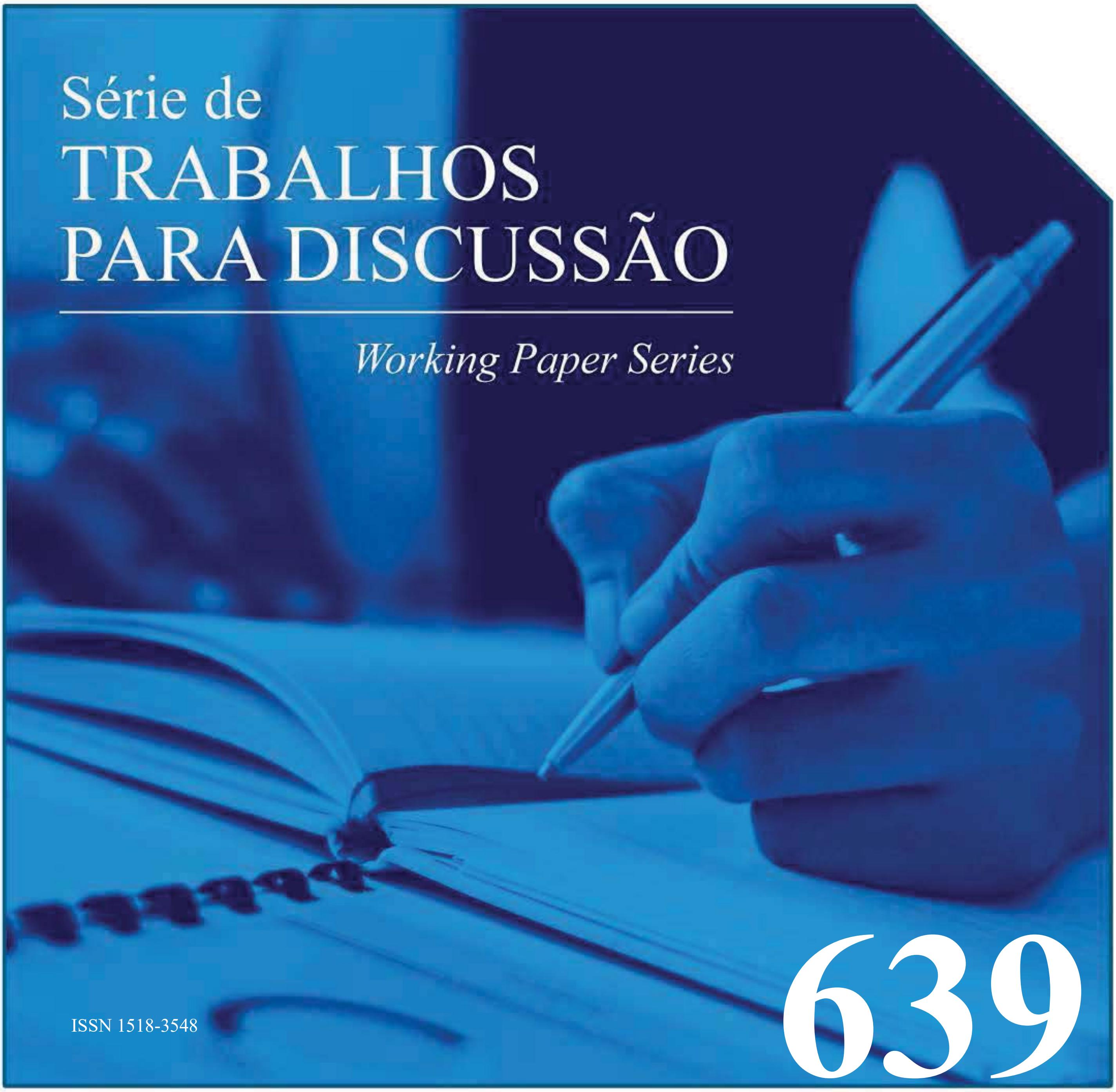


Dezembro 2025

The Causal Effects of Commodity Shocks

Alisson Curatola-Melo, Bernardo Guimarães

BANCO CENTRAL DO BRASIL

ISSN 1518-3548
CGC 00.038.166/0001-05

Working Paper Series	Brasília	no. 639	Dezembro	2025	p. 3-38

Working Paper Series

Edited by the Research Department (Depep) – E-mail: workingpaper@bcb.gov.br

Editor: Rodrigo Barbone Gonzalez

Co-editor: Eurilton Alves Araujo Jr

Head of the Research Department: Euler Pereira Gonçalves de Mello

Deputy Governor for Economic Policy: Diogo Abry Guillen

The Banco Central do Brasil Working Papers are evaluated in double-blind referee process.

Citizen Service Division

Banco Central do Brasil

Deati/Diate

SBS – Quadra 3 – Bloco B – Edifício-Sede – 2º subsolo

70074-900 Brasília – DF – Brazil

Toll Free: 0800 9792345

Fax: +55 (61) 3414-2553

Internet: http//www.bcb.gov.br/?CONTACTUS

Non-technical Summary

Macroeconomic and financial indicators often move together with commodity prices, but this correlation does not necessarily reflect causal relationships. Global forces, such as shifts in growth expectations and changes in international financial conditions, tend to influence both commodity markets and other asset prices simultaneously. For this reason, it is challenging to determine how much of the observed co-movement is caused by commodity price shocks.

This study estimates the causal impact of grain price movements using high-frequency data and a source of price variation that has received little attention: the quarterly release of the USDA Grain Stocks Report. These announcements have a strong impact on soybean, corn, and wheat prices, generating the changes in volatility needed for the empirical strategy adopted in this study, the so-called identification through heteroskedasticity.

The results show that the causal effects of grain shocks on emerging-market assets are much smaller than simple correlations suggest. For sovereign CDS spreads, estimates from ordinary least squares (OLS) regressions are typically more than twice as large as those obtained using methods designed to address endogeneity. For stock indices, the causal effects are close to zero even though OLS results point to a strong positive relationship. Exchange-rate responses to a positive price shock vary across countries: Brazil's currency appreciates significantly, Colombia, Mexico, and Peru exhibit smaller appreciations, and Chile tends to experience depreciation. Positive grain shocks also raise oil prices and the S&P 500 while reducing the VIX, although the magnitudes are substantially smaller than those implied by naive regressions.

Taken together, the findings show that assuming commodity prices are independent of other global forces leads to an overestimation of their role in shaping economic and financial outcomes.

Sumário Não Técnico

Indicadores macroeconômicos e financeiros frequentemente se movem em conjunto com os preços das commodities, mas essa correlação não reflete, necessariamente, relações de causalidade. Fatores globais, como mudanças nas expectativas de crescimento e alterações nas condições financeiras internacionais, tendem a influenciar simultaneamente tanto os mercados de commodities quanto outros preços de ativos. Por essa razão, não é trivial determinar em que medida a correlação observada é causada por choques nos preços das commodities.

Este estudo estima o impacto causal das variações nos preços dos grãos utilizando dados de alta frequência e uma fonte de variação de preços pouco explorada: a divulgação trimestral do relatório USDA Grain Stocks. Esses anúncios têm forte impacto sobre os preços da soja, do milho e do trigo, gerando as mudanças de volatilidade necessárias para a estratégia empírica adotada neste estudo, conhecida como identificação por heterocedasticidade.

Os resultados mostram que os efeitos causais dos choques de grãos sobre ativos de mercados emergentes são muito menores do que sugerem correlações simples. Para os spreads de CDS soberanos, as estimativas obtidas por regressões de mínimos quadrados ordinários (OLS) são tipicamente mais que o dobro daquelas produzidas por métodos que tratam adequadamente a endogeneidade. Para os índices acionários, os efeitos causais são praticamente nulos, apesar das fortes associações positivas indicadas pelas regressões OLS. As respostas cambiais a um choque positivo de preços variam entre os países: a moeda brasileira se aprecia de forma significativa; Colômbia, México e Peru apresentam apreciações menores; e o Chile registra depreciação. Choques positivos de grãos também elevam os preços do petróleo e do índice S&P 500, enquanto reduzem o VIX, mas com magnitudes muito inferiores às sugeridas por regressões simples.

Em conjunto, os resultados mostram que assumir que os preços das commodities são independentes de outros fatores globais leva a uma superestimação de seu papel na determinação de variáveis econômicas e financeiras.

The Causal Effects of Commodity Shocks*

Alisson Curatola-Melo† Bernardo Guimaraes‡

November 18, 2025

Abstract

This paper disentangles the causal effects of commodity price movements on emerging market indicators from those driven by correlated external factors, such as global growth expectations and financial conditions. We employ an identification-through-heteroskedasticity approach using USDA Grain Stock reports, which have an exogenous impact on soybean, corn, and wheat prices. Our findings show that the causal effects of grain price shocks on default risk, stock indexes, and exchange rates are typically less than half the size of the unadjusted estimates.

KEYWORDS: Emerging economies, High-Frequency Identification, Heteroskedasticity, USDA, Grain prices.

JEL CLASSIFICATION: F31, F34, F44, Q02

*We thank Pedro Castro, Bruno Ferman, Carlos Goncalves, Diogo Guillen, Marcel Ribeiro, Samer Shousha, and seminar participants at Banco Central do Brasil, Sao Paulo FGV and SBE 2023 (Rio de Janeiro) for comments and suggestions. Luca Borghi and Vinicius Sabbag provided excellent research assistance. Guimaraes gratefully acknowledges financial support from CNPq. The views expressed here are those of the authors and do not necessarily reflect those of the Banco Central do Brasil.

†Banco Central do Brasil, Brazil, alisson.melo@bcb.gov.br.

‡Sao Paulo School of Economics - FGV, Brazil, bernardo.guimaraes@fgv.br.

1 Introduction

In emerging markets, fluctuations in economic and financial indicators are often closely aligned with movements in commodity prices. However, it is not clear how much of this co-movement is truly caused by commodity prices themselves. External factors – such as global growth expectations and worldwide financial conditions – shift in ways that correlate with commodity prices. This paper aims to disentangle the causal effects of commodity price movements from the influence of these external influences.

Making this distinction is essential for understanding the main transmission channels affecting emerging economies. If commodity prices are the primary driver, then the effects likely operate through direct trade links, highlighting these countries' dependence on commodity exports. Conversely, if commodity prices simply reflect broader global conditions, the underlying forces may lie elsewhere – such as capital flows, foreign investment, or generalized demand for exports.

This paper estimates the contemporaneous causal effects of commodity shocks using a high-frequency identification approach, leveraging the USDA Grain Stocks Report as a source of exogenous variation in global agricultural prices. The report has a pronounced impact on commodity prices, roughly doubling the standard deviation of grain price changes on release days.

The key identification assumption is that, on dates when the USDA Stocks Reports are released, there is an additional random shock to the prices of soybean, corn, and wheat that does not directly affect other financial prices. This assumption, combined with the identification-through-heteroskedasticity methodology (Rigobon, 2003; Rigobon and Sack, 2004), allows us to consistently estimate the effects of commodity price shocks.

We construct a grain price variable as the first principal component of soybean, corn, and wheat prices. Using this measure, we estimate the impact of grain prices on financial indicators across five emerging markets – Brazil, Chile, Colombia, Mexico, and Peru – as well as the United States, in addition to assessing their effect on the prices of other commodities.

The OLS coefficients capture the correlation between grain price movements and financial indicators in emerging markets. In contrast, GMM estimates identify the causal impact of grain price shocks under our assumptions. Comparing both reveals that taking grain price movements as exogenous shocks, a common assumption in the literature, vastly overstates their effects on emerging economies. Correlated external factors are typically responsible for most of the impact on default risk, exchange rates and stock markets.

For CDS prices, OLS coefficients are typically more than twice as large as the GMM estimates, which nonetheless remain significant. Similarly, for stock indexes, OLS estimates suggest a stronger influence of grain prices, while we find minimal causal effects. Finally, OLS results imply that grain price shocks generally lead to currency appreciation across countries, but GMM estimates reveal a more nuanced response: Brazil shows a clear appreciation; Colombia, Mexico, and Peru exhibit smaller and borderline significant appreciations; and Chile appears to experience depreciation.

The five emerging economies differ in their export composition: Brazil is the only one with a large share of grain and agricultural exports. Despite these differences, the estimated effects on CDS spreads and stock indices are broadly similar across countries.

Results for U.S. indicators show minimal and statistically insignificant effects on the exchange rate, interest rates, and inflation. Grain price shocks positively impact the S&P 500 and negatively affect the VIX, though the effects are substantially smaller than those suggested by OLS regressions. Additionally, grain price shocks have a positive effect on oil prices, but the effect size is only a third of the OLS estimate.

The results thus suggest that the effect of grain price shocks on emerging markets is meaningful but less than half of what one would obtain by interpreting commodity price changes as exogenous shocks. The remainder appears to be driven by other external factors that directly affect emerging economies and also influence commodity prices. Moreover, the similarity of estimates across countries with different export compositions is consistent with the view that these effects operate mainly through worldwide equilibrium adjustments rather than directly via export revenues.

This paper focuses on grain prices. Extending the analysis to other commodities would require identifying dates with significant commodity-specific shocks. OPEC announcement dates appear to be a natural choice for oil, but their effects on oil prices are not nearly as important as the impact of USDA Stocks Reports on grain prices. Given the methodology used here, the increase in variance due to OPEC announcements are not sufficiently informative to pass weak identification tests.

This paper relates to a broad literature studying the effects of commodity price fluctuations on various aspects of national economies. There is evidence that such fluctuations influence exchange rates (Chen and Rogoff, 2003; Cashin et al., 2004), and a growing body of work emphasizes commodity price shocks as key drivers of business cycles in emerging markets. Examples include Shousha (2016); Ben Zeev et al. (2017); Fernández et al. (2017, 2018); Drechsel and Tenreyro (2018); Kohn et al. (2021); Colombi (2024); Toma and Cuba (2024). Other contributions examine the effects of commodities on long-term growth (e.g., Addison et al., 2016; Tahar et al., 2021).

This paper has implications for how some results in this literature should be interpreted. Models are often calibrated by matching the responses of macroeconomic variables to commodity price movements observed in the data. We find, however, that much of the observed co-movement between commodity prices and financial variables is driven by other global forces. As a result, calibrating models to match these correlations might overstate the role of commodities as independent drivers of economic outcomes.[1]

Previous research has highlighted credit spreads as a key transmission channel for commodity price shocks in resource-exporting countries (Shousha, 2016; Fernández et al., 2018; Drechsel and Tenreyro, 2018). While our results corroborate the hypothesis of improved financial conditions in response to grain price increases, they also indicate that this effect is substantially smaller once commodity price shocks are disentangled from other external shocks that are correlated with – but not caused by – commodity prices.

We are closely related to work that has employed different methodologies to answer questions similar to ours. Using a general-equilibrium model of global business cycles, Alquist et al. (2020) conclude that commodity-related shocks have contributed modestly to global economic fluctuations, consistent with our findings. Juvenal and Petrella (2024) employ a local-projection method with instrumental variables based on a narrative approach and find that export price shocks have significant effects on GDP but not on capital flows.

Several papers focus on one or few commodities. There has been research on the oil market aiming at disentangling the causal effects of price innovations – see Kilian and Zhou (2020) for a survey. In particular, Känzig (2021) explores oil price variations on days when the Organization of the Petroleum Exporting Countries (OPEC) announces its production policy to identify a "news shock" on oil prices. He then uses it as an external instrument in a VAR model to identify a structural oil supply shock. His methodology mitigates weak identification issues but also requires stronger assumptions than our GMM estimator.

Fernandez-Perez et al. (2016) study the interplay between energy and agricultural commodities. Stein (2025) employs a high-frequency identification strategy with intraday

[1] Along these lines, some studies treat commodity price shocks as proxies for broader external conditions (e.g., Bazzi and Blattman, 2014; Gazzani et al., 2024).

data for New Zealand dairy prices and finds a small effect of terms-of-trade shocks to the nominal exchange rate. Alessandri and Gazzani (2025) uses news on the European gas market and a VAR model to study how gas prices affect the economy.

Methodologically, our work aligns with a broad literature that uses high-frequency identification and, more specifically, to a subset of this literature that relies on identification through heteroskedasticity for causal estimation in macroeconomics. Our estimation procedure follows Rigobon and Sack (2004). Researchers have used this method to estimate effects of several variables, including the Central Bank policy rate (Rosa, 2011, and many others), real interest rates (Foley-Fisher and Guimaraes, 2013), Central Bank's asset purchases (Gilchrist and Zakrajšek, 2013), wars (Rigobon and Sack, 2005), trade wars (Carlomagno and Albagli, 2022), and default risk (Hébert and Schreger, 2017). We propose a way to use the methodology of identification through heteroskedasticity to estimate the effect of grain price shocks.

Broadly speaking, the results of this paper are relevant to those studying several economic issues of commodity-exporting countries, such as fiscal policy (e.g., Céspedes and Velasco, 2014; Di Pace et al., 2024), monetary policy (e.g., Ferrero and Seneca, 2019; Drechsel et al., 2019), the importance of terms-of-trade shocks (e.g., Schmitt-Grohé and Uribe, 2018; Di Pace et al., 2025) and inflation (e.g., Gelos and Ustyugova, 2017; Choi et al., 2018).

2 Empirical Methodology

Commodity prices and financial indicators affect each other and are affected by a bunch of omitted variables. These econometric issues are well captured by a system of two simultaneous equations:

$$p_t = \beta x_t + \gamma_p w_t + \varepsilon_t \tag{1}$$

$$x_t = \alpha p_t + \gamma_x w_t + \eta_t \tag{2}$$

where p_t are daily log changes in commodity prices, x_t are daily log changes in a particular financial price, w_t represents a set of unobserved variables and ε_t and η_t are shocks. Expectations about global macroeconomic variables (GDP, interest rates, inflation) are examples of omitted variables.

Estimating Equation (2) using OLS will not provide a consistent estimator of α.

Rigobon and Sack (2004) propose an estimator grounded on the assumption that in particular dates, there is an extra random shock to only one of the above equations. Let two sample periods be denoted by E for "event" and R for "regular". The crucial assumptions are that

$$\begin{aligned}\sigma_{\varepsilon}^{E} &> \sigma_{\varepsilon}^{R},\\ \sigma_{\eta}^{E} &= \sigma_{\eta}^{R},\\ \sigma_{w}^{E} &= \sigma_{w}^{R},\end{aligned}$$

Moreover, shocks are assumed to be uncorrelated, and parameters are assumed to be constant over time (as usual). In words, the estimator proposed by Rigobon and Sack (2004) can be applied if it is possible to identify dates when there is a shock affecting commodity prices but not directly affecting other financial prices or omitted variables. Typical instrumental variable estimation requires having some measure of the shock, while identification through heteroskedasticity (IH) requires knowing when the shocks occur.

Let Σ^i for $i \in \{E, R\}$ be the covariance matrix for each subsample:

$$\Sigma^i = \begin{bmatrix} Var(p_t) & Cov(p_t, x_t) \\ Cov(p_t, x_t) & Var(x_t) \end{bmatrix}$$

As shown in Rigobon and Sack (2004), under the identifying assumptions, the difference between the covariance matrix for each subsample is given by:

$$\Delta\Sigma = \Sigma^E - \Sigma^R = \frac{\left(\sigma_{\varepsilon}^{E} - \sigma_{\varepsilon}^{R}\right)}{(1-\alpha\beta)^2} \begin{bmatrix} 1 & \alpha \\ \alpha & \alpha^2 \end{bmatrix}$$

This generates three moments that depend on 2 unknowns:

$$\Delta Var(p_t) = Var^E(p_t) - Var^R(p_t) = \lambda \tag{3}$$

$$\Delta Cov(p_t, x_t) = Cov^E(p_t, x_t) - Cov^R(p_t, x_t) = \lambda\alpha \tag{4}$$

$$\Delta Var(x_t) = Var^E(x_t) - Var^R(x_t) = \lambda\alpha^2 \tag{5}$$

where $\lambda = \left(\sigma_{\varepsilon}^{E} - \sigma_{\varepsilon}^{R}\right)/[(1-\alpha\beta)^2]$.

We estimate α for several dependent variables. In each specification, p_t denotes a grain price index, while x_t represents a financial variable capturing either economic conditions in the United States or in emerging economies, or the price of another commodity.

We employ a GMM estimator with target moments given by (3), (4) and (5) – for more details, see Appendix A. We compare the results to a standard OLS estimate, which treats commodity price shocks as exogenous variables, in line with most of the literature. This comparison allows us to assess the importance of commodity shocks relative to other factors that correlate with them. Additionally, we present results from an event-study approach, which consists of an OLS regression of x_t on p_t using only the subsample of events. In the limiting case where the ratios $\sigma_\varepsilon/\sigma_\eta$ and $\sigma_\varepsilon/\sigma_w$ approach infinity, the event-study estimator is consistent.

In this paper, as in most of the literature, we take commodity price shocks as the starting point of our analysis. One could conjecture, however, that the source of these shocks matters: weather shocks and industrial technology shocks might generate similar movements in commodity prices but have different implications for the world economy. This is an interesting question, yet it lies beyond the scope of the present paper.

This issue is nonetheless related to our identification strategy. We treat price changes following the release of USDA Stocks Reports as exogenous shocks to commodity prices. One could argue, however, that these reports may also convey information about the broader state of the world economy – precisely the type of information our methodology aims to isolate from. If such an information channel is relevant, part of the observed price changes may reflect responses to the usual macroeconomic disturbances that jointly affect commodity prices and the global economy. In that case, the GMM estimates would be biased toward underestimating the difference between the true parameters and OLS coefficients, implying that the true causal effects of commodity shocks could be even smaller than our estimates.[2]

[2]A related debate concerns whether interest rate changes following monetary policy announcements can be seen as monetary shocks or reveal Central Bank's private information about the economy; see, e.g., Bauer and Swanson (2023) and Nakamura and Steinsson (2018).

3 Data and identification

3.1 USDA Stocks Reports

The fundamental premise of heteroskedasticity-based identification is that in certain dates, there is an important random shock to grain prices with no direct effect on other financial variables. This is indeed what happens on dates the USDA Stocks Reports are released.

The USDA is a government agency whose activities include collecting and publishing agricultural statistics. In particular, the Grain Stocks report, published every quarter since 1973, has been closely watched by market participants. Since 1987, it has been published in mid-January and on the last business day of March, June, and September.[3] Several studies have shown that USDA reports have strong effects on commodity prices (Adjemian, 2012; Adjemian and Irwin, 2018; McKenzie and Ke, 2022).

The report provides estimates of the domestic volume of grain stored in on-farm and off-farm storage facilities, broken down by state. The estimates are based on surveys conducted during the first two weeks of the last month of a quarter. The in-farm figures come from a survey based on a sampling procedure designed to ensure that any US producer can be selected. Off-farm statistics comprise all known commercial grain storage facilities, such as mills, elevators, warehouses, terminals, and processors. Despite paying special attention to corn, soybean, and wheat, the report also includes estimates for sorghum, oats, barley, flaxseed, canola, rapeseed, rye, sunflower, safflower, and mustard seed. The report is released at 12:00 p.m. EST. Around 30 pages of tables follow a highlight section summarizing the results.[4]

3.2 Data

Our dependent variable comes from prices of corn, soybeans, and wheat. Daily grain prices are measured by applying principal component analysis to the six nearby futures contracts traded on the same exchanges. The first principal component explains at least 90% of the variance in the six nearby future contracts for all the commodities considered. Using the first PC for several maturities avoids the liquidity distortions of spot prices and

[3] Appendix B provides an example of the Grain Stock report summary and a table with all release dates used in this paper.

[4] USDA reports were previously published before market opening. In 2013, the release time was changed to 12:00 p.m. EST, allowing markets to absorb new information during a period of high liquidity.

mitigates potential noise from the term structure in individual future contracts. Hence it tends to better reflect the impact of new information concerning the underlying supply and demand conditions.[5]

As the Grain Stocks report provides information on the three inventories simultaneously and their prices influence each other, our methodology cannot disentangle the effects of individual shocks. Hence our dependent variable p_t is the principal components of the three price series and use their first component to gauge price innovations. Hence we are estimating the joint causal effect of these three crops.

The variables x_t are categorized into three groups: i) prices of other commodities (crude oil, soybean oil, live cattle, and heating oil); ii) indicators from emerging economies (CDS, nominal exchange rate, and stock index for Brazil, Chile, Colombia, Mexico, and Peru);[6] and iii) US indicators (Dollar Index, S&P 500, Implied Volatility Index (VIX), breakeven inflation, and interest rate). All variables are standardized log changes of daily quotes from October 2003 to October 2024 (5412 observations).

The selection of variables, countries, and time range is primarily based on their availability and suitability for the adopted econometric model. Among the set of variables for which the response to a grain price shock may be of interest, only those measured daily are selected. The chosen emerging countries are those whose financial market is open during the release of the USDA Grain Stocks report and for which there are at least 95% of daily quotes for CDS in the established period. The U.S. economy is also included due to its relevance and greater variety of high-frequency data. Finally, the beginning of the sample is constrained by the U.S. breakeven inflation data. See Appendix C for more details.

3.3 The importance of USDA Stock Reports

In order to implement the methodology of identification through heteroskedasticity, the sample is split in two: dates when the USDA Stocks Reports are released (subsample E)

[5]This approach is common in the literature (for example, Känzig (2021) employs a similar method to get a measure of oil price shocks).

[6]In Appendix G, we show results for the EMBI premium, another proxy for default risk.

and all other dates (subsample R).[7] The methodology requires a substantial increase in variance in subsample E.

To assess the importance of the USDA Stocks Reports, we calculate the variance of grain prices in both subsamples. The variance is 5.7 times greater for Corn, 4.2 times greater for Soybeans, and 3.4 times greater for Wheat when reports are released. Table 1 shows mean and variance of p_t, calculated as the principal component of the three grain prices. On Event dates, the variance of p_t is 4.6 times larger.

Window Type	Event	Non-Event
Mean p_t	-0.025	0.0004
Variance p_t	4.381	0.947
Number of dates	84	5328

Table 1: The sample is divided in two subsamples: dates when USDA Reports are released (Events) and other dates (Non-events). The variable p_t is the principal component of time series of prices of Corn, Soybeans and Wheat.

We test whether the difference in variance between the two subsamples is statistically significant and, consequently, whether the USDA shock is sufficiently important to allow for the identification of a causal effect. Table 2 shows that the hypothesis of equal variances is strongly rejected by the tests of Levene (1960) and Brown and Forsythe (1974), and that the heteroskedasticity-based instrument proposed by Rigobon and Sack (2004) passes weak identification tests with flying colors. The bottom row reports the F-statistic from the weak identification test in models identified through heteroskedasticity, as proposed by Lewis (2022). He provides a rule of thumb requiring $F > 37.42$ for the first-stage F-statistic to reject the null hypothesis that the bias associated with weak instruments exceeds 5% (and $F > 23.11$ for 10%).

Appendix H provides further evidence on the importance of the USDA Grain Stocks Report. Using the limited available intraday trading data, it shows that the report release has a striking market impact, often triggering price jumps and consistently causing sharp spikes in trade volume. In the 15 minutes following the release, trade volume for the three commodities averages over ten times the median volume at that hour on a typical day.

[7]Since three quarters of USDA Report announcement dates fall on month-end dates, we also estimate the model using only month-end dates as the control group. The results, shown in Appendix F, are similar to those presented in the main text.

Test	F-statistic	p-value
Levene	153.75	0.000
Brown-Forsythe	153.55	0.000
First-Stage F-stat	0.216	0.000
Lewis F-stat	357.87	

Table 2: Tests of Differences in Variance

4 Results

For each pair of p_t and x_t, we provide 3 estimates: (i) a standard OLS estimate, that takes commodity price shocks as exogenous variables in line with the literature; (ii) an event-study approach, which is an OLS regression of x_t on p_t using only the subsample of events; and (iii) the GMM estimator, based on the methodology of identification through heteroskedasticity. By comparing these three estimates, we can evaluate the bias caused by endogeneity issues.

All variables have been normalized to zero mean and one standard deviation, so a coefficient of 0.1 means that a positive one standard deviation shock in p_t leads to an elevation of 0.1 standard deviations in x_t.

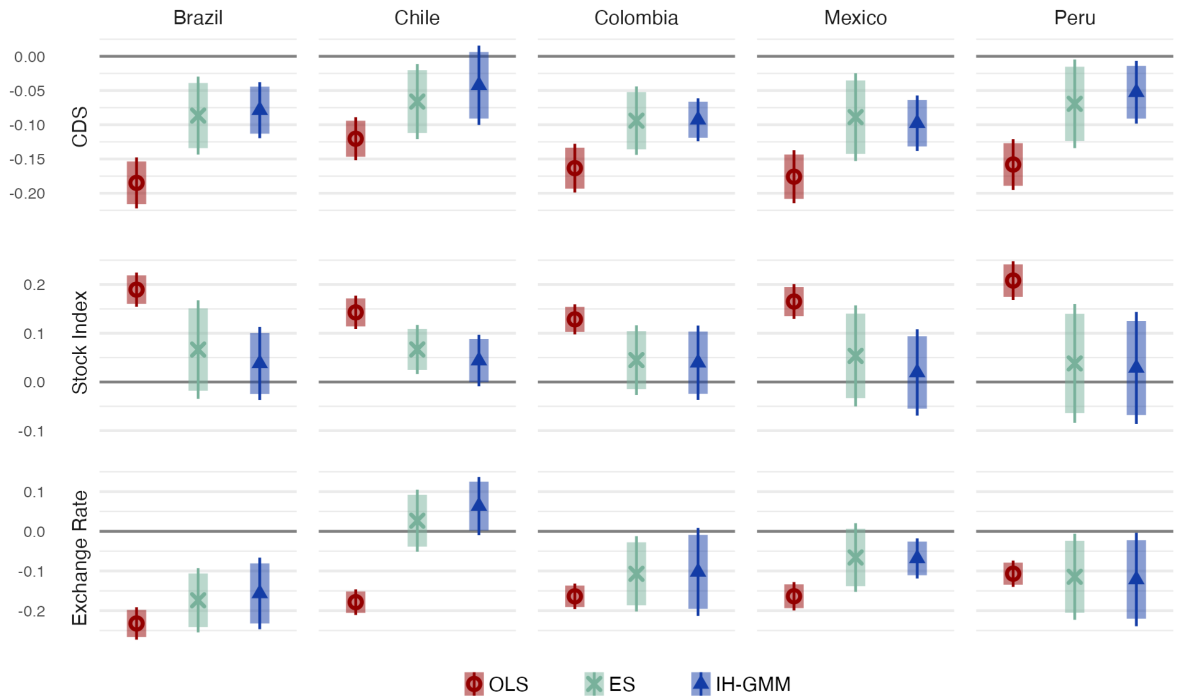
Emerging economies. Figure 1 show the estimates of the effects of commodity shocks on CDS prices, the stock market and exchange rates for Brazil, Chile, Colombia, Mexico and Peru.

The OLS estimates show a negative relationship between grain prices and CDS prices for Latin American countries, with coefficients ranging from -0.12 to -0.18. These values lie well outside the confidence intervals of estimates obtained through heteroskedasticity-based identification, which range from -0.04 to -0.10. While statistically significant, the latter estimates are approximately half to a third the magnitude of the OLS estimates. Hence, while commodity shocks do influence credit risk in emerging economies, their effect is considerably smaller than what a naive approach assuming exogenous commodity prices would imply.

The second row of Figure 1 shows that OLS tends to overestimate the effects of grain prices estimates on stock indices even more. The true causal effects appear to be minimal, as none of the IH estimates significantly differ from zero. While OLS estimates range from 0.12 to 0.21, the IH point estimates are always positive but do not exceed 0.05.

The third row of Figure 1 displays the responses of nominal exchange rates. The

Figure 1: Effects on emerging economies



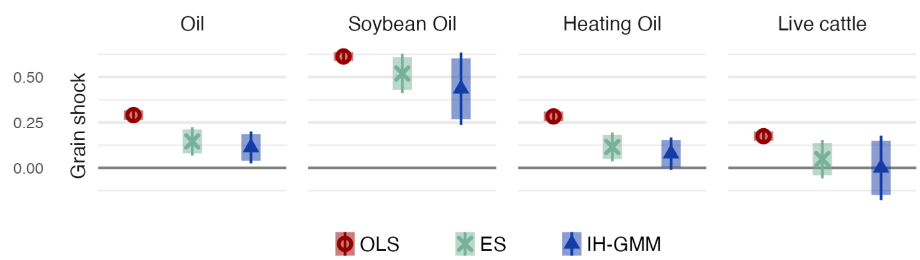
Note: Estimates of α for different countries (columns) and response variable x_t (rows), according to different approaches (OLS, Event Study, and Identification through Heteroskedasticity). The sample period ranges from October 2003 to October 2024, with 5412 observations for OLS and IH-GMM estimates, and 84 for the event study. The solid dots are point estimates, while error bars/lines show the 90%/95% confidence intervals based on standard errors robust to heteroskedasticity and autocorrelation. All variables are normalized to zero mean and one standard deviation. Table 6 in Appendix D shows the values of estimates and standard errors.

OLS estimates are relatively similar across countries, suggesting that grain price shocks generally lead to currency appreciation. However, the GMM results reveal a more nuanced picture. In Chile, positive shocks to grain prices, if anything, tend to result in currency depreciation. In the other countries, these shocks appear to lead to currency appreciation, although only in the case of Brazil is the coefficient clearly statistically significant.

Judging by the point estimates, the OLS coefficients seem somewhat inflated for Brazil and Colombia, substantially overstated for Mexico, completely wrong for Chile, but possibly accurate for Peru. Overall, the results indicate that grain price shocks affect exchange rates differently and that assuming the exogeneity of commodity shocks leads to an overestimation of their impact.

Commodities. It is also instructive to examine the responses of other commodity prices to grain shocks. As shown in Figure 2, the OLS estimates are upward biased. We find a positive effect on oil prices, but the magnitude is about one-third of the OLS estimate. A one-standard deviation increase in grain prices raises oil prices by around 0.1 standard deviations of daily changes.[8]

Figure 2: Effects on commodity prices



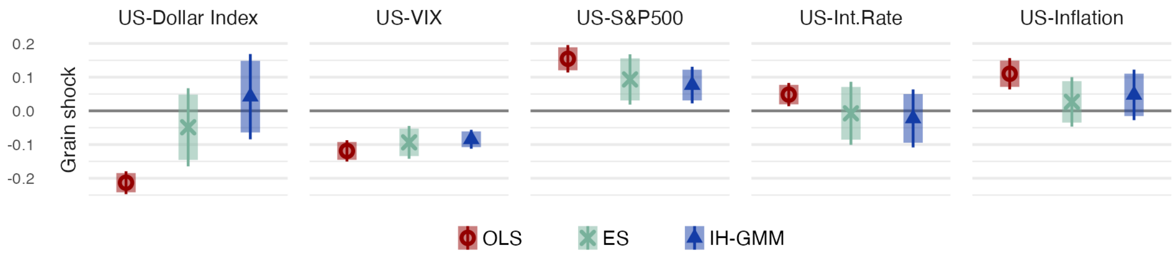
Note: Estimates of α for distinct commodity prices, according to different approaches (OLS, Event Study, and Identification through Heteroskedasticity). The sample period ranges from October 2003 to October 2024, with 5412 observations for OLS and IH-GMM estimates and 84 for the event study. The solid dots are point estimates, while error bars/lines show the 90%/95% confidence intervals based on standard errors robust to heteroskedasticity and autocorrelation. All variables are normalized to zero mean and one standard deviation. Table 7 in Appendix D shows the values of estimates and standard errors.

U.S. indicators. Finally, Figure 3 presents the estimates for the responses of U.S. indicators. Owing to data availability, the sample begins in November 2004 rather than in October 2003 as before. Aside from the ever-present OLS bias, two observations stand out. First, grain price shocks have a positive effect on the S&P 500 index and a negative effect on the VIX, with magnitudes (in terms of standard deviations of daily changes) roughly similar to those of the effects on CDS spreads and oil prices. Second, the effects on the exchange rate, interest rates and inflation are small and not statistically different from zero.[9]

[8] Fernandez-Perez et al. (2016) study the effect of grain prices on oil using a structural VAR analysis. They do not find a significant effect of agricultural commodities on crude oil, whereas we find a small but statistically significant effect. The differences in results may arise due to methodological differences or because their sample period is approximately half the length of the period examined here.

[9] In Appendix I, we examine whether using residuals from a regression of commodity prices on U.S. financial indicators can mitigate the endogeneity bias in OLS estimates. While this approach alleviates part of the bias, it does not fully resolve the issue.

Figure 3: Effects on U.S. variables



Note: Estimates of α for US financial variables, according to different approaches (OLS, Event Study, and Identification through Heteroskedasticity). The sample period ranges from November 2004 to October 2024, with 5142 observations for OLS and IH-GMM estimates and 80 for the event study. The solid dots are point estimates, while error bars/lines show the 90%/95% confidence intervals based on standard errors robust to heteroskedasticity and autocorrelation. All variables are normalized to zero mean and one standard deviation. Table 8 in Appendix D shows the values of estimates and standard errors.

Event-study and GMM estimators. Figures 1, 2 and 3 show that the event-study and GMM estimates are typically close to each other. This is common in work that follows the methodology of Rigobon and Sack (2004). The event-study estimator converges to the true parameter – and therefore to the GMM estimator – as the variance of grain price shocks on event dates grows towards infinity. In practice, this variance is finite, so some bias remains. However, when shocks on event dates are large, the bias of the event-study estimator is small. Conversely, when shocks are not large, the estimator is likely to fail weak-identification tests, as the strength of the instrument depends on a sizable increase in the volatility of shocks to equation (1) on event dates.

An additional shock to commodity prices raises not only the variance of commodity prices themselves but also that of other affected variables. Hence, since the variance of commodity price changes around USDA Stocks Report release dates is 4.6 times larger than on other dates, the shocks to equation (1) on event dates must be much larger than usual. This explains why the instrument is strong (Table 2) and why the event-study and GMM estimates are similar.

In contrast, the OLS estimates are very different, implying that treating commodity prices as exogenous leads to overstating their causal effects.

How commodity prices affect emerging economies. The export composition of the five emerging countries differs substantially. Brazil is the only one with a sizable share of grain exports – especially soybeans, but also corn. Its net exports of agricultural products exceed those of energy and metals.[10] By contrast, Chile, Colombia, and Peru rely heavily on exports of energy and metals.[11] Mexico exports primarily to the United States, with its main export products being manufactured goods such as telephones, cars, and computers, though oil remains significant.

Despite those differences, estimated causal effects on CDS spreads and stock market indices are broadly similar across the five emerging economies. The estimated effect on Brazil's CDS ranks third among them – and second when the CDS is replaced by the EMBI premium (see Appendix G). Estimated effects on stock market indices are all below 0.05 and not statistically significant at the 5% level.

However, the effects on exchange rates differ across countries. A positive commodity price shock leads to a larger and clearly statistically significant currency appreciation in Brazil, a smaller and borderline significant appreciation in Colombia, Mexico, and Peru, and a borderline significant depreciation in Chile.

Taken together with the results for other commodities and U.S. financial indicators, these findings suggest the following narrative. A positive shock to grain prices has a modest but significant effect on the global economy: it lowers the VIX, raises the U.S. stock market index, and reduces sovereign spreads. Countries whose export revenues benefit directly from higher commodity prices experience currency appreciation, but most effects on local economies appear to operate indirectly – through worldwide equilibrium adjustments – rather than directly via export revenues.

5 Concluding remarks

It is well known that commodity prices are highly correlated with other financial and macroeconomic variables. However, extracting cause-and-effect relationships from these co-movements is challenging due to their simultaneity. In this paper, we use the increased volatility produced by relevant information releases to isolate the causal effects of grain prices on several financial indicators, exploring a novel source of shocks, the USDA Grain

[10]Brazil's exports of agricultural products are roughly on par with its exports of energy and metals, but petroleum, coal, and metals also account for a sizable share of Brazilian imports.

[11]In Chile, copper dominates exports, though animal products and fruits are also relevant, each accounting for about 10% of total exports. Colombia's exports are concentrated in oil, coal, and gold, while its main agricultural exports – coffee, flowers, and bananas – together represent roughly 10% of total exports. In Peru, petroleum and metals are by far the most important export goods.

Stocks report.

We conclude that commodity price shocks are considerably less influential than suggested by simple regressions of changes in emerging market financial indicators on commodity price changes. Nevertheless, these shocks have a meaningful impact on the global economy. A one-standard deviation increase in grain prices raises the S&P 500 index and reduces the VIX by about 0.08 standard deviations of daily changes, while lowering sovereign CDS spreads in emerging economies by approximately 0.05 to 0.10 standard deviations.

References

Addison, Tony, Atanu Ghoshray, and Michalis P Stamatogiannis, "Agricultural commodity price shocks and their effect on growth in Sub-Saharan Africa," *Journal of Agricultural Economics*, 2016, *67* (1), 47–61.

Adjemian, Michael K., "Quantifying the WASDE Announcement Effect," *American Journal of Agricultural Economics*, 2012, *94* (1), 238–256.

Adjemian, Michael K and Scott H Irwin, "USDA Announcement Effects in Real-Time," *American Journal of Agricultural Economics*, 2018, *100* (4), 1151–1171.

Alessandri, Piergiorgio and Andrea Gazzani, "Natural gas and the macroeconomy: not all energy shocks are alike," *Journal of Monetary Economics*, 2025, *151*, 103749.

Alquist, Ron, Saroj Bhattarai, and Olivier Coibion, "Commodity-price comovement and global economic activity," *Journal of Monetary Economics*, 2020, *112*, 41–56.

Bauer, Michael D and Eric T Swanson, "An alternative explanation for the 'Fed information effect'," *American Economic Review*, 2023, *113* (3), 664–700.

Bazzi, Samuel and Christopher Blattman, "Economic shocks and conflict: Evidence from commodity prices," *American Economic Journal: Macroeconomics*, 2014, *6* (4), 1–38.

Ben Zeev, Nadav, Evi Pappa, and Alejandro Vicondoa, "Emerging economies business cycles: The role of commodity terms of trade news," *Journal of International Economics*, 2017, *108*, 368–376.

Brown, Morton B and Alan B Forsythe, "Robust tests for the equality of variances," *Journal of the American Statistical Association*, 1974, *69* (346), 364–367.

Carlomagno, Guillermo and Elías Albagli, "Trade wars and asset prices," *Journal of International Money and Finance*, 2022, *124*, 102631.

Cashin, Paul, Luis F. Céspedes, and Ratna Sahay, "Commodity currencies and the real exchange rate," *Journal of Development Economics*, 2004, *75* (1), 239–268.

Chen, Yu-chin and Kenneth Rogoff, "Commodity currencies," *Journal of International Economics*, 2003, *60* (1), 133–160.

Choi, Sangyup, Davide Furceri, Prakash Loungani, Saurabh Mishra, and Marcos Poplawski-Ribeiro, "Oil prices and inflation dynamics: Evidence from advanced and developing economies," *Journal of International Money and Finance*, 2018, *82*, 71–96.

Colombi, Emilio, "The distributional consequences of commodity booms," *Working Paper*, 2024.

Céspedes, Luis Felipe and Andrés Velasco, "Was this time different?: Fiscal policy in commodity republics," *Journal of Development Economics*, 2014, *106*, 92–106.

Di Pace, Federico, Luciana Juvenal, and Ivan Petrella, "Commodity prices and fiscal (pro) cyclicality," *Working Paper*, 2024.

_ , _ , and _ , "Terms-of-trade shocks are not all alike," *American Economic Journal: Macroeconomics*, 2025, *17* (2), 24–64.

Drechsel, Thomas and Silvana Tenreyro, "Commodity booms and busts in emerging economies," *Journal of International Economics*, 2018, *112*, 200–218.

_ , Michael McLeay, and Silvana Tenreyro, "Monetary policy for commodity booms and busts," 2019. Paper prepared for the 2019 Jackson Hole Economic Policy Symposium.

Fernandez-Perez, Adrian, Bart Frijns, and Alireza Tourani-Rad, "Contemporaneous interactions among fuel, biofuel and agricultural commodities," *Energy Economics*, 2016, *58*, 1–10.

Fernández, Andrés, Andrés González, and Diego Rodríguez, "Sharing a ride on the commodities roller coaster: Common factors in business cycles of emerging economies," *Journal of International Economics*, 2018, *111*, 99–121.

_ , Stephanie Schmitt-Grohé, and Martín Uribe, "World shocks, world prices, and business cycles: An empirical investigation," *Journal of International Economics*, 2017, *108*, S2–S14.

Ferrero, Andrea and Martin Seneca, "Notes on the Underground: Monetary Policy in Resource-Rich Economies," *Journal of Money, Credit and Banking*, 2019, *51* (4), 953–976.

Foley-Fisher, Nathan and Bernardo Guimaraes, "US real interest rates and default risk in emerging economies," *Journal of Money, Credit and Banking*, 2013, *45* (5), 967–975.

Gazzani, Andrea, Fabrizio Venditti, and Giovanni Veronese, "Oil price shocks in real time," *Journal of Monetary Economics*, 2024, *144*, 103547.

Gelos, Gaston and Yulia Ustyugova, "Inflation responses to commodity price shocks – How and why do countries differ?," *Journal of International Money and Finance*, 2017, *72*, 28–47.

Gilchrist, Simon and Egon Zakrajšek, "The impact of the Federal Reserve's large-scale asset purchase programs on corporate credit risk," *Journal of Money, Credit and Banking*, 2013, *45* (s2), 29–57.

Hébert, Benjamin and Jesse Schreger, "The Costs of Sovereign Default: Evidence from Argentina," *American Economic Review*, 2017, *107* (10), 3119–3145.

Juvenal, Luciana and Ivan Petrella, "Unveiling the dance of commodity prices and the global financial cycle," *Journal of International Economics*, 2024, *149*, 103941.

Kilian, Lutz and Xiaoqing Zhou, "The Econometrics of Oil Market VAR Models," *FRB of Dallas Working Paper*, March 2020, *No. 2006.*

Kohn, David, Fernando Leibovici, and Håkon Tretvoll, "Trade in commodities and business cycle volatility," *American Economic Journal: Macroeconomics*, 2021, *13* (3), 173–208.

Känzig, Diego R., "The Macroeconomic Effects of Oil Supply News: Evidence from OPEC Announcements," *American Economic Review*, 2021, *111* (4), 1092–1125.

Levene, Howard, "Robust tests for equality of variances," *Contributions to Probability and Statistics*, 1960, pp. 278–292.

Lewis, Daniel J., "Robust Inference in Models Identified via Heteroskedasticity," *Review of Economics and Statistics*, 2022, *104* (3), 510–524.

McKenzie, Andrew M. and Yangmin Ke, "How do USDA announcements affect international commodity prices?," *Journal of Commodity Markets*, 2022, *28*, 100239.

Nakamura, Emi and Jón Steinsson, "High-frequency identification of monetary non-neutrality: the information effect," *Quarterly Journal of Economics*, 2018, *133* (3), 1283–1330.

Rigobon, Roberto, "Identification through Heteroskedasticity," *Review of Economics and Statistics*, 2003, *85* (4), 777–792.

— **and Brian Sack**, "The impact of monetary policy on asset prices," *Journal of Monetary Economics*, 2004, *51* (8), 1553–1575.

— **and** — , "The effects of war risk on US financial markets," *Journal of Banking & Finance*, 2005, *29* (7), 1769–1789.

Rosa, Carlo, "The Validity of the Event-study Approach: Evidence from the Impact of the Fed's Monetary Policy on US and Foreign Asset Prices," *Economica*, 2011, *78* (311), 429–439.

Schmitt-Grohé, Stephanie and Martín Uribe, "How important are terms-of-trade shocks?," *International Economic Review*, 2018, *59* (1), 85–111.

Shousha, S., "Macroeconomic Effects of Commodity Booms and Busts : The Role of Financial Frictions," *Working Paper*, 2016.

Stein, Hillary, "Got milk? The effect of export price shocks on exchange rates," *Journal of International Economics*, 2025, *155*, 104080.

Tahar, Moez Ben, Sarra Ben Slimane, and Mohamed Ali Houfi, "Commodity prices and economic growth in commodity-dependent countries: New evidence from nonlinear and asymmetric analysis," *Resources Policy*, 2021, *72*, 102043.

Toma, Hiroshi and Walter Cuba, "The Financial Propagation Mechanism of Commodity Booms," *Working Paper*, 2024.

A GMM estimation

The set of moments is given by

$$b_t = \text{vech}\left(\left(\frac{N}{N_E}\tau_t^E - \frac{N}{N_R}\tau_t^R\right)[p_t\ x_t]'\,[p_t\ x_t] - \lambda[1\ \alpha]'[1\ \alpha]\right)$$

where N_E, N_R, and N are the number of observations in each subsample and the whole sample; τ_t^E and τ_t^R are dummy variables for the subsamples; and $\lambda \equiv \frac{\left(\sigma_\varepsilon^E - \sigma_\varepsilon^R\right)}{(1-\alpha\beta)^2}$ summarizes the degree of heteroskedasticity. The estimation consists of finding $\left\{\hat{\alpha}_{\text{ih}}, \hat{\lambda}\right\}$ that minimize

$$\left[\sum_{t=1}^{N} b_t\right]' W_N \left[\sum_{t=1}^{N} b_t\right]$$

where W_N is the optimal weighting matrix.

The GMM estimation follows a two-step procedure, with the first step using the identity matrix as the weighting matrix.

B USDA information

Figure 4: Highlights of a Grain Stocks report

USDA

Grain Stocks

ISSN: 1949-0925

Released January 12, 2022, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA).

Corn Stocks Up 3 Percent from December 2020
Soybean Stocks Up 7 Percent
All Wheat Stocks Down 18 Percent

Corn stored in all positions on December 1, 2021 totaled 11.6 billion bushels, up 3 percent from December 1, 2020. Of the total stocks, 7.23 billion bushels are stored on farms, up 3 percent from a year earlier. Off-farm stocks, at 4.41 billion bushels, are up 4 percent from a year ago. The September - November 2021 indicated disappearance is 4.70 billion bushels, compared with 4.74 billion bushels during the same period last year.

Soybeans stored in all positions on December 1, 2021 totaled 3.15 billion bushels, up 7 percent from December 1, 2020. Soybean stocks stored on farms totaled 1.52 billion bushels, up 16 percent from a year ago. Off-farm stocks, at 1.63 billion bushels, are down 1 percent from last December. Indicated disappearance for September - November 2021 totaled 1.54 billion bushels, down 14 percent from the same period a year earlier.

All wheat stored in all positions on December 1, 2021 totaled 1.39 billion bushels, down 18 percent from a year ago. On-farm stocks are estimated at 273 million bushels, down 43 percent from last December. Off-farm stocks, at 1.12 billion bushels, are down 8 percent from a year ago. The September - November 2021 indicated disappearance is 384 million bushels, 16 percent below the same period a year earlier.

Table 3: Event dates

12/01/2004	12/01/2007	12/01/2010	11/01/2013	12/01/2016	08/02/2019	12/01/2022
31/03/2004	30/03/2007	31/03/2010	28/03/2013	31/03/2016	29/03/2019	31/03/2022
30/06/2004	29/06/2007	30/06/2010	28/06/2013	30/06/2016	28/06/2019	30/06/2022
30/09/2004	28/09/2007	30/09/2010	30/09/2013	30/09/2016	30/09/2019	30/09/2022
12/01/2005	11/01/2008	12/01/2011	10/01/2014	12/01/2017	10/01/2020	12/01/2023
31/03/2005	31/03/2008	31/03/2011	31/03/2014	31/03/2017	31/03/2020	31/03/2023
30/06/2005	30/06/2008	30/06/2011	30/06/2014	30/06/2017	30/06/2020	30/06/2023
30/09/2005	30/09/2008	30/09/2011	30/09/2014	29/09/2017	30/09/2020	29/09/2023
12/01/2006	12/01/2009	12/01/2012	12/01/2015	12/01/2018	12/01/2021	12/01/2024
31/03/2006	31/03/2009	30/03/2012	31/03/2015	29/03/2018	31/03/2021	28/03/2024
30/06/2006	30/06/2009	29/06/2012	30/06/2015	29/06/2018	30/06/2021	28/06/2024
29/09/2006	30/09/2009	28/09/2012	30/09/2015	28/09/2018	30/09/2021	30/09/2024

Notes: The dates for the USDA Grain Stocks report are a compilation from the USDA website.

C Data details

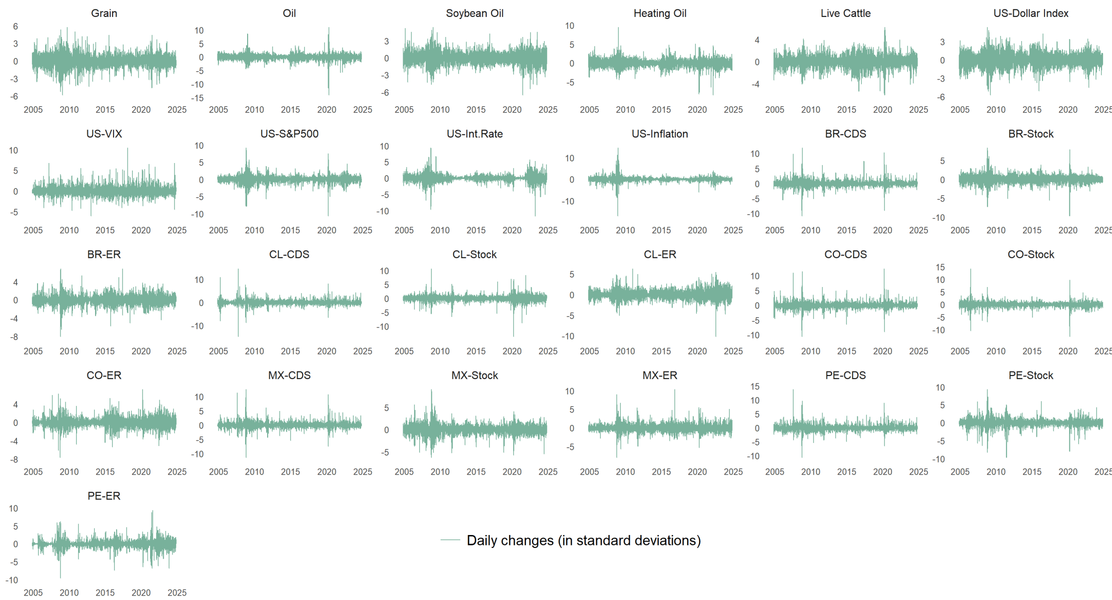
Table 4: Data sources: country indicators

Country	Indicator	Bloomberg Ticker
Brazil	Credit Default Swap (CDS)	CBRZ1U5 CBIN Curncy
Brazil	Stock Index	IBOV Index
Brazil	Currency rate against US dollar	BRL CMPN Curncy
Chile	Credit Default Swap (CDS)	CCHIL1U5 CBIN Curncy
Chile	Stock Index	IPSA Index
Chile	Currency rate against US dollar	CLP CMPN Curncy
Colombia	Credit Default Swap (CDS)	CCOL1U5 CBIN Curncy
Colombia	Stock Index	COLCAP Index
Colombia	Currency rate against US dollar	COP CMPN Curncy
Mexico	Credit Default Swap (CDS)	CMEX1U5 CBIN Curncy
Mexico	Stock Index	MEXBOL Index
Mexico	Currency rate against US dollar	MXN CMPN Curncy
Peru	Credit Default Swap (CDS)	CPERU1U5 CBIN Curncy
Peru	Stock Index	SPBLPGPT Index
Peru	Currency rate against US dollar	PEN CMPN Curncy
United States	US Dollar Index	DXY Curncy
United States	VIX	VIX Index
United States	S&P 500 INDEX	SPX Index
United States	Generic Government Bond Yield 2 Yr	GT2 Govt
United States	Zero-coupon inflation swap (ZCIS) 2 Yr	USSWIT2 BGN Curncy

Table 5: Data sources: commodity prices

Commodity	Nearby Future Contracts	Bloomberg Ticker
CBOT Soybean	1-6	S COMDTY
CBOT Corn	1-6	C COMDTY
CBOT Wheat	1-6	W COMDTY
CBOT Soybean Oil	1-6	BO COMDTY
CME Live Cattle	1-6	LC COMDTY
NYMEX Light Crude Oil	1-6	CL COMDTY
NYMEX Heating Oil	1-6	HO COMDTY

Figure 5: Transformed data series



Note: Daily series included in the empirical exercise. All variables are standardized log changes.

D Estimates

Table 6 shows the estimates for the effects of commodity shocks on CDS, stock indices and exchange rates for 6 Latin American countries, depicted in Figure 1.

Table 6: Estimates

		OLS		ES		IH-GMM	
Country	Index	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
BR	CDS	-0.18	0.02	-0.09	0.03	-0.08	0.02
BR	Stock Index	0.19	0.02	0.07	0.05	0.04	0.04
BR	Exchange Rate	-0.23	0.02	-0.17	0.04	-0.16	0.05
CL	CDS	-0.12	0.02	-0.07	0.03	-0.04	0.03
CL	Stock Index	0.14	0.02	0.07	0.03	0.04	0.03
CL	Exchange Rate	-0.18	0.02	0.03	0.04	0.06	0.04
CO	CDS	-0.16	0.02	-0.09	0.03	-0.09	0.02
CO	Stock Index	0.13	0.02	0.04	0.04	0.04	0.04
CO	Exchange Rate	-0.16	0.02	-0.11	0.05	-0.10	0.06
MX	CDS	-0.18	0.02	-0.09	0.03	-0.10	0.02
MX	Stock Index	0.17	0.02	0.05	0.05	0.02	0.05
MX	Exchange Rate	-0.16	0.02	-0.07	0.04	-0.07	0.03
PE	CDS	-0.16	0.02	-0.07	0.03	-0.05	0.02
PE	Stock Index	0.21	0.02	0.04	0.06	0.03	0.06
PE	Exchange Rate	-0.11	0.02	-0.11	0.05	-0.12	0.06

Table 7 shows the estimates for the effects of grain shocks on the price of other commodities, depicted in Figure 2.

Table 7: Figure 2 estimates

Commodity	Model	Estimate	S.E.
Live Cattle	OLS	0.17	0.02
Live Cattle	ES	0.05	0.05
Live Cattle	IH-GMM	0.00	0.09
Heating Oil	OLS	0.28	0.02
Heating Oil	ES	0.12	0.04
Heating Oil	IH-GMM	0.08	0.05
Oil	OLS	0.29	0.02
Oil	ES	0.15	0.04
Oil	IH-GMM	0.11	0.04
Soybean Oil	OLS	0.61	0.01
Soybean Oil	ES	0.52	0.05
Soybean Oil	IH-GMM	0.44	0.10

Table 8 shows the estimates for the effects of grain shocks on financial indicators in the US, depicted in Figure 3.

Table 8: Figure 3 estimates

		OLS		ES		IH-GMM	
Country	Index	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
US	Dollar Index	-0.21	0.02	-0.05	0.06	0.04	0.06
US	Inflation	0.11	0.02	0.03	0.04	0.05	0.04
US	Interest Rate	0.05	0.02	-0.01	0.05	-0.02	0.04
US	SP 500	0.15	0.02	0.09	0.04	0.08	0.03
US	VIX	-0.12	0.02	-0.09	0.02	-0.08	0.01

E Tests of Equal Variance

A potential concern is that the timing of USDA Stocks Report releases could coincide with other major news announcements. However, an examination of those dates suggests that any such overlap is of little importance.[12]

Coincidence with those or other news releases could increase the variance of changes in financial prices on event dates. In fact, our identifying assumptions imply that the variance of changes in other financial variables should be somewhat higher on those dates, reflecting the transmission of commodity price shocks to financial markets. Nevertheless, for most variables, this effect on the variance should be relatively small. If the variance equality tests detected a generalized increase in the volatility of financial variables around event dates – given that we only have 84 such dates – we would be concerned. However, as shown in Table 9, that is not the case.

Table 9: Levene tests of equal variance

Variable	F-stat	p-value
Oil	0.007	0.933
Natural gas	0.390	0.532
Gold	0.825	0.364
Dollar index	1.452	0.228
VIX	3.856	0.050
S&P 500	0.550	0.459
US interest rates	0.096	0.757
US inflation	1.518	0.218

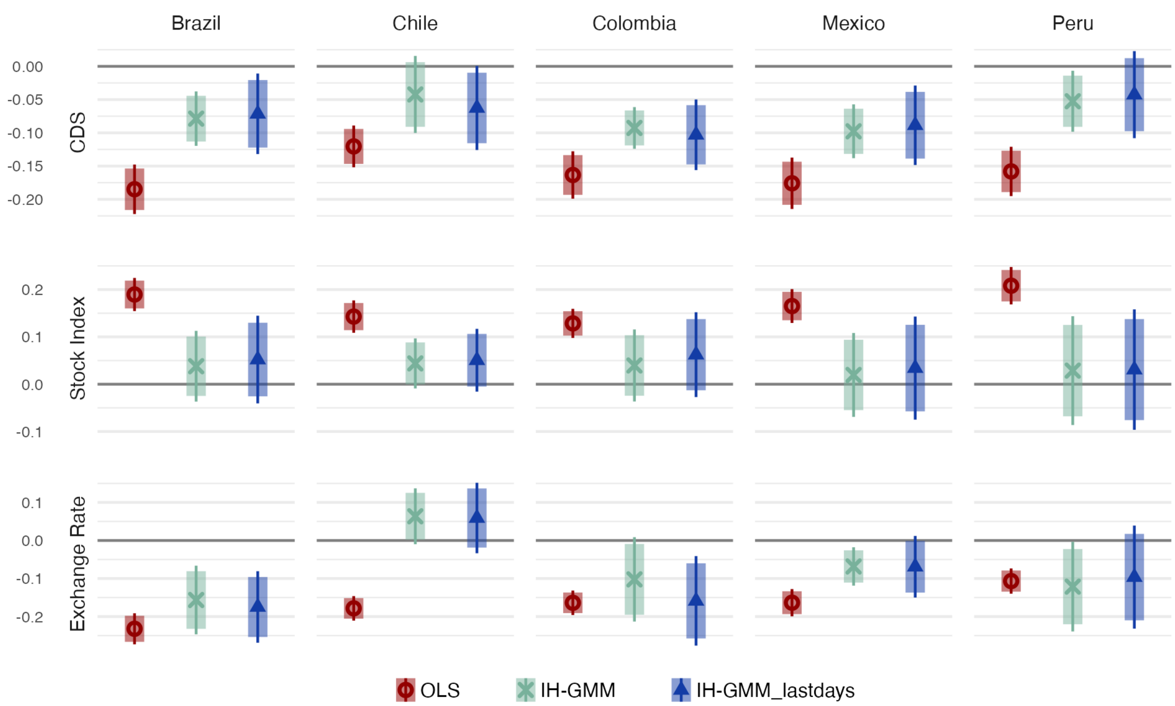
The tests fail to reject the null of equal variance for all variables except the VIX, which is consistent with our finding that commodity prices have a significant effect on the VIX.

[12] Out of 5,412 days in our sample, 84 correspond to a USDA Stocks Report, implying that the probability of any random date falling on a report release is just 1.55%. A closer look at major scheduled announcements reveals no meaningful deviation from this pattern. For example, 2 out of 179 FOMC meeting dates (1.12%) coincide with a Stocks Report. The corresponding figures are 3 out of 264 (1.14%) for China's trade balance releases, 2 out of 313 (0.64%) for ECB policy decisions, 3 out of 138 (2.17%) for OPEC announcements, and 2 out of 277 (0.72%) for U.S. payroll data releases.

F Month-End Dates as Control Group

In our baseline estimations, all calendar dates are included in the sample: dates with USDA Report announcements are classified as event dates, and all other dates serve as the control group. Since most reports are released on the last day of a month, we also re-estimate using an alternative control group composed only of month-end dates with no USDA Report announcement.

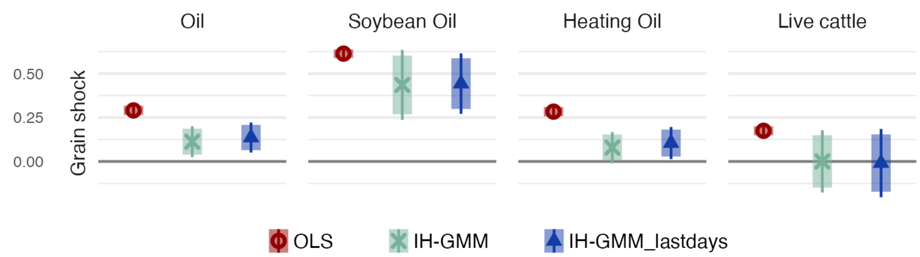
Figure 6: Effects on emerging economies



Note: Estimates of α for different countries (columns) and response variable x_t (rows), according to different approaches (OLS, IH with all dates in the control group, and IH with only month-end dates in the control group). The sample period ranges from October 2003 to October 2024. The solid dots are point estimates, while error bars/lines show the 90%/95% confidence intervals based on standard errors robust to heteroskedasticity and autocorrelation. All variables are normalized to zero mean and one standard deviation.

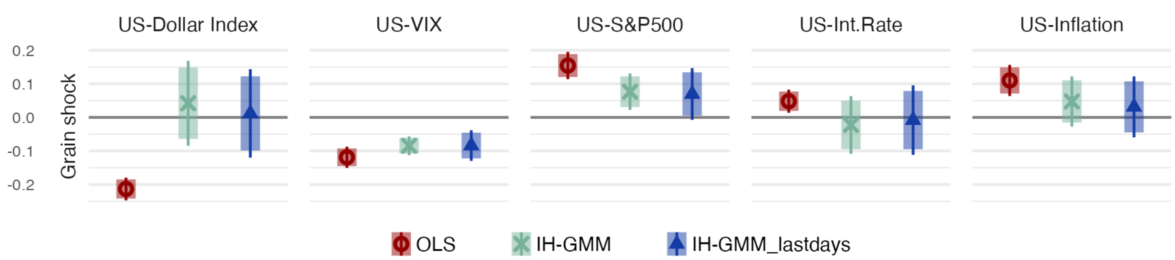
Figures 6, 7, and 8 present estimates obtained with OLS, with identification through heteroskedasticity using all dates as the control group, and with identification through heteroskedasticity using only month-end dates as the control group. The heteroskedasticity-based estimates are very similar across the two control groups, and typically differ from those obtained with OLS. When the control group is restricted to month-end dates, standard errors are often a bit larger due to the smaller sample size.

Figure 7: Effects on commodity prices



Note: Estimates of α for distinct commodity prices, according to different approaches (OLS, IH with all dates in the control group, and IH with only month-end dates in the control group). The sample period ranges from October 2003 to October 2024. The solid dots are point estimates, while error bars/lines show the 90%/95% confidence intervals based on standard errors robust to heteroskedasticity and autocorrelation. All variables are normalized to zero mean and one standard deviation.

Figure 8: Effects on U.S. variables



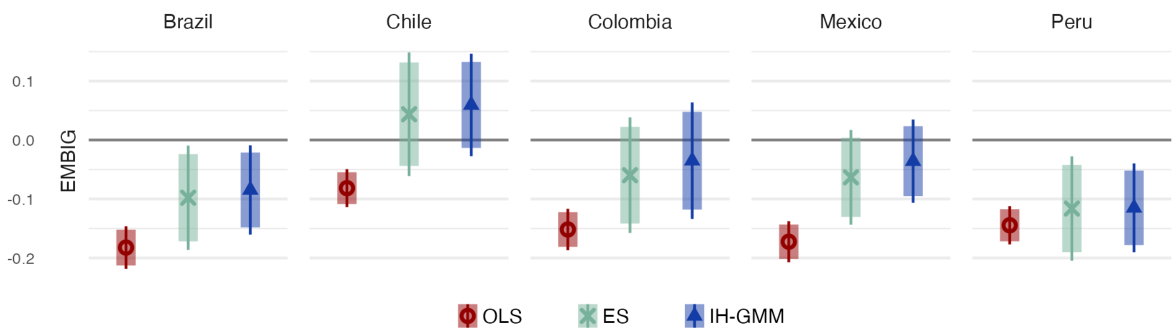
Note: Estimates of α for US financial variables, according to different approaches (OLS, IH with all dates in the control group, and IH with only month-end dates in the control group). The sample period ranges from November 2004 to October 2024. The solid dots are point estimates, while error bars/lines show the 90%/95% confidence intervals based on standard errors robust to heteroskedasticity and autocorrelation. All variables are normalized to zero mean and one standard deviation.

G EMBI as dependent variable

Our baseline regressions use CDS spreads as indicators of default risk. Another commonly used measure is the EMBI premium. We now replicate the analysis using EMBI-G data for the five countries in our sample.

Overall, the conclusions are broadly the same, but the standard errors of the GMM estimators are larger when using the EMBI, which limits what we can learn from these regressions. Considering the point estimates, results for Brazil are similar to those obtained using CDS, the OLS bias appears even more pronounced for Chile, Colombia, and Mexico, while it seems smaller for Peru.

Figure 9: Effects on EMBI-G



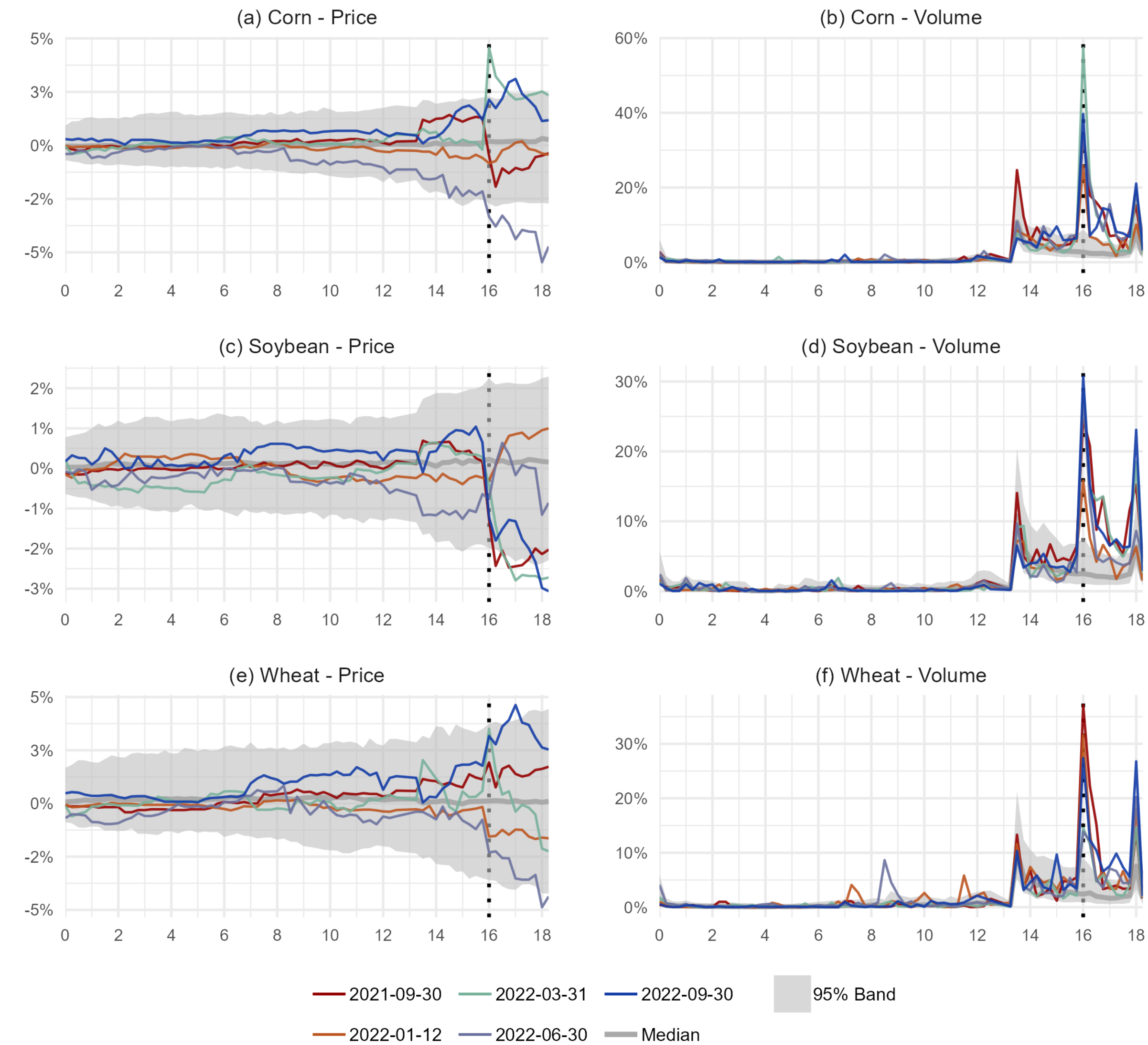
Note: Estimates of α for different countries when x_t is the default risk measured by the EMBI-G, according to different approaches (OLS, Event Study, and Identification through Heteroskedasticity). The sample period ranges from October 2003 to October 2024, with 5412 observations for OLS and IH-GMM estimates, and 84 for the event study. The solid dots are point estimates, while error bars/lines show the 90%/95% confidence intervals based on standard errors robust to heteroskedasticity and autocorrelation. All variables are normalized to zero mean and one standard deviation.

H Further evidence on the effect of USDA shocks

This section illustrates intraday patterns using price and trade volume at a 15-minute frequency. As intraday data have limited availability, the paper relies on daily data. The data source used for this paper only provides intraday transaction data for the last 140 days. For intraday data, each commodity's price and trade volume is the average of second and third nearby futures contracts traded at the Chicago Board of Trade (CBOT) and the New York Mercantile Exchange (NYMEX) from 2021-09-20 to 2022-10-31.

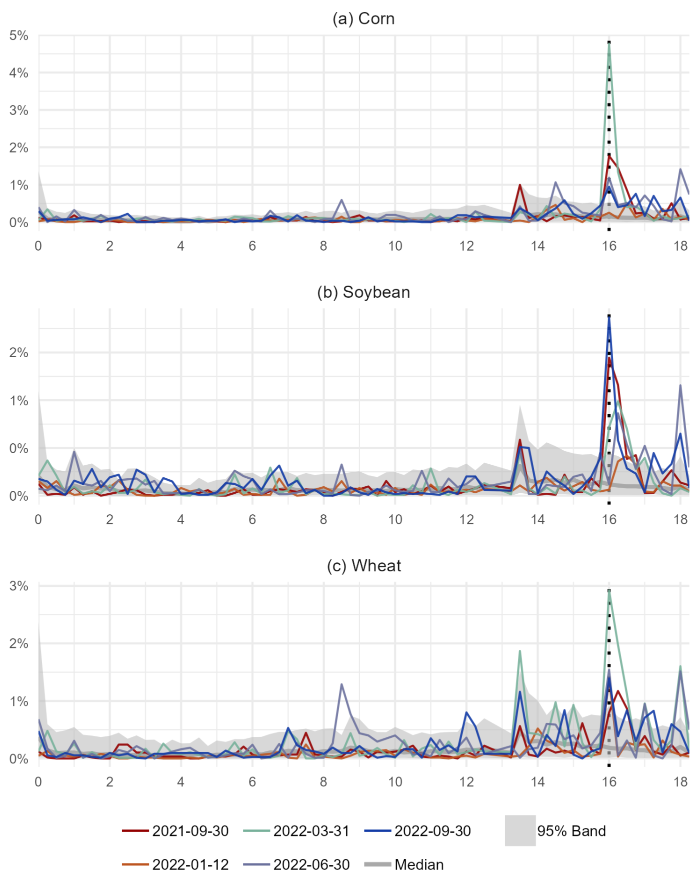
The release of the Grain Stocks report has a striking effect on markets. Figure 10 compares the intraday price and trade volume behavior on the days when the report is released (referred to as "event" days) to behavior on all other days (referred to as "regular" days) for corn, soybean, and wheat. On "event" days, at the time of the report release (session hour 16), there is often a price jump (shown in panels (a), (c), and (e)) and always a substantial increase in trade volume (panels (b), (d), and (f)). Remarkably, in the 15 minutes following the release, the trade volume of these three commodities is, on average, more than ten times higher than the median trade volume observed at the same hour on a "regular" day.

Figure 10: Intraday Grain Market



Note: X-axes denote the session hours, beginning at 8:00 p.m. the day before and closing at 2:20 p.m. (EST). The colored lines refer to the days of the Grain Stocks report, released at hour 16 of the session (depicted by a vertical dotted line). Panels (a), (c), and (e) show the accumulated price change from the previous session's closing price. Panels (b), (d), and (f) present the intraday volume distribution as a share of the last session's total volume. Shaded areas denote bands between 2.5% and 97.5% quantiles. Figure 11 in the Appendix shows the 15-minute absolute price changes for grains.

Figure 11: Intraday absolute price changes



Note: Panels (a), (b), and (c) show 15-minute absolute price changes. All x-axes denote the session hours, beginning at 8:00 p.m. the day before and closing at 2:20 p.m. (EST). The colored lines refer to the days of the Grain Stocks report, released at hour 16 of the session (depicted by a vertical dotted line). Shaded areas denote bands between 2.5% and 97.5% quantiles.

I Using Residual Commodity Shocks

We have shown that estimating the effects of commodity price shocks on emerging market financial variables using OLS leads to biased results. This bias arises because a substantial portion of the variation attributed to commodity prices is, in fact, driven by correlated global shocks – such as changes in global growth prospects or international financial conditions.

A natural question is whether one could instead regress commodity prices on U.S. financial indicators that capture these external factors and then use the residuals as regressors. If the OLS and GMM estimates were similar, this could be a good strategy. Since our results suggest that commodity price shocks have a statistically significant, albeit moderate, causal effect on financial variables, this approach is unlikely to fully address the endogeneity problem. Nevertheless, we now explore this possibility.

Figure 12 and Table 10 present results from regressions in which the key independent variable is the residual from a regression of grain prices on the VIX, the S&P 500 index, and U.S. interest rates.[13]

The OLS estimated effects on CDS spreads are broadly similar to those obtained using GMM. However, some of the results for stock indices and exchange rates are very different, implying that although this residual-based approach reduces the bias, it does not eliminate it.

[13]Due to data limitations, this sample begins in November 2004 rather than October 2003.

Figure 12: Effects on emerging economies – residual p_t

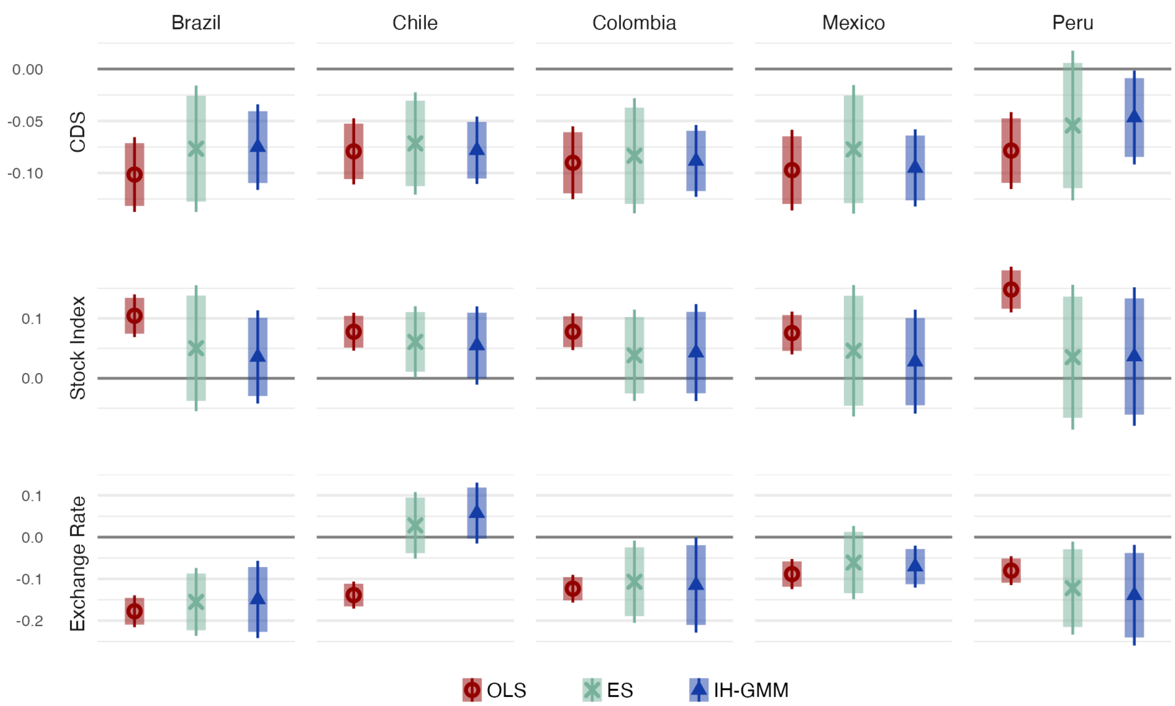


Table 10: Estimates – residual p_t

		OLS		ES		IH-GMM	
Country	Index	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
BR	CDS	-0.10	0.02	-0.08	0.03	-0.07	0.02
BR	Stock Index	0.10	0.02	0.05	0.05	0.04	0.04
BR	Exchange Rate	-0.18	0.02	-0.15	0.04	-0.15	0.05
CL	CDS	-0.08	0.02	-0.07	0.02	-0.08	0.02
CL	Stock Index	0.08	0.02	0.06	0.03	0.06	0.03
CL	Exchange Rate	-0.14	0.02	0.03	0.04	0.06	0.04
CO	CDS	-0.09	0.02	-0.08	0.03	-0.09	0.02
CO	Stock Index	0.08	0.02	0.04	0.04	0.04	0.04
CO	Exchange Rate	-0.12	0.02	-0.11	0.05	-0.12	0.06
MX	CDS	-0.10	0.02	-0.08	0.03	-0.10	0.02
MX	Stock Index	0.08	0.02	0.05	0.06	0.03	0.04
MX	Exchange Rate	-0.09	0.02	-0.06	0.04	-0.07	0.03
PE	CDS	-0.08	0.02	-0.05	0.04	-0.05	0.02
PE	Stock Index	0.15	0.02	0.04	0.06	0.04	0.06
PE	Exchange Rate	-0.08	0.02	-0.12	0.06	-0.14	0.06