Chronic inflation and the costs of not addressing an upsurge in time

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Abstract:

The study of chronic inflation has declined over the years, but the recent surge in global inflation has made it crucial to revisit this phenomenon to prevent it from becoming entrenched. In this paper, we identify more than 300 significant inflation outbreaks worldwide and explore why some become chronic while others do not. Our findings reveal that large inflation surges negatively impact GDP in the short term, regardless of whether they become chronic. This affects particularly middle-income economies, Latin American and Caribbean countries, and Middle Eastern and North African nations. Although these shocks are often exogenous, their consolidation into chronic inflation largely depends on policy responses. When governments effectively address upsurges with monetary, exchange rate, and fiscal policies, they can resolve the outbreaks; however, inaction leads to the entrenchment of chronic inflation. In such cases, the likelihood of reaching higher inflation levels increases, and the resulting output losses are significantly more severe, especially in middle-income economies and Latin American and Caribbean countries.

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1. Introduction

An inflation regime is an institutional environment in which the public and authorities interact, form expectations, and make price decisions (Heymann & Leihonhufvud, 1995). One of the aspects that a regime defines is the degree of persistence of inflation (D'Amato & Garegnani, 2013). When an economy steps out of the low inflation regime (the one that prevails most of the time in the majority of countries), prices are revised more often, contracts shorten, and many forms of formal and informal indexation to past prices appear (Frenkel, 1979). This way, inflation can remain high for several years, even decades, becoming a chronic process (Pazos, 1969, 1990).

Many scholars studied how different inflation regimes work (Dornbusch, Sturzenegger & Wolf, 1990; Fischer, Sahay y Vegh, 2002; Frenkel, 1979; Heymann, 1986; Heymann & Leihonhufvud, 1995). There is also a major branch of literature on how to end such inflations (Bruno, 1993; Bruno, Di Tella, Dornbusch & Fischer, 1988; Calvo & Végh, 1994, 1999; Dornbusch & Simonsen, 1987; Fanelli & Frenkel, 1989; Kiguel, & Liviatan, 1988, 1990, 1992a, 1992b; Palazzo, Rapetti & Waldman, 2023; Reinhart & Végh, 1994, 1999; Végh, 1992; Veiga 1999, 2000, 2008). However, there is much less written about how chronic inflation processes appear. What makes the difference between a temporary inflation shock and a consolidated chronic inflation is a question that remains without answer.

In this article, we study large inflationary shocks all over the world, the costs they impose on the economy and why some of them become chronic while others don't. This work is related to Ari, Mulas-Granados, Mylonas, Ratnovski & Zhao (2023), who study inflationary shocks of smaller magnitude (2 percentage points), what they generate and how they are addressed. We will concentrate on larger inflations, as we are specifically interested on those shocks that could lead a country to a chronic inflation regime. This focus has several reasons.

In the first place, we want to study larger inflations because inflation has a non-linear effect on growth (Fischer, 1993). Although low inflation is harmless, when it surpasses certain thresholds, it imposes huge costs on the economy in the form of reduced or negative growth (Bruno & Easterly, 1998; Ibarra & Trupkin, 2016; Khan & Senhadji, 2001; Sarel, 1996).

In the second place, we are interested on higher inflations because getting above certain values -around 25%/30%- increase dramatically the probability of spiralizing to extreme values (Bruno, 1995; Dornbusch & Fischer, 1993; Fischer, Sahay y Vegh, 2002; Morra, 2014). This makes those

processes a more important and difficult issue to deal with. We think it deserves particular attention so inflation can be avoided or solved before consolidating into chronic.

In the third place, chronic inflation is a phenomenon that have lost interest for several years, due to the reduction in global inflation. However, we think that the mechanisms and characteristics attributed to these processes remained in force in the shorter list of countries that suffered from it in the years 2000/2010. Recently, the COVID-19's pandemic and the Ukraine's invasion caused world-wide shocks, increasing again the number of countries with 2-digits inflation rates and the proportion of them that evolve into chronic. Many countries are currently undergoing such processes, and others could enter soon.[1] This renews the importance of studying chronic inflation outbreaks and how to avoid them.

We find evidence pointing that having a large inflation upsurge has a negative effect on GDP. This is driven by what happens to middle-income countries, while high- and low-income economies do not seem to be affected. Using a regional classification, the effect is driven by the GDP fall of the countries from Latin America and Caribe and Middle East and North Africa.

We inquire into the difference between inflation shocks that become chronic and those that are shortly solved. This difference relies on the economic policy response. The likelihood of getting chronic inflation depends positively on the evolution of the exchange rate and the money issuance the year after the shock, while depends negatively on the fiscal balance and the real interest rate. While the monetary and exchange rate policies show robust evidence, the fiscal policy importance is weaker.

There is no 'recession now vs latter' trade-off: those countries that acquire chronic inflation do not have short-term benefits and do have long-term costs. Although measures to tackle inflation may seem unpleasant, the short-term growth of countries that address the issue immediately is not different from that of countries that let inflation take hold. When inflation outbreaks are not faced upfront, they provoke higher long-term costs on economic activity. This is very

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[1] In July-2022, 72 countries (42% of the countries with available data) reached 2-digits YoY inflation, the highest number since 2008. In December-2023, 22 countries remained above 10%, and 15 of them above 20% (Angola, Argentina, Egypt, Ethiopia, Ghana, Haiti, Iran, Laos, Lebanon, Malawi, Nigeria, Pakistan, Sierra Leone, Türkiye and Venezuela). According to our classification, there are 30 going through chronic inflation, the 15 aforementioned plus Burundi, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Rwanda, Sao Tome and Principe, South Sudan, Sri Lanka, Sudan, Suriname, Ukraine, West Bank and Gaza, and Zimbabwe. Most of them had a couple of months below 20%, so they may be getting out of chronic inflation or may be oscillating, while for some others (Sudan, Suriname, Zimbabwe) we do not have data for December 2023.

heterogeneous within regions and income levels, being significant in middle-income and Latin American countries. Surprisingly, South Asian countries show the opposite pattern, with a growth improvement from chronic inflation.

The worse performance of chronic inflation economies arises from the higher levels of inflation they reach over extended periods of chronic inflation. Surpassing certain thresholds explain the fall in GDP growth, and the likelihood of surpassing them is positively related to the duration of the event.

The rest of the article is organized as follows. In section 2, we explain the data, the case selection and the classification. In section 3, we show our findings. We conclude in section 4.

2. Case selection

The focus of this article is global. Chronic inflation has not been evenly distributed, as some countries and regions experienced it far more than others. Nevertheless, our aim is to explore its origins worldwide. We delimit the starting point of our observation window in 1960, due to data availability reasons. We do not trim the ending point, so we include data until mid-2024. However, in many analyses, we do not include events started after 2022 as we do not know how or when they end.

To delve into chronic inflation dynamics, we built a database of Consumer Price Index (CPI) variations using International Monetary Fund's International Financial Statistics, Ha, Kose & Ohnsorge (2023) and domestic sources, when necessary. As we want to study economies that had low inflation until they received shocks, we define a country that has at least 18 consecutive months of year-over-year inflation under 20% as a low-inflation economy.[2] We look at every case where a low-inflation economy has a rise in inflation, reaching 20%. This leaves us with 332 events in 125 countries. This is our full dataset of events. We analyze each case until it comes to

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[2] We include some cases where there are data gaps. For example, Algeria's inflation surpasses 20% in February-1981. We do not have monthly inflation data for the 18 previous months but for the 13 previous months (since January-1980), and they are all under 20%. We consider these cases. On the contrary, we do not consider events where the first or second available datapoint is above 20%. This exclude 47 events of 2 kinds: a) countries that start publishing data being on a high inflation, as many Eastern Europe nascent nations (Albania-1992, Armenia-1993, among others); and b) countries that had high inflation since before 1960 (Argentina, Brazil, Chile and Uruguay).

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a low inflation scenario (18 consecutive months below 20%). We classified these events into two groups:

1) **Non-chronic inflation processes**: We classify an event in this group when it goes back to low inflation before 3 years and a half from the inflation outbreak. This means that inflation had been above 20% for less than 2 years (the last month where the YoY inflation rate could have been over 20% is t+23). We have 207 events of this kind (67% of our cases), with a mean (median) duration of 10 (9) months. In some cases, they reach very high inflation rates (Indonesia-1998 and Laos-1989 surpassed 70%), but they do not stabilize around 20% nor spiralize.

2) **Chronic inflation processes**: An event is classified with this label when it lasts more than 3 years and a half (inflation stays above 20%, in some cases with ups and downs from this threshold, for more than 24 months). We have 103 events of this kind (33% of our cases), with a mean (median) duration of 83 (46) months. Some of these events remain oscillating around 20%, while others keep accelerating.

We also have 22 non-classified events. 19 of them begin in 2022 or later, so there's not enough observations to decide if they will be chronic. The other 3 are Liberia-2018, Syria-2012 and Togo-1994 that also were not classified due to severe lack of data.

In addition to inflation data, we gather a set of macroeconomic variables, such as growth, nominal exchange rate, food and energy international prices, interest rates, broad money, fiscal accounts, income and regional classifications and population. The source for each variable is shown in the Table A.1. in the Appendix.

3. **Inflation upsurges, growth dynamics and policy responses**
   a. Some descriptive statistics

The likelihood of occurrence of an inflation shock is not the same at any point in time. In Figure 1 a), we plot the number of events starting in each year and in Figure 1 b) we illustrate the number of events that are occurring at each point in time. We see jumps in 1973-74 (45 events starting in both years) and 1979-80 (29 events starting in both years). We can attribute these to the oil price shocks that occurred in those years (a more rich and detailed explanation can be read in Bruno & Sachs, 1985). The oil shocks caused both the rise of chronic and non-chronic
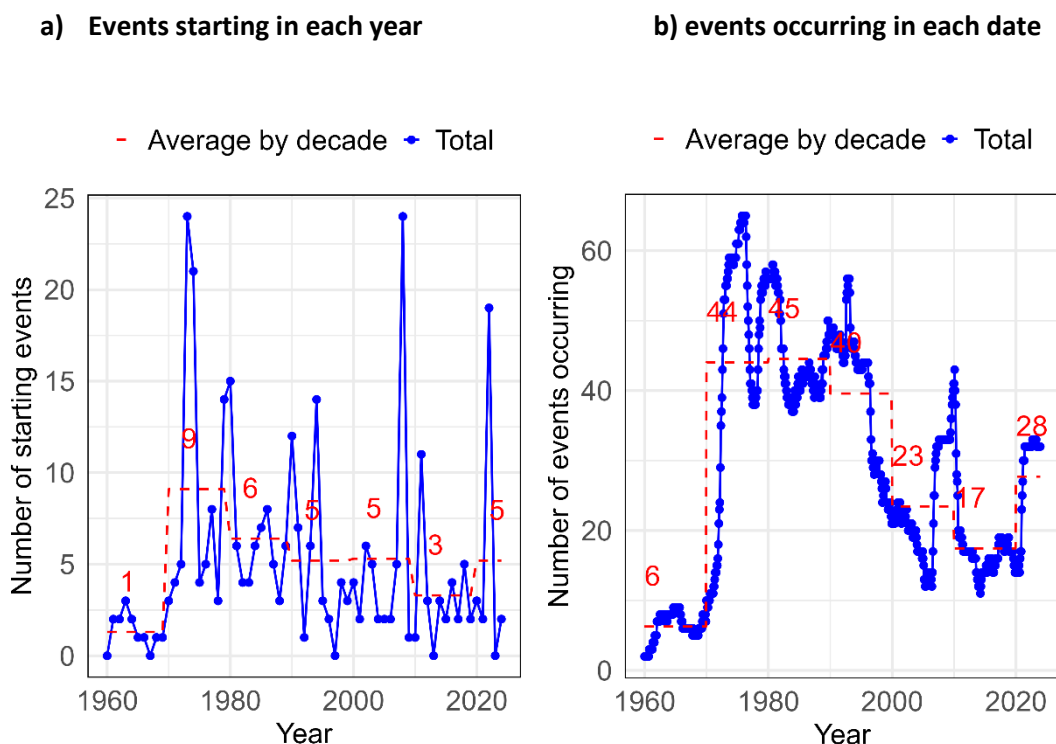
events in a similar proportion to the general one: in 1973-74, 29% of events became chronic and 71% did not, while in 1979-80, 31% of new events became chronic and 69% did not.

Many of the episodes that started in the seventies remained in the eighties, so this is an inflationary decade although there are not that much starting events in any particular year. In the nineties, 2 years stand out by the number of inflation shocks: 1990 and 1994 (12 and 14 events, respectively). While 1990's cases do not seem to have common roots, 1994's events are mainly in French ex-colonies due to the CFA Franc devaluation (Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Cote D'Ivoire, Mali, Niger, Senegal and Togo). While 1990 events became mostly chronic, 1994 shock caused almost only transitory events.

Since mid-nineties, many developing countries solved their inflationary problems, while the industrialized countries entered in what is known as the 'Great Moderation' (Bernanke, 2004). Along the 2000's and 2010's the number of countries with chronic inflation or large inflationary outbreaks descent. The exception is the year 2008, when the US financial crisis spread around the world and made 24 countries get to above-20% inflation. None of those evolved into chronic.

Lastly, in 2022 there was another commodities' price shock, provoked by the Russia's invasion of Ukraine. This shock happened amid a context of high liquidity, due to the expansive monetary and fiscal policies taken to fight the COVID-19 pandemic's economic effects. 19 events began in 2022. We still cannot tell if they are going to be chronic, but they make the 2020s seem like a more inflationary decade -at least, for now-.

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Figure 1. Number of cases on each date

a) Events starting in each year   b) events occurring in each date

Source: Own elaboration based on IMF IFS, Ha, Kose & Ohnsorge (2023) and domestic sources.

Despite the global aspect of inflation, there is also an idiosyncratic aspect. Large inflations are not distributed equally neither across rich or poor countries, nor between regions. As can be seen in Table 2, we have a more than proportional number of events in low-income and lower-middle-income countries, and a smaller proportion in upper-middle-income and high-income. There is also a disproportionate number of events in Sub-Saharan Africa and a small proportion in Europe and Central Asia, always comparing with the proportion of inflation data available.[3]

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[3] We use the World Bank's income classification. It is available since 1987, so we can use it for 178 events (89 cases in 50 countries of low income, 57 cases in 41 countries of lower-middle income, 27 cases in 17 countries of upper-middle income, and 5 events in 5 countries of high income). In the other 154 events, we use as a proxy the nearer classification. For example, we take Argentina-62 as upper-middle-income, as Argentina is classified in that category in the first year of the database.
In the regional classification, we also use World Bank's, but exclude Taiwan as it is not classified by it. We have 330 cases.

Table 2. Proportion of inflationary shocks according to country's income and region

Income category	Low	Lower-middle	Upper-middle	High
% of events	41%	37%	16%	6%
% of inflation data	21%	29%	22%	28%

Region	East Asia and Pacific (EAP)	Europe and Central Asia (ECA)	Latin America and Caribe (LAC)	Middle East and North Africa (MENA)	South Asia (SA)	Sub Saharan Africa (SSA)	North America (NA)
% of events	12%	13%	23%	10%	5%	37%	0%
% of inflation data	14%	25%	23%	10%	4%	23%	2%

Source: Own elaboration based on World Bank, IMF IFS, Ha, Kose & Ohnsorge (2023) and domestic sources.

Low and lower-middle income countries have a somewhat smaller proportion of cases that evolves to chronic (30% vs. 33% in the overall sample), while upper-middle and high income have a higher one (46% and 38%, respectively). Classified by regions, South Asia is the one where the probability of evolving to chronic inflation is lower (19%), while Latin America and the Caribe have a larger proportion (42%).[4]

The mean inflation of the non-chronic processes (between the first and the last month over 20%) is of 25%, well behind the mean of the chronic ones (85%). This is due to the probability of the chronic inflation processes to spiralize. While 65% of non-chronic cases do not exceed 30% inflation, with only 5% surpassing 60%, 88% of chronic events exceed 30%, and 45% reach 60%. Moreover, 6% of the chronic inflations evolves into extreme (according to Dornbusch,

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[4] The predominance of chronic inflation in Latin America and the Caribe and in Upper-middle income countries are the only ones that increase this probability with statistical significance (at 10% and 5%, respectively).

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Sturzenegger & Wolf, 1990, above 1,000%) and 9% get to hyperinflation (above 50% monthly, using Cagan 1956 definition).[5] These figures can be seen in Table 3.

Table 3. Inflation statistics for chronic and non-chronic inflation processes: number of cases that reach each threshold

	N	>30%	>40%	>50%	>60%	>100%	Extreme (>1,000%)	Hyper (>50% MoM)	Mean π	Median π
Non-chronic	207 (67%)	35%	16%	9%	5%	0,5%	-	-	25%	23%
Chronic	103 (33%)	88%	67%	50%	45%	27%	6%	9%	85%	28%

Source: Own elaboration based on IMF IFS, Ha, Kose & Ohnsorge (2023) and domestic sources.

b. How inflation gets chronic

To avoid inflation to become chronic, governments must take policy actions upfront. We test 4 measures of policy and their contribution to the probability of lowering inflation down. We use a probit approach where the dependent variable is the dummy "chronic", as defined in section 2. The interpretation cannot be in terms of causality due to endogeneity problems (including the fact that we use the evolution of the policy variables after the inflation upsurge). What we show is that the probability of evolving into chronic is correlated with policy decisions taken after the inflation outbreak, and not only on the nature of the shock. The estimated equation is the following:

$$Chronic^*_i = \beta_x\, x_i + u_i, \qquad u_i|x_i \sim N(0,1) \qquad (1)$$

$$Chronic_i = \begin{cases} \mathbf{0}\ if\ Chronic_i^* \leq 0 \\ \mathbf{1}\ if\ Chronic_i^* > 0 \end{cases}$$

The variables included in *X* are the Year-over-Year nominal exchange rate and broad money variations, the *ex-post* real policy interest rate and the primary fiscal balance. The first three of

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[5] There are 3 events where a monthly inflation above 50% (12,875% annualized) does not reach a Year-over-Year above 1,000%: Chile-62, South Sudan-14, and Zimbabwe-18.

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them are measured 12 months after the beginning of the event, while the primary balance is measured as a percentage of GDP of the calendar year after the inflation upsurge. As $\widehat{\beta_x}$ does not have direct interpretation, we report the average marginal change in the probability of being in each category. This is:

$$\frac{dProbability\ (Chronic = 1)}{dx} \equiv \left. \sum_{i=1}^{N} \frac{dProbability\ (Chronic_i = 1)}{dx_i} \right/ N \qquad (2)$$

This can be interpreted as how much an infinitesimal change in x changes the likelihood of each category.

Table 4. Probability of evolving to chronic inflation – estimated coefficient as in Eq. (2)

	Estim. 1	Estim. 2	Estim. 3	Estim. 4	Estim. 5	Estim. 6	Estim. 7
Nominal NER var. t+12	+0.35*** (0.08)				+0.29*** (0.07)	+0.38*** (0.09)	+0.64 (0.51)
Nominal Broad money var. t+12		+0.76*** (0.15)			+0.70*** (0.15)		
Real interest rate t+12			-2.93** (1.16)				-2.49** (1.22)
Fiscal primary balance T+1				-1.63* (0.86)		-1.72** (0.87)	
N	305	283	26	183	280	181	26
Pseudo R²	4.9%	7.3%	14.4%	1.5%	10.4%	7.1%	20.0%

	Estim. 8	Estim. 9	Estim. 10	Estim. 11	Estim. 12	Estim. 13	Estim. 14	Estim. 15
Nominal NER var. t+12				+0.31*** (0.09)		+0.61 (0.48)	+0.85 (0.71)	+1.12 (0.86)

Nominal Broad money var. t+12	+1.00*** (0.20)	+2.13*** (0.67)		+0.96*** (0.20)	+2.04** (0.87)		+2.36*** (0.50)	+2.61*** (0.56)
Real interest rate t+12		-3.05** (1.23)	-2.59** (1.24)		-3.02* (1.60)	-2.17 (1.33)	-2.41** (1.17)	-2.93** (1.37)
Fiscal primary balance T+1	-1.11 (0.87)		-0.82 (2.89)	-1.10 (0.21)	+0.28 (3.51)	-0.95 (2.72)		+2.83 (3.18)
N	163	19	24	161	17	24	19	17
Pseudo R^2	12.4%	30.2%	12.6%	16.5%	24.7%	18.4%	44.2%	41.9%

Significance level at which the null hypothesis is rejected: *** 1%; ** 5%; and * 10%. In regressions including fiscal primary balance (equations 4, 6, 8, 10, 11, 12, 13 and 15), countries with less than 1 million inhabitants are excluded, because small countries have much more extreme values (the variance of the primary balance as a percentage of GDP in the available sample for small countries is 28-times the variance in the sample for large countries). Excluding those countries in the other regressions does not change much the estimations nor the significance level.

When testing each variable independently, we observe that the exchange rate, monetary policy, and fiscal policy responses are significant. Each additional percentage point of currency depreciation raises the probability of becoming chronic by 0.3%-0.4%.[6] An additional percentage point of money issuance increases this probability by 0.7%-2.6%. Conversely, a one percentage point increase in the primary fiscal balance reduces this probability by 1.6%-1.7%, and each percentage point rise in the real interest rate decreases it by 2.4%-3.1%. The first coefficient is stable and significant across different specifications, except when the real interest rate is included. We attribute this to a severe lack of data, as the sample size shrinks from over 160 cases to fewer than 25. The second coefficient remains consistently significant, though its magnitude varies. The third coefficient shows a substantial and stable magnitude, but it should be interpreted with caution due to the limited data on interest rates. Lastly, the coefficient associated with the fiscal balance provides mixed evidence, as it is not always significant, losing significance when either of the two monetary policy variables is included.

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[6] We refer here as 'depreciation' to the increase in the price of the US dollar measured in local currency.

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Our findings are consistent with those of Ari, Mulas-Granados, Mylonas, Ratnovski & Zhao (2023). They find that countries that resolve inflation shocks contain the NER depreciation and relay more on monetary than on fiscal policies.

We do not want to emphasize on the specific numeric values or their robustness, but rather on the significance of policy variables. Although the shock may be unavoidable, there is a role for economic policies in stopping the acceleration. When adding a dummy variable for currency crises (using the criteria from Laeven & Valencia, 2013) to the regressions, it is never statistically significant and does not qualitatively alter the previous estimations.[7] Conversely, a dummy variable for a "commodity crisis," constructed by applying the Laeven & Valencia (2013) criteria to the World Bank's food and energy commodity indexes, is statistically significant.[8] When an inflation outbreak is related to a commodities' shock, the probability of becoming chronic is reduced by 9%-20%. However, it does not substantially alter the coefficients or the statistical significance of estimations 1-15. This underscores the importance of policy responses.

c. The cost of inflation upsurges and chronic inflation

What is the effect on growth of inflation surges? To answer that question, we perform estimations of the form:

$$Growth_{i,t} - Benchmark\ Growth_{i,t} = \beta * event + u_i, \qquad u_i|x_i \sim N(0,1) \qquad (3)$$

Using as $Benchmark\ Growth_{i,t}$, alternatively, the growth in year t of the group of countries with a specific level of income (Low, Lower-middle, Upper-middle or High) or the average growth in year t of the countries of the region (East Asia and Pacific, Europe and Central Asia, Latin America and Caribe, Middle East and North Africa, South Asia or Sub Saharan Africa).

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[7] Laeven & Valencia (2013) consider as a currency crisis a nominal depreciation of at least 30% YoY that is also at least 10 percentage points higher than the rate of YoY depreciation of the same month of the previous year. The numeric rule is applied to the nominal exchange rate data from the BIS database, and we use both end of period and average through the month nominal exchange rate (one and/or the other measure accomplishes the criteria). There are 80 events with a currency crisis in the initial month.
[8] We consider there is a commodity crisis whenever the indexes for Food and/or Energy show an increase of at least 30% YoY that is also at least 10 percentage points higher than the YoY variation of the same month of the previous year. This dummy is equal to 1 19% of the time, including parts of the years 1971-74, 1979-80, 1983, 1987-90, 1996, 1999-2000, 2002-11, 2016-18 and 2021-22.

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The estimated cost is 1%. Surprisingly, this cost varies significantly depending on the level of income and the region where the inflation surge occurs. As shown in Table 5, low-income and high-income economies do not exhibit statistically different growth rates compared to their peers in the year they experience the shock. Similarly, countries in East Asia and the Pacific, Europe and Central Asia, South Asia, and Sub-Saharan Africa do not show a significant slowdown. In contrast, middle-income economies, as well as countries in Latin America and the Caribbean, and the Middle East and North Africa, experience a statistically significant decline in their growth rates compared to similar economies. These decelerations in growth range from 1.4% to 5.5% and drive the overall outcome.

To look at the change in growth within the same country, we also performed the estimations against the previous year growth and the average growth of the previous 5 years. Middle-income, Latin America and Caribe and Middle East and North Africa remain with significant drops. Also, High-income (in both measures), Europe and Central Asia and Sub-Saharan Africa (only when looking in the difference against the previous year) have a significant deceleration. All this numbers are robust to excluding small countries (less than 1 million people), as Ari, Mulas-Granados, Mylonas, Ratnovski & Zhao (2023) do.

Table 5. Growth statistics for inflation upsurges according to income group and region. $\hat{\beta}$ for equation (3)

	N	Avg. growth	Δ Income level growth	Δ Region growth	Δ previous year	Δ previous trend
Low income	134 (41%)	3.6%	+0.78%	-0.08%	-0.67%	-0.17%
Lower-middle income	117 (36%)	2.9%	-1.39%**	-1.17%*	-2.35%***	-1.44%**
Upper-middle income	54 (17%)	0.3%	-4.97%***	-3.08%**	-4.07%***	-3.67%**
High Income	18 (6%)	3.6%	+0.37%	-0.85%	-2.18%**	-2.25%***
East Asia and Pacific	39 (12%)	5.3%	+1.33%	-0.20%	-1.35%	-1.16%
Europe and Central Asia	39 (12%)	2.3%	-1.84%	-1.18%	-2.65%**	-1.28%
Latin America and Caribe	74 (23%)	2.1%	-1.91%***	-1.29%**	-2.19%***	-1.30%**
Middle East and North Africa	31 (10%)	-0.8%	-5.45%**	-4.67%*	-4.49%*	-5.39%**
South Asia	18 (6%)	5.2%	+1.92%	+0.19%	+0.62%	+0.35%
Sub Saharan Africa	121 (38%)	3.0%	-0.26%	-0.31%	-1.45%*	-0.57%
Total	323	2.8%	-1.01%**	-1.02%***	-1.93%***	-1.31%***

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Source: Own elaboration based on IMF IFS, IMF WEO and World Bank data. There are 323 events with growth data. In the region analysis, we also exclude Taiwan-80 because the World Bank does not classify it into a region. There is no Low-income growth data for the sixties, so in column 'Δ income level growth' we lose Burkina Faso-61, Ghana-65 and Nepal-66. In column 'Δ previous year' we lose Burkina Faso-61 (Low income), Paraguay-61 (Lower-middle income), and Taiwan-80 (High income) due to lack of data. In column 'Δ previous trend' we lose 17 events for the same reason. Significance level at which the null hypothesis is rejected: *** 1%; ** 5%; and * 10%.

We cannot stablish causality, but our evidence suggest correlation between inflation upsurges and deteriorations in the real side of the economy. This is driven specifically by what happens in some groups and regions.

After finding these short-term costs of inflation upsurges, we also look for long-term costs. To do so, we build a measure of loss that captures the accumulated difference between the GDP of the affected country and a benchmark along the time that the inflation process lasts. It is $L_{i,t;t+Y} \equiv \prod_{t}^{t+Y} \frac{(1+g_{i,j})}{(1+G_{k,j})} - 1$, where $g_{i,j}$ is the growth of country i (belonging to group K, that can be an income level or a region) in the year j, $G_{K,j}$ is the growth of the aggregate group of countries K, and j goes from t, that is the calendar year when inflation reaches 20%, to $t+Y$, the last calendar year when inflation is above 20% ($Y+1$ is the number of years that the process lasts). This measure captures how much an economy lags behind its pairs after getting an inflation upsurge.

Having an upsurge in inflation accounts for an accumulated loss in output of 2.2-2.7%, depending on which counterfactual growth we use. This difference is significant and explained again by the middle-income and Latin American and Caribbean countries. High income economies show a significant improve in growth when using income as counterfactual, but not when using the region. The same happens with the SA region, while ECA region shows a significant decrease when using income as counterfactual, but not when using the region. On the other hand, low-income countries and the EAP, MENA and SSA regions show no significant differences in growth. The full list of impacts and their statistical significance is shown in Table A.2. In the appendix.

We also split each group between the countries that evolve to chronic and those that do not. It can be argued that governments avoid taking measures necessary to curb accelerating inflation

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in order to protect economic activity. In this way, there could be a tradeoff between short-term growth and long-term growth, if countries with chronic inflation showed better performances in the initial year but worse ones in the following ones. In our sample, there is evidence of the latter but not of the former.

When introducing a chronic inflation dummy into Equation (3), which estimates short-term growth, the estimations only indicate increased growth (relative to the region or income group, but not compared to the previous year or trend) in the East Asia and Pacific and South Asia regions. However, these findings are not robust when small countries are excluded and contrast with the overall decrease in growth (by 1.5%) compared to the previous year across the entire sample. This decline is primarily driven by a 2.5%-3.2% reduction in growth in low-income countries and Sub-Saharan Africa.

On the other hand, in the long-term, the output loss in chronic countries drives the general decrease. Those economies grow 5.1%-6.8% less than their pairs, especially in middle-income countries (loss off 6.1% -20.9%) and Latin America and the Caribe (11.0%-18.7%). All this numbers are included in Table A.2. In the appendix.

To estimate the numeric impact of letting inflation become chronic, we perform the following estimation:

$$L_{i,t;t+Y} = \beta_0 + \beta_1 * chronic + u_i, \qquad u_i|x_i \sim N(0,1)$$

(4)

The results are showed in Table 6. The overall impact is of 4.40%-6.25%, led by Middle-income and Latin American countries.

Table 6. Growth statistics for inflation upsurges according to income group and region along the whole duration of the period. $\widehat{\beta}_1$ for equation (4).

	Total growth differential	
	Δ Income group	Δ region
Low income	+0.61%	-2.34%
Lower-middle income	-8.16%***	-5.44%**
Upper-middle income	-15.26%***	-7.10%
High Income	+4.46%	+3.25%

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East Asia and Pacific	+7.49%*	+5.59%
Europe and Central Asia	-1.91%	+1.78%
Latin America and Caribe	-15.59%***	-9.52%***
Middle East and North Africa	+0.63%	-0.65%
South Asia	+10.68%**	+6.93%***
Sub Saharan Africa	-4.49%	-5.98%**
Total	**-6.25%***	**-4.40%***

Source: Own elaboration based on IMF IFS, IMF WEO and World Bank data. We exclude non-classified countries, so we keep 300 observations. Significance level at which the null hypothesis is rejected: *** 1%; ** 5%; and * 10%.

d. What determines the cost?

The previous subsection gave us the idea that letting inflation evolve into chronic is costly. In this section we postulate that the loss is linked to the inflation thresholds that each process surpass. We perform the following estimation:

$$L_{i,t;t+Y} = \beta_0 + \beta_1 * \pi\ level\ dummies + u_i, \qquad u_i|x_i \sim N(0,1) \tag{5}$$

Table 7. Output loss determinants – estimated coefficient as in Eq. (5)

	Δ Income group	Δ region
$\widehat{\beta_0}$	+0.28% (0.01)	+0.24% (0.01)
Surpass 40%	-4.59%** (0.02)	-4.01%** (0.02)
Surpass 80%	-8.39%*** (0.03)	-5.30%* (0.03)
Hyperinflation (>50% monthly)		-13.44%* (0.07)
Extreme (>1,000%)	-36.79%*** (0.06)	-16.40%* (0.08)

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N	320	323
R^2	25.0 %	21.2%

Significance level at which the null hypothesis is rejected: *** 1%; ** 5%; and * 10%. In the 'Δ Income group' regression the hyperinflation was excluded due to statistical insignificance.

As shown in Table 7, the output loss is closely tied to the level of inflation. This cost appears to be convex, with surpassing certain thresholds imposing increasing marginal costs on economic activity. Unlike the previous analysis, this exercise does not rely on our useful, but inevitably arbitrary classification, making it a valuable robustness check for earlier findings.

The likelihood of reaching higher inflation values is positively and significantly influenced by the duration of each event. For instance, using a probit approach, each additional month of chronic inflation increases the probability of reaching 40% year-over-year by 3.82% and the probability of experiencing hyperinflation by 0.88%. These figures accumulate to +45.84% and +10.56% annually, respectively. This evidence should be viewed as a compelling argument against inaction.

4. Concluding remarks

In this article, we examine significant inflation outbreaks and present evidence indicating that these surges result in output losses, particularly when they become chronic. We also analyze the regional and income-level patterns of inflation upsurges, finding that the resulting output losses disproportionately affect middle-income economies, Latin American and Caribbean countries, and Middle Eastern and North African nations.

Transitioning to a chronic inflation regime increases the likelihood of reaching higher inflation levels, which is costly for the economy. This effect also has regional and income-level components. The overall negative outcome is driven by middle-income and Latin American countries, while chronic inflation in South Asian countries is associated with improved growth.

The encouraging news for policymakers is that preventing inflation from becoming chronic hinges on policy decisions rather than exogenous factors. Furthermore, we find no evidence of 'recession now vs. later' tradeoff, as addressing inflation early does not impose greater short-term economic losses. At this level of inflation, monetary and exchange rate policies appear to

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be more important than fiscal contractions, though the optimal policy response should be further studied.

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6. **Appendix**

Table A.1. Source for each variable

Variable	Source
Inflation	International Financial Statistics – International Monetary Fund (IMF), Ha, Kose & Ohnsorge (2023), INDEC and other domestic sources for Argentina, Fundação Instituto de Pesquisas Econômicas for Brazil, INE for Chile, CEPALSTATS – ECLAC and BCN for Nicaragua, and BCV for Venezuela.
Growth	International Financial Statistics – International Monetary Fund (IMF), World Economic Outlook – International Monetary Fund (IMF), and World Bank.
Nominal exchange rate	Bank for International Settlements (BIS), BCE for Ecuador, and Ilzetzki, Reinhart & Rogoff (2021) for Nicaragua.
Food and energy international prices	World Bank.
Broad money	World Bank.
Interest rates	Bank for International Settlements (BIS), IMF IFS, BCRA for Argentina, Edwards (1986) and World Bank (1980) for Chile, BCRD for Dominican Republic and BCE for Ecuador
Primary and overall fiscal balance	Kehoe & Nicolini (2022), Mauro, Romeu, Binder, & Zaman (2015), World Economic Outlook – International Monetary Fund (IMF).
Population	World Bank.
Income and region classification	World Bank.

Source: Own elaboration

Table A.2. Growth statistics for inflation upsurges according to income group and region along the whole duration of the period.

		Total growth differential. $L_{i,t;t+Y}$	
		Δ Income group	Δ region
Low income	Chronic	+2.34%	-2.29%
	Non-chronic	+1.72%*	+0.05%
	Total	+1.91%	-0.67%
Lower-middle income	Chronic	-9.69%***	-6.15%**
	Non-chronic	-1.53%	-0.71%
	Total	-4.02%***	-2.37%**
Upper-middle income	Chronic	-20.94***	-9.94%**
	Non-chronic	-5.68**	-2.85%
	Total	-12.72%***	-6.12%**
High Income	Chronic	+6.08%	+1.55%
	Non-chronic	+1.61%	-1.70%
	Total	+3.40%*	-0.40%
East Asia and Pacific	Chronic	+8.25%*	+3.82%
	Non-chronic	+0.77%	-1.77%
	Total	+2.54%	-0.45%
Europe and Central Asia	Chronic	-3.58%*	+0.55%
	Non-chronic	-5.49%	-1.23%
	Total	-4.21%**	-0.64%
Latin America and Caribe	Chronic	-18.71%***	-10.95%***
	Non-chronic	-3.12%**	-1.43%
	Total	-9.86%***	-5.54%***
Middle East and North Africa	Chronic	-2.79%	-3.42%
	Non-chronic	-3.42%	-2.77%
	Total	-3.16%	-3.04%
South Asia	Chronic	+3.34%**	+7.11%**
	Non-chronic	+14.02%	+0.12%
	Total	+5.47%***	+1.48%

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Sub Saharan Africa	Chronic	-3.39%	-5.49%
	Non-chronic	+1.10%	+0.49%
	Total	-0.33%	-1.38%
Total	**Chronic**	**-6.81%***	**-5.12%***
	Non-chronic	**-0.56%**	**-0.72%**
	Total	**-2.69%***	**-2.20%***

Source: Own elaboration based on IMF IFS, IMF WEO and World Bank data. We exclude non-classified countries, so we keep 300 observations. Values and statistical significance of 'total' rows is robust to including them. Estimations are also robust to excluding small countries (less than 1 million people). Significance level at which the null hypothesis is rejected: *** 1%; ** 5%; and * 10%.