

Author:

JOSÉ RAFAEL PINEDA ALBARRÁN

Facultad de Economía, Universidad Nacional Autónoma de México (UNAM), Ciudad de México

ACCUMULATION OF INTERNATIONAL RESERVES IN LATIN AMERICA: THE MEXICAN CASE*

ABSTRACT

This article has two objectives. First, it identifies the motivations behind the accelerated accumulation of reserves in Latin American countries in recent decades arguing that it was triggered by the need to create a shield to protect themselves from the series of financial crises that occurred with great frequency during the 1990s. Second, it analyses how Mexico has accumulated reserves, describing its administrative, legal and accounting framework and highlighting the problems of development associated with the cost of keeping them.

Keywords: International Reserves; Monetary Policy; Financial Liberalization; Central Bank

JEL Classification: E52; E58; F30; F33

RIASSUNTO

L'accumulo di riserve internazionali nell'America Latina: il caso del Messico

Questo articolo ha due obiettivi. Il primo di questi è quello di identificare i motivi che hanno portato all'accelerazione dell'accumulo di riserve da parte dei paesi latino-americani negli ultimi decenni. Si ipotizza che tale accumulo sia stato causato dal bisogno di crearsi una protezione da eventuali crisi finanziarie rivelatesi molti frequenti durante gli anni 90. Il secondo obiettivo dell'articolo è analizzare come il Messico ha accumulato queste riserve, sulla base della sua struttura amministrativa, legale e contabile. Contestualmente si evidenziano i problemi di sviluppo associati al costo del mantenimento delle riserve accumulate.

1. INTRODUCTION

Since the frequent episodes of financial crises of the 1990s, the growing accumulation of official reserves in emerging economies has become a major feature of the international financial

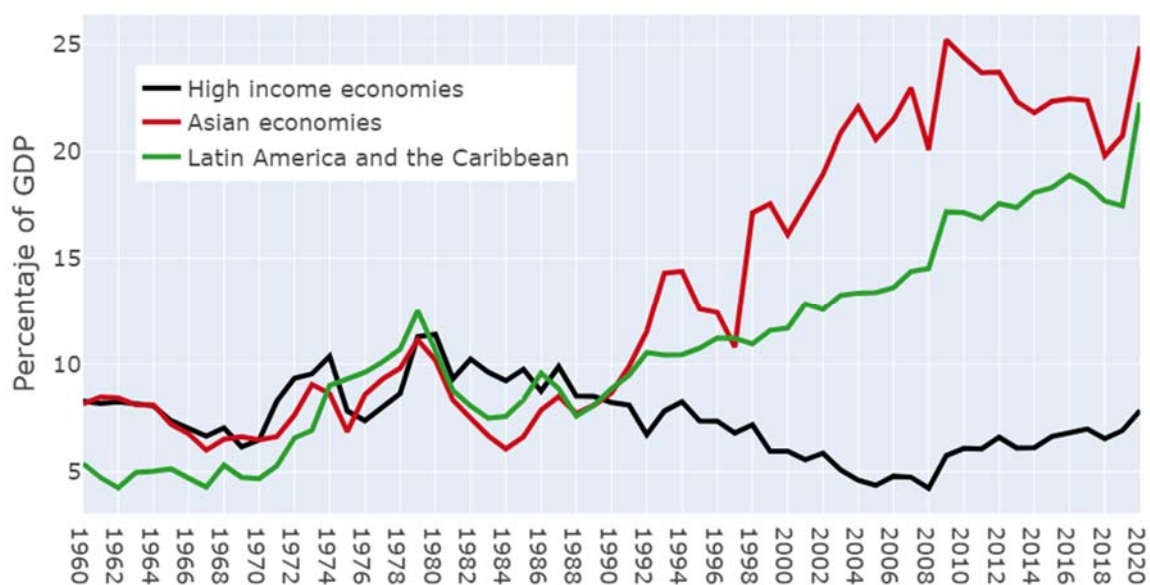
* The author thanks the comments and recommendations of an anonymous reviewer.

system, which is also characterised by a different trend in advanced or high-income economies (see Figure 1).

This configuration of the international financial architecture has favoured the richest economies: the growing accumulation of reserves implies giving up domestic currencies for foreign ones, mainly US dollars and to a lesser extent other currencies of advanced countries (Capraro and Panico, 2021, p. 115). Then, it has forced low- and medium-income countries to finance them, generating the opposite result to the one that was promised in the 1970s to promote the liberalisation of the international capital movements and furthering a progressive vulnerability of low- and medium-income countries on account of the restrictions it has imposed on fiscal policies and public investment.

This paper first seeks to identify the motivations behind the accelerated accumulation of reserves in Latin American countries, arguing that it was triggered by the need they had to create a shield to protect themselves from the series of financial crises that had been increasingly occurring since the 1990s.

FIGURE 1 - *Reserve Accumulation by Country Group, 1960-2020*



Source: Own elaboration with data from WDI, World Bank (2022).

The literature refers to the “Tequila Effect” to recall that the 1994 Mexican crisis was one of the first episodes generating the tendency to create this kind of protection by accumulating international reserves (Durdu *et al.*, 2007, p. 1). Then, the paper analyses the accumulation of reserves in Mexico, describing its administrative, legal and accounting framework and highlighting the problems associated with the cost of keeping them at a high level. It argues that the institutional structure of Bank of Mexico and his reputation has ensured an adequate management of international reserves that contributes to reducing the probability of speculative attacks against the Mexican peso.

However, this self-insurance has not come free, so this paper also contributes by pointing out the costs that this growing accumulation of international reserves represents for Mexico. This highlights the price of the “rules of the game” that middle- and low-income economies have to pay in a world with liberalized capital markets.

The framework adopted by the paper to deal with the Mexican case coincides with that employed in the management of international reserves worldwide. It follows the definitions put forward by the international organizations (such as, the International Monetary Fund) and accepted by the Organic Law of the Bank of Mexico.

The work is organised as follows. Section 2 reviews the process of financial liberalization that the world experienced in the last decades of the twentieth century. Section 3 describes how episodes of *sudden stops* forced Latin American economies to protect themselves against speculative attacks by increasing the accumulation of reserves. Section 4 deals with the management of international reserves. Section 5 highlights the problems associated with the cost of keeping the high level of reserves as a financial shield. Section 6 concludes.

2. THE ROOTS: FINANCIAL LIBERALIZATIONS

At the beginning of the 1970s some important literature (McKinnon, 1973; Shaw, 1973) recommended the liberalisation of the financial markets of lower-income countries, arguing that it would be beneficial for them in economic and social terms. McKinnon (1973) claimed that the liberalisation of financial markets would have made domestic interest rates reflect the existing scarcity of capital, showing up a positive difference with the interest rates of rich economies. The

positive difference would have led capital from the latter to move towards the former raising their rates of economic growth.

Similarly, Shaw (1973) analysed the conditions of underdevelopment in which low- and middle-income countries lived at that time. He coined the term “financial strangulation” to describe the choice of policymakers in these countries to “repress” the entry of external capital and to contend that this choice restrained the growth of these countries. For him, a process of financial liberalization would have promoted higher levels of growth.

Together with the transition from fixed to floating exchange rates and the changes in the approach to financial regulation in many countries (Panico *et al.*, 2016, p. 251), the liberalisation of international capital movements increased the earnings of the financial industry and favoured its expansion:

“By freeing capital from the shackles of government regulation and supervision, a reinvigorated banking sector saw the skies open to pursue rent-seeking opportunities, while a new set of trade rules (regulating areas such as financial services, investment, and intellectual property rights) expanded the protection of capital with complete freedom of movement” (UNCTAD, 2019, p. 2).

According to Mendoza (2004, p. 61), these changes initially led the economic profession to think that the progressive insertion of developing economies into international capital markets could have caused a significant reduction of international reserves. However, reality progressively disproved this idea and the results obtained have been exactly the opposite (see Fig. 1).

3. THE SUDDEN STOPS, THE PRUDENT POLICIES AND THE PRECAUTIONARY MOTIVE

The abandonment of the Bretton Woods agreements in 1971 by the United States imposed a system of fiat money not related to any form of commodity (as it was previously with gold). The value of money so came to depend on the economic conditions of the different countries and on the ability of their central banks to achieve monetary stability. Nonetheless, the exceptional expansion of international financial activities increased instability and caused an upsurge in the number of crises, as documented by Laeven and Valencia (2018). The rising instability led the operators to pay attention on the probability of devaluations attached to the diverse currencies, which were so divided into two groups. The first, which are referred to as “definitive or

permanent money”, are currencies of the richest countries, which financial operators consider of the highest quality since they are less likely to devalue. The second, to which the literature refers to as “provisional or periphery money”, are the currencies of the other countries, which are more likely to devalue (see McKinnon, 2002, p. 1-3).

In times of high economic stability, capital flows from rich to lower-income countries, driven by the fact that interest rates tend to be higher in the latter than in the former. However, when periods of uncertainty arise, capital returns to the “definitive” currencies and pressures towards significant depreciations in the exchange rates of the lower-income countries ensue, deteriorating their current account and, in the worst-case scenario, causing sudden stops in their funding (Calvo *et al.*, 2012).

In this situation, the dollar became the definitive reference currency. It maintained and reinforced this privileged position in the subsequent years while the number of crises significantly increased in Asia and Latin America in the 1990s. As MacKinnon (2002, p. 3) puts it:

“In the 21st century, the dollar is definitive money—much like gold was in the 19th century”.

The “High-Level Panel Report on Financing for Development” of the United Nations, known as the “Zedillo Report”, presented in 2001, also highlighted the remarkable increase of international reserves in emerging countries, generated by the large number of financial crises that occurred in different parts of the globe (UN, 2001)¹.

The term *sudden stops* became popular after the publication of an article by Dornbusch and Werner (1994) on the Mexican financial crisis of 1994². These stops occur when foreign capital suddenly leaves an emerging country in a generalized way, causing a drastic depreciation of its exchange rate, a fall in the level of international reserves, high volatility and downward pressure in the equity market, and severe damage to its balance of payments. On the real side, GDP growth slows, investment falls and the current account improves on account of the increase in

¹ “In recent years, developing countries have had a strong need to accumulate reserves to reduce their vulnerability to shocks, and have financed this accumulation either with current account surpluses or by borrowing on terms, much more onerous than those associated with SDRs. The result is a large flow of what is sometimes referred to as ‘reverse help’. To prevent or at least reduce it, the IMF should resume SDR allocations” (UN, 2001, p. 15).

² The famous banker saying “it is not speed that kills you, it is the sudden stop” came instead from an article by Dornbusch *et al.* (1995).

exports following the depreciation of the exchange rate and the reduction of imports due to the recession (Eichengreen and Gupta, 2016)³.

Then, the *Tequila* crisis would be the protagonist in studies on evaluating the vulnerability of a country subject to the occurrence of a crisis of these characteristics. Calvo (1996, p. 208) wrote:

“The recent crisis in Mexico has made it evident that balance-of-payments crises are not only provoked like by ‘flow’ type disequilibria, current account or fiscal deficits, but are also, and perhaps fundamentally, linked to financial vulnerabilities”.

At the beginning of the decade, in a context of privatization of Mexican banking, reduction of reserve requirements to practically zero and liberalization of bank interest rates, a large amount of international capital flows would arrive in the country (Calvo and Mendoza, 1996). According to Ros (2001, p. 121):

“from 1990 to 1993, almost half of the capital inflows to Latin America went to Mexico”⁴.

Although the Mexican one represented the first episode of crisis with these features, the series of financial crises that occurred in Southeast Asia and in other countries in 1997 and 1998 should really be considered the watershed for the conduct of policies of emerging countries. Economies that had just doubled their real *per capita* income, such as South Korea, would see their currencies depreciate rapidly and lose much of the employment and economic growth accumulated in previous years⁵. Such a leap from the Asian miracle to the deep crisis imposed a crucial change in the accumulation of international reserves for low- and middle-income economies:

³ Eichengreen and Gupta (2016) identify 44 *sudden stops* in a sample of 34 emerging economies since 1991. On average, these episodes last four quarters. The authors calculate capital outflows at an average of around 1.5% of GDP per quarter (i.e. 6% of GDP for full duration of the episode).

⁴ Ros (2001) details the capital boom that Mexico experienced just into the 1990s. The conjunction of internal reforms (such as the deregulation of foreign direct investments, the privatization of the Mexican banking and telecommunications sector in 1991-1992, the drastic reduction of internal and external debt thanks to the income from these same privatizations, etc.) and the prospect that Mexico would finally enter the developed world through the NAFTA negotiations in 1990, promoted a vigorous entry of capital into the country, which rested mainly on three factors: 1) the reduction of the country risk premium, 2) the opening of domestic financial markets and 3) the real appreciation of the Mexican peso and high interest rates.

⁵ A major cause of the Asian crises was their accelerated and premature financial liberalization in the early nineties, which lacked effective terms of financial regulation and supervision (Singh, 1998). In this regard, Bustelo Gómez (1999, p. 22) points out: “[...] *in addition to liberalizing interest rates, barriers to entry into financial intermediation were eliminated (which led to the proliferation of new and inexperienced non-bank institutions), greater leeway was granted in borrowing and lending decisions by financial institutions and restrictions on corporate debt financing disappeared*”.

“It has been argued that the Asian crisis marked a watershed, in that emerging market countries became painfully aware that even sound macroeconomic policies did not insulate them from contagion and sharp reversals in capital flows. The buildup in reserves could be a rational adaptation to this new, more volatile world” (Jeanne, 2007, p. 7).

According to several authors (Aizenman and Marion, 2003; Mendoza, 2004; Cruz, 2015; Obstfeld *et al.*, 2008), the prudence shown by the authorities of emerging countries after these notable crises has represented the main reason for the growing accumulation of reserves, which is synthesized in a precautionary motive. This has displaced the old motivations related to the transaction motive. Cruz and Kriesler (2010, p. 11) point out:

“A crucial difference in the new era is that the vulnerability of the balance-of payments now emanates primarily from the capital rather than the current account”.

In the decades prior to financial liberalization, the literature studying this issue had considered that the demand for international reserves primarily depended on real factors, such as the possibility of smoothing temporary imbalances in the current part of the balance of payments⁶. Hence, for many years the coverage of at least three months of imports was considered an adequate measure of their adequacy. The remarkable number of crises occurred after the financial liberalization and the consequent emergence of prudent policies implemented by many countries have however induced the literature to see monetary factors, rather than real ones, as the main motivation of the demand for international reserves. In the words of Rodrik (2006):

“the increase in developing country’s reserves is related to changes not in real quantities (such as imports or output) but in financial magnitudes”.

In this regard, Feldstein (1999) concludes that, after the world precipitated in the series of *sudden stop* episodes in the nineties, low- and middle-income economies could not limit themselves to relying on the support of the international organizations, such as the International Monetary Fund, or on the soundness of their macroeconomic policies. The risk of contagion from financial crises proved to be common in recent experiences. Thus, the key point of the policies of emerging economies had to be “self-protection” by increased international

⁶ Triffin (1947) noted that the demand for international reserves would increase in tandem with the growth of world trade. At this point, the frequency and amount of foreign transactions, driven mainly by movements in the current account, are taken as the main explanatory factor for the accumulation of reserves.

reserves. By reinforcing the confidence of financial operators that the country is protected from the occurrence of a crisis, the accumulation of reserves can also generate a reduction of the risk premium associated with investing in it (see De Gregorio, 2011).

This precautionary motivation of the accumulation of reserves acts as a preventive measure. It aims to deter attempts at speculative attack before a financial crisis occurs. For this reason, legislation of middle- and low-income countries tends to forbid the use of the reserves for domestic policy objectives, establishing that they must be held for protection against the risk of a financial crisis⁷.

According to De Gregorio (2011, p. 78),

“reserves play a stabilizing role by the fact of being there and not necessarily by being used: in this sense, they play a *deterrent role*”. Similarly, Bussiere *et. al.* (2014, p. 7) highlight that “international reserves should be viewed as being akin to ‘nuclear weapon’ having a deterrent effect, rather than to true ‘gunpowder’, to be used in intervention. In other words, having a large stock of reserves prior to any external shocks will deter speculators from attacking”.

For the specific case of Latin America, Cruz (2015), through a panel data model from 1995 to 2011, demonstrates that the demand for international reserves in the region responds to precautionary reasons. Then, the authorities’ biggest concern is the abrupt outflow of capital and all the costs associated with the product; the main driver of the growing reserves accumulation it’s associated with financial factors.

4. ADMINISTRATION AND OPERABILITY OF INTERNATIONAL RESERVES IN MEXICO

4.1 Basic Definitions and Components

The International Monetary Fund’s International Balance of Payments and Investment Position Manual (BPM6) presents the following definition of reserve assets:

“Reserve assets are those external assets that are readily available to and controlled by monetary authorities for meeting balance of payments financing needs, for intervention in exchange markets to

⁷ For example, in accordance with article 28, sixth paragraph of the Political Constitution of the United Mexican States, it is not allowed to use international reserves to pay public debt.

affect the currency exchange rate, and for other related purposes (such as maintaining confidence in the currency and the economy and serving as a basis for foreign borrowing)” (IMF, 2009, p. 111).

The control of the monetary authorities and the immediate availability are two key features of this definition of reserves assets⁸. The authorities must be able to quickly intervene if the country needs liquidity in foreign currency to avoid a balance of payments crisis or an abrupt outflow of capital. The reserve assets must represent a credit right towards a non-resident, unless they are gold bars, which are a property and not a credit right. They must be of “high quality” and convertible into the required currency without delay and drastically losing market value if an unfavourable situation arises⁹. Potential or contingent credit rights, for instance non-activated credit lines such as the IMF’s Flexible Credit Line (FCL), the Precautionary and Liquidity Line (LPL) or the FED’s liquidity swap lines, cannot be considered reserve assets.

As to Mexican legislation, Chapter IV of the Organic Law of the Bank of Mexico establishes the legal guidelines of the management of international reserves. Article 18 established that:

“The Bank of Mexico shall have a reserve of international assets, which shall have the purpose of contributing to the stability of the purchasing power of the national currency by compensating for imbalances between the country’s foreign exchange inflows and outflows” (Law of the Bank of Mexico, 1993).

Complying with the content of Articles 19 and 20 of the Organic Law, Bank of Mexico puts forward the following definitions of the magnitudes involved in the management of international reserves: 1) Gross Reserve (*GR*), 2) International Assets (*FA*), 3) International Reserve (*IR*) and 4) Net International Assets/Net Foreign Assets (*NFA*). The gross reserve, also known as official reserve assets, consists of foreign banknotes and coins, deposits, securities, and other obligations payable outside the national territory that are denominated in foreign currency, SDRs of the IMF, and credits from central banks that are due for a term of less than six months. The international reserve is defined as:

⁸ The functional definition of “monetary authorities” brings together the central bank and another group of operations that can be attributed to the central bank but are sometimes carried out by other public institutions (such as the Ministry of Finance). These operations include the issuance of currency, the operation of exchange stabilization funds, the maintenance and administration of reserve assets, transactions with the IMF, among others.

⁹ “*Freely usable currency means that of a member that, in the opinion of the Fund, (i) is widely used, in fact, to make payments for international transactions, and (ii) is widely traded in major foreign exchange markets*” (IMF, 2015).

$$IR = GR - L6M$$

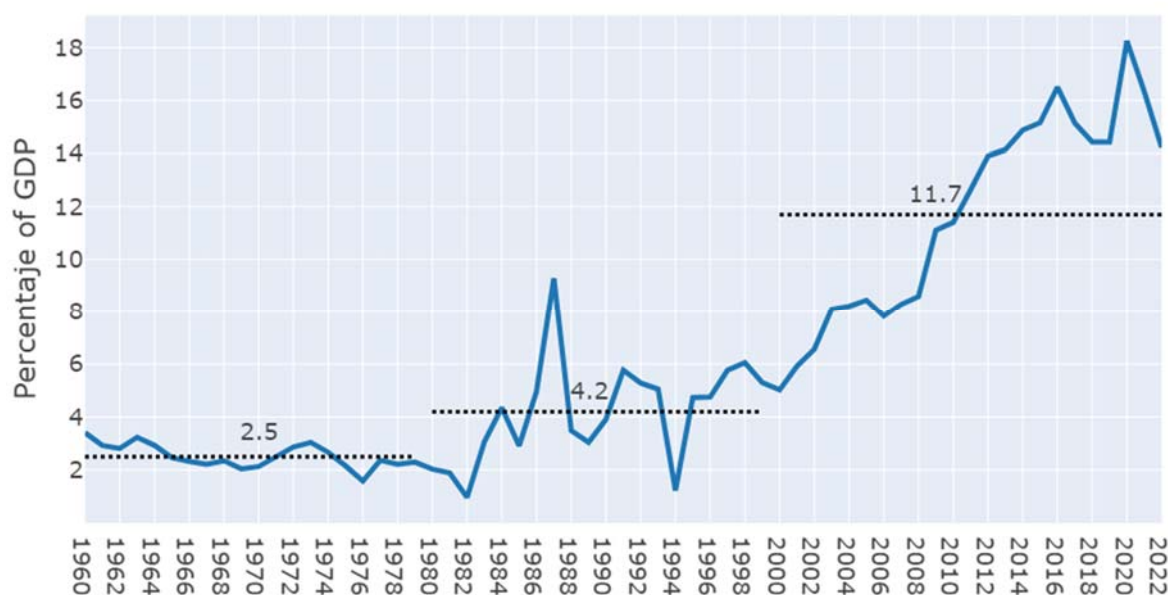
That is the the difference between the gross reserve (GR) and the liabilities to less than six months¹⁰ ($L6M$). The international assets are defined as:

$$IA = GR + CCB$$

That is the gross reserve (GR) plus all those credits in charge of other central banks receivable for more than six months (CCB). Finally, the net foreign assets it's the difference between international assets (IA) and international liabilities (IL):

$$NFA = IA - IL$$

FIGURE 2 - *International Reserves Accumulation in Mexico, 1960-2022*



Source: Own elaboration with data from WDI (World Bank, 2022).

As figure 2 shows, in line with what was indicated in the previous section, the accumulation of international reserves in Mexico had a watershed before and after the 1994 crisis. During the 1960s and 1970s, the average level of accumulation was 2.5% of GDP. Between 1980 and 1990 the

¹⁰ They are all those liabilities in foreign currency with a maturity period less than six months. Their main components are the current accounts in foreign currency of PEMEX and the Federal Government.

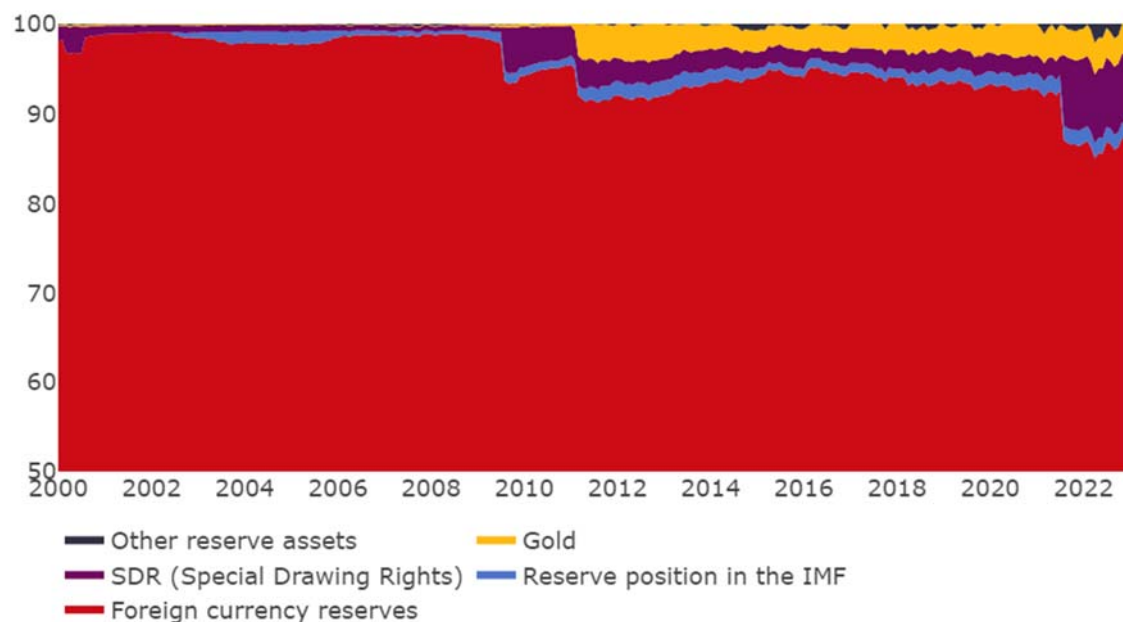
figure rose to 4.2%. However, since the beginning of the 21st century and until today, this same figure has had a sharp increase to 11.7% of GDP.

The Bank of Mexico publishes monthly data of the official reserve assets, that is, the gross reserve, in the following items: 1) Foreign currency reserves (*FCR*), 2) Reserve position in the IMF (*RPIMF*), 3) Special Drawing Rights (*SDRs*), 4) Gold and 5) Other reserve assets (*ORA*).

$$GR = FCR + RPIMF + SDRs + Gold + ORA$$

The main component is the foreign currency reserves: in 2022 they represent about 86.5% of gross reserves (see figure 3). In turn, this item is divided into two parts, one corresponding to debt securities that are issued by foreign governments, foreign entities or international financial organizations; and another to legal money and total deposits, which can be in other national central banks, in the Bank for International Settlements (BIS) and the IMF.

FIGURE 3 - *Historical Behaviour of Gross Reserve Components in Mexico, 2000-2023*



Source: Own elaboration with data from Banxico (2022).

In second place are the IMF's Special Drawing Rights¹¹, which represented in 2022 of 7.7% gross reserves. They were created in 1969 to supplement and contribute to the accumulation of official reserves of the member countries. IMF's Special Drawing Rights are potential conversion rights. They cannot be considered a currency or an IMF credit and are based on a basket of "freely usable" currencies, i.e., those currencies which are widely used to make payments for international transactions and is widely traded in the principal exchange markets (IMF, 2009).

The next component is the gold¹², which includes gold deposits and gold *swaps*¹³. In volume, gold reserves account for about 3.86 million ounces (troy). For 2022, it had a weight in gross reserves of 3.4%. There is also the so-called "reserve position in the IMF", which

"is the sum of (a) the 'reserve tranche', that is, the foreign currency (including SDRs) amounts that a member country may draw from the IMF at short notice; and (b) any indebtedness of the IMF (under a loan agreement) in the General Resources Account that is readily available to the member country, including the reporting country's lending to the IMF under the General Arrangements to Borrow (GAB) and the New Arrangements to Borrow (NAB)" (IMF, 2009, p. 114).

The share in gross reserves of this component is at 1.7% in 2022. The last component is other reserve assets, which refers mainly to financial derivatives. However, this just represents the 0.7% of gross reserves.

Figure 3 shows how until 2009 the share of the reserve in foreign currency represented almost the entire gross reserve (about 98%). However, since then this proportion has been declining slightly, due to the SDR allocation of 2009 – and even more so to that of 2021 – and to the increase in the accumulation of gold since 2011. Notice, nonetheless, that foreign currency reserves maintain the highest share, close to 86% of gross reserves in 2022 (53% corresponding to securities and 33% to legal money and total deposits).

¹¹ The value of the SDR is calculated daily based on the quotes of 5 currencies with different weights for each of them (US dollar 43.38%, euro 29.31%, Chinese renminbi 12.98%, Japanese yen 7.59% and British pound 7.44%, according to the last update made by the IMF on August 1, 2022). The weights are reviewed every 5 years. The amount of allocation that each member country receives of these rights depends on its respective participation quota in the IMF.

¹² The gold represents a good diversification option compared to the other assets that regularly make up international reserves. Historically it has had a low or negative correlation with the US dollar, so it is used as a hedge to protect themselves from the risk of other currencies such as the dollar (Reboredo, 2013). In addition to not involving the risk of default by a counterparty, it is durable, scarce, difficult to counterfeit, divisible and transportable.

¹³ A swap is an agreement between two parties to exchange cash flows in the future; in this case, a *swap* Gold-based exchange is based on the price of gold. With this financial instrument you can make up the difference between the price agreed in the contract and the market price (Hull *et al.*, 2013).

4.2 Sources of Variation

The variation in international reserves can fundamentally come from 4 sources:

$$\Delta IR_t = Pemex_t + FG_t + FXMO_t + OF_t$$

Where ΔIR_t it's the change in the level on international reserves, $Pemex_t$ refers to the central bank's currency purchase/sale operations with this public company, FG_t refers to the same type of operations but with the federal government, $FXMO_t$ means the transactions with the foreign exchange market in order to mitigate exchange volatility and OF_t which refers to the others flows related to the investment performance of the reserves.

In December 1994 the Foreign Exchange Commission¹⁴ announced that Mexico was moving from “nominal exchange rate targeting with a crawling band regime” to a “floating regime” with the authorities' interventions mainly devoted to reduce the volatility of the exchange rate. The crisis that led to this decision occurred after a series of events raised financial instability and led to a speculative attack on the currency that reduced the level of international reserves to their historical lows¹⁵.

At the time Pemex, the national oil company had a large trade surplus, which made it a key player of the national exchange policy (Acosta *et al.*, 2021, p. 173). Since it could cause undesired distortion in the exchange rate, the Organic Law of the Bank of Mexico restricted its activity. Article 34 of this law established:

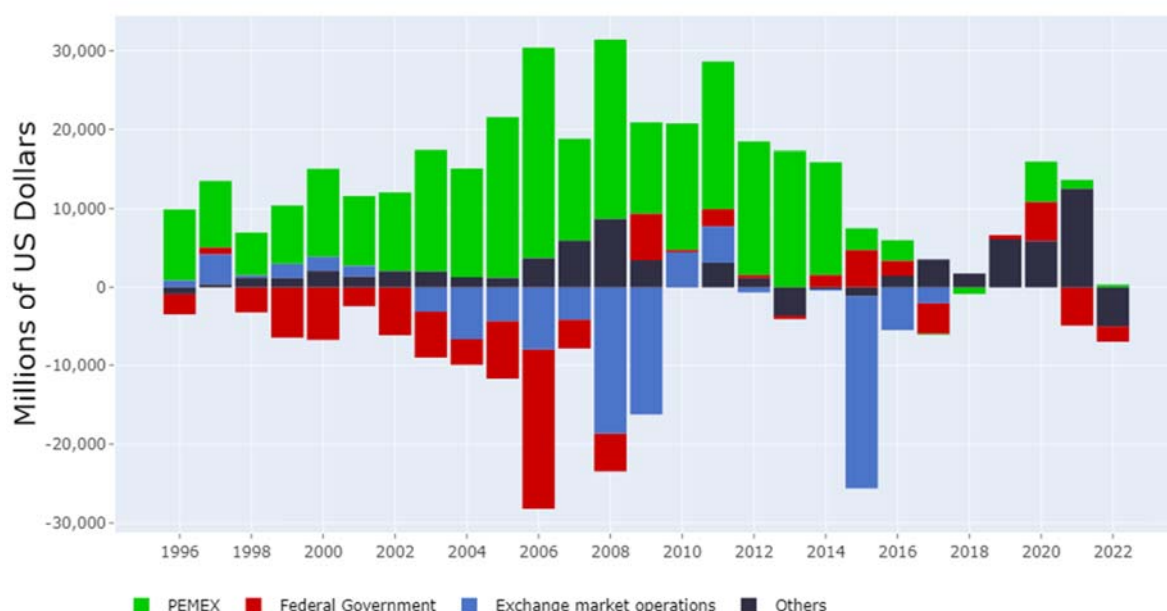
“The agencies and entities of the Federal Public Administration that are not financial intermediaries shall keep their foreign currency and carry out their transactions with these, according to the regulations, guidelines and policies set forth by Banco de México. For this purpose, they will provide the Bank with the information requested regarding their foreign currency transactions and will be obligated to sell their foreign currency to the Bank in the terms of the provisions it issues, which shall not reflect different terms as the ones established by market conditions” (Bank of Mexico Law, 1993).

¹⁴ The Foreign Exchange Commission is the body responsible for Mexico's foreign exchange policy. It is composed of the Secretary and Undersecretary of Finance and Public Credit and another sub-secretary by the Governor of the Bank of Mexico and two additional members of the Board of Governors of the same Bank.

¹⁵ The 1994 Annual Report of the Bank of Mexico reads: “*The international reserve of the Bank of Mexico, which on the day of the assassination [of Mr. Luis Donaldo Colosio] was 28,321 million in the thirty days following the crime, it fell nearly \$11 billion in the thirty days following the crime [...] The accusations of Deputy Attorney General Mario Ruiz Massieu, in raising serious concerns about the stability of the Mexican political system, caused a loss of about 3,500 million dollars*” (Banxico, 1995, pp. 47-49).

From 1995 to 2014, Pemex was a net seller of dollars to the Bank of Mexico and the main contributor to the growing variation in international reserves (see figure 4). The period from 2010 to 2014 saw the largest increase in international reserves. They moved from 92 billion dollars in January 2010 to 193 billion in December 2014. Pemex sold a large amount of dollars to the central bank on account of the sustained increase in crude oil Mexico export price (see figure 5), which occurred from 2009 (in January the average price was 38 dollars per barrel) to 2014 (in July the price was around 95 dollars per barrel).

FIGURE 4 - *Source of Variation of the Gross Reserve in Mexico*



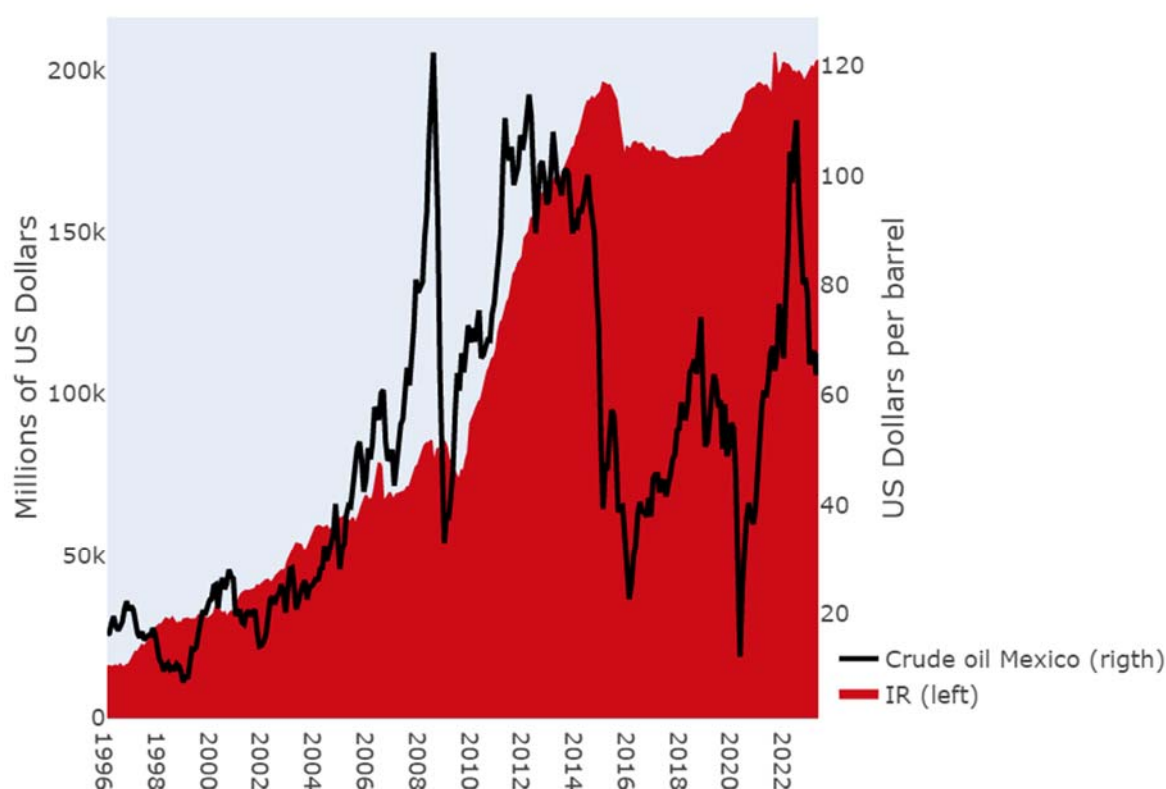
Source: Own elaboration with data from Banxico (2022).

In 2014 and 2015 the international prices of oil and of other commodities *prices* fell sharply and the rise of official reserves slowed and went on at a steadier pace than before. Thus, in recent years Pemex's participation in the variation of international reserves has practically disappeared.

Another important factor causing variations in the level of reserves is the net demand for foreign currency by the Federal Government to meet its dollar requirements for external debt service payments. This element was particularly important between 1999 and 2008 (see figure 4).

In a few circumstances, however, the government became a net seller of dollars to Bank of Mexico. This happened, for instance, when the government issued debt denominated in foreign currency and could sell part or all the collected resources to the Central Bank. Another example is when the government obtains income derived from its foreign exchange hedging programs (a forex hedge), in such a way that a profit is generated when these hedges are executed against a drop in oil prices (as occurred in 2009, 2015, 2016 and 2020; note that in figure 4 during these years the variations attributed to the federal government are positive, that is, international reserves increased in this way).

FIGURE 5 - *Behaviour of the Crude Oil Mexico Export Price and the Level of International Reserves*



Source: Own elaboration with data from Banxico (2022).

The third source of variation of official reserves comes from the exchange market interventions of the central bank aiming to reduce the volatility of the exchange rate during periods of

pressures in international markets. Through these interventions, Bank of Mexico improves the operating conditions of the Mexican foreign exchange market, increasing or reducing at its discretion the level of official reserves.

The last source of variations, called other flows, are the gains derived from the investment of the reserves. They are generated by changes in prices (either yields or exchange rates) of the different financial instruments and currencies in which the reserves are invested or by the interest paid by them.

4.3 “The Trilogy of Reserves”: Objectives of the Administration of International Reserves

A proper management of international reserves must be based on three principles, to which the literature refers as “reserve trilogy” or “the classic trilogy of objectives”. They are: 1) Security, 2) Liquidity and 3) Performance. Nugée (2000, p. 14) effectively reconcile the three principles by stating:

“The objective of official reserve management should be to maximize return, subject to the maintenance of sufficient asset security and adequate liquidity to meet the remaining reserves”.

This description is consistent with what the IMF’s proclaims in its text *Revised Guidelines for the Management of Foreign Exchange Reserves*:

“Reserve management should seek to ensure that (1) adequate foreign exchange reserves are available to meet a defined set of objectives; (2) liquidity, market, credit, legal, settlement, custody and operational risks are prudently controlled; and (3) subject to liquidity and other risk constraints, reasonable medium- and long-term risk-adjusted returns are generated on invested funds” (IMF, 2014, p. 4).

Each objective of the reserve trilogy it’s what it follows:

1) Security. International reserves ultimately represent a public good for society. Therefore, their management should try to achieve the greatest possible security for these resources. This objective is coherent with the *precautionary* motive that the literature has identified as the main reason for accumulating reserves on the part of low- and middle-income countries (Aizenman and Marion, 2003; Cruz, 2015; Mendoza, 2004).

It is about preserving, as much as possible, the accumulated capital by minimizing the probability of unexpected losses in the investment portfolio of the reserves and thus avoiding changes in them due to a fall in assets' prices in international markets (Acosta *et al.*, 2021). This criterion requires maintaining a conservative (i.e., risk-averse) investment profile. In this way, the investment strategy is sought with safe financial instruments, showing low volatility and a reduced probability of generating losses.

2) Liquidity. An emerging country like Mexico must have a high level of liquidity in foreign currency to face the occurrence of significant imbalances in the balance of payments or moments of financial stress. Therefore, an important objective (perhaps the greatest of all, particularly for this type of country) is to maintain a high degree of liquidity in the investment portfolio of international reserves. The above means that these foreign resources can be quickly and easily converted into cash and without conditions.

3) Performance/Return. Since low- and middle-income countries must accumulate large amounts of international reserves, the need to maximizing the returns of its investments cannot be ignored. Even if it may not be the main objective, it is nonetheless relevant pursuing it. The central banks should try to obtain the highest possible return in the medium and long term, considering an appropriate management of financial and operational risks.

4.4 The Currency Composition of Official Reserve Assets

A first element affecting the composition of the reserves of a country is the structure of its international trade and its relationship with the country whose local currency is “*freely usable*” currency (as defined above). Ito and McCauley (2019)¹⁶ show that the larger the share of exports denominated in dollars (that is, the level of trade between Mexico and the United States, for example), the greater will be the percentage of reserves denominated in dollars.

This approach, understood as an “international” unit of account type function, reinforces the characteristic of international store of value:

¹⁶ The authors compiled a broad set of data based on annual reports, financial statements, and other documents from central banks. As a result, they were able to examine the composition of reserves by currency type for a panel of 58 countries since 1999.

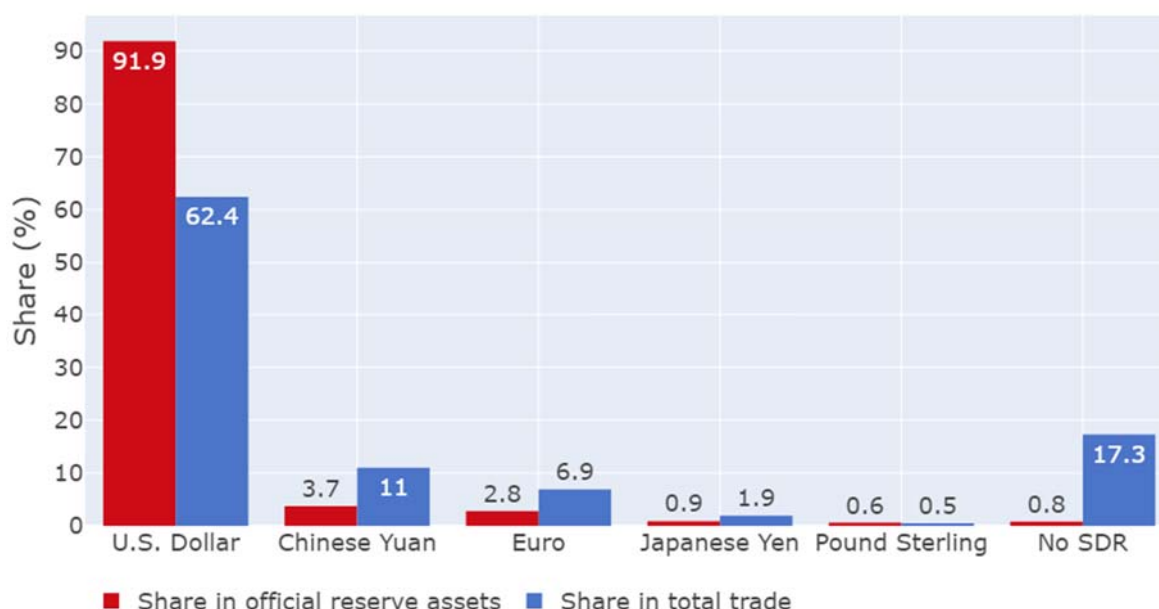
“The role of a currency as a unit of account for trade invoicing decisions is complementary to its role as a secure store of value” (Gopinath and Stein, 2018, p. 1).

This complementarity ultimately affects the currency composition of international reserves. In the words of Ito and McCauley (2019, p. 3):

“the dollar’s role as unit of account and as anchor in the FX market exert about equal effects on the share of the dollar in FX reserves and that, taken together, these two factors account for the bulk of the variance in the dollar’s share”.

In the case of the Bank of Mexico, international reserves may only be invested in any of the following eligible currencies: Norwegian Krone, Swedish Krone, Australian Dollar, Canadian Dollar, United States Dollar, New Zealand Dollar, Singapore Dollar, Euro, Swiss Franc, British Pound, China Renminbi, South Korean Won and Japanese Yen (Banxico, 2021).

Figure 6 shows the composition of the official reserve assets (the gross reserve) for the 5 currencies that make up the basket of the Special Drawing Rights and the aggregate of the currencies that do not belong to that basket. The second bar shows the participation of each respective country in Mexico’s total trade (that is, the sum of exports and imports). As Ito and McCauley (2019) suggest, the level of each currency’s share in gross reserves corresponds to the country’s level of total trade in that currency with Mexico. The US dollar is the main component of Mexico’s gross reserves, and the United States is its main commercial partner; in 2022, they accounted for 91.9% of total reserve assets and their share in total trade was 62.4%. Secondly, the Chinese yuan represents a 3.7% share of the gross reserve and China’s total trade with Mexico has a weight of 11%.

FIGURE 6 - *Currency Composition of Mexico's Official Reserve Assets, December 2022*

Source: Own elaboration with data from Banxico (2022).

5. COSTS, PROSPECTS AND CHALLENGES OF RESERVE ACCUMULATION IN MEXICO

The protection that the country receives from the accumulation of reserves can induced to think that it represents a net gain. However, the accumulation also generates some costs that may surpass the benefits and transform its net result in a loss (Rozo and Maldonado, 2017). The literature has highlighted that Mexico pays other costs to comply with the increase in the reserves imposed by financial liberalizations. They can be classified into two types: 1) financial costs related to the accounting obligations produced by the accumulation of reserves and 2) the opportunity costs spawned by the reserves.

The former, known as the cost of carrying the reserves, emerges from the following reason. From an accounting point of view, international reserves represent assets of the balance sheet of Bank of Mexico. They therefore impose, as an accounting counterpart, the registration of some liabilities in the same balance sheet, in the form of monetary base acquired by the sellers of the foreign currency and deposited at their credit institutions. This amount of monetary base is therefore registered in the balance sheet of credit institutions and the Bank of Mexico must carry out “sterilization operations” with them to keep the control of the monetary circulation

and the interest rates. These operations produce a rise in the Net Domestic Credit, i.e. in the net credit that the Central Bank receives from financial institutions and the Federal Government. The central bank must make on these loans some interest payments, whose amount depends on the rates prevailing in the country.

Thus, the accumulation of reserves simultaneously produces some costs depending on the national interest rates and some revenues depending on the interest rates paid on the foreign assets in which the central bank has invested. Since the interest rates of an emerging country like Mexico tend to be higher than those paid on the assets of the rich countries, the overall result of these operations tends to be a positive cost of carrying the reserves. The recent rate hike process because of the inflationary environment has caused the financial cost of maintaining reserves to increase (Figure 7). This makes the accumulation of reserves even more expensive.

The implementation of sterilizing operations is described by Figure 8, which shows that the rise in the Net Foreign Assets of Banco de Mexico has been compensated by the change in the Net Domestic Credit, which are loans of the financial and the Government sectors to the central bank.

The main instrument for sterilizing large amounts of liquidity are the Monetary Regulation Deposits, which consist of deposits of the credit institutions and of the Government sector with Banco de México for an indefinite term and for a fixed amount. There are two types: 1) Deposits in Pesos and 2) Deposits in Government Securities. The former are mandatory deposits that credit institutions must maintain at Banco de México, when the central bank considers it necessary. They cannot be withdrawn and pay an interest rate similar to that of monetary policy. The latter are deposits of the Federal Government at the central bank that cannot be withdrawn and do not pay interest rate. As established by the Organic Law regulating its activity, Banco de Mexico can issue government bonds, without asking permission to the Federal Government, and oblige credit institutions to buy them. The receipts of these sales are then placed in the Deposits in Government Securities.

As noted by Capraro and Panico (2021, p. 120-121), in 2006 Banco de México decided that sterilizing operations had to be only executed through Monetary Regulation Deposits in Government Securities. This decision, which caused that after 2009 the amount of these Deposits became larger than those in Pesos, was beneficial for credit institutions, which can sell

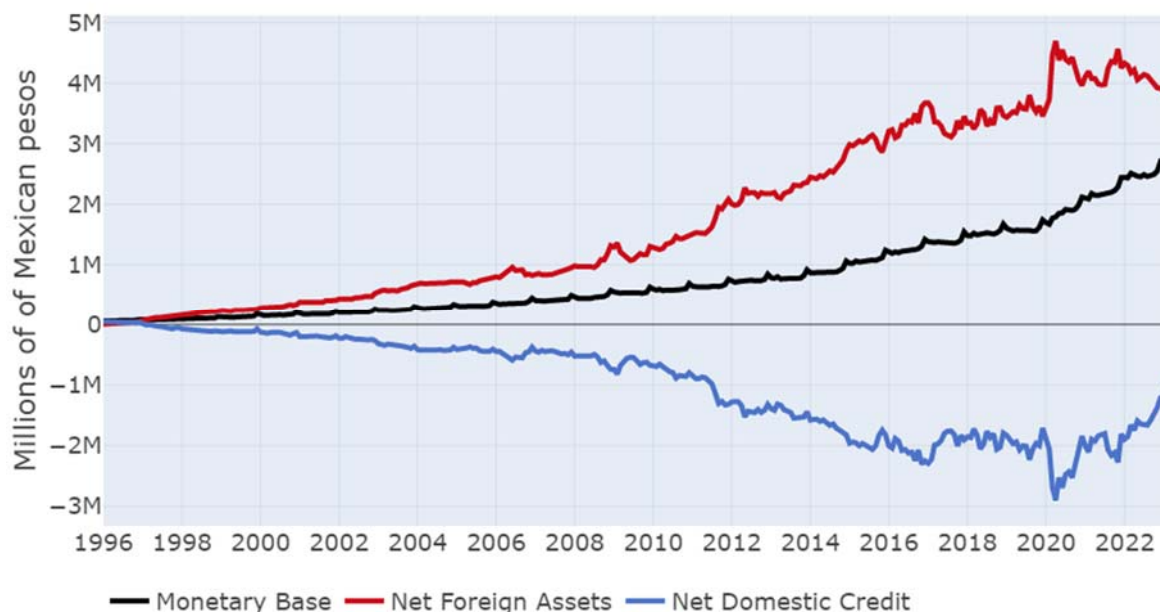
in the secondary market the government securities that they have bought for the formation of the former and use the liquidity recovered to invest in consumer credits and mortgages that earn a higher interest rate. For the Federal Government, on the contrary, this decision has represented a restriction to the fiscal space it can use, which is also limited by a legislation imposing a rigid rule on the size of its deficit. Then, the process of increasing reserve accumulation has led to a historical novelty, where the government has converted to a net creditor of the central bank.

FIGURE 7 - *The Cost of Holding Foreign Exchange Reserves*
(Mexico-US One-Year Rate Differential), 2016-2023



Source: Own elaboration with data from Banxico and FED.

The opportunity cost of holding the reserves, on the other hand, can be assessed in terms of the overall volume of the external assets accumulated. These resources could have been used to promote the economic and social development of the country. Some authors have calculated the social opportunity cost of maintaining reserves at around 1% of GDP in emerging economies (Bird and Rajan, 2003 and Rodrik, 2006).

FIGURE 8 - *Net Foreign Assets, Monetary Base and Net Domestic Credit, 1996-2023*

Source: Own elaboration with data from Banxico (2022).

Rodrik (2006, p. 262) considers high unbalanced and far from optimal the response of developing countries to financial globalization¹⁷. On the size of these resources he observes:

“This is a large number by any standard. It is a multiple of the budgetary cost of even the most aggressive anti-poverty programs implemented in developing countries”.

Referring more specifically to the Mexican case, Rozo and Maldonado (2017) calculate the total cost of accumulating reserves by adding to the financial and opportunity costs the cost of contracting the Flexible Credit Line with the IMF (considering that each year Mexico pays a premium of around 1,080 million dollars). On average between 2008 and 2014 (the fastest period of accumulation, see chart 4), the total cost of the “financial armor-plating” (which is the financial cost plus the cost of opportunity plus the cost of the Flexible Credit Line with the IMF) was equivalent to 1.83% of GDP.

¹⁷ In Rodrik’s words (2006, p. 2): “Every dollar of reserves that a country invests in these assets has an opportunity cost that equals the cost of the endexternal avoidance for that economy (or, alternatively, the social rate of return on investment in that economy)”.

6. CONCLUSIONS

The massive accumulation of international reserves of Latin American economies in recent decades ultimately responds to the explosive growth of the financial industry in the economic and political sphere. The liberalization of international financial markets is one manifestation of the fundamental role that financial activity has been recently playing in the economic system.

Contrary to what had been originally promised, financial liberalisation has produced negative consequences on the working of the international monetary architecture. It has principally damaged low- and middle-income countries, which have been forced to pay high costs in terms of risk exposure and economic and social development.

The precautionary motive has been seen as the major justification for accumulating foreign assets in these countries. The increasing number of financial crises occurred in the 1990s induced them to set up a financial shield. This prudent attitude of low- and middle-income countries could limit the number of crises in the new millennium but did not eliminate their occurrence. Financial instability has kept rising producing new crises, which have proved more damaging than in previous years since they started in rich countries. At the same time, the economies have shown a reinforced tendency to stagnate.

The management of international reserves in Mexico, understood as the set of legal, accounting, and institutional frameworks that promote an adequate operability of these resources, is aligned with global quality standards. The composition of official reserve assets is based on the IMF-recommended benchmark, which ensures comparability of these resources with other countries and adheres to an international tradition of transparent information on major reserve movements.

The management of these resources has sought to comply with the so-called “trilogy of reserves”, which is the recognised benchmark on the objectives that the operability of international reserves must follow. The trilogy is summarized by the words liquidity, security, and performance, in that order of priority.

The correct division of responsibilities within the institutional organization and the prioritization of the liquidity objective, are the elements that have contributed most to the correct management of these resources. In the case of Mexico, complying with these rules has

achieved satisfactory results in terms of financial stability. Yet, dissatisfaction in terms of development and distributive equality are widespread.

We have argued that the accumulation of international reserves does not come free to Mexico. This process has been accompanied with the imposition of costs both in terms of a purely accounting or financial terms and in terms of economic and social development that has to be renounced. Some authors complain that these costs are excessively high. More analysis is however required to make a comprehensive assessment of the costs and benefits that Mexico pays to maintain financial stability.

REFERENCES

- Acosta, J., G. García and A. San Martín (2021), *Administración de las reservas internacionales*, in: R. Cano, J. Acosta, O. Palacio (Eds), "Instrumentación de las operaciones monetarias, cambiarias y de administración de reservas del Banco de México, Capítulo 3 (pág. 148-208), Banco de México.
- Aizenman, J. and N. Marion (2003), "The High Demand for International Reserves in the Far East: What is Going On?", *Journal of the Japanese and International Economics*, 17(3), 370-400.
- Bank of Mexico (1993), Law on the Bank of Mexico, Chamber of Deputies of the H. Congreso de la Unión: Mexico.
- Banxico (1995), Informe Anual 1994, Banco de México: Ciudad de México.
- Banxico (2021), Políticas y criterios respecto de las operaciones sobre la reserva de activos internacionales, Banco de México: Ciudad de México.
- Banxico (2022), Boletín Semanal sobre el Estado de Cuenta del Banco de México al 28 de octubre de 2022, Banco de México: Ciudad de México.
- Bird, G. and R. Rajan (2003), "Too Much of a Good Thing? The Adequacy of International Reserves in the Aftermath of Crisis", *World Economy*, 26(6), 873-891.
- Bussiere, M., G. Cheng, M.D. Chinn and N. Lisack (2014), "For a Few Dollars More: Reserves and Growth in Times of Crises", NBER Working Paper No. 19791.
- Bustelo Gómez, P. (1999), Las crisis financieras asiáticas (1997-1999). Nuevos indicadores y escasos precedentes, Boletín ICE Económico No. 2626, pp. 21-25.
- Calvo, G.A. (1996), "Capital Flows and Macroeconomic Management: Tequila Lessons", *International Journal of Finance & Economics*, 1(3), 207-223.
- Calvo, G.A. and E.G. Mendoza (1996), "Mexico's Balance-of-Payments Crisis: A Chronicle of a Death Foretold", *Journal of International Economics*, 41(3-4), 235-264.
- Calvo, G.A., A. Izquierdo and R. Loo-Kung (2012), "Optimal Holdings of International Reserves: Self-Insurance against Sudden Stops", NBER Working Paper No. 18219.
- Capraro, S. and C. Panico (2020), ¿Podemos defendernos de los efectos persistentes de la crisis y fortalecer la economía?, Cuaderno de Investigación en Desarrollo, Universidad Nacional Autónoma de México.

- Capraro, S. and C. Panico (2021), “Monetary Policy in Liberalized Financial Markets: The Mexican Case”, *Review of Keynesian Economics*, 9(1), 109-138.
- Cruz, M. (2015), “The Need for Official Reserves in Latin America: Assessing the Precautionary Motive”, *Cuadernos de Economía*, 34(65), 327-347.
- Cruz, M., and P. Kriesler (2010), “International Reserves, Effective Demand and Growth”, *Review of Political Economy*, 22(4), 569-587.
- De Gregorio, J. (2011), “International Reserve Accumulation in Emerging Economies”, *Cuadernos de Economía*, 30(55), 77-89.
- Dornbusch, R., I. Goldfajn and R. Valdés (1995), “Currency Crises and Collapses”, *Brookings Papers on Economic Activity*, 26(2), 219-294.
- Dornbusch, R. and A. Werner (1994), “Mexico: Stabilization, Reform, and No Growth”, *Brookings Papers on Economic Activity*, 25(1), 253-316.
- Durdu, C.B., E. Mendoza and M. Terrones (2007), “Precautionary Demand for Foreign Assets in Sudden Stop Economies: an Assessment of the New Merchantilism”, NBER Working Paper No. 13123.
- Eichengreen, B. and P. Gupta (2016), “Managing Sudden Stops”, Policy Research Working Paper 7639, World Bank Group.
- Feldstein, M. (1999), “Self-Protection for Emerging Market Economies”, National Bureau of Economic Research Working Paper No. 6907.
- Gopinath, G. and J.C. Stein (2018), “Banking, Trade and the Making of a Dominant Currency”, NBER Working Paper Series No. 24485.
- Hull, J., S. Treepongkaruna, D. Colwell, R. Heaney and D. Pitt (2013), *Fundamentals of Futures and Options Markets*, Pearson Higher Education: Australia.
- IMF (2009), *Balance of Payments and International Investment Position Manual*. Sixth edition (BPM6), International Monetary Fund: Washington, DC.
- IMF (2014), *Revised Guidelines for Foreign Exchange Reserve Management*, International Monetary Fund: Washington, DC.
- IMF (2015), IMF Executive Board Concludes 2015 Review of SDR Valuation, Press Release No. 15/543, Retrieved from International Monetary Fund:
<<https://www.imf.org/es/News/Articles/2015/09/14/01/49/pr15543>>.
- IMF (2022), IMF Executive Board Concludes Quinquennial SDR Valuation Review and Determines New Currency Weights for SDR Valuation Basket, Press Release No. 22/153,

- Retrieved from International Monetary Fund:
<<https://www.imf.org/es/News/Articles/2022/05/14/pr22153-imf-board-concludes-sdr-valuation-review>>.
- Ito, H. and R.N. McCauley (2019), “The Currency Composition of Foreign Exchange Reserves”, BIS Working Papers No. 828.
- Jeanne, O. (2007), “International Reserves in Emerging Market Countries: Too Much of a Good Thing?”, *Brookings Papers on Economic Activity*, 38(1), 1-79.
- Laeven, M.L. and M.F. Valencia (2018), “Systemic Banking Crises Revisited”, International Monetary Fund Working Paper No. 206.
- McKinnon, R.I. (1973), *Money and Capital in Economic Development*, Brookings Institution: Washington, DC.
- McKinnon, R.I. (2002), “The Dollar Standard and its Crisis-Prone Periphery: New Rules for the Game”, Address Delivered on the Occasion of CEMLA’s Fiftieth Anniversary, Mexico City.
- Mendoza, R. (2004), “International Reserve-Holding in the Developing World: Self Insurance in a Crisis-Prone Era?”, *Emerging Markets Review*, 5(1), 61-82.
- Nugée, J. (2000), *Foreign Exchange Reserves Management*, Centre for Central Banking Studies: Bank of England.
- Obstfeld, M., J. Shambaugh and A. Taylor (2008), “Financial Stability, the Trilemma, and International Reserves”, NBER Working Paper No. 14217.
- Panico, C., A. Pinto, M.P. Anyul and M.V. Suarez (2016), *A Sraffian Approach to Financial Regulation*, in: G. Freni, H.D. Kurz, A.M. Lavezzi, R. Signorino (Eds), “Economic Theory and its History”, Part 4, 249-270.
- Reboredo, J.C. (2013), “Is Gold a Safe Haven or a Hedge for the US Dollar? Implications for Risk Management”, *Journal of Banking & Finance*, 37(8), 2665-2676.
- Rodrik, D. (2006), “The Social Cost of Foreign Exchange Reserves”, NBER Working Paper No. 11952.
- Ros, J. (2001), *Del auge de capitales a la crisis financiera y más allá: México en los noventa*, en: R. Ffrench-Davis (Ed.), “Crisis financieras en países’ exitosos”, pp. 119-157, McGraw-Hill Interamericana/CEPAL: Santiago.
- Rozo, C. and N. Maldonado (2017), “Currency Carry Trade and the Cost of International Reserves in Mexico”, *CEPAL Review*, 123 (December), 148-166.

- Singh, A. (1998), “‘Asian Capitalism’ and the Financial Crisis”, SCEPA Working Paper Series 1998-15, Schwartz Center for Economic Policy Analysis (SCEPA), The New School for Social Research.
- Shaw, E.S. (1973), *Financial Deepening in Economic Development*, Oxford University Press: New York.
- Triffin, R. (1947), *National Central Banking and the International Economy*, in: C.L. Allen, W. Allen (Eds), “Foreign Trade and Finance: Essays in International Economic Equilibrium and Adjustment”, MacMillan: New York.
- UNCTAD (2019), Informe sobre el comercio y el desarrollo 2019. Financiar un New Deal verde global, Conferencia de las Naciones Unidas sobre Comercio y Desarrollo.
- United Nations (2001), Report of the High-Level Panel on Financing for Development: Note by the Secretariat, Retrieved from: <<https://digitallibrary.un.org/record/449151>>.
- World Bank (2022), World Development Indicators Database, <<https://databank.worldbank.org/source/world-development-indicators>>.