Growth Lab

Bolivia's Economic Pivot: The Making of a Macroeconomic Crisis

Fernando García, Guillermo Arcay, Alejandro Werner, and Ricardo Hausmann

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HARVARD KENNEDY SCHOOL
79 JFK STREET
CAMBRIDGE, MA 02138

GROWTHLAB.HKS.HARVARD.EDU

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About the Growth Lab

The Growth Lab at Harvard University's multidisciplinary team pushes the frontiers of research on economic growth and development policy. The Lab advances academic research on the nature of economic growth and conducts applied, place-based engagements that aim to understand context-specific growth processes, address key constraints, and identify promising opportunities. Through its research and teaching activities, the Lab has become a global thought leader offering breakthrough ideas, methods, and tools —including Growth Diagnostics, Economic Complexity and Green Growth— that help practitioners, policymakers, and scholars understand how to accelerate economic growth and expand opportunity across the world. Consistent with the mission of the Harvard Kennedy School of Government, in which the program is housed, the Lab works to expand capabilities for improved economic policy-making such that more people and societies can enjoy higher levels of wellbeing through stronger, more sustainable, and more inclusive economic growth processes.

About the Series

The "Bolivia's Economic Pivot" series, produced by the Growth Lab, comprises seven documents: (1) Main findings and reform priorities, which integrates and synthesizes the six thematic studies in the series (Hausmann et al., 2026); (2) The Making of a Macroeconomic Crisis (García et al., 2026); (3) Early Macroeconomic Achievements and Remaining Challenges (Arcay et al., 2026); (4) Reviving the Energy Sector (Lamby et al., 2026); (5) Unlocking the Mining and Lithium Potential (Lamby & Hausmann, 2026); (6) Opportunities and Challenges in Agriculture (Shah et al., 2026); and (7) A Growth Diagnostics of the Tourism Sector (Freeman & Hausmann, 2026). See references.

Acknowledgments

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We note that the views expressed in this report are solely those of the authors and do not necessarily reflect the views of those acknowledged here.

Data and Information Disclaimer

This report is based exclusively on publicly available information and statistics at the time of writing. Official datasets in Bolivia are often outdated, incomplete, or published with significant lags, which limits the precision of certain estimates and the depth of the analysis. Where possible, these gaps have been addressed through secondary sources, historical trends, or internationally comparable data, though some figures should be interpreted as indicative rather than definitive. Given this, judgment was applied in preparing some of the numbers and calculations contained in this report, and any changes or developments occurring after February 28th, 2026, are not fully accounted for.

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1. Introduction

Bolivia is facing a full-blown macroeconomic crisis. Fiscal deficits have exceeded 10 percent of GDP, the fixed exchange rate regime has effectively collapsed, a parallel foreign exchange market has emerged, inflation has accelerated into double digits, fuel shortages have become recurrent, and economic growth has stagnated. On the surface, the story resembles those of other Latin American commodity exporters after the end of the commodity super-cycle (Argentina and Ecuador among others) but with a significant lag.

What explains the lag? The management of the boom. Bolivia accumulated an unusually large stock of foreign reserves during the commodity super-cycle, which allowed the authorities to sustain a demand-driven growth model under a fixed exchange rate for nearly a decade after commodity prices fell and, more significantly, natural gas production collapsed. Rather than adjusting domestic demand and relative prices when the export engine weakened, the country accumulated fiscal and external imbalances through successive rounds of financing: first by drawing down foreign exchange reserves, then through the inflation tax, and eventually through financial repression. When international reserves were finally exhausted in 2023, the peg collapsed, inflation took off, and shortages became widespread.

In the years since, Bolivia found new ways to stay afloat. Financial repression became the primary financing mechanism: pension savings were channeled into government paper at below-market rates and the central bank issued interest-bearing liabilities (including dollar- and inflation-linked liabilities) to sterilize excess liquidity at negative real rates. In 2024 alone, the government extracted an estimated 11.7 percent of GDP through the inflation tax and financial repression. As external financing options dried up entirely, the authorities went further, imposing gold export surrender requirements on mining companies as a last resort to rebuild foreign exchange holdings. Lending rate caps on "productive sectors", which comprised roughly 65 percent of bank loan portfolios, meant that as inflation rose, banks could not raise deposit rates without destroying their margins, effectively trapping depositors into negative real returns and transferring resources from savers to subsidized borrowers.

This paper explains how Bolivia got to this point and what imbalances remain to be addressed. The central argument is straightforward: Bolivia's strong performance in the 2000s was the product of an extraordinary external windfall interacting with a gas export engine built in the 1990s, yet even compared to richer regional peers, growth remained relatively disappointing. Regulatory changes, then cemented by the 2009 Constitution, undermined that engine, and rather than adjusting, policy kept the old model alive through successive layers of financing, each more distortionary than the last. The paper ends with a diagnostic ledger of the imbalances and vulnerabilities that any stabilization program must confront. The question of what to do about them (the scenarios, policy packages, and sequencing) is left for a companion paper (Arcay et.al.).

The paper proceeds as follows. Section 2 sets out the internal and external conditions behind the boom and Bolivia's use of the windfall relative to regional peers. Section 3 traces the mechanics of the breakdown: the collapse of the gas export engine, the resulting fiscal and external gaps, the financing choices that postponed adjustment, and the macro-financial vulnerabilities that accumulated in the

process. Section 4 offers two benchmarks: a counterfactual for GDP and an estimate of the equilibrium real exchange rate, to gauge the scale of the imbalances. Section 5 concludes with the diagnostic ledger.

2. Background: Internal and External Conditions

2.1. The internal conditions in the prelude to the commodity super-cycle

The 1990s marked a turning point in Bolivia's economic trajectory. The decade began in the aftermath of the 1984–85 hyperinflation episode, widely characterized as the most severe in Latin America in the 20th century and among the largest hyperinflations recorded internationally (Sachs 1986; Morales 1987). Stabilization was initiated through Supreme Decree No. 21060 (August 29, 1985), which anchored a broad macroeconomic adjustment program and restored nominal stability.

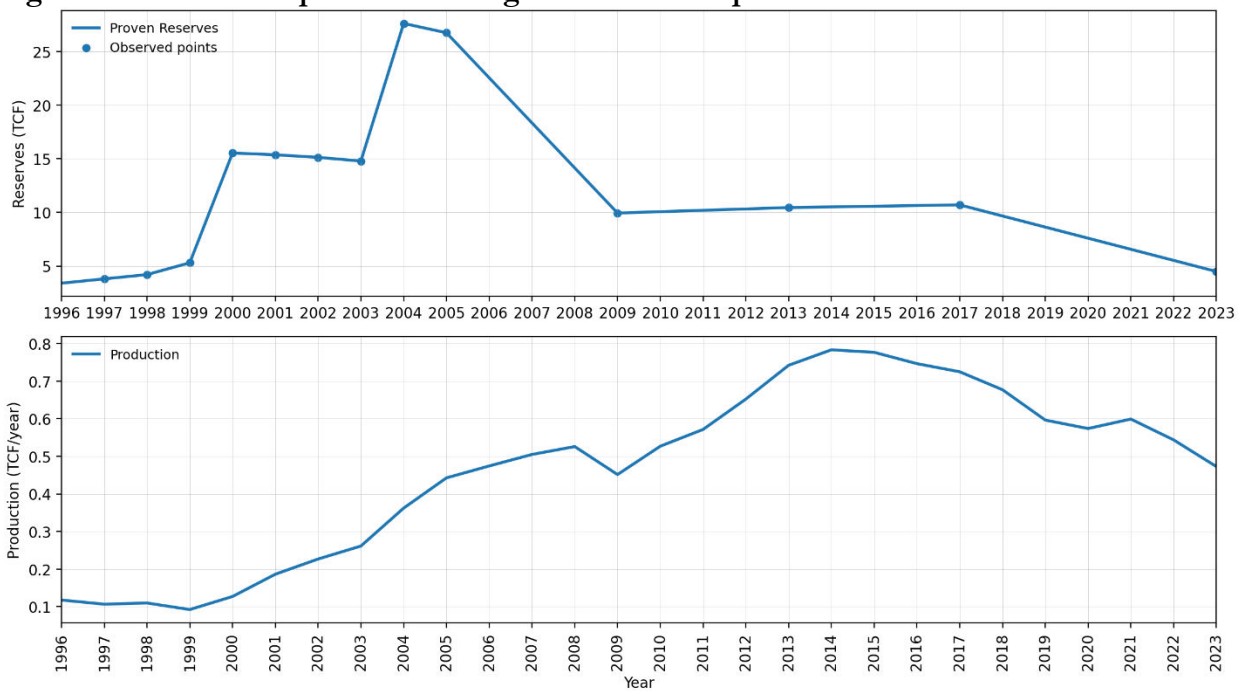
Building on this stabilization, Bolivia subsequently pursued a strategy to scale up its hydrocarbons sector. Public and private investments, supported by external financing and technical assistance, were directed toward upstream exploration and midstream transport infrastructure, with the objective of expanding proven reserves and converting natural gas into a sustained export base.

To this end, Bolivia secured long-term market access. The centerpiece was the Gas Supply Agreement (GSA) negotiated between *Yacimientos Petrolíferos Fiscales Bolivianos* (YPFB) and Petrobras, which anchored demand in Brazil and gave investors a credible outlet for future production. To make the contract viable, both countries jointly financed and built the Gasbol pipeline starting in 1996, even though Bolivia's reserves base was still not fully validated. In effect, the pipeline came first, and the reserves were expected to follow.

They did. The institutional reforms of the period were designed to make that outcome more likely. The 1996 Hydrocarbons Law (No. 1689) shifted the sector away from YPFB-centered operational control toward a shared-risk contractual framework that granted private companies greater autonomy to explore, develop, and export. At the same time, oversight functions were separated from YPFB through the creation of an independent regulator (the Superintendencia de Hidrocarburos), reducing conflicts of interest between regulation and operation (García Molina and Murcia, 2008). Fiscal terms were also adjusted to attract exploration, including a reduction in the royalty rate in new fields from 50 percent to 18 percent.

The response was rapid: foreign investment entered at scale from companies such as Petrobras, Repsol, Total, Pluspetrol among others, bringing capital, technology, and execution capacity. Between 1997 and 2004 Bolivia's proven gas reserves expanded dramatically (Figure 1), underpinned by discoveries and development in mega-fields such as Margarita, Sábalo, San Alberto, and Itaú. By the early 2000s, Bolivia had built the preconditions for a gas boom: a pipeline to its main market, a contractual and regulatory framework that could mobilize private investment, and a newly expanded reserves base. Those initial conditions are what made the "golden goose" possible. Gas production increased steadily since 1999 by almost a factor of eight, when it peaked in 2014.

Figure 1. Evolution of proven natural gas reserves and production in Bolivia



Note: Proven reserves are extrapolated using observed proven reserves in specific years. The decline in gas reserves between 2005 and 2009 cannot be attributed to production during that period. Rather, it likely reflects a combination of previous overestimation and changes in the methodology used for reserve assessments. Source: Authors' elaboration based on Fundación Jubileo, which in turn draws on data from YPFB and the Ministry of Hydrocarbons (MH) and from YPFB directly.

These internal conditions were necessary for a macroeconomic boom. Having gas in the ground, contracts to sell it, and a pipeline to deliver it creates export capacity and tradable income. But the scale of the macroeconomic dividend depends on a second ingredient: the terms of trade. In other words, Bolivia entered the 2000s with the ability to produce and export large volumes of gas just as the world moved into a commodity super-cycle. The boom that followed was therefore the product of an interaction: domestic capacity (volumes) multiplied by external prices (terms of trade). The next section quantifies the size of that external component - the income windfall - and sheds light on how Bolivia used it.

2.2. The external conditions: the commodity boom and bust

A useful way to discipline the narrative of Bolivia's boom years is to separate what was driven by exogenous external conditions from what reflected domestic factors and policy choices. As discussed in the previous section, the late 1990s and early 2000s saw a major investment cycle in hydrocarbons that increased proven reserves and expanded production and export capacity. This created the conditions for Bolivia to benefit from the global commodity super-cycle, during which natural gas prices rose sharply relative to the 1990s.

But Bolivia's boom was not just a story of better prices. Countries do not benefit from a commodity super-cycle simply because the world decides to pay more; they benefit because they have built the capacity to produce and export at scale when that moment arrives. Bolivia had done exactly that in

the end of 1990s. Gas production increased almost eightfold between 1999 and its peak in 2014, and, holding prices constant, hydrocarbon value added rose by 197 percent over the same period. The boom was therefore the interaction of an external price shock with a domestically enabled expansion in quantities. The windfall measure we computed below isolates only the first component.

To quantify the magnitude of this external impulse and compare it to other Latin American countries, we follow Adler and Magud (2013, 2015) and compute the commodity income windfall. The commodity windfall is a measure of the additional purchasing power a country gained because commodity prices were higher than they were before the boom (see Appendix A for details of the methodology).

Re-estimating this measure for Bolivia and a sample of Latin American commodity exporters places Bolivia's windfall in regional perspective (Table 1). Table 1 shows a striking pattern. Venezuela and Chile experienced exceptionally large windfalls over the boom episode, with increases of purchasing power of around 35–36 percent on average per year. Ecuador, Bolivia, and Perú also experienced sizable windfalls. In Bolivia, the cumulative income windfall reached 184.1 percent, equivalent to an annual average of 15.3 percent. At the other end of the distribution, Colombia and Brazil display much smaller windfalls. These differences are consistent with the share of commodities in the export basket, as well as heterogeneity in types of commodity dependence and the openness to trade across countries.

Because commodity windfalls are temporary, savings and investment decisions matter for the intertemporal response to the terms-of-trade shock. Private and public decisions shape how the windfall is absorbed, whether it is smoothed through saving or amplified through higher aggregate demand. The table summarizes this through the marginal saving rate (as a share of the cumulative windfall), which measures the extent of the effort to save the income windfall, decomposed into additional domestic investment and the accumulation of foreign assets (foreign saving).

Bolivia stands out in two respects. First, its marginal saving rate is markedly higher than that of all of its peers. 96.5 percent of the commodity income windfall was saved (versus 50.7 percent for the average of selected Latin American countries). This increase in the marginal savings rate was in part channeled through increases in the marginal investment rate (27.4 percent of the commodity income windfall), but a larger share was saved through the accumulation of foreign assets (68.7 percent of the commodity income windfall). This stands in stark contrast with the rest of these Latin American countries. On average, countries in Latin America increased domestic investment marginally more than savings, which resulted in a reduction in foreign assets. Second, the public sector captured a larger portion of the windfall through fiscal channels than most peers. Bolivia exhibits one of the highest fiscal responses of revenues with respect to the windfall, alongside a substantial increase in public expenditure, while still recording net fiscal saving over the episode. Public revenues increased by an amount equivalent to 98.4 percent of the windfall, while public expenditure increased by 51.2 percent of the windfall. This implies that roughly 47 percent of the windfall was retained as net fiscal saving.

In this sense, Bolivia resembles cases such as Colombia and Ecuador, where the state appropriated a large share of windfall resources, but these two countries without building extra buffers.[1]

Table 1. Income windfall, saving, investment, and fiscal response (boom period)

	Episode		Income Windfall (%)		Marginal Rates (% of windfall)			Fiscal Elasticities (% of windfall)	
Country	Start	End	Cumulative	Annual Avg.	Total Saving	Domestic	Foreign	Revenue	Expenditure
Venezuela	2004	2014	391.3	35.6	38.2	44.5	−6.3	27.9	45.2
Chile	2004	2014	382.1	34.7	26.6	29.3	−2.8	29.4	20.9
Ecuador	2002	2014	280.6	21.6	33.8	41.5	−7.8	77.0	85.7
Bolivia	2003	2014	184.1	15.3	96.5	27.8	68.7	98.4	51.2
Peru	2003	2014	179.8	15.0	60.6	59.9	0.7	38.3	21.7
Paraguay	2002	2014	148.0	11.4	78.6	54.4	24.2	−9.8	−13.0
Argentina	2003	2014	120.1	10.0	50.6	72.9	−22.3	131.7	106.1
Colombia	2004	2014	47.5	4.3	78.5	95.4	−17.0	91.3	54.8
Brazil	2006	2014	27.9	3.1	−7.0	119.0	−126.0	58.6	45.2
Latin America	—	—	**195.7**	**16.8**	**50.7**	**60.5**	**−9.8**	**60.3**	**46.4**

Note: As in Adler & Magud (2015), we decompose aggregate savings into domestic (i.e., investment) and foreign saving, relying on the current account identity ($S = I + CA$). We follow also that paper to set the start date of the episode. Source: Author's elaboration based on The Economist Intelligence Unit, World Economic Outlook, and CEPAL

How did countries adjust once the commodity boom ended? Table 2 compares "boom" averages with the 2014-2024 bust period for national saving, domestic investment, and the overall government balance (all as a percent of GDP). The common theme is that the adjustment in most countries operated through a contraction of investment, often accompanied by a decline in savings. In several cases, national savings fell by more than investment, implying that countries relied more on external financing or reserves' losses.

A second regularity is that the widening external gap was, in many countries, closely mirrored by a deterioration in the public balance. Government deficits increased across much of the sample, indicating that part of the post-boom adjustment was postponed through fiscal policy—either deliberately, to smooth the cycle, or mechanically, through the collapse of commodity-linked revenues and the persistence of expenditures that proved difficult to unwind.

Bolivia stands out both in magnitude and in composition. Relative to its boom period, Bolivia's national saving rate fell by about 11 percentage points of GDP, while on average during this period domestic investment remained broadly unchanged. Therefore, the adjustment occurs almost entirely through a change in the external balance. Crucially, this swing is mostly explained by a large deterioration in the public balance or fiscal dissaving (roughly on average 9 percentage points of GDP). This configuration is consistent with a boom in which the state captured a large share of the windfall

[1] Argentina was coming out of an acute crisis in 2001-2 and official statistics were manipulated starting in 2007.

and accumulated foreign assets, followed by a bust in which the public sector kept spending levels stable despite the collapse of hydrocarbon revenues, transforming what had been a large accumulation of foreign asset into a sustained drawdown of external buffers.

Table 2. From boom to bust: saving, investment, and fiscal balance

	Boom average (% of GDP)			Bust average 2014–2024 (% of GDP)			Change (Bust − Boom, pp)		
Country	Saving	Investment	Gov. Balance	Saving	Investment	Gov. Balance	Δ Saving	Δ Investment	Δ Gov. Balance
Argentina	15.6	16.9	−3.1	15.6	17.1	−5.3	0.0	0.2	−2.1
Bolivia	24.8	18.3	1.2	14.1	18.4	−7.4	−10.7	0.0	−8.6
Brazil	17.9	21.6	−2.3	14.4	17.0	−6.7	−3.5	−4.5	−4.3
Chile	23.1	28.1	0.1	19.8	24.0	−2.7	−3.3	−4.1	−2.8
Colombia	19.0	22.1	−0.4	15.9	20.7	−4.0	−3.0	−1.4	−3.6
Ecuador	27.6	28.1	−5.6	25.4	24.7	−4.3	−2.1	−3.4	1.2
Paraguay	22.0	21.6	−1.1	23.6	23.2	−2.9	1.6	1.6	−1.8
Peru	21.3	25.1	1.4	20.1	22.2	−2.5	−1.2	−2.9	−3.9
Venezuela	29.0	27.7	−10.1	12.0	13.6	−10.6	−17.0	−14.1	−0.5
Latin America	**22.3**	**23.3**	**−2.2**	**17.9**	**20.1**	**−5.2**	**−4.4**	**−3.2**	**−2.9**

Source: Author's elaboration based on The Economist Intelligence Unit, World Economic Outlook, and CEPAL

Bolivia's commodity windfall was sizable and a significant amount of it was intermediated by the public sector through increased tax collection (and the increase in tax rates post-nationalization). The accumulation of foreign assets during the boom years allowed the country to sustain consumption (public and private) for a prolonged period of time by running large current account deficits and drawing on its foreign assets. These shocks and the policy responses conditioned significantly the growth performance of Bolivia, as we shall see next.

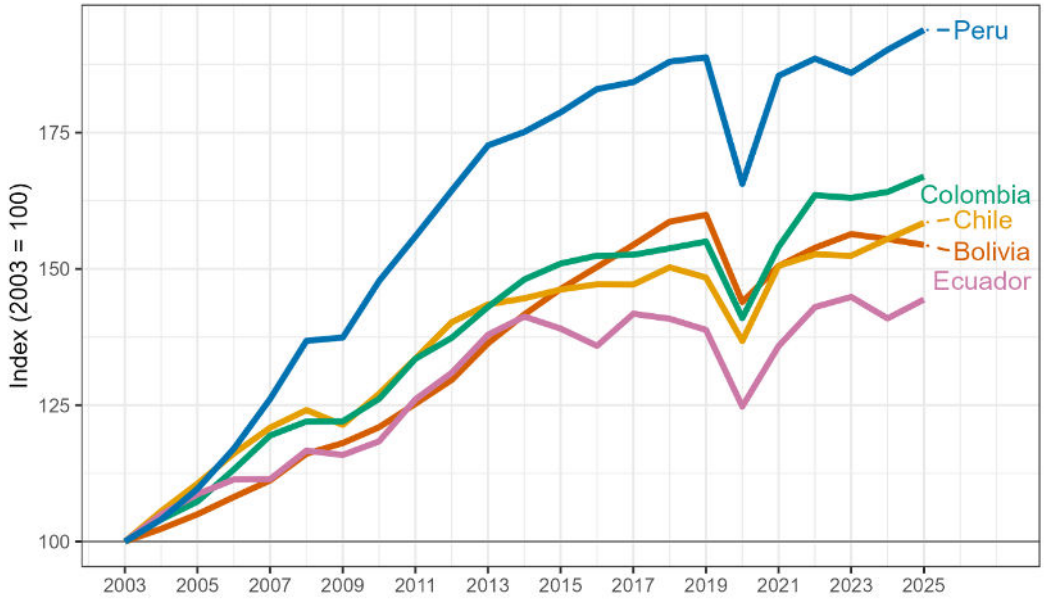
2.3. Growth and structural performance

Bolivia's "growth miracle" is simply not there in the data. It sustained growth longer than peers because of accumulated foreign assets, not because it built productive capacity. By 2025, per-capita GDP is below its 2019 level and Bolivia loses the growth race against Colombia and Paraguay, which received lower income windfalls, and has fallen significantly behind Peru by a significant margin from 2003. This means Bolivia is not even converging toward its regional peers. Total factor productivity (TFP) rose only marginally during the boom and collapsed more sharply than any comparable economy in the region afterward.

Figure 2 shows Bolivia's economic performance vis-à-vis regional peers that experienced similar income windfalls. The figure shows two marked periods. Between 2003 and 2019, Bolivia outperforms most of its peers, except Peru, which experienced a similar income windfall. During this period, Bolivia sustained growth longer than the rest of its peers despite the end of the super cycle in 2014, consistent with the policy decision to sustain aggregate demand with the buffers it accumulated during the boom.

However, Bolivia ends up 2025 with a per capita GDP below of that one of 2019 and it loses the growth race against Colombia and Paraguay during this whole period.

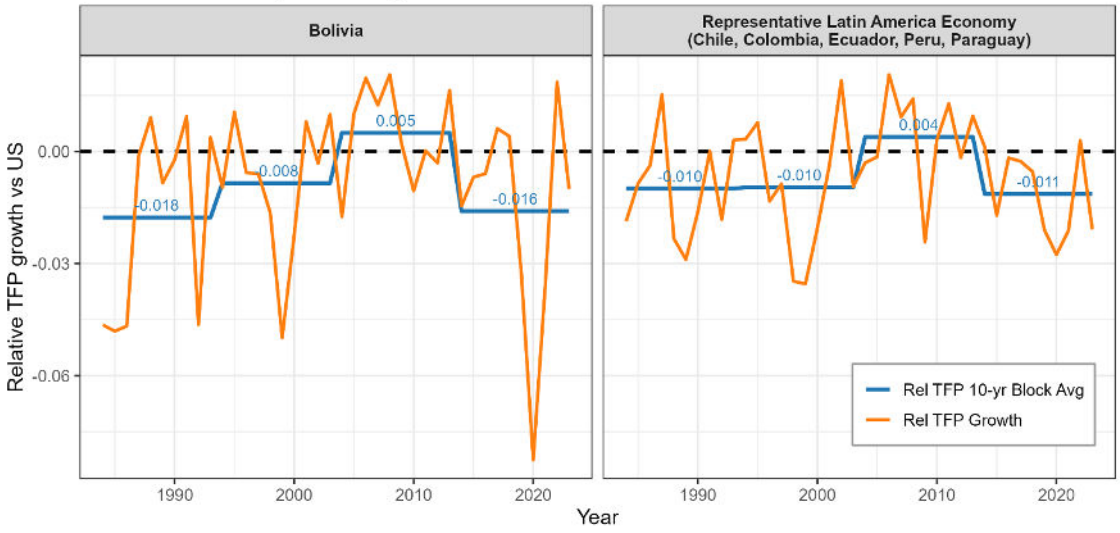
Figure 2. Real GDP per capita (base 100 = 2003)



Note: Year 2025 is the IMF's projection as of October 2025. Source: Authors' elaboration based on IMF's WEO.

Under a convergence perspective, given that Bolivia's income per capita was lower than all of these peers in 2003, Bolivia's economic performance was far from a miracle. When one analysis the country's relative TFP to the US in Figure 3, Bolivia's productivity rose only marginally more than the US in the 2000s and similarly to its peers and that after the commodity super cycle ended, the productivity collapses more than its peers.

Figure 3. Relative TFP: 10-year average growth

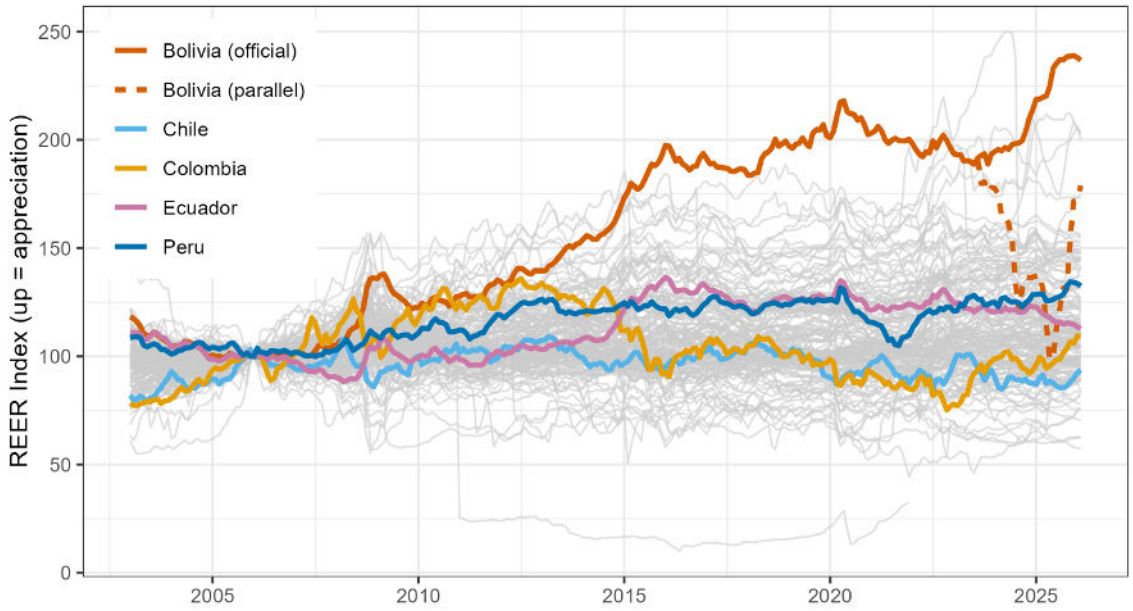


Source: Authors' elaboration based on Penn World Tables.

As productivity, growth, and the terms of trade improved, Bolivia's multilateral real exchange rate[2] appreciated by roughly 75 percent between January 2006 and the end of the commodity super-cycle. This appreciation is consistent with the experience of many commodity exporters during boom periods.

However, once external and domestic conditions deteriorated, the earlier temporary rise in tradable income (temporary in price and, most importantly, in quantity) turned into a persistently appreciated real exchange rate. Because Bolivia maintained a fixed nominal exchange rate vis-à-vis the U.S. dollar and inflation remained broadly in line with that of the U.S., most of the movement in the real exchange rate after 2015 reflects the fact that trading partners allowed their currencies to depreciate against the dollar, while Bolivia did not. As Bolivia had accumulated substantial foreign assets during the boom, the Central Bank was able to defend the peg and postpone the adjustment that occurred elsewhere in the region. This stands in sharp contrast to neighboring countries such as Colombia, Chile, and Peru, whose currencies depreciated or whose real exchange rates adjusted downward after the end of the super-cycle (Figure 4). In Bolivia's case, the foreign assets accumulated during the boom allowed the country to sustain an unusually appreciated real exchange rate at a time when peer countries were undergoing external adjustment.

Figure 4. Multilateral real effective exchange rate (January 2006 = 100)

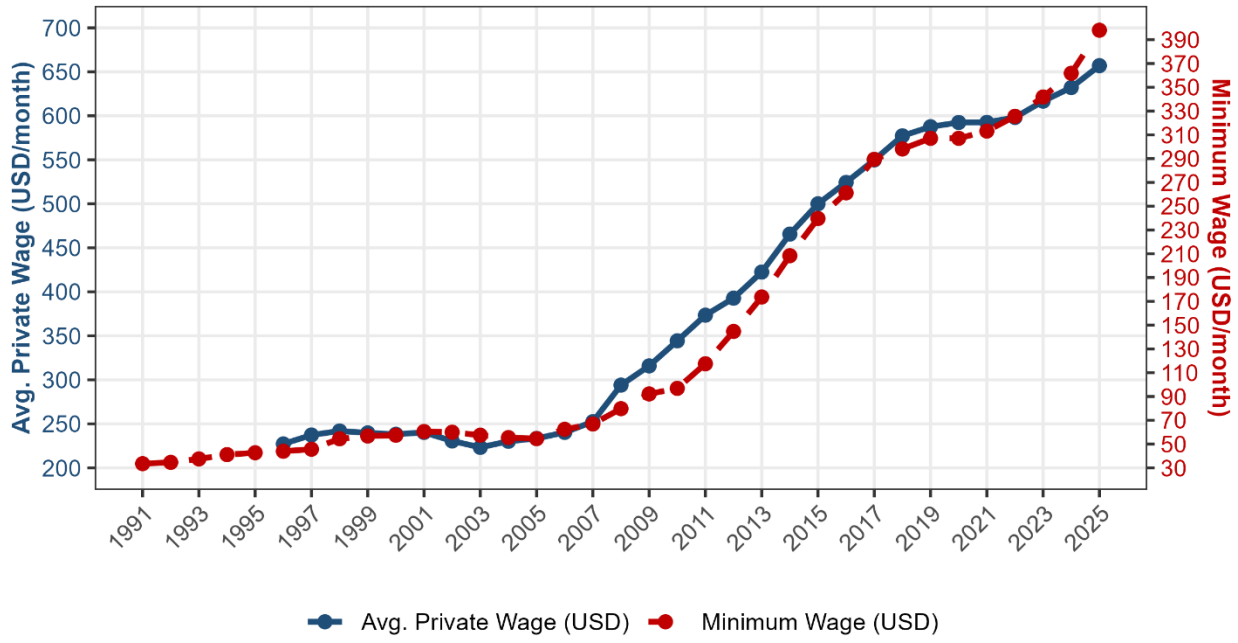


Note: in gray are all countries in the world (10 percent outliers excluded). In color are regional peer countries and Bolivia.
Source: Bruegel and dolarbluebolivia.click/datos.

[2] Measured using Bruegel's monthly CPI-based real effective exchange rate (REER) index against a broad basket of 120 trading partners. This is a multilateral measure of the real value of the currency relative to trading partners. Most of the variation in this measure after 2015 reflects movements in partner-country exchange rates against the dollar, together with relative price changes, rather than changes in Bolivia's bilateral nominal exchange rate against the U.S. dollar.

The appreciation of the real exchange rate also entailed a "windfall" for certain import-intensive sectors and for workers, given that salaries in dollars rose sharply and were maintained for a long period due to the large stock of accumulated foreign assets. Figure 5 illustrates this through the evolution of wages expressed in US dollars, which provides a complementary measure of the misalignment of the official real exchange rate vis-à-vis the US. The average private sector wage nearly tripled in dollar terms between 2005 and 2015, rising from around $220 to over $550 per month, while the minimum wage quadrupled over the same period, from roughly $55 to $230 per month. Strikingly, rather than adjusting downward after the end of the commodity boom, dollar wages continued to rise—reaching approximately $650 and $390 per month respectively by the mid-2020s. This reflects the fact that nominal wages in bolivianos kept increasing while the exchange rate remained fixed, so dollar wages mechanically continued to climb even as Bolivia's competitiveness eroded. In peer countries that allowed their currencies to depreciate, dollar wages fell or stagnated, facilitating external adjustment; Bolivia's peg prevented this correction.

Figure 5. Private sector and minimum wage in USD (official) per month

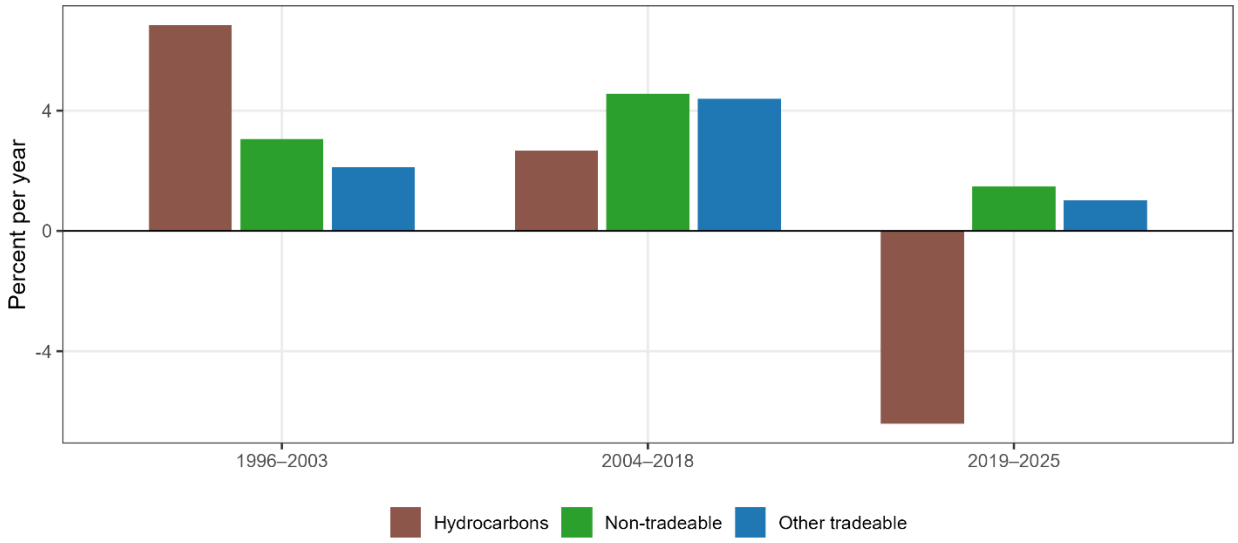


Note: Private sector wages are an average of wages across economic activities excluding hydrocarbons and mining. Source: INE

Despite a large appreciation of the real exchange rate during this period, there is no clear evidence of a "Dutch disease" that affected the non-gas tradeable sector. We decompose growth by sector and group activities by the likelihood they are tradeable and non-tradeable. Figure 6 shows this in three different periods starting in 1996. Sectorial growth components show that: i) the hydrocarbon boom starts in the period of 1996-2005, ii) hydrocarbon's growth rate slows down and there is a non-tradable and non-gas tradeable boom during the commodity super-cycle until 2019 and iii) a growth collapse of hydrocarbons and a significant slowdown of tradable and non-tradables. The evidence doesn't show aspects of a "Dutch disease" as the country saved some of its windfall, but also because agriculture

did relatively well, fueled by cheap credit, low energy costs, and low taxes. The growth slowdown in both tradeable and non-tradeable activities is associated with the collapse in hydrocarbons and the macroeconomic crisis that resulted from it, which we describe in detail in the next section.

Figure 6. Average growth in real value-added by sector



Note: Other tradeable is defined as Agriculture, Manufacturing, and Mining. Source: Author's elaboration based on INE.

3. From boom to breakdown: Bolivia's macro-financial crisis

3.1. The collapse of the export engine

The collapse of natural gas production after 2014 was not a response to the end of the commodity super-cycle. It was, in large part, the consequence of policy choices that eroded the investment foundations the sector depended on. Two decisions were particularly consequential: the overhaul of the fiscal and regulatory framework governing the sector, and the setting of domestic gas prices far below export parity.

The 1990s reforms described in Section 2 built an investment-driven export engine through clear fiscal terms, private operational autonomy, and credible regulatory oversight. That framework was dismantled after the sector had already taken off. The 2006 nationalization, the sharp increase in the government take, the reduction in legal certainty, and the erosion of regulatory credibility removed the conditions that had attracted private investment in the first place. The 2009 Constitution cemented these changes. The regulatory and contractual conditions that had attracted Petrobras, Repsol, Total, and Pluspetrol in the 1990s had been fundamentally altered.

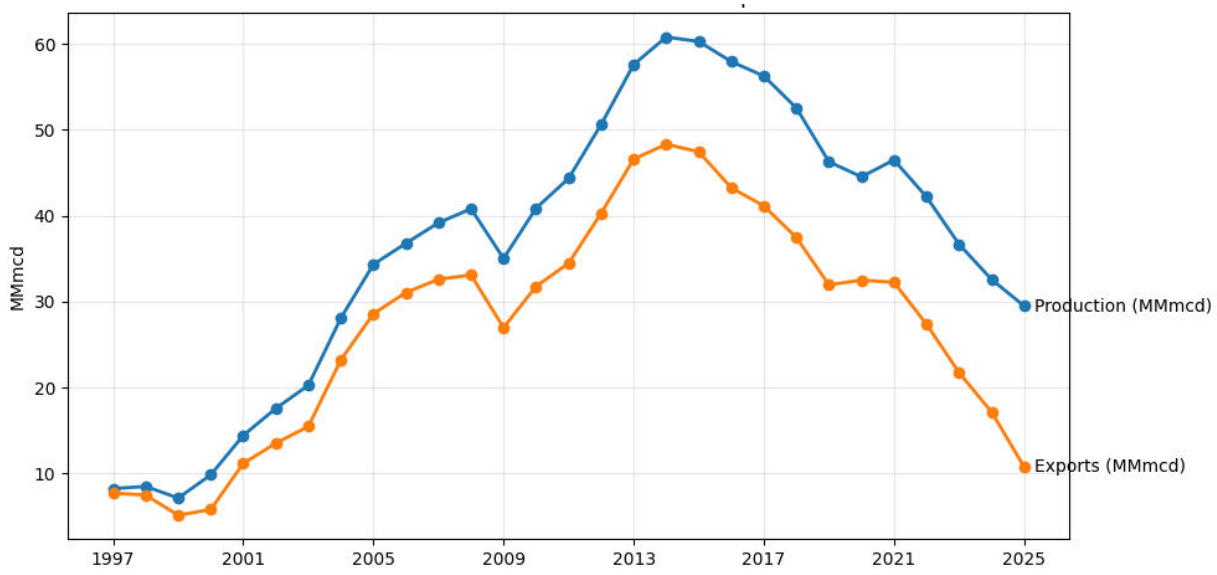
Compounding the disincentive to invest was the pricing of gas in the domestic market. Bolivia sold natural gas domestically at prices far below the export parity prices paid by Brazil and Argentina. At those regulated prices, the profitability of new exploration and development fell sharply, particularly for fields without access to export contracts. Low domestic prices also discouraged investment in alternatives, such as hydropower, that would have been economically competitive if gas were priced

at its opportunity cost. The combined effect was a slow strangulation of the sector's investment base, whose consequences accumulated over years before surfacing the production data.

This does not mean that the collapse in private incentives mechanically implied the collapse of all investments. Even after private exploration weakened, the state still had the option of investing through YPFB to sustain reserve replacement and develop new production capacity. But that did not happen at the scale or with the success required to offset the decline of mature fields. As the companion energy paper argues, private exploration fell sharply after the mid-2000s, few large discoveries followed, and YPFB's expanded role after 2009 did not succeed in generating sufficient new reserves or production.[3] The record is consistent with several, non-mutually exclusive explanations: limited political willingness to prioritize high-risk exploration, excessive optimism that existing discoveries would suffice for longer, and weaker technical or managerial capabilities relative to the international firms that had led the earlier exploration cycle. Bolivia did not just lose the private investment engine, but it also failed to build a public sector capable of replacing it.

The numbers are stark. Gas production rose from 8.3 MMmcd in 1997 to a peak of 59.6 MMmcd in 2014, then fell to 27.3 MMmcd by 2025, a decline of 54.2 percent from the peak. The drop in exports was even steeper: from 48.3 MMmcd in 2014 to 10.8 MMmcd in 2025, a fall of 78 percent. The share of production destined for export fell from roughly 79 percent in 2014 to 37 percent in 2025 (Figure 7). Bolivia had built an export engine in the 1990s; the policy choices of the following decade ensured it would not be maintained.

Figure 7. Natural gas production and exports (in MMmcd)



Source: Authors' elaboration based on INE.

[3] Lamby et.al., 2026

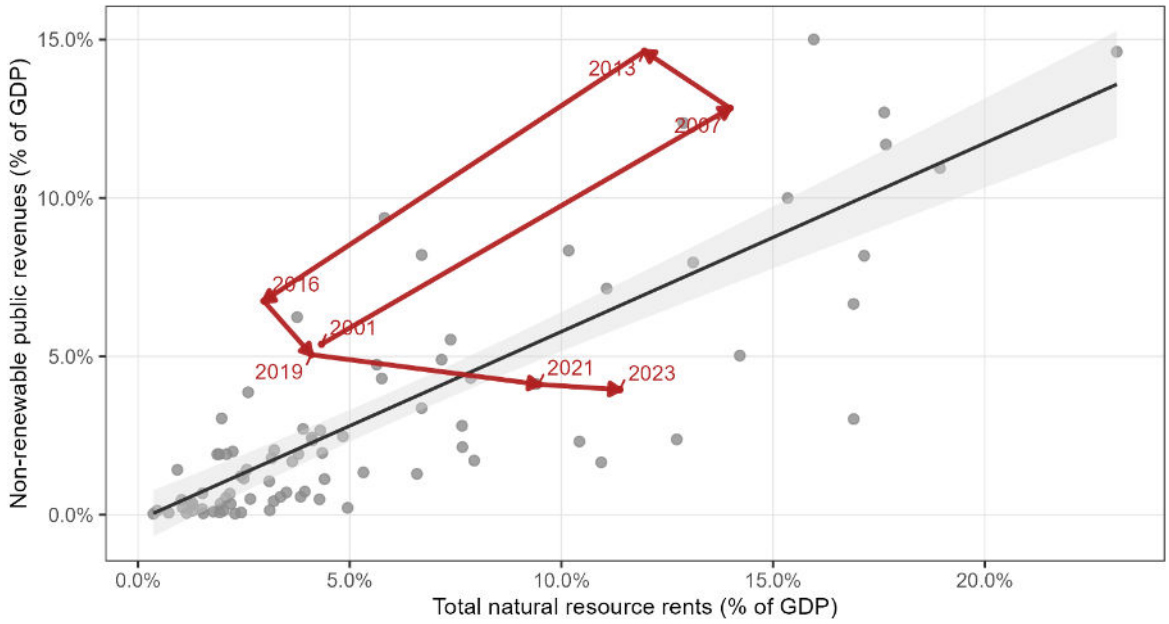
3.2. The fiscal arithmetic: a structural deficit emerges

The collapse of gas production created an immediate and severe fiscal problem. The government relied heavily on taxing the gas sector, especially after the nationalization of the sector once the sector already took off. Among other measures, the government introduced a 32 percent direct tax on gross production (*i.e.*, *Impuesto Directo a los Hidrocarburos* or *IDH*), which added to the pre-existing 18 percent royalty rate, which meant that the government participation in the gross profits of the operation was raised to over 76 percent and often to over 90 percent (Medinacelli 2007).

Bolivia always depended heavily on its natural resources to collect revenues. Non-renewable revenues have been almost always above what it would be expected given Bolivia's natural resource rents. During the upswing of the gas cycle and after the increase in the government take, Bolivia moved up and to the right: as resource rents rose to the low tens as a share of GDP, non-renewable public revenues also climbed sharply, reaching 12.8 percent in 2007 and 14.6 percent of GDP in 2013 (Figure 8).

After the super-cycle ended, Bolivia's path reverses: the economy moved back to the left as natural resource rents fall markedly. Public revenues from non-renewables also decline to 6.7 percent in 2016 and 5.1 percent as a share of GDP in 2019, but the post-boom pattern reveals an important pattern: revenues drop less smoothly and less proportionally than rents, and in 2021 and 2023 they remain relatively low (4.1 percent and 4.0 percent of GDP, respectively) even when measured rents partially rebound. The figure suggests a weakening of the pass-through from resource rents to the government's revenues, consistent with a combination of (i) lower taxable volumes as gas production and exports decline, (ii) increases in mining rents that the government is unable to tax.

Figure 8. Natural resource rents and non-renewable public revenues



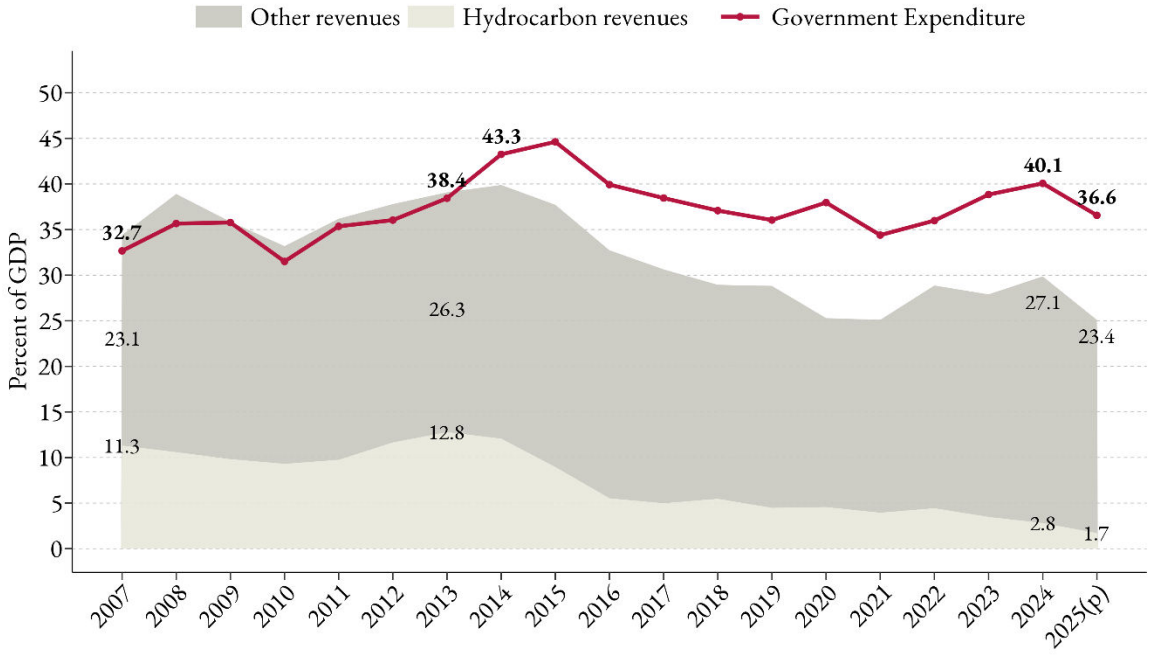
Note: Non-renewable public revenues refer to extraction of hydrocarbons (up-stream), commercialization and sale of hydrocarbons, and mining. Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and

soft), mineral rents, and forest rents. All countries shown (points) for years: 1995, 1999, 2003, 2007, 2011, 2015, 2019, 2021, and 2023. Bolivia trajectory highlighted, line is OLS fit (all points). Source: ECLAC and World Bank (WDI). Total natural resource rents (percent of GDP) for the year 2023 are estimated by the authors.

This had significant implications for Bolivia's public finances. A decline of approximately 10 percent of GDP in hydrocarbon revenues, while maintaining public spending at boom levels, left a 10 percent fiscal deficit in 2024 (Figure 9). Despite some consolidation, as of the first semester of 2025, the projected deficit for 2025 is expected to increase, as hydrocarbon revenues continue to decline and lower revenue collection from other sources.

On the expenditure side, the fiscal accounts exhibit pronounced downward rigidity. Rather than adjusting downward with hydrocarbon revenues, total spending remained near 40 percent of GDP, and its composition shifted away from capital expenditure toward wages, transfers, and energy subsidies, items that are typically harder to reverse and therefore tend to lock in persistent deficits.

Figure 9. Public finances of the consolidated public sector

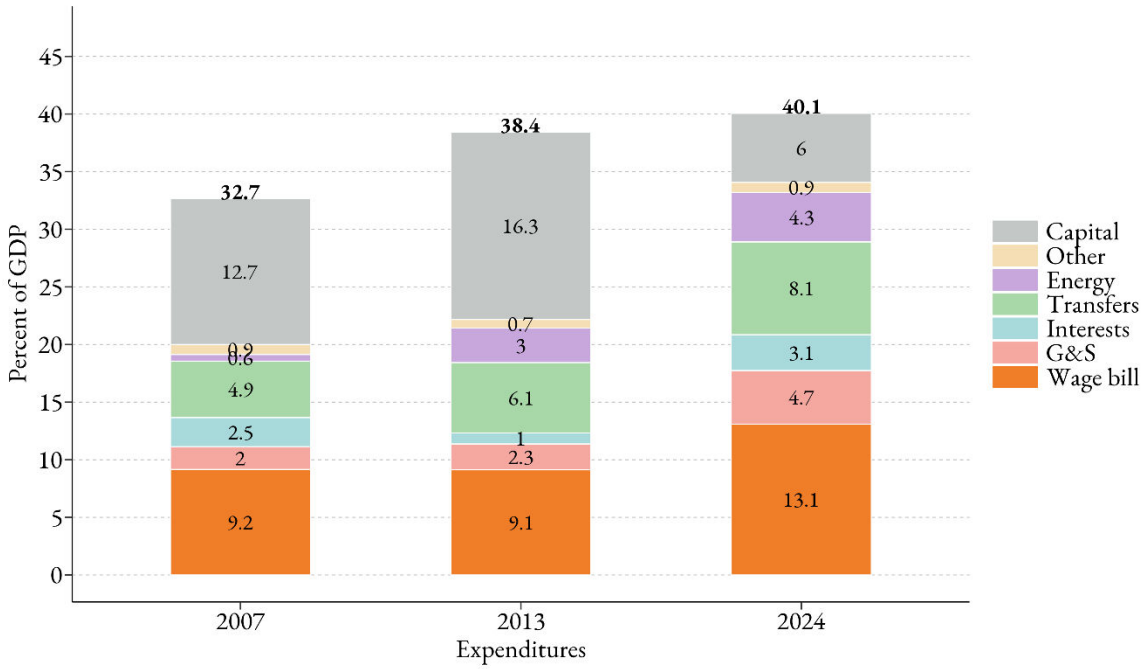


Source: Authors' elaboration based on Ministerio de Economía y Finanzas Públicas and IMF.

Total spending increased during the boom and remained elevated in the post-boom period. Figure 10 presents the composition of public spending in 2007, 2013, and 2024. First, it shows the significant increase in spending over the period, which grew from 32.7 percent of GDP in 2007 to 40.1 percent of GDP in 2024. Second, the spending composition did adjust. Capital expenditure was exceptionally high during the boom (12.7 percent of GDP in 2007 and 16.3 percent in 2013) but fell sharply to 6.0 percent by 2024 (and is estimated to decline further in 2025). As public investment was reduced, spending shifted toward more rigid current expenditures. The wage bill rose from 9.2 percent of GDP in 2007 to 13.1 percent in 2024, indicating a sizeable increase in the structural payroll burden. Current transfers also increased from 4.9 percent in 2007 to 8.1 percent in 2024, consistent with expanded

social programs and other private-sector subsidies delivered through transfer mechanisms. Finally, explicit energy-related expenditure became increasingly material, rising from 0.6 percent of GDP in 2007 to 4.3 percent in 2024, consistent with the growing fiscal cost of maintaining regulated domestic energy prices in local currency as hydrocarbon production declined.

Energy subsidies deserve separate treatment because the fiscal cost understates the economic problem. The explicit budget line (from 0.6 percent of GDP in 2007 to 4.3 percent of GDP in 2024, at the official exchange rate) captures only what the government spends in cash (the fiscal cost). The larger cost is implicit: Bolivia sells domestically produced gas below export parity value, and gasoline and diesel at prices far below their import parity value. Once this opportunity cost is valued at the parallel exchange rate, the total economic cost of energy subsidies exceeds USD 4 billion; an amount equivalent to the fiscal deficit itself (Figure 10. **Public spending by categories (as percent of GDP)**

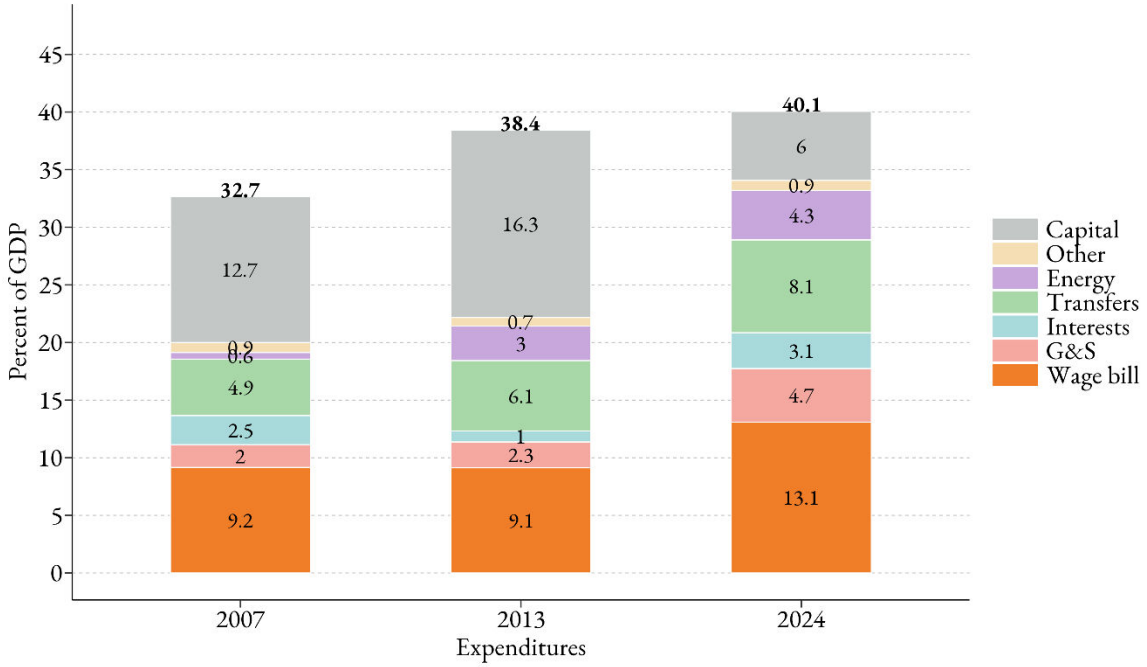


Source: Authors' elaboration based on Ministerio de Economía y Finanzas Públicas and IMF.

Figure 11).

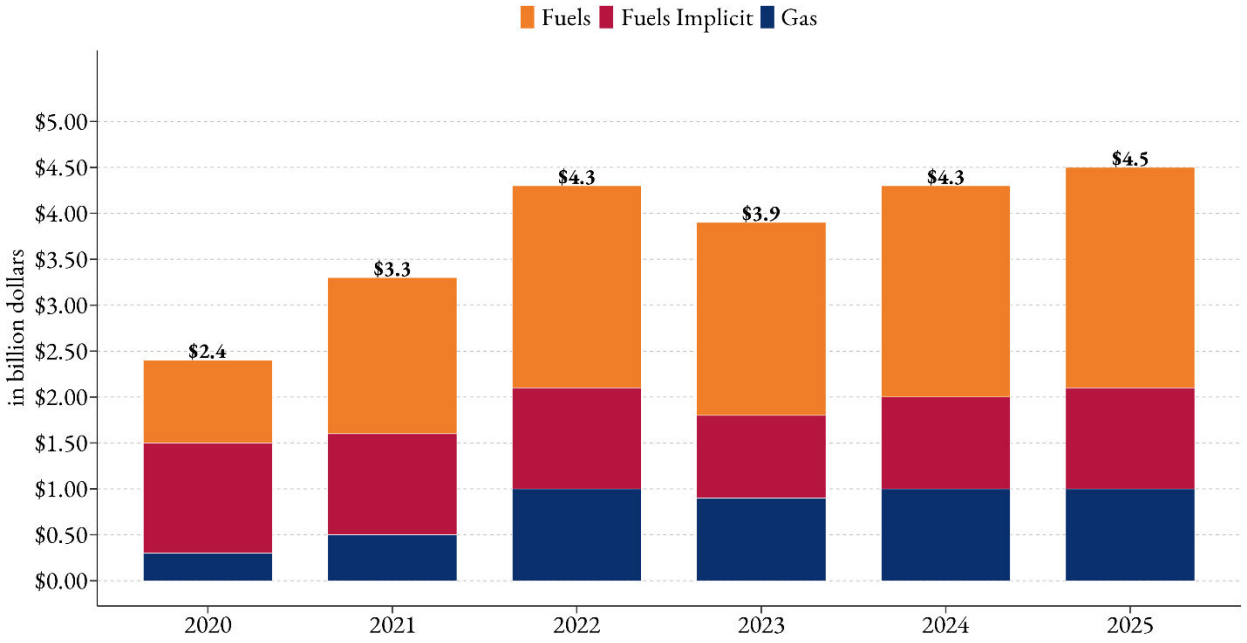
The incentive consequences matter as much as the accounting. Low regulated domestic prices reduce the profitability of new gas exploration and development, compounding the investment disincentives created by the fiscal and regulatory regime described above. They also distort the energy mix: hydroelectric power would be economically competitive at opportunity-cost pricing of gas but is crowded out under the current regime. The subsidy simultaneously drains the fiscal accounts, discourages supply, and locks in an energy structure that Bolivia can no longer afford.

Figure 10. Public spending by categories (as percent of GDP)



Source: Authors' elaboration based on Ministerio de Economía y Finanzas Públicas and IMF.

Figure 11. Explicit and implicit energy subsidies (2020-2025)



Note: Calculated at the parallel exchange rate from 2023 onward. Implicit subsidies for gas are calculated at the weighted average export price to Brazil and Argentina. International prices for other fuels are taken from ANH. Source: Authors' elaboration based on ANH, GELA, and INE.

3.3. A decade-long making of a crisis

Bolivia's crisis did not arrive without warning. Fiscal and external imbalances accumulated over nearly a decade through a financing strategy that, at each stage, introduced a new distortionary instrument to avoid collapse. Understanding the sequence matters: the vulnerabilities in the pension system, the central bank, and the banking system today are not separate problems but a residue of the same strategy.

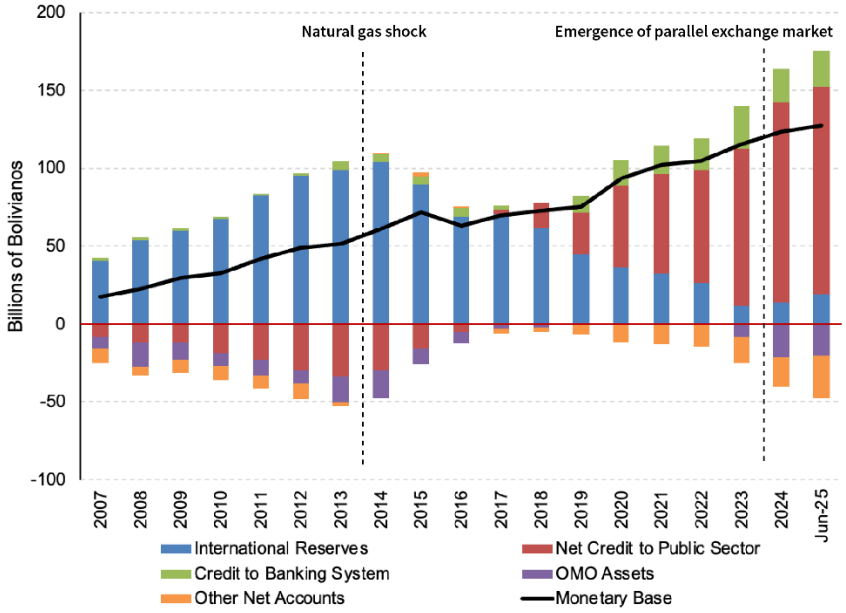
Under a fixed exchange rate, the money supply is endogenous. If money demand remains constant, when the government borrows from the central bank, international reserves decline proportionally. This single mechanism governed Bolivia's adjustment for nearly a decade (see Box 1 for the formal framework).

During the boom years, the dynamic ran in reverse: fiscal surpluses meant the government was depositing resources at the central bank more than what it was borrowing from it, and international reserves rose alongside money demand as the economy expanded. Once hydrocarbon revenues collapsed and spending held firm, the direction reversed. The government started to borrow heavily from the Central Bank, with increases in net domestic credit compensated for by declines in international reserves (Figure 12), until these practically disappeared by 2023 and a balance of payments crisis ensued.[4] Without liquid reserves (Figure 13.A), the central bank could no longer

[4] We see also in the Figure 12 that, between 2015 and 2022, the demand for money increased moderately, especially during the COVID-19 pandemic, a phenomenon seen in many countries during those times of significant uncertainty.

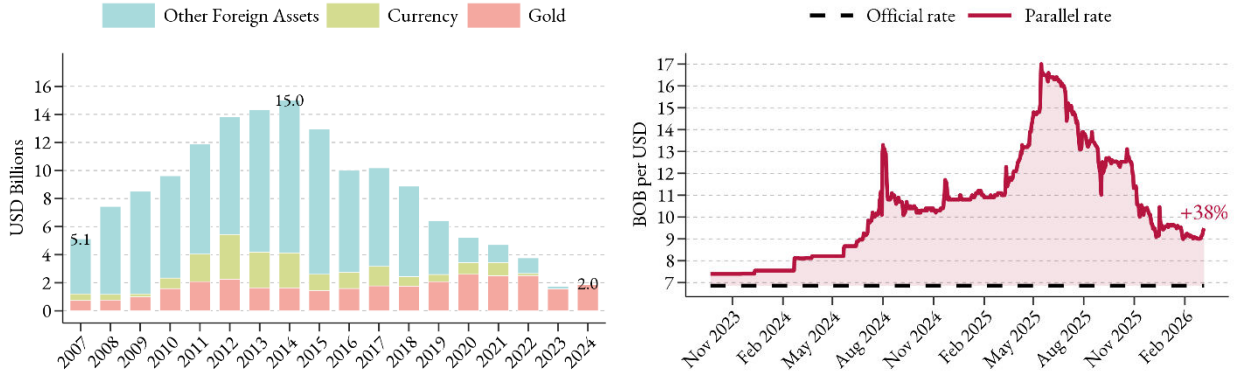
sustain the peg, and a parallel foreign exchange market emerged in April of that year (Figure 13.B). From there, the parallel exchange rate depreciated in successive steps: from around Bs 7.4 per dollar when data first appeared in late 2023, to roughly Bs 8.1–8.2 by early 2024, around Bs 10–11 by mid- to late-2024, and a peak of Bs 17 in May 2025, before partially retracing to about Bs 9.5 by early March 2026. Relative to the official rate fixed at Bs 6.86 per dollar, this implied that the parallel-market premium widened from about 8 percent at the outset to nearly 150 percent at its peak and remained close to 38 percent by the latest observation[5], underscoring the persistence of exchange-rate misalignment even after some easing.

Figure 12. Decomposition of monetary base by origin



Source: Authors' elaboration based on BCB.

Figure 13 (A) International reserves and (B) Official and parallel FX



Source: Authors' elaboration based on BCB and Dolarbo.com.

[5] 38.3% as of March 8th, 2026.

Box 1: A First-Generation Framework for Bolivia's Balance of Payments Crisis

To understand conceptually how the crisis unfolded in Bolivia, we use a simplified conceptual framework of a first-generation type model of currency crisis (Salant and Henderson, 1978; Krugman, 1979; and Agénor and Montiel, 1996).

In this simplified version of an IS-LM model, in which we assume output as constant and foreign prices fixed and equal to 1, prices increase at the rate of depreciation. Moreover, there is perfect capital mobility. The demand for real balances is $\frac{M}{P} = L(i)$, since output is constant. The Central Bank follows a fixed exchange rate regime, so then by the interest rate parity, local interest rates are equal to the international interest rate. Hence, the demand for money is fixed $\bar{M} = PL(i^*)$. Since the price level is fixed to 1, then the equilibrium in the money market is:

$$\bar{M} = L(i^*) = R^* + DC$$

Where R^* are international reserves and DC domestic credit. The government finances itself with money creation, in other words, expanding DC. Since the demand for money does not grow, the increase in DC has a corresponding decrease in R^*. This, in essence, is a simplified version of the balance sheet of the Central Bank.

Once international reserves are depleted, the Central Bank is unable to maintain the fixed exchange rate and a parallel exchange rate emerges. Now, the demand for money will decrease as local interest rates increase, below the level of the fixed exchange rate regime ($\bar{M}$):

$$M_d = L(i^* + \Delta e) < \bar{M} = L(i^*)$$

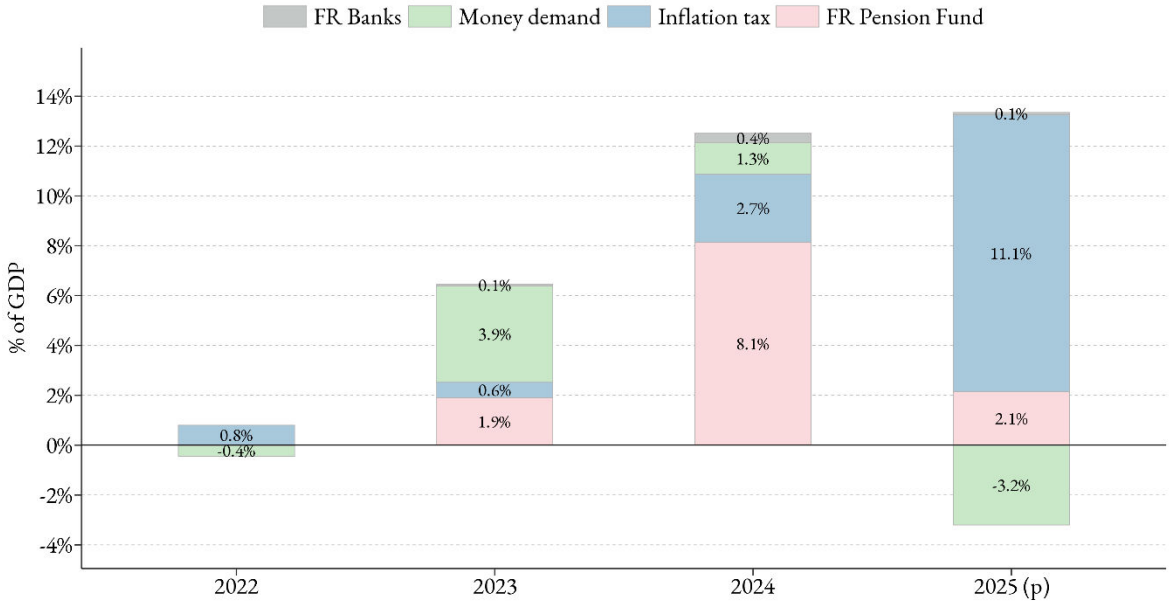
Given the assumption of the neutrality of money, the inflation rate will be determined by the rate of the depreciation of the parallel exchange rate.

With the peg broken and reserves gone, the government shifted increasingly to a second mechanism: financial repression. Capital controls imposed on financial institutions allowed the government to finance itself at interest rates below the rate of inflation and the depreciation of the parallel foreign exchange rate[6]. This meant both that the demand for money was kept artificially high for the first two years of the new regime and that the real value of local savings started to decline. Figure 14 quantifies these effects. In 2024 alone, the government extracted an estimated 11.7 percent of GDP in implicit revenues: 2.7 percent from the inflation tax, 1.3 percent from real balances (increases in money demand), and 7.7 percent from financial repression, the vast majority of which fell on the pension system. This strategy postpones more difficult fiscal choices, but it has come at a rising cost to the health of the financial and pension systems and the savings of Bolivians. This cost materialized more

[6] Restrictions are in place on foreign investments by financial institutions, domestic dollar deposits, and charges on dollar transfers abroad.

heavily in seigniorage in 2025, where money demand declined and the inflation tax increased significantly, measured at 11.1 percent of GDP. As the depreciation of the parallel rate ameliorated in 2025, the opportunity cost of holding government bonds decreased for the pension fund, which also received relatively higher interest rates.

Figure 14. Estimated revenue from financial repression and seigniorage (percent of GDP)



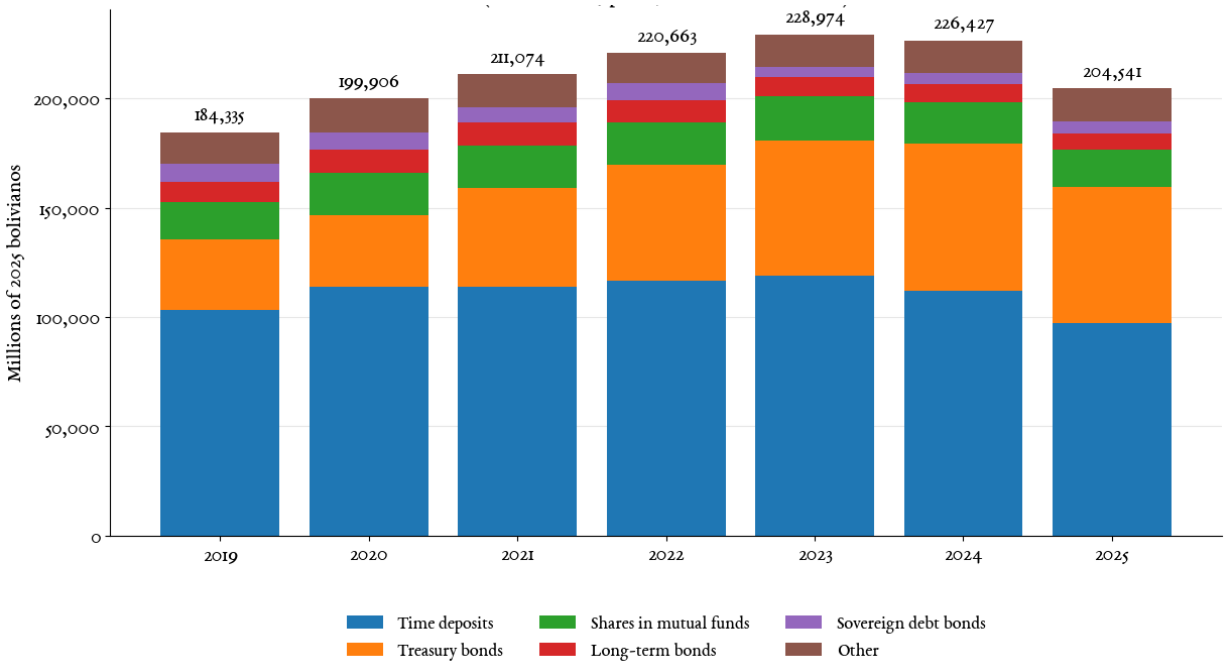
Note: Financial repression (FR) is defined as the interest rate differential between external borrowing and domestic Treasury debt at the parallel foreign exchange rate, applied to the stocks held by pension funds and banks.[7] Seigniorage is disaggregated into inflation tax and real balances (increases in money demand). Source: Authors' calculations.

The pension system became the largest single channel through which financial repression operated, and it did so through two distinct mechanisms. The first was through the flow of resources. Worker contributions that had previously been invested largely in longer-term fixed-term deposits at commercial banks were increasingly redirected toward shorter-term government treasury paper at below-market rates, initiating a process of crowding out (Figure 15). The second, and quantitatively more important, mechanism operated through the stock of assets. A significant share of the portfolio previously held in foreign assets was liquidated and reinvested in boliviano-denominated treasury instruments. As a result, short-term treasury holdings by pension funds rose from 21 percent of the portfolio in 2019 to 30.5 percent by 2025, a trend that accelerated sharply after the public administrator Gestora replaced the private pension fund managers in 2023. The use of pension assets to support the state also went beyond straightforward purchases of domestic public paper. Gestora financed the purchase of USD 200 million in dollar-denominated public debt by repo-ing its Eurobond holdings to foreign investors at a 70 percent haircut and a 12 percent interest rate (IMF, 2025), effectively leveraging workers' foreign assets to provide the public sector with scarce foreign exchange. The result is that the real value of the pension fund portfolio deteriorated markedly: after peaking in 2023, it fell

[7] See Giovannini and de Melo (1993) for a full description on how to calculate government revenue from financial repression.

by roughly 12 percent by 2025 and dropped below its 2021 level, meaning that the use of pension savings to finance the state was not merely a transfer of resources but a destruction of the real savings of Bolivia's workers (Figure 15).

Figure 15. Real value of Bolivia's pension system investment portfolio, millions of 2025 bolivianos



Note: Data on the total value of the portfolio are as of December 31, 2025, while data on the portfolio's composition are as of August 2025. Source: Authors' elaboration based on Autoridad de Fiscalización y Control de Pensiones y Seguros – APS.

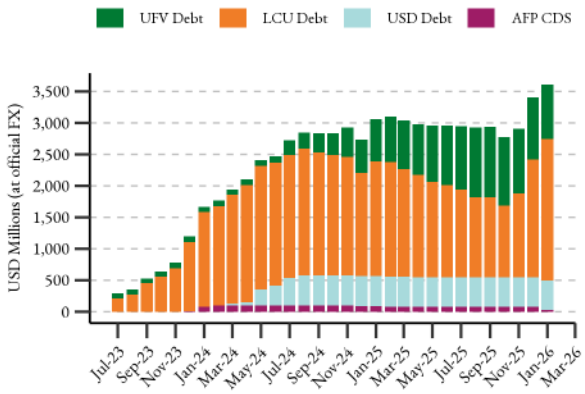
A decade of deficit financing has left the central bank's balance sheet in a structurally weak position that deserves attention in its own right. Central bank solvency is undermined by its issuance of interest-bearing liabilities to absorb liquidity and its currency and indexation mismatches. Its assets are increasingly composed of government debt with artificially low nominal yields, while a growing share of its liabilities are in dollars and indexed to inflation. The BCB began issuing its own debt instruments in 2023 to sterilize excess liquidity and contain inflationary pressures (since it shrinks net domestic credit and, therefore, the increase in the monetary base). These instruments were initially denominated in local currency and offered yields exceeding those on treasury bills. However, as inflation accelerated and the exchange rate premium widened, the BCB progressively had to transition to issuing inflation-linked instruments (currently totaling USD 867 million at the official exchange rate) and dollar-denominated debt, which stood at USD 473 million as of January 2026 (Figure 16.A). Total outstanding BCB debt with privates now stands at an equivalent of USD 3.6 billion or 7 percent of GDP as of January 2025, with approximately 70 percent being held by commercial banks.

The structure of liabilities has become increasingly misaligned with the central bank's remaining asset base. With usable FX reserves depleted–net liquid reserves stood at negative USD 4 billion by end of 2024–the BCB lacks the means to service its foreign currency liabilities or hedge its inflation-linked

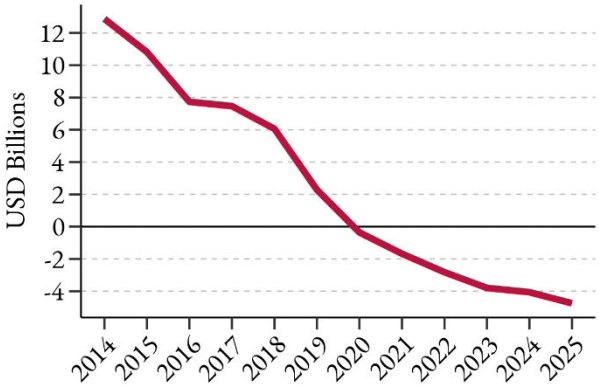
debt (Figure 16.B). This growing currency mismatch and the spread between the low yield Treasury assets and the higher-yield sterilization instruments has created a structural negative spread on its balance sheet, creating a quasi-fiscal deficit and wiping out its net equity. It also creates a risk of outright default on its dollar liabilities.

Figure 16. Balance sheet of central bank

(A) Debt with privates



(B) Net liquid international reserves



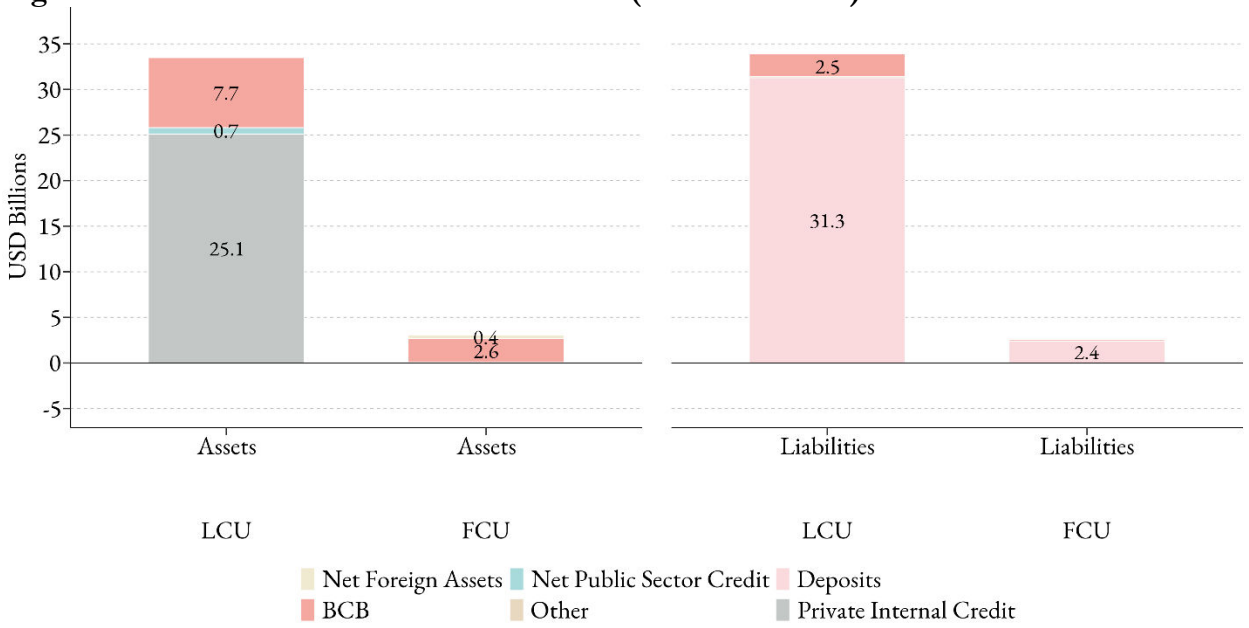
Note: Net Liquid International Reserves are BCB's Gross Foreign Assets, excluding gold and quotas at multilaterals, minus bank deposits in dollars and foreign liabilities. Source: Authors' elaboration based on BCB.

One last financing mechanism was introduced in 2024: a tax on the exports of gold. To obtain FX, the central bank bought around 1 ton of gold per month from domestic producers, purchased in local currency (at a variable premium relative to the price per the official exchange rate), then certified and exchanged for FX. As a consequence, exports of gold collapsed through commercial channels, shifting the accounting from a current account export to reserve accumulation. In essence, the purchases of local gold are effectively an export tax on gold miners that increases the incentives to informality and smuggling.

While commercial banks have maintained positive lending margins, lending rate caps have meant that both real lending and deposit rates have been negative, meaning that depositors have been effectively subsidizing borrowers. Although interest rates paid on local currency time deposits have increased – from an average of 2.3 percent in January 2023 to 3.4 percent in May 2025 – these remain dramatically insufficient to offset inflation, resulting in continued real losses for depositors, including the pension fund. By contrast, commercial banks are not heavily exposed to government debt (Figure 17). The estimated implicit contribution to the deficit from banks' Treasury holdings was just 0.4 percent of GDP in 2024 (Figure 14). Instead, banks have purchased BCB obligations that are inflation-indexed and earn a higher yield. These gains have compensated for declining net interest margins on their loan book.

Despite these considerations, Bolivia's commercial banks are not without vulnerabilities. They face a combination of structural risks, including currency and maturity mismatches, as well as rising macro-financial risks.

Figure 17. Balance sheet of commercial banks (December 2025)



Source: Authors' elaboration based on BCB.

To begin with, commercial banks face a maturity mismatch. Transforming short-term liabilities into longer-term assets is one of the basic functions of banking, and banks are normally expected to manage the resulting liquidity and interest rate risks. In Bolivia, however, this mismatch stands out because the composition and pricing of bank assets have been heavily shaped by regulation. On the asset side, banks hold long-term, fixed-rate loans concentrated in so-called *productive* sectors and social housing, driven by regulatory mandates introduced in 2013. These mandates require at least 60 percent of lending to be directed toward these sectors, in addition to imposing interest rate caps on lending. By 2023, 77 percent of the loan portfolio in the three largest banks (Banco Unión, Banco Nacional de Bolivia, and Banco Mercantil Santa Cruz) was composed of long-term loans with a maturity of 5 years or longer (Secondly, commercial banks face a currency mismatch. Banks have an estimated USD 2.4 billion in dollar-denominated deposits from the public, that used to be matched with dollar assets (Figure 17). But they entered a swap with the BCB, exchanging their dollar assets for bolivianos. However, the BCB does not have the dollar assets to repay the banks and hence, cannot unwind these swaps, leaving banks with unhedged dollar liabilities.

Besides the maturity and currency mismatches, banks also face potential credit risk. While reported non-performing loans (NPLs) remain low (3.1 percent in 2025), this is due in part to negative real interest rates and to pandemic-era regulatory forbearance that has allowed banks to defer recognizing bad loans (reprogrammed loans remain around 15% of total loans). In a likely scenario where interest rates rise significantly and inflation comes down the quality of the banks' loan book could deteriorate rather quickly.

Figure 18). On the liability side, longer-term deposits used to come mainly from pension funds, which have declined for the reasons described above, so the maturity of their liabilities has gradually

shortened. As a result, banks would be vulnerable to a generalized rise in interest rates, given that their assets have a longer maturity and are at fixed rates.

Secondly, commercial banks face a currency mismatch. Banks have an estimated USD 2.4 billion in dollar-denominated deposits from the public, that used to be matched with dollar assets (Figure 17). But they entered a swap with the BCB, exchanging their dollar assets for bolivianos. However, the BCB does not have the dollar assets to repay the banks and hence, cannot unwind these swaps, leaving banks with unhedged dollar liabilities.

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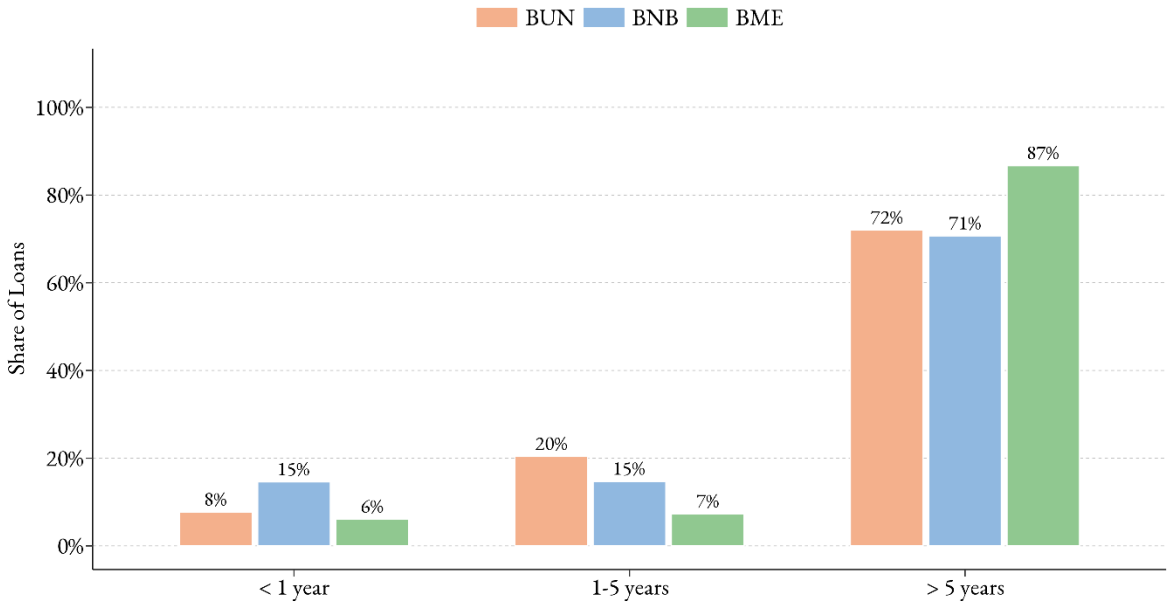
Figure 18. Asset maturity profile of main commercial banks

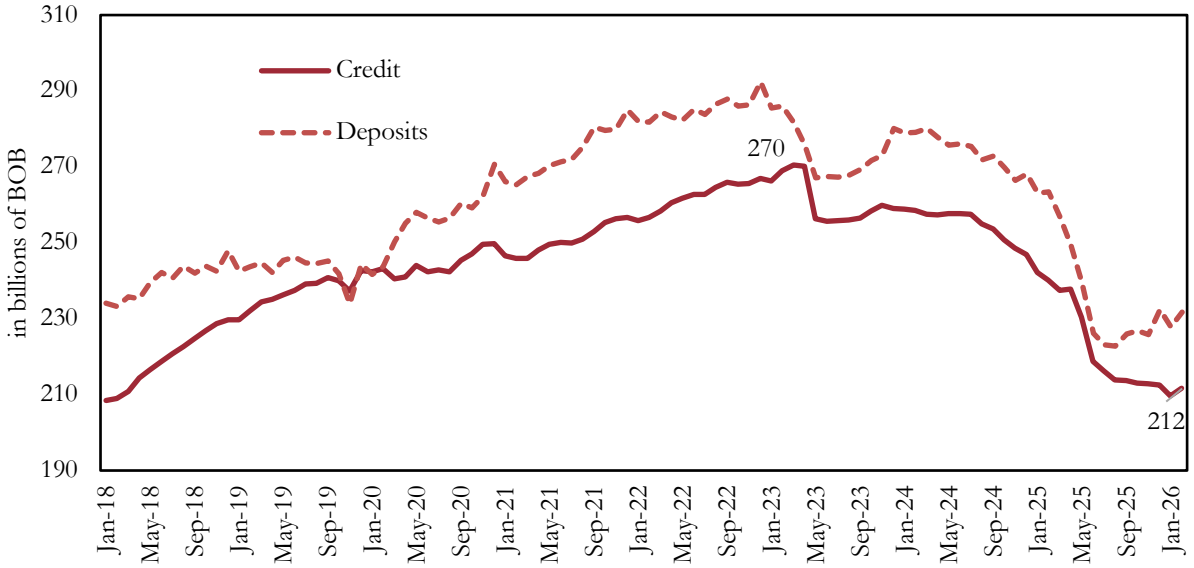


Source: Authors' elaboration based on ASFI.

These balance-sheet shifts had visible macroeconomic consequences. As pension fund flows were redirected away from bank deposits and toward government paper, and as banks increasingly absorbed central bank sterilization instruments, the resources available for lending to the private sector contracted. In real terms, private sector credit fell sharply after its 2023 peak, declining by 22 percent between April 2023 and January 2026, from BOB 270 billion to BOB 212 billion in February 2026 prices (Figure 19). This decline was not simply the result of weaker credit demand in a slowing economy. It also reflected a process of crowding out, in which the financial system was increasingly

mobilized to finance the public sector and support monetary sterilization rather than intermediate savings toward productive private investment.[8]

Figure 19. Real credit and deposits of the private sector (billions of February 2026 bolivianos)



Note: Series are deflated to February 2026 prices. Deposits include demand deposits, savings accounts, time deposits, and other liabilities. They do not include public sector deposits. Source: Authors' elaboration based on BCB and INE.

Bolivia's financing strategy bought time (nearly a decade of it). But the delay will prove more costly than acting in due time. Each instrument used to close the gap left a scar: depleted reserves, an impaired central bank balance sheet, an eroded pension system, a weakening export sector, and a banking sector whose vulnerabilities are largely invisible in today's reported figures but would surface quickly under stabilization conditions. A stabilization program will require not just fiscal consolidation, but also a careful approach and sequence to avoid problems in the financial system. The next step, then, is to move from diagnosis to magnitudes: how large are the underlying macroeconomic disequilibria, and what do they imply for the design of a stabilization program?

4. Two benchmarks on growth and the exchange rate

To inform policy, this section asks two practical questions that any stabilization program must answer. First: once stability is restored, how much room is there for the economy to expand, given what has happened to gas production? We address this by constructing a counterfactual benchmark that forecasts Bolivia's GDP under the pre-break relationship between external conditions, gas income, and domestic activity. Second: what relative price adjustment is consistent with Bolivia's fundamentals in a segmented foreign exchange market? Because stabilization will ultimately require some form of an exchange rate and/or monetary anchor, we estimate a fundamentals-based equilibrium real exchange rate that separates a long-run equilibrium from short-run deviations for both the official and

[8] A discrete break in deposits and credit in early 2023 also coincided with pressures on dollar deposits and the collapse of Banco Fassil, which likely amplified the contraction in bank funding.

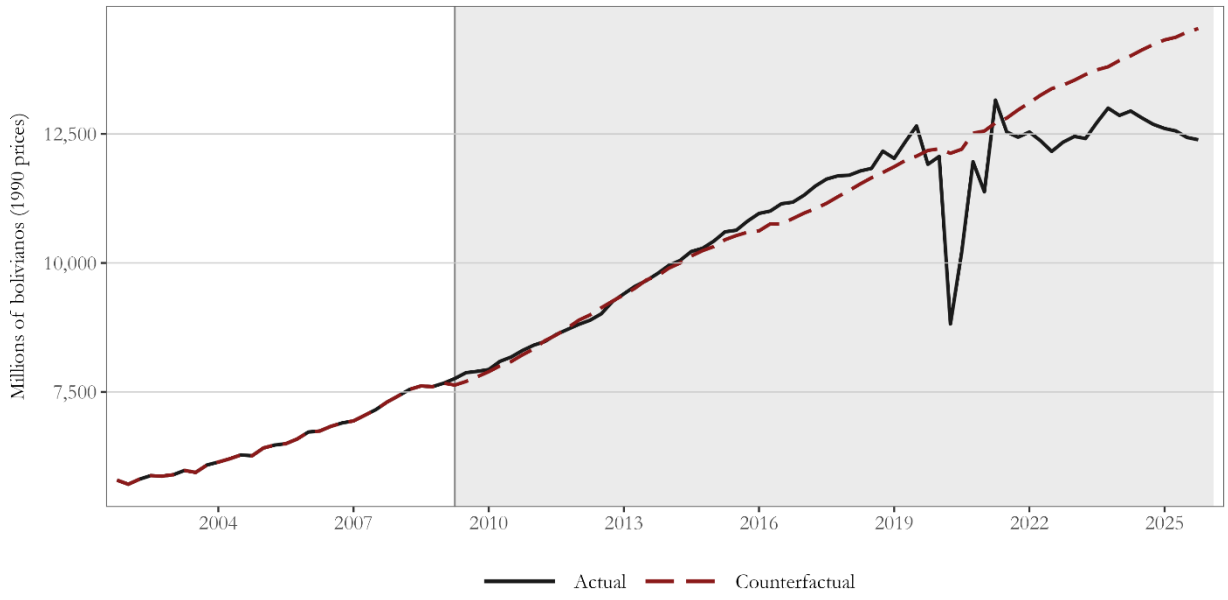
parallel rates. Together, these benchmarks provide a grounded way to think about the feasibility of post-stabilization growth and the exchange-rate choices that will shape it.

4.1. Where would GDP be based on pre-reform gas income?

Bolivia has already paid a large output cost and domestic policy choices, not the commodity bust, are to blame. By 2025, actual GDP stands approximately 15% percent below a model-based counterfactual that captures what growth would have looked like had the structural links between external conditions, gas income, and domestic activity remained as they were before 2009 (Figure 20). The gap has widened steadily since the recovery of the COVID-19 pandemic and accelerated after 2023. It is not closing on its own.

The counterfactual is not a forecast of what should have happened, but a conditional projection of what Bolivia's own pre-break dynamics predicted, given the external environment the country actually faced. Because the model conditions observed commodity prices and gas income (including their sharp decline after 2014) the shortfall that remains cannot be attributed to the commodity bust itself. Bolivia was always going to decelerate as gas revenues fell. The counterfactual incorporates that deceleration. What Figure 20 reveals is the residual: the portion of underperformance driven by domestic factors, i.e., policy choices, investment disincentives, and institutional deterioration. This is not a causal estimate that isolates a single culprit, but the direction is unambiguous. Full technical details are in Appendix B.

Figure 20. Actual vs counterfactual GDP level in Bolivia 2001Q1-2025Q3

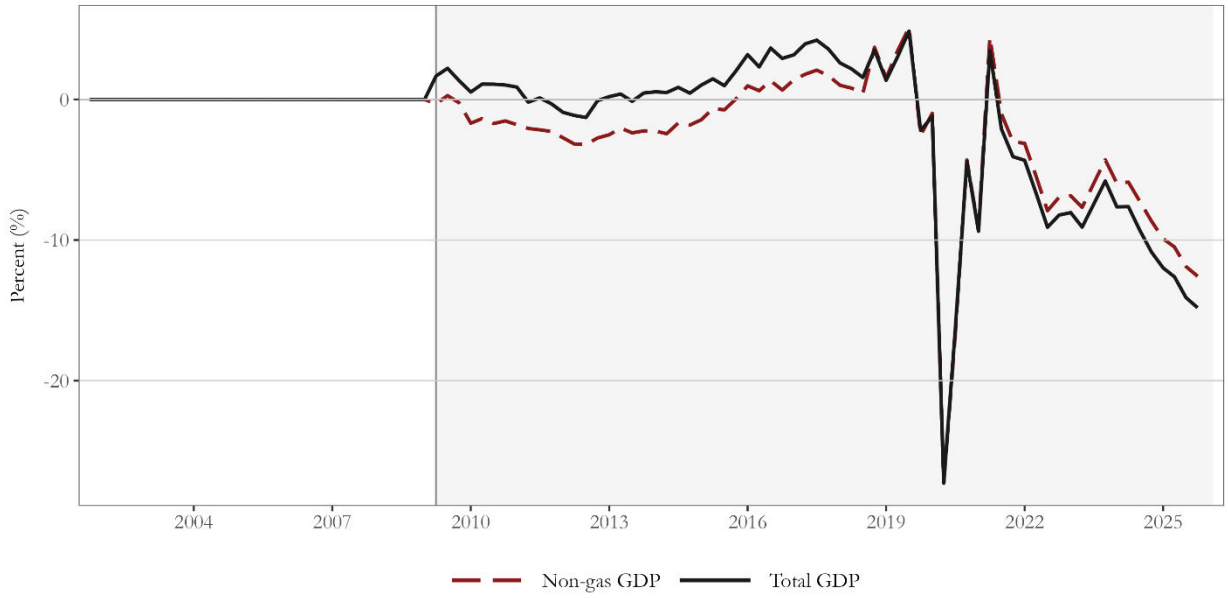


Note: Seasonally adjusted quarterly GDP at constant 1990 prices. The counterfactual is estimated using a Vector Error Correction Model calibrated through 2009Q1. It projects the path of total GDP (oil+ non-gas) under the assumption that gas income behaved as its pre-break period (between 2001 and 2009). Shaded area denotes the forecast horizon (2009Q2–2025Q3). Source: Instituto Nacional de Estadísticas (INE), Bolivia; World Bank (Brent oil price); authors' calculations.

Two features of the figure deserve attention. First, the counterfactual path shows resilient post-COVID recovery: the structural dynamics of the pre-2009 model imply that, even under weaker external conditions, the economy would have bounced back and continued to expand at a relatively stable rate. The widening gap after 2020 thus reflects not just the pandemic shock but the failure to recover in line with fundamentals. Second, Figure 21 shows that the non-gas sector accounts for a significant share of the total shortfall, which matters for the policy diagnosis: the weakness is not limited to the oil sector.

The policy implications are direct. First, macroeconomic stability is a necessary condition for closing the gap. Second, stabilization may not be necessarily contractionary. The post-COVID growth performance has been extremely weak, constrained by the shortage of foreign exchange needed to sustain the imports that underpin domestic production and exports. But stability alone is not sufficient. The gas export engine that powered the old growth model has been structurally weakened and will not return to its former role in the short run. Closing the output gap will require new sources of tradable income—and that, in turn, requires a real exchange rate and a business environment that make non-gas exports viable.

Figure 21. Non-gas and total GDP gap vis-a-vis counterfactual



Note: Gap computed as 100 × (Actual / Counterfactual − 1). A positive value indicates GDP above the counterfactual path. Shaded area denotes the forecast horizon (2009Q2–2025Q3). Source: Instituto Nacional de Estadísticas (INE), Bolivia; World Bank (Brent oil price); authors' calculations.

4.2. Where would the real exchange be based on fundamentals?

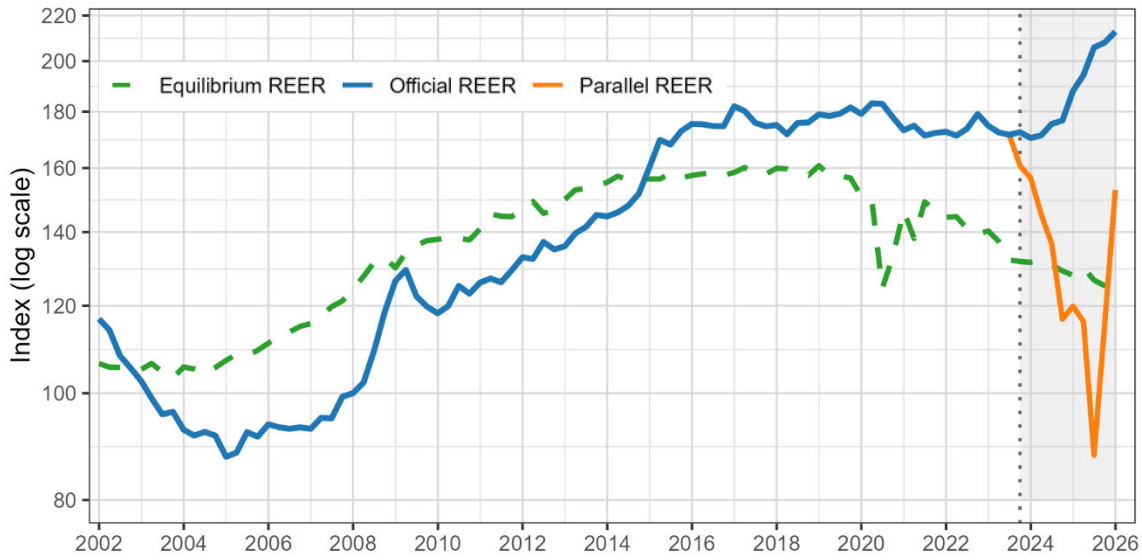
There are questions regarding the equilibrium level of the real exchange rate in a segmented market like Bolivia. The official exchange rate is used in a limited set of transactions (predominantly those involving the public sector) while a market-based/parallel exchange rate operates both through commercial banks and through crypto channels. This segmentation raises a natural question: what is

the level of the exchange rate to which the official and market rates would converge in the long run if short-run frictions were reduced and the economy were allowed to settle to its macroeconomic fundamentals? To address this question, we estimate a long-run equilibrium real exchange rate (ERER) using a reduced-form, fundamentals-based approach grounded in the literature (see Appendix C for methodology and assumptions).

Three patterns emerge from the analysis (Figure 22). First, Bolivia's equilibrium real exchange rate behaves similarly to the observed real exchange rate during the commodity super-cycle. During this period, the ERER trends steadily toward real appreciation by roughly 50 percent between 2002 and 2014. The misalignment points towards an undervaluation, although on average the magnitudes are relatively small. This is precisely what one would expect since the country was becoming richer and catching up with its trading partners.

Second, the equilibrium real exchange rate weakens as the fundamentals soften post-commodity boom, consistent with a standard commodity-economy mechanism in which real gas income and external buffers relax the external constraint and support a more appreciated equilibrium, while the erosion of those buffers requires a more depreciated equilibrium. The misalignment switches from an undervaluation to an overvaluation starting in 2015 and continues trending upwards until the government breaks the convertibility of the currency.

Figure 22. Real effective exchange rate: official, parallel, and model-implied equilibrium

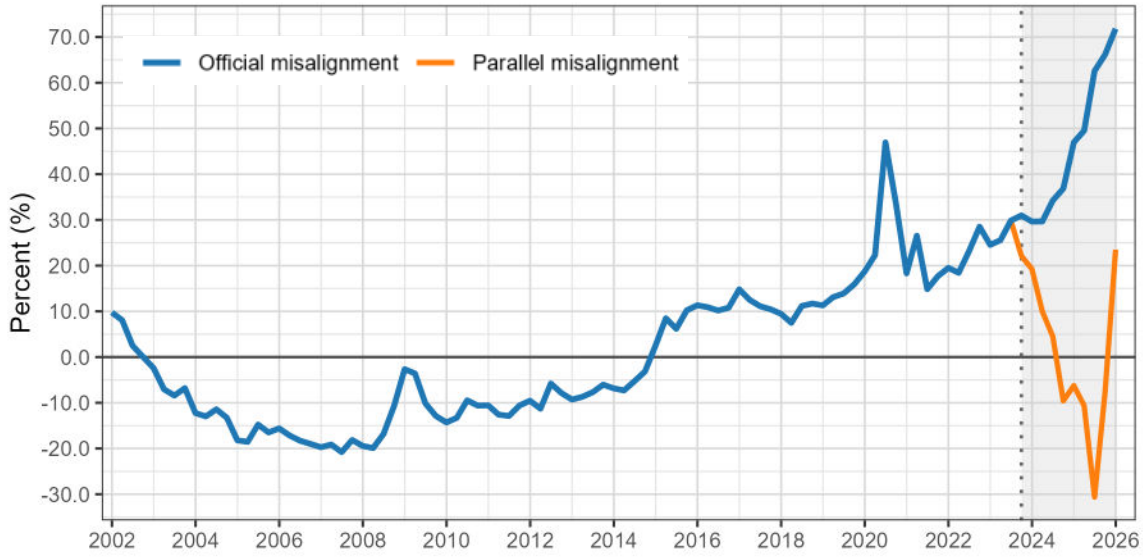


Note: Estimation period is 2002q1-2023q3. The shaded region marks the conditional forecasting period (post-estimation), where the equilibrium is updated using realized fundamentals. Source: Author's elaboration based on INE, EIU, and Bruegel.

Third, when the fixed exchange rate regime breaks, the parallel real exchange rate adjusts downward rapidly and fluctuates closer to the model-implied equilibrium (much more so than the official rate). This implies that the parallel exchange rate is a better price signal for this relative price. As of this writing, the parallel rate is approximately 9.5 per U.S. dollar, and the implied misalignment is on the

order of 20 percent (Figure 23), suggesting that the market price has moved partway toward fundamentals but that a meaningful gap remains. However, the key issue is not the precise point estimate of equilibrium (no reduced-form ERER estimate should be read that way) but the direction and persistence of the deviation. Developments in the official and parallel markets should be closely monitored if that is the case.

Figure 23. Real effective exchange rate: official, parallel, and model-implied equilibrium



Note: Misalignment is defined as the percent deviation of the REER from the ERER; positive values indicate an appreciated (overvalued) real exchange rate relative to equilibrium. The shaded region marks the conditional-extension period. Source: Author's elaboration based on INE, EIU, and Bruegel.

5. Conclusion

Bolivia's crisis is best understood as the result of a sequence of policy choices that became increasingly difficult to sustain over time. The foundation had been a gas export engine built in the 1990s through a strategic bet that mobilized investment, expanded production, and created export capacity. Over the following decade, however, the conditions that had supported that engine weakened. The fiscal and regulatory regime introduced after 2006 substantially increased the government take while domestic gas prices remained far below export prices, reducing the incentives to sustain investment, replace reserves, and expand production. Over time, this combination eroded the sector's capacity to continue playing its earlier role in the economy. When revenues collapsed after 2014, adjustment required a contraction in aggregate demand and a real depreciation that would have moved resources toward other tradable activities. Instead, the government kept spending near boom levels, shifting the composition from capital to current expenditures, which proved far harder to reverse. Deficits were financed first by drawing down the reserves accumulated during the boom, then through increases in base money. Reserves declined until they were exhausted. At that point, the fixed exchange rate peg collapsed, leading to inflation, financial repression, dual exchange rates, and a major erosion of the real value of bank deposits and pension savings.

The implication is that the cost of postponing stabilization and of delaying the economy's pivot toward a more sustainable growth model has become too high. Stabilization is thus necessary, though it will be challenging. For it to succeed, it must also be internally consistent. Bolivia cannot recover by devising new ways to finance the same underlying imbalances; it can only recover by addressing them. The analysis in this paper therefore points to a diagnostic ledger: the set of imbalances and vulnerabilities that any credible stabilization strategy will need to confront.

1. Fiscal adjustment: magnitude, speed, and composition. The collapse of hydrocarbon revenues created a structural fiscal gap of roughly 10 percent of GDP that cannot be permanently financed through money creation or forced saving. Stabilization requires not just closing that gap but doing so with a composition that favors recovery and growth.
2. Monetary and exchange rate regime. Bolivia's official exchange rate remains misaligned with fundamentals, and the dual/segmented foreign exchange system imposes growing distortions on relative prices and resource allocation. Stabilization requires a credible monetary anchor and a defined sequence toward exchange rate unification.
3. Debt management. Years of deficit financing have produced a complex and fragile debt structure: a deteriorated central bank balance sheet, a large stock of domestic debt held by the pension system at below-market rates, Eurobond amortization payments, repo operations, and arrears that complicate external financing. Managing this stock, without triggering financial instability in the process, is one of the most technically demanding aspects of any stabilization program.
4. Public prices. Energy subsidies (at the opportunity cost) are estimated at over USD 4 billion, approaching the size of the fiscal deficit itself. Beyond the fiscal cost, below-parity domestic prices for gas and fuel distort investment incentives throughout the hydrocarbon sector and crowd out alternatives such as hydroelectric power. Correcting public prices is simultaneously a fiscal reform, an investment reform, and a signal of policy credibility.
5. Financial reforms. The financing regime has produced compounding vulnerabilities: negative real deposit rates, maturity and currency mismatches in commercial banks, and a pension system increasingly exposed to government paper at below-inflation yields. Unwinding financial repression will need to be sequenced carefully to avoid significant losses in the banking system or a collapse in pension fund solvency.
6. Growth drivers: rebuilding the tradable base. Stabilization is a necessary condition to a sustainable growth path for Bolivia, but other structural reforms may be needed to find new tradable income. The regulatory and pricing choices that undermined investment incentives in the hydrocarbon and mining sector, and left Bolivia without a viable alternative export engine, are not a secondary issue. They are part of the same crisis.

"Bolivia's Economic Pivot: Early Macroeconomic Achievements and Remaining Challenges" (Arcay et.al., 2026) takes this ledger as its starting point and asks which policy packages can close the fiscal and external gaps, realign relative prices, and unwind repression without triggering a financial crisis and in what sequence.

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Appendix A. An approach to measure commodity income windfalls

In Adler and Magud's approach, nominal GDP is deflated by the consumer price index (CPI) to obtain a measure of GDI and compare it to a counterfactual path that nets out the terms-of-trade-driven boost associated with the commodity cycle.[9] As in Kohli (2004), they define country i's real GDI (RI) as

$$RI_{i,t} = \frac{GDP_{i,t}}{P^{C}_{i,t}}$$

Where GDP and P^{C}_{t} denote the nominal gross domestic product and the consumer price index, respectively. Differentiating this equation, combining it with the demand components of the GDP deflator, and stripping out the effect of changes in the real exchange rate yields:

$$\widehat{RI_{i,t}} = \widehat{RGDP_{i,t}} + \left[\widehat{P^{X,r}_{i,t}} * W^{X}_{i,t-1} - \widehat{P^{M,r}_{i,t}} * W^{M}_{i,t-1}\right]$$

Where $\hat{J}$ denotes annual percentage change of any variable; $P^{X,r}_{t} = \frac{P^{X}_{t}}{P^{*}_{t}}$ and $P^{M,r}_{t} = \frac{P^{M}_{t}}{P^{*}_{t}}$ are country i's export and import prices, expressed relative to the US CPI; W^{X}_{t-1} and W^{M}_{t-1} denote the ratios of exports and imports of goods and services to GDP. In this paper we focus on the difference between actual real income and the counterfactual real income at constant pre-boom terms of trade. Then, we compute the annual income windfall as:

$$wi_{it} = \left(\frac{RI_{it} - RI^{*}_{it}}{RI^{*}_{it}}\right)$$

where RI_{it}, is an index of actual real income, and RI^{*}_{it} is the corresponding counterfactual, constructed by compounding the equation of $\widehat{RI_{i,t}}$. Thus, the annual income windfall at any point in time is given by the vertical distance between real income and real income at pre-boom terms of trade, and the cumulative windfall is measured by the area between the two. Both are expressed as shares of real income at pre-boom terms of trade. The cumulative income windfall for country i in episode j is, thus, computed as $WI_{i,j} = \sum_{t} wi_{i,j,t}$.

[9] Adler and Magud uses actual GDP as a measure of the counterfactual. This is a simplification. The "counterfactual", actual real GDP, underestimates the income windfall since the increase in purchasing power coming from the windfall is likely affecting positively real GDP growth. The original paper also uses another counterfactual, without affecting the overall conclusions.

Appendix B. The technical framework on counterfactual GDP

B.1 Overview and Identifying Assumptions

This appendix describes the methodology used to construct the counterfactual GDP benchmark discussed in Section 4.1. The exercise asks: given the external conditions Bolivia actually faced after 2006, what would GDP have looked like if the pre-2006 transmission mechanisms between gas income and domestic economic activity had remained in place?

The counterfactual is built in three steps. First, we forecast gas sector activity under the pre-Constitutional reform relationship between the hydrocarbon sector and its external drivers. Second, we map the forecasted gas activity into a gas income proxy that captures the demand and fiscal impulse flowing from the sector to the rest of the economy. Third, we use the estimated pre-break relationship between gas income and non-gas GDP to generate the counterfactual path for aggregate output. The key identifying assumption throughout is that the 2006 nationalization and the 2009 Constitutional reform altered the transmission mechanisms in ways that can be approximated by a structural break in these relationships — not that external conditions were different from what they actually were.

B.2 Step 1: Forecasting Gas Sector Activity

We model real activity in the hydrocarbon sector using a Vector Autoregressive (VAR) model estimated over a pre-policy-shift window ending in 2005. The model includes gas production (in MMmcd), an index of external gas demand, and the real price of natural gas. The pre-break estimation window is chosen to capture the investment-driven growth phase of the sector, before the regulatory regime change altered incentives.

We generate two counterfactual paths for the gas sector:

- A conditional forecast that feeds in realized post-break values of external drivers (gas demand and prices), holding only the domestic transmission mechanism fixed at its pre-2006 values. This is the primary benchmark.
- An unconditional baseline that holds all drivers at their end-sample values, used as a robustness check.

The conditional forecast is the relevant one for the policy question: it isolates the domestic contribution to the production shortfall by holding external conditions at their actual realized values.

B.3 Step 2: Gas Income Proxy

Gas income matters for the non-gas economy primarily through its effect on fiscal space, spending capacity, and foreign exchange availability. We construct a nominal gas income proxy by combining the counterfactual gas activity forecast with realized oil prices — which proxy for Bolivian gas export prices through long-term supply contracts with Brazil and Argentina.

This creates an index proportional to gas export receipts:

$$Gas\ Income\ =\ Counterfactual\ Gas\ Volume\ \times\ Realized\ Export\ Price\ Index$$

This proxy is the key state variable linking the gas sector to the rest of the economy. It captures both the quantity shock (production decline) and the price channel (terms of trade), while the counterfactual holds the quantity path at its pre-reform trajectory.

B.4 Step 3: Non-Gas GDP and the VECM

We model real non-gas GDP jointly with the gas income proxy in a Vector Error Correction Model (VECM), estimated over the pre-break sample. The identifying restriction is a single cointegrating relationship between the level of non-gas GDP and the level of gas income — consistent with the view that over the long-run, non-gas activity co-moves with the rent-financed demand capacity of the economy. External non-gas demand (a trade-weighted index of partner country GDP) enters as an exogenous control in the short-run dynamics. The counterfactual non-gas GDP path is then generated by feeding the counterfactual gas income proxy into the estimated VECM. The gap between actual and counterfactual GDP at each point in time captures the cumulative divergence attributable to domestic factors.

B.5 Interpretation and Caveats

Three interpretive points are worth stating explicitly. First, this is not a structural model of potential output, nor an estimate of what GDP should be. It is a reduced-form external benchmark: it asks what GDP would have looked like if Bolivia had continued to behave as it did in the pre-reform period, given the external conditions it actually faced.

Second, the counterfactual gap should not be attributed entirely to the 2006 nationalization. It captures the cumulative effect of all domestic factors that caused Bolivia to diverge from its historical relationship with external conditions — including fiscal policy, financial repression, and the investment climate more broadly.

Third, the exercise is deliberately conservative on the price side: it uses realized export prices, which already reflect the commodity bust. The counterfactual therefore does not assume a more favorable external environment, only a more favorable domestic one.

Appendix C. The technical framework on the equilibrium real exchange rate

C.1 Conceptual Framework

This appendix describes the methodology used to estimate the equilibrium real exchange rate (ERER) discussed in Section 4.2. We follow the Behavioral Equilibrium Exchange Rate (BEER) approach, which defines the equilibrium as the level of the real exchange rate consistent, in the long run, with a set of slowly evolving macroeconomic fundamentals. The BEER is not a normative target. It does not say where the exchange rate should be, but a positive benchmark for where it would settle if short-run frictions were removed and the economy were in internal and external balance.

Let q denote the log of the CPI-based real effective exchange rate (REER), normalized so that an increase corresponds to a real appreciation. We decompose q into a slow-moving equilibrium component q^* driven by fundamentals, and a transitory deviation μ interpreted as misalignment:

$$q = q^*(f) + \mu$$

where f is a vector of fundamentals.

C.2 Fundamentals

We include three fundamentals motivated by the Bolivia-specific context:

- Net foreign assets proxy: captures the external buffer position and the credibility of the exchange rate regime. Higher net foreign assets support a more appreciated equilibrium by relaxing the external constraint.
- Productivity differential: a Balassa-Samuelson channel. As Bolivia becomes relatively more productive in tradables versus non-tradables, the equilibrium REER appreciates. We proxy this with the relative real non-gas output per capita against trading partners.
- Real gas income proxy: captures the commodity income channel. Higher gas income supports stronger domestic demand and a more appreciated equilibrium.

C.3 Estimation: Johansen Cointegration within a VECM

Since the REER and the proposed fundamentals are integrated of order one (confirmed by standard ADF and KPSS unit root tests) we estimate the long-run relationship using the Johansen (1988, 1991) maximum-likelihood approach within a Vector Error Correction Model (VECM):

$$\Delta X_t = \Pi X_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \, \Delta X_{t-i} + \Phi D_t + \varepsilon_t,$$

where $D_t$collects deterministic and exogenous terms (including a constant in the cointegration space), and $\Pi = \alpha\beta'$. The matrix βcontains the cointegrating vectors (long-run relationships) and α contains the adjustment coefficients ("loadings") governing how deviations from the long-run relationship feed back into short-run dynamics.

VAR lag order is selected using AIC, SC, and HQ information criteria, with residual diagnostics checked for serial correlation and heteroskedasticity. Cointegration rank is determined using the Johansen trace and maximum-eigenvalue tests, with a baseline preference for rank $r = 1$ consistent with the single-equation BEER framework standard in the literature.

C.4 Equilibrium Computation and Normalization

The model-implied equilibrium q* is computed as the fitted long-run component implied by the estimated cointegrating vector, evaluated at the actual path of fundamentals. Identification requires normalizing the cointegrating vector on q, so that the coefficient on the REER is unity.

To facilitate interpretation of the misalignment series, we normalize q* so that average misalignment over the estimation window is approximately zero. This normalization is standard in the BEER literature and does not impose a view about the level of misalignment at any point, it only anchors the mean of the series. The results should be interpreted in terms of the direction and persistence of deviations from equilibrium, not as point estimates of overvaluation or undervaluation.

C5. Extending to the Parallel Market

Bolivia's exchange rate segmentation after April 2023 requires extending the analysis to the parallel rate. We compute misalignment for both the official and parallel REER relative to the same model-implied equilibrium q*. Beyond the estimation endpoint, we extend the equilibrium path mechanically using realized values of the fundamentals—what we call a "conditional forecast." This isolates the extent to which post-sample movements in the equilibrium reflect changes in observed fundamentals, rather than model-projected dynamics.

The parallel REER is constructed using the parallel exchange rate from commercial bank and informal market sources, combined with the same CPI-based deflators used for the official REER.

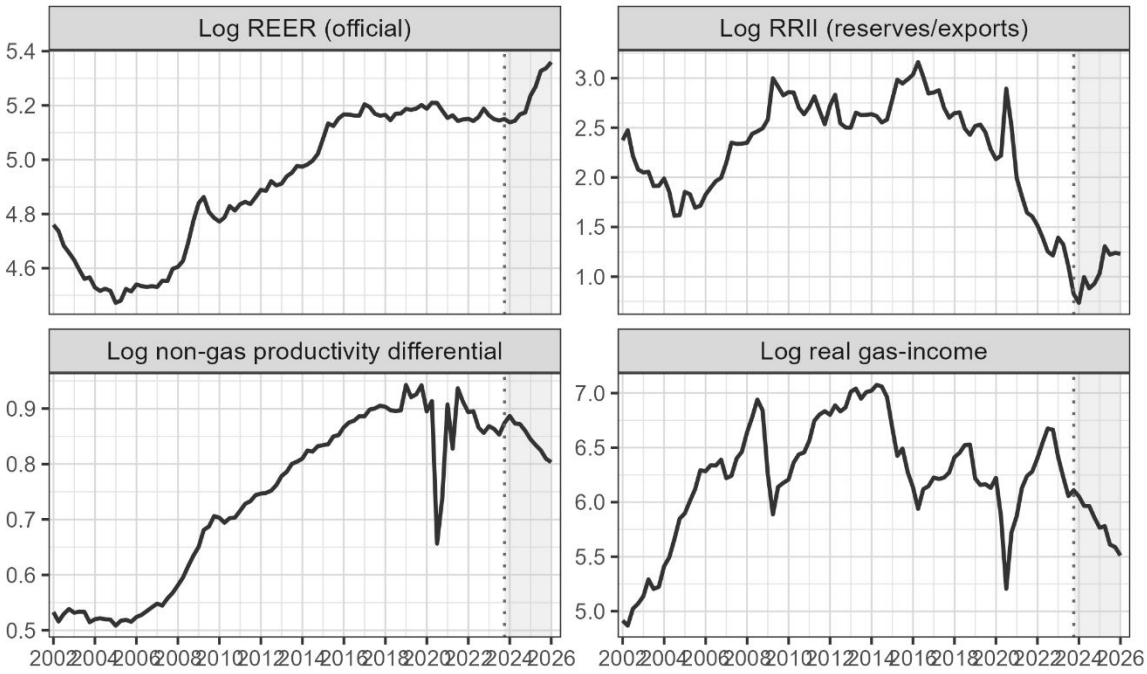
C.6 Estimation

The ERER model follows the behavioral equilibrium exchange rate (BEER) tradition, relating the real effective exchange rate to three fundamentals: the net foreign asset position (proxied by the ratio of international reserves to exports, RRII), a non-gas productivity differential, and real gas income. The choice of fundamentals is motivated by Bolivia's structural features—a commodity-dependent, relatively closed economy where external balance is driven by hydrocarbon revenues and reserve accumulation.

Figure C.1 plots the log of each variable over the full sample (2001Q1–2025Q4), with the dotted vertical line marking the end of the estimation window (2023Q3). The panels reveal three features that motivate the cointegration approach. First, all four series trend over the sample, consistent with non-stationarity. Second, the co-movement during the commodity boom (2004–2014) is visible across all panels: the official REER appreciated, reserves relative to exports rose sharply, gas income expanded, and the productivity differential widened. Third, and most strikingly, the post-2014 reversal is sharp

and sustained in the RRII and gas-income panels, while the official REER did not depreciate commensurately, which is precisely the overvaluation the model captures.

Figure C.1. Model variables used in the ERER estimation (logs)



Note: Log levels of the four variables entering the ERER model. The dotted vertical line marks the end of the estimation sample (2023Q3); the shaded region to its right is the conditional extension using realized fundamentals. RRII = international reserves / exports of goods and services. Real gas income is constructed as a cumulative index from log-differenced nominal gas revenues deflated by U.S. CPI. Source: INE Bolivia; Banco Central de Bolivia; World Bank.

Table C.1 reports the estimated cointegrating vector and adjustment coefficients.

Table C.1. Estimated cointegrating vector

Variable	Cointegrating vector (β)
Log REER (official)	1
Log reserves/exports ratio	-0.0832
Log non-gas productivity differential	-0.7583
Log real gas income	-0.0694
Constant	-3.6936

Note: Johansen VECM (K = 4, r = 1). Estimation sample: 2001Q1–2023Q3. Cointegrating vector normalized on log REER (official). α not defined for the constant row (-). Positive β on a fundamental implies appreciation pressure.