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EFFECT OF INFLATION ON SAVINGS DEPOSITS IN VENEZUELA DURING THE PERIOD 1998Q1-2017Q2 AND A PROPOSAL OF A FINANCIAL INDEXED PRODUCT FOR THE SAVINGS INSTRUMENTS IN THE VENEZUELAN BANKING SECTOR¹

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Abstract

This research studies the effects of inflation on savings deposits in Venezuela during the first quarter of 1998 to the second quarter of 2017 (1998Q1 - 2017Q2). To carry out this analysis, an endogenous variable called "Real Savings Deposits" was constructed, which was measured in three different approaches. Similarly, the variation of the National Consumer Price Index was used as an explanatory variable. However, certain control variables were added to make the model more robust. The analysis was carried out using multiple regression models. The results suggest that inflation had a negative impact on savings deposits in the period 1998Q1-2017Q2, regardless of the measure used for said variable. As a result, a financial product is proposed that indexes the savings deposit accounts and time deposits of the Venezuelan banking sector to the evolution of the devaluation of the national currency against the US dollar. Likewise, it ensures a return due to the minimum interest rates required. According to the experts interviewed, the application of this product would protect the purchasing power of the public's savings, increase the financial margin of banking institutions, as well as the intermediation index and level of competitiveness. In turn, it would generate value for society, the economy, and the health of the banking system.

Keywords: savings deposits, inflation, indexation, financial product, banking sector, Venezuela.

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EFFECT OF INFLATION ON SAVINGS DEPOSITS IN VENEZUELA...

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Introduction

Savings are a fundamental component of a country's growth and economy, since they constitute the main source of resources for financing investment. The level of savings that prevails is determined by the consumption and investment choices of the different economic agents that comprise it. However, in inflationary periods, an accumulation of money loses purchasing power rapidly. This leads to an increase in monetary spending for consumption and a decrease in savings, as income is rapidly eroded. Even high inflation rates cause savings to be transferred abroad, i.e., they favor the flight of capital and prevent the import of capital (Haber- ler, 1958).

During the last few years, inflation in Venezuela has been characterized by its high rates and negative effects on other macroeconomic variables. In particular, the inflation rate in the country has always been in double digits or more per year between 1998Q1 and 1998Q2. and 2017Q2. Between 1998 and 2012, the inflation rate ranged between 12.28 % and 31.22 % per year, with an average of 21.98 % per year. However, after 2012, this rate increased, reaching an annual rate of 862.63 % in 2017 (maximum level in the period under study).

On the other hand, savings deposits in Venezuela increased by 137.03 % in real terms during the period 2003-2007. However, from 2007 to 2017, the index of said variable decreased by 73.16 % in real terms. This means an important problem for the country's economy, since according to Ortega (1995) it constitutes the main source of resources for financing investment, promoting economic development.

One of the most commonly used ways to store savings is in currency, but when the currency loses value and real interest rates are negative, this tool would no longer be efficient. Consequently, inflationary periods lead to the decrease, and in their later stages, to the complete destruction of savings (Pazos, 1980). Thus, according to Haberler (1958), inflation not only discourages savings, but also transfers savings abroad, i.e., it favors capital flight and prevents capital imports.

The indexation or indexation in the savings instruments of the banking sector may have positive effects on the Venezuelan economy's savings, since the deposits will be adjusted according to the evolution of the devaluation of the national currency against the U.S. dollar. This will allow the money to maintain its value over time, due to the structure implemented in the de-dexation method.

Samuelson and Nordhaus (2010) refer to indexation or indexation as the mechanism by which wages, prices and contracts are partially or fully adjusted to compensate for changes in the general price level.

The difference between a non-indexed economy and one that is indexed is that nominal quantities are adjusted to inflationary pressures by the free play of the market. Consequently, it can be considered as a mechanism aimed at supplementing the role of money as a means of account in the face of the loss of correspondence between nominal and real magnitudes introduced by inflation (Jiménez, 1993).

By stipulating indexation clauses, the need to predict the future inflation rate would be eliminated. Therefore, indexation could be advantageously introduced in the financial market in order to preserve the real value of securities and placements. The real value of savings is thus protected through the acquisition of financial assets instead of physical assets. The creation of indexed financial assets allows savings to be channeled through natural channels and does not aggravate price distortion (Patinkin, 1977).

Indexation in savings responds mainly to the concern for protecting savers from the loss of purchasing power suffered by their savings in the face of inflation (Prieto, 1982).

Thus, the general objective is to analyze the effect of inflation on savings deposits in Venezuela during the period from 1998Q1 to 2017Q2 in order to propose a financial product based on an indexation in the savings instruments of the Venezuelan banking sector.

Research methodology Variables

To study the behavior or effect of inflation on savings deposits in the Venezuelan banking sector during the period 1997Q1-2017Q2, the following variables were used:

• *Real savings deposits* (DDAR). Real savings deposits were taken as the sum of savings deposits and real savings deposits. Specifically, savings accounts and time deposits in banks (Banco Central de Venezuela, n.d.c). Real savings deposits take nominal savings deposits and correct them for price increases. Savings deposits and time deposits were obtained from Central Bank of Venezuela statistics and are expressed in constant 2007 bolivars.

 $Depósitos \ de \ ahorro \ real \ (t) \ = \ \frac{Depósitos \ de \ ahorro \ nominal \ (t) \ x \ INPC \ base \ (2007)}{INPC(t)}$

where, t is the calculated period.

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- *Ratio of real savings deposits to real GDP* (RDDARPIBR). It was obtained by dividing real savings deposits by real GDP. This serves to identify how much savings deposits represent in relation to GDP. It is expressed in decimals.
- *Ratio of real savings deposits to real asset accounts* (RDDARCAR). It was obtained by dividing real savings deposits by real active accounts. This serves to measure financial intermediation. It is expressed in decimals.
- National Consumer Price Index (NCPI). The CPI is a statistical indicator that measures the evolution of prices of a basket of national goods and services representative of household consumption during a given period (Banco Central de Venezuela, n.d.c). The reference or base year is December 2007. The CPI was obtained from the statistics of the Central Bank of Venezuela.
- *Real gross domestic product* (RGDP). The quantity of goods and services produced in a country during a year. Real GDP takes nominal GDP and corrects it for price increases (Samuelson and Nordhaus, 2010). GDP was obtained from

The figures are based on Central Bank of Venezuela statistics and are expressed in constant 2007 bolivars.

$$PIB \ real(t) = \frac{PIB \ nominal(t) \ x \ INPC \ base(2007)}{INPC(t)}$$

where, ^t is the calculated period.

- Nominal deposit rate (TIPN). This is the interest rate paid by banks to their depositors (Banco Central de Venezuela, n.d.c). The nominal deposit rate was obtained from the statistics of the Banco Central de Venezuela and is expressed in decimals.
- *Real deposit rate* (TIPR). The real deposit rate takes the nominal deposit rate and corrects it for price increases. The real deposit rate was properly calculated and is expressed in decimals.

$$1 + tasa interés real (t) = \frac{1 + tasa interés nominal (t)}{1 + inflación (t)}$$

where, t is the calculated period.

It is important to note that this variable will be taken for the study as 1 + real passive interest rate, as shown in the previous equation.

 Real asset accounts (CAR). They represent banks' liquid assets, credit portfolio and investments. The real asset accounts take nominal asset accounts and are corrected for price increases. This variable measures the size of the Venezuelan banking sector. The asset accounts were obtained from the Central Bank of Venezuela statistics and are expressed in constant 2007 bolivars.

$$Cuentas activas real (t) = \frac{Cuentas activas (t) \times INBP base (2007)}{INPC (t)}$$

where, t is the calculated period.

Methodology to obtain the results

In order to observe the effect of inflation on savings deposits, an econometric model using the ordinary least squares (OLS) method was developed, with savings deposits as the endogenous variable and inflation as the exogenous or explanatory variable. At the same time, certain control variables were added to obtain a more robust model. These control variables are: real gross domestic product, asset accounts in real terms and the deposit rate in nominal and real terms. It is important to note that the endogenous variable will be measured in three different ways: savings deposits, real savings deposits/real GDP ratio and real savings deposits/real asset accounts ratio.

Once the behavior of the variables was observed, it was found that they behaved exponentially except for the nominal passive interest rate (TIPN) and both ratios (RDDARPIBR, RDDARCAR); therefore, it was decided to apply a Cox Box to smooth the series. The variables were as shown in Table 1.

Variable	Name on the model
LN(PIBR)	LNPIBR
LN(DDAR)	LNDDAR
LN(INPC)	LNINPC
LN(CAR)	LNCAR
LN(TIPR)	LNTIPR

Tabla 1. Resumen de variables aplicando Box Cox.

Source: Own elaboration

When observing the LNPIBR variable, it can be noted that the series shows seasonality. According to Gujarati and Porter (2010), seasonality is defined as movement above or below the trend of a series, which occurs in periods of less than one year and on a regular basis. Therefore, the series was corrected with the additive adjustment method. We define this adjusted series as LNPI- BRSA.

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In turn, a binary or dummy variable was added in the third quarter of 2016 to capture the effect in that period. This is due to the fact that the data for the third quarter of 2016 presents an unusual peak in inflation, since the Central Bank of Venezuela made an adjustment to the money supply that allowed slowing the pace of currency expansion (Dinero, 2016).

Therefore, the model was as follows:

Depósitos de ahorros reales_t = α + β LNINPC_t + γ X_t + μ _t

Where the dependent variable (Real Savings Deposits) was measured in three different ways:

- 1. LNDDAR = logarithm of real savings deposits.
- 2. RDDARPIBR = ratio of real savings deposits to real GDP.
- 3. RDDARCAR = ratio of real savings deposits to real asset accounts.

In turn, X is a vector of control variables, which are: LNPIBRSA, LNCAR, TIPN and LNTIPR.

It is important to note that the different statistical tests were performed to corroborate the validity of the model and to obtain non-spurious results.

Once the stationarity of the series had been evaluated, the relevant models were estimated. A total of three models were developed for each dependent variable.

To find the implications or effect of inflation on real savings deposits, the following regression was estimated:

Depósitos de ahorros reales_t = α + DDLNINPC_t + γX_t + μ_t

Where Real Savings Deposits represents the three different measures explained above; DDLNINPC is the second difference of the logarithm of the national consumer price index; and X is a vector of control variables, including: DLNCAR, DLNPIBRSA, DTIPN, DLNTIPR and a Dummy variable. The first variable is included because Boyd, Levine and Smith, (2001) use it to measure the importance of savings deposits reflected in total assets. Gross domestic product and real and nominal interest rates are included because they are variables that usually explain the behavior of savings deposits.

The signs of the coefficients of the real asset accounts, real gross domestic product and nominal and real interest rates are expected to be positive, while the national consumer price index is expected to have a negative sign. The results obtained from the above-mentioned regression can be seen in the following table.

	Real savings deposits (DLNDDAR)		
Variables	1	2	3
DDLNINPC	-0,644656 (0,0566)*	-0,748083 (0,0460)**	-0,678102 (-0,0625)*
DLNCAR		0,644699 (0,0071)***	0,633114 (0,0081)***
DLNPIBRSA		0,295452 (0,0725)*	0,285995 (0,0575)*
DTIPN		0,287255 (0,6627)	
DUMMY		-0,303008 (0,0014)***	-0,274988 (0,0023)***
DLNTIPR			0,072335 (0,0338)**
R ²	0,088282	0,568944	0,578977
# Obs	76	76	76

Table 2. Effects of inflation on real savings deposits (DLNDDAR). 1998T1-2017T2.

Source: Own elaboration

Note. All regressions include intercepts. The p-values in parentheses are based on HAC Newey West standard errors. Signs *, ** and *** correspond to the significance level of 10 %, 5 % and 1 %, respectively. The Eviews file with the results is available upon request.

As can be seen in the table above, the DDL-NINPC coefficients are negative and significant at the usual levels. It should be noted that the control variables have the expected signs. In turn, they are significant except for DTIPN. This is due to the fact that nominal interest rates were regulated for most of the time during the period studied. Thus, evidence has been found that inflation has negative effects on real savings deposits, even controlling for the influence of other relevant variables.

Additionally, the regression was estimated using another measure for savings deposits, in this case, the ratio of savings deposits to GDP in real terms (DRDDARPIBR).

Table 3.
Effects of inflation on Real Savings Deposits / real gross domestic product
(DRDDARPIBR) 1998T1-2017T2.

	Deposits of real savings (DRDDARPIBR)		
Variables	1	2	3
DDLNINPC	-0,305683 (0,0335)**	-0,369148 (0,0015)***	-0,341874 (0,0045)***
DLNCAR		0,211548 (0,0039)***	0,205982 (0,0054)***
DLNPIBRSA		-0,264743 (0,0601)*	-0,276380 (0,0512)**
DTIPN		0,410226 (0,3552)	
DUMMY		-0,123118 (0,0001)***	-0,112438 (0,0005)***
DLNTIPR			0,028226 (0,3723)
R ²	0,079578	0,258812	0,259016
# Obs	76	76	76

Source: Own elaboration.

Note. All regressions include intercepts. The p-values in parentheses are based on HAC Newey West standard errors. Signs *, ** and *** correspond to the significance level of 10 %, 5 % and 1 %, respectively. The Eviews file with the results is available upon request.

Measuring real savings deposits as a ratio to real gross domestic product, we obtain that the coefficients of DDLNINPC are negative and significant at the usual levels. It is worth noting that the control variables have the expected signs. In turn, they are significant with the exception of DTIPN and DLNTIPR. Thus, we find evidence that inflation has negative effects on the size of real savings deposits relative to real gross domestic product, even controlling for the influence of other relevant variables.

It is important to note that the coefficient of the DLNPIBR variable has a negative sign, since, by construction of the dependent variable, an increase or decrease in GDP will generate an opposite effect on the ratio.

A third regression was also estimated using another measure for savings deposits, in this case the ratio of savings deposits to asset accounts in real terms (DRDDARCAR).

Table 4. Inflation effects on real savings deposits / real assets accounts (DRDDARCAR) 1998T1-2017T2.

	Deposits of real savings (DRDDARCAR)		
Variables	1	2	3
DDLNINPC	-0,084651 (0,3978)	–0,299529 (0,0656)*	-0,281970 (0,0748)*
DLNCAR		-0,185101 (0,0695)*	-0,187936 (0,0661)*
DLNPIBRSA		0,098136 (0,1504)	0,096303 (0,1502)
DTIPN		0,051811 (0,8106)	
DUMMY		-0,085439 (0,0314)**	-0,078392 (0,0384)**
DLNTIPR			0,018148 (0,1904)
<i>R</i> ²	0,018241	0,276696	0,284549
# Obs	76	76	76

Source: Own elaboration

Note. All regressions include intercepts. The p-values in parentheses are based on HAC Newey West standard errors. Signs *, ** and *** correspond to the significance level of 10 %, 5 % and 1 %, respectively. The Eviews file with the results is available upon request.

Measuring real savings deposits as a ratio with respect to real asset accounts, we obtain that the coefficients of DDL-NINPC are negative and significant at 10 % levels, except for specification one. It should be noted that the control variables have the expected signs. Thus, we find evidence that inflation has negative effects on the size of real savings deposits relative to real asset accounts when controlled for the influence of other relevant variables.

It is important to note that the coefficient of the DLNCAR variable has a negative sign, since, by construction of the dependent variable, an increase or decrease in active accounts will generate an opposite effect on the ratio.

After running the models, the linear regression assumptions tests were applied in order to validate the results. These tests were: correct specification, homoscedasticity, autocorrelation, multicollinearity and normality.

Discussion of results

In the previous sections, we found evidence in favor of the hypothesis that inflation has had negative effects on savings deposits in Venezuela during the period 1998Q1-2017Q2.

It is important to note that the independent variable (savings deposits) was studied with different approaches, that is, not only was the behavior or effect of inflation on savings deposits (DLNDDAR) examined, but also the behavior was scrutinized using ratios (DRDDARPIBR, DRDDDARCAR) to validate the hypothesis with different approaches and make the results more robust. Regardless of the measure used, the inflation coefficient was negative and significant in all regressions, with the exception of the simple regression with the ratio of savings deposits to asset accounts. In this sense, the evidence suggests that inflation has had a negative impact on savings deposits in Venezuela.

On the other hand, the magnitude of the coefficients of the DDL-NINPC variable in the regressions whose endogenous variable is DLNDDAR ranges between -0.67 and -0.74, i.e., inflation has a significant impact on savings deposits. In particular, a one percentage point increase in the variation of inflation (DDLNINPC), generates a dis- minution between 0.67 and 0.74 percentage points in savings deposits, on average. This means that if, for example, in the third quarter of 2015 the second difference of the CPI, whose value at that time was 9.6254 percentage points, decreases to its average value throughout the sample (0.003007), then savings deposits would have increased 6.975 percentage points.

In turn, with a one percentage point increase in the second difference of the logarithm of the national consumer price index (DDLNINPC), the size of savings deposits relative to the economy will decrease between 0.34 and 0.36 percentage points, on average. While with a one percentage point increase in the second difference of the logarithm of the national consumer price index (DDLNINPC), the size of savings deposits relative to the banking sector will decrease by 0.28 to 0.29 percentage points, on average.

In addition, it can be seen that all the coefficients of DD-LNINPC increase in the different regressions when the control variables are added. However, it is clear that this coefficient decreases (in absolute value) in all regressions when changing the control variable DTIPN to DLNTIPR. This is mainly due to the fact that part of the effect of inflation on savings deposits is taken by the coefficient related to real interest rates. In turn, it can be seen that by running the regressions with the DLNTIPR variable, the goodness of fit increases.

Proposal

According to the statistics of the Central Bank of Venezuela (s.f.a), it can be observed how the percentage of the size of savings and time deposit accounts has decreased in relation to total public deposits throughout the period studied. In September 1999, the sum of both accounts represented 56.47% of public deposits, while from January 2018 to July 2020, this ratio did not exceed 10.00% (Banco Central de Venezuela, n.d.a).

In turn, by observing the results of the econometric model and confirming the hypothesis that inflation had a negative impact on savings deposits in Venezuela from 1998Q1 to 2017Q2, a financial product is proposed that will allow

Descripción de la iniciativa

Unidad de Valor para Ahorrar (UVA) is a financial product that allows maintaining the purchasing value of savings in Sovereign Bolivars, since it is adjusted or indexed by the evolution of the devaluation of the dollar through the Investment Index (IDI). This product will be implemented only in savings and time deposit accounts of the domestic banking sector.

$$IDI = \frac{Tipo \ cambio \ actual}{Tipo \ cambio \ base} \ x \ 100$$

In turn, the minimum interest rate for savings deposit accounts will be 0.25% per annum and 1% per annum for time deposit accounts. However, each bank may set its own passive interest rate in order to be more competitive and efficient with other institutions, while complying with the established minimums.

According to Official Gazette No. 41,742, dated October 21, 2019, the universal bank has an active product (credits.

indexed to the Investment Index (IDI). The maximum interest rate that banks can charge customers when granting commercial credit is 6.00% per annum (Finanzas Digital, 2019). Therefore, financial institutions will continue to have a positive bre- cha when applying the Savings Value Unit (UVA) in the aforementioned accounts.

For such purposes, the amounts placed in such accounts must be expressed in UVA terms, resulting from dividing the amount in sovereign bolivars placed by the Investment Index (IDI) in effect for such date, which is determined by the Venezuelan Central Bank taking into account the variation of the market reference exchange rate and published daily on its web page. It is important to note that the amount of interest is credited in UVA.

$$UVA = \frac{Monto \ colocado \ en \ Bs.S}{IDI \ vigente}$$

In the event that the IDI of the grant date is less than the time of withdrawal or maturity of the deposit, the IDI of the initial date is used to determine the amount.

Since there is a legal reserve requirement of 93% of all deposits, deposits, bonds or deposit operations, the universal bank can only dispose of the remaining 7% to place it in productive assets.

In view of this, in order for the product to be profitable for financial institutions, the Venezuelan Central Bank will remunerate the devaluation of the legal reserve of all amounts collected in savings deposits and time deposits that are not placed in productive assets, i.e., it will only compensate the increase due to devaluation of savings deposits and time deposits that were not placed, thus assuming the partial cost of devaluation of the public's savings.

To achieve this, the Venezuelan Central Bank must convert all embedded sovereign bolivars not placed in productive assets and captured in savings deposit accounts and time deposits into Savings Value Units (UVA) on a daily basis. At the end of each month, the bank will pay such remuneration to the financial institutions.

It is important to note that everything placed in the productive assets coming from the deposits collected in savings and time deposits that are encashed, will be released from the legal reserve. In other words, if the financial institution places more than 7% in the productive assets of the deposits collected in the aforementioned accounts, the Central Bank of Venezuela will release the reserve requirement proportionally. For example, if a bank is able to place 10% of the deposits collected in savings and time accounts in productive assets, the Venezuelan Central Bank will release only 3% of the reserve requirement for such accounts, since the remaining 7% is free.

Therefore, as financial institutions increase their loan portfolio, the Central Bank of Venezuela's expenditure will decrease, due to the lower remuneration of the reserve requirement.

Finally, it should be emphasized that the current characteristics of savings and time deposit accounts will remain the same except for the proposals mentioned above (minimum interest rate and convertibility of sovereign bolivars into UVA).

Conclusions

This exhaustive research work found strong evidence that inflation had a negative impact on savings deposits in the Venezuelan banking sector during the period 1998Q1-2017Q2, which seems to confirm the planned hypothesis.

In this paper, three measures were constructed to estimate savings deposits in real terms.

In the first, savings deposits were measured in real terms; in the second, a ratio was created between real savings deposits and real gross domestic product. And finally, in the third, another ratio was created that encompasses real savings deposits over real asset accounts of the Venezuelan banking sector.

The results allow us to conclude that for all measures there is a negative and significant relationship between real savings deposits and inflation, with the exception of the simple regression with the ratio of real savings deposits to asset accounts. Similarly, the magnitude of the coefficients of the inflation variable has a significant impact on savings deposits. This means that a one percentage point increase in the change in inflation has a significant impact on Venezuelan savings deposits.

That said, a financial product indexed to the evolution of the devaluation of the national currency against the U.S. dollar was proposed for savings and time deposit accounts in the Venezuelan banking sector.

After designing the UVA financial product and conducting expert surveys, it can be concluded that the product would not only protect the purchasing power of the public's savings, which would incentivize this variable, but would also increase the financial margin of banking institutions. Also, by not placing a maximum ceiling on the percentage of interest liabilities, the level of competitiveness of Venezuelan banks would increase enormously, since the institutions would be able to raise their rates in order to attract more deposits. Likewise, the intermediation rate and the health of the banking system would increase with the application of such a product, since the amounts of indexed accounts would grow.

While it is true that the product must be accompanied by certain premises or changes in the regulation of banking, such as for example, freeing the legal reserve of everything placed in the productive assets coming from the two indexed accounts, or that the Central Bank of Venezuela remunerate the devaluation of everything placed in the reserve (up to 93%) that is not placed in the productive assets coming from the savings and time deposit accounts, the interviewees state that it should be the Central Bank of Venezuela that should assume the costs generated by inflation and not the savers.

In turn, the UVA financial product may help to reduce pressure on both the exchange rate and inflation. This is due to the fact that, by having savings and time deposits indexed, the need to exchange them into a strong and stable currency would decrease.

In conclusion, evidence was found that inflation had a negative impact on Venezuelan savings deposits, which is why a financial product was designed to index the Venezuelan banking sector's savings instruments in order to encourage savings and time deposits. However, it is important to emphasize that this financial product alone is not the only answer to the existing problem, but should be accompanied by a series of reforms and policies in the financial system and the economy in order to have the desired effect.

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Recommendations

Although it is true that a series of control variables were included in the regressions estimated to determine the effect of inflation on savings deposits in Venezuela, one aspect to take into account for future research is to broaden the vector of variables, since it is possible that inflation is related to some other important determinant of savings deposits.

Similarly, it is recommended that a study be conducted in which not only the actual savings deposits are taken as a savings variable, but also the national savings or total savings. In this way, this problem could be analyzed from another perspective.

On the other hand, it would be interesting to study the effect on the balance sheets and income statements of the Central Bank of Venezuela when applying the UVA financial product in the banking sector. Likewise, it would be worthwhile to examine the macroeconomic impact that could be generated.

Finally, the possibility of a reduction in the legal reserve requirement on all deposits and other encapsulated obligations could be considered, instead of the Central Bank of Venezuela remunerating the devaluation of the legal reserve requirement on all savings and time deposits that are not placed in productive assets. In this way, the banks would have greater capacity to grant loans and the Venezuelan Central Bank would not be directly assuming the cost.

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