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Research Article

The Economic Model of the Fixed Exchange Rate in Bolivia: Towards Price Stability and Economic Instability

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Abstract

The objective of this article is to demonstrate and analyze whether the fixed exchange rate is a variable that benefits or harms the Bolivian economy in the short term, medium term and long term. Because it is a fundamental economic variable, mainly to keep prices stable, that is, low and controlled inflation in national prices, this fixed exchange rate has been frozen since 2011. In addition, it regulates or affects foreign trade, i.e., imports and exports, which have been dragging a deficit in the trade balance, which favors imports and smuggling to the detriment of national production and a growing informal labor market. The Bolivian economy is especially dependent on exports without specialization and added value, such as natural gas, minerals, mainly gold, legally and illegally, among others. In addition, the significant deterioration of macroeconomic variables, as reflected in historical data, such as the collapse of savings due to the gradual fall in net international reserves since 2014, leaving the vaults of the Central Bank of Bolivia with scarce reserves in gold and foreign currency, as well as the significant increase in internal and external public debt, Both of them have reached the Gross Domestic Product, at the same time, the increase in public spending in the public sector and public administration in general and the addition of public strategic companies, the latter seeking to replace imports of the productive apparatus, generating a more robust state apparatus and with levels of fiscal deficit recorded in the last ten years and taking into account the progressive subsidies for imports of fuels such as gasoline and diesel in the face of the growing demand for these fuels legally due to the growing vehicle fleet and illegally due to drug trafficking, generating a deficit in the balance of trade. Finally, the levels of corruption and country risk reflected in recent months by specialized institutions in 2023 show a deterioration of the Bolivian economy. Thus, this research will demonstrate the effects of the economic, social, community and productive model with a fixed exchange rate on the Bolivian economy and the effects on macroeconomic variables.

Keywords

Fixed Exchange Rate, Inflation, Gas, Net International Reserves, External Debt, Fiscal and Trade Deficit

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1. Introduction

The recent history of the positions of the monetary authorities has led to firm policies in the management of the exchange rate system. In 1985, an exchange rate mechanism based on the public auction of foreign currency was introduced, which was later transformed into a managed mechanism "crawling peg" Ferrufino (1991) [10]. From 2006 onwards, the stance of exchange rate policy was modified, initiating a period of exchange rate appreciation. This change responded to a context of high international food prices and the depreciation of the US dollar against other currencies, which generated greater external inflationary pressures (De Sousa & Zeballos 2015) [8]. At the end of 2011, macroeconomic policy decided to keep the selling exchange rate stable at Bs 6.96 and the purchase rate at Bs 6.86, levels that are still in force. This differential between the buying and selling exchange rates was introduced by the Central Bank of Bolivia (2023) [7]. Bolivia, with its economic, social, community and productive model since 2006, had to face different external and internal shocks, keeping inflation at controlled levels, reaching an average year-on-year inflation rate of 4.41% in the period 2006 to 2022 (National Institute of Statistics of Bolivia, 2014 and 2023) [27, 28], maintaining the Consumer Price Index (CPI) at controlled levels, becoming one of the lowest in South America and one of the lowest in the world (Central Bank of Bolivia, 2022) [6]. To achieve this price stability, it focused on controlling domestic prices through the fixed exchange rate and on international prices with the subsidy of fuels that are affected by the price of oil Dom ńguez and Rodrik (1992) [9].

The progressive fall of natural gas reserves since 2014, decreasing the export of said good each year, causing a decrease in foreign currency or dollars for Bolivia, leading the economic, social, community and productive model to weaken, this model established mainly in extractivism and depending on a single non-renewable raw material such as natural gas, to trigger a disproportionate increase in public spending by the state apparatus (Vargas, *et. al.,* 2023) [33]. Added to the subsidies of imported fuels, as well as the increase in the external debt with its respective interest and amortizations, these revenues are insufficient to cover the obligations mainly with own resources, which led to the decumulation and fall of the Net International Reserves (NIR), as reflected in the data the Ministry of Economy and Finance (2023) and of the Central Bank of Bolivia (2023) [7, 24]. The lack of transparency in the dissemination of periodic information deployed by the Central Bank of Bolivia due to the shortage of dollars in the internal market caused mistrust and uncertainty in Bolivian society, in this regard it should be noted that the authors Vargas, et. al., (2023) [34] stated that Bolivian public institutions were not very transparent in disseminating public economic information through their web portals.

According to author Loza (2023) [20], the government applied policies to have greater liquidity in foreign currency, marketing RINs, implementing a preferential exchange rate for exports, and increasing external and internal debt through loans from international organizations to finance the shortage of dollars. Thus, this research will demonstrate the effects of the economic, social, community and productive model with a fixed nominal exchange rate, for which we will develop in the following sections.

2. The Exchange Rate System

Within the framework of a fixed exchange rate system, an increase in production and an expansionary fiscal policy would produce an economic expansion Blanchard *et al.* (2012), Mart ńez *et. al.* (1995) and Whyman (2003) [3, 23-35], if and only if there were sufficient reserves to sustain the fixed exchange rate in the face of potential balance-of-payments deficits. According to Aliber (1970) [2] is the one who proposed the theoretical conception of business expansion propelled by the imperfections produced by the different currency zones, in the approach of attracting Foreign Direct Investment (FDI), there is the "macroeconomic and multiple currency zones" approach to explain the reasons why investments flow from one economy to another according to their exchange rates.

With respect to Bolivia, based on a desire for harmonious coexistence of the balances between internal economies and in an environment of macroeconomic stability, the change of Bolivian economic structure based on the export of goods and services with added value substituting imports, as validated by Gray (2010) and Madrid (2011) [11, 22]. The justification for the drift of exchange rate administration in Bolivia is due to the influence of the structuralist school of economics. According to this author, Taylor (1989) [32] points out that the aforementioned factors are of meridian importance when implementing economic policies, especially in small and open economies such as Bolivia, where the relevance of the import of capital and intermediate goods for their development is highlighted.

The evidence applying this methodology can be mentioned at the national level to the authors Ades et al. (1999) [1], as well as internationally to the authors Hoffman and MacDonald (2003), MacDonald and Ricci (2003) and Miyajima (2005) [15, 21-26], among others, on the Behavioral Equilibrium Exchange Rate (BEER) Gab-Je (2004) [12] is one of the methods commonly used in estimating the real exchange rate, which is based on econometric models to establish the foundations that explain the real exchange rate. to then be able to estimate the degree of exchange rate misalignment. In short, the exchange rate is one of those "key" variables in economics, both because of its importance in affecting other variables, inflation, net international reserves and other macroeconomic debt indicators, and because of the

redistributive effects that its manipulation entails.

2.1. Bolivia and the Real Exchange Rate and Fuel Subsidies

The real exchange rate is defined as the ratio at which a person can exchange the goods and services of one country for those of other countries, and if we apply a fixed nominal exchange rate to stabilize prices (Helmers, 1988) [14], its corresponding formula is:

$$RER = \frac{E \cdot P^*}{P}$$

Where:

RER: Real Exchange Rate

E: Fixed Nominal Exchange Rate, defined as units of fixed domestic currency per unit of foreign currency

P*: Variable International Price in Foreign Currency Terms

P: Fixed National Price in terms of national currency

If we apply the aforementioned formula to the fuel subsidy, that is, to the national prices of subsidized fuels, mainly diesel oil and special gasoline, and considering the average of both, their prices per liter are Bs 3.73 bolivianos and the international prices are variable per liter because they are indexed to oil and applying a fixed exchange rate for the sale of Bs 6.96 bolivianos per dollar. We will be able to obtain the real exchange rate for subsidised fuels, for which it is necessary to define and apply the formula.

$$RER = \frac{\bar{E} \cdot P^*}{\bar{P}}$$

$RER = f(\bar{E}, \bar{P})$

$RER > (\bar{E}, \bar{P})$ The national currency depreciates

$RER < (\bar{E}, \bar{P})$ The national currency appreciates

Where:

RER: Real Exchange Rate

$\bar{E}$: Fixed Nominal Exchange Rate, defined as units of fixed domestic currency per unit of foreign currency

P*: Variable International Price in Foreign Currency Terms

$\bar{P}$: Fixed National Price in terms of national currency

According to the information released by the National Hydrocarbons Agency of Bolivia (NHAB) (2023) [29], as we can see in Figure 1, the variable international prices of fuels per liter were increased from 2006 from Bs. 5.70 to 2012 to Bs 9.41 and then remained stable until 2021 at Bs 8.78 per liter, then rose to reach Bs 9.73 as of March 2023 bolivianos per liter. While the national prices of subsidized diesel fuels Bs 3.72 and special gasoline Bs 3.74 bolivianos, mainly due to their high consumption, on average were constant per liter at Bs 3.73.

With respect to the exchange rate as of 2011, based on information from the National Hydrocarbons Agency of Bolivia (NHAB) (2023) [29], the fixed exchange rate is incorporated into the sale of Bs 6.96, international prices have been moving away from national fuel prices since 2011, from that year the fuel subsidy margin was around Bs 6 until 2023 and the reports International Monetary Fund (IMF) (2023) [16]. With respect to this, the real exchange rate increased between 2006 and 2021 except for 2009, from 2010 onwards it averaged Bs 2.39 with the fixed exchange rate, see Figure 1.

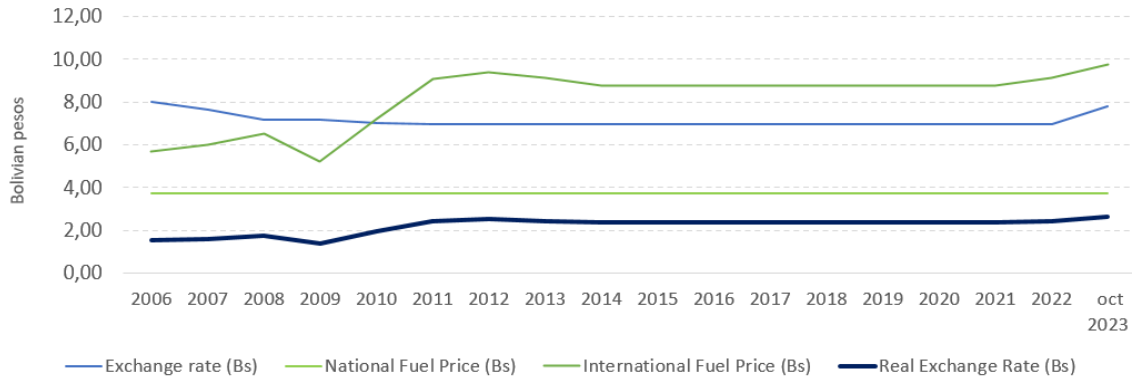

Figure 1. *Bolivia, Real exchange rate for diesel fuels and special gasoline.*

Period: 2006 to oct 2023 (Bolivian pesos)
Source: National Hydrocarbons Agency of Bolivia (NHAB) (2023)

It can be said that the national currency appreciated because the real exchange rate is below national prices and the fixed exchange rate, but its trend was increasing but did not exceed any of the variables mentioned since 2011. With respect to the foreign currency, that currency exceeded the fixed nominal exchange rate and subsidized prices. For a better understanding we will contrast it with its nine main economic partners of Bolivia, it is possible to consider important

asymmetries, in this sense we will study the following section.

2.2. Bolivia's Nominal Exchange Rate and Its Main Trading Partners

According to the Jubilee Foundation (2022, p. 18) [17], the Fixed Exchange Rate (FER) with respect to the main trading partners with the Variable Nominal Exchange Rate (VNER), how it influences the appreciation or depreciation of currencies. To do this, we will rely on the following Figure 2, which shows the main differences between the most relevant exchange rates for Bolivia. The main exporting partner of goods to Bolivia is Brazil, which, according to the Nominal Exchange Rate Index, would have depreciated its currency against Bolivia by 65.42% in August 2022. The third major partner in the above terms is Argentina, whose Nominal Exchange Rate ratio has depreciated with respect to Bolivia by 97.15%.

Much less spectacular are the differences with the Euro, whose depreciation is estimated to be around 21.86%, the fourth economic zone from which Bolivian imports come. However, it is noteworthy that China, being the second most important economy from which Bolivian imports come, depreciated nominally with respect to Bolivia, only by 7.43% Jubilee Foundation (2022, p. 19) [17]. Consequently, it would seem that the Bolivian exchange rate would be excessively appreciated considering the time frames of analysis.

Figure 2. *Nominal Exchange Rate Index, Bolivia's Main Trading Partners.*

Period: January 2012 to August 2022
Source: From https://www.x-rates.com/ and Central Reserve Bank of Peru Jubilee Foundation (2022, p. 19)

However, when nominal exchange rates are contrasted, although it is possible to observe trends, the increase in the prices of the exporting partners to Bolivia is not considered, in other words, the (FER) in nominal terms appreciates with respect to its main partners.

$$FER > VNER$$

There is a trend of appreciation of the national currency, due to the exchange rate depreciation of trading partners.

$$FER < VNER$$

There is a trend of depreciation, as a result of the exchange rate appreciation of trading partners.

2.3. Multilateral Real Exchange Rate

The Multilateral Real Exchange Rate (MRER) is an index constructed by the Central Bank of Bolivia, calculated with the variable weights method (Jubilee Foundation, 2022, p-19) [17], whose calculation method[1].

A comparative measure of a currency's appreciation is the observation of the real exchange rate contrasted with the Consumer Price Index (CPI) and the Average Parallel Exchange Rate Koske Isabell (2008) [18]. The MRER

1 $$I_t = I_{t-1} \prod_i \left[\frac{\frac{e_t p_{i,t}}{pt}}{\frac{e_{t-1} P_{i,t-1}}{p_{t-1}}} \right]^{w_{i,t}}$$

where:
It: This is the index for period t, which takes the value of 100 in August 2003
e: It is the nominal exchange rate expressed in bolivianos per unit of the currency of the partner i
pi: This is the consumer price index of partner i
pt: This is Bolivia's consumer price index
Wi: is the weighting of partner i, which may change annually, depending on the share of trading with partner i in the Bolivia's total trade. Only countries whose characteristics are similar are considered.

compares exchange rate and inflation variations in Bolivia in relation to exchange rate and inflation variations in our trading partners

MRER > AERPM

There is a depreciation trend, due to the real exchange rate appreciation of trading partners.

MRER < AERPM

There is a trend of appreciation, as a result of the real depreciation of trading partners.

In other words, the MRER shows the aggregate exchange rate of trading partners deflated by their corresponding inflations, thus showing more accurately the position of the Bolivian economy in terms of real appreciation or depreciation of its currency (Jubilee Foundation, 2022, p. 20) [17]. In the following Figure 3, the variables mentioned in the preceding paragraph are exposed with the quality of measuring the variations at 12 months, because this avoids the potential seasonality of these variables. The states that when the MRER is above the Average Exchange Rate of the Parallel Market (AERPM) there is a depreciation trend, due to the real exchange appreciation of trading partners. On the other hand, when the MRER is below AERPM there is an appreciation trend, as a result of the real depreciation of trading partners. Therefore, the depreciation of the MRER and its appreciation depend on the net effect of changes in nominal exchange rates and the effects of price changes of trading partners in a context where their exchange rate systems are flexible Glick (1995) [13].

The Figure 3, it is possible to distinguish two identifiable scenarios, where the appreciation of the currency is the one that manifests its preeminence over the depreciation. In general, below is only the dynamic to watch where appreciation is above depreciation. This shows the appreciation of the exchange rate between April 2018 and November 2020 (II). The second is a brief depreciation of the exchange rate, between February and November 2021 (Jubilee Foundation, 2022, p. 21) [17], due to the monetary actions of Bolivia's trading partners (IV). The rest of the exchange rate depreciation and appreciation scenarios correspond to adjustments (I), (III) and (V), given the information constraints allowed by this outlook. However, it is possible to clearly see the positions of the Bolivian MRER with respect to their respective trading partners and inflation, for a better understanding we will analyze the trade balance.

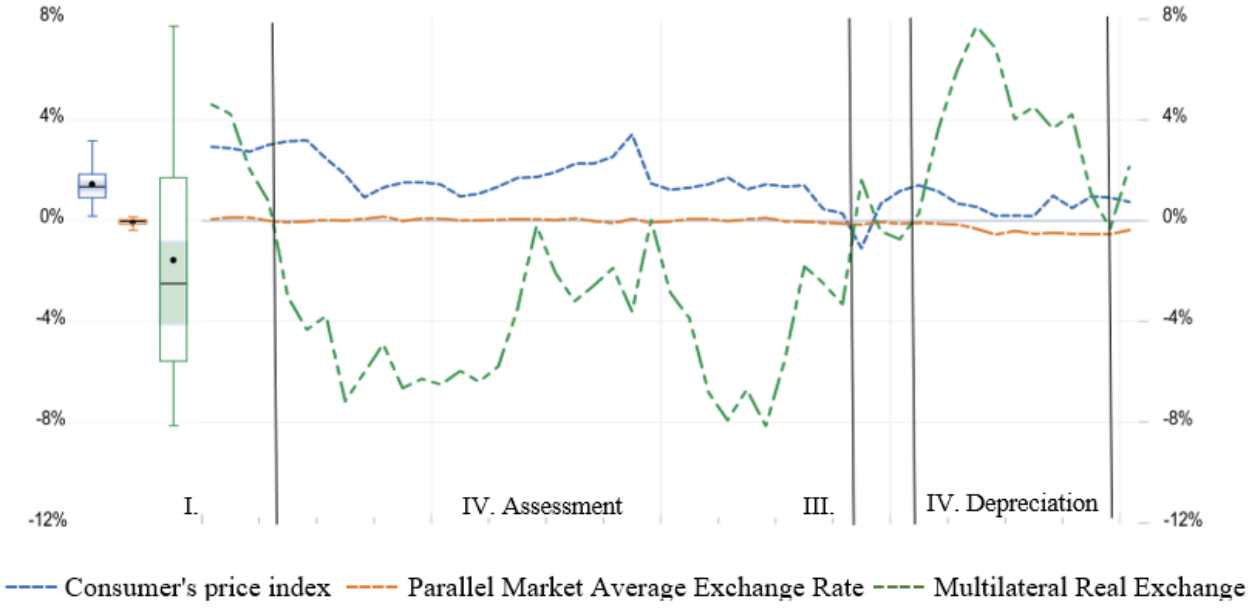

Figure 3. *Average parallel exchange rate, multilateral real and inflation percentage change rates.*

Period: January 2018 – January 2022
Source: Based on reports from the Central Bank of Bolivia (BCB) (2023) and the National Institute of Statistics (INE) (2023) and (Jubilee Foundation, 2022, p. 20)

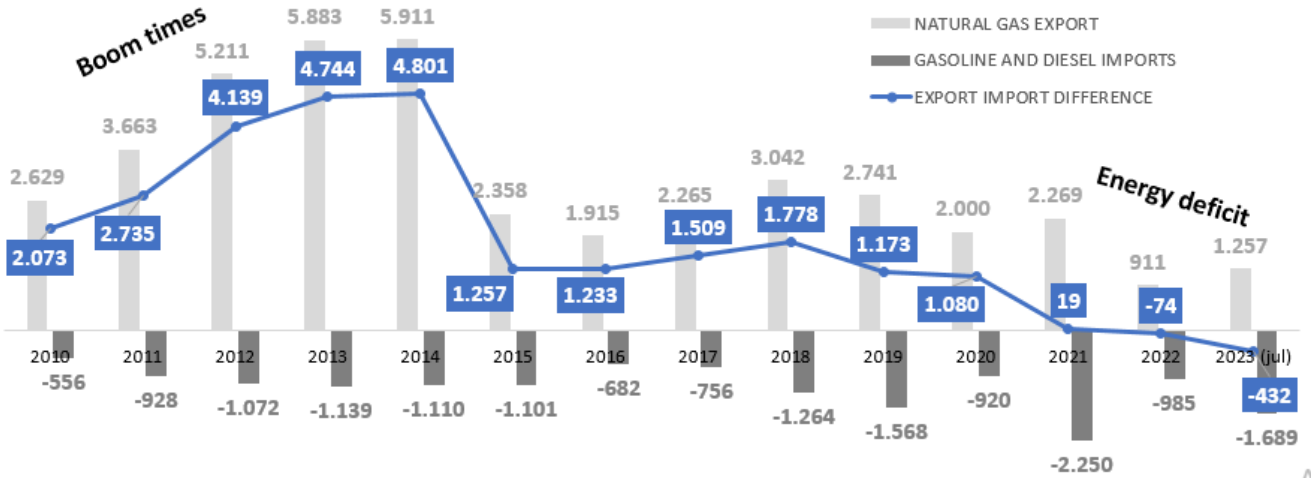

Figure 4. *Bolivia's Gas Exports and Fuel Imports.*

Period: 2010 to 2026 (Billions of dollars)
Source: From: https://www.gasenergyla.com/es/publicaciones/ Gas Energy Latin America (GELA) (2023), National Institute of Statistics (2023) and Bolivian Institute of Foreign Trade (2022)

3. Fuel Trade Balance

The fuel trade balance of both exports and imports, which we will analyze separately, on the one hand fuel imports according to official sources of the reports of the Gas Energy Latin America (GELA) (2023) [2], Bolivia in a decade imported diesel and gasoline for a total of (-11.775) billion dollars between 2013 and 2022, racing its record high in October 2023 of (-1.689) million dollars of fuel imports and a flight of foreign currency or dollars, according to the authors (Vargas, et. al., 2023) [34] this trend will continue to grow mainly due to the increase in demand for the vehicle fleet, which is growing significantly day by day, as well as the illegal demand for fuels for drug trafficking, see Figure 4.

On the other hand, exports of fuels such as natural gas, according to data from the Bolivian Institute of Foreign Trade (2022) and the Central Bank of Bolivia (2023) [4, 5] Bolivia's natural gas exports in a decade exported 34.506 billion dollars between 2013 from its only two buyers, which are the countries of Argentina and Brazil, The highest level of export of this raw material was in 2014 with 4.801 billion dollars, exports of natural gas abroad were decreasing over the years reaching 1.257 billion dollars by October 2023, which caused a decrease in the entry of dollars into the country, while public spending remained at high levels of 36% of GDP in 2022, as mentioned by the authors (Vargas, et. al., 2023) [34], see Figure 4.

4. Macroeconomic Variables and the Fixed Exchange Rate

In the report of the Central Bank of Bolivia (2023) [5] we find information on the external and internal debt for the last ten years, as can be seen in Figure 5. However, total debt grew significantly from $9.302 billion in 2013 to $44.064 billion in 2023, or 79%. The authors (Vargas, et. al., 2023) [34] justify that financing costs could continue to increase in the face of a greater risk of default on the external debt, due to lower income and higher interest and amortization payments, as stated. I mention the risk rating agency (Standard & Poor's, 2023) [30]. With respect to Net International Reserves (NIR), they fell from 15,123 in 2014 to 2,147 million dollars until August 2023, that is, approximately -85%.

The trade balance with a decreasing trend since 2014 with a trade balance would be subject to a deficit of 4,667 million dollars to have a deficit in 2023 -3,610 million dollars, that is, imports are higher than exports and that a deficit in the trade balance has been dragging on, which favors imports and smuggling to the detriment of national production and exports, see Figure 5. With respect to the fiscal deficit, 2014 marked a turning point, when a deficit of 3.4% was recorded, generated both in the accounts of the general government and in public companies, although the latter had already shown deficits since 2012. In the 13-year period, the fiscal deficit reached -7.86%. In the report of the National Institute of Statistics (2023) [28] on Bolivia's average inflation rate in the period 2013 to 2022 reached 2.76%, inflation fell from 5.19% in 2014 to 1.76% in 2022, As of the publication of the Central Bank of Bolivia (2022 and 2023) [5, 6], Bolivia's external debt reached

2 https://www.gasenergyla.com/es/publicaciones/ revised 14-12-2023

13,327 billion dollars as of May 2023.

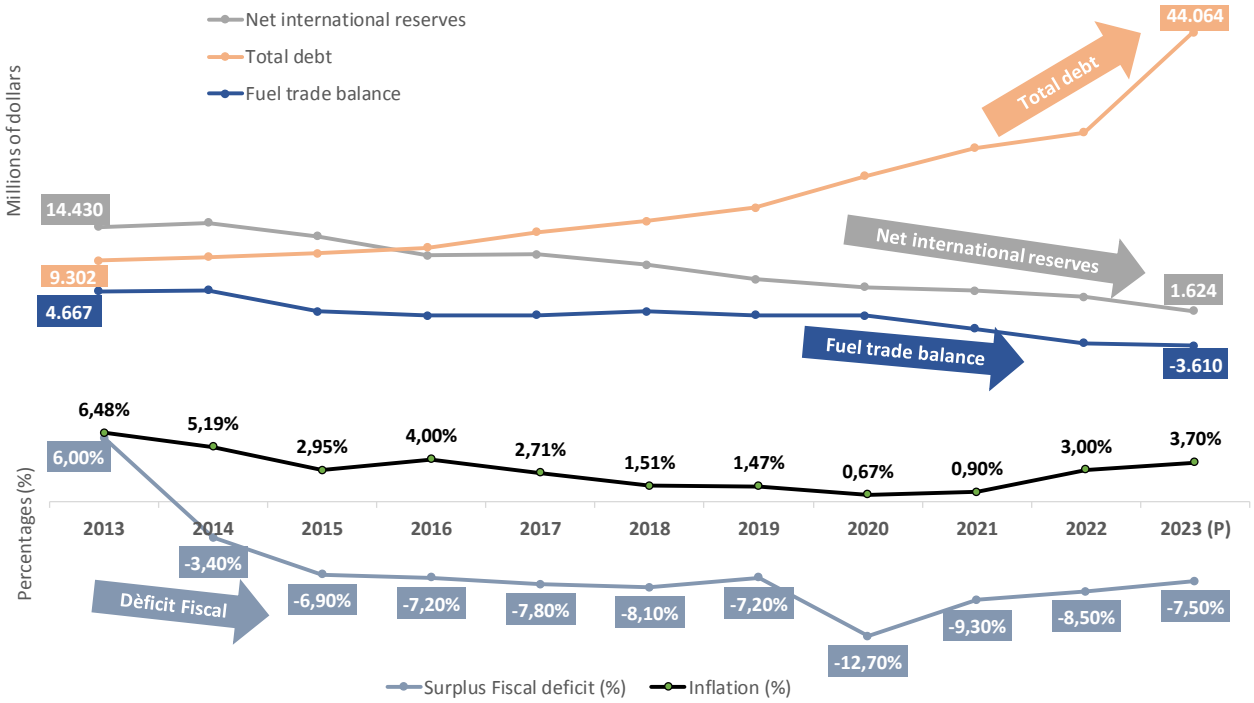

Figure 5. *Inflation controlled with a fixed exchange rate, to the detriment of reserves, debt, fiscal.*

Period: 2013 to 2022 (In millions of dollars and percentages)
Source: From the Central Bank of Bolivia (2023) and National Statistics Institute (2014, 2022)

In the Figure 5, according to Statista (2023) [31], Bolivia's average inflation rate projected for 2013 to 2023 would be 2.96% at controlled inflation, i.e., the objective met. But to the detriment of variables, such as net international reserves, external and internal debt, the latter will continue to grow to continue protecting obligations in foreign currency or dollars, which previously covered gas exports and international reserves, this will depend on new public policies. The (World Bank, 2023) [36] on the one hand fiscal policy with the reduction of public spending to reduce the public deficit and the overheating of the economy and, on the other hand, the exchange rate policy of modifying the nominal exchange rate fixed but with the danger of devaluing and depreciating the national currency and generating inflation as occurs in Venezuela and Argentina in Latin America, considering the characteristics of the Bolivian economic model of high levels of corruption, drug trafficking, smuggling and an informal labor market that continues to grow day by day in the country.

The Ministry of Economy and Finance supports the use of non-renewable resources for economic growth and projects through industrialization projects that replace the export of Natural Gas, the start-up of the Biodiesel Plant, the Zinc Separation Plant and the Mut ún Project, as well as the larger scale production of lithium carbonate and its concentrates among others Ministry of Economy and Finance (2022 and 2023) [24, 25].

It will be a challenge to get out of this economic situation, keeping inflation low with the nominal exchange rate fixed and no longer depending on a non-renewable good such as natural gas, and depending on formal work and productivity, if applicable, to continue with the economic model with a fixed exchange rate and constant prices.

5. Conclusions

According to the IMF, the exchange rate in Bolivia is classified within the framework of a stabilized exchange rate system. In Bolivia it is called the managed exchange rate and in the current economic context it is not feasible to maintain a fixed exchange rate system and the triggering risk of inflation, in the face of an imminent crisis of exchange rate sustainability, must be avoided as a national priority. The Multilateral Real Exchange Rate of the Bolivian currency shows the general appreciation in recent years with the implicit variability of the movements of the exchange rates of the main trading partners. The evolution of Bolivia's Terms of Trade contrasted with the main Latin American partners shows that they have deteriorated, but this has been slowed down due to the fact that Bolivia has concentrated on exporting inelastic goods at their reference prices. Fuel

imports, which account for about 40 per cent of Bolivia's total imports, have a negative impact on the trade deficit and the public deficit due to the subsidy.

The objective of having a fixed exchange rate in Bolivia from 2011 to 2022 and stable and low inflation, with price controls through fuel and food subsidies and having an economic growth of GDP, this economic policy lasted a decade while there was an excess of natural gas reserves for export; But once natural gas exports were declining and imports of diesel and subsidized gasoline increased, it led to a shortage of dollars to meet foreign currency obligations. In addition to all of the above, all macroeconomic variables had to be taken into account, such as the fall in Net International Reserves, the increase in internal and external debt, as well as pension funds and other funds where there were dollars.

But the trigger was that it affected the root of the economic model, that is, the exchange rate, which ceased to be fixed and became variable and speculative, directly affecting inflation, which was affected from 2021 where inflation stood at 0.9%, for 2022 it reached 3.12% and the estimate for 2023 management will oscillate 3.7% accompanied by the fiscal deficit that have been dragging on for more than a decade, exacerbating the economic model and overheating the Bolivian economy. Despite the fact that the government of the day insists on continuing with the current economic model, now based mainly on policies such as the gold law and biofuels and other non-renewable resources such as lithium, urea, among others. But not in the creation of formal employment, nor in specialized human capital, nor in productivity. Therefore, Bolivia's economic, social, community and productive model is deteriorating at a very rapid rate and will depend on a change of course from the current economic model.

Conflicts of Interest

The authors declare no conflicts of interest.

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