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## The Modern Hyperinflation Cycle: Some New Empirical Regularities

by José Luis Saboin-García

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I N T E R N A T I O N A L M O N E T A R Y F U N D

**IMF Working Paper**

Western Hemisphere Department

**The Modern Hyperinflation Cycle: Some New Empirical Regularities.**

**Prepared by José Luis Saboin García**

Authorized for distribution by Trevor Alleyne

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**Abstract**

Using a database of up to 62 variables for 196 countries over 57 years, a *hyperinflation cycle* has been characterized to propose a broader setting of stylized facts. Beyond the usual facts, the findings in this paper *contribute* to the literature of modern hyperinflations in that these cycles occur in contexts where there are (i) depressed economic freedoms, (ii) deteriorated socioeconomic conditions and rule of law, as well as (iii) high levels of domestic conflictivity and government instability. Despite social infrastructure factors improve during stabilization, they keep being substantially lower than the representative non-hyperinflation country, suggesting an important role for them in the occurrence of modern hyperinflations. Finally, the role of international financial assistance in stabilization was studied, noting that (i) a clear majority of hyperinflation countries used it, further improving their (ii) economic freedoms, and allowing themselves (iii) greater fiscal flexibility and (iv) more exchange rate stability.

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## I. MOTIVATION AND INTRODUCTION

Just when economists thought that hyperinflation was something from the past, it has aroused again: since November 2017, Venezuela has joined the hyperinflation<sup>1</sup> club. At the time of writing these lines (September 2018) year-on-year inflation has reached 488,865 percent.<sup>2</sup> This exponential increase in prices has been accompanied by a massive contraction of economic activity, although this fall had begun before the hyperinflation process initiated.<sup>3</sup> The social implications of this economic collapse have not been different: poverty indexes have increased, eradicated diseases have proliferated<sup>4</sup> and, for the years 2017 and 2018, emigration has been the highest recorded worldwide, according to the United Nations. Until today, the Venezuelan society has not envisioned a solution to these problems.

Given these circumstances, other societies might wish to know (or perhaps remember) how they can get into these situations, but also, and more importantly, how to avoid them. In this sense, the present work intends to revive the discussion about the empirical regularities of what in this work is called the *hyperinflation cycle*. This way, although this research wants to be exhaustive in comparing the behavior of a long list of economic variables (62, to be exact) in and out the cycle, it does not seek to spin finely on the interactions between them, nor the mechanisms of causation among them, nor to discriminate among them. That is, the work is a starting point to observe the generalities of these processes to then advance in depth to their analysis.

The results of the paper indicate that the hyperinflation cycle seems to be a phenomenon that, more than regional, occurs in economies with high presence of natural resource rents (and potentially higher State intervention in the economy) and where economic freedoms have been diminished, especially those related to property rights and the ease of doing business and economic exchange. The cycles also coincide with contexts in which socioeconomic conditions such as employment and real wages deteriorate, where the rule of law and democratic accountability are subdued, the instability of the government increases and there is a greater presence of military personnel over political issues. Although external factors matter, their role may not have been as important as domestic factors, especially those inherent to economic policy: high fiscal deficits, in some cases financed with external debt at the beginning and with seigniorage afterwards; inability to maintain a certain exchange rate regime and restrictions on transactions in the financial account of the balance of payments are the variables whose performance coincides with the advent of a hyperinflation cycle.

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<sup>1</sup> In the sense of Cagan (1956). In his seminal work, based on the European episodes that occurred between 1920-1946, Phillip Cagan defined hyperinflations as those that begin in the month in which monthly inflation exceeds 50 percent and that end in the month before the month in which monthly inflation is less than 50 percent for at least one year.

<sup>2</sup> According to the figures of the National Assembly, because the Central Bank stopped publishing these and other indicators since December 2015.

<sup>3</sup> See, IMF, World Economic Outlook, April 2017.

<sup>4</sup> According to ENCOVI (a consortium of researchers from the most important universities in the country).

The results also suggest that hyperinflation cycles end when there are improvements on three essential fronts: (a) the fiscal and monetary mix: fiscal accounts are closer to equilibrium and base money growth decreases substantially; (b) the interaction with the external sector: barriers to international trade diminish and the exp/imp capacity of the economy increases, the burden of foreign debt on exports regularizes, the resounding level of devaluation of the currency is stopped, hand in hand with less variability of the foreign exchange rate; (c) the structural factors: economic freedoms increase and there is improvement government stability and quality.

The paper continues in the following way: the next sections briefly comment the previous literature and the challenges of studying hyperinflation; section III explains the definition of the hyperinflation cycle and shows the dynamics of each phase; section IV talks about data and methodology; section V discusses the empirical findings for each block of variables. Section VI concludes and sections VII and VIII respectively present references and the appendix.

## II. THE CHALLENGES OF STUDYING HYPERINFLATION

Hyperinflation is an uncommon phenomenon. In fact, in what can already be considered a classic in the economic literature, Fischer, Sahay and Végh (2002) —from here on *Fischer et. al*— examined the main characteristics of hyper and high modern inflations. In their work, authors emphasize that, since the end of the Second World War and until 1996, hyperinflations, despite being a modern phenomenon, had been rare episodes and, rather, very high inflation processes —of about 100 percent— had been much more common.

Regarding the subject that competes this research, hyperinflation, these authors show that in the world there were no hyperinflations during the period 1947-1984. From 1984 until 1996, only 13 countries had experienced this phenomenon. Of which, four were Latin American countries (Argentina, Bolivia, Brazil and Nicaragua), two Africans (Angola and the Democratic Republic of the Congo) and six transition economies (Armenia, Azerbaijan, Georgia, Tajikistan, Turkmenistan, Serbia and Ukraine).<sup>5</sup>

Although from 1984 to 1996 hyperinflation episodes occurred almost annually, from there the occurrence has been minimal: only 3 countries have registered hyperinflation in the last 20 years. These countries are: Bulgaria (1997) —using the Cagan criterion; Zimbabwe (2007) and currently Venezuela (2017) —using the criterion of Fischer *et. al*.

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<sup>5</sup> It is important to note that the authors excluded episodes that lasted less than two months because many economies, especially those in transition, suffered only one month of inflation greater than 50 percent. But because these episodes were more in the nature of a price level adjustment than a continuous process of high inflation, the authors adjusted their definition to exclude them. However, if we include these countries, the list of countries with hyperinflation in the modern era amounts to 25.

The fact that hyperinflation is uncommon has important repercussions for its analysis. First, the infrequency of hyperinflations implies unusual levels of granularity and heterogeneity in the data, which implies high probability of leading to diversity of criteria in their definition, which in turn has the potential to create biased or impractical analyzes of the phenomenon in general, but also in particular.

An example of the above can be seen in the difference between the definitions of Cagan, Fischer *et. al*, and the rest.<sup>6</sup> While according to the definition of Cagan, hyperinflations of one and two months should be recorded as hyperinflation cases, the definition of Fischer *et. al* does not include them. This does not mean, however, that one definition is better than the other, but that both conform to the facts of study by their authors. This indeed happens with the definition most used in the literature —and this is what Cagan recognizes with its definition of hyperinflation— since it is based on the empirical regularities found in the European episodes during the interwar period. However, it is remarkable that the Cagan criterion, when applied to other episodes, can identify regularities like those found by this author.

The other repercussion of the rarity of hyperinflations is related to the statistical difficulties of small sample inference, especially those that attempt against the asymptotic properties of the parameters, as well as to unobserved heterogeneity. The combination of two limitations: short duration and low occurrence, presents important obstacles for statistical inference using standard regression methods. It is paradoxical, however, that the empirical regularities of hyperinflation make it one of the phenomena that has contributed the most to the field of macroeconomics.<sup>7</sup>

In addition to the above, another implication for the analysis of hyperinflations is associated to the lack of availability of high frequency data: while inflation data can be found at a monthly frequency, the data of other variables, like other macroeconomic variables (such as fiscal and external accounts), but especially structural variables and those of public policies (such as access to international financial assistance programs and changes in economic freedoms), whose frequency is usually annual. Although this is not a rigid impediment, since the variables can be aggregated (disaggregated), this process generally makes the estimates less accurate and, therefore, with potential to be biased.<sup>8</sup>

After the study of Fischer *et. al* in 2002, technological advances and institutional capacity has allowed researchers to apply new methodologies and incorporate new data, generating new

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<sup>6</sup> According to the International Accounting Standards Board, for example, hyperinflation occurs when a rate of 100 percent is recorded for three consecutive years. Reinhart and Rogoff (2011), when talking about modern hyperinflations, use the threshold of an annual rate of 500 percent.

<sup>7</sup> The stylization of money demand "a la Cagan" and its consequent utility for the advancement of the study of the demand for money and other monetary phenomena, can be an example of this.

<sup>8</sup> Some variables considered key to the study are only available in annual frequency, which on the one hand makes the strict application of the Cagan or Fischer *et. al* criteria difficult but on the other hand facilitates statistical inference in a wide sense. That is, what could be lost in accuracy is what is gained in empirical practicality.

approaches whose results have broadened the analysis of different phenomena. In this sense, the present work seeks to enrich the hyperinflation literature, not only by incorporating new variables, but by using non-parametric methods that, despite being simple, do not stop generating relevant information—as they reduce biases—and that, by being simple, are easy to understand to non-specialized audiences.

### III. STYLIZED FACTS: THE DYNAMICS OF THE HYPERINFLATION CYCLE

This study aims to observe the behavior of different variables during what has been termed in this paper as the *hyperinflation cycle* and in this way infer (i) under what conditions hyperinflation episodes have begun, (ii) what happens during these episodes, (iii) under what conditions the hyperinflation episode could probably end and (iv) what authorities could do to increase the probability that a disinflation process will be carried out successfully.

The hyperinflation cycle comprises two major stages (rise and fall), which in turn can be divided into two sub-periods each, taking a total of 4 phases. The first stage, *the rise*, is composed of (i) the phase prior to the hyperinflation period, which has been termed *extraordinary acceleration phase* or the path towards hyperinflation, defined as the period in which the annual average inflation rate is higher or equal to 50 percent, but less than 500 percent; and (ii) the *hyperinflation phase*, which is defined as the period in which it is greater than or equal to 500 percent. The second stage, which has been designated as *the fall*, is composed of (iii) the *disinflation phase*, defined as the period in which average annual inflation is less than 500 percent, but greater than or equal to 50 percent and (iv) the *stabilization phase*, which is defined as the period in which it falls below 50 percent and which remains below this threshold for a minimum period of five years. The duration of each hyperinflation cycle is the number of years in which inflation is within these thresholds, allowing the existence of deviations within each threshold (gaps) for periods less than or equal to five years.

The reason why the thresholds of 50 and 500 percent per year have been chosen is inspired in different methodologies applied in previous works, such as those of Dornbusch and Fischer (1993), Bruno and Easterly (1995) and Fischer *et. al* (2002). However, as mentioned in section I, the definition of a hyperinflation episode always contains some traces of arbitrariness.

In this sense, considering that various adjectives have been used throughout the literature to categorize inflationary episodes and that a single denomination still has not been agreed upon, the *extraordinary acceleration phase* is thus named due to the fact—found by Fischer *et. al*— that once annual inflation has exceeded the 50 percent threshold, the probability of it falling or remaining the following year is significantly less than half (33.6 percent), whereas once inflation has exceeded 400 percent a year, the probability that it continues to increase is 67.6 percent. On the other hand, when annual inflation is less than 50 percent, the probability that it is reduced or maintained is significantly greater than half (84.9 percent). See the highlighted area in table 1, below:

Inflation Range	Year T+1						Probability		Number of observations
	<25	25-50	50-100	100-200	200-400	>400	Rise	Fall	
<b>Year T</b>									
< 25	95.4	4.1	0.4	0.1	0	0	4.6	0	3,343
25-50	46.5	38.4	13.3	1.4	0.4	0	15.1	46.5	279
50-100	10.6	23	47.5	14.8	1.6	2.5	18.9	33.6	122
100-200	10.1	11.9	18.6	42.4	15.3	1.7	17	40.6	59
200-400	11.7	5.9	5.9	11.8	17.6	47.1	47.1	35.3	17
> 400	2.7	0	8.1	13.5	8.1	67.6	0	32.4	37
<b>Total</b>									3,857

Source: Fischer, Sahay y Végh (2002).

Under the criterion used in this paper, 19 hyperinflation cycles were found in 19 countries (Table 2).<sup>9</sup> In the Western Hemisphere, there are 6 countries (all Latin Americans): Argentina, Bolivia, Brazil, Chile, Nicaragua and Peru. In the Commonwealth of Independent States, 6 countries: Armenia, Azerbaijan, Belarus, Kazakhstan, Russia and Ukraine.<sup>10</sup> In Europe, 3 countries: Bulgaria, Croatia and Poland (although by the time, very influenced by the USSR). In Africa: Angola, Democratic Republic of the Congo (Zaire) and Zimbabwe. Finally, in Asia and the Pacific, 1 country: Indonesia.

The duration of an average hyperinflation cycle is 16-17 years with an annual average inflation of 893 percent (a median duration of 14 years and a median annual inflation of 45 percent).<sup>11</sup> The longest cycle was 31 years in the Democratic Republic of the Congo, followed by Argentina (25 years). While the shorter cycles (6-8 years) occurred in economies in transition —although in many of these cases there is not enough data on phase 1, the results here coincide with the aforementioned studies. In Latin America, the country with the shortest cycle was Bolivia, followed by Chile, although the increase in prices in Bolivia was substantially greater than in Chile (Table 2).

<sup>9</sup> From this moment on, contrasts with other definition criteria will be reduced, leaving this exercise to the interested reader.

<sup>10</sup> Ukraine currently has an association agreement with the European Union. So far, not enough data have been found to complete the hyperinflation episodes of Georgia, Tajikistan, Turkmenistan and Serbia. Thus, these countries have been dropped from the sample.

<sup>11</sup> It is important to note that for some countries, such as Armenia, for example, data begins with the advent of the cycle, so the duration could be much longer in these cases.



**Table 2: Modern Hyperinflation Cycles in the World**

Region	Country	Initial Year	Final Year	Duration (years)	Cumulative Average Annual Inflation (%)	Average Annual Inflation (%)	Maximum Average Annual Inflation (%)
Africa	Angola	1991	2008	18	10,892	605	4,145
	Congo's Dem. Rep.	1976	2006	31	35,497	1,145	23,773
	Zimbabwe	1999	2013	15	27,404	1,827	24,411
Asia and the Pacific	Indonesia	1960	1973	14	2,187	156	1,136
Commonwealth of Independent States	Armenia	1994	2000	7	3,591	513	3,373
	Azerbaijan	1993	2000	8	3,218	402	1,662
	Belarus	1993	2006	14	4,940	353	2,221
	Kazakhstan	1994	2000	7	2,139	306	1,877
	Russia	1993	2004	12	1,638	137	875
	Ukraine	1993	2001	9	6,173	686	4,735
Europe	Bulgaria	1991	2002	12	1,885	157	1,058
	Croatia	1986	1999	14	4,646	332	1,500
	Poland	1982	1996	15	1,298	87	555
Western Hemisphere	Argentina	1972	1996	25	9,467	379	3,080
	Bolivia	1982	1991	10	13,791	1,379	11,750
	Brazil	1981	2000	20	11,631	582	2,948
	Chile	1972	1982	11	1,752	159	505
	Nicaragua	1985	1996	12	27,292	2,274	10,205
	Perú	1978	1997	20	13,006	650	7,482

Source: Author's calculations.

The average duration of the first phase (Table 3) is 8-9 years with an annual average inflation of 125 percent (a median duration of 8 years and a median annual inflation of 96 percent). It stands out that only 6 countries did not have this phase, that is, they went from inflation less than 50 percent per year to inflation greater than or equal to 500 percent per year, in one year. These countries are the economies of the Commonwealth of Independent States, whose episodes, according to the data available and the studies mentioned above, reflect more an adjustment to the price level than a continuous and endogenous process of high inflation. The longest *acceleration* took place in the Democratic Republic of the Congo (15 years), followed by Argentina (12 years). The shortest episode occurred in Angola, Azerbaijan, Bolivia and Chile (1-2 years), followed by Croatia (3 years) and Indonesia (6 years).

**Table 3: Modern Hyperinflation Cycle: Phase 1**

Country	Initial Year	Final Year	Duration (years)	Cumulative Average Annual Inflation (%)	Average Annual Inflation (%)	Maximum Average Annual Inflation (%)
Angola	1991	1992	2	383	191	299
Congo's Dem. Republic	1976	1990	15	950	63	104
Zimbabwe	1999	2005	7	1,347	192	432
Indonesia	1960	1965	6	746	124	307
Armenia	-	-	-	-	-	-
Azerbaijan	-	-	-	-	-	-
Belarus	-	-	-	-	-	-
Kazakhstan	-	-	-	-	-	-
Russia	-	-	-	-	-	-
Ukraine	-	-	-	-	-	-
Bulgaria	1991	1996	6	782	130	338
Croatia	1986	1988	3	369	123	186
Poland	1982	1989	8	502	63	245
Argentina	1972	1983	12	1,995	166	444
Bolivia	1982	1983	2	399	200	276
Brazil	1981	1987	7	1,131	162	228
Chile	1972	1973	2	431	215	353
Nicaragua	1985	1985	1	219	219	219
Perú	1978	1987	10	872	87	163

Source: Author's calculations.

The second phase (Table 4), *the hyperinflation*, has an average duration of 3-4 years with an average annual inflation of 2,912 percent (a median duration of 4 years and a median annual inflation of 1,330 percent), this being the shortest phase. The longest episode took place in Argentina<sup>12</sup> and Brazil (7 years),<sup>13</sup> followed by Nicaragua (6 years). The shortest episode occurred in Armenia, Bulgaria, Chile, Indonesia, Kazakhstan, Poland and Russia (1-2 years), followed by Azerbaijan, Bolivia and Ukraine (2-3 years).

The third phase (Table 5), *disinflation*, has an average duration of 3-4 years with an average annual inflation of 195 percent (a median duration of 6 years and an average annual inflation of 171 percent). The longest episode took place in Angola, (7 years), followed by Belarus, the Democratic Republic of Congo and Russia (6 years). The shortest episode occurred in Argentina, Bolivia, Brazil, Croatia, Kazakhstan and Poland (0-1 year), followed by Indonesia, Peru and Ukraine (1-2 years). Only 3 countries did not have this phase, that is, they went from inflation equal to or greater than 500 percent per year to inflation less than 50 percent per year, in less than one year. These are: Nicaragua, Bulgaria, Zimbabwe.

<sup>12</sup> Including 3 years of deviation from the threshold, 1986, 1987 and 1988. If we exclude these years, Nicaragua would go to the first place along with Brazil.

<sup>13</sup> Including 1 year of deviation in the threshold, 1991.

**Table 4: Modern Hyperinflation Cycle: Phase 2**

Country	Initial Year	Final Year	Duration (years)	Cumulative Average Annual Inflation (%)	Average Annual Inflation (%)	Maximum Average Annual Inflation (%)
Angola	1993	1996	4	9,145	2,286	4,145
Congo's Dem. Republic	1991	1995	5	32,586	6,517	23,773
Zimbabwe	2006	2008	3	26,048	8,683	24,411
Indonesia	1966	1966	1	1,136	1,136	1,136
Armenia	1994	1994	1	3,373	3,373	3,373
Azerbaijan	1993	1994	2	2,790	1,395	1,662
Belarus	1993	1995	3	4,121	1,374	2,221
Kazakhstan	1994	1994	1	1,877	1,877	1,877
Russia	1993	1993	1	875	875	875
Ukraine	1993	1994	2	5,626	2,813	4,735
Bulgaria	1997	1997	1	1,058	1,058	1,058
Croatia	1989	1993	5	4,147	829	1,500
Poland	1990	1990	1	555	555	555
Argentina	1984	1990	7	7,257	1,037	3,080
Bolivia	1984	1985	2	13,031	6,515	11,750
Brazil	1988	1994	7	10,396	1,485	2,948
Chile	1974	1974	1	505	505	505
Nicaragua	1986	1991	6	26,999	4,500	10,205
Perú	1988	1990	3	11,547	3,849	7,482

Source: Author's calculations.

**Table 5: Modern Hyperinflation Cycle: Phase 3**

Country	Initial Year	Final Year	Duration (years)	Cumulative Average Annual Inflation (%)	Average Annual Inflation (%)	Maximum Average Annual Inflation (%)
Angola	1997	2003	7	1,259	180	325
Congo's Dem. Republic	1996	2001	6	1,879	313	514
Zimbabwe	-	-	-	-	-	-
Indonesia	1967	1968	2	235	117	129
Armenia	1995	1995	1	176	176	176
Azerbaijan	1995	1995	1	412	412	412
Belarus	1996	2001	6	713	119	294
Kazakhstan	1995	1995	1	176	176	176
Russia	1994	1999	6	681	114	308
Ukraine	1995	1996	2	457	229	377
Bulgaria	-	-	-	-	-	-
Croatia	1994	1994	1	107	107	107
Poland	1991	1991	1	77	77	77
Argentina	1991	1991	1	172	172	172
Bolivia	1986	1986	1	276	276	276
Brazil	1995	1995	1	66	66	66
Chile	1975	1977	3	679	226	375
Nicaragua	-	-	-	-	-	-
Perú	1991	1992	2	483	242	410

Source: Author's calculations.

The average duration of the last phase is 5-6 years (Table 6), with an average annual inflation of 15 percent (a median duration of 5 years and an average annual inflation of 13 percent). The longest episode took place in the Democratic Republic of the Congo and Russia (9 years). For the rest, all countries managed to keep inflation below 50 percent per annum 5 years after the start of disinflation, especially Bulgaria, Nicaragua and Zimbabwe.

Country	Initial Year	Final Year	Duration (years)	Cumulative Average Annual Inflation (%)	Average Annual Inflation (%)	Maximum Average Annual Inflation (%)
Angola	2004	2008	5	105	21	44
Congo's Dem. Republic	1998	2006	9	1,271	141	514
Zimbabwe	2009	2013	5	5	1	4
Indonesia	1969	1973	5	70	14	31
Armenia	1996	2000	5	41	8	19
Azerbaijan	1996	2000	5	16	3	20
Belarus	2002	2006	5	106	21	43
Kazakhstan	1996	2000	5	85	17	39
Russia	1996	2004	9	258	29	86
Ukraine	1997	2001	5	89	18	28
Bulgaria	1998	2002	5	45	9	19
Croatia	1995	1999	5	23	5	6
Poland	1992	1996	5	163	33	45
Argentina	1992	1996	5	43	9	25
Bolivia	1987	1991	5	84	17	21
Brazil	1996	2000	5	38	8	16
Chile	1978	1982	5	138	28	40
Nicaragua	1992	1996	5	73	15	24
Perú	1993	1997	5	104	21	49

Source: Author's calculations.

In summary, the dynamics of the cycle shows that, on average, a hyperinflation cycle has a relatively long incubation period (8-9 years), a relatively short explosive phase (2-3 years), a period of disinflation generally at half of the incubation period (3-4 years) and almost all countries managed to stabilize prices five years after the inflation rate lowered the 50 percent threshold. The countries with shorter cycles were those belonging to the Commonwealth of Independent States, while the countries with the longest cycles were in Africa and Latin America. Coinciding with duration, the highest accumulated rates were recorded in Africa and Latin America and the lowest in the Commonwealth of Independent States. The same occurs with the maximum registered rates, although the highest average rates were found in Latin America.

#### IV. DATA AND METHODOLOGY

After having observed the hyperinflation dynamics, the next step is to try to determine which are the macro variables<sup>14</sup> that underlie these processes. In this sense, to observe what distinguishes these episodes, the median of a series of variables (62 to be exact) that have been considered "key" during the four phases (extraordinary acceleration, hyperinflation, disinflation and stabilization), the two stages (rise and fall) and the complete cycle has been estimated for two samples: the first sample involves the 19 episodes and the other sample comprises the rest of the countries (the control group). Subsequently, a statistical test was performed to determine if the difference between the medians of the two samples is significant at standard confidence levels (Tables 7 to 13)<sup>15</sup>. Figures 1 to 5 show a stylized representation of these key variables between the two samples at the two stages.

#### V. EMPIRICAL REGULARITIES

##### A. Hyperinflation and Fiscal and Monetary Factors

The median value of the whole sample for the government's fiscal balance as a percentage of GDP is -1.9 percent. Controlling for hyperinflation, the median value of this variable was around 3.1 percentage points lower during the rise stage (stage 1) and 1.5 percentage points higher during the fall stage (stage 2) than in the countries without hyperinflation, at the level of significance of 1 percent (see Figure 1, first column, charts 1 and 3, and first row of Table 7 for statistical significance). However, for the whole cycle, it is observed that the fiscal result of the government is 0.5 percentage points *higher* than in the rest of the sample, which would suggest that a hyperinflation cycle "helps" to improve fiscal accounts, but no statistically significant difference is found.

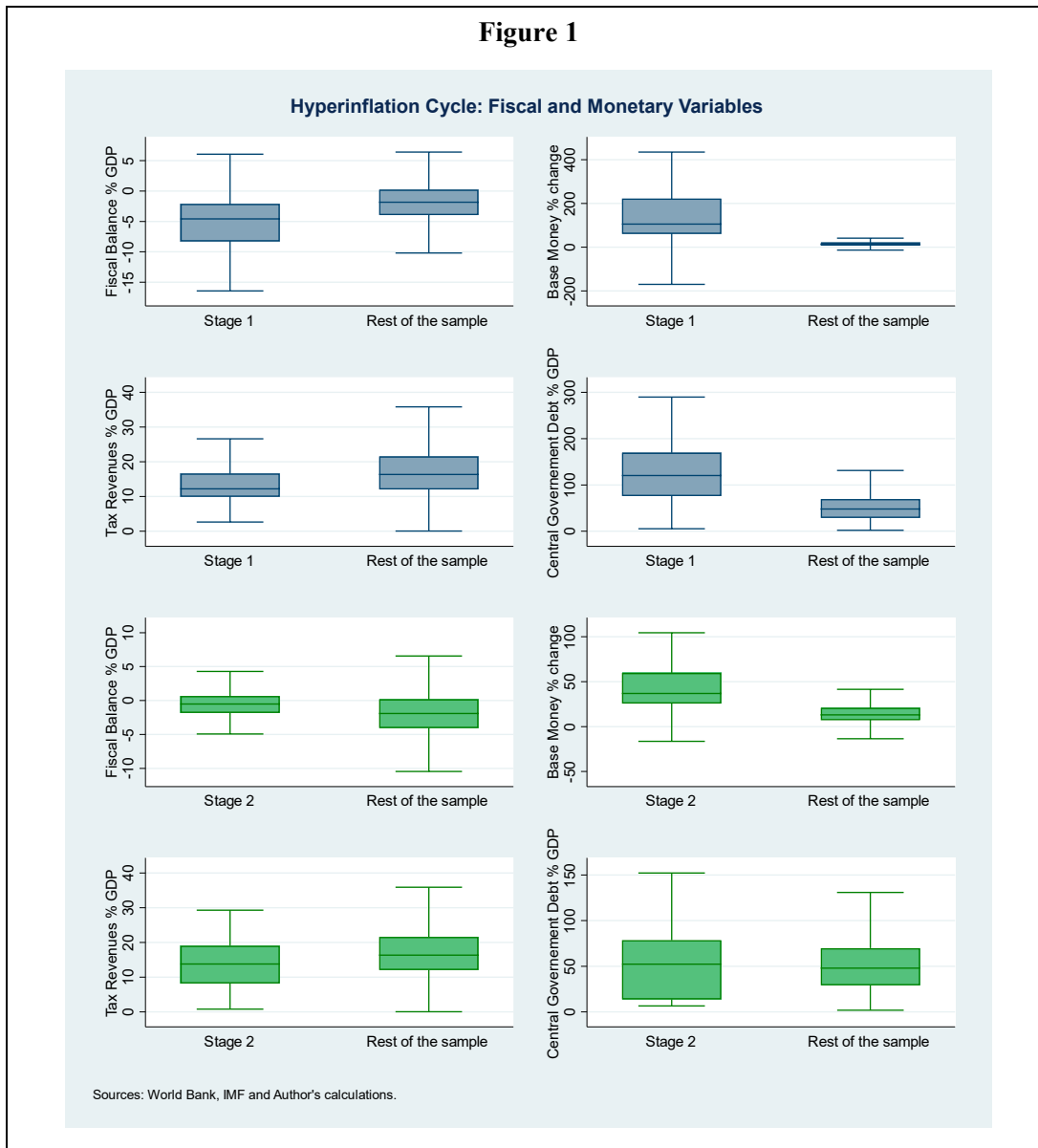
**Table 7: Modern Hyperinflation Cycle: Fiscal and Monetary Variables.  
Hodges-Lehman Median Differences 1/**

Variable	Phase 1 Acceleration	Phase 2 Hyperinflation	Phase 3 Disinflation	Phase 4 Stabilization	Stage1 Rise	Stage2 Fall	Cycle
Fiscal Balance (% GDP)	-3.2*	-2.6***	1.1*	1.5***	-3.1***	1.5***	0.5
Base Money (% change)	52.6***	241.7***	60.5***	18.1***	91.6***	24.3***	44.3***
Tax revenues (% GDP)	-2.4*	-5.2*	-2.6	-2.9*	-3.6**	-2.5	-2.9*
Central Government Debt (% GDP)	242***	67.6	-1.1	1.9	67.8	-1.3	10.9

1/ The significance at the levels of 10, 5 and 1 percent is represented as \*, \*\*, \*\*\*, respectively.  
Sources: World Bank, IMF and Author's calculations.

<sup>14</sup> See the statistical appendix for a complete description of each of these variables.

<sup>15</sup> The method used is the confidence interval test for the Hodges-Lehmann medium difference (1963), which is a special case of the average slope of Theil (1950), discussed by Sen (1968). Confidence intervals are used to identify equivalent values at a level of significance of 1, 5, and 10 percent. These intervals are calculated with robust variances since they consider the grouping of observations by countries. For the detail of this methodology, see Newson (2000).



A similar result is observed in tax revenues as a percentage of GDP, which is more than proportionally lower in stage 1 (3.6 percentage points) than in stage 2 (1.5 percentage points). This result may be related to the Keynes-Olivera-Tanzi effect,<sup>16</sup> by means of which hyperinflation not only reduces tax collection in real terms, but also erodes the tax base. Additionally, the result for the whole cycle of -2.9 percentage points is interesting: it suggests that a representative country of the hyperinflation cycle collects less taxes than the representative country of the sample.

On the other hand, the median value of the growth rate of base money (a proxy variable of seigniorage) is 91.6 percentage points higher in stage 1 than in any other part of the sample,

<sup>16</sup> See Fisher *et. al* (2002) for a reference and summary of this literature.

at 1 percent confidence; while it is also 24.3 points higher in stage 2, also at 1 percent, and throughout the cycle it is 44.3 percentage points higher than in the rest of the sample, also at 1 percent, being the median value of the entire sample of 13.2 percent. These results suggest that an extraordinary growth of base money is an invariable fact during all phases of the hyperinflation cycle (see Figure 1, second column, charts 1 and 3, and second row of Table 7 for statistical significance).

The results of this block of variables are in line with the previous findings of the literature, which suggest a relationship between fiscal deficits, seigniorage and inflation.

## **B. Hyperinflation and External Factors**

External factors matter. Especially when we want to try to answer the famous question: was it bad policy or bad luck? In several occasions external factors have been attributed part of the responsibility for the advent of a hyperinflation cycle (the bad luck hypothesis) while most of the occasions to domestic factors such as agents behavior (the bad policy hypothesis). Regarding hyperinflation, this study finds that the scale is tilted toward the bad policy side.

External factors can manifest themselves in several ways, among which we can find: (i) shocks in the terms of trade (affecting the real exchange rate and, therefore, prices; also, less income in foreign currency can induce greater seigniorage and, consequently, higher inflation), (ii) volatility in international capital markets (volatility in the markets can increase the cost of external debt and/or reduce its supply, possibly inducing seigniorage) (iii) restrictions on external financing (high interest rates, poor macroeconomic management, low institutional quality, diplomatic conflicts, etc., can reduce access to capital markets, inducing seigniorage) (iv) restrictions on foreign trade (trade wars, controls on current account flows, can act as a shock to external accounts, reducing hard currency supply, increasing relative prices, therefore inducing seigniorage).

To understand the role of external factors in the hyperinflation cycle, an export price index has been used as a proxy variable of changes in the terms of trade. Regarding the role of market volatility, the Libor interest rate was used in real terms (using the U.S. GDP deflator) and the behavior of the VIX index. Given that several countries with hyperinflation have high levels of income from natural resources, a variable that measures the proportion of this income over GDP is also included, to see the role of price booms and collapses in countries dependent on them. To observe the role of trade restrictions and external financing, variables of the balance of payments have been considered, such as tariffs applied to tradable products and the balance of the current and financial accounts and their components. Table 8 below presents the results of the median difference tests for the external sector variables:

**Table 8: Modern Hyperinflation Cycle: External Variables.  
Hodges-Lehman Median Differences 1/**

Variable	Phase 1 Acceleratio n	Phase 2 Hyperinflatio n	Phase 3 Disinflation	Phase 4 Stabilization	Stage1 Rise	Stage2 Fall	Cycle
VIX Index (% change)	-0.2	-2.5***	1	0.3	-1.6***	0.4	0
Unites States real interest rate (%)	2.8***	0.6	-0.1	-0.5	1.9***	-0.3	0.5
Natural resource rent (% GDP)	1.7	1.7	3.3	1.1	1.7	1.4*	1.6*
Share of products subject to tariffs (%)	4.2***	-0.1	0	0	1.3	0	0
Average applied tariff (% of total tradable products)	2	6.9*	2.9***	2.8**	3.1	2.9**	3*
Current account (% GDP)	0.5	0.2	-0.5	-1.6	0.4	-1.5	-0.8
Export volume (% change)	-1.1	2.6	1.6	2.2**	0	3**	2*
Import volume (% change)	-5.7**	0.7	4.4	2.5	-3	4.5***	1.8
Export price - relative to US (Index, 2010 = 100)	-0.2	-0.3***	-0.3***	-0.2***	-0.2***	-0.2***	-
Import price - relative to US (Index, 2010 = 100)	0.1	-0.1	-0.1*	-0.1	0	-0.1*	-0.1
External debt interest payments (% Exports)	11***	4	-0.6	1.2	7.3***	0.6	2.4
Financial account (% GDP)	-0.2	0.1	-1.1	-2	0	-1.8	-1.2
FDI, net inflows (% GDP)	-1.2***	-0.9***	-0.2	0.5	-1.1***	0.3	-0.4**
FDI, net outflows (% GDP)	-0.2***	-0.2***	-0.1***	-0.1*	-0.2***	-0.1***	-
Portfolio investment (% GDP)	0	0	0	-0.1	0	0	0
International Reserves, flow (% GDP)	-4***	-3.6***	-1.4**	0.1	-3.8***	-0.2	-1.4**
International Reserves, stock (% GDP)	-4.5***	-5.5***	-5.4***	-1.9*	-4.9***	-2.7***	-
							3.7***

1/ The significance at the levels of 10, 5 and 1 percent is represented as \*, \*\*, \*\*\*, respectively.

Sources: World Bank, IMF, Saint Louis Fed and Author's calculations.

Although the difference in the median value of the price of exports in hyperinflation episodes is statistically significant at 1 percent, this is only slightly lower (-0.2 percentage points), with an exactly equal performance in the rise and fall stages, coupled with the fact that in the rise stage the difference is not statistically significant. This result would be reducing the emphasis of the hypothesis of the important role this variable might have at the beginning of a hyperinflation cycle. In sum, although the role of external prices is significant, its impact seems marginal.

In terms of market volatility, the median value of the VIX index is not different during the cycle, although it does not have statistical significance either.<sup>17</sup> However, during the first stage of the cycle, the volatility of the markets is 1.6 percent lower than on any other side of the sample. This result could be suggesting, among other things, that a hyperinflation cycle may develop despite greater stability in the capital markets. However, the real interest rate in the U.S. is up to 2 percentage points higher in the rise stage, at 1 percent significance, while in the rest of the stages (including the complete cycle), the difference is not statistically significant. Thus, higher borrowing costs could be an important factor.

<sup>17</sup> This may be since the VIX index collects information on market volatility since 1990.



Regarding restrictions to international trade, only a difference in medians is statistically significant. This variable, which is a quotient that measures the size of the tariff applied to tradable goods in the economy of origin, shows that, during the second stage of the cycle, this rate is up to three percentage points higher than in the rest of the sample, at the five percent level.

As another proxy variable to the performance of current foreign transactions, the balance of the current account as a percentage of GDP was used. For this variable, it stands out that—at least at the traditional levels of confidence—no difference in medians is statistically significant. This implies that the signs and magnitudes may differ across countries. However, the sign of the differences in medians during the two stages of the cycle contains relevant information: in the first stage, the balance of the current account as a percentage of GDP is 0.4 percentage points higher than the rest of the sample. In the second stage, it is 1.5 percentage points lower than in the rest of the sample.

This result can have different implications. Among them, we could have, given that external prices are somewhat lower during the cycle: (i) lower imports (both by reductions in economic activity and/ or restrictions—foreign and domestic—to the capital account that, in response to different policy options, may result in import cuts), (ii) lower volume of exports (due to falls in economic activity or trade restrictions), (iii) lower (or greater) payments of external debt and less repatriation of dividends (both due to the occurrence of defaults or to refinancing/restructuring of public external debt, as well as due to falls in economic activity and controls) and/or (iv) falls in current transfers.<sup>18</sup>

To test hypothesis (i), the behavior of prices and volumes of imports has been incorporated. In the case of prices, there are no significant differences, but in the case of volumes, it is observed that, in the first phase, the growth rate of imports is 5.7 percentage points lower, while during the second stage, it is higher by 4.5 percentage points, at the 5 percent level. In the case of export volumes (hypothesis ii), a positive difference of 3 percentage points is observed in the second stage of the cycle, at the 5 percent level. These results mainly suggest a deterioration and subsequent recovery of the absorption and export capacity of the economy during the cycle.

Similarly, to identify the role of external debt payments (hypothesis iii), we have observed the behavior of the variable that measures interest payments on foreign debt as a percentage of total exports of goods, services and net factor payments. This variable shows an interesting dynamic: it is 11 percentage points higher (and significant at 1 percent level) during the rise stage, while in the fall stage, especially during the beginning of disinflation (phase 3), it is 0.6 percentage points lower than the rest of the sample (although this difference is not statistically significant). That is, external debt interest payments increase significantly when

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<sup>18</sup> An analysis of this variable is not done, mainly due to the absence of data. However, the role of current transfers in a representative hyperinflation economy usually tends to be low.

domestic prices rise, then fall when the disinflation process begins and then regularize during the stabilization phase.

This behavior of the external debt service to exports during hyperinflation —especially the statistical relevance during the rise period— is interesting in the sense that it has potential to explain the contractionary role of fiscal policy in such episodes. It suggests, among other things, that increases in public spending based on increases in external debt have the capacity to alter the future allocation of resources (via fewer imports and increases in seigniorage, for example), affecting not only the government's capacity to generate goods and services but also that of the private sector (via the crowding out effect, increased borrowing costs, etc.), which in turn exacerbate the deterioration in economic activity and trigger other problems (such as shortages<sup>19</sup>), that reinforce the process of exponential increase on domestic prices.

The above described mechanism could be amplified in economies with a high level of natural resource dependency where the State also exercises a strong presence in economic activity, since committing exports proceeds to pay debt could have a deeper impact than in the rest of countries. This is the case of Angola, the Democratic Republic of the Congo, some Commonwealth countries, Russia, Bolivia, and Chile.

The median value of the financial account balance as a percentage of GDP is 1.8 percentage points lower during the hyperinflation cycle, although it is not statistically significant. It is noteworthy, however, that while this difference is not substantial in the first stage (between 0 and -0.2 percentage points), it is substantial in the second (between -1 and -1.8 percentage points). Inquiring through the components of the financial account, we observe that the flows of foreign direct investment (FDI, from now on) are 0.5 points of GDP lower (-0.4 for incoming flows and -0.1 for outgoing flows) during the cycle, at 1 percent level. These lower FDI flows are greater in the first stage than in the second, which suggests a greater inflow once inflation begins to fall and stabilize. The median value of portfolio investment is not significantly different from the rest of the sample in each of the four phases of the cycle, which suggests that the rest of the contraction of the financial account during the cycle comes from the other investment account and variations in international reserves. In fact, the median value of international reserve flows as a proportion of GDP is lower by 3.6 points, at the 1 percent level.

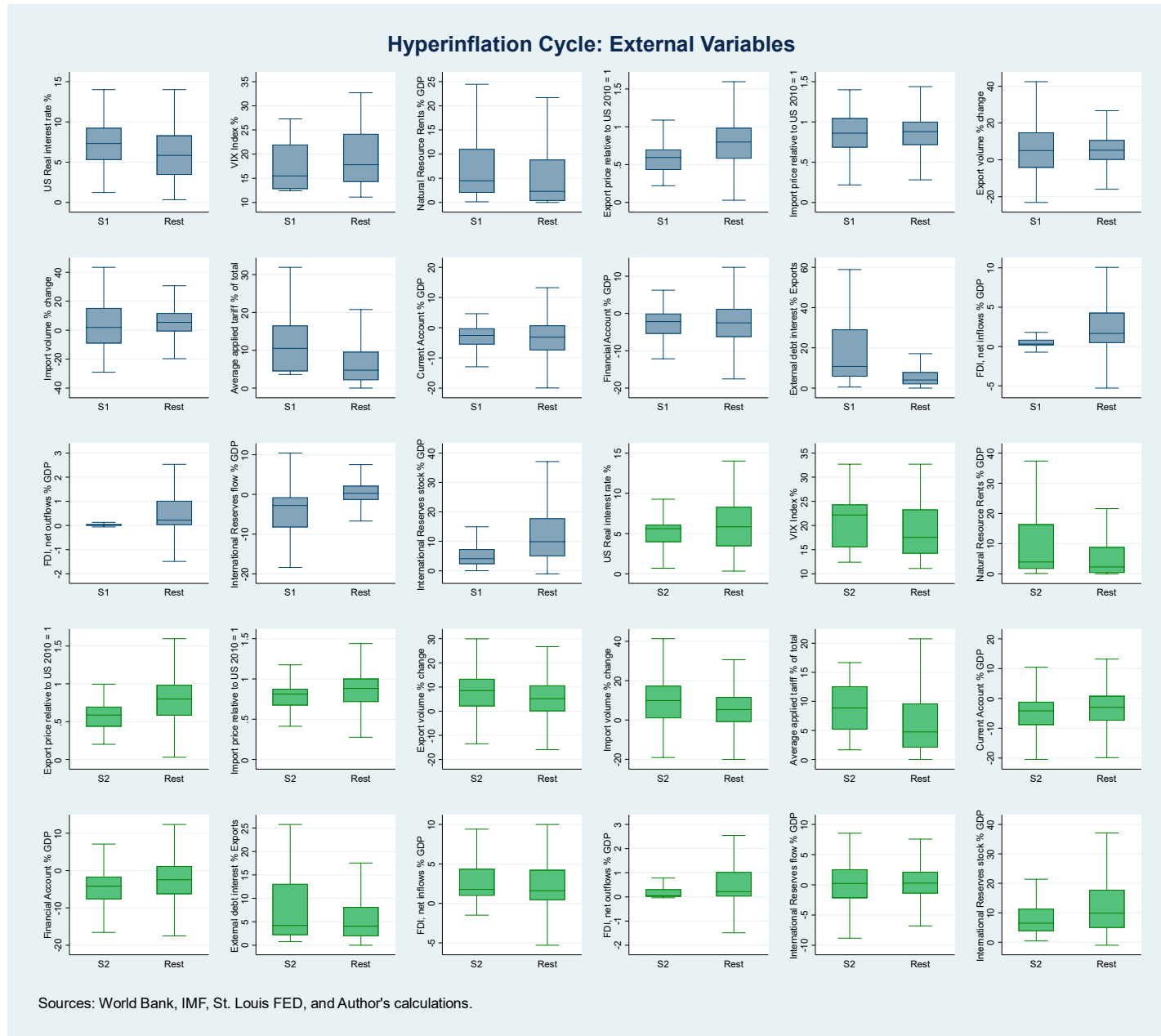
The results of the financial account could help conjugate the hypothesis that the lower current and financial accounts balances during the cycle are mainly due to (i) a greater burden of external debt service as a percentage of exports, (ii) lower FDI inflows and (iii) lower cash flows, lower commercial and financial loans and (iv) net losses of international reserves.

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<sup>19</sup> Although in Latin American and African cases there is granular evidence on the problems of scarcity during hyperinflation, unfortunately, due to data availability and scope of this research, the role of scarcity indicators is not incorporated.

In sum, from the analysis of external factors, it can be inferred that exogenous external factors (such as shocks in the terms of trade and volatility in international financial markets) are not very different during the hyperinflation cycle, although the role of external interest rates seems to be important. Rather, factors associated with economic policy variables, such as high fiscal deficits, intervention on current and capital account transactions, the exchange rate regime, basic economic freedoms, are the ones that differ significantly. See Figure 2 below:

Figure 2:



### C. Hyperinflation and the Real and Financial Sectors

This section goes on to explore the impact of the hyperinflation cycle in the two most important exchange sectors of the economy: real and financial. This section will evaluate the unanimous view of the economic literature that high inflation, in this case hyperinflation, is detrimental to economic growth. As well as the case that, in hyperinflations, the financial system contracts significantly, influencing the effect this sector has in the economy.<sup>20</sup>

In this sense, for the block of real variables, the growth rate of all components of aggregate demand (GDP) and the real exchange rate have been considered; while for the financial variable block, credit to the private sector and bank deposits (as proxy variables of the performance of the banking sector) were also considered.

**Table 9: Modern Hyperinflation Cycle: Real and Financial Variables.  
Hodges-Lehman Median Differences 1/**

Variable	Phase 1 Acceleration	Phase 2 Hyperinflation	Phase 3 Disinflation	Phase 4 Stabilization	Stage 1 Rise	Stage 2 Fall	Cycle
GDP growth (% change)	-3.8***	-7.2***	-3.2	1.2*	-5***	0.6	-1.9***
GDP growth, per capita (% change)	-4***	-7.1***	-3	2.1***	-5.2***	1.3*	-1.6**
GDP, per capita (USD 2010)	-549.4**	-442.1**	-622***	-242.9	-490.8**	-343.1*	-417**
Real consumption (% change)	-2.9***	-10.5**	-4.4***	1.3**	-3.9***	-0.3	-0.7
Real consumption, public sector (% change)	n.a.	-3.9**	0.2	1.3*	-3***	1.5*	0
Real consumption, private sector (% change)	n.a.	-4.6**	-0.9	-0.7	-2.9*	-0.9	-1.5*
Real Gross Fixed Capital Investment (% change)	-6.1***	-5.4*	-5	4.2**	-6.3***	3.2**	-0.9
Real Gross Fixed Capital Investment, public sector (% change)	n.a.	3.5	-3.6	1.2	3.5	1.8	2
Real Gross Fixed Capital Investment, private sector (% change)	n.a.	5.5	5.6	2.3	5.5	4.6	4.8
Inventories (% change)	-4	2.8	-7.2	4.5	-0.8	1.6	0.5
Real effective exchange rate (Index, 2010 = 100)	-36***	-3.4	-6.4	-9.9	-20.4	-9.1	-13.2
Bank credit to the private sector (% GDP)	-11**	-13.2***	-17.9***	-12.6***	-11.7***	-14.2***	-13.3***
Bank Deposits (% GDP)	-11.1***	-15.7***	-18.2***	-14.4***	-13***	-15.7***	-14.8***
Gross Fixed Capital Investment (% GDP)	-5.6*	-2.8	-4.1**	-4.5***	-4.2*	-4.2***	-4.3***
Gross Fixed Capital Investment, private sector (% GDP)	-4.3**	0.7	0.7	-0.6	-2.3	0	-1
Gross national saving (% GDP)	-2	-4.9*	-4.4	-6.5**	-3.4*	-5.9***	-5.1***

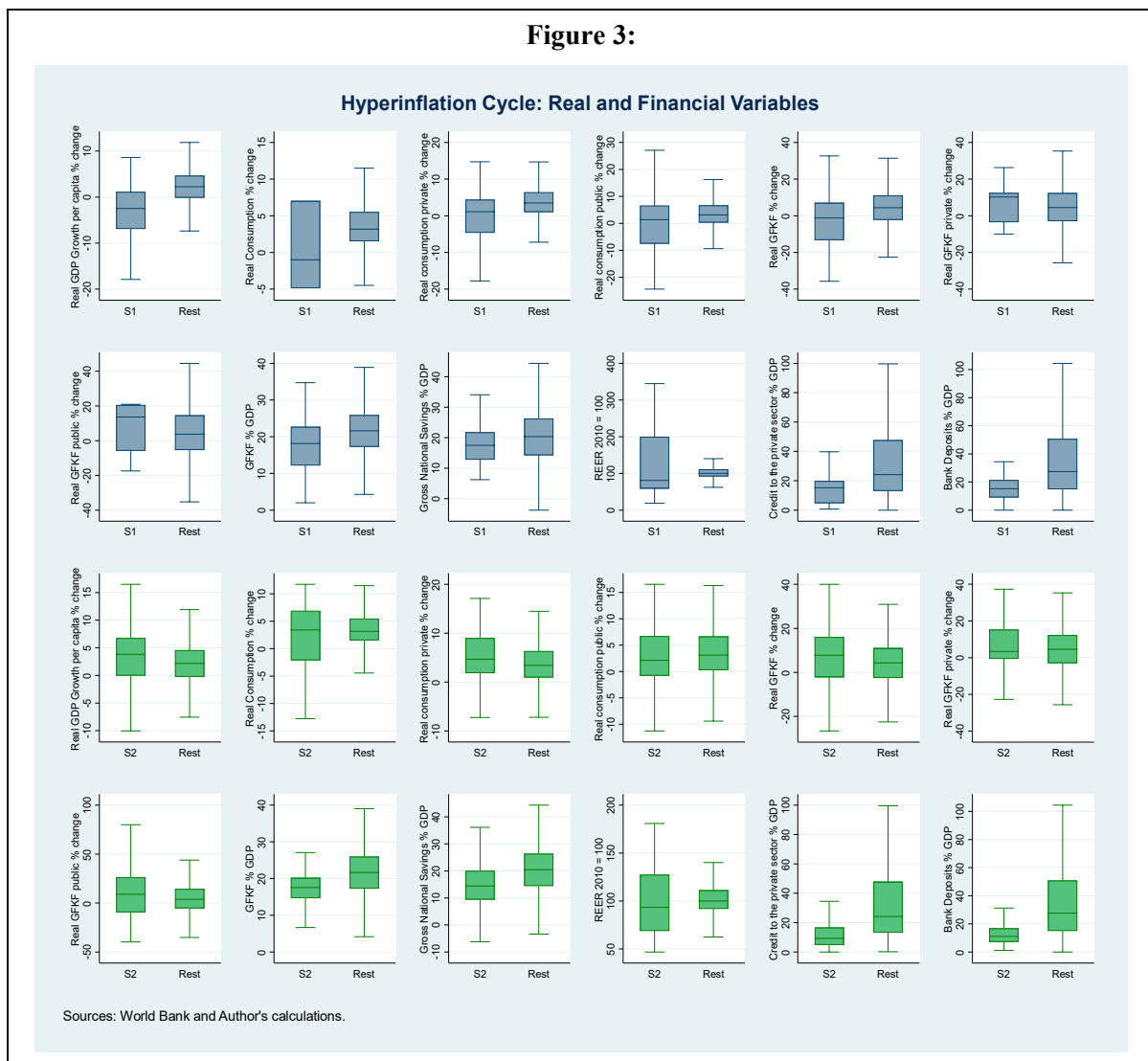
1/ The significance at the levels of 10, 5 and 1 percent is represented as \*, \*\*, \*\*\*, respectively.  
Sources: World Bank, IMF and Author's calculations.

The median value of 3 different variables that measure the performance of the economy: real GDP growth, real GDP growth per capita, and GDP per capita in constant dollars, is lower during the entire hyperinflation cycle, at least at the 5 percent level. Similarly, although there is a negative difference of medians throughout the cycle for consumption and investment,

<sup>20</sup> The performance of the financial sector can be analyzed using different methods and using different variables. However, given the old and little occurrence of a hyperinflation cycle, the availability of data is quite limited, so an in-depth analysis of the financial sector goes beyond the scope of this research.

these are not statistically significant. However, public consumption contracts by 1.5 percentage points, at the 10 percent level. In the case of the real exchange rate, while the median value is lower by 13.2 percentage points (which suggests a real depreciation), this difference is not statistically significant. Finally, investment and household savings as a proportion of real GDP are between 4 and 5 percentage points lower than in the rest of the sample, at the 1 percent level.

In the case of the financial sector, during the whole cycle, the average value of credit to the private sector as a proportion of GDP is 13.3 percentage points lower while the ratio of bank deposits/GDP is also lower by 14.8. percentage points, at 1 percent confidence in both cases. This result goes hand in hand with the previous findings of the literature on hyperinflations.<sup>21</sup> See Figure 3 below as a summary of these findings.



<sup>21</sup> See Reinhart y Savastano, (2002).

#### **D. Hyperinflation, Other Economic Policy Variables and Structural Factors**

In the previous sections it was described how, in this sample, and beyond a series of exogenous factors, an unsustainable macroeconomic policy mix highlights as the characteristic factor during all the hyperinflation episodes. However, these are not the only variables that the authorities of a country have to influence their economy. There are other economic policies, such as exchange rate policy (via the design and management of the exchange rate regime), as well as development policies (via changes or reforms that affect the structure and functioning of the economy), that also deserve to be considered.

In this sense, for the first block (exchange rate policy), three variables have been included: (i) the type of exchange rate regime (based on of Itzenski, Reinhart and Rogoff<sup>22</sup> database), understanding that changes in the exchange regime have repercussions on other policy variables as well as on the economy; (ii) an index of restrictions and controls to the financial account (using the Chin and Ito<sup>23</sup> Index), understanding that the level of regulation of international financial transactions impacts the flow of capital and, therefore, may increase seigniorage, and (iii) the depreciation rate of the nominal exchange rate, understanding — based on the extensive literature on the role of the nominal exchange rate as an economic policy variable— that country authorities intervene in the foreign exchange market so as to smooth out fluctuations as to promote the exports competitiveness<sup>24</sup> and that, in turn, large nominal exchange rate depreciations have an impact on the aggregate level of prices, the fiscal, monetary and external accounts, among others. (Dornbusch, 1993; Morales, 1989).

For the second block (structural changes), three variables have been included: (i) Heritage Foundation's economic freedom index,<sup>25</sup> understanding that changes in economic freedoms have an impact on the performance of the economy, (ii) access to multilateral financial assistance programs (particularly programs with the International Monetary Fund), understanding that these programs aim to improve the macroeconomic performance of countries in times of stress and (iii) country risk indicators from the International Country Risk Guide (ICRG),<sup>26</sup> which measure socioeconomic, institutional and political conditions, understanding that the hyperinflation cycle can affect (and be affected by) the behavior of these variables.

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<sup>22</sup> See Itzenski, Reinhart y Rogoff (2017).

<sup>23</sup> See Chinn e Ito (2006).

<sup>24</sup> See Calvo and Reinhart (1998), Frenkel (1979).

<sup>25</sup> For the detail of the calculation methodology of these indices, visit: <https://www.heritage.org/index/pdf/2018/book/methodology.pdf>

<sup>26</sup> For the detail of the calculation methodology of these indices, visit: <https://www.prsgroup.com/wp-content/uploads/2012/11/icrgmethodology.pdf>

**Table 10: Modern Hyperinflation Cycle: Exchange Rate Policy and Structural Variables. Hodges-Lehman Median Differences 1/**

Variable	Phase 1 Acceleration n	Phase 2 Hyperinflatio n	Phase 3 Disinflatio n	Phase 4 Stabilizatio n	Stage1 Rise	Stage2 Fall	Cycle
Nominal official exchange rate (% change)	52.6***	246.9***	66.6***	6.3***	94.4***	11.7***	39.8***
Exchange rate regime	10***	9***	9***	1	10***	3***	6***
Financial account openness (Index, from -2 to 2)	-0.8***	-1.1***	-0.8***	-0.1	-1***	-0.5	-0.7***
Economic Freedom (Index, from 0 to 100)	-18.1***	-25.5***	-20.2***	-12.8***	-21***	-	-
Property rights (Index, from 0 to 100)	-20**	-20	-10	-10	-20	-10	-10
Freedom from corruption (Index, from 0 to 100)	-4**	-17***	-20***	-8**	-8**	-11***	-11***
Fiscal freedom (Index, from 0 to 100)	-13.3***	-17.3***	-15.3***	-1.9	-	-5	-6.6**
Government expenditure (Index, from 0 to 100)	-11.5**	-30.5*	-14	-5	14.3***	-17.4*	-8.9
Business freedom (Index, from 0 to 100)	-11.1***	-15***	-12.7*	-15**	-15***	-	-
Labor freedom (Index, from 0 to 100)	-18.7***	-17***	n.d.	-21.5***	-	-	-
Monetary freedom (Index, from 0 to 100)	-41.2***	-74.5***	-71.7***	-38.3***	19.5***	15.4***	16.7***
Trade freedom (Index, from 0 to 100)	-13.6**	-21***	-18.2***	-12***	50.8***	58.1***	56.9***
Investment freedom (Index, from 0 to 100)	-30	-20**	-20	-20	16.4***	12.8***	13.4***
Financial freedom (Index, from 0 to 100)	-20*	-20**	-10	-10	-20	-10	-10
Socioeconomic conditions (Index, from 0 to 12)	-1.5	-3***	-3.5***	-2***	-2***	-2.5***	-2.5***
Bureaucratic quality (Index, from 0 to 4)	-1	-1	-1***	-1***	-1	-1***	-1**
Rule of law (Index, from 0 to 6)	-1	-2***	-1**	-0.5	-1.5**	-1	-1*
Corruption (Index, from 0 to 6)	0	-0.5	-1**	-1	0	-1	-1
Democratic accountability (Index, from 0 to 6)	-1.5*	-1.5**	-2***	-1**	-1.5**	-1***	-1.5***
Government stability (Index, from 0 to 12)	-2**	-4***	0	0.5	-3***	0	-1*
Military in politics (Index, from 0 to 6)	-1	-2**	-2**	-1	-1.5**	-1	-1*
External conflict (Index, from 0 to 12)	-1.5	-1.5	-1	0	-1.5	-0.5	-1
Internal conflict (Index, from 0 to 12)	-2.5	-4**	-3***	-0.5	-3**	-1*	-2**
Religious tensions (Index, from 0 to 6)	0	0	-1	0	0	0	0
Ethnic tensions (Index, from 0 to 6)	0	-1	-2**	0	-1	-0.5	-1

1/ The significance at the levels of 10, 5 and 1 percent is represented as \*, \*\*, \*\*\*, respectively.

Sources: World Bank, IMF, Heritage Foundation, ICRG and Author's calculations.

Regarding the role of the exchange regime, it is necessary to explain first that the Itzenski *et. al* Index moves on a scale of 1 to 15, with the first levels being “more pegged” regimes while the highest levels reflect regimes that float freely, depreciate in free fall or in which a dual exchange rate system with parallel markets exists.<sup>27</sup> That is, as the index increases, there is more variability in the currency.

In this sense, it is observed that, during the complete cycle, the median value of the index is 6 positions higher than the rest of the sample, at the 1 percent level. In stage 1, the median

<sup>27</sup> See statistical appendix for a detailed explanation of the index. To see in depth, review Itzenski *et. al* (2017).



value of the index increases 10 positions, while in stage 2 it increases only 3, also at the 1 percent level. During the first 3 phases, the median value of the exchange regime becomes between 9 and 10 positions “more flexible” than the median value of the rest of the sample, while, in the last phase (the stabilization), the index is only one position higher than the rest of the sample’s median, but this difference is not statistically significant. The median value of the exchange regime for the whole sample is 4 (i.e. de facto peg).

In other words, in the first stage, a fixed exchange rate regime changes to a free fall and/or dual market one. While in the stabilization stage, countries return to a regime of less fluctuation/more stability of/in the foreign exchange rate. This result suggests capacity, willingness and credibility losses in the management of exchange rate policy by the authorities during the cycle, perhaps as a consequence of the application of controls to foreign currency transactions, financing restrictions in capital markets, among others.

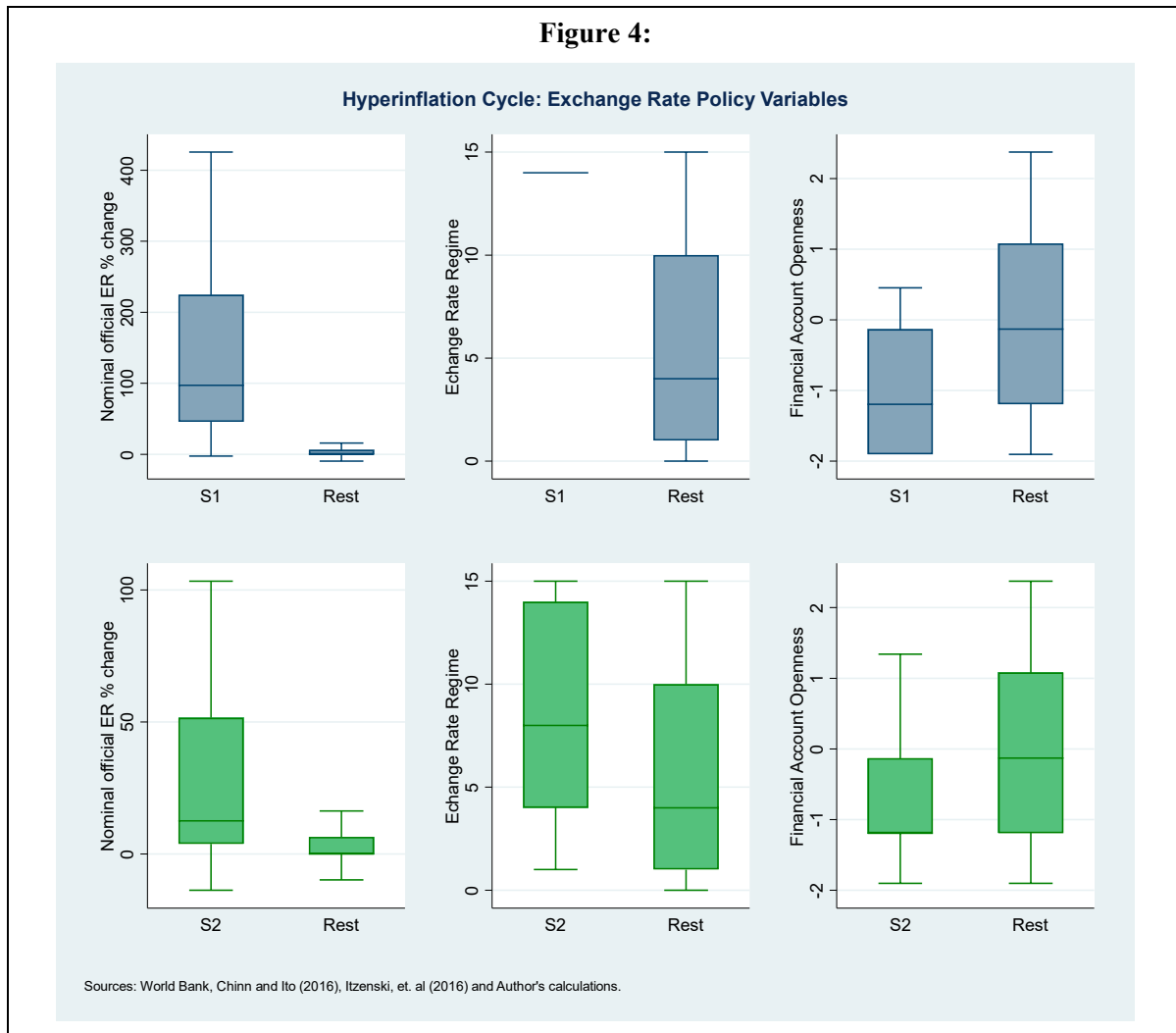
The previous results go hand in hand with the dynamics of the nominal exchange rate. For the whole cycle, the median depreciation rate of the official nominal exchange rate is almost 40 percentage points higher than the rest of the sample, this difference being significant at 1 percent level. In the first stage, the depreciation rate is 94.5 percentage points higher than in the rest of the sample, while in the second stage the difference in medians is higher by 11.7 percentage points, both at 1 percent confidence (the median value of the depreciation rate of the nominal exchange rate in the entire sample is 0).

Finally, the median value of the Chinn and Ito capital control index (ranging from -2 to 2, where a negative value reflects greater restrictions) decreases by 0.7 during the hyperinflation cycle, at 1 percent level. In the rise stage, this difference increases to -0.9 (also at the 1 percent), while in the fall stage it only decreases 0.5 points (although the difference is not statistically significant), highlighting that, in the stabilization phase, there are practically no differences with the median value of the rest of the sample (the median value of the index for the whole sample is -0.1).

The fact that the median value of the Chinn and Ito index for the entire sample is zero illustrates how, during the rise stage, countries have opted for a stricter stance towards capital flows, while, in the fall stage, things “return to normal”. That is, although the controls on the financial account do not reflect a statistically significant change on capital flows, the negative sign of the financial account for the entire cycle suggests two things: (i) greater control of these transactions does not achieve a change in the financial account at the first stage, that is to say, there is still a net negative balance (i.e. the net outflows of capital do not decrease, in any case they are contained), while (ii) their relaxation in the second stage deteriorates the net negative balance of said account (i.e. net capital outflows increase).

These findings show that, during a hyperinflation cycle, tightening the control over the financial account has the usual implications found in the literature on capital flows<sup>28</sup> and is even counterproductive because it exacerbates the external constraint in a context of deterioration of the local currency, possibly generating pressures on the nominal exchange rate and seigniorage. Relaxing this control, however, seems to go hand in hand with a lower pressure on the nominal exchange rate, less seigniorage and greater (absolute) capital inflows.

The results of the exchange rate policy set are consistent with the results for other policy variables mentioned up to this point, since they show that the exchange rate regime is rather accommodating price increases; and capital controls rather exacerbate the effects of other economic policy variables. See Figure 4 below:



<sup>28</sup> See Calvo *et. al* (2004).

With respect to the set of structural variables, in the case of economic freedoms (measured by the index of economic freedom, which ranges from 0 to 100 and where the higher the index, the greater the freedom) it is observed that, throughout the cycle, the median value of the aggregate index is 16 points lower than the rest of the sample, at 1 percent confidence. In the first stage, the index is lower by 21.1 points, at 1 percent confidence. In the second stage, the index is lower by 14.8 points, also at 1 percent confidence. For comparison, see Figure 5, column 1, charts 1 and 3, and so on.

Inquiring through the components of the index, it is observed that freedoms to do business, labor and exchange, decrease significantly, at the 1 percent level. The significant deterioration in fiscal (at 5 percent) and monetary (at 1 percent) freedom rates validates the findings in part A of this section. Likewise, freedom from corruption also deteriorates significantly during the cycle, at 1 percent confidence.

While these results are revealing and suggest that during the hyperinflation cycle restrictions to economic activities increase, two characteristics that underlie the sample should be highlighted and weighted: while only 3 of the 19 countries that have had a hyperinflation cycle show data coinciding with the index (since it starts in 1995), it is relevant that the median value of all countries (i.e. even when they were not at hyperinflation) that have had hyperinflation is up to 16 points lower than the representative value the rest of the sample shows, suggesting that hyperinflations are a phenomenon that occurs in contexts in which economic freedoms are substantially reduced<sup>29</sup>.

Likewise, indicators of political and social risk show that, during the hyperinflation cycle, there is a statistically significant deterioration in socioeconomic conditions (this being an index that considers variables of unemployment, consumer confidence and poverty). This result may reflect the closure of companies and the consequent loss of jobs, as well as the loss of purchasing power during hyperinflations. For a more detailed discussion of these issues see Bailey (1956), Braumann (2001).

Similarly, there is a deterioration in democratic accountability (at 1 percent confidence), the quality of institutions (at 5 percent) and the rule of law (at 10 percent); as well as greater instability in the government (10 percent) and greater internal conflicts (5 percent). It also highlights that, throughout the hyperinflation cycle, there is a greater presence of the military in the government (5 percent). Among other things, these results coincide with findings like those of Alesina and Drazen (1991), who show how institutional conflicts and political economy problems delay stabilizations.

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<sup>29</sup> Here, the sample of countries that have had hyperinflation includes Venezuela.

Figure 5:



The other economic policy variable that has been considered key during a hyperinflation cycle is multilateral assistance. Sargent (1982), in his seminal work on how the great European hyperinflations of the interwar period came to a halt, highlighted as an essential factor the role of international assistance not only in stabilizing prices but also in reactivating economic growth.

In this sense, it is observed that in 18 of the 19 hyperinflation cycles a program of financial assistance with the IMF has been implemented, Angola being the only country that did not request assistance. In the first stage, the presence of a program is observed in 45 percent of the cases. While, in the second, it is observed in 62 percent of the cases. If we observe the behavior of this variable in each of the four phases, three interesting facts stand out: (i) the absence of programs in phase 2 (hyperinflation), 66 percent of the cases; (ii) the greater presence of programs in phase 4 (stabilization), 67 percent of cases and (iii) that on the road to hyperinflation, the first phase, the presence of programs was 51 percent, suggesting that in half of the cases, a hyperinflation cycle developed despite having multilateral assistance.

The countries that used this assistance the longest were Democratic Republic of the Congo (12 years, 7 of them in phase 1, the rest in phase 4) and Argentina (12 years, starting one year before starting phase 2, until the end of the cycle). The countries that used this assistance the least were Zimbabwe (2 years, only at the beginning of phase 1) and Chile and Brazil (3 years, only in phases 2 and 3).

<b>Country</b>	<b>Program starts</b>	<b>Program ends</b>	<b>Duration (years)</b>	<b>Cycle starts</b>	<b>Cycle ends</b>	<b>Duration (years)</b>
Angola	-	-	-	1991	2008	18
Argentina	1981	1992	12	1972	1996	25
Congo's Dem. Rep.	1982	1994	12	1976	2006	31
Bulgaria	1991	2002	12	1991	2002	12
Kazakhstan	1994	2000	7	1994	2000	7
Ukraine	1995	2001	7	1993	2001	9
Poland	1990	1996	7	1982	1996	15
Bolivia	1986	1991	6	1982	1991	10
Nicaragua	1991	1996	6	1985	1996	12
Azerbaijan	1995	2000	6	1993	2000	8
Croatia	1994	1999	6	1986	1999	14
Indonesia	1965	1969	5	1960	1973	14
Armenia	1995	1999	5	1994	2000	7
Russia	1994	1999	5	1993	2004	12
Perú	1985	1988	4	1978	1997	20
Brazil	1989	1991	3	1981	2000	20
Chile	1974	1976	3	1972	1982	11
Zimbabwe	1999	2000	2	1999	2013	15
Belarus	1995	1996	2	1993	2006	14

Source: Author's calculations.

To evaluate the impact of financial assistance in the hyperinflation cycle, the same median difference test was carried out, but comparing the years in which the countries had assistance against the years in which they did not have it. In terms of the complete cycle, it is highlighted that in the countries that had an assistance program, both, base money growth and nominal exchange rate depreciation were lower (-29.2 and -34.3 percentage points, respectively).

In the first stage, assistance recorded a higher balance of payments and higher GDP growth, despite registering a higher cost of imports. In the second stage, countries that deflated and stabilized using IMF assistance registered a fiscal result 1.8 points of GDP lower (i.e. a greater deficit) than the countries that stabilized without using it. They also showed a larger contraction on base money growth (17.3 points lower). There were also lower volumes of imports, a greater proportion of external resources destined to serve the external debt and a lower contraction in the final consumption expenditure of the public sector.

**Table 12: Modern Hyperinflation Cycle: Selected Variables in Case of Financial Assistance. Hodges-Lehman Median Differences 1/**

Variable	Phase 1 Acceleration	Phase 2 Hyperinflation	Phase 3 Disinflation	Phase 4 Stabilization	Stage1 Rise	Stage2 Fall	Cycle
Fiscal balance (% GDP)	-2.4	4.2	0.8	-2.7**	2	-1.8*	-1.3
Base Money (% change)	-9	-82.8*	-4.6	-9.6**	-45.1	-17.3***	-29.2**
VIX Index	-2.8	1.2	-6.9*	0	0.3	-1.5	0
United States real interest rate (%)	0	1.5	0.5**	2.1	0.8	0.7	0.5
Rent from natural resources (% GDP)	1.9	-9.8**	-14.7	-6.3*	-1.1	-6.7	-3.2
Current account (% GDP)	4.1**	4.6**	3.5	-1.9	4.5***	-0.9	1.3
Export volume (% change)	2.6	0.3	-4.7	0.1	1.1	-2.5	-1.3
Import volume (% change)	0.7	0.5	-10.7	-2.5	0.3	-6.8**	-3.8
Export price - relative to US (Index, 2010 = 100)	-0.1	0.2**	0.1	-0.1*	0.1	0	0
Import price - relative to US (Index, 2010 = 100)	0	0.3*	0.1	-0.1	0.2**	0	0
External debt interest payments (% Exports)	-5.9	13*	0.7	3.9**	6.2	3.1**	3.4*
Financial account (% GDP)	3.8**	5**	2	-1.9	4.6***	-1.4	0.8
FDI, net inflows (% GDP)	-0.1	0.2	-0.2	1.2**	0	0.9	0.3
GDP growth, per capita (% change)	1.7	4.3**	-2.6	-2.6	2.9**	-1.6	1.2
Real consumption, public sector (% change)	n.a.	-0.5	-5.5	-3.7	-0.5	-4.6**	-2.2
Real consumption, private sector (% change)	n.a.	4.3	-7*	-0.6	-3.1	-1.5	-1.8
Nominal official exchange rate (% change)	-2.4	-88.7**	-22.4	1.8	-38.3	-14.6	-34.3**
Exchange rate regime (change)	0	0	0	2	0	0	0
Financial account openness (Index, -2 a 2)	0.1	0	0.7	0.4	0	0.7	0.4
Economic freedom (Index, 0 a 100)	13.3***	13.6	13.3*	9.2*	13.8***	10.8**	11.8***
Socioeconomic conditions (Index, 0 a 12)	2	3**	-1	1	2**	0.5	1
Military in politics (Index, 0 a 6)	1	3*	0	0.8	2*	0	1
Internal conflicts (Index, 0 a 12)	2	6***	-2	-0.5	4**	0	2

1/ The significance at the levels of 10, 5 and 1 percent is represented as \*, \*\*, \*\*\*, respectively.

Sources: World Bank, IMF, Heritage Foundation, ICRG and Author's calculations.

Finally, it highlights that, at both stages of the cycle, the economic freedom index was higher for the representative country that went to the IMF.

These results show that, throughout the cycle, access to multilateral financial assistance programs entails, in terms of statistical relevance, more fiscal flexibility, lower growth of base money, less variation in the nominal exchange rate, greater burden of external debt on exports and greater economic freedoms. In the fall stage, apart from those mentioned above, a lower growth of imports, lower growth of public consumption and greater economic freedoms stand out. There are no differences in the exchange regime, nor in the flows of foreign direct investment.

### **E. Within Analysis**

Given that the analysis presented in the four previous subsections only shows the comparison between countries, this section would be doing the within countries one. Table 13 below shows the difference in medians between the rise and fall stages, although only showing the variables that turned out to be statistically significant.

When prices rise, the fiscal and monetary variables show the expected signs. Regarding the external sector, while lower market volatility is observed, higher interest rates in the markets are shown. There is also a contraction on imports, a greater burden of external debt interest on exports, and lower capital flows and international reserves. Although there are no significant differences regarding the financial system (at least at the 10 percent level), GDP growth, public consumption and investment are lower.<sup>30</sup> As for exchange rate policy, there is evidence of a massive depreciation of the exchange rate, coupled with a much less stable exchange rate regime which, by symmetry, translates into lower depreciation and a much less volatile exchange rate regime in the fall stage.<sup>31</sup> Finally, it highlights how, at the rise stage, economic freedoms are lower and there is greater government instability.

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<sup>30</sup> These findings are in line with the literature. For a discussion: See Easterly (1996), Fischer, Sahay and Végh (1996 and 1997) Echenique and Forteza (1997).

<sup>31</sup> For a discussion: See Calvo and Végh (1993), Reinhart and Végh (1995) and Mendoza and Uribe (1999).

**Table 13: Modern Hyperinflation Cycle: Selected Variables at Stages 1 and 2.  
Hodges-Lehman Median Differences 1/**

<b>Variable</b>	<b>Rise vs. Fall</b>
<u>Fiscal and Monetary policies</u>	
Fiscal Balance (% GDP)	-4,4***
Base Money (% change)	67,9***
Central Government Debt (% GDP)	92,5**
<u>External Sector</u>	
VIX Index	-2,5*
United States real interest rate (%)	2,2***
Import volume (% change)	-7,4**
External debt interest payments (% Exports)	6,8**
FDI, net inflows (% GDP)	-1,3***
International Reserves, flows (% GDP)	-3,6***
International Reserves, stock (% GDP)	-2,3***
<u>Real and Financial Sector</u>	
GDP growth (% change)	-5,6***
GDP growth, per capita (% change)	-6,7***
Real consumption expenditure, public sector (% change)	-5***
Gross Fixed Capital Formation (% change)	-8,3***
<u>Other economic policy variables and structural factors</u>	
Nominal official exchange rate (% change)	75***
Exchange rate regime (change)	6**
Economic freedom (Index, 0 a 100)	-8,4**
Government stability (Index, 0 a 12)	-3***

1/ The significance at the levels of 10, 5 and 1 percent is represented as \*, \*\*, \*\*\*, respectively.  
Sources: World Bank, IMF, Heritage Foundation, ICRG and Author's calculations.

## VI. CONCLUSIONS

At the beginning of this paper, it was proposed to infer (i) under what conditions the hyperinflation cycles have begun, (ii) what happens during these episodes, (iii) under what conditions the hyperinflation episode could probably be closed and (iv) what could be done by authorities to increase the probability that a disinflation process will be carried out successfully and at the lowest possible cost.

Now the initial questions will be responded:

(i) The hyperinflation cycle seems to be a phenomenon that, more than regional, occurs in economies with high presence of natural resource rents (and potentially higher State intervention in the economy) and where economic freedoms have been diminished, especially those related to the ease of doing business and trade, as well as those related to rigidities and inefficiencies in the labor market. Although external factors matter, their role may not have been as significant as domestic factors, especially those inherent to economic policy: high fiscal deficits, in some cases financed with external debt at the beginning and with seigniorage afterwards; inability to maintain a certain exchange rate regime and restrictions on transactions in the financial account of the balance of payments are the variables whose performance coincides with the advent of a hyperinflation cycle. The cycles



also coincide with contexts in which socioeconomic conditions such as employment and real wages deteriorate, where the rule of law and democratic accountability are subdued, the instability of the government increases and there is a greater presence of military personnel over political issues.

(ii) In hyperinflation (the second phase of the four that comprise the cycle) base money grows exorbitantly, there is a greater loss of international reserves, the deterioration in the aggregate demand of the economy is massive, the financial sector contracts, the currency loses all (or almost all) its value, social and political conditions, as well as economic freedoms, deteriorate to the lowest levels recorded in the sample. All of this, even though the external factors seem to be better with respect to the previous phase.

(iii) Although it is not intended to be exhaustive, since each country requires "a tailored suit", the results of this sample suggest that hyperinflation cycles end when there are improvements on three essential fronts: (a) the fiscal and monetary mix: fiscal accounts are closer to equilibrium and base money growth decreases substantially; (b) the interaction with the external sector: barriers to international trade diminish and the exp/imp capacity of the economy increases significantly, the burden of foreign debt on exports regularizes, the resounding level of devaluation of the currency is stopped hand in hand with less variability of the foreign exchange rate; (c) the structural factors: economic freedoms increase and there is greater government stability.

(iv) In this paper, it was proposed to evaluate the role of multilateral assistance during the hyperinflation cycle. The reason is simple: countries that face these cycles find themselves in a position where, on their own, recovery would look uphill. It was observed that the representative country that has used it registers lower base money growth, smaller variation of the exchange rate, a greater burden of foreign debt payment to exports (perhaps suggesting a lower haircut on external debt outstanding) and greater economic freedoms. No significant differences were observed on economic growth,<sup>32</sup> the exchange rate regime, and foreign investment flows. These results, rather than suggesting that countries that had assistance managed to have greater fiscal flexibility and lower monetary growth (an interesting result), invite analyzing the particularities of each case from an optimistic perspective, since it is precisely in the design of these programs, where the "tailored suit" applies the most.

Looking ahead, the empirical regularities found here propose multiple avenues to advance in the analysis of hyperinflation cycles. Questions like: Why is there no substantive evidence of hyperinflation between 1947 and 1984? What coincidences are in the institutional arrangements and/or political systems of the countries that have suffered this phenomenon? What is the true impact of external factors on hyperinflations, is it as marginal as it looks in this study? How is the financial system affected beyond the balance sheet? What is the

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<sup>32</sup> Contrary to other findings in the literature, see, for example, Easterly (2005).

behavior of the labor market, can it be documented in detail? What role do parallel markets play? Why do countries that used assistance programs with the IMF appear to have more fiscal flexibility than countries that do not? are those that occur to the one who write these lines and are open to be answered by anyone who has a great interest in continuing to document the hyperinflation cycle.

## APPENDIX I. DATA

The tables below show from where are obtained and a brief description of each of the variables studied.

**Table A1: Fiscal and Monetary**

Variable	Source	Description
Inflation (%)	World Bank	The inflation measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that can be fixed or changed at specific intervals, such as annually. The Laspeyres formula is generally used.
Fiscal Balance (% GDP)	World Bank	The net lending (+) / net borrowing (-) is equal to the government's income less the expenses, minus net investment in non-financial assets. It is also equal to the net result of transactions in financial assets and liabilities. Net lending / net borrowing is a summary measure that indicates the extent to which the government makes financial resources available to other sectors of the economy or abroad, or uses the financial resources generated by other sectors of the economy or abroad.
Base Money (% change)	IMF	Annual percentage change in the monetary base or base money, which is defined in general terms as the currency in circulation outside the central bank, the net holdings of deposits of other deposit societies in the central bank and the rest of the sectors of the economy that are also included in money in a broad sense.
Tax Revenue (% GDP)	World Bank	Tax revenues refer to compulsory transfers to the central government for public purposes divided by GDP. Certain mandatory transfers are excluded, such as fines, penalties and most social security contributions. Reimbursements and corrections of tax revenues wrongly collected are treated as negative income.
Central Government Debt (% GDP)	World Bank	The debt is the entire stock of direct contractual obligations of the government to others at a given date. It includes domestic and foreign obligations such as deposits of money and cash, securities other than shares and loans. It is the gross amount of government liabilities reduced by the amount of capital and financial derivatives that the government owns. Because debt is a stock rather than a flow, it is measured from a certain date, usually the last day of the fiscal year.

**Table A2: External**

Variable	Source	Description
VIX Index (% change)	St. Luis FED	Implied volatility index of the put options market in Chicago, United States.
Unites States real interest rate (%)	St. Luis FED	It is obtained by deflating the short-term Libor rate (less than 1 year). The US annual GDP deflator is used as the adjustment variable.
Natural resource rent (% GDP)	World Bank	Total rents of natural resources are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents and forest rents, divided by GDP.
Share of products subject to tariffs (%)	World Bank	The proportion of tariff lines with specific rates in the proportion of lines in the tariff list that are established per unit or that combine the ad valorem and per unit rates. It shows the extent to which countries use tariffs based on physical quantities or other non-ad valorem measures.
Applied tariff (% of total tradable products)	World Bank	The weighted average applied rate is the average of the rates applied, weighted by the parts of the imports of products corresponding to each partner country. The data is classified using the Harmonized System of Commerce at the level of six or eight digits. The data of the tariff line was compared with revision 3 codes of the International Classification of International Trade to define the commodity groups and the import weights. As far as possible, the specific rates have been converted to their ad valorem equivalent rates and have been included in the calculation of the weighted averages. The weightings of imports were calculated using the Commodity Trade (Comtrade) database of the United Nations Statistics Division. The tariff rates effectively applied at the six- and eight-digit product level are averaged for the products in each product group. When the rate applied is not available, the most favored nation rate is used instead.
Current account (% GDP)	World Bank	The balance of the current account is the sum of net exports of goods and services, net primary income and net secondary income.

Export volume (% change)	IMF	Annual percentage change in exports of goods and services based on constant local currencies. Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transportation, travel, royalties, license fees and other services, such as communication, construction, financial, information, commercial, personal and governmental services. Exclude employee compensation and investment income (formerly called factor services) and transfer payments.
Import volume (% change)	IMF	Annual percentage change in imports of goods and services based on constant local currencies Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transportation, travel, royalties, license fees and other services, such as communication, construction, financial, information, commercial, personal and governmental services. Exclude employee compensation and investment income (formerly called factor services) and transfer payments.
Export price - relative to US (Index, 2010 = 100)	IMF and author's calcs.	Exports price index relative to that of the United States, normalized to 100 in the year 2010.
Import price - relative to US (Index, 2010 = 100)	IMF and author's calcs.	Imports price index relative to that of the United States, normalized to 100 in the year 2010.
External debt interest payments (% Exports)	World Bank	Total payments of interest on exports of goods, services and primary income. The total payment of interest is the sum of the interest paid in cash, goods or services on the long-term debt, interest paid on the short-term debt and charges to the IMF.
Financial account (% GDP)	World Bank	The net financial account shows the acquisition and net disposal of financial assets and liabilities. It measures how the net lending or borrowing of non-residents is financed and is conceptually equal to the sum of the balances of the current and capital accounts. The data is in current U.S. dollars.
FDI, net inflows (% GDP)	World Bank	Direct foreign investment is the net investment flows to acquire a long-term management interest (10% or more of the shares with voting rights) in a company that operates in an economy different from that of the investor. It is the sum of social capital, the reinvestment of profits, other long-term capital and short-term capital, as shown in the balance of payments. This series shows net inflows (new investment flows minus divestment) in the reporting economy of foreign investors and is divided by GDP.
FDI, net outflows (% GDP)	World Bank	Foreign direct investment refers to direct investment capital flows in an economy. It is the sum of social capital, reinvestment of profits and other capital. Direct investment is a category of cross-border investment associated with a resident in an economy that has control or a significant degree of influence in the management of a company that resides in another economy. The ownership of 10 percent or more of the common shares of voting shares is the criterion to determine the existence of a direct investment relationship. This series shows the net outflows of investment from the reporting economy to the rest of the world and is divided by GDP.
Portfolio investment (% GDP)	World Bank	Portfolio investment covers transactions in equity securities and debt securities. The data are in current U.S. dollars, divided by GDP in local currency adjusted by the average exchange rate for the year.
International Reserves, flow (% GDP)	World Bank	Reserves and related items are the net changes in a country's holdings of international reserves as a result of transactions in current, capital and financial accounts. Reserve assets are those external assets readily available and controlled by the monetary authorities to meet the balance of payments financing needs, and include monetary gold holdings, special drawing rights (SDR), reserve position in the IMF and other reserve assets. Also included are IMF loans and net loans (excluding the reserve position) and exceptional total financing. The data are in current U.S. dollars and divided by GDP transformed into U.S. dollars using the average official exchange rate for the corresponding year. For some countries where the official exchange rate does not reflect the rate actually applied to real currency transactions, an alternative conversion factor is used.
International Reserves, stock (% GDP)	World Bank	Total reserves include holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF and holdings of currencies under the control of the monetary authorities. The gold component of these reserves is valued at the end of London prices (December 31). The data are in current U.S. dollars and are divided by the GDP transformed into US dollars using the average official exchange rate of the corresponding year. For some countries where the official exchange rate does not reflect the rate actually applied to real currency transactions, an alternative conversion factor is used.

**Table A3: Real and Financial**

Variable	Fuente	Description
GDP growth (% change)	IMF	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant U.S. dollars of 2010. GDP is the sum of the gross added value of all producers' resident in the economy plus any tax on the product and less any subsidy not included in the value of the products. It is calculated without making deductions for the depreciation of manufactured assets or for the depletion and degradation of natural resources.
GDP growth, per capita (% change)	IMF	GDP per capita is the gross domestic product divided by the mid-year population.
GDP, per capita (USD 2010)	IMF and author's calcs.	Gross Domestic Product in real terms normalized to U.S. dollars for the year 2010. For some countries where the official exchange rate does not reflect the rate actually applied to real currency transactions, an alternative conversion factor is used.
Real consumption (% change)	IMF	Annual percentage change based on constant local currency. The final consumption expenditure (before total consumption) is the sum of final consumption expenditure of households (private consumption) and final consumption expenditure of general government (general government consumption). This estimate includes any statistical discrepancy in the use of resources in relation to the supply of resources.
Real consumption, public sector (% change)	IMF	Annual percentage change based on constant local currency. The final consumption expenditure of the general government (previously, general government consumption) includes all current government expenditures for purchases of goods and services (including compensation of employees). It also includes the majority of defense and national security expenditures but excludes government military expenditures that are part of the government's capital formation.
Real consumption, private sector (% change)	IMF	Annual percentage change based on constant local currency. Household final consumption expenditure (formerly private consumption) is the market value of all goods and services, including durable products (such as automobiles, washing machines and home computers), acquired by households. It excludes the purchase of houses but includes the imputed rent for the dwellings occupied by their owners. It also includes payments and fees to governments to obtain permits and licenses. Here, household consumption expenditure includes the expenses of non-profit institutions that serve households, even when the country reports separately. This element also includes any statistical discrepancy in the use of resources in relation to the supply of resources.
Gross Fixed Capital Investment (% change)	IMF	Annual percentage change based on constant local currency. Gross fixed capital formation (formerly known as fixed gross domestic investment) includes land improvements (fences, ditches, drains, etc.); purchases of plants, machinery and equipment; and the construction of roads, railways and the like, including schools, offices, hospitals, private homes and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.
Gross Fixed Capital Investment, public sector (% change)	IMF	Annual percentage change based on constant local currency. Public investment covers the gross disbursements of the public sector (including military spending) in additions to its fixed domestic assets.
Gross Fixed Capital Investment, private sector (% change)	IMF	Annual percentage change based on constant local currency. Private investment covers gross disbursements from the private sector (including private non-profit agencies) in additions to their fixed domestic assets.
Inventories (% change)	IMF	Annual percentage change based on constant local currency. They are the value of the entries in the inventories minus the value of the withdrawals, and less the value of any recurring loss of assets in the inventories.
Real effective exchange rate (Index, 2010 = 100)	World Bank	The real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency versus a weighted average of several foreign currencies) divided by a price deflator or a cost index.
Bank credit to the private sector (% GDP)	World Bank	Domestic credit to the private sector refers to financial resources provided to the private sector by financial corporations, such as loans, purchases of securities other than investment and commercial loans and other accounts receivable, which establish a claim for refund. For some countries these claims include credit to public companies. Financial corporations include monetary authorities and money deposit banks, as well as other financial corporations where data is available (including companies that do not accept transferable deposits but incur liabilities such as savings and time deposits). Examples of other financial corporations are financial and leasing companies, money lenders, insurance companies, pension funds and currency companies.

Bank Deposits (% GDP)	World Bank	It is the sum of sight deposits and term deposits, both in national currency and in foreign currency divided by GDP.
Gross Fixed Capital Investment (% GDP)	World Bank	Gross fixed capital formation (formerly known as fixed gross domestic investment) includes land improvements (fences, ditches, drains, etc.); purchases of plants, machinery and equipment; and the construction of roads, railways and the like, including schools, offices, hospitals, private homes and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.
Gross Fixed Capital Investment, private sector (% GDP)	World Bank	Private investment covers gross disbursements from the private sector (including private non-profit agencies) in additions to their fixed domestic assets.
Gross national saving (% GDP)	World Bank	Gross national savings are calculated as gross national income less total consumption, plus net transfers, divided by GDP.

**Table A4: Other Economic Policy and Structural**

Variable	Source	Description
Nominal official exchange rate (% change)	World Bank	The official exchange rate refers to the exchange rate determined by the national authorities or to the rate determined in the exchange market legally sanctioned. It is calculated as an annual average based on the monthly averages (units of local currency in relation to the US dollar).
Exchange rate regime	Itzenski, Reinhart and Rogoff	The Itzenski index, <i>et. al</i> moves a scale of 1 to 15, being: 1 There is no legal tender or monetary union. 2 Pre-set peg or conversion box. 3 Pre-announced horizontal band that is narrower or equal to +/- 2%. 4 De facto crawling peg. 5 Crawling peg previously announced; de facto mobile band narrower than or equal to +/- 1%. 6 Crawling band previously announced that is narrower or equal to +/- 2% or de facto horizontal band that is narrower or equal to +/- 2%. 7 Crawling peg. 8 De facto crawling band that is narrower or equal to +/- 2%. 9 Crawling band previously announced that is greater than or equal to +/- 2%. 10 De facto crawling band that is narrower or equal to +/- 5%. 11 Mobile band that is narrower or equal to +/- 2% (that is, it allows both the appreciation and depreciation over time). 12 De facto mobile band +/- 5% / Administered floating. 13 Freely floating. 14 Free falling. 15 Dual market in which parallel market data are lacking.
Financial account openness (Index, from -2 to 2)	Chinn and Ito	Range that goes from -2 to 2, where a negative value reflects greater restrictions to the transactions of the financial account.
Economic Freedom (Index, from 0 to 100)	Heritage Foundation	The Economic Freedom Index focuses on four key aspects of the economic environment over which governments typically exercise control of the policy: rule of law, size of government, regulatory efficiency, market opening. The higher the index, the greater the economic freedom.
Property rights (Index, from 0 to 100)	Heritage Foundation	The score for this component is obtained by averaging scores for the following five subfactors, all weighted equally: physical property rights, intellectual property rights, strength of investor protection, risk of expropriation and quality of land administration.
Freedom from corruption (Index, from 0 to 100)	Heritage Foundation	The score of the judicial effectiveness component is obtained by averaging the scores of the following three subfactors, which are weighted equally: judicial independence, quality of the judicial process and probability of obtaining favorable judicial decisions.
Fiscal freedom (Index, from 0 to 100)	Heritage Foundation	The score of this component is derived from quantitative subfactors: the upper marginal tax rate on individual income, the higher marginal tax rate on corporate income, the total tax burden as a percentage of GDP, the fiscal deficit as a percentage of the average GDP of the last 3 years and public debt as a percentage of GDP.

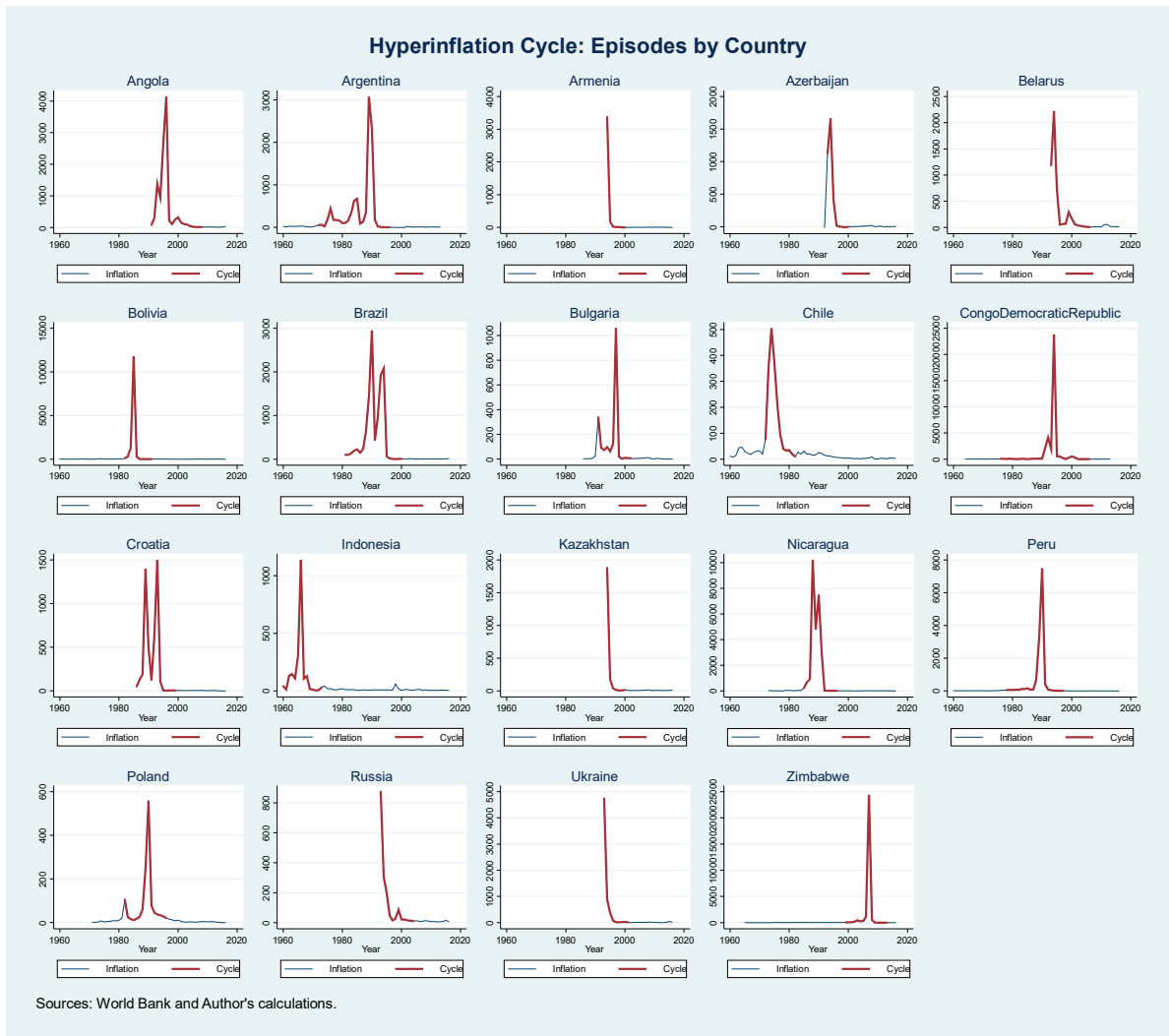
Government expenditure (Index, from 0 to 100)	Heritage Foundation	Total Government expenditure as a percentage of GDP.
Business freedom (Index, from 0 to 100)	Heritage Foundation	Doing Business Report, World Bank.
Labor freedom (Index, from 0 to 100)	Heritage Foundation	Seven quantitative subfactors have the same weighting, each one counted as a seventh of the labor freedom component: ratio between the minimum wage and the average value added per worker, impediment to hire additional workers, rigidity of the hours, difficulty in dismissing redundant employees, mandatory legal notice period, compensation for mandatory dismissal and participation rate in the work force.
Monetary freedom (Index, from 0 to 100)	Heritage Foundation	The score for the monetary freedom component is based on two subfactors: the weighted average inflation rate of the last three years and presence of price controls.
Trade freedom (Index, from 0 to 100)	Heritage Foundation	The free trade score is based on two factors: the trade-weighted average tariff rate and non-tariff barriers.
Investment freedom (Index, from 0 to 100)	Heritage Foundation	It is composed of 7 restrictions: national treatment of foreign investment, foreign investment code, land ownership restrictions, sectoral investment restrictions, sectoral investment restrictions, currency exchange controls, capital controls.
Financial freedom (Index, from 0 to 100)	Heritage Foundation	The Index qualifies the financial freedom of an economy by looking at five broad areas: the degree of government regulation of financial services, the degree of state intervention in banks and other financial firms through direct and indirect ownership, government influence in the allocation of credit, the extension of the development of the financial and capital markets, and openness to foreign competition.
Socioeconomic conditions (Index, from 0 to 12)	International Country Risk Guide	This is an assessment of socio-economic pressures in society that could restrict government action or fuel social dissatisfaction. The assigned risk rating is the sum of three subcomponents: unemployment, consumer confidence and poverty.
Bureaucratic quality (Index, from 0 to 4)	International Country Risk Guide	The institutional strength and quality of the bureaucracy is a buffer that tends to minimize policy revisions when governments change. Therefore, outstanding points are awarded to countries where the bureaucracy has the strength and experience to govern without drastic changes in policy or interruptions in government services. In a low-risk country, the bureaucracy tends to be somewhat autonomous in the face of political pressure and have an established mechanism of recruitment and training. Countries that lack the cushioning effect of a strong bureaucracy receive low points because a change in government tends to be traumatic in terms of policy formulation and day-to-day administrative functions.
Rule of law (Index, from 0 to 6)	International Country Risk Guide	"Law and order" form a single component, but its two elements are evaluated separately, and each element is scored from zero to three points. To evaluate the element "Law", the solidity and impartiality of the legal system are considered, while the element "Order" is an evaluation of the popular observance of the law. Therefore, a country can enjoy a high rating -3- in terms of its judicial system, but a low rating -1- if it suffers a very high crime rate or if the law is routinely ignored without an effective sanction (e. g. generalized illegalization of strikes).

Corruption (Index, from 0 to 6)	International Country Risk Guide	<p>This is an evaluation of corruption within the political system. The most common form of corruption that companies directly face is financial corruption in the form of demands for special payments and bribes related to import and export licenses, exchange controls, tax liens, police protection or loans. Such corruption can hinder the effective conduct of business and, in some cases, may force the withdrawal or retention of an investment.</p> <p>Although the measurement considers this corruption, real or potential corruption in the form of excessive patronage, nepotism, work reserves, "favors for favors", funds from secret parties and suspiciously close links between politics is also considered. These insidious types of corruption are potentially much riskier for foreign companies, as they can generate popular discontent and encourage the development of black markets.</p> <p>The greatest risk of such corruption is that at some point it will become so dazzling, or some important scandal will be suddenly revealed, as to provoke a popular reaction, which will result in a fall or overthrow of the government, a major reorganization or restructuring of the government, the political institutions of the country, or, in the worst of cases, a collapse of law and order, making the country ungovernable.</p>
Democratic accountability (Index, from 0 to 6)	International Country Risk Guide	This is a measure of how responsive the government is to its people, on the basis that the less receptive it is, the more likely it is that the government will fall peacefully (in a democratic society), but possibly violently (in an undemocratic one).
Government stability (Index, from 0 to 12)	International Country Risk Guide	This is an assessment of both the ability of the government to carry out its declared program(s) and its ability to remain in office. The assigned risk rating is the sum of three subcomponents: unity in the government, legislative force and popular support.
Military in politics (Index, from 0 to 6)	International Country Risk Guide	<p>The military is not democratically elected. Therefore, their participation in politics, even at a peripheral level, is a diminution of democratic responsibility. However, it also has other significant implications. The military could, for example, become involved in government due to an actual or created internal or external threat. Such a situation would imply the distortion of government policy to deal with this threat, for example, by increasing the defense budget at the expense of other budgetary allocations.</p> <p>In some countries, the threat of military takeover may force an elected government to change the policy or have it replaced by another government more responsive to the wishes of the military. A military takeover or the threat of a takeover can also represent a high risk if it is an indication that the government cannot function effectively and that, therefore, the country has an uncomfortable environment for foreign companies.</p> <p>A large-scale military regime represents the greatest risk. In the short term, a military regime can provide new stability and thus reduce commercial risks. However, in the longer term, the risk will almost certainly increase, partly because the government system will become corrupt and partly because the continuation of that government will likely create an armed opposition. In some cases, military involvement in government can be a symptom rather than a cause of underlying difficulties.</p> <p>In general, a low risk rating indicates more military involvement in politics and therefore a higher level of political risk.</p>
External conflict (Index, from 0 to 12)	International Country Risk Guide	The measure of external conflict is an assessment of the risk to the exercise of foreign action, from non-violent external pressure (diplomatic pressure, withholding of aid, trade restrictions, territorial disputes, sanctions, etc.) to violent external pressure (from border conflicts to total war).
Internal conflict (Index, from 0 to 12)	International Country Risk Guide	This is an assessment of political violence in the country and its actual or potential impact on governance. The highest rating is given to those countries where there is no armed or civil opposition to the government and the government does not allow arbitrary violence, direct or indirect, against its own people. The lowest rating is awarded to a country involved in an ongoing civil war.
Religious tensions (Index, from 0 to 6)	International Country Risk Guide	Religious tensions can derive from the domination of society and/or governance by a single religious group that seeks to replace civil law by religious law and exclude other religions from the political and/or social processes; the desire of a single religious group to dominate the government, the suppression of religious freedom; the desire of a religious group to express its own identity, separated from the country as a whole. The risk involved in these situations varies from inexperienced people who impose inappropriate policies through civil dissent to civil war.



Ethnic tensions (Index, from 0 to 6)	International Country Risk Guide	This component is an assessment of the degree of tension within a country attributable to racial, nationality or language divisions. Lower grades are awarded to countries where racial and nationality tensions are high because opposition groups are intolerant and unwilling to compromise. Higher ratings are awarded to countries where tensions are minimal, even though such differences still exist.
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APPENDIX II. ADDITIONAL CHARTS



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