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Factors influencing the exchange rate in Mexico: Mexican peso – US dollar ratio

Factores que influyen en el tipo de cambio en México: relación peso mexicano – dólar estadounidense

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Abstract

The main of this paper is to describe the behavior of the Mexican peso-US dollar exchange rate in the period 2003-2023. The methodological approach is based on the ordinary least squares (OLS) technique to determine the degree of influence of economic variables on the exchange rate. The results indicate that the level of exports from Mexico and the United States, the Mexican trade balance and US imports cause the exchange rate to appreciate. In contrast, Mexico's inflation, rising Mexican and US debt, and Mexican imports cause a depreciation of the Mexican peso. The evolution of the exchange rate shows an upward trend throughout the 20 years of study that has been characterized by very marked stages of volatility, so it is necessary to design monetary policies that reduce the impact from abroad and promote the strengthening of the Mexican coin.

Keywords: Exchange rate, Mexican peso, volatility, currency forecast, ordinary least squares.

Resumen

El objetivo de este artículo es describir el comportamiento del tipo de cambio peso mexicano/dólar estadounidense en el periodo 2003-2023. La aproximación metodológica es a partir de la técnica de mínimos cuadrados ordinarios (MCO) para determinar el grado de influencia de variables económicas sobre el tipo de cambio. Los resultados indican que el nivel de exportaciones de México y de Estados Unidos, la balanza comercial mexicana y las importaciones estadounidenses ocasionan que el tipo de cambio se aprecie. En contraste, la inflación de México, el aumento de la deuda mexicana y estadounidense y las importaciones mexicanas provocan una depreciación del peso mexicano. La evolución del tipo de cambio muestra una tendencia hacia el alza a través de los 20 años de estudio que se ha caracterizado por etapas de volatilidad muy marcadas, por lo que es necesario diseñar políticas monetarias que reduzcan el impacto del exterior y promuevan el fortalecimiento de la moneda mexicana.

Palabras claves: Tipo de cambio, peso mexicano, volatilidad, previsión de divisas, mínimos cuadrados ordinarios.

INTRODUCTION

International trade is carried out with different national currencies which are linked to relative prices called exchange rates. Transactions between currencies of different countries are carried out in the exchange market or also called the foreign exchange market. Exchange rate changes have economy-wide effects that are largely transmitted through international trade. As expressed by Auboin and Ruta (2013), trade volumes are usually related to changes in relative prices and changes in real activity either in the country (for imports) or abroad (for exports). Therefore, the volatility of the exchange rate has effects on trade.

The exchange rate refers to the value of a currency expressed in a foreign currency or currency. It is classified into two types of exchange: nominal and real. If analyzed from the relationship between the Mexican peso and the US dollar, the first refers to the amount of pesos that must be had to exchange it for a dollar while the second would be the relative price of national products in terms of products of the foreigner (Devereux, et al., 2017). In this sense, an appreciation occurs when the local currency strengthens, so a smaller amount of pesos is required to acquire a dollar. On the other hand, there is a depreciation when more pesos are needed to obtain one US dollar.

The exchange rate is one of the most important variables within the economic indicators that exist in a country due to its level of influence on the prices of domestic and imported products; due to its impact on interest rates and, consequently, on investment and financing; because it influences the way in which the Central Bank carries out monetary policy and; due to the expectations of economic agents about the future of the economy in terms of employment and production (Yuxin, 2020). Therefore, the objective of this research work is to analyze the evolution of the Mexican peso-US dollar exchange rate and identify the variables that have the greatest impact on said indicator.

Without a doubt, the exchange rate has significant effects on international trade, on the flow of goods between countries, and on the production of goods and services in countries (Myoung, 2017). In this direction, the importance of this research work lies in describing the behavior that the peso-dollar exchange rate has presented over time, as well as establishing the variables that influence the variations in the exchange rate. The document is divided into four sections in addition to this introduction. The first includes a review of the literature regarding works carried out on exchange rates. In the second section, the methodology is presented through ordinary least squares econometric models. In the third section, the results of the study are shown. Finally, the fourth section contains the conclusions.

Literature review on exchange rates

The analysis of the factors that influence the value of the exchange rate and establishing the causes of its variations over time has been one of the topics that has had great development in the literature, since being one of the variables that more impacts it has on an economy it has generated a large number of jobs. In this sense, specialized literature places special emphasis on the importance of the exchange rate as one of the fundamental elements of foreign trade, economic growth, foreign investment and, consequently, the economic stability of a country. Below is a brief review of different research works that address the topic.

In the study carried out by Clavellina (2018) he analyzes the determinants that influence the peso-dollar exchange rate in the period 2001-2016. They carry out a temporality contrast by assessing short- and long-term factors. They find that the differentials in the growth of price levels (inflation rate) and production (GDP) between both economies generate changes in exchange rates over time. Additionally, they indicate that trade barriers, the lack of fiscal consolidation and the levels of public debt of the Mexican economy impact the value of the currency. Likewise, an interesting aspect that they highlight is that the Mexican peso acts as a hedge in the derivatives markets, which results in an increase in transactions and greater volatility, causing a depreciation of the peso against the dollar.

For their part, Capistrán et al. (2019) analyze the behavior of the exchange rate for Mexico in the period 1990-2015. They use econometric estimates with quarterly data with a long-term structure to a structural vector error correction model through the Dornbusch tool of exchange rate overreaction. They indicate that the model reflects that Mexico is a small and open economy, with both real and financial links with the US economy. In this sense, they specify that the exchange rate shows a positive relationship with interest rates, production behavior, and the price level. In contrast, there is a negative relationship with the issuance of money.

In a more recent study, Landa (2023) studied the determinants of exchange rates for the Mexican economy with respect to the US dollar in the period 1990-2019. To do so, he applies the methodology of the portfolio balance model through the distributed autoregressive lag

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(ARDL) technique. The findings indicate that the applied model behaves in a solid manner when describing the performance of the exchange rate. In addition, the author argues that the differences presented in interest rates and GDP play in favor of the Mexican currency by generating an appreciation process. In contrast, the differentials in inflation rates and in the trade balance bring with them a depreciation of the Mexican peso.

In the work of López-Herrera (2024) he studies the volatility of the exchange rate between Mexico and the United States in the period from June 21, 2017 to June 21, 2022. To do so, he uses three stochastic volatility models estimated by Markov Chain Monte Carlo methods. Specifically, it aims to describe the variations in the exchange rate in a context in which, on the one hand, in political terms, important changes occurred in the country with the arrival of López Obrador to the presidency. And, on the other hand, Covid-19 caused a major economic crisis. Among the results, the author indicates that the models have been consistent in showing the variability of the exchange rate during the pandemic, which gradually decreased as economic activities resumed.

Factors that explain the movement of exchange rates

A series of elements that usually influence the movement of exchange rates are listed below:

1. Inflation rate. The growth between the general price level of products in Mexico and in the United States is compared. If the same product has higher prices in Mexico than in the United States, competitiveness is lost, which will cause a decrease in exports, and the relative decrease in prices of products from other countries will cause an increase in imports and, therefore, a depreciation of the Mexican peso. Meanwhile, when the increase in national prices is lower than those abroad, there is an appreciation of the local currency. In this sense, Ruiz (2005) points out that the uncertainty generated by inflation can have effects on the exchange rate and on the production levels of an economy.

2. Trade balance. A trade surplus, in which exports exceed imports, reflects the good acceptance of national products, which strengthens the local currency. In the meantime, when there is a trade deficit, it implies that imports are greater than exports, causing an outflow of money and, in turn, the depreciation of the Mexican peso. As expressed by Göçer, et al., (2013), the trade balance will be negatively affected by a depreciation in the short term, this is because the price effect is greater than the volume effect in the first term

3. Government Budget Deficit. Public finances usually influence the exchange rate since if the government tends to go into debt, it generates a depreciation of the Mexican peso. On the other hand, if the government's finances are prudent and there is no over-indebtedness, it is reflected in an appreciation of the local currency. In the work of Saheed, et al., (2015) they indicate that external debt and debt service payments are usually statistically significant in explaining the fluctuation of the exchange rate. They therefore recommend that the government ensure that all public debt is directed towards productive economic activities that can generate returns on the service and pay the debt when due.

4. Interest rates. This refers to the relative profitability that different currencies can offer, since when there are high interest rates in the short term, foreign capital usually arrives and this inflow of money allows the national currency to appreciate. In contrast, when interest rates are low, capital moves away and thus there is a depreciation of the exchange rate. In the research carried out by Hashchyshyn, et al., (2020) they establish that, in the short term, there is a positive relationship between interest rates and the value of the exchange rate, so that when an expansionary monetary policy is applied, the local currency is usually strengthened.

5. Psychological reasons. This refers to the "safe haven effect" of currencies. This is generated when a problem occurs, capital flows are protected in the dollar, the euro and the pound sterling. That is, when there are international complications, such as a war, political tensions between powers, a health crisis (Covid-19), currencies such as the Mexican one tend to weaken as capital moves towards developed economies. In the study by Ranaldo and Söderlind (2007) they document that currencies such as the Swiss franc, the euro, the Japanese yen and the pound sterling tend to appreciate when currency markets become more volatile.

6. Political Stability: when investing, logic dictates that capital seeks politically stable countries with a strong economy to take its capital to. When there have been cases of ungovernability in Mexico, whether due to acts of corruption, social conflicts, increased insecurity or poor management of the economy, it has caused a depreciation of the Mexican peso. In the study by Onour and Sergi (2020) they indicate that a balance of exchange rates cannot be achieved in conditions of political instability and economic sanctions that cause a significant outflow of capital from the country.

7. Speculation. This occurs when investors believe that a currency will appreciate or depreciate in the near future and decide to place their capital in favor of or against said currency. This means that there may be a general opinion that the dollar will appreciate. This can cause the main speculators in the market to start buying dollars with the aim of obtaining profits from their sale when it increases in value. In the research developed by Hayward (2018) he indicates evidence that exchange rates usually move in the same direction as speculative sentiment.

8. Relative value of other currencies. If a currency is very attractive to investors and speculators, has a high demand and also attractive interest rates in a stable socio-political environment, then it can be argued that its value should increase. As happened in Mexico, after the pandemic, the Central Bank decided to increase interest rates, which was attractive to investors, bringing in a large amount of capital, which caused an appreciation of the Mexican peso.

MATERIALS AND METHODS

The ordinary least squares (OLS) model is one of the most widely used techniques in econometric analysis because it allows the behavior of a set of variables to be examined over time. In the work developed by Hanke and Wichern (2006), they state that the OLS method has the capacity to reduce the sum of the squared residuals, that is, this methodology reduces the variance between the data found in a given study. For their part, Anderson et al. (2015) establish that when trying to explain the relationship between an explained variable and a set of explanatory variables, the OLS model allows for a great fit.

The model presented below seeks to explain the behavior of the Mexican peso-US dollar exchange rate through the ordinary least squares (OLS) technique, represented by the following equation:

$$\varepsilon_t = \alpha + \beta\pi MX_{i,t} + \beta\pi EU_{i,t} + \beta\chi MX_{i,t} + \beta\chi EU_{i,t} + \beta\mu MX_{i,t} + \beta\mu EU_{i,t} + \beta\alpha_{i,t} + \beta\partial_{i,t} + \beta\sigma_{i,t} + u_{i,t} \quad (1)$$

Where Ɛt is the explained variable that refers to the Mexican peso-US dollar exchange rate while the explanatory variables are $\pi MX_{i,t}$ (i,t) representing the inflation rate of Mexico; $\beta\pi EU_{i,t}$ (i,t) refers to the inflation rate of the United States; $\chi MX_{i,t}$ (i,t) is the level of exports of Mexico; $\beta\chi EU_{i,t}$ (i,t) represents the level of exports of the United States; $\mu MX_{i,t}$ (i,t) constitutes the level of imports of Mexico; $\mu EU_{i,t}$ i,t) is the level of imports of the United States; $\beta g\alpha_{i,t}$,t) is the balance in the trade balance of Mexico; $g\sigma_{i,t}$ (i,t) represents the increase in Mexico's debt; $g\sigma_{i,t}$ (i,t) measures the increase in US debt and; $u_{i,t}$ (i,t) measures the error term of the model.

Econometric analysis

Table 1 shows the econometric estimates of exchange rate variations in relation to a series of economic variables for Mexico and the United States for the period 2003-2023. The Mexican inflation rate has a positive coefficient, which implies that as price levels increase, it generates an increase in the exchange rate, that is, a depreciation of the Mexican peso. In contrast, the inflation rate in the United States has an inverse relationship with the exchange rate, so that an increase in prices causes an appreciation of the Mexican currency. In relation to the variable exports of both countries, there is a coefficient with a negative sign, so that as sales abroad increase in Mexico and the United States, the Mexican peso appreciates.

Table 1

Exchange rate growth regression on economic variables: 2003-2023

Variable	Coefficient	T- statistic	Probability
Constant	-12.2313	-1.8159	0.0967
Mexico inflation rate	0.4856	0.7679	0.4587
United States inflation rate	-1.8921	-3.5402	0.0046
Exports from Mexico	-0.3697	-1.7850	0.1018
Exports from the United States	-0.9738	-3.8060	0.0029
Imports from Mexico	1.7440	4.6093	0.0008
Imports from the United States	-0.6418	-3.4547	0.0054
Mexico's Trade Balance	-0.0159	-2.3324	0.0397
Mexico's Debt	0.4729	2.9236	0.0138
United States Debt	0.1216	3.7118	0.0034
R^2	0.8525		
Durbin-Watson	2.3483		
Test (F)	0.0018		

Source: Prepared by the authors based on Econometric Views.

The import variables of Mexico and the United States have opposite signs, since in the case of the national economy it is positive, which is interpreted as meaning that increases in purchases from abroad cause a depreciation of the Mexican peso; while imports from the northern neighbor have a negative sign, so increases in purchases made abroad, specifically those made from Mexico, bring with them an appreciation of the peso. On the other hand, the Mexican trade balance registers an inverse relationship with the exchange rate, which implies that an increase in the balance leads to a decrease in the exchange rate, that is, an appreciation of the peso. Finally, the debt of Mexico and the United States are observed with a positive relationship, which

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suggests that an increase in the debt levels of both countries generates an increase in the exchange rate and, therefore, a depreciation of the Mexican peso.

Regarding the econometric estimators, it can be noted that most of the explanatory variables have statistical significance, with the exception of the Mexican inflation rate and Mexican exports, although the latter has a reliability close to being significant. The determination coefficient (R2) estimator is very good since the model explains 85.25% of the exchange rate behavior, which is noteworthy due to the complexity of explaining the behavior of the exchange rate. Regarding the Durbin-Watson estimator, it has a value above the appropriate one, which implies that the variables do not present autocorrelation problems. Finally, the F Test handles a high level of reliability, so the model in general has a high statistical significance.

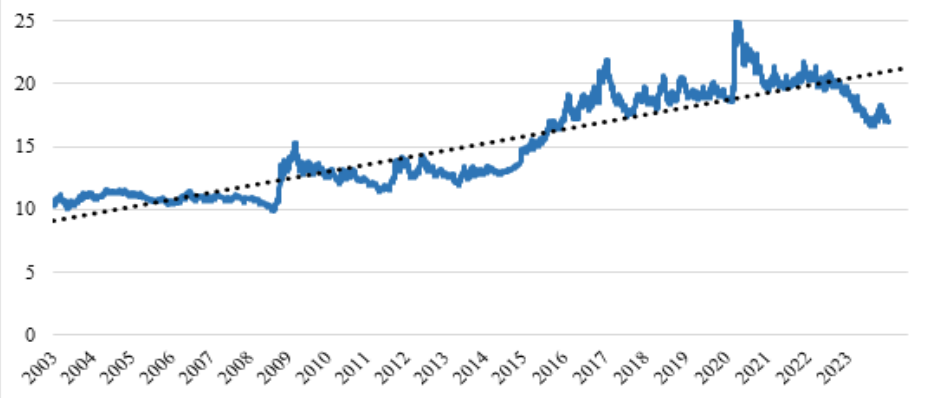
Evolution of the exchange rate

Chart 1 shows the behavior of the Mexican peso-US dollar exchange rate for the period 2003-2023. Significant variations in the exchange rate are shown over the years with an upward trend, which implies a reduction in the Mexican peso in relation to the US dollar. Typically, after an economic crisis there is a depreciation of the Mexican currency. In this sense, with the global financial crisis of 2008-2009 there was a large decrease in the peso, going from $10 to $15 per dollar, which represents a loss of 50%. This crisis, which originated in the United States and spread globally, caused a strong depreciation of the Mexican currency.

After this crisis there was an appreciation process of the Mexican currency in 2010, 2011 and 2012, reaching a level of $11.63 per dollar. However, the following years were characterized by very marked fluctuations, since in 2013 the Mexican currency depreciated to levels of $14.23 per dollar. Later, in 2014, 2015 and early 2016, the peso appreciated to the exchange rate of close to $13 per dollar. However, it was difficult for the Mexican government to maintain stability, which led to the devaluation of the currency in the following years, the escape of "The Chapo" Guzmán, the corruption case of the "White House", the "Master Scam" and other incidents such as the disappearance of 43 students in Ayotzinapa, the "gasolinazos" and the continuous snubs of Donald Trump towards Mexicans, which led to the exchange rate reaching $21 per dollar.

Figura 1

Evolution of the Mexican peso-US dollar exchange rate: 2003-2023. In Mexican pesos



Source: Prepared by the authors based on data from the Bank of Mexico: 2003-2023.

Once Andrés Manuel López Obrador assumed office as president in Mexico, with a resounding victory in 2018, the Mexican currency recovered in 2019 and early 2020, reaching $18.57 pesos against the dollar. However, with the unfortunate arrival of the pandemic crisis, a worldwide wave of speculation on emerging economies occurred, causing a significant shock to the Mexican currency, which depreciated to $25 per dollar. Since then, and particularly with the good performance of the Bank of Mexico, there has been a continuous appreciation until reaching $16.92 per dollar at the end of 2023, which has been called the "super weight" due to the great stability shown in recent years by the national currency in relation to the US dollar.

In this sense, the Mexican peso showed a significant appreciation in 2023 due to a context of low volatility shown in the financial markets with

solid macroeconomic support, a gradual reduction in inflation and an expansionary monetary policy that have contributed to being one of the most stable currencies within emerging economies (Banco de México, 2023). The above is supported by Flores (2023) when indicating that the actions of the López Obrador government in eliminating unnecessary expenses, with the implementation of greater tax compliance by companies, with increases in minimum wages without causing high inflation rates have generated positive conditions to achieve solidity of the Mexican peso.

CONCLUSIONS

This research paper has sought to describe the behavior of the Mexican peso-US dollar exchange rate and to establish the degree of influence of key variables. Without a doubt, the exchange rate is one of the most relevant variables for the Mexican economy, since its importance lies in being a reference for people when making a purchase abroad and for companies that sell products abroad or import inputs or machinery and equipment from abroad. In this way, it can be said that the exchange rate is one of the fundamental variables, since it affects the price of imported goods and influences economic prospects.

Particularly, for the Mexican economy, the importance of the exchange rate is reflected in the degree of trade openness – an indicator that measures in relative terms the level of contribution of exports and imports in relation to the Gross Domestic Product – at the time this document is written, Mexico's trade openness is 83%, which reflects the priority of foreign trade in the Mexican economy. Likewise, 80% of Mexico's foreign sales are directed to the United States, which shows the relative importance of our northern neighbor and the impact of its operations on our economy.

To conclude, the evolution of the Mexican peso/US dollar exchange rate shows an upward trend throughout the 20 years of study, which has been characterized by very marked periods of volatility. The great dependence on the United States is evident because the Mexican economy is linked since the economic cycles of both countries are synchronized, which has caused that when an economic contraction of our commercial partners occurs, there are collateral effects on Mexico's performance. For all of the above, the development of monetary policies that mitigate the impact of the exterior and promote the strengthening of the Mexican currency is essential.

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