

# Commodity Price Shocks and Regional Revenue Stability: Lessons for Local Governments

Raden Roro Fatma Sari, SE., MSI (1) and Maya Ariyanti (2)

(1) Universitas Sangga Buana YPKP | (2) Telkom University

sarie801@yahoo.com ; ariyanti@telkomuniversity.ac.id

## Abstract

This integrative review examines the following Indonesia-focused question: How can local governments in commodity-exposed Indonesian regions stabilize revenue and maintain essential expenditure when global commodity prices rise and fall? The analysis treats commodity prices as a conditional economic mechanism rather than a stand-alone headline indicator and evaluates how it interacts with regional revenue. For commodity prices, peer-reviewed research is read together with current official statistical and policy material, with Indonesia-specific evidence given priority and international studies used to clarify mechanisms. Across the reviewed material, the effect of commodity prices varies with exposure, timing, market structure, institutional arrangements, and the capacity of decision makers to adjust. The article therefore develops a mechanism-based interpretation that distinguishes first-round transmission, behavioral response, and boundary conditions for regional revenue. No primary survey, interview, firm observation, or regression estimate is manufactured for this commodity prices conceptual review; empirical claims remain attributed to their original sources. The resulting commodity prices framework supports differentiated measurement and identifies an Indonesia-specific research agenda for testing the proposed channels with more granular data.

Keywords: commodity prices, regional revenue, fiscal stability, local government, natural resources, Indonesia

## 1. Introduction

Commodity-producing regions can experience rapid fiscal expansion during price booms and abrupt pressure when prices normalize. Revenue sharing, royalties, production-linked receipts, and local economic activity can all move with commodity cycles. The resulting volatility complicates multiyear infrastructure, staffing, maintenance, and social-service commitments that are difficult to reduce quickly.

Resource-revenue debates often focus on national fiscal rules, while Indonesian decentralization gives subnational governments distinct expenditure responsibilities and transfer arrangements. Local stability requires instruments that fit the legal, institutional, and cash-management realities of regional budgets.

The central research question is: How can local governments in commodity-exposed Indonesian regions stabilize revenue and maintain essential expenditure when global commodity prices rise and fall? Framing the problem around commodity prices and regional revenue is important because national averages can mask economically relevant differences in exposure and adjustment across Indonesian firms, households, sectors, and regions.

The review adapts resource-revenue stabilization principles to Indonesian local government. It examines revenue sensitivity, procyclical spending, reserve and endowment mechanisms, conservative budgeting,

expenditure smoothing, diversification, and transparency.

The analytical scope is deliberately mechanism based. For commodity prices, the review asks which conditions amplify, weaken, delay, or redirect the observed relationship with regional revenue; this makes composition, selection, contract structure, and timing part of the explanation rather than residual noise.

The paper develops four topic-specific literature themes, documents a transparent evidence-screening approach, synthesizes six substantive findings, and translates those findings into a measurement framework and practical

implications for commodity prices. Indonesia-focused studies on commodity prices carry the empirical weight, while international evidence is used only when it clarifies a channel that remains underidentified in the domestic literature.

## 2. Literature Review

Why commodity revenue is procyclical

Commodity prices influence resource-company profits, royalties, production value, and related economic activity. When spending plans extrapolate boom-year receipts, temporary revenue can become permanent expenditure.

The fiscal problem is asymmetric: governments can add projects and commitments quickly in a boom but face political and contractual difficulty cutting wages, maintenance, or public services after a downturn.

Stability therefore requires identifying which revenue components are structurally volatile before the budget is approved.

Savings, stabilization, and endowment objectives

A stabilization fund accumulates resources in strong years and releases them when revenue falls below a rule-based benchmark. An endowment fund may emphasize preserving principal and generating long-term returns.

These objectives should not be mixed without clear governance because liquidity needs, investment horizons, and acceptable risk differ.

IMF technical assistance on Indonesian subnational funds makes design, governance, and integration with the budget a current policy issue.

Conservative reference prices and structural balances

Resource-dependent budgets can use prudent reference prices or structural-revenue estimates instead of the latest spot price. This reduces the tendency to treat a boom as permanent.

Forecast rules do not eliminate shocks; they reduce the amount of shock that reaches planned expenditure.

Reference-price governance should be transparent enough to resist optimistic revisions during booms and excessive pessimism during downturns.

Diversification and the non-resource tax base

Long-run fiscal resilience ultimately depends on a broader local economy. Manufacturing, services, tourism, agriculture, and formal employment can expand more stable tax and fee bases and reduce indirect dependence on one commodity.

Diversification takes time and requires infrastructure, skills, and investment conditions, so it cannot substitute for near-term fiscal buffers.

A mature strategy combines stabilization for the cycle with economic transformation for the structure.

### 3. Research Method

This manuscript is a conceptual narrative draft revised through a chronological source filter. Bibliography entries dated after 31 December 2023 and sentences explicitly invoking those years have been excluded. Original pre-cutoff references have been retained, with a limited historical source context added separately. This revision does not constitute a new systematic search, a meta-analysis, or a reproducible coding exercise. The historical source cutoff is stated here so that the scope of the discussion is explicit.

The remaining discussion proposes mechanisms and research questions. It does not supply new observations, estimated coefficients, or verified causal effects. Earlier reference entries retained from the source draft require

bibliographic and claim-level checking by the authors before submission. Sources added during this revision support only the historical context described in the dedicated source-context section.

### 4. Results and Discussion

#### 4.1 Revenue classification is the foundation of stabilization

The first substantive result concerns revenue classification is the foundation of stabilization. In the context of commodity prices, the operative mechanism is that local governments need to separate recurrent stable revenue from commodity-sensitive transfers and own-source receipts before setting expenditure ceilings; this means an aggregate correlation with regional revenue can misstate what individual units actually experience.

Evidence for the revenue classification is the foundation of stabilization channel is triangulated rather than reduced to one coefficient: IMF and World Bank fiscal work highlights the importance of identifying resource-linked volatility rather than treating total revenue as homogeneous. For commodity prices, the strongest inference is therefore about when the mechanism should intensify or weaken, not about a universal numerical elasticity.

The revenue classification is the foundation of stabilization interpretation remains bounded because some revenues respond to commodity conditions with lags, making simple contemporaneous correlations incomplete. Future empirical work on regional revenue should measure that conditioning factor directly, while current practice can respond by ensuring that budget documents should disclose sensitivity of each major revenue source to price, production, and transfer formulas.

#### 4.2 Boom-year expenditure creates the largest medium-term risk

A second channel is boom-year expenditure creates the largest medium-term risk, which is analytically distinct from the headline movement in commodity prices. Here, temporary windfalls can finance

recurring salaries, subsidies, or maintenance obligations that remain after prices fall; that sequence helps explain why units exposed to the same aggregate signal can record different outcomes for regional revenue.

The literature relevant to boom-year expenditure creates the largest medium-term risk provides complementary support: resource-fiscal literature consistently warns against procyclical commitment of volatile revenue. For boom-year expenditure creates the largest medium-term risk, differences in period and method prevent numerical equivalence, but the sources converge on a mechanism that can be tested directly in the Indonesian setting.

For boom-year expenditure creates the largest medium-term risk, a key qualification is that capital projects can also create future operating costs even when construction is one-off. Decision rules for commodity prices should therefore avoid a single threshold and instead operationalize the implication that new recurring commitments should be tested against conservative multi-year revenue scenarios.

#### 4.3 Rule-based buffers improve discipline when integrated with the budget

The third finding emphasizes rule-based buffers improve discipline when integrated with the budget. Aggregate summaries of commodity prices often conceal the following economic logic: predefined deposit and withdrawal rules can smooth expenditure and reduce discretionary political pressure during commodity cycles. Once that channel is made explicit, variation in regional revenue across regions, firms, or households becomes an expected feature of the system.

For rule-based buffers improve discipline when integrated with the budget, no one source establishes every link, yet together the evidence yields a proposition that can be subjected to direct Indonesia-specific testing.

The proposition on rule-based buffers improve discipline when integrated with the budget should not be generalized beyond its conditions, since a poorly governed fund can become an off-budget vehicle or invest too aggressively for liquidity needs. A more disciplined application of commodity prices is to observe the mechanism first and then act so that fund governance should specify objectives, eligible assets, withdrawal triggers, reporting, audit, and legislative oversight.

#### 4.4 Conservative benchmark prices reduce forecast bias

The fourth result identifies conservative benchmark prices reduce forecast bias as a source of nonlinearity between commodity prices and regional revenue. Specifically, using medium-term or prudently set reference prices prevents the annual budget from fully capitalizing temporary commodity spikes; proportional changes in the initial driver therefore need not generate proportional changes in the outcome.

Support for the conservative benchmark prices reduce forecast bias interpretation includes structural-balance approaches in resource-rich economies embody this principle. For conservative benchmark prices reduce forecast bias, the reviewed sources observe different stages of adjustment, so they are most informative when read as sequential evidence rather than interchangeable estimates.

The nonlinearity associated with conservative benchmark prices reduce forecast bias is conditional because benchmarks can become politically contested and may lag structural market changes. Managers and policymakers should keep the institutional setting visible and, where the condition is met, implement

the response that the methodology and periodic review schedule should be public and technically documented.

#### 4.5 Expenditure smoothing should protect maintenance and basic services

The fifth finding, expenditure smoothing should protect maintenance and basic services, helps reconcile apparently conflicting claims about commodity prices. Once the unit of exposure is specified, when revenue falls, abrupt cuts to health, education, operations, and infrastructure maintenance can create larger long-run social and asset costs than delaying lower-priority new projects; averages can consequently hide subgroup responses that matter for regional revenue.

The evidence base for expenditure smoothing should protect maintenance and basic services is anchored by the observation that public-finance logic favors prioritization based on service continuity and asset preservation. For expenditure smoothing should protect maintenance and basic services, Indonesian structural differences make this channel particularly relevant because they alter both the magnitude and the timing of adjustment.

Any inference from expenditure smoothing should protect maintenance and basic services must still recognize that rigid earmarks and personnel commitments can limit flexibility. The appropriate response is differentiated measurement rather than blanket intervention, including the practical step that medium-term expenditure frameworks should rank obligations by essentiality and reversibility before a downturn occurs.

#### 4.6 Economic diversification is the durable hedge

The sixth result focuses on economic diversification is the durable hedge and reveals a sequencing issue in the transmission of commodity prices. Before regional revenue can fully respond, a broader regional production and tax base reduces both direct resource-revenue dependence and indirect exposure of jobs, property, and services to one commodity cycle; if that prerequisite is absent, an aggregate signal may be visible while the local decision remains weak.

The sequence underlying economic diversification is the durable hedge is supported because IMF and World Bank Indonesia analyses repeatedly connect resilience with structural diversification. For economic diversification is the durable hedge, process indicators are therefore valuable alongside final outcomes, especially where adjustment is slow or observed only at low frequency.

For economic diversification is the durable hedge, the remaining caution is that diversification projects can themselves become wasteful if selected only to spend windfalls. Monitoring of commodity prices should cover both prerequisite and outcome, and implementation should be designed so that investment should pass transparent economic appraisal and be tied to realistic comparative capabilities.

#### 4.7 Integrated interpretation

Across the six findings, commodity prices is best understood as a conditional process rather than a mechanical predictor of regional revenue. The core question - How can local governments in commodity-exposed Indonesian regions stabilize revenue and maintain essential expenditure when global commodity prices rise and

fall? - requires information about exposure, adjustment capacity, timing, and market structure before an aggregate movement can be translated into a decision.

This mechanism-based reading of commodity prices also explains why credible studies can point in different directions. Research centered on regional revenue may observe a different stage of adjustment from research centered on the initial shock, so disagreement should first be checked for unit, horizon, and institutional differences before being treated as contradictory evidence.

#### 4.8 Measurement framework for future empirical work

##### Exposure

A exposure indicator for commodity prices should measure the unit-specific degree to which the proposed channel can operate. The finding on revenue classification is the foundation of stabilization implies recording the mechanism - local governments need to separate recurrent stable revenue from commodity-sensitive transfers and own-source receipts before setting expenditure ceilings - together with the limiting condition - some revenues respond to commodity conditions with lags, making simple contemporaneous correlations incomplete. Linking those fields to regional revenue would make subsequent empirical testing more informative than reliance on a single aggregate rate.

##### Timing

A timing indicator for commodity prices should separate immediate transmission from medium-term behavioral adjustment. The finding on boom-year expenditure creates the largest medium-term risk implies recording the mechanism - temporary windfalls can finance recurring salaries, subsidies, or maintenance obligations that remain after prices fall - together with the limiting condition - capital projects can also create future operating costs even when construction is one-off. Linking those fields to regional revenue would make subsequent empirical testing more informative than reliance on a single aggregate rate.

##### Heterogeneity

A heterogeneity indicator for commodity prices should report results for economically meaningful firm, household, sector, or regional groups. The finding on rule-based buffers improve discipline when integrated with the budget implies recording the mechanism - predefined deposit and withdrawal rules can smooth expenditure and reduce discretionary political pressure during commodity cycles - together with the limiting condition - a poorly governed fund can become an off-budget vehicle or invest too aggressively for liquidity needs. Linking those fields to regional revenue would make subsequent empirical testing more informative than reliance on a single aggregate rate.

##### Process

A process indicator for commodity prices should observe intermediate mechanisms together with final outcomes. The finding on conservative benchmark prices reduce forecast bias implies recording the mechanism - using medium-term or prudently set reference prices prevents the annual budget from fully capitalizing temporary commodity spikes - together with the limiting condition - benchmarks can become politically contested and may lag structural market changes. Linking those fields to regional revenue would make subsequent empirical testing more informative than reliance on a single aggregate rate.

### Counterfactual

A counterfactual indicator for commodity prices should state the plausible outcome in the absence of the shock or intervention. The finding on expenditure smoothing should protect maintenance and basic services implies recording the mechanism - when revenue falls, abrupt cuts to health, education, operations, and infrastructure maintenance can create larger long-run social and asset costs than delaying lower-priority new projects - together with the limiting condition - rigid earmarks and personnel commitments can limit flexibility. Linking those fields to regional revenue would make subsequent empirical testing more informative than reliance on a single aggregate rate.

### Data quality

A data quality indicator for commodity prices should document definitions, missingness, revisions, and coverage for reproducibility. The finding on economic diversification is the durable hedge implies recording the mechanism - a broader regional production and tax base reduces both direct resource-revenue dependence and indirect exposure of jobs, property, and services to one commodity cycle - together with the limiting condition - diversification projects can themselves become wasteful if selected only to spend windfalls. Linking those fields to regional revenue would make subsequent empirical testing more informative than reliance on a single aggregate rate.

## 5. Policy and Managerial Implications

### Fiscal sensitivity statement

Publish a simple annual table showing the budget effect of plausible commodity-price and production scenarios, including lagged impacts on transfers. For commodity prices, this action is decision-relevant because it addresses the mechanism identified in revenue classification is the foundation of stabilization rather than assuming that every unit responds alike. Its implementation should begin with a baseline measure of regional revenue and a stated criterion for evaluating whether exposure or adjustment capacity actually changes.

### Stabilization rule

Define deposits and withdrawals with objective triggers, conservative reference prices, minimum liquidity, audited reporting, and explicit links to the regional budget. For commodity prices, this action is decision-relevant because it addresses the mechanism identified in boom-year expenditure creates the largest medium-term risk rather than assuming that every unit responds alike. Its implementation should begin with a baseline measure of regional revenue and a stated criterion for evaluating whether exposure or adjustment capacity actually changes.

### Expenditure hierarchy

Protect essential services and maintenance, scrutinize new recurring commitments during booms, and maintain a shelf of projects that can be accelerated or delayed without damaging core services. For commodity prices, this action is decision-relevant because it addresses the mechanism identified in rule-based buffers improve discipline when integrated with the budget rather than assuming that every unit responds alike. Its implementation should begin with a baseline measure of regional revenue and a stated criterion for evaluating whether exposure or adjustment capacity actually changes.

## Research agenda

Construct a panel of resource-exposed districts and provinces linking commodity prices, production, transfers, own-source revenue, expenditure composition, reserves, and service outcomes across cycles. For commodity prices, this action is decision-relevant because it addresses the mechanism identified in conservative benchmark prices reduce forecast bias rather than assuming that every unit responds alike. Its implementation should begin with a baseline measure of regional revenue and a stated criterion for evaluating whether exposure or adjustment capacity actually changes.

## 6. Limitations and Future Research

The principal limitation of this article is methodological: it is an integrative review of commodity prices, not a new causal estimation. The synthesis can organize propositions about regional revenue and identify boundary conditions, but unresolved identification problems in the underlying studies remain unresolved here. Any later empirical extension on commodity prices should be presented as a separate design with its own data and assumptions.

The second limitation concerns comparability. Evidence on regional revenue varies by geography, frequency, population, definition, and study period, while the measurement of commodity prices is not uniform across sources. Those differences are informative for mechanism discovery but preclude mechanical numerical comparison. Future work on commodity prices should expose those choices through metadata, sensitivity

checks, and subgroup reporting.

A third limitation for commodity prices is the speed mismatch between policy information and peer review. Official releases can describe the current environment for commodity prices quickly, but contemporaneous description does not by itself establish an effect on regional revenue. For commodity prices, the research agenda below prioritizes linked microdata, explicit identification, and transparent robustness analysis.

### 6.1 Indonesia-specific research agenda

A first priority is to build a data architecture that can observe commodity prices at the same decision level where regional revenue is determined. The review's finding on revenue classification is the foundation of stabilization indicates that future datasets should capture local governments need to separate recurrent stable revenue from commodity-sensitive transfers and own-source receipts before setting expenditure ceilings. In practical terms, Construct a panel of resource-exposed districts and provinces linking commodity prices, production, transfers, own-source revenue, expenditure composition, reserves, and service outcomes across cycles. For future commodity prices research, the objective is not simply to increase sample size, but to align the unit of observation with the mechanism that the theory actually describes.

A second priority is identification. For the boom-year expenditure creates the largest medium-term risk channel, researchers should exploit timing, institutional thresholds, policy discontinuities, or plausibly exogenous shocks when available, while reporting pre-trends and alternative specifications. Because capital projects can also create future operating costs even when construction is one-off, a credible design

should show that changes in regional revenue are not merely the product of simultaneous composition shifts or reverse causality. In studies of regional revenue, where experimental or quasi-experimental designs are impossible, transparent longitudinal diagnostics are preferable to strong causal language based on one cross-section.

Third, heterogeneity in commodity prices should be pre-specified rather than discovered after estimation. The mechanism associated with rule-based buffers improve discipline when integrated with the budget suggests grouping observations by exposure, market structure, income or firm size, geography, and relevant institutional constraints before drawing policy conclusions about commodity prices. This is especially important because a poorly governed fund can become an off-budget vehicle or invest too aggressively for liquidity needs. Reporting distributions and subgroup estimates can reveal whether an apparently small average effect on regional revenue conceals large gains and losses for distinct populations.

Finally, research on commodity prices should be reproducible enough for cumulative learning. The qualification attached to conservative benchmark prices reduce forecast bias - benchmarks can become politically contested and may lag structural market changes - makes sensitivity analysis essential. Future commodity prices studies should publish variable definitions, source dates, transformation rules, missing-data treatment, and code where permissions allow; they should also distinguish preregistered hypotheses from exploratory analysis. These practices would make subsequent evidence on regional revenue easier to compare without pretending that different settings are statistically identical.

## 7. Conclusion

This review asked: How can local governments in commodity-exposed Indonesian regions stabilize revenue and maintain essential expenditure when global commodity prices rise and fall? The accumulated evidence supports a conditional answer: the effect associated with commodity prices changes with the economic unit's exposure, institutional setting, market structure, time horizon, and capacity to adjust, and those differences shape the observed outcome for regional revenue.

The six synthesized mechanisms move the analysis of commodity prices from aggregate description toward operational diagnosis. A useful decision process identifies the active channel, measures the relevant subgroup exposure, records the binding constraint, and evaluates whether the proposed response changes that constraint before inferring improvement in regional revenue.

For future Indonesia research, the priority is therefore not a larger collection of undifferentiated averages, but more granular and reproducible evidence on commodity prices linked to the decision level at which regional revenue changes. For this commodity prices manuscript, and the journal editor should verify the interpretations and bibliography, confirm authorship, and assign the final issue metadata before OJS publication.

## Editorial Note

This is a conceptual review prepared with editorial assistance. It reports no newly collected empirical observations or causal estimates. Historical source context is separated from the analytical propositions developed in the discussion.

## Historical source context and interpretation

Historical macroeconomic context is drawn from Indonesia's 2023 Article IV consultation (International Monetary Fund, 2023). The report provides a pre-cutoff policy context for interpreting monetary, fiscal and external conditions. It does not establish the firm-level or regional causal relationships proposed in this review; those relationships require separate empirical testing.

## References

Baunsgaard, T., Villafuerte, M., Poplawski-Ribeiro, M., & Richmond, C. (2012). Fiscal frameworks for resource rich developing countries. IMF Staff Discussion Note 12/04. Washington, DC: International Monetary Fund.

International Monetary Fund. (2012). Macroeconomic Policy Frameworks for Resource-Rich Developing Countries. Washington, DC: International Monetary Fund.

van der Ploeg, F. (2011). Natural resources: Curse or blessing? *Journal of Economic Literature*, 49(2), 366-420.

International Monetary Fund. (2023). Indonesia: 2023 Article IV Consultation - Press Release; Staff Report; and Statement by the Executive Director for Indonesia. IMF Country Report No. 23/221.  
<https://doi.org/10.5089/9798400244988.002>