Managing the chaos: policy challenges in a hyperinflationary environment

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Abstract

We look into Venezuela's 2018-2019 hyperinflation episode to examine the policy constraints governments face during extreme economic distress. Our analysis is guided by a simple model that integrates reputational constraints to explain how media coverage shapes the discretionary use of foreign exchange (FX) policies in a segmented market system. Leveraging a special dataset of daily consumer prices, we show that official FX manipulation allowed the government to mitigate hyperinflationary pressures by maintaining overvalued levels (relative to the black-market) that in turn helped anchor expectations. Crucially, our empirical results indicate that some media coverage significantly constrained the government's ability to manipulate FX policy, demonstrating media's role as an implicit check on discretionary economic management.

JEL codes: D80; E31; E50; H50; P20

Keywords: hyperinflation; media coverage; exchange rate; policy discretion

1. INTRODUCTION

In May 2019, the central bank of Venezuela released official GDP and inflation figures for the first time since 2015.[1] It was a rare acknowledgement of the magnitude of hyperinflation devasting the country, with average month-on-month inflation above 50%, adding to an annualised rate of 130060% in 2018 (see the report by ECLAC, 2022). Apart from scarce official statistics,[2] there is limited evidence to illustrate the country's broad economic and social collapse, and even less to understand policy options available during a hyperinflation episode of such magnitude. Yet, in a global geopolitical context marked by raising uncertainty stemming from multiple sources and crises, we believe that policymaking in volatile economic environments is likely to attract increased interest.

To provide context, some details are in order. The country has been strained by emigration, social unrest, and extreme poverty in large segments of the population. To stabilize the economy and maintain social order in a country that has long been reliant on a socialist-oriented system, the government resorted to manipulating the few remaining nominal anchors, amid a lack of transparency (or selective disclosure at best) in public data. Persistent supply shortages led to strict price controls for essential goods (e.g. pharmaceuticals and hygiene products) and official exchange (FX) rates set well below black-market levels. Gasoline and fuels were provided essentially for free, distributed through the government-owned oil producer and exporter *Petróleos de Venezuela S.A.* (henceforth PDVSA). By holding a *de facto* monopoly over the hard currency supply, the central (monetary and fiscal) authorities were able to sustain artificially low FX rates that created a substantial FX gap relative to black-market levels. In a desperate move, in February 2018, the government decided to remove the heavily subsidised fixed exchange rate of 10 bolivars per dollar and replace it by an auction-based rate of 25000 bolivar per dollar, which effectively amounted to a 99% devaluation in one day.[3]

[1] News reported by Financial Times, https://www.ft.com/content/5cb83c1c-821b-11e9-b592-5fe435b57a3b.

[2] The few data compiled in the annual reports of the Economic Commission for Latin America and the Caribbean (ECLAC) illustrates the size of the economic collapse. ECLAC reports are an invaluable information source and are available at https://www.cepal.org/en/publications/type/economic-survey-latin-america-and-caribbean. See also available from Alvarez et al (2022).

[3] From 2014, Venezuela had a dual exchange rate system in place with a preferential rate for priority sectors and a higher auction-based FX rate, which led to persistent disparities between official and black-market rates. A new

With a limited economic policy toolkit, the government increased its use of force, relying on military enforcement and judicial control to suppress political dissent. At the same time, it sought to manage expectations through propaganda and selective data releases. TV stations in Venezuela are typically subject to strict licensing and heavy state oversight (Lutscher and Donnay, 2023; Knight and Tribin, 2022), but online media platforms are relatively inexpensive to set up and easier to bypass censorship. There is evidence that the Maduro government tried extending its grip on digital information through Internet (DNS) blocking, server restrictions, and content filtering, especially during politically sensitive events. Despite such challenges, independent media continued to operate online, driven by a robust demand for free information, potentially offering an alternative to government-controlled narratives and propaganda.[4]

This paper investigates the role of media in limiting the use of discretionary policies, a common challenge for autocratic regimes as well as for many transition economies. Our empirical analysis is guided by a simple model featuring reputational constraints and discretionary policy conduct. We show that the optimizing behaviour of the central authority implies a trade-off between inflation and the FX gap; this incentivises a manipulative FX control, which in the case of Venezuela was sustained by large oil-funded central bank reserves. Segmented FX markets are typical in economies experiencing severe distress and turmoil. We verify and confirm that, despite consistent overvaluations relative to its black-market levels, the official FX acted as the ultimate nominal anchor in overcoming the 2018-2019 hyperinflation episode. Since FX changes are fully passed through into domestic prices within three months, this buys time and allows the government to instrument the official depreciation pace for its own policy objectives. Crucially, we find limits to this discretionary policy conduct: due to its

auction-based fixing was introduced in the interbank market in February 2018, but FX rates were still heavily distorted by central bank interventions and strict capital controls. A news from Reuters provides more details about the disparity, available at https://www.reuters.com/article/us-venezuela-economy-idUSKBN1FP2WK. See our section A in the online Appendix for a more detailed discussion on FX rates in Venezuela.

[4] A VPN (Virtual Private Network) secures internet traffic and hides IP addresses, allowing users to bypass potential censorship and access restricted content. To gauge interest in online privacy and free content, we look at Google Trends data and find a spike in VPN searches after February 2018, which marks the start of our sample. Some additional information is included in our dedicated section B from the online Appendix where we discuss the media landscape in Venezuela.

influence on inflation expectations, media can force an autocratic government to curtail its manipulative control over the official FX rate.

Despite severe data availability challenges, we provide solid empirical evidence in support of these mechanisms. To do so, we rely on a unique dataset called *Inflationverdadera* (or *TrueInflation* in English), including daily prices collected by volunteers who shop in local stores for staples; the project uses a mobile phone app allowing anyone to take photos of price tags, which are then validated, filtered, and organised in a database.[5] Access to daily inflation data is essential for understanding the main mechanisms at work during periods of hyperinflation; rapid price increases create significant uncertainty and information frictions, complicating expectation formation and policy responses.[6] Coibion and Gorodnichenko (2015) show that information rigidity in expectations is associated with policy and institutional characteristics. With manipulated nominal anchors, like the overvalued official FX (relative to its black-market levels), expectations formation becomes even more complex. The FX typically influences consumer prices via imports, at least for essential goods. According to the World Bank, the GDP share of imports was 31.4% in 2014 – which is the last available observation;[7] however, due to the general collapse of the Venezuelan economy, by 2018-2019 the import share was probably even higher. Despite potential pitfalls related to the segmented, multi-tier FX market system, we use the official FX rate against the USD as it is widely available and regularly reported, whereas black-market FX data are scarce and unreliable (see section A in Appendix).

A substantial political economy literature focuses on mechanisms explaining media's influence in developed economies (see DellaVigna and Gentzkow, 2010; DellaVigna and La Ferrara 2015). We contribute to the narrower literature strand discussing media in autocratic regimes, where propaganda

[5] Data collection was supported by the Billion Prices Project @ MIT Sloan and Harvard Business School. The project was an academic initiative founded by Alberto Cavallo and Roberto Rigobon in 2008; it is no longer active but continues today through other similar initiatives. See more at http://www.inflacionverdadera.com and https://thebillionpricesproject.com.

[6] Information frictions are typical in hyperinflationary contexts. What complicates the problem in the case of Venezuela is the complete lack of official statistics for basic indicators (inflation, GDP), which increases the cost of processing information; see the discussion in Gaglianone et al., (2022).

[7] This 31.4% represents nevertheless a significant increase from an average of just 21.5% during the 2000s. See https://data.worldbank.org/indicator/NE.IMP.GNFS.ZS?locations=VE.

and state-controlled narratives play a key role in shaping public opinion, maintaining regime stability, and suppressing dissent (see reviews in Guriev and Treisman, 2019; Zhuravskaya et al., 2020). One of our contributions is to incorporate media coverage as a driver of inflation expectations in a model designed to expose policy trade-offs that arise during severe economic distress. In our setup, agents form expectations by incorporating FX information alongside past inflation; media coverage amplifies or reduces the impact of FX changes on these expectations, which may not necessarily lead to lower information frictions. Media news influence expectations through its content, frequency, and the range of topics it addresses (DellaVigna and Gentzkow, 2010; D'Acunto et al., 2023). To gain more insights, we also look at coverage across different domains (e.g., economics, politics, sports) when identifying limits to the government's ability to manipulate FX.

The rest of the paper proceeds as follows. Section 2 present the theoretical model used to guide our empirical strategy. Section 3 describes our data and methods, while section 4 presents the empirical results. Finally, section 5 concludes. More details about our data and model specifications are relegated to the online Appendix.

2. BASIC MODEL

We use a loss function that captures reputational constraints from the discretionary use of FX policy controls in a segmented market context:

$$L_t = \frac{1}{2}\pi_t^2 + \frac{1}{2}\lambda\left(e_t - e_t^b\right)^2 \qquad (1)$$

where e_t and e_t^b are the official and black-market FX rates respectively, while λ is the weight placed on reputation concerns by the central planner. These concerns may arise because the FX gap, denoted by $(e_t - e_t^b)$, can be seen as a sign of currency (in)stability, which affects public trust. With an economy dominated by supply shortages and large imports for essential goods, our Phillips curve is simply:

$$\pi_t = \beta E_t \pi_{t+1} + \alpha(e_t - e_{t-1}) + \gamma\left(e_t^b - e_{t-1}^b\right) + \varepsilon_t \qquad (2)$$

where β is a discount factor, t is a time index, α measures the passthrough from official FX and γ is the passthrough from black-market FX, while ε_t is a supply shock.

With hyperinflation, rapid price changes make nominal anchors crucial for shaping expectations. Media coverage influences this process by amplifying certain information sources, altering the weight economic agents assign to different signals (Pfäuti, 2024). In our setting, inflationary expectations are specified as backward looking but we include a component that depends on the FX gap, whose weight is a function of media attention, which we denote by m. An overvalued official FX relative to its black-market levels, i.e. $e_t^b - e_t > 0$, would make people doubt the ability of the central planner and induce expectations of FX depreciation, leading to higher expected inflation. Meanwhile, a higher media coverage would increase the weight economic agents attach to nominal anchors, in our case the FX component, making it more important for inflation expectations.[8] To keep all these interactions tractable, we can simply write:

$$E_t\pi_{t+1} = \pi_{t-1} + m\left(e_t^b - e_t\right) \tag{3}$$

The central (monetary and/or fiscal) authority minimizes its loss function under discretion, by choosing the instrument e_t subject to constraints given in (2) and (3).[9] The F.O.C. leads to the following expression for the optimal FX rate:

$$e_t = e_t^b - \frac{\alpha - \beta m}{\lambda}\,\pi_t \tag{4}$$

The following implications arise: (i) high inflation incentives the central authority to keep the official FX rate relatively overvalued, hence $e_t < e_t^b$, and (ii) higher media attention, m, would alter expectations and force a depreciation of the official FX rate to bring it closer to its black-market level, thus limiting reputation losses, as well as FX manipulation incentives. Since we lack reliable, high-frequency estimates for black-market FX levels, we take a less direct approach in validating these theoretical predictions in our empirical analysis. Firstly, we confirm the role of official FX as a nominal anchor, showing that prices react to FX changes but with an incomplete passthrough in the very short-

[8] To rule out explosive dynamics, we assume $\beta m < \alpha$; then even in the extreme case that the FX gap is corrected in one single period, and $e_{t+1} = e_t^b$, inflation expectations in (3) would converge to inflation in (2).
[9] In our simple model we may assume a linear relation that ties central bank reserves to the official FX level in equilibrium and derive a policy solution for reserves operating as the instrument, instead of the official FX rate. Developing a general equilibrium models of FX management, like Fanelli and Straub (2021), is beyond the scope of this paper, which focuses on demonstrating the media's influence on discretionary FX policies.

term, lasting up to three months.[10] Secondly, we demonstrate that some media coverage plays a significant role in explaining fluctuations in the official FX rate. This last finding allows us to conclude that media coverage acts as an implicit check on the discretionary use of FX policy controls.

3. DATA AND METHODS

Our first major source is the *Inflationverdadera* data collection project, which supplies us with daily consumer prices for Venezuela. Prices were collected for many consumption items available for sale in supermarkets and then aggregated using a set of relevant consumption basket weights into an index that is our main variable of interest. The obvious limitation is that this basket might not accurately represent Venezuelan consumers' spending patterns, given the widespread availability of subsidized goods and the impact of price controls on large segments of the population. In section C of the online Appendix, we provide more details; a comparison with the official consumer price inflation (that was released by Venezuelan authorities with a substantial delay) shows that *Inflationverdadera* prices provide a reasonable approximation of the inflation dynamics we want to investigate.

Bloomberg is our second major source, which is used for financial data. We employ daily official FX rates for the local currency, the Bolivar, against the USD as well as daily WTI oil prices expressed in USD. Our sample covers a very challenging period for Venezuela – a period characterised by hyperinflation, absence of official data statistics, political turmoil and generalised economic decline; the sample starts the day after the introduction of the new auction-based FX fixing in February 2018 and runs on a daily frequency until the end of February 2020.[11]

For media news, we draw our data from GDELT (i.e. *Global Database of Events, Language, and Tone*), which is a large project set up to monitor broadcast, print and online media news from all over the world. The project was set up with support from Google, which provides the critical infrastructure and

[10] An official FX depreciation would limit reputation losses by narrowing the FX gap but in the same time fuel inflation due to the high passthrough; the estimated three-month interval allows the central planner to derive some short-term, indirect benefits, like buying 'social peace' with more fuel subsidies via monetary creation.
[11] We wanted to avoid the large, lockdown-induced, drop in WTI oil prices from spring 2020.

technological support enabling GDELT to function as a database; an early description of it is provided by Leetaru and Schrodt (2013). We extract various proxies for media coverage, using for each specific domain or topic a short list of synonyms; more details are in section D of our Appendix. As discussed in Gentzkow et al. (2019), a major challenge in using media news, and text data more broadly, is the inherent high dimensionality, which often requires complex dimension reduction techniques to extract meaningful insights. To deal with high data dimensionality, our media proxies are expressed as the relative share of a specific topic within total media coverage. The sheer volume of news can significantly shape expectations, as demonstrated by Fronzetti Colladon et al. (2023), revealing that the frequency of economic-related keywords robustly predicted consumer confidence. Obviously, relying on topic shares constructed based on news volumes (i.e. quantities) would overlook qualitative aspects such as sentiment or tone that are also critical for understanding media influence; we explore the qualitative dimension of our media proxies but do not find significant results for which reason we relegate the discussion in section E of the Appendix. Complementary proxies could measure the diversity of media narratives or network analyses that track information dissemination across media channels, which are all rather difficult undertakings in the confined media landscape of Venezuela.

In term of analytical methods, we estimate *vector autoregressive* (or VAR) model specifications that allow us to efficiently capture the high-frequency dynamics of all endogenous variables. To draw our main insights, we rely on standard impulse response functions (IRFs) and variance decompositions (VDs) methods.

4. EMPIRICAL ANALYSIS

4.1. Official FX as a nominal anchor

From 2003 the Venezuelan government introduced strict currency controls, fixing the exchange rate and establishing a national commission to regulate foreign currency transactions. This system aimed to prevent capital flight and stabilize the Bolívar but led to the emergence of a parallel black market due to limited access to official rates. Further adjustments occurred in 2014 when the government

announced a dual exchange rate system: a preferential rate for priority sectors and a higher rate determined by the Central Bank's currency auctions for other sectors. These measures struggled to unify the exchange rates, resulting in persistent disparities between official and black-market rates (see section A in the Appendix).

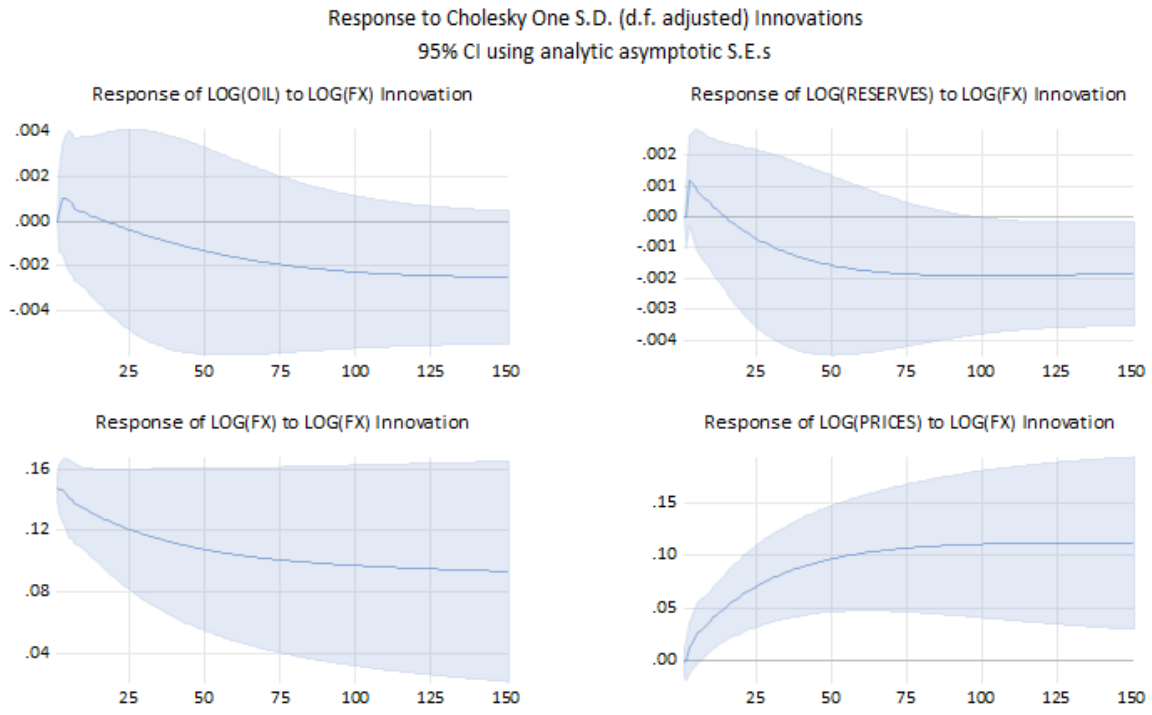
During 2018-2019, the official FX rate was heavily managed by the central bank;[12] limited amounts of USD were sold during regular auctions to the local banks, whose bids were averaged to determine the daily FX fixing. With large official reserves bolstered by decreasing oil exports (due to heavy international sanctions) the government could exert an effective control over the supply of dollars in the interbank market, effectively employing FX depreciation as a policy lever. Stable FX rates would anchor inflation expectations, but an FX depreciation would bolster public revenues, denominated in local currency; FX depreciation could then be used to expand subsidies (e.g. like free fuels), enabling the government to alleviate living costs and slow (hyper)inflationary pressures. This mechanism is consistent with existing anecdotal evidence about the impact of government subsidies for the fuel sold by PDVSA – the large state-owned company responsible for the exploration, production, refining and distribution of petroleum products. Hence, international oil prices served as the only hard constrain on the size of central bank reserves, which served to backstop the overvalued official FX rate relative to its black-market levels.

In the first step of our empirical analysis, we quantify the FX passthrough into domestic consumer prices from a simple four-variable VAR. The four endogenous variables are the following: $[OIL, REZ, FX, PRICES]$, where OIL denotes WTI prices in USD, then REZ denote central bank reserves in USD, FX is the official exchange rate, and finally $PRICES$ denote the consumer price index based on *Inflacionverdadera* data. This VAR captures the mechanisms described above, with reserves being the most exogenous domestic variable (Lane and Burke 2001). A simple Choleski decomposition is applied, with $PRICES$ ordered last, FX ordered second last, then central bank reserves and, finally, international WTI oil prices; all variables are in log terms and in levels. To control for all sources of

[12] See news reported by Reuters, https://www.reuters.com/article/us-venezuela-economy-idUSKBN1FP2WK.

potential non-stationarity, we also include a linear trend. With daily data, we use 5 lags to remove the autocorrelation in residuals. The IRFs below indicate a full passthrough from FX changes into consumer prices after approximately three months (or 75 days). However, in the very short term, passthrough remains incomplete; after one month (or about 25 days), it is less than 60%. This time lag provides the government with sufficient flexibility in manipulating the FX rate, because any depreciation will immediately boost its revenues, which can be used to expand subsidies.

Figure 1: Responses to an official FX (depreciation) shock



4.2. Media influence

Our previous VAR model specification includes four variables, which capture the main drivers and constraints characterising the use of FX as a policy lever. However, inflation is not simply a monetary phenomenon, and there is extant literature showing that expectations and information frictions can

play a key role (see Pfäuti, 2024). Such information frictions may arise from sources and through mechanisms that are not explicit in our previous VAR specification (see also Pfajfar and Santoro, 2013). The media landscape in Venezuela is a rather complex environment, as we explain in section B from our Appendix. *FreedomHouse* (a nonprofit organization that conducts research and advocacy on democracy, political freedom, and human right) reports significant barriers to access, ranking Venezuela at the bottom of its global ranking. Meanwhile, propaganda and various forms of censorship are rampant. The role of state-controlled media in shaping public perceptions of economic conditions is well-documented in the literature (see Chomsky, 2011). Despite these challenges, online opposition media remained strong, able to organise social gatherings, national strikes and other civil events to which the government has been forced to respond. The evidence we report in Section B of the Appendix, using GDELT data, shows that the media landscape is not fully dominated by propaganda.

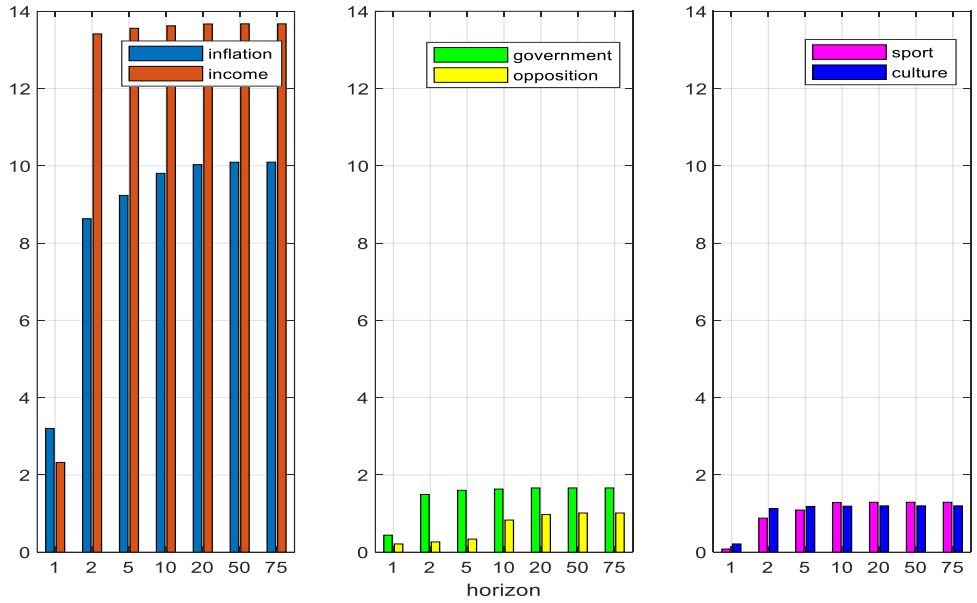
Including a media proxy in our model specification is a rather simple task, but it requires extra care when analysing the properties of the extended model. Since our media proxy is a stationary variable, the four initial variables are transformed in their first differences to allow stable variance decompositions. As discussed in section 2, we treat media coverage as an exogenous variable and order it just after OIL, keeping the Choleski decomposition for this extended model specification.

Although top stories everywhere are most likely about politics, international relations and economics, Boczkowski and Mitchelstein (2013) show that people generally like to consume news about sports, entertainment, crime and weather. Media coverage topics in Venezuela can vary widely, but the Maduro government can exert a large influence and control. Our preliminary analysis suggests that newsworthy content is first about *politics* and second about *economic* aspects (see section D in the online Appendix). We are not interested in identifying the specific (causal) impact of media news but rather its interactions with the other nominal variables, particularly with the FX rate.[13]

[13] Newsworthy events are likely unexpected, which creates prediction errors (Nimark 2014). However, media shocks are difficult to identify in the challenging media landscape of Venezuela, where despite strict government censorship (including banning and internet restrictions), independent media outlets are still able to reach out to their readers. See our detailed discussion in section B of the online Appendix.

We rely on the GDELT data engine to extract local daily news' volumes, differentiated by topic to have a broad representation of media coverage in Venezuela. We organise our topics into six large categories or topics covering *economics, politics,* and *entertainment* (e.g. sport and culture). Each main topic is identified here by a single keyword (to facilitate exposition), but we rely on various alternative synonyms to maximize coverage; for example, [topic: "inflation"] was extracted using closely related keywords like: "inflation", "price" and "prices"; for [topic: "income"] we used as keywords: "income", "wage", "wages", "salary", "salaries". More details about our media variable are provided in section D of the online Appendix.

Figure 2: FX variance explained by our media proxy, when differentiated by topic



Note: Share of FX variance explained by media shocks in a VAR estimated with 5 variables with a Choleski decomposition where media is ordered second after OIL. Media proxies are given as topic shares in total news volumes and are extracted from GDELT. The x-axis depicts the horizon where variance decomposition is performed; the y-axis depicts the % share of FX variance explained by media shocks in a 100 total.

As predicted by our theoretical model in section 2, media coverage is a key element influencing policy discretion. As illustrated in Figure 2, media explains a sizable share of the FX variance decompositions. A relatively high share of FX variance (around 9-14% at horizons ranging from one week to one month)

can be explained by *economic* news (discussing either "inflation" or "income" related topics). Topics covering *politics* explain a small percentage of the FX variance (below 2%), while *entertainment* topics (including "sport" and "culture") have similar explanatory power (around 1%). This result stands in sharp contrast to the observed distribution of topics in local media coverage; as shown in section E of the online Appendix, the relative share of local coverage allocated to *economics* is rather marginal, below 10%, compared to *politics*, for which more than one out of two news includes "government"- or "opposition"-related keywords.

The above result is perhaps surprising if we think that the government exerts substantial control over the local audiovisual media (e.g. TV and radio stations). King et al., (2017) show that, in democracies, even small media outlets can have nation-wide influences on public agendas and opinions. In autocratic regimes, propaganda works mostly by diluting media coverage with unrelated and/or irrelevant news (see Zhuravskaya et al., 2020; Boitani and Dragomirescu-Gaina 2023); such a strategy helps maintain political support for the incumbent by diverting media attention away from sensitive topics. Indeed, internet (DNS) blackouts, detention of journalists, and harassment of dissenting voices, are not unusual in Venezuela; many civil society groups complain about censorship, restricted access to independent news sources. Therefore, it is reasonable to expect that the government retains some significant influence over the general online media coverage too, although we need to rule out complete/absolute control.

The explanation is rather straightforward and aligns with our theoretical predictions: as media economic coverage increases, it becomes harder for the government to manipulate the FX fixing to some artificially overvalued levels to influence inflation and prices; FX rates were usually set below black-market levels to stabilize expectations, but this strategy can backfire because a large FX gap would create depreciation expectations, which would then increase inflation expectations. Hence, higher media coverage incentivises the central authority to depreciate an overvalued official FX rate, therefore reducing the FX gap relative to black-market levels. The FX responses to a media shock

compiled from our five-variable VAR (and illustrated in section E of the Appendix) confirm this interpretation, especially for media topics related to *economics* and *politics*.

To further support this claim, Table 1 presents the correlation coefficients between FX changes and the various media proxies, which are lagged by one week to avoid reverse causality concerns; to smooth out some large variations, we used 5-day averages for all variables. We only find positive and statistically significant correlations in the case of *economic* news, implying that a higher *economic* media coverage today (with topics related to "inflation" and "income") is associated with higher FX depreciation next week.

Table 1: Correlation between official FX changes and lagged media proxies

	Topic: "inflation"	Topic: "Income"	Topic: "Government"	Topic: "Opposition"	Topic: "Sport"	Topic: "Culture"
Correlation	0.12	0.08	0.03	-0.20	-0.06	-0.02
t-stat	2.88	1.74	0.72	-4.72	-1.29	-0.53
prob.	0.00	0.08	0.47	0.00	0.20	0.60

Note: Sample includes daily data from Feb. 2018 – Feb. 2020.

As a robustness check, we want to include a different type of data in our extended five-variable VAR specification. Maduro's government has regularly employed internet blackouts as a means of censorship, disrupting access to information and communication. To account for this, we add an additional dummy variable reflecting internet shutdowns that occurred between Feb. 2018 and Feb. 2020, totalling 17 days. The data was manually collected from NetBlocks.org, an independent and non-partisan global internet monitoring organization specializing in digital rights and internet governance; see section E in the Appendix. This censorship dummy works as an extreme but obviously discretionary tool for the government, hence it is ordered before all the other domestic variables (though second after OIL). Anecdotal evidence suggests that these shutdowns are more potent instruments of control than the manipulation of FX rates via official fixing; the latter functions much like a quasi-auction system, where inherent market dynamics could introduce uncertainty and allow for limited precision in managing currency fluctuations on a daily basis. In stark contrast, by completely severing digital

communication channels, the government can enforce an immediate and comprehensive suppression of dissent and information. We repeat the VDs exercise from Figure 2 by estimating a six-variable VAR but find no substantial difference; if anything, we see a higher share of FX variance explained by some of our six topics (particularly in the case of "inflation"). This robustness check underscores the main result about media's role as a crucial information channel, actively shaping the government's discretionary use of FX controls.

5. CONCLUSIONS

We delve into Venezuela's 2018-2019 hyperinflation episode to examine the complex interactions between key policy levers, domestic price dynamics, and online media. With scarce official statistics, we leverage data from the *Inflationverdadera* project to understand the high-frequency dynamics of consumer prices and government's responses. To navigate the hyperinflation chaos, the authorities relied on a range of discretionary policy controls, consistent food and fuel subsidies, increased military and political repression, and tightened their grip on media outlets and other information sources.

Our analysis is guided by a simple theoretical model that incorporates policy discretion, reputational constraints and inflation expectations influenced by media attention to nominal anchors, which become salient during periods of uncertainty, especially in hyperinflation episodes. We find that official FX changes are fully passed through into domestic prices within three months, confirming the role of the exchange rate as the ultimate nominal anchor. Large oil-funded central bank reserves enabled the government to maintain an overvalued official FX rate relative to black-market levels, which in turn helped anchor expectations and mitigate hyperinflationary pressures. Crucially, we demonstrate that media significantly influences the government's discretionary use of FX controls. This result only strengthens when we include internet blackouts as an additional control in the empirical model. While we can only speculate from here, this positive impact of media coverage likely helped restore some credibility, enabling the authorities to maintain a steady disinflation process in the years that followed.

Acknowledgements

We have no conflicts of interest. This research did not benefit from any external funding. We would like to thank Leandro Elia, Alistair Macaulay, Riccardo Masolo, Maurizio Motolese, Emiliano Santoro, Daniele Siena and Tommaso Tornese for comments. Obviously, all remaining errors are our own.

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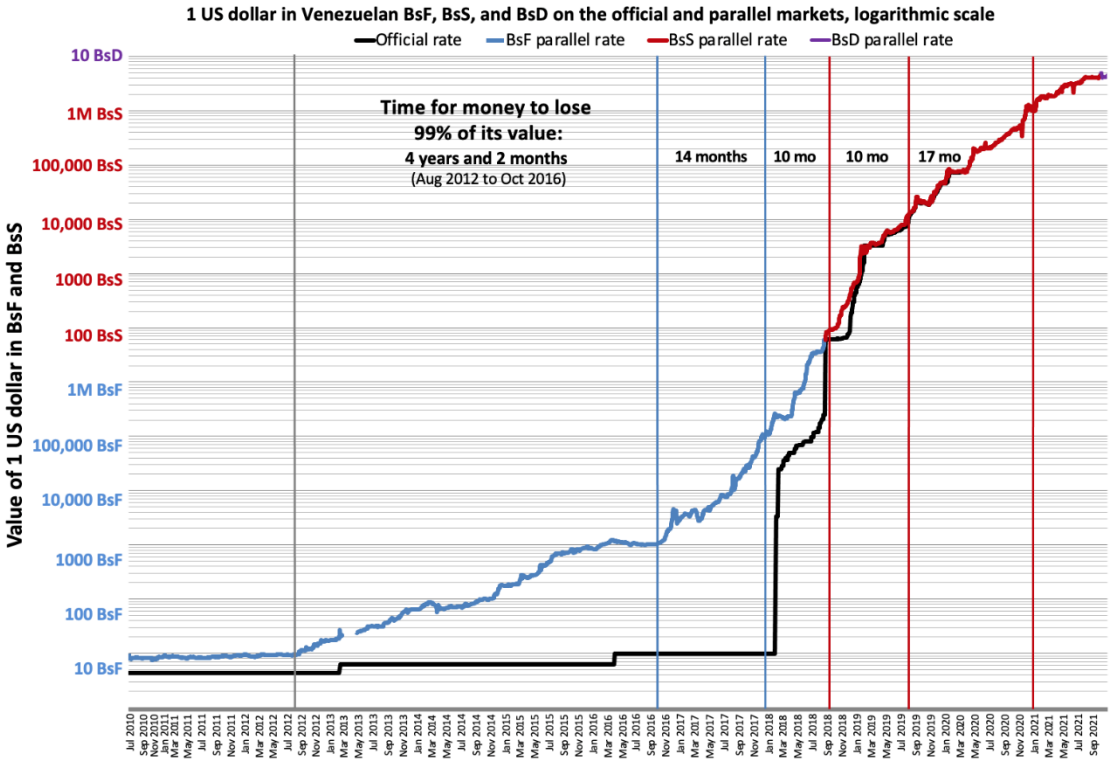
ONLINE APPENDIX

Section A: The Multi-Tiered Exchange Rate System in Venezuela

During 2018-2020 Venezuela was experiencing a complex and challenging economic situation characterized by, among many others, a multi-tiered foreign exchange system. The system included various official exchange rate levels for different purposes and sectors/individuals. Due to generalised corruption, it was mostly influent businesses and politically connected people who had access to preferred FX rates, generally reserved for essential imports (e.g. pharmaceutical products).

Due to the significant differences between the official rates and the real market conditions, a black market for foreign exchange flourished where individuals and businesses could access foreign currency at more realistic rates and in more adequate quantities. According to Wikipedia, the gap between the official and black-market FX levels was the largest before the Feb-2018 devaluation, which is the starting point of our sample. The gap subsided afterwards, but it still imposed a significant cost to business and people.



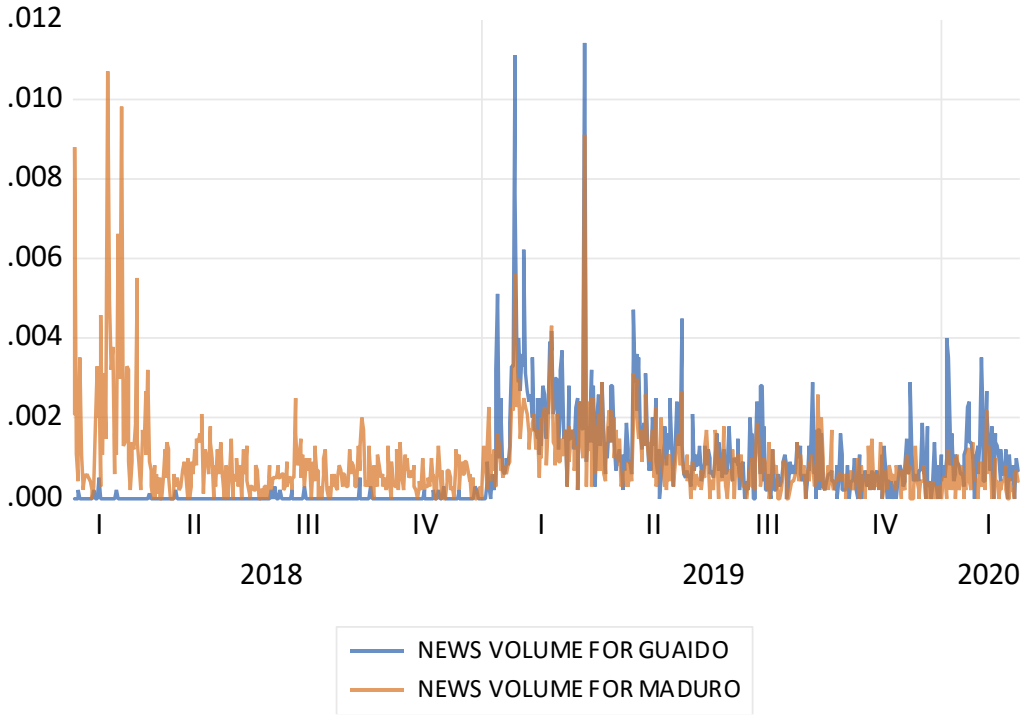
Note: Graph taken from https://en.wikipedia.org/wiki/Venezuelan_bol%C3%ADvar. Black market exchange rates (in blue, red and purple) were collected from https://dolartoday.com/indicadores. Official exchange rates (in black) are from http://www.bcv.org.ve/estadisticas/tipo-de-cambio. Notice the logarithmic scale for the three currency denominations (BsF, BsS, and BsD) used in Venezuela over the 2010 – 2021 period.

Section B: Media Landscape in Venezuela

Many independent voices, think-tanks, NGOs and even international bodies/organisations (e.g. United Nations Human Rights Committee) have consistently raised concerns about Maduro's government restricting and blocking internet access to independent media, as well as targeting and prosecuting journalists. Against this background, there is limited data available to reflect the media landscape in Venezuela. This section collects data and indicators from several sources in order to provide more details on the media landscape in Venezuela.

Strong government censorship typically extends to TV stations and channels in Venezuela (see Lutscher and Donnay, 2023). Online newspapers and media outlets are less costly to operate, hence they may escape censorship more easily. Our media proxy builds on GDELT data, which is intended to cover all traditional, online media outlets (i.e. hence social media platforms or WhatsApp groups are excluded). In the figure below we compare the GDELT news volumes for the incumbent president Maduro and the challenger Guaidó, who only raised to prominence in early 2019, after the results from the 2018 presidential election were contested; if anything, this figure shows that pro-government media does not completely dominate the domestic market for online news, as per the GDELT dataset.[14]

Figure B1: GDELT news volumes: "Maduro" versus "Guaidó" (or "Guaido")

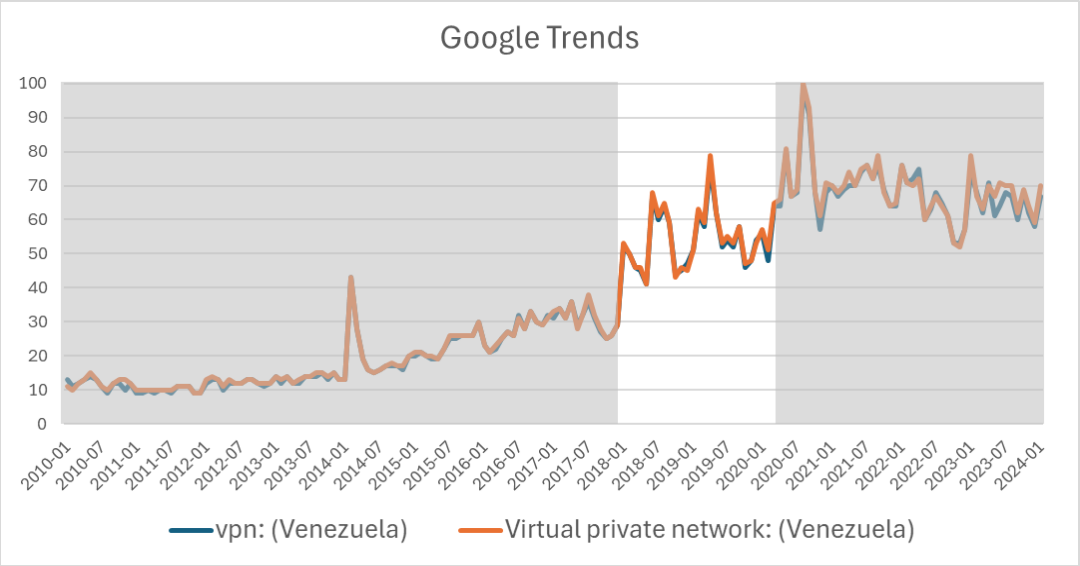


Note: We used "Maduro" and "Guaido" as the only keywords, while restricting our search to Venezuela only.

[14] Knight and Tribin (2022) show that during Chavez presidency, Venezuelans responded to government censorship by switching to opposition TV channels. While the media landscape during the Maduro's presidency has definitely changed (compared to the Chavez period), their result demonstrates that people are willing to search for alternative information sources in response to censorship.

We next rely on Google Trends to understand the demand for *free* access to information in Venezuela. Since "virtual private networks" or VPN are simple tools available in different countries, including in Venezuela, we use this as a keyword to construct the following figure. Notice the sharp increase that starts in early 2018; the highlighted area in Figure B2 below corresponds to our sample.

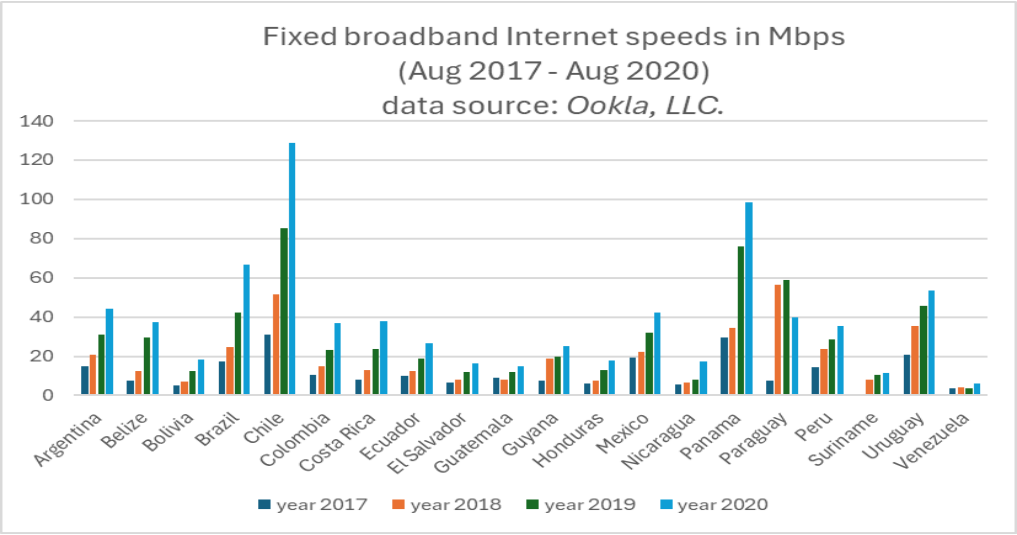
Figure B2: Google Trends search interest for "VPN" and synonyms



Source: Google Trends data

Despite remaining largely outside government control, online media in Venezuela faces increasing internet censorship, DNS blocking, and server restrictions as Maduro's government actively works to suppress information dissemination and limit access to critical content. To illustrate this idea, we rely on data from OOKLA L.L.C., which is a global leader in network intelligence and connectivity data. According to the figure B3 below, Venezuela had by far the lowest internet speed across South and Central Americas during 2017-2020, which largely overlaps with our sample.

Figure B3: Internet speed across South and Central America over 2017 - 2020



Note: This data is property of Ookla, LLC. and was downloaded in March 2025 from https://datahub.io/@cheredia19/ookla-speedtest-global-index-fixed-broadband-2017-2024

According to *FreedomHouse*, Venezuela experienced a marked decline in internet freedom between 2018 and 2020. Already categorized as "Not Free" in 2018, the country's "Freedom on the Net" score deteriorated over this period, as illustrated in Table B1 below, reflecting an intensification of state-imposed restrictions. The administration of Nicolás Maduro expanded its control over digital information flows through DNS blocking, server restrictions, and content filtering, with independent media and social networking platforms facing heightened censorship, particularly during politically sensitive events. The state-owned telecommunications provider, CANTV, played a central role in executing these measures, including temporary blocks on platforms such as Wikipedia and major social media sites. Furthermore, structural deficiencies, including recurrent power outages, exacerbated barriers to internet access. Journalists and online users encountered increased surveillance, arbitrary detentions, and cyberattacks, contributing to a pervasive environment of self-censorship. These trends underscore the erosion of digital rights and the broader contraction of Venezuela's informational and communicative space between 2018 and 2020. Some stabilization or even improvements can be observed after 2020, although it is early to draw definitive conclusions.

The *FreedomHouse* annual reports used in our characterisation above refer to 2018-2020 and can be freely downloaded at:
https://freedomhouse.org/country/venezuela/freedom-net/2018
https://freedomhouse.org/country/venezuela/freedom-net/2019
https://freedomhouse.org/country/venezuela/freedom-net/2020

Table B1: "Internet Freedom" scores provided by *FreedomHouse* for Venezuela, 2016 - 2024

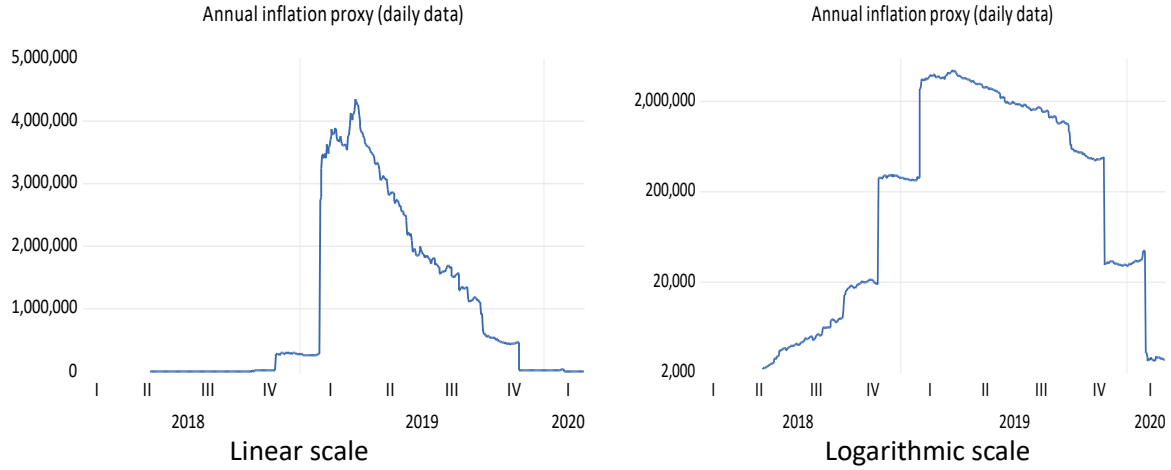
	2016	2017	2018	2019	2020	2021	2022	2023	2024
A. Obstacles to access (max value 25)	7	6	5	4	5	6	7	7	8
B. Limits to content (max value 35)	18	17	16	14	13	12	12	11	11
C. Violations of user rights (max value 40)	15	14	13	12	10	10	11	11	11
Total (max value 100)	40	37	34	30	28	28	30	29	30
Characterisation	Partly free	Not free	Not free	Not free	Not free	Not free	Not free	Not free	Not free

Note: *FreedomHouse* scores are available and can be downloaded from the following link: https://freedomhouse.org/countries/freedom-world/scores. The methodology to compile the scores is available at: https://freedomhouse.org/reports/freedom-net/freedom-net-research-methodology.

Section C: *Inflationverdadera* Data Collection project

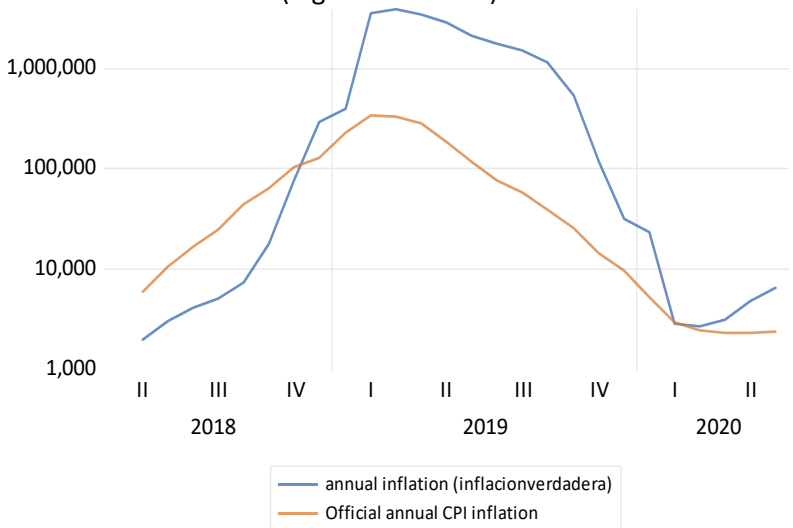
The figures below illustrate the dynamics of the annual inflation in Venezuela over a very challenging period, spanning from Feb. 2018 (after the introduction of the action-based system in setting FX rates) to Feb. 2020. Data are taken from *Inflationverdadera*.[15]
The central bank of Venezuela halted regular reporting in December 2015. It resumed releasing data in May 2019, also providing official CPI inflation figures for previous years (e.g., 2016, 2017, and 2018).

Figure C1: Annual inflation proxy over the Feb. 2018 – Feb. 2020 period



Note: Annual inflation rate is computed as 100*(IPC/IPC(-365) – 1), using the IPC data from *Inflationverdadera*. The left graph uses a linear scale, while the right graph uses a logarithmic scale.

Figure C2: Annual inflation - official data (logarithmic scale)

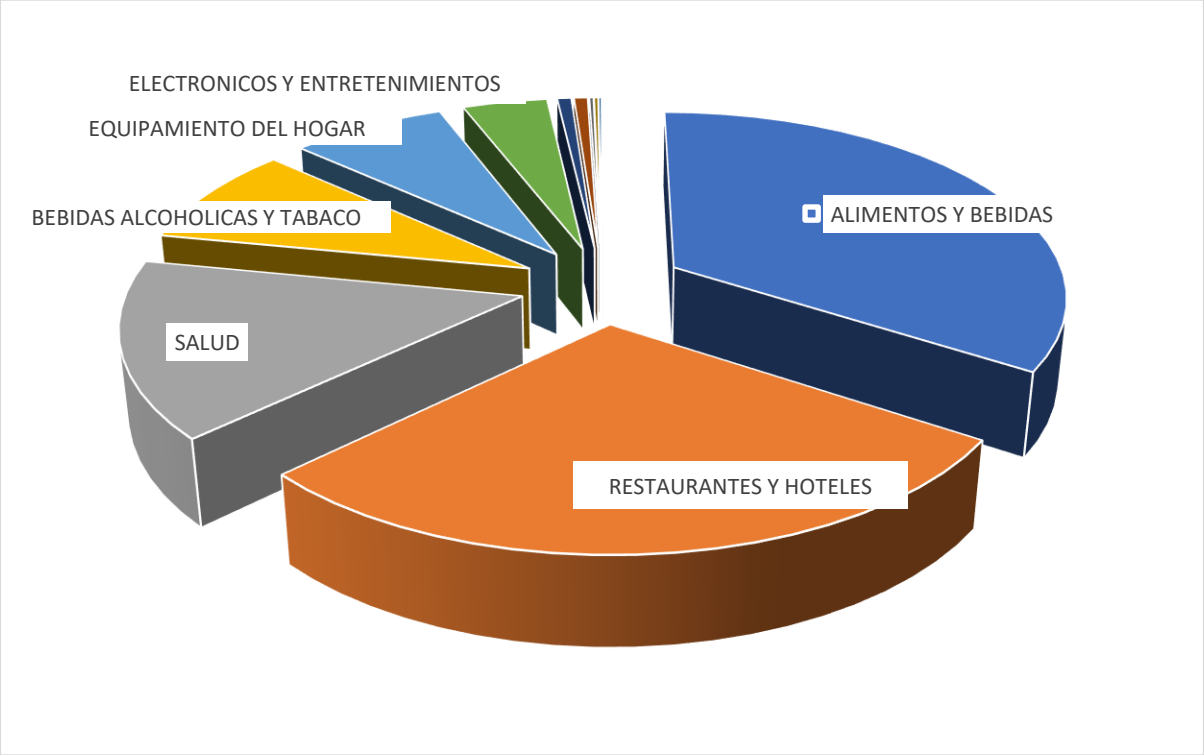


Note: Data source for official annual CPI inflation is the central bank of Venezuela.

[15] See more at http://www.inflacionverdadera.com and https://thebillionpricesproject.com.

Some 34455 prices were collected by volunteers shopping in Venezuela, across its major cities: Caracas, Maracaibo, Valencia, La Cruz Barcelona, San Cristobal, Merida, and Otras Ciudades.

Figure C3: Distribution of collected prices, by broad category, during Feb 2018 – Mar 2020



Note: Basket weights used to compile the consumer price index from *Inflationverdadera* project. Some 34455 prices were collected for various items, divided in broad categories as illustrated above. Not listed, are the following minor categories: vestido y calzado, bienes y servicios diversos, servicios de la vivienda excepto teléfono, transporte, comunicaciones (teléfonos y servicios asociados), servicios de educación, alquiler de vivienda.

Section D: Media Coverage Proxies and Topics

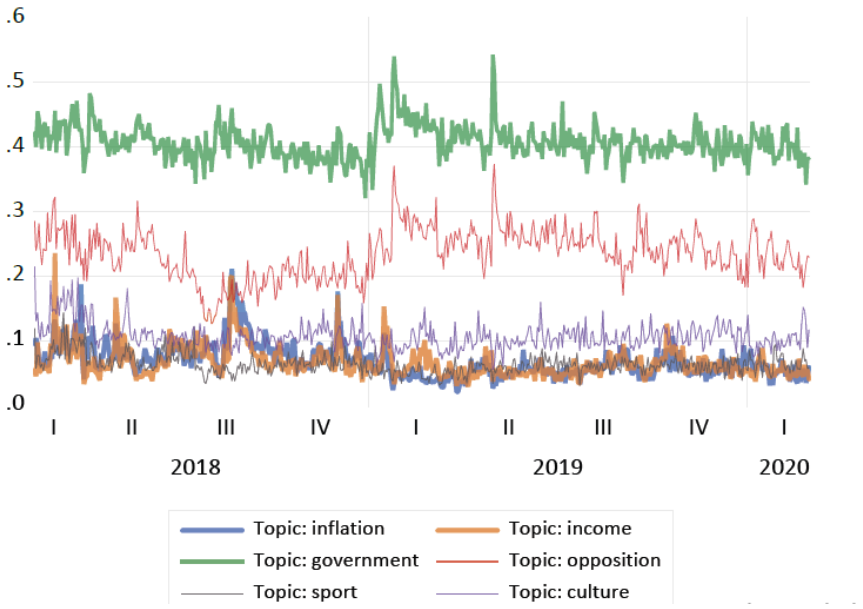
The following table summarises the main keywords (and synonyms) used to extract each media proxy from the GDELT data engine. All queries are restricted to report news volumes from Venezuela; for our empirical analysis, Sunday and Saturday news volumes are averaged with Monday volumes to match the data availability of exchange rates and WTI oil prices.

Media topic	**Keywords** (OR is a logical element connecting all keywords in a query)
Topic: "inflation"	"inflation" OR "price" OR "prices"
Topic: "income"	"income" OR "wage" OR "wages" OR "salary" OR "salaries"
Topic: "government"	"Maduro" OR "president" OR "government"
Topic: "opposition"	"Guaido" OR "Guaidó" OR "opposition" OR "America" OR "American" OR "Washington" OR "imperialists" OR "Western"
Topic: "sport"	"football" OR "game" OR "sport"
Topic: "culture"	"culture" OR "art" OR "artist" OR "music" OR "cultural" OR "movie" OR "actor" OR "song" OR "singer" OR "theatre"
$TOTAL\_news$	"and"

All our media proxies are indicators of *relative* media coverage, constructed by dividing the corresponding GDELT news volume with the total volume of local news (i.e. TOTAL_news extracted using "and" as a keyword, reported on the last row of the table above). The exact formula is:

$$Media\_proxy\_topic = log\left(1 + \frac{Media\_topic}{TOTAL\_news}\right)$$

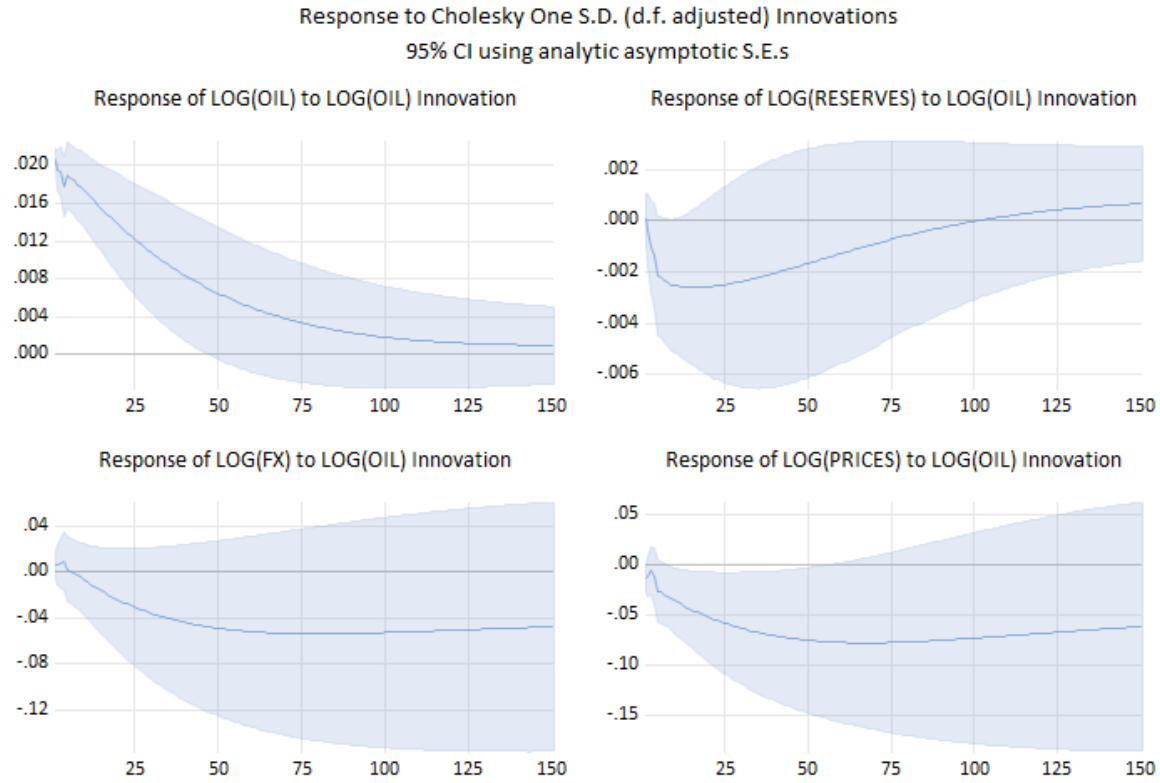
The following graph displays the time-series of all these media proxies, organised by topic. Note that news about *politics* dominate media coverage in Venezuela ("government" has a 40% share, followed by "opposition" with 25% share), while *economic* topics have small relative shares (below 10%).



Section E: Additional Results, Robustness Checks and Alternative Proxies

Due to their country's OPEC membership status, Venezuelans benefit from heavily subsidised prices for fuels, provided by the local monopoly conglomerate PDVSA. International oil prices capture precisely this seigniorage effect, where lower oil prices result in reduced public revenues and increased inflation due to the necessary monetary creation to finance fuel subsidies. With exports dominated by petroleum products, seigniorage decrease with lower international oil prices, thus constraining the government's ability to subsidise the prices of essential goods; in a heavily state-controlled economy, this translates into higher costs and prices because consumers need to find elsewhere what government cannot provide. Figure E1 below depicts a temporary drop in consumer prices after an oil shock - a drop lasting slightly more than two months that validates the mechanism exposed above.

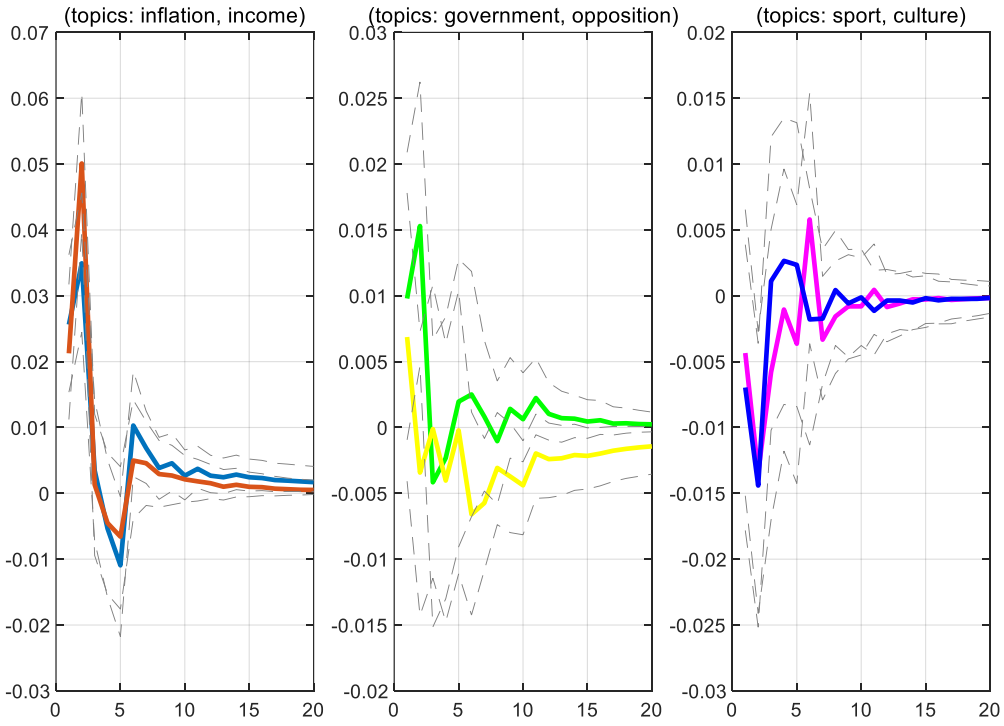
Figure E1: Responses to a positive oil shock from a VAR estimated in levels



Note: These IRFs are generated from a 4-variable VAR estimated in levels, using a Choleski decomposition as described in section 4.1. in the main text.

The following figure presents selected IRFs to a positive media shock, differentiated by topic. In line with our theoretical predictions from section 2, the official FX rate depreciates in reaction to a positive media shock (i.e. an increase in news volume) in *economic* news (topics: “inflation” or “income”) but much less so for *politics* news (topics: “government” or “opposition”); topics pertaining to “sport” and “culture” bring a very short-lived, negative FX response instead.

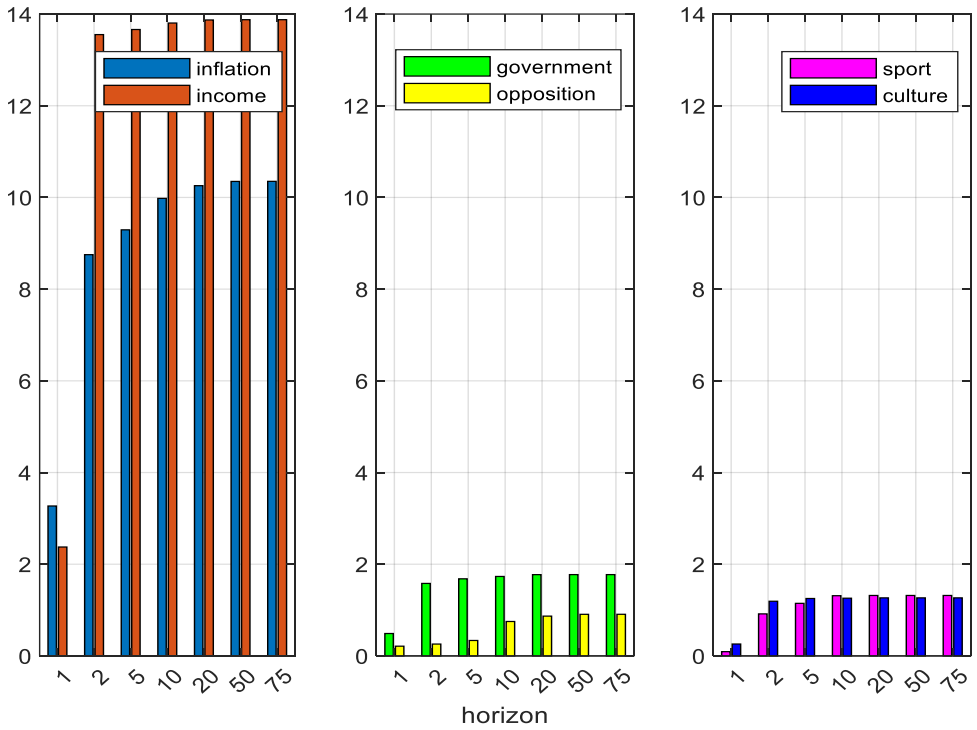
Figure E2: Median FX responses to a positive media shock, where media is differentiated by topic



Note: The grey dotted lines depict the 90% confidence interval for the median responses estimated from a 5-variable VAR estimated in first differences, as in Figure 2 from the main text. We use the same colour map and the same template to organise the plots as in Figure 2.

In our main robustness check we include an additional dummy variable that reflects internet blackouts occurring during Feb 2018 - Feb 2020 for a total of 17 days. Data was hand-collected from netblocks.org, which is a global internet monitor, independent and non-partisan, working at the intersection of digital rights, cybersecurity and internet governance. Because this dummy functions as government censorship instrument, it is ordered second, just after the OIL variable which is exogenous by default. Hence, the 6-variable VAR would feature media as its 3rd variable, because we are keeping the Choleski order. Variance decompositions for the FX variable are depicted below. If any, these VDs show slightly higher values for *economic* news (above 10% after a month), while the values for other topics remain confined below 2%, same as in Figure 2 from the main text.

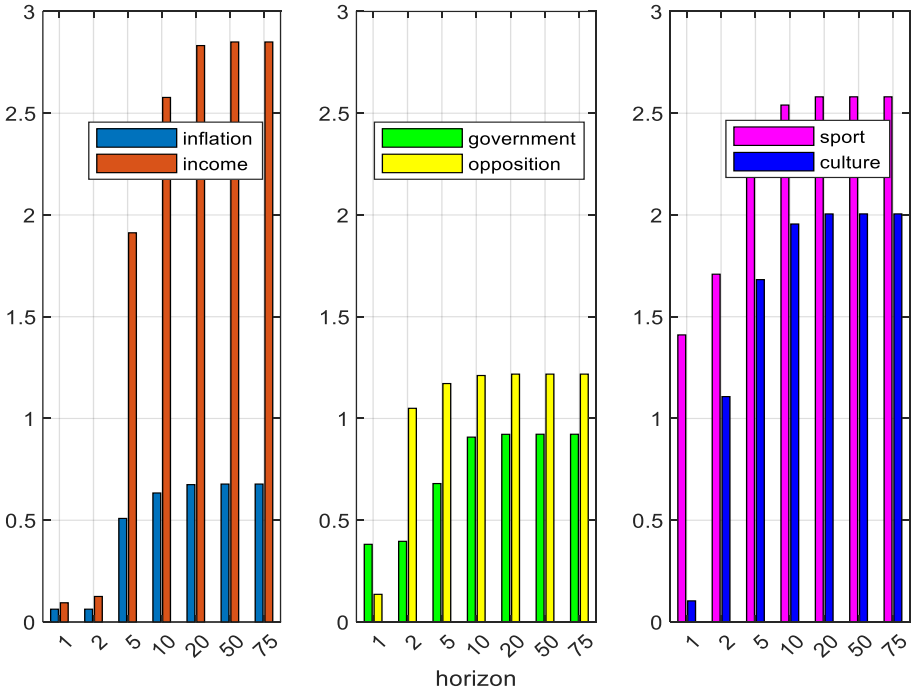
Figure E3: FX variance explained by media, differentiated by topic, in a 6-variable VAR



Note: Share of FX variance explained by media shocks in a VAR estimated with 6 variables with a Choleski decomposition where media is ordered 3rd after OIL and the dummy for internet blackouts. Media proxies are given as topic shares in total news volumes and are extracted from GDELT. The x-axis depicts the horizon where variance decomposition is performed; the y-axis depicts the % share of FX variance explained by media shocks in a 100 total.

The following figure instead summarises the VDs obtained after replacing the topic share of media volumes (our quantitative media proxy) with their corresponding media tones (a new qualitative proxy). The tone is automatically computed and provided by GDELT as an average for all news articles extracted after a user query. We keep the same queries (or keywords) as for the main analysis, differentiating our proxies by topic and download media tone data, averaging the values for Saturdays and Sundays with those for Mondays. We re-estimate the same five-variable VARs (as in Figure 2) and report the variance decomposition below. Notice that no news tone proxy, for any topic, explains more than 3% of the total variation in the official FX rate.

Figure E4: FX variance explained by media *tone* proxies, differentiated by topic



Note: Share of FX variance explained by media shocks in a VAR estimated with 5 variables with a Choleski decomposition where media is ordered second after OIL. Media proxies are given as news tones, differentiated by topic, and are extracted from GDELT. The x-axis depicts the horizon where variance decomposition is performed; the y-axis depicts the % share of FX variance explained by media shocks in a 100 total.