: 2586–2624.

Gouel, C. 2016. "Trade Policy Coordination and Food Price Volatility." *American Journal of Agricultural Economics* 98: 1018–37.

Guo, S., B. Shen, T. M. Choi, and S. Jung. 2017. "A Review on Supply Chain Contracts in Reverse Logistics: Supply Chain Structures and Channel Leaderships." *Journal of Cleaner Production* 144: 387–402.

Hadachek, J., M. Ma, and R. J. Sexton. 2023. "Market Structure and Resilience of Food Supply Chains Under Extreme Events." *American Journal of Agricultural Economics* 106: 21–44.

Hummels, D., J. Ishii, and K. M. Yi. 2001. "The Nature and Growth of Vertical Specialization in World Trade." *Journal of International Economics* 54: 75–96.

Jayne, T. S., B. Zulu, and J. Nijhoff. 2006. "Stabilizing Food Markets in Eastern and Southern Africa." *Food Policy* 31: 328–341.

Johnson, R. C. 2018. "Measuring Global Value Chains." *Annual Review of Economics* 10: 207–236.

Johnson, R. C., and G. Noguera. 2012. "Proximity and Production Fragmentation." *American Economic Review* 102: 407–411.

Jones, R. W. 2000. *Globalization and the Theory of Input Trade*. Cambridge: MIT Press.

Josling, T., and S. Tangermann. 1999. "Implementation of the WTO Agreement on Agriculture and Developments for the Next Round of Negotiations." *European Review of Agricultural Economics* 26: 371–388.

Kiloes, A. M., A. Puspitasari, Sulistyaningrum, N. Khaririyatun, D. Mulyono, S. Prabawati, M. J. A. Syah, N. F. Devy, Hardiyanto 2024. "Unravelling the Provisioning System of a Strategic Food Commodity to Minimise Import Dependency: A Study of Garlic in Indonesia." *Food Policy* 123: 102604.

Kim, K. G., and D. Park. 2023. "Can the Federal Reserve Save the Environment?" *Journal of Cleaner Production* 423: 138730.

Kolesár, M., R. Chetty, J. Friedman, E. Glaeser, and G. W. Imbens. 2015. "Identification and Inference With Many Invalid Instruments." *Journal of Business & Economic Statistics* 33: 474–484.

Koopman, R., Z. Wang, and S. J. Wei. 2014. "Tracing Value-Added and Double Counting in Gross Exports." *American Economic Review* 104: 459–494.

Larch, M., J. Luckstead, and Y. V. Yotov. 2024. "Economic Sanctions and Agricultural Trade." *American Journal of Agricultural Economics* 106: 1477–1517.

Lim, S., and S. W. Kim. 2022. "Global Agricultural Value Chains and Employment Growth." *Journal of the Agricultural and Applied Economics Association* 1(4): 402–418.

Los, B., and M. P. Timmer. 2018. "*Measuring Bilateral Exports of Value Added: A Unified Framework*." Working paper, National Bureau of Economic Research.

Luckstead, J. 2024. "Globalisation and Agri-Food Trade." *European Review of Agricultural Economics* 51: 32–53.

Ma, M., and J. L. Lusk. 2021. "*Concentration and Resilience in the US Meat Supply Chains*." Working paper, National Bureau of Economic Research.

Mancini, M., P. Montalbano, S. Nenci, and D. Vurchio. 2024. "Positioning in Global Value Chains: World Map and Indicators, a New Dataset Available for GVC Analyses." *The World Bank Economic Review* 38: 669–690.

Melitz, M. J. 2003. "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71: 1695–1725.

Melitz, M. J., and S. J. Redding. 2014. "Missing Gains From Trade?" *American Economic Review* 104: 317–321.

Millimet, D. L., and M. F. Bellemare. 2025. "*On the (Mis) Use of the Fixed Effects Estimator*." Oxford Bulletin of Economics and Statistics. forthcoming.

Miroudot, S. 2020. "Resilience Versus Robustness in Global Value Chains: Some Policy Implications." In *COVID-19 and Trade Policy: Why Turning Inward Won't Work*, Vol 2020 117–130. London: CEPR Press.

Montalbano, P., and S. Nenci. 2022. "Does Global Value Chain Participation and Positioning in the Agriculture and Food Sectors Affect Economic Performance? A Global Assessment." *Food Policy* 108: 102235.

Nakamura, E., and J. Steinsson. 2014. "Fiscal Stimulus in a Monetary Union: Evidence From US Regions." *American Economic Review* 104: 753–792.

Ndubuisi, G., and S. Owusu. 2021. "How Important Is GVC Participation to Export Upgrading?" *The World Economy* 44: 2887–2908.

Newbery, D. M., and J. E. Stiglitz. 1984. "Pareto inferior trade." *The Review of Economic Studies* 51: 1–12.

Novy, D., and A. M. Taylor. 2020. "Trade and Uncertainty." *Review of Economics and Statistics* 102: 749–765.

Pieters, H., and J. Swinnen. 2016. "Trading-off Volatility and Distortions? Food Policy During Price Spikes." *Food Policy* 61: 27–39.

Posey, S., N. Magnan, E. B. McCullough, V. Hoffmann, N. Opoku, and A. H. Alidu. 2024. "Challenges to Groundnut Value Chain Development: Lessons From an (Attempted) Experiment in Ghana." *Journal of Development Effectiveness* 16: 468–484.

Roser, M., and H. Ritchie. 2021. *Food Prices. Our World in Data*. https://ourworldindata.org/food-prices.

Rude, J., and H. An. 2015. "Explaining Grain and Oilseed Price Volatility: The Role of Export Restrictions." *Food Policy* 57: 83–92.

Sandmo, A. 1971. "On the Theory of the Competitive Firm Under Price Uncertainty." *The American Economic Review* 61: 65–73.

Solingen, E., B. Meng, and A. Xu. 2021. "Rising Risks to Global Value Chains." In *Global Value Chain Development Report—Beyond Production* (chap. 5) 134–187. Geneva, Switzerland: World Trade Organization.

Sposi, M., K. M. Yi, and J. Zhang. 2021. "Trade Integration, Global Value Chains, and Capital Accumulation." *IMF Economic Review* 69: 505–539.

Swinnen, J., and P. Squicciarini. 2012. "Mixed Messages on Prices and Food Security." *Science* 335: 405–6.

Swinnen, J. F. 2010. "The Political Economy of Agricultural and Food Policies: Recent Contributions, New Insights, and Areas for Further Research." *Applied Economic Perspectives and Policy* 32: 33–58.

Turnovsky, S. J. 1974. "Technological and Price Uncertainty in a Ricardian Model of International Trade." *The Review of Economic Studies* 41: 201–217.

Turnovsky, S. J., H. Shalit, and A. Schmitz. 1980. "Consumer's Surplus, Price Instability, and Consumer Welfare." *Econometrica: Journal of the Econometric Society* 48: 135–152.

Van den Broeck, G., J. Swinnen, and M. Maertens. 2017. "Global Value Chains, Large-Scale Farming, and Poverty: Long-Term Effects in Senegal." *Food Policy* 66: 97–107.

Von Braun, J., and G. Tadesse. 2012. *Global Food Price Volatility and Spikes: An Overview of Costs, Causes, and Solutions.* ZEF-Discussion Papers on Development Policy No. 161. Cham: Springer. https://www.econstor.eu/bitstream/10419/84801/1/685074609.pdf

Wang, Z., S. J. Wei, X. Yu, and K. Zhu. 2017. "*Measures of Participation in Global Value Chains and Global Business Cycles*." Working paper, National Bureau of Economic Research.

Waugh, F. V. 1944. "Does the Consumer Benefit From Price Instability?" *The Quarterly Journal of Economics* 58: 602–614.

Zhao, Y., S. Wang, T. E. Cheng, X. Yang, and Z. Huang. 2010. "Coordination of Supply Chains by Option Contracts: A Cooperative Game Theory Approach." *European Journal of Operational Research* 207: 668–675.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Dalheimer, Bernhard, and Marc F. Bellemare. 2025. "Global Agricultural Value Chains and Food Prices." *American Journal of Agricultural Economics* 1–18. https://doi.org/10.1111/ajae.70030