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On the asymmetric effect of commodity terms of trade shocks on growth in commodity-dependent countries: Does the choice of exchange rate regimes matter?

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Abstract

This paper analyzes the asymmetric effects of commodity terms-of-trade shocks on economic growth in resource-dependent economies, with a focus on exchange rate regimes. Using panel data and appropriate estimators, the study finds that negative shocks significantly reduce growth, while positive shocks do not consistently yield benefits — especially in agriculture-based countries. The exchange rate regime plays a key role: fixed regimes absorb shocks faster but risk competitiveness losses, while flexible regimes offer more adjustment capacity but face greater volatility. These findings highlight the need for tailored macroeconomic policies to enhance resilience to external shocks.

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1. Introduction

Recent volatility in global commodity prices — triggered notably by the COVID-19 pandemic and the war in Ukraine — has renewed scholarly and policy interest in the macroeconomic implications of terms of trade shocks, particularly for commodity-dependent economies. Jerzmanowski (2006) highlights that transitions between growth regimes (e.g., miracle growth, stable growth, stagnation, and crisis) are closely linked to the intensity of such shocks. While prevailing theoretical frameworks suggest that negative terms of trade shocks exert a disproportionately greater impact than positive ones, empirical evidence remains mixed. For instance, Herrera et al. (2015) find no significant asymmetry in economic responses to oil price fluctuations, whereas Dehn (2000) demonstrates that large negative commodity price shocks can significantly hinder growth. Berg et al. (2012) further show that the adverse effects of external shocks — including terms of trade — are more pronounced during periods of growth acceleration, although their overall global relevance is limited.

More recent contributions (Di Pace et al., 2020; Wilson et al., 2021) have examined the role of terms-of-trade shocks in driving business cycle fluctuations. Di Pace et al. (2020) find that export price shocks are, on average, twice as influential as import price shocks in shaping domestic business cycles. Wilson et al. (2021) argue that the output response to positive shocks is amplified following sustained improvements in commodity terms of trade, whereas negative shocks are more damaging when they follow prolonged declines. Notably, adverse movements in commodity terms of trade are associated with sharper contractions in non-commodity growth, especially in countries with high commodity dependence and fragile macroeconomic fundamentals — such as elevated public debt and low international reserves.

The capacity of countries to absorb these asymmetric shocks is closely tied to their exchange rate regimes. The literature has long debated the shock-buffering role of exchange rate arrangements. Fixed exchange rate regimes are often lauded for promoting trade and investment by reducing uncertainty (Lahrèche-Revil, 2000). However, their rigidity can exacerbate the impact of asymmetric shocks, as nominal exchange rate adjustments are constrained. Classical theorists such as Meade (1951) and Friedman (1953) emphasized that fixed regimes intensify the effects of external shocks, particularly negative ones. Empirical studies by Broda (2001, 2004) and Edwards and Levy-Yeyati (2005) confirm that fixed exchange rate regimes tend to amplify the adverse effects of terms of trade shocks, while flexible regimes enhance a country's ability to stabilize output and absorb external disturbances.

Conversely, some scholars question the effectiveness of flexible exchange rate regimes in developing countries, citing institutional and structural limitations. Bailliu et al. (2003) and Couharde et al. (2013) argue that fixed regimes may offer comparable resilience, especially when embedded within optimal currency areas (OCAs) characterized by price flexibility and factor mobility. Couharde et al. (2013) underscore the benefits of monetary integration, noting that real effective exchange rate volatility is significantly lower in CFA zone countries than in those with independent currencies — facilitating faster adjustment to imbalances. Bailliu et al. (2003) also caution that flexible regimes may introduce additional exchange rate volatility, potentially amplifying business cycles and dampening growth. However, much of the existing literature focuses on the magnitude of shocks across regimes without adequately exploring the underlying mechanisms of shock absorption, limiting the ability to attribute differences solely to exchange rate arrangements.

This paper advances the existing literature by broadening the analytical scope to assess the asymmetric effects of commodity terms of trade shocks on economic performance across various exchange rate regimes, including monetary unions, in commodity-dependent economies. Unlike most prior studies, we incorporate a wider spectrum of shocks by explicitly controlling for internal disturbances — notably political and natural shocks — alongside

external shocks such as terms of trade fluctuations, which may be particularly relevant for developing and commodity-dependent countries. While the literature has extensively examined external shocks, the role of internal shocks in shaping short-run growth dynamics remains underexplored. To our knowledge, no empirical study has systematically analyzed the impact of internal shocks — especially conflict and natural disasters — under different exchange rate regimes. Only a few contributions, such as Rasaki and Malikane (2015), have integrated both internal and external macroeconomic variables — including inflation, interest rates, real GDP, money supply, external debt, commodity prices, and exchange rates — into their analysis[1]. By addressing this gap, our study provides new insights into the interaction between shock absorption mechanisms and exchange rate arrangements in commodity-dependent contexts.

Our empirical strategy employs an equilibrium correction model (ECM), following Edwards and Levy-Yeyati (2005), to capture deviations in growth rates from their long-run equilibrium, driven by both internal and external shocks. Using annual data from 77 commodity-dependent countries over the period 1981–2023, we conduct a cross-country comparative analysis across subgroups defined by resource type (oil, agriculture, and ores). Our empirical analysis reveals that commodity terms-of-trade shocks have asymmetric effects on economic growth in resource-dependent economies, with negative shocks significantly reducing growth, while positive shocks do not consistently yield gains — particularly in agriculture-based countries. These asymmetries are strongly influenced by the exchange rate regime: fixed regimes tend to absorb shocks more quickly but are more vulnerable to competitiveness losses during booms, whereas flexible regimes offer greater adjustment capacity but face slower convergence and higher volatility. The findings highlight the importance of tailoring macroeconomic policies to each country's resource profile and exchange rate framework.

The remainder of this paper is organized as follows. Section 2 outlines the methodological framework and describes the data sources employed in the analysis. Section 3 presents the empirical results and provides a detailed interpretation of the findings. Section 4 concludes by summarizing the key insights and discussing their policy implications.

2. Methodological approach

This section outlines the econometric strategy employed to estimate both the long-run growth equation and the short-run growth dynamics. Specifically, we adopt an equilibrium correction model (ECM)[2], following the approach developed by Edwards and Levy-Yeyati (2005), to capture deviations from the long-run growth path in response to internal and external shocks.

2.1. Estimating the Long-Run Growth Equation

The empirical analysis begins with the estimation of a cross-sectional growth regression, which serves as the benchmark for computing equilibrium growth rates. The model is specified as:

$$y_i = c + \beta_j X_{i,j} + \varepsilon_i \qquad (1)$$

[1] Rasaki and Malikane (2015) suggest that the relative dominance of internal versus external shocks — such as commodity price fluctuations — depends on the time horizon. Internal shocks tend to have more immediate effects on economic activity, whereas the impact of external shocks unfolds more gradually over a longer period.

[2] In reference to classical error-correction models in econometrics.

Where y_i denotes the average real GDP per capita growth for country i; $X_{i,j}$ represents a vector of control variables commonly used in the growth literature (see Tsangarides, 2005); β_j is the coefficient associated with the j[th] explanatory variable; and c and ε_i are respectively the classical constant and error term.

Relying on Tsangarides (2005), we incorporate the following control variables into our analysis: (i) the initial level of income, proxied by the logarithm of real GDP per capita in the base year (1981), to account for convergence effects as posited by the classical Solow-Swan growth model; (ii) physical capital accumulation, measured by the investment-to-GDP ratio; (iii) human capital, captured through gross school enrollment rates; and (iv) institutional quality, represented by an index constructed as the average of six governance indicators from Kaufmann et al. (2010).

The estimation results of the long-run growth equation (1), presented in Table I below, indicate that initial income, human capital, and institutional quality are robust and statistically significant determinants of long-term growth in commodity-dependent economies. In particular, the negative and statistically significant coefficient of initial GDP per capita provides empirical support for the conditional convergence hypothesis, suggesting that countries with lower initial income levels tend to grow faster, holding other growth determinants constant (see Béreau et al., 2009). In contrast, although the coefficient on investment is positive — as theoretically expected — it is not statistically significant, suggesting potential inefficiencies in investment, particularly in public sector spending. Similar findings regarding the limited growth impact of investment have been reported by Edwards and Levy-Yeyati (2005).

Table I: Long-run growth regression

	$\hat{y}_1$	$\hat{y}_2$
VARIABLES	(1)	(2)
Initial GDP per capita (log)	-1.61***	-1.58***
	(0.14)	(0.15)
Investment (% GDP)	0.10	0.06
	(0.08)	(0.08)
School enrollment	0.07***	0.05**
	(0.02)	(0.02)
Quality of institution		2.31**
		(0.99)
Constant	-5.71**	-2.59
	(2.16)	(2.03)
Observations	77	77
R-squared	0.66	0.69
Adj. R-squared	0.67	0.67

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.10.

2.2. Equilibrium Correction Model for Short-Run Growth Dynamics

In the second stage, we exploit the panel structure of our dataset to compute the deviation of the lagged growth rate, y_{it-1}, from the country-specific long-run equilibrium growth rate, $\hat{y}_i$, as derived from the fitted values of equation (1). This deviation captures the extent to which a country's growth rate diverges from its long-term trajectory. We then estimate the short-term growth dynamics using the following specification:

$$\Delta y_{it} = a + \lambda(y_{it-1} - \hat{y}_i) + \varphi_k Z_{it,k} + \omega_{it} \quad (2)$$

Where Δy_{it} denotes the change in the growth rate of country i at time t and λ represents the speed of adjustment toward the long-run equilibrium. A negative and statistically significant λ would indicate that deviations from the equilibrium growth rate are gradually corrected over time. The vector Z_{it} captures the shocks considered in this study, including commodity terms-of-trade shock (our main variable of interest) as well as indicators of natural and political shocks. The parameters a and ω_{it} denote the constant and error term respectively.

To further investigate the asymmetric effects of commodity terms of trade shocks, we construct a dummy variable Dt, which takes the value 1 when the terms of trade shock is positive and 0 otherwise, following Aguirre and Calderón (2005). Based on this, we define the positive and negative commodity terms-of-trade shocks as follows: $\mathrm{CTOT}^{+} = \left(\mathrm{CTOT} - \overline{\mathrm{X}}^{\mathrm{P}}\hat{\beta}\right) * \mathrm{D_t}$ and $\mathrm{CTOT}^{-} = \left(\mathrm{CTOT} - \overline{\mathrm{X}}^{\mathrm{P}}\hat{\beta}\right) * (1 - \mathrm{D_t})$. These variables allow us to disentangle the differential impacts of positive and negative terms-of-trade shocks on short-term growth dynamics. Equation (2) is estimated using the Generalized Least Squares (GLS) estimator, as suggested by Edwards and Levy-Yeyati (2005).

2.3. Data sources

To achieve its main objective — examining the asymmetric impact of commodity terms-of-trade shocks on real GDP per capita growth, with a particular focus on exchange rate regimes — this paper draws on annual data covering the period 1981-2023 for 77 least developed and commodity-dependent countries, compiled from multiple reputable sources[3].

Exchange rate regimes are classified using the de facto fine classification developed by Ilzetzki et al. (2019). Our approach further considers the duration of regime experience, acknowledging that countries may transition through multiple regimes over time (see Gnimassoun and Coulibaly, 2014)[4]. To assess the sensitivity of the asymmetric effects to resource dependence, we adopt the classification of commodity-dependent countries provided by UNCTAD (2023). Detailed classifications of exchange rate regimes and country characteristics are presented in Tables A–C in the appendix.

The regression analysis incorporates several key variables. The growth rate of real GDP per capita, and initial GDP levels are sourced from the World Economic Outlook (WEO) database. Commodity terms-of-trade movements are captured using the dataset developed by Gruss and Kebhaj (2021), which reflects country-specific exposure to global commodity price fluctuations by weighting the prices of 41 commodities with country-specific net export shares.

To control internal shocks, we include indicators for political instability and natural disasters, measured respectively by the Uppsala Conflict Data Program (UCDP/PRIO) and the International Disaster Database (EMDAT). Additional control variables used in the cross-sectional regressions — such as the investment-to-GDP ratio, gross school enrollment, and

[3] The focus on least developed countries enables the study to concentrate on a relatively homogeneous group in terms of development level, thereby enhancing the consistency of the analysis. While it would be valuable to include developed countries that are dependent on natural resources, the classification adopted — UNCTAD (2023) — identifies only five such countries: Australia, Montenegro, New Zealand, Norway, and the Russian Federation. Their inclusion does not materially alter the core findings of the study. Results incorporating these countries are available upon request.

[4] As part of the robustness analysis, we examined the most recent exchange rate policy stance by considering the regimes applied over the last five years, aiming to capture any recent shifts. However, we found that only a small number of countries had transitioned from their historical exchange rate regime classifications during this period. To further assess the sensitivity of our findings, we also employed the coarse classification of exchange rate regimes. The results obtained were broadly consistent with those derived from the fine classification. Estimation results based on the last five years' exchange rate regimes are available upon request.

institutional quality — are drawn from the World Development Indicators (WDI) and the World Governance Indicators (WGI). Descriptive statistics for all variables are provided in Table D in the appendix.

3. Empirical results

We estimate Equation (2) using both the fixed effects (within)[5] estimator and the Generalized Least Squares (GLS) method as proposed by Edwards and Levy-Yeyati (2005). Across all specifications, the coefficient associated with the return to equilibrium (λ) is consistently negative and statistically significant. This indicates that any deviation of the growth rate from its equilibrium level tends to be corrected over time, at a pace determined by λ, assuming no additional shocks affect the economy.

Notably, Table II below shows that the speed of adjustment is higher in agriculture-dependent countries, with λ estimated at -0.671 under the GLS approach. This corresponds to a half-life of approximately 12.4 months[6], meaning that half of the deviation from equilibrium is absorbed within that period. In contrast, oil-dependent countries exhibit a slower adjustment (λ = - 0.566; half-life ≈ 14.7 months), while mineral-dependent countries show the slowest pace (λ = - 0.419; half-life ≈ 19.85 months). These findings suggest that, on average, mineral-dependent economies require 7.46 months more than agriculture-based ones to correct half of a growth deviation, while oil-dependent economies need 2.3 additional months. One plausible explanation for these differences lies in the greater volatility of oil and mineral commodity prices, which may lead to larger initial deviations from equilibrium in these economies.

Table II: Growth and TOT shocks by resource dependence

	Within estimates				GLS estimates			
Explained variable:	All	Oil	Agr	Ores	All	Oil	Agr	Ores
$\Delta GDP\ percap\ growth$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$(y_{it-1} - \hat{y}_i)$	-0.502***	-0.540***	-0.586***	-0.422***	-0.534***	-0.566***	-0.671***	-0.419***
	(0.035)	(0.073)	(0.072)	(0.043)	(0.016)	(0.029)	(0.028)	(0.023)
Δtot	0.037	0.133***	-0.047*	0.046	0.043***	0.116***	-0.054**	0.056*
	(0.024)	(0.042)	(0.024)	(0.055)	(0.015)	(0.024)	(0.024)	(0.031)
Δnat	-0.349**	-0.617*	-0.211	-0.267	-0.268**	-0.338	-0.285	-0.119
	(0.152)	(0.351)	(0.237)	(0.224)	(0.129)	(0.304)	(0.179)	(0.232)
$\Delta conf$	-0.154	1.008	1.822	-2.854**	-0.132	-0.676	1.557	-1.612
	(1.138)	(2.120)	(1.371)	(1.206)	(0.692)	(1.386)	(1.050)	(1.179)
Constant	0.466***	1.021***	0.366***	0.197***	0.664***	0.986***	0.668**	0.189
	(0.004)	(0.091)	(0.010)	(0.040)	(0.182)	(0.269)	(0.303)	(0.405)
Observations	2,902	780	1,092	1,030	2,902	780	1,092	1,030
R-squared	0.277	0.327	0.305	0.238				
Number of countries	77	21	28	28	77	21	28	28

Notes: The table presents estimates of the global effect of commodity terms-of-trade shocks on GDP per capita growth. The speed of adjustment uses the long run equilibrium growth rates in column (2) of table I. Standard errors robust against heteroskedasticity and serial correlation in parentheses (column 1-4 are clustered by country). *** p<0.01, ** p<0.05, * p<0.10.

[5] The within estimates are clustered at the country level to account for the variation in shocks across countries (see Bertrand and Mullainathan, 2003; Leblebicioğlu and Weinberger, 2020).

[6] The half-life, or the time it takes to correct half of a deviation, is calculated as $-\ln(2)/\lambda$.

The estimation results confirm that terms-of-trade shocks are a key driver of economic growth dynamics. Specifically, improvements in the terms-of-trade have a positive effect on growth across the full sample, as well as in oil- and mineral-dependent economies. However, in economies reliant on agricultural exports, terms-of-trade changes appear to exert a negative influence on growth — a counterintuitive finding that is explored in greater detail in Section 3.1 (asymmetry analysis) and Section 3.2 (exchange rate regime effects).

In addition to the effects of terms-of-trade shocks, the analysis reveals that natural shocks — and to a lesser extent, political shocks — have a significant and negative impact on economic growth trajectories in the countries studied. Among them, mineral-dependent economies appear particularly vulnerable to political instability, underscoring the critical role of institutional resilience in resource-rich contexts. The dominant influence of terms-of-trade shocks aligns with findings from previous studies, such as those by Kose and Riezman (2001) and Rasaki and Malikane (2015), who emphasize that external shocks — including fluctuations in commodity prices and trade conditions — account for a substantial share of economic volatility in developing economies.

3.1. Estimating the asymmetrical impact of commodity terms-of-trade shocks on economic growth

To investigate whether the effects of commodity terms-of-trade shocks on growth differ depending on the direction of the shock, we estimate an asymmetric model that distinguishes between positive and negative changes in the terms of trade. This approach allows us to assess whether growth responses are more pronounced during commodity booms or busts, and whether this asymmetry varies across country groups based on their primary export commodities. The results are presented in Table III below.

The estimation results reveal a clear asymmetric relationship between terms-of-trade shocks and economic growth in resource-dependent economies, as observed in the global sample. Specifically, negative terms-of-trade shocks exert a statistically significant adverse effect on growth, while the impact of positive shocks — although directionally favorable — is not statistically significant. These findings reinforce the hypothesis that "terms-of-trade shocks are not all alike", echoing recent insights of Di Pace et al. (2020). However, this aggregate result conceals important heterogeneity across subgroups. In oil-dependent economies, both positive and negative shocks have the expected signs and are statistically significant, with nearly identical coefficient magnitudes. This suggests a symmetrical relationship between terms-of-trade fluctuations and growth in these countries. A similar conclusion applies to mineral-dependent economies, where neither positive nor negative shocks show statistical significance, indicating a weak or neutral relationship.

In contrast, the group of agriculture-dependent economies displays a counterintuitive pattern: positive terms-of-trade shocks are associated with a statistically significant negative impact on growth, while negative shocks appear to have no significant effect. Further investigation attributes this anomaly to the prevailing exchange rate regime. Indeed, 82% of countries in this subgroup (23 out of 28) operate under a fixed exchange rate system. In such contexts, positive terms-of-trade shocks can lead to real exchange rate appreciation, driven by inflationary pressures resulting from central bank interventions — specifically, the purchase of foreign currency to maintain the fixed exchange rate. This appreciation erodes external competitiveness and ultimately dampens economic growth. These findings underscore the complex interaction between external shocks and macroeconomic policy frameworks, particularly in economies with limited exchange rate flexibility.

Table III: Growth and asymmetric TOT shocks by resource dependance

	Within estimates				GLS estimates			
Explained variable:	All	Oil	Agr	Ores	All	Oil	Agr	Ores
$\Delta GDP\ percap\ growth$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$(y_{it-1} - \hat{y}_i)$	-0.502***	-0.540***	-0.586***	-0.423***	-0.534***	-0.566***	-0.674***	-0.418***
	(0.035)	(0.073)	(0.072)	(0.043)	(0.016)	(0.029)	(0.028)	(0.023)
ctot^-	-0.056*	-0.135***	0.025	-0.044	-0.069***	-0.122***	0.019	-0.080
	(0.031)	(0.040)	(0.048)	(0.067)	(0.026)	(0.039)	(0.044)	(0.055)
ctot^+	0.018	0.131*	-0.064	0.048	0.017	0.111***	-0.084**	0.034
	(0.044)	(0.072)	(0.042)	(0.108)	(0.026)	(0.042)	(0.041)	(0.052)
Δnat	-0.347**	-0.617*	-0.208	-0.267	-0.264**	-0.336	-0.282	-0.114
	(0.152)	(0.352)	(0.236)	(0.227)	(0.129)	(0.304)	(0.179)	(0.233)
$\Delta conf$	-0.141	1.009	1.827	-2.856**	-0.114	-0.669	1.550	-1.583
	(1.136)	(2.119)	(1.369)	(1.212)	(0.692)	(1.386)	(1.055)	(1.183)
Constant	0.634**	1.038**	0.536	0.181	0.879***	1.030***	0.955**	0.402
	(0.258)	(0.368)	(0.332)	(0.617)	(0.252)	(0.372)	(0.431)	(0.565)
Observations	2,902	780	1,092	1,030	2,902	780	1,092	1,030
R-squared	0.277	0.327	0.306	0.238				
Number of countries	77	21	28	28	77	21	28	28

Notes: The table presents estimates of the asymmetric effects of commodity terms-of-trade shocks on GDP per capita growth. The speed of adjustment uses the long run equilibrium growth rates in column (2) of table I. Standard errors robust against heteroskedasticity and serial correlation in parentheses (column 1-4 are clustered by country). *** p<0.01, ** p<0.05, * p<0.10.

3.2. The role of exchange rate regimes: asymmetric effects within exchange rate regimes

To deepen the analysis of the asymmetric impact of terms-of-trade shocks on economic growth, we disaggregate the sample according to countries' exchange rate regimes. This approach allows us to assess whether the nature and magnitude of the growth response to external shocks differ between economies operating under fixed versus flexible exchange rate arrangements[7]. The empirical results are presented in Tables IV and V below, corresponding respectively to countries with flexible and fixed exchange rate regimes. The findings offer several noteworthy insights. First, only a small fraction of resource-dependent countries (11 out of 77) has historically adopted flexible exchange rate regimes, reflecting a phenomenon commonly referred to as "fear of floating." This limited adoption suggests a preference for nominal stability, even at the cost of reduced policy flexibility.

Second, the speed of adjustment to equilibrium — captured by the coefficient of the return-to-equilibrium term — is lower and less statistically significant in countries with flexible exchange rate regimes compared to those with fixed regimes. This implies that growth shock tends to persist longer in flexible exchange rate environments. Similar to the findings of Couharde et al. (2013) regarding real exchange rate shock absorption, this result may be attributed to the larger average deviations from equilibrium and the inherent uncertainties of flexible regimes, which can hinder the resolution of macroeconomic imbalances. It is widely acknowledged that flexible exchange rate regimes are more susceptible to macroeconomic volatility, potentially amplifying the effects of terms-of-trade shocks.

[7] We also considered subgroups composed of member countries belonging to a monetary union or member countries of the CFA franc zone. These results are available upon request from the authors.

Table IV shows that, in countries with flexible exchange rate regimes, both negative and positive terms-of-trade shocks have the expected signs and are statistically significant for the full sample of resource-dependent economies, as well as for the oil- and mineral-dependent subgroups. Moreover, the coefficients for positive and negative shocks are of similar magnitude, suggesting a symmetric response to external shocks in these groups. In contrast, for agriculture-dependent countries with flexible exchange rate regimes, neither positive nor negative shocks are statistically significant. This indicates that terms-of-trade shocks do not exert an asymmetric effect on growth in these economies. Instead, these countries appear to benefit from positive shocks and suffer from negative ones in a relatively balanced manner.

An additional finding of interest is the positive and significant impact of conflict on oil-producing countries with flexible exchange rate regimes. This may be explained by the strategic and geopolitical importance of the oil sector, which often enjoys special protection — even during periods of political instability — due to the dominance of multinational corporations and the sector's critical role in national revenue (see, for example, Cramer, 2006)[8].

Table IV: Growth and asymmetric TOT shocks by resource dependance in historical flexible exchange rate regime

	Within estimates				GLS estimates			
Explained variable:	All	Oil	Agr	Ores	All	Oil	Agr	Ores
$\Delta GDP\ percap\ growth$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$(y_{it-1} - \hat{y}_i)$	-0.329***	-0.424**	-0.359***	-0.233**	-0.308***	-0.439***	-0.353***	-0.220***
	(0.043)	(0.053)	(0.060)	(0.035)	(0.033)	(0.070)	(0.057)	(0.047)
ctot^-	-0.445***	-0.573	-0.338	-0.702	-0.498***	-0.522**	-0.375	-0.695*
	(0.129)	(0.244)	(0.326)	(0.359)	(0.167)	(0.236)	(0.304)	(0.378)
ctot^+	0.527***	0.971	-0.006	0.615**	0.514***	0.872***	-0.061	0.616***
	(0.164)	(0.410)	(0.427)	(0.097)	(0.153)	(0.247)	(0.400)	(0.234)
Δnat	0.138	-0.389	0.519	0.168	0.176	-0.222	0.551	0.134
	(0.227)	(0.373)	(0.259)	(0.510)	(0.252)	(0.432)	(0.408)	(0.444)
$\Delta conf$	2.103	12.160*	-5.288	-4.683**	0.396	8.927***	-5.933	-4.251
	(4.798)	(3.809)	(2.796)	(0.970)	(2.134)	(3.147)	(7.452)	(2.798)
Constant	0.184	-3.437	1.379	1.715	0.338	-2.464	1.699	1.429
	(0.646)	(2.329)	(1.410)	(1.051)	(1.038)	(1.921)	(1.891)	(1.777)
Observations	368	102	160	106	368	102	160	106
R-squared	0.241	0.431	0.209	0.293				
Number of countries	11	3	5	3	11	3	5	3

Notes: The table presents estimates of the asymmetric effects of commodity terms-of-trade shocks on GDP per capita growth. The speed of adjustment uses the long run equilibrium growth rates in column (2) of table I. Standard errors robust against heteroskedasticity and serial correlation in parentheses (column 1-4 are clustered by country). *** p<0.01, ** p<0.05, * p<0.10.

Table V highlights a different pattern for countries with fixed exchange rate regimes. In these economies, negative terms-of-trade shocks have a statistically significant adverse effect on growth, while positive shocks do not show a significant impact. This suggests the presence of an asymmetric relationship between terms-of-trade shocks and economic growth. A closer

[8] This positive and significant effect of conflict variable in oil-producing countries under flexible regimes (Table IV), contrasted with its negative and insignificant effect under fixed regimes (Table V), suggests that the exchange rate regime plays a mediating role in how economies respond to internal shocks. One possible explanation is that flexible regimes allow for quicker nominal adjustments, which may help mitigate the adverse effects of conflict by facilitating external competitiveness and enabling more responsive fiscal and monetary policies. In contrast, fixed regimes may constrain such adjustments, leading to a more muted or delayed economic response.

examination of subgroups reveals that this asymmetry is primarily driven by agriculture-dependent countries, where positive shocks are paradoxically associated with slower growth. This finding reinforces earlier results and underscores the influence of fixed exchange rate regimes — characterized by nominal and real rigidities — in shaping the asymmetric transmission of terms-of-trade shocks.

Finally, natural shocks also emerge as a significant factor in the short-term dynamics of growth in resource-dependent countries with fixed exchange rate regimes. Their disruptive effects further complicate the macroeconomic environment, especially in economies with limited policy flexibility.

Table V: Growth and asymmetric TOT shocks by resource dependance in historical fixed exchange rate regime

	Within estimates				GLS estimates			
Explained variable:	All	Oil	Agr	Ores	All	Oil	Agr	Ores
$\Delta GDP\ percap\ growth$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$(y_{it-1} - \hat{y}_i)$	-0.562***	-0.570***	-0.725***	-0.471***	-0.595***	-0.609***	-0.774***	-0.473***
	(0.040)	(0.089)	(0.091)	(0.042)	(0.017)	(0.032)	(0.032)	(0.026)
ctot^-	-0.040	-0.109**	0.032	-0.040	-0.061**	-0.111***	0.019	-0.066
	(0.031)	(0.038)	(0.050)	(0.069)	(0.026)	(0.038)	(0.044)	(0.056)
ctot^+	-0.015	0.074	-0.088**	-0.001	-0.008	0.080*	-0.105***	-0.003
	(0.044)	(0.057)	(0.041)	(0.114)	(0.026)	(0.042)	(0.040)	(0.054)
Δnat	-0.496***	-0.719*	-0.446*	-0.338	-0.405***	-0.560	-0.391**	-0.203
	(0.162)	(0.385)	(0.251)	(0.257)	(0.146)	(0.402)	(0.195)	(0.262)
$\Delta conf$	-0.397	-0.730	1.846	-2.563	-0.091	-1.766	1.602	-1.194
	(1.180)	(2.356)	(1.243)	(1.604)	(0.723)	(1.501)	(1.065)	(1.265)
Constant	0.717**	1.707***	0.654*	0.049	1.042***	1.297***	1.161***	0.270
	(0.282)	(0.365)	(0.330)	(0.684)	(0.260)	(0.378)	(0.440)	(0.594)
Observations	2,534	678	932	924	2,534	678	932	924
R-squared	0.305	0.344	0.371	0.255				
Number of countries	66	18	23	25	66	18	23	25

Notes: The table presents estimates of the asymmetric effects of commodity terms-of-trade shocks on GDP per capita growth. The speed of adjustment uses the long run equilibrium growth rates in column (2) of table I. Standard errors robust against heteroskedasticity and serial correlation in parentheses (column 1-4 are clustered by country). *** p<0.01, ** p<0.05, * p<0.10.

4. Conclusion and policy recommendations

This study provides robust empirical evidence on the asymmetric effects of commodity terms-of-trade shocks on economic growth in resource-dependent economies, with a particular focus on the role of exchange rate regimes. The results confirm that negative terms-of-trade shocks have a significantly adverse impact on growth, while positive shocks do not always yield statistically significant benefits — especially in agriculture-dependent economies. These asymmetries are further shaped by the type of exchange rate regime in place. Countries with fixed exchange rate regimes tend to absorb shocks more rapidly but are also more vulnerable to the negative consequences of positive terms-of-trade shocks, particularly due to real exchange rate appreciation and loss of competitiveness. In contrast, flexible exchange rate regimes offer greater adjustment capacity but are associated with slower convergence to equilibrium and heightened macroeconomic volatility.

The findings underscore the importance of macroeconomic policy frameworks in mediating the transmission of external shocks and highlight the need for tailored strategies depending on a country's resource profile and exchange rate regime. To enhance resilience, resource-dependent economies should: (i) consider adopting more flexible exchange rate regimes — particularly in agriculture-based countries — to preserve competitiveness during commodity booms; (ii) strengthen institutional frameworks in mineral-rich economies to mitigate the impact of political instability; (iii) implement counter-cyclical fiscal policies and establish stabilization funds to manage commodity price volatility; (iv) reinforce macroeconomic tools in flexible regimes to improve shock absorption; and (v) promote economic diversification to reduce vulnerability and support sustainable growth.

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