ecoanalítica

Economic Outlook

Report

17 – September 2022

ecoanalitica.com

Content

Googling the economy ***Internet searches as a market metric***

Every week billions of Google search data are published[1] . For economies such as Venezuela's, this alternative source of data[2] can be very useful to try to fill the information gap of official institutions, especially when we want to study high frequency activity figures[3] . To this end, at **Ecoanalítica** we designed a method of compiling and transforming Google search figures for Venezuela, to later contrast the results with other macroeconomic variables and identify part of the underlying dynamics in such realizations.

In this report we will examine the potential of these searches to estimate and project inflation in Venezuela, relying on multiple econometric methods to identify the effectiveness of this new way of collecting and analyzing data to help explain domestic economic dynamics.

Reviewing the search history

In recent years, non-traditional methods have demonstrated their power to provide useful operational information for estimating aspects such as economic growth, inflation and unemployment. Researchers such as Götz and Knetsch (2019)[4], Koop and Onorante (2019)[5] and Askitas and Zimmermann (2009)[6] have explored the potential of using the Google Search Volume Index (BVI)[7] to reduce the information gap and improve estimates in LDCs[8] . An IMF study[9] also found that, in forecasting various economic variables, the root-mean-square error (RMSE[10]) of the best model was

[1] Hubspot (2021). *25 Google Search Statistics to Bookmark ASAP.*
[2] Google searches are identified by items typed into different Google products, which include web searches, youtube, froogle, images and news. Searches are further classified according to the country in which the search was performed and are also grouped into different categories.
[3] Similar methodologies for estimating real activity are outlined in the Economic Outlook Report N˚11 (2022) *Mirage or Oasis? Recontextualizing the Economic Recovery* and in the Real Environment section of the Q2 Outlook Report (2022) *Growing in a Fragile Environment.*
[4] Götz, T. B. & Knetsch, T. A. (2019). *Google data in bridge equation models for german GDP.* International Journal of Forecasting,
[5] Koop, G. & Onorante, L. (2019). *Macroeconomic nowcasting using google probabilities.* Emerald Publishing Limited.
[6] Askitas, N. & Zimmermann, K. F. (2009). *Google econometrics and unemployment forecasting.*
[7] The Search Volume index refers to the total number of searches performed on Google, relative to the total number of searches performed on the web.
[8] Least developed countries.
[9] Narita, M. F. & Yin, R. (2018). *In search of information: use of google trends' data to narrow information gaps for low-income developing countries.* International Monetary Fund.
[10] Root-mean-square error. This measure refers to the amount of error between two data sets, where the predicted (estimated) value and the observed value are compared.

significantly reduced after including the BVI among the predictors. This suggests that the BVI could be particularly useful for improving estimates of some macroeconomic variables.

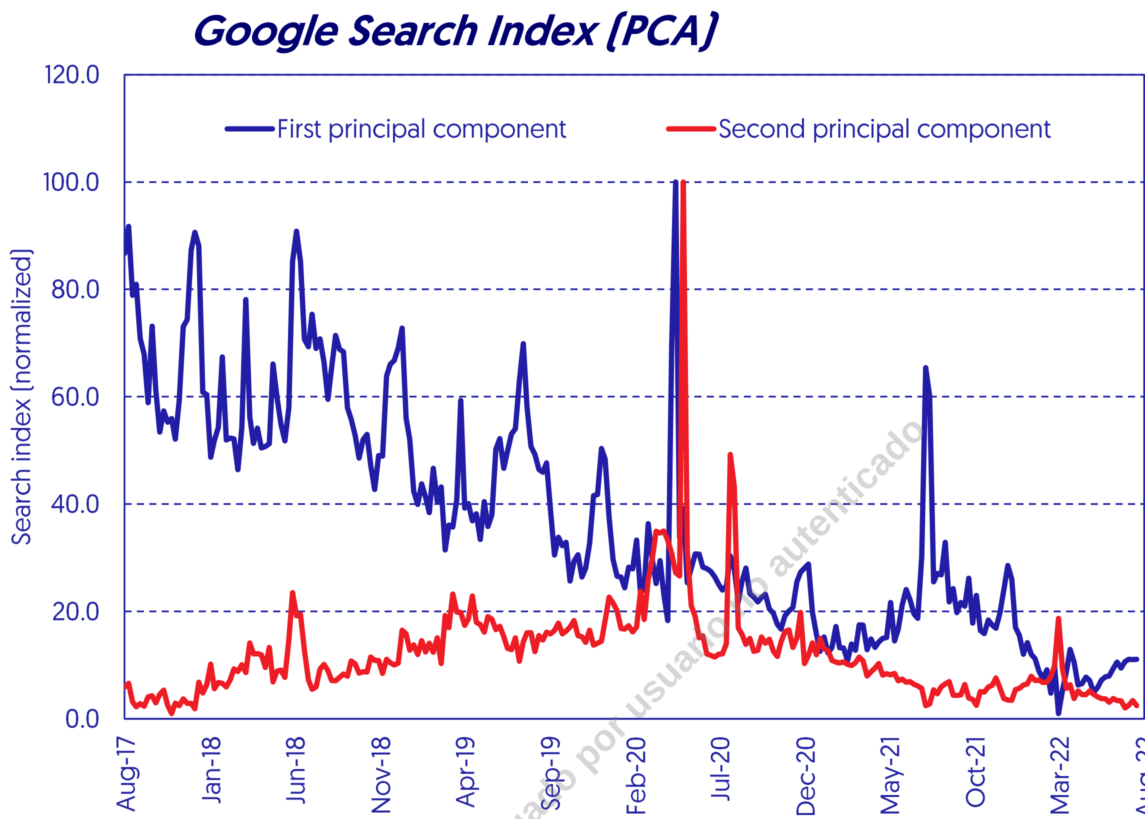
Searching for aggregate demand

Unlike the aforementioned studies, our analysis dispensed with aggregate BVIs; instead, methodologies were designed to aggregate different relevant search terms on the Venezuelan economy that focus on essentially reflecting aggregate demand conditions or factors.

Particularly, to represent the aggregate consumption of Venezuelans, different items (terms) were identified that correspond to the demand for products or services offered domestically. The classification of the items followed the categories of the basket implicit in the inflation measurement made by the Central Bank of Venezuela[11]. A total of 400 search terms were listed. To summarize the information of the terms in fewer dimensions, the Principal Component Analysis methodology was used (Bro and Smilde, 2014[12]), as well as a simple sum of the values. The statistical procedure was performed per category, as well as for the whole set of searches.

For the case of all Google searches, principal component analysis resulted in 233 factors generated from 281 search items, explaining 100% of their variance; however, only 3 of them turned out to be relevant, jointly accounting for 79% of all variation (we focused on these three factors to model the inflationary trend).

[11] "Food and non-alcoholic beverages", "alcoholic beverages and tobacco", "clothing and footwear", "housing rental", "home services except telephone", "home equipment", "health", "transport", "communications", "leisure and culture", "education services", "restaurants and hotels" and "Other goods and services".
[12] Bro, R. & Smilde, A. K. (2014). *Principal component analysis*. Analytical methods.



Note: The indexes were normalized based on Principal Component Analysis (PCA) on the totality of search terms, where the highest value is equal to 100 and the lowest value is equal to one.
Sources: Google and Ecoanalitica.

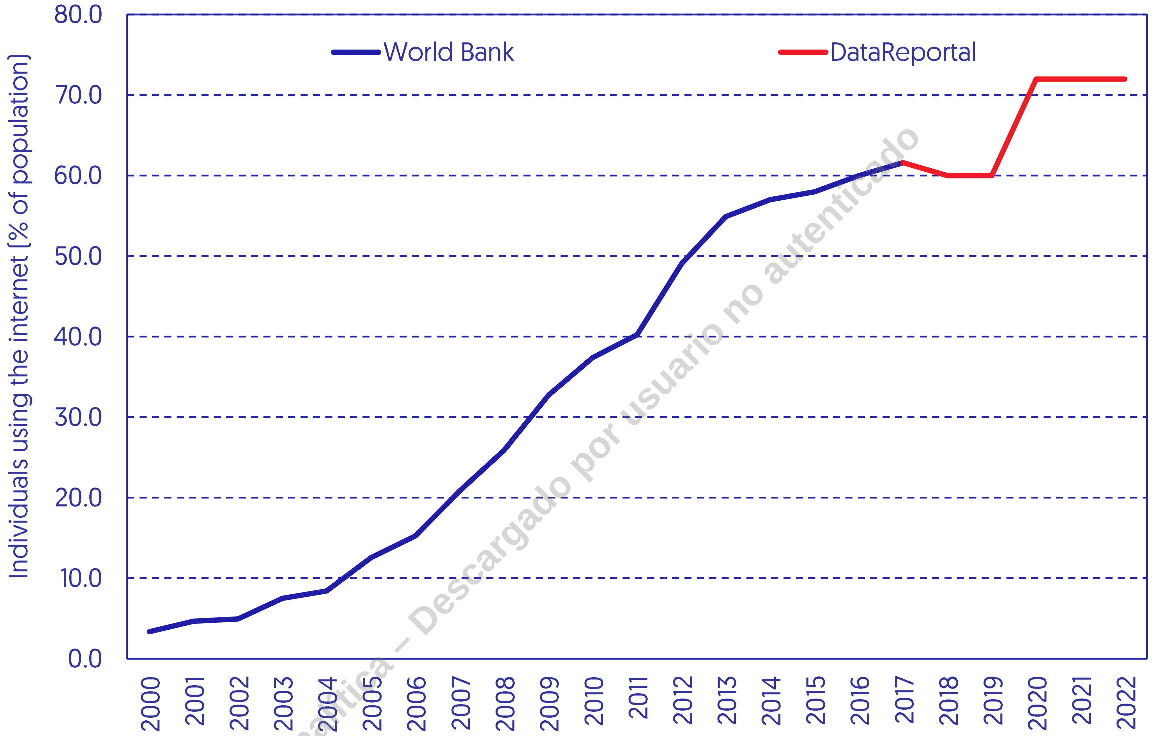
I feel lucky: we wanted copper and found gold

A general look at the results obtained from Google searches leads us to believe that they seem to reflect the dynamics of real activity, particularly aggregate demand. However, due to the nature of the search platform, this method may contain other information processes, such as digitization of the economy and economic expectations (uncertainty). The weights of each factor appear to vary by item, but in general, these could be divided into:

- **Aggregate demand:** Google searches seem to respond to movements in real activity, with a clear seasonality, where indexes increase in periods of higher consumption (October-December). In addition, as reviewed in the Economic Outlook Report N˚11 "Mirage or oasis? Recontextualizing the economic recovery", the estimated indices seem to reveal a behavior in line with expectations for real activity between 2017 and 2022, with a sustained fall until mid-2021, from which date a slight economic recovery begins to be observed. The categories that best reflect this factor are: "clothing and footwear", "alcoholic beverages and tobacco" and "home services except telephone".

- **Digitalization of the economy:** Another key factor to take into consideration is the increased use of digital platforms to access goods and services, in addition to other reasons of interest[13]. According to Datareportal, in February 2022 72% of Venezuelans have internet access, an increase of 10 pp. over January 2017[14]. This phenomenon seems to have intensified with the pandemic, as economic agents shifted to digital methods of acquiring goods. Such factor may be better reflected in items such as "food and non-alcoholic beverages", "alcoholic beverages and tobacco" and "housing rental".

People with internet access



Note: The World Bank and DataReportal series were spliced. It should be noted that both series match for the 2017 data (62%).
Sources: World Bank, DataReportal and Ecoanalítica.

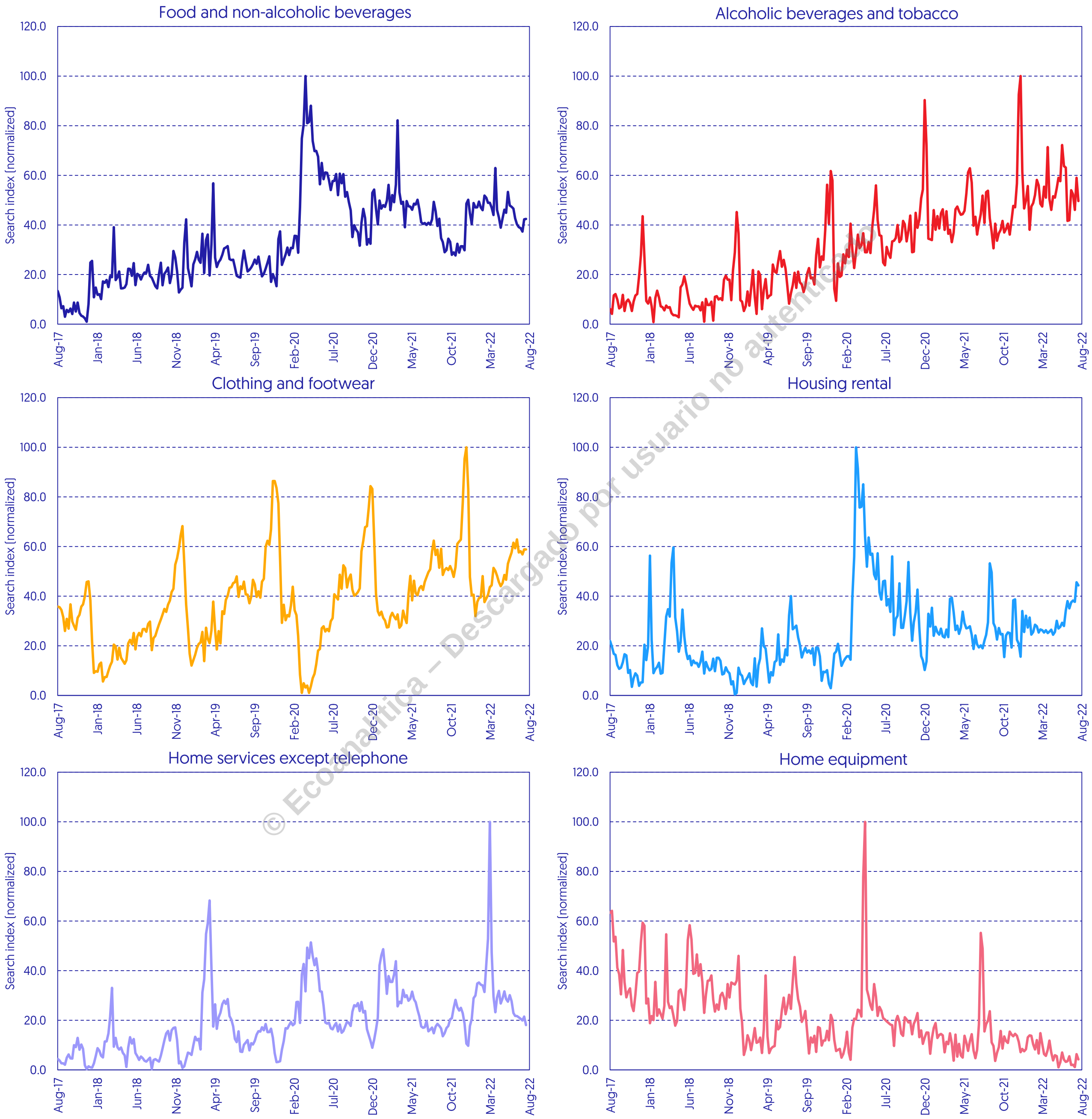
- **Economic uncertainty and social instability:** Some of the selected terms also seem to reflect economic events of great public interest, such as an increase in transportation rates (visible in the item "transport"), problems in the water service ("home service except telephone") and the exit of DirecTV from Venezuela ("communications"). In these cases, beyond an increase in the demand for such services, it seems that the increase in searches represents a greater interest in the eventuality, adjusting agents' expectations and increasing uncertainty around the item.

- **Other economic distortions:** Trends seen in search indexes could also reflect responses to changes in other macroeconomic variables, such as to the amount of bolivars in the economy and exchange rate volatility. In both cases, an increase in the

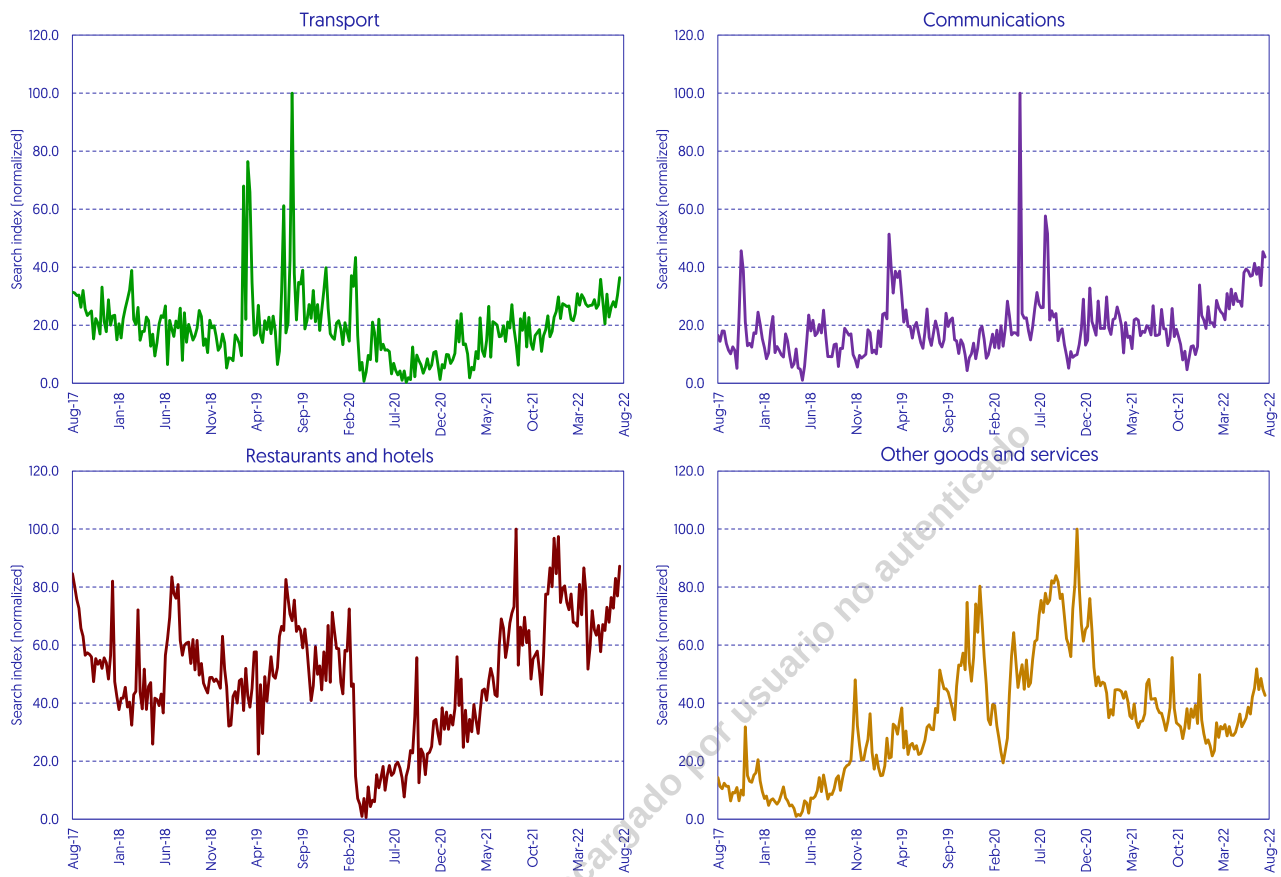
[13] Such as the use of the platform to know the price or type of goods or services, as well as curiosity about a specific topic related to the industry.
[14] Datareportal (2022). *Digital 2022: Venezuela.*

marker would lead to an increase in the demand for goods, which is reflected in a higher number of searches[15].

Google search index by category (simple sum)



[15] This is reinforced by looking at the econometric results.



Note: All indexes were normalized from the simple sum of the search terms for each item, where the highest value equals 100 and the lowest value equals one.
Sources: Google and Ecoanalítica.

Advanced Search: Google vs. inflation

To calibrate the effectiveness of the search indexes, we proceeded to estimate econometric models that allow us to study and predict inflationary processes in Venezuela. To this end, it is important to highlight that prices respond significantly to changes in monetary aggregates (which modify the demand for the local currency), to fluctuations in the currency exchange rate and to shocks in the real economy, mainly observed by variations in aggregate supply or demand.

However, it should be remembered that the Venezuelan economy experienced a hyperinflationary process between 2017 and 2022[16], a period during which price dynamics were mainly explained by sharp increases in the money supply and loss of confidence in the monetary authorities (money demand). However, with the

[16] Following the criteria established by both Cagan (1956) and Reinhart & Rogoff (2011).
Cagan, P. (1956). *The monetary dynamics of hyperinflation*. Studies in the Quantity Theory of Money.
Reinhart, C. M. & Rogoff, K. S. (2011). *From financial crash to debt crisis*. American economic review.

deceleration of the inflationary trend, as annual inflation went from 2,510% to 721% between 2020 and 2021, real shocks can be expected to have amplified their relevance when trying to explain current price variations in Venezuela.

What do the models say?

In this sense, we modeled our inflation estimates for Venezuela considering all these possible sources of inflation. Monetary aggregates were included as a primary source, in addition to private credit and the exchange rate. To such regressors we added the total Google search items[17] as a demand *proxy*. On this basis, multiple regressions with lags and vector autoregressive (VAR) models were estimated in three modes: without including Google searches, including only the principal components of the search terms, and using all available regressors[18].

In general terms, the second factor of the principal component presented a positive and significant relationship with inflation[19], a phenomenon that was consistent in all the models in which it was added. In the case of the regressions, the inclusion of the principal components led to improvements in goodness of fit and RMSE, although most of the coefficients turned out to be insignificant (in statistical terms). This may have been due to endogeneity among the variables, especially if the principal components of Google searches reflect more than changes in aggregate demand, such as economic distortions and economic uncertainty and distress.

[17] Principal component calculated from all search terms, using the 3 principal components explaining 79% of the variance.
[18] The study period was limited to weeks between February 1, 2019 and May 27, 2022.
[19] According to economic theory, because the second component was the one that best aligned the weights of the total searches according to demand factors, distortions and uncertainty.

Estimated relationships between Google search items and inflation

Regressors	[1] OLS standard	[2] Only PCs	[3] Overall
Prices (Lag1)	0.269		0.163
	[0.191]		[0.158]
Prices (Lag2)	0.323***		0.167
	[0.123]		[0.111]
M2	0.279***		0.100
	[0.080]		[0.083]
Real credits	-0.088		-0.067
	[0.127]		[0.107]
Exchange rate	0.095*		0.086*
	[0.049]		[0.047]
PC 1		0.010**	0.002
		[0.005]	[0.005]
PC 2		0.022***	0.012**
		[0.006]	[0.005]
PC 3		-0.008**	-0.003
		[0.004]	[0.003]
Observations	**170**	**172**	**170**
R-squared	**0.710**	**0.692**	**0.738**
RMSE	**0.0376**	**0.0388**	**0.0361**

Note: All variables were transformed with logarithmic difference, except for the principal components, which were not differentiated. In addition, all the variables lag the dependent variable (inflation).
Source: Ecoanalítica.

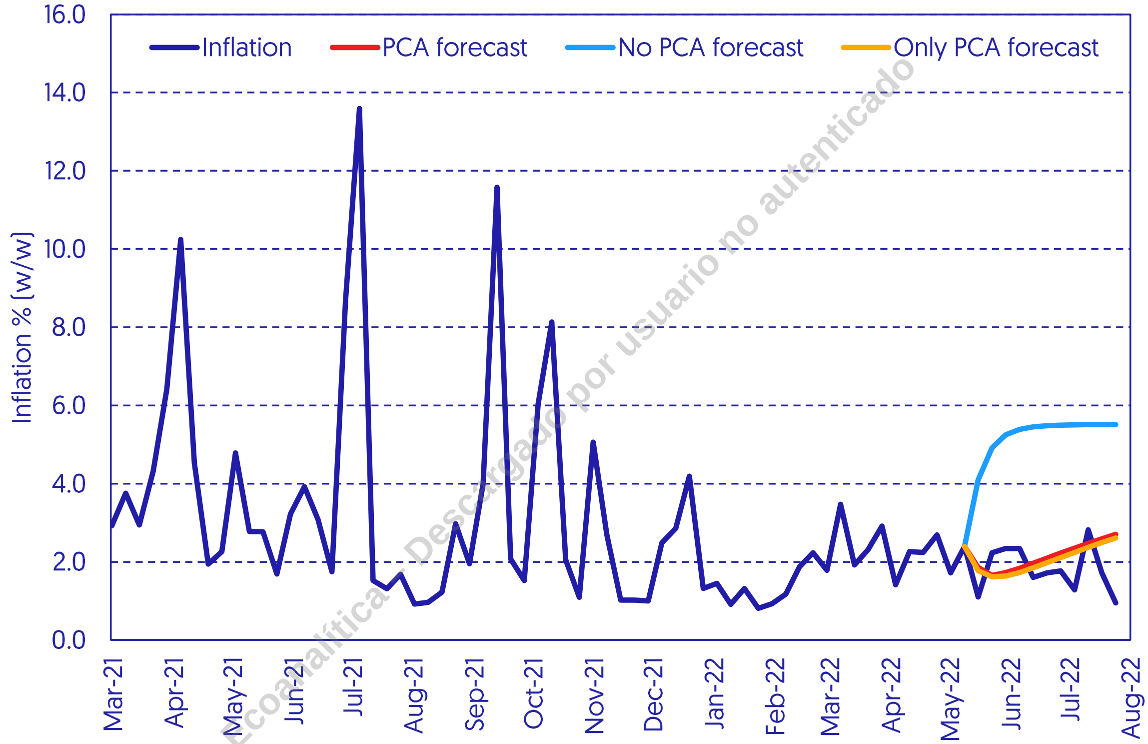
As in the regressions, the VAR showed a positive and significant relationship between the second principal component and inflation[20]. The inflation projections of the first VAR, including all variables, showed a similar trend to the values observed by **Ecoanalítica** (projecting 11 weeks[21]), with an average difference of 0.33 percentage points (pp.). For comparison, a similar VAR was estimated excluding the main

[20] In addition, monetary aggregates and the exchange rate also presented positive relationships with prices, following economic theory.
[21] From June 3 to August 12, 2022.

components of the calculation; in that case, the estimated values showed an average difference of 3.48 pp, significantly higher than the original estimates.

Finally, when predicting inflation using only the three principal components, the average difference was reduced to 0.23 points, maintaining the significant and positive relationship observed between inflation and the second principal component; therefore, the usage of principal components appears to improve drastically the predictive qualities of the standard VAR models for inflation.

Inflation Forecast



Source: Ecoanalítica.

Google Searches: Usage and implications

Accessing data has always been a challenge in developing countries, especially regarding high-frequency data that reflect changes in the real economy. This deficiency of reliable and timely information impedes real-time assessment of economic conditions and restricts the ability to establish sound management strategies and policies.

For this purpose, the compilation and estimation of Google search indexes is useful. Our results, in particular, have found such data to be effective in making appropriate inflation estimates and predictions. Estimates that used Google search items performed similarly to the results from the standard model[22] and, moreover, proved

[22] Model that excluded the main components from the calculation.

to be relatively better than the standard model in forecasting inflation. However, it should be noted that these indexes appear to reflect factors outside of aggregate demand, particularly changes in the digitization of the economy, uncertainty and economic malaise, and other economic distortions.

In this way, the constructed indexes can be a useful tool to measure the general sentiment of Venezuelan consumers, whether it is their spending patterns, their preference for digital platforms, or even high-frequency responses to political and economic events. Considering this, the internalization of this method within public and private institutions can be a key factor to survive in an environment where one of the most important resources is scarce: information.

Diego Santana Fombona
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Weekly ***Indicators***

	5th Week August	*Weekly chg. (%)*	*Depre/Apre (pp)*[1]
FX Boards (VES/USD)[2]	7.9	17.0	14.6
	3rd Week August	Weekly chg. (pp)	Annual chg. (pp)
Lending Interest Rate (%)	57.0	-1.8	2.5
	5th Week August	Weekly chg. (pp)	Annual chg. (pp)
Overnight Interest Rate (%)	4.7	0.3	-125.3
	4th Week August	Weekly chg. (%)	Annual chg. (%)
International Reserves (USD Bn)	10.2	0.16	64.3
	3rd Week August	Weekly chg. (%)	Annual chg. (%)
Monetary Liquidity (MM VES)**	11,090.7	22.5	392.0

Price of International Oil Baskets (USD/bl)

	4th Week August	Weekly chg. (%)	Annual chg. (%)
WTI	94.5	2.9	39.7
Brent	98.9	2.2	40.0

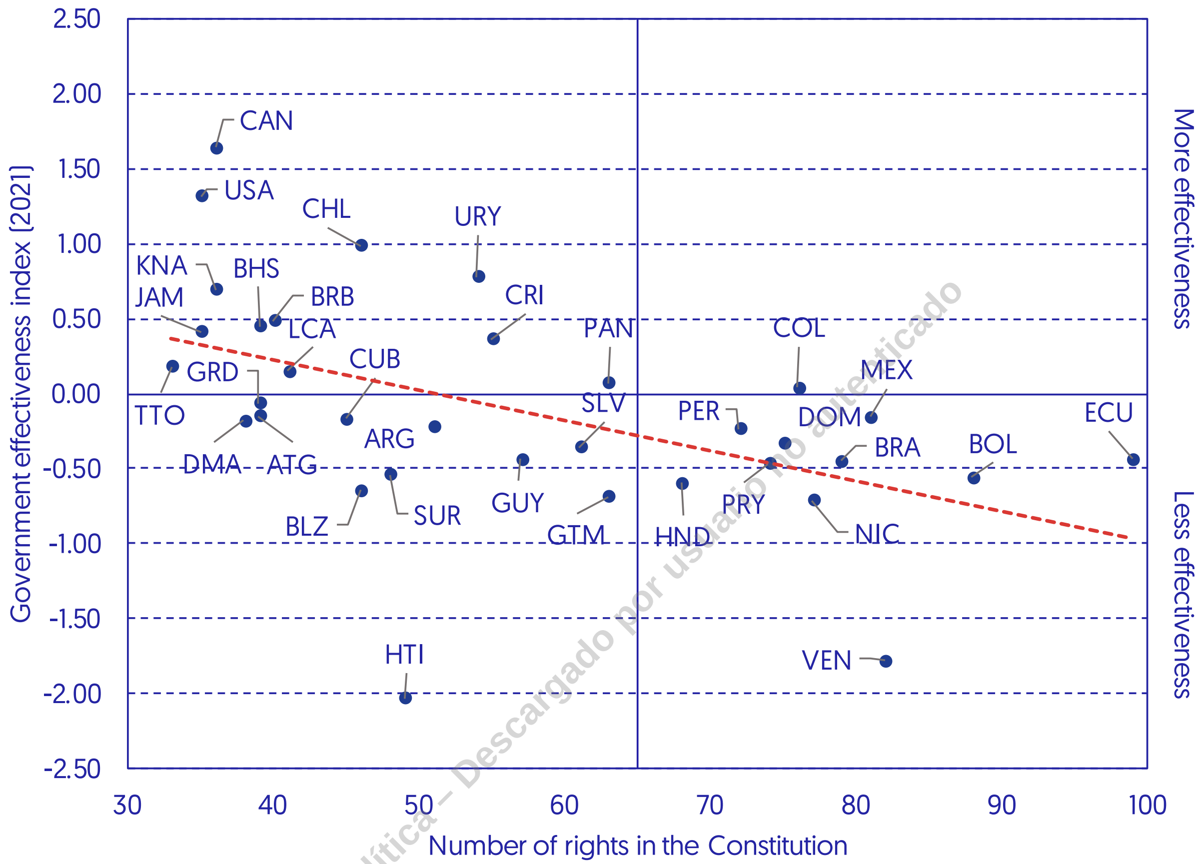
Price of the Venezuelan oil basket (USD/bl)

	5th Week July (2020)	Weekly chg. (%)	Annual chg. (%)
Weekly Average	22.4	0.0	-61.9
Annual Average	28.8	-0.7	-51.7

Sources: BCV, MENPET, ONT and Ecoanalítica.
****Annual variation of accumulated expenditure.***
*****Reconverted amounts.***
[1]Depreciation (+)/Appreciation (-)
[2]FX Borads' average exchange rate.

Graphic of the week
Paper leviathans

Government effectiveness and constitutional rights



Note: Effectiveness index on a scale from -2.50 (least effective) to 2.50 (most effective).
Sources: Comparative Constitution Project (CCP), World Bank, and Ecoanalítica.

Since the end of the 18th century, the American continent has followed a marked constitutionalist tradition, with 35 countries producing 32% of the world's constitutional texts. Many of these charters have been subject to frequent amendment and renewal, resulting in an average constitution life of 14.4 years.

Throughout the 20th century, Latin American constitutions have expanded to acquire a "programmatic" character insofar as they extend the reach of the state and enshrine public policy outcomes as rights. According to the record of the Comparative Constitutions Project (CCP), of the twenty constitutions with the most rights in the world, nine are in Latin America.

This extension of rights has not necessarily translated into government capacity to fulfill them; the continent shows a slightly negative relationship when comparing the number of constitutional rights with the government effectiveness index, calculated by the World Bank as part of the global governance indicators.

The index, which measures the perception of the quality of public services, civil service, design and implementation of public policy and credibility of the authorities, tends to be higher in countries with narrower constitutions such as Canada (1.64), the United States (1.32) and Chile (0.99) and lower for countries with broader constitutions such as Honduras (0.60) and Nicaragua (0.71).

This is not to say that more constitutional rights cause worse government outcomes. Haiti (-2.03) and Venezuela (-1.78) stand out as countries with relatively "fewer" and "more" constitutional rights, respectively, and similarly poor state effectiveness; however, the difference between de jure aspirations and concrete de facto outcomes indicates that throughout the Americas, success in public policy requires more than putting them in the constitution.

Tips
Economic, oil, sectorial and political

ECONOMIC TIPS

COVID-19 in Venezuela. According to government figures as of August 30, the country accumulated 542,397 registered cases of coronavirus and 5,796 deaths. In turn, according to OurWorldInData, it is estimated that 78.6% of the population has received at least one dose of a vaccine as of March 25, 2022.

Remembering old times (I). In the second half of August, the bolivar devalued significantly after a period of relative stability. As a result, the unofficial exchange rate rose 13.8% between August 12 and 19 and 17.6% between August 19 and 26, reaching a cumulative increase of 33.8% in just two weeks.

Remembering old times (II). On the other hand, the official exchange rate took longer to adjust, which caused the gap between both rates to widen for a few days to its highest level since October last year. We see that the official exchange rate increased only 2.9% between August 12 and 19 and in the following week it grew 28.6%, for a total accumulated adjustment of 32.3% in that period.

Back to the wanderings. This explosion of the exchange rate coincides with an abrupt increase in monetary aggregates. In the week of August 12-19, the monetary base increased 36.2%, while monetary liquidity advanced 22.5%. Weekly increases of this magnitude have not been seen since September 2018 and January 2019, respectively.

Interventions to the rescue (I) On August 16, the BCV continued with its weekly intervention strategy by injecting USD 90 million into the banking system at a rate of VES 6.12/EUR, equivalent to VES 5.98/USD. Subsequently, as the exchange rate escalated, the BCV reportedly made additional interventions in the last two weeks of August.

Interventions to the rescue? (II) In this regard, it was learned that between Friday, August 26 and Tuesday, August 30, the BCV injected an additional USD 253 million to the Banks in an attempt to stabilize the exchange market, which closed that Tuesday with an official exchange rate of VES 7.82/USD.

Money Tables. For the last week of March, the average money desk rate was VES 7.9/USD, which represents a depreciation of 14.6% with respect to the previous week.

OIL TIPS

Promise far from being fulfilled. Nicolás Maduro maintained the goal of producing two million barrels per day (bpd) of oil by the end of 2022 and, furthermore, asserted that growth will continue until producing three million bpd in 2023. However, oil production has fallen 28% since December 2021 and stood at 629,000 bpd in July, meaning that production would need to increase by 218% to reach Maduro's 2022 target.

Oil to offset debt. Since November 2020, China Aerospace Science and Industry Corp (Casic) has been transporting Venezuelan crude oil in three tankers it acquired in 2020 from PetroChina, as part of an agreement to offset Venezuela's multi-billion-dollar debt with the Asian giant. So far, the company has taken 13 cargoes, transporting a cumulative total of approximately 25 million barrels of oil, equivalent to USD 1.5 billion.

For the first time since March 8, the increase in the price of gas in Europe exceeded USD 3,200 per 1,000 cubic meters. This price increase is due to the uncertainty regarding the security of gas supplies in the old continent. Likewise, this price increase is a phenomenon that started in March 2021, due to the fear that the European Commission (EC) would prohibit the import of fuel from Russia.

If it is not shipped, it is flared. According to a report by Rystad Energy, Russia is flaring about EUR 10 million a day in natural gas. Specifically, it would be flaring some of the excess gas it is not sending to Europe since it cut flows to some countries such as Germany.

Cardón is reactivated. The Cardón refinery, the second largest in Venezuela, restarted gasoline production after solving some faults that had kept it inoperative since June 2022. The repairs were extended beyond the 21 days foreseen. According to Reuters, 28.0 kb/d of high-octane gasoline is being produced.

Cutting output... President Joe Biden's administration is pressuring U.S. refiners to replenish gasoline and diesel inventories as the Atlantic hurricane season approaches, affecting production, rather than increasing record volumes of product exports.

as a precautionary measure. U.S. Energy Secretary Jennifer Granholm said the U.S. has already put two million barrels of emergency product in reserve, but that the most effective response is for refiners to use the time to prioritize building inventories.

SECTORIAL TIPS

Binational payment (I). Following the intentions of the Governments of Venezuela and Colombia to restart economic activity, the Venezuelan Federation of Chambers of Commerce and Production (Fedecámaras) considers that the use of a binational payment system in Táchira is extremely important to promote the coexistence of the bolivar and the peso.

Binational payment (II). For this reason, José Luis Jiménez, executive director of Fedecámaras Táchira, requested the implementation of this measure when the international bridges are opened and informed that a meeting will be held in the next few days in Caracas to discuss and finalize the offer for the implementation of the system.

Business meeting with Colombia. Regarding the intention to resume commercial activity between Venezuela and Colombia, Carlos Fernández, president of Fedecámaras, commented that a bi-national business meeting is planned for October, in the state of Zulia, with representatives from Venezuela and Colombia. Fernández explained that the meeting will be similar to the one held in Cúcuta, but with a more commercially oriented focus.

Revision of prices (I). During the weekend, the Superintendence for the Defense of Socioeconomic Rights (Sundde) deployed its prosecutors in stores in nine states of the country to verify if they were carrying out their transactions at the official dollar rate stipulated by the Central Bank of Venezuela (BCV).

Price review (II). This control process was carried out after the 27% increase in the price of the dollar in the last week, which has devalued the bolivar by 21% in the official market and 18% in the parallel market.

Revision of prices (III). Likewise, Tiziana Polesel, president of Consecomercio, confirmed the audits carried out by Sundde officials and commented that these have had a respectful tone and that *"an interesting dialogue with the competent authorities"* has been maintained. Finally, she explained that *"3,000 establishments were visited and in only 3 cases the Official Exchange Rate was not being complied with"*.

Cedice basket at USD 430. According to Cedice Libertad, in the first fortnight of August, the average consumption of a family of three in cities such as Caracas, Valencia and Maracaibo, was VES 2.626.29, or USD 430, which translates into an increase in prices in bolivars of 4.11% and 2.06% in dollars in the first fifteen days of the month and 7.24% in bolivars and 2.51% in foreign currency in the period between July 15 and August 15.

POLITICAL TIPS

Special economic area... Nicolás Maduro announced that he will propose to the President of Colombia, Gustavo Petro, to create a large commercial economic zone between the border territories formed by the department of Norte de Santander and the state of Táchira for binational benefit.

...as a test. He assured that it will be a special economic area that will serve as a test and that later could be replicated in other Venezuelan border states. Likewise, Maduro insisted that the economic and commercial opening with Colombia is a fact and assured that the local team appointed to work on this activation seeks a productive and happy opening of the border area closed since 2019.

Reestablishment of diplomatic relations (I). The Venezuelan Minister of Foreign Affairs, Carlos Faría, informed that the new Venezuelan Ambassador to Colombia, Félix Plasencia, arrived in Colombia to fulfill the task of rescuing bi-national relations in different areas.

Resumption of diplomatic relations (II). Plasencia, appointed ambassador to Colombia by Maduro on August 11, also informed of his arrival in Bogota and assured that the purpose of the visit is to present his credentials to President Gustavo Petro. His arrival in the neighboring country comes shortly after the Colombian ambassador to Venezuela, Armando Benedetti, arrived in Caracas to, likewise, present his credentials to Nicolás Maduro.

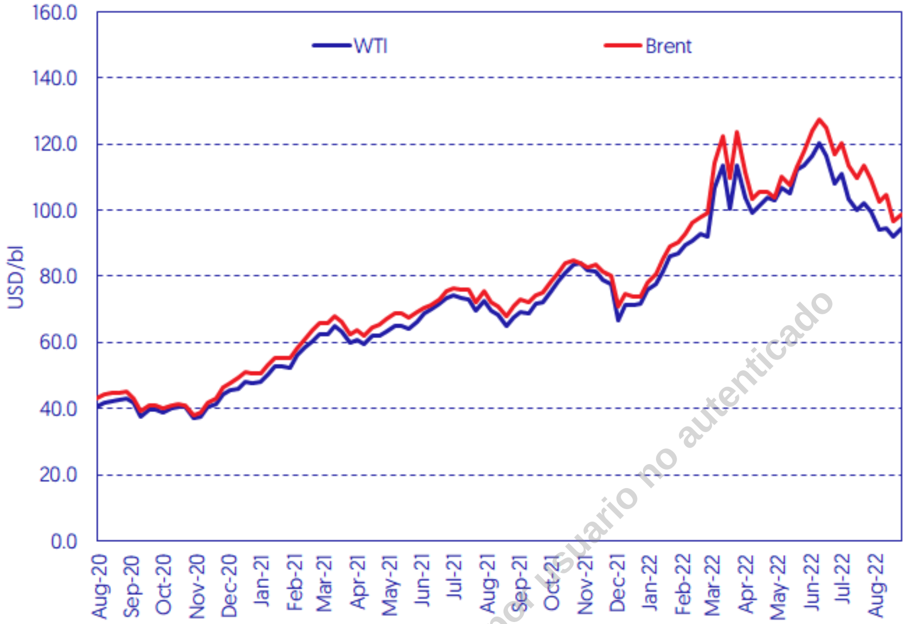
No more monitor? Nicolás Maduro made a call to use the dollar of the Central Bank of Venezuela (BCV) and warned people "not to let themselves be robbed with the parallel dollar". Although economists insist that the value of the dollar is overestimated due to the interventions made by the BCV in the exchange market, Maduro defended his government's economic strategy to control the US currency.

Insufficient information (I). Different media and sources close to the case point out that the defense of the Colombian-Venezuelan businessman Alex Saab accused the United States of "refusing" to offer evidence of his alleged diplomatic status.

Insufficient information (II). Camilla Fabri, Saab's wife, explained that the defense once again requested the release of classified and unclassified documents from the Central Intelligence Agency (CIA), the Drug Enforcement Administration (DEA) and the U.S. Departments of Defense, Justice and State, which they have so far refused to hand over.

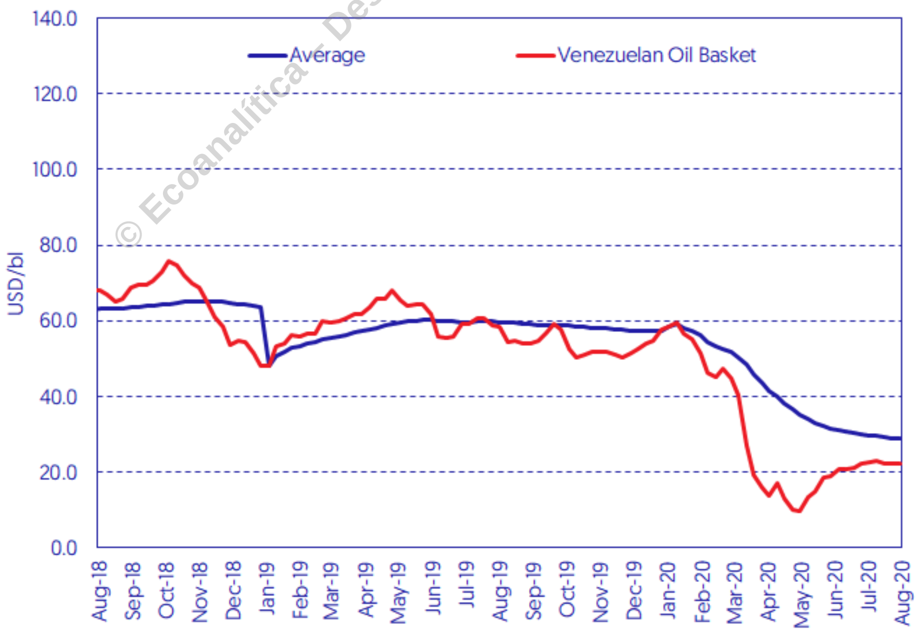
Economic ***Indicators***

Oil prices (WTI and Brent)



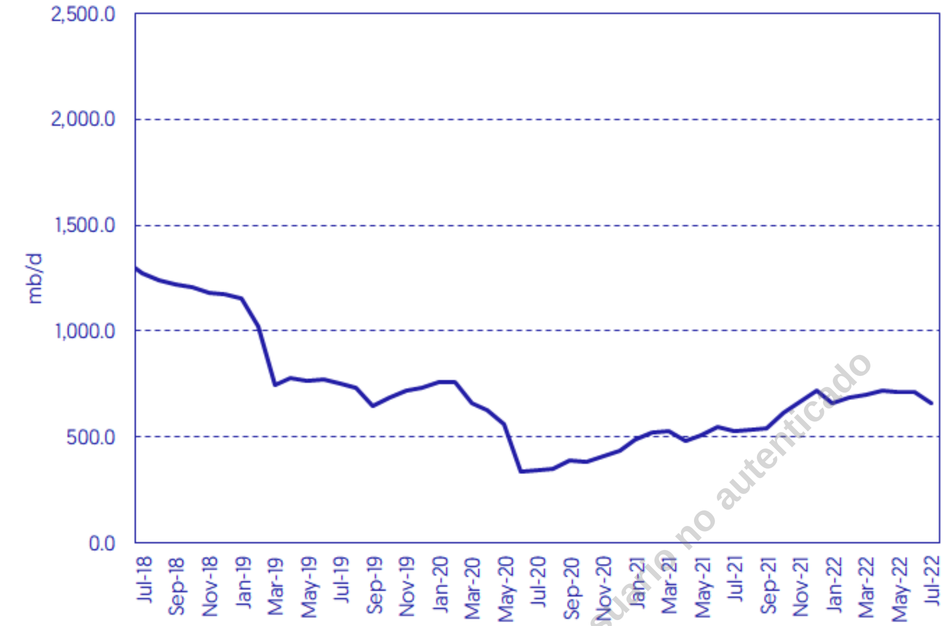
Sources: Menpet and Ecoanalitica.

Oil prices (Venezuelan basket)



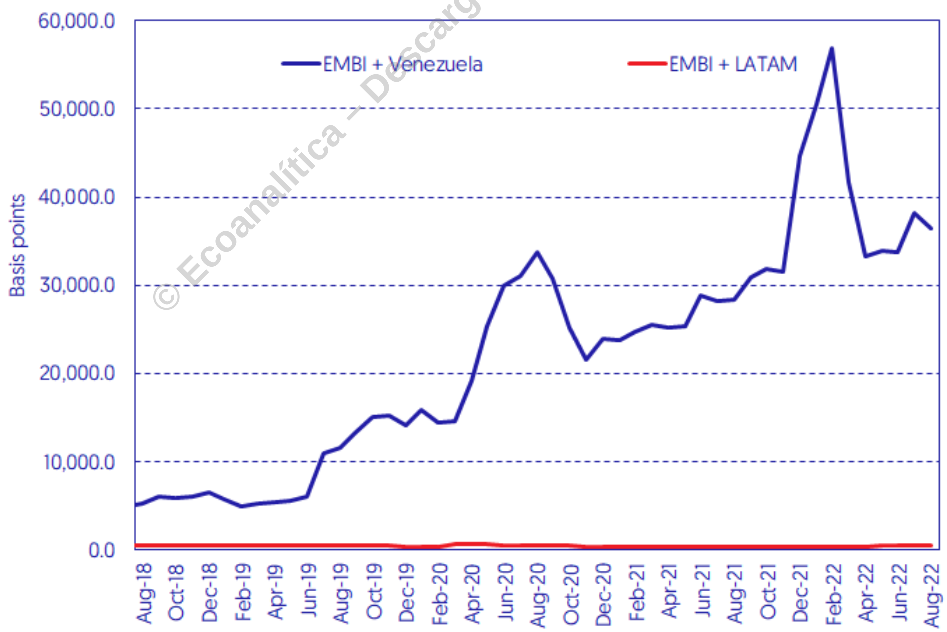
Sources: Menpet and Ecoanalitica.

Oil production (secondary sources)



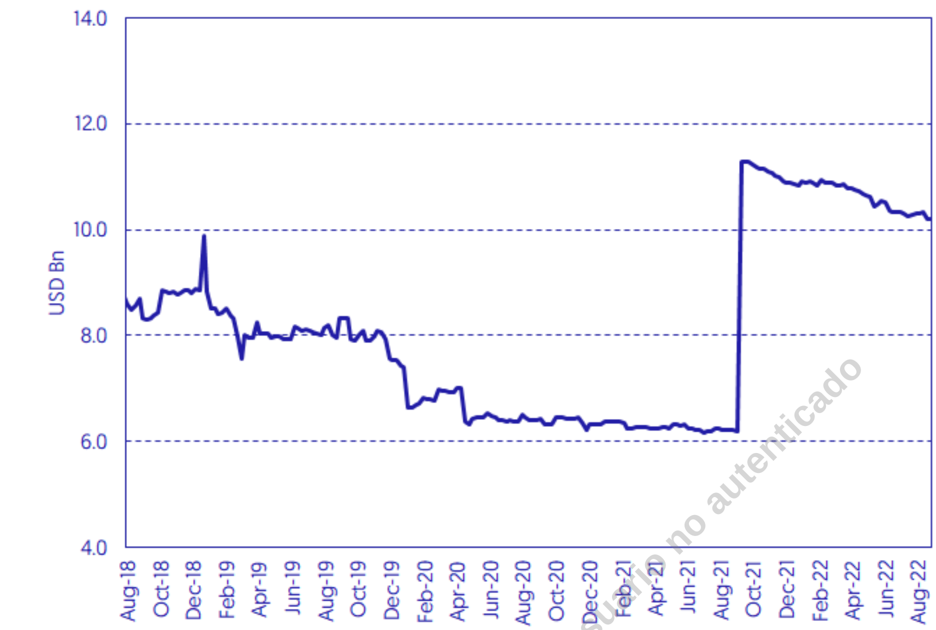
Sources: OPEC and Ecoanalitica.

EMBI



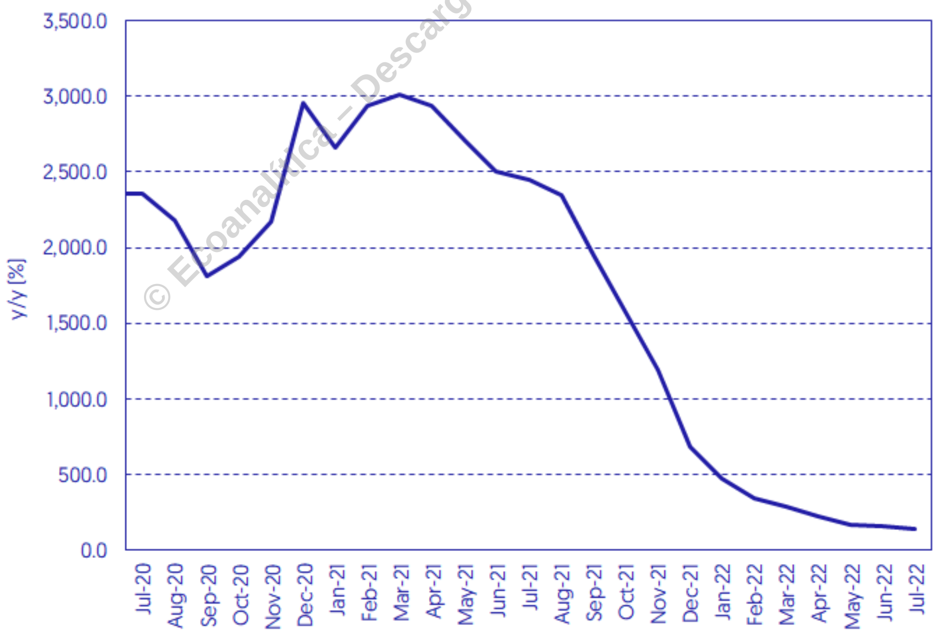
Sources: BCRP and Ecoanalitica.

International reserves (BCV)



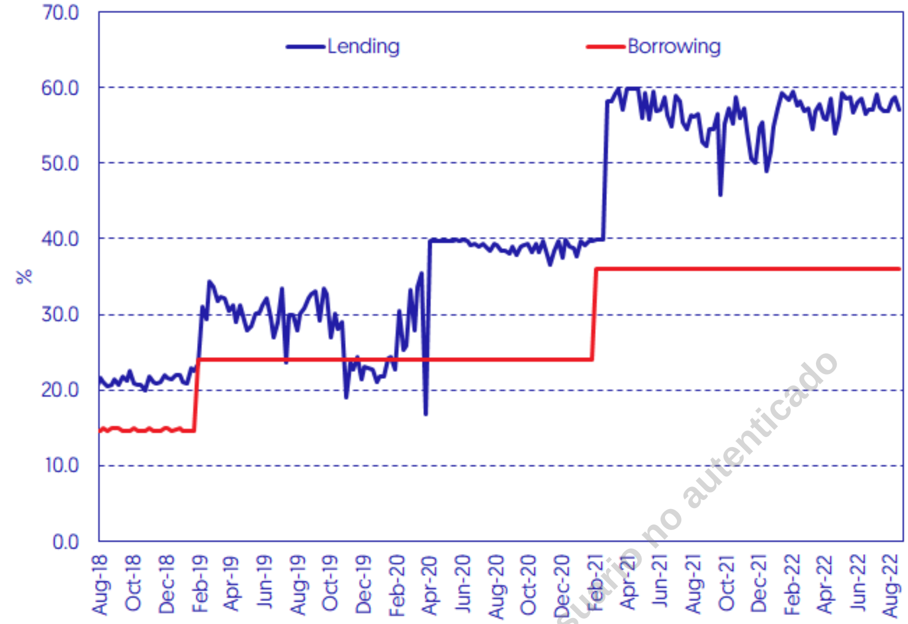
Sources: BCV and Ecoanalitica.

Inflation (BCV)



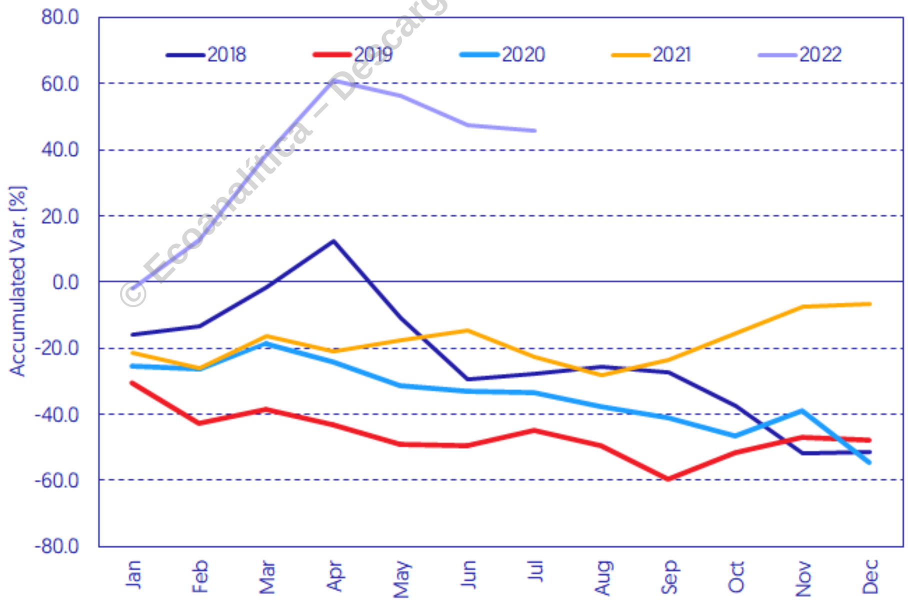
Sources: BCV and Ecoanalitica.

Interest rate (six major banks)



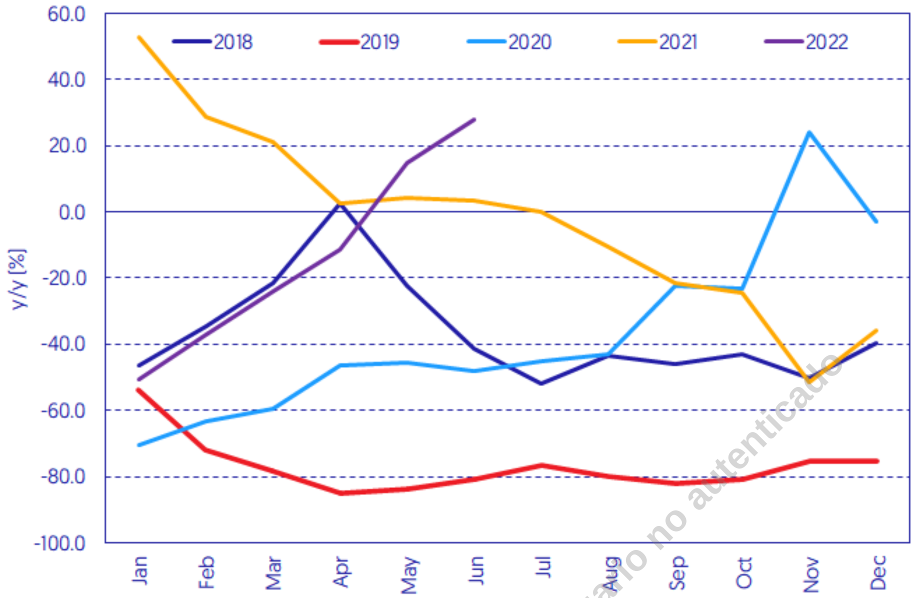
Sources: BCV and Ecoanalitica.

M2 Expansion (real)



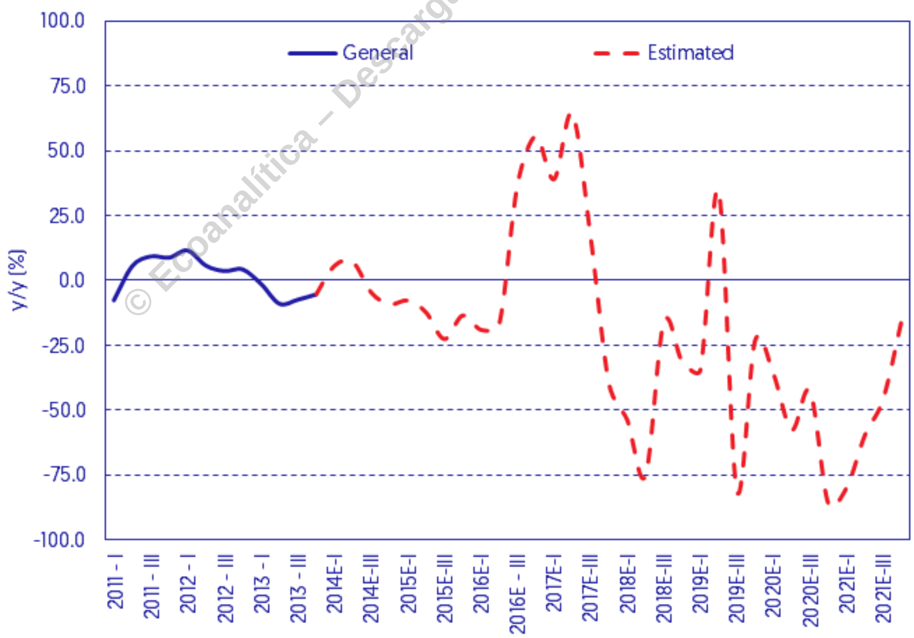
Sources: BCV and Ecoanalitica.

Loan Portfolio (real)



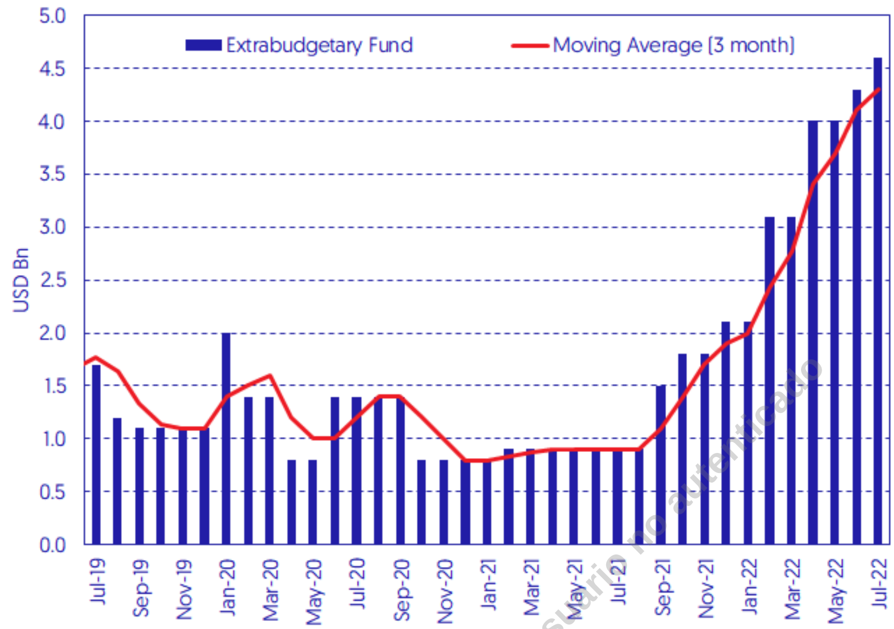
Sources: Sudeban and Ecoanalitica.

Real wage index



Sources: BCV and Ecoanalitica.

State extrabudgetary resources



Source: Ecoanalitica.

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