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Economic Research Methods

Presentation April 22nd

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Does Inflation Today Indicate Political Instability Tomorrow, on an International Scale?

Background:

The purpose of this paper is to examine how inflation may cause political instability. Persistent and high levels of inflation cause many issues within an economy, not limited to decreasing real wages and the redistribution of wealth from creditors to debtors. One example of how painful inflation can be for people impacted by it is from Germany during 1920-1923 under the Weimar Republic. Citizens resorted to burning piles money rather than wood to keep warm during the winter because it was less expensive than purchasing firewood. Economic issues and the general need for a scapegoat led to the overthrowing of the Weimar Republic and allowed the Nazi regime to take over. This has been repeated throughout the world as governments which allow inflation to reach crippling heights are ousted by enraged citizens, both through peaceful political means and violent ones. The relationship between inflation and political instability has been well documented from one perspective, that instability causes inflation, but the existing literature on the other, that inflation causes instability, is less prevalent.

Literature Review:

The duty of a central bank is to keep inflation as low as possible while still allowing for economic growth. In the United States, the Federal Reserve Bank or Fed is an apolitical entity whose job is to control monetary policy to best suit the needs of the country. Since 2012, the Fed has settled on an inflation target of two percent per year to achieve its main goals: maximum

employment and price stability. Other countries, like the Czech Republic in 1998, adopted this strategy of inflation targeting much earlier, as examined by Smidkova, Hrnčir and Yurkovsky (2000). Inflation targeting eases insecurities in the financial market as investors will have better insights into the direction of price levels. They note many issues that arise from inflation including the slowing of financial activity, delayed payments by debtors, income redistribution among savers and debtors, all of which could lead to the erosion of political stability in a country. The general economic thinking about inflation says that the most beneficial inflation is a maintained low inflation rate.

While in the United States, the Fed is considered to be independent of the government, not every central banker will be immune to pressures, both governmental and personal. Malmendier et al (2017) found that central bankers' first-hand inflation experiences can strongly influence their leanings in terms of inflationary policy. Hawkish leanings are characterized by tight inflation policy, advocating for keeping inflation lower while dovish leanings will have looser inflation policy, advocating that the growth of the economy is more important than a specific inflation rate. As this relates to this paper, those in power ought to follow a similar trend but if they will be left unaffected personally by their inflation decisions, it may follow, based on Malmendier's research, that they may make more dovish decisions. If their concerns are less impacted by inflation, then the inflation rate may be a tertiary concern behind voter's support and power consolidation if even that high.

One commonly discussed impact of inflation is a decrease in consumer purchasing power due to the decreasing value of a currency. Inflation causes not only the price of goods to increase but the amount of money a consumer has to spend to decrease at the same time. High levels of inflation have been found to cause sharp reductions in real wages, as discussed by Braumann

(2004). He found that there was a median decline in real wages of 24% in 17 different countries, over the course of 23 episodes of high inflation. While this decline is often associated with the lag in adjusted nominal wages, he finds that inflation decreases capital stock and thus lowers productivity of labor which in turn causes prices to shift against the labor-intensive good. His findings suggest that within commonly discussed inflation issues, there may be deeper impacts of high levels of inflation.

Some economists believe that inflation's unpredictability is actually more harmful to an economy than its levels, as people do not have an idea of where price levels will be in the future. Ellison and Yates discuss the movement of developed economies, like the United States, from volatile inflation in the 1970's towards more stable inflation levels in the 1990's. This was a significant shift, as inflation levels in the 70's were around 8% and in the 90's, it fell to around 2%. They found that with the discovery of the Phillip's curve, there was an incentive for governments to allow price levels to vary in order to respond to unemployment shocks. This theory was quickly done away with as they argue that the government had doubts about the existence of the Phillips curve. Thus, the government could not maintain more volatile levels of inflation without the boons of lower unemployment. This transition of belief is highlighted by the fact that the government no longer uses inflation levels to offset shocks.

What these papers are missing are some of the deeper impacts of sustained levels of high inflation, namely the erosion of trust in the government. The less control that a government appears to have over issues that impact citizens in daily life, like inflation, the less satisfied citizens are going to be with that government. As is the case with Bolivia in the 1980's, high levels of inflation led to the removal of the government that had allowed the increase of inflation. Jeffrey Sachs (1987) examined this period of historic inflation and discussed the possibility of

hyperinflation striking at times of instability which causes worse instability until an entity is able to consolidate power and stabilize the economy. True hyperinflation, according to Phillip Cagan's definition of 50% per month, lasted in Bolivia for a period of eighteen months until a stabilization policy was instituted. This policy was the product of a new government rising to power and taking major strides to combat the inflation. This example of soaring inflation levels leading to a change in government is the question that this paper will address. The Siles Suazo led government who presided over this period of historic inflation relied heavily on seigniorage and saw the tax system collapse under the weight of rising prices. Inflation crippled the Bolivian economy and triggered an early election where the people voted to remove Siles from office. Sachs highlighted some of the causes of this period of rapid inflation but does not do an empirical analysis of the relationship between high levels of inflation and political instability which this paper will address.

Most who discuss this problem look at it from the reverse perspective, that political instability can increase inflation. Haider, Din, and Chani (2011) argue that governments without a promise of day to day security will be more inclined to make short term decisions to try to influence voters for reelections. Unstable governments will be more willing to create higher inflation, given their need to influence citizens with spending splurges. For example, if the unstable government employs seigniorage to pay for reducing unemployment, many voters may be influenced by the fact that they now have jobs under this regime. However, this will not last long, as those voters seduced by new jobs will still be stuck footing the bill through soaring inflation levels. Thus, this persistent high inflation could be a cause of further political instability through rising levels of consumer anger. Haider et al did find that, in Pakistan, high corruption

with weak governance results in high inflation and low growth levels. This paper will examine whether this relationship exists in an inverse fashion, high inflation leads to weaker governance.

Martin Paldam (1987) wrote that the causal relationship between inflation and political instability is bilateral. He analyzed this relationship with regard to eight different Latin American countries which this paper will attempt to do as well. His analysis focuses on the relationship between military or civilian led governments and inflation while this analysis will focus more on the causal relationship between inflation levels and political instability. He cites three potential avenues by which inflation levels can impact political stability: inflation tax, falling popularity of governments, and shift in income distribution. He found that nearly all peaks in inflation are correlated with a regime switch. These results are encouraging for this paper as it does appear that Paldam was able to show that higher levels of inflation do influence the stability of a government.

Others have examined the relationship between usage of seigniorage and the erosion of political stability. Seigniorage is the profit a government makes by issuing new currency and it always results in the devaluing of that currency. Political regimes focused more on continuations of their reign rather than social welfare often result in a weaker tax system which results in more reliance on the power of seigniorage. Cukierman, Edwards, and Tabellini (1992) discuss the relationship between political instability and a reliance on seigniorage rather than a strong tax system to generate government revenues. The reliance on seigniorage will result in higher levels of inflation as it devalues the currency. This will result in an even weaker tax system as people will try to save as much money as they can by evading taxes due to the weaker value of their money. Cukierman's model is limited by its use of a dummy variable to indicate democratic regimes while this paper will utilize the 21-point Polity IV metric to get a better understanding of

the regime in place. This improvement may help to clarify the relationship as Haider et al. did find that, in Pakistan, democratic regimes had significantly higher levels of inflation than military regimes.

There have been economists who have tried to show quantitative measures of the stability of a government. While it may not be possible to put a number on civilian frustration or government ineptitude, Linehan (1976) attempts to build a model to try to make this possible. He identified 5 indicator variables of political instability: man hours in political conflict, riots, protest demonstrations, armed attacks, and deaths from political conflict. This captures a metric of public outrage that shows the intensity of political instability but his model is focused on portraying present levels of instability, while this paper will focus on future indicators of instability. Goldstone et al. (2010) addresses this issue and builds a model with the ability to estimate future political instability. It only has four independent variables but they do more to capture the broad picture of a country's predicaments: regime type, infant mortality, conflict ridden neighborhood, and state-led discrimination. These models do not include economic variables such as inflation which this paper will examine.

Hollie Nyseth Breh (2017) wrote about the risk factors for genocide, which can be interpreted as the pinnacle of social or political instability. She found that there were an array of factors like oil production, riots, and economic crisis which can indicate a future genocide. She also found that partial democracies are more unstable than full democracies or even than full autocracies. These partial governments may be more inclined to make decisions leading to both genocide and instability as they try to maintain and strengthen their grips on power. These indicators like the presence of civil war, assassination attempts, and others referenced in her

paper will be used in this paper as left side variables to test inflation's impact on these genocide predictors.

The paper which this one will most closely model is Ari Aisen and Francisco Jose Veiga's (2006). They examined whether political instability leads to higher inflation using a panel data set covering 100 countries from 1960 to 1999. They use a system-generalized method of moments estimation to capture the impact of inflation inertia. They also use a theoretical and empirical model while this paper will only use an empirical approach. It includes four independent variables for political instability and six independent economic variables to reflect characteristics of the economies and their performance. This paper will include a similar analysis using many of the same variables, including lagged inflation and Polity IV scores. The data used in this paper will span from 1970 to as recent as possible.

Kathryn Hochstelter (2006) found that between 1978 and 2003 40% of elected presidents were challenged by civilian actors and 23% of presidents were removed by impeachment or by other means. There have been a number of other high profile impeachments since, including Brazil's president Dilma Rousseff's impeachment in 2016 and Venezuela's president Nicolás Maduro's contested presidency of 2019. Such failures have led to a vicious cycle of furthering political instability. This area's consistent pattern of unstable governments suggests that it would be a good area to examine within this paper's study. This will be examined by using a dummy variable to indicate Latin American countries.

Methods and Methodology:

Although inflation has immediate effects on the people who use the currency, its impact on how citizens feel about government may take longer to take effect. This time suggests that the use of a lagged inflation variable will be necessary. This paper will examine this relationship

using a one year and a five year lagged inflation variable. Similarly to Aisen and Viegas model from “Does Political Instability Lead to Higher Inflation”, I will use a lagged inflation variable. This paper will compile a list of similar countries based on their GDP per capita, population, and a number of other qualities. Aisen and Viegas used a panel data set, including over 170 countries and this paper will follow that example. I hypothesize that this relationship will be even stronger in developing economies. This hypothesis will be tested using an indicator variable for these such countries, defined in this study by a real GDP of below the 25th percentile of this variable. These economies are likely less stable and more apt to be influenced by higher levels of inflation.

The first cut of the model used for this analysis will be an OLS regression equation:

$$\text{Political Instability} = \alpha + \beta (\text{lagged inflation}) + \gamma (\text{lagged real GDP}) + \theta (\text{Parameters}) + \epsilon$$

This regression is expected to find a positive, significant coefficient in δ to answer the question this paper is addressing. The Political Instability metric will be based on genocide literature as well and will look at several dependent variables to see which has the greatest effect. These dependent variables will be set for a series of political instability metrics to see if inflation's effect carries throughout different measures of instability. I anticipate that the impact of inflation will be greater for certain metrics that are more impacted by an aggravated populace, such as coup attempts and episodes of civil war. The parameters will include other control variables for instability. These are trade as a percentage of the country's GDP, democracy on an index scale with higher scores indicating higher levels of democracy, and unemployment, youth unemployment where possible but national rate of unemployment where this is not possible. These are each strongly correlated to instability from the literature and will try to account for the levels of instability present in a country, excluding inflation.

The inflation variable will be lagged first by one year, then I will take a five-year average of inflation to see whether it takes longer for reactions to inflation to impact stability. This variable will be examined for volatility. Here, instead of a lagged inflation variable, this variable will take on the value of the difference between this year and last's inflation levels. This will then be subjected to the same restrictions as the level of inflation, a one year, then with the five-year restriction, an average of volatility over the past five years. The Polity IV metric is an overall score for a country's government, ranging from a -10, indicating a full autocracy, to a positive 10, indicating a full democracy. Incorporating the squared Polity IV term will allow for non-linear effects, which would appear to make sense, as a one point movement from a full autocracy to a slightly weaker autocracy would indicate less movement in stability than a one point movement for a partial democracy or autocracy.

Table 1

Variable	Observations	Mean	Standard Deviations
Polity	7,339	1.2617	7.356
Polity Squared	7,339	55.6959	32.43
Inflation	5,154	25.4135	247.1256
Extreme Levels of Inflation	5,154	0.04986	0.2177
Real GDP	3,015	575,727.8	1,836,774
Democracy	7,339	1.7704	15.6062
Trade	5,822	74.1323	46.6116
National Youth Unemployment	1,950	17.5870	11.1977
National Unemployment	2,780	7.8033	5.7181

A standard ordinary least squares regression model, however, is more restrictive than a logit, so this paper, where appropriate for the data, will also utilize a logit model using the same variables to try to get an even better understanding about how these two variables interact. The logit model will be used to analyze whether inflation and other dependent variables against the indicator variables created through the polity metrics.

Table 1 presents the descriptive statistics for the variables of interest. Polity2 is the political instability ranking from the Center for Systemic Peace. The data here is robust and the mean being such a low score is indicative of many states throughout its range having weaker governments. The Polity squared variable is a generated variable squaring this Polity metric. This is expected to help limit potential confounding effects of the Polity metric having a range from -10 to 10 and to help highlight the weaker governments with lower scores.

Inflation will also be tested to see if only in extreme cases of high levels of inflation does a government's stability become tenuous. This will be an indicator variable of instances of extreme inflation, coded as a one when inflation is in the 95th percentile of its distribution and a zero elsewhere. This may prove fruitful as we have seen numerous real world examples of the chaos that extraordinarily high levels of inflation can cause, such as in Zimbabwe 2008. The inflation rate for that country reached at its heights 89 sextillion percent. This staggering number represents 10 raised to the 21st power. This country's struggles with this high inflation led it to adopting a foreign currency, the US dollar as its official currency. It is possible that inflation's effects are only felt at the highest levels, so this study will try to account for these episodes of hyperinflation. These two variables share a high number of observations, which strengthens the opportunity for significance. The mean for inflation is surprisingly high but the mean for extreme

inflation makes sense, as it is expected to be about 5 percent. The fairly wide standard deviations are also to be expected as there is a wide range of inflation, as referenced above.

Real GDP has significantly lower observations than the polity metric, but is a strong indication of how well developed an economy is, so its inclusion in all of these models will prove useful. It is measured here in millions of US dollars at 2011 dollar, with the conversion using chained purchasing power parities. This means that each observation is comparable to one another. This variable will be lagged as well, to try to capture other aspects of economic growth that inflation may not. While an economy strengthens, typically higher levels of inflation are also expected, so this variable's inclusion ought to help capture some of the changes in the economy outside of inflation. It is also commonly used in other literature surrounding political instability. Typically, as an entire economy does better, instability tends to decrease as the citizens have less to be frustrated about when they can meet personal needs and consumption desires. The spread of this variable is also to be expected as there is an extremely large range of GDPs in the world, with Liberia's real GDP in 1996 equivalent to 488 million dollars and China's real GDP in 2017 of 18,396,068 million dollars. This tremendous range also explains the fairly high mean, as the economic superpowers of the world will make a bigger impact on this mean than weaker economies would. This impact will be attempted to be eliminated by taking the logarithm of this variable, then lagging it in the rounds of logistical regressions.

The Democracy variable is an additive index of 0-10 based on a country's score on four key elements of democracy as seen by the Center for Systemic Peace. These four elements are competitiveness of executive recruitment, openness of executive recruitment, constraint on chief executive, and competitiveness of political participation. The aspect they view as the strongest determinant of democracy is constraint on the chief executive. The Center for Systemic Peace

also argues that participation in a democracy must be open, unrestricted, and fully competitive as well as has elective recruitment for the executive. This variable has a predictably low mean, as there are very few countries who enjoy highly democratic governments and a much larger sample of those that have partial or non-democratic systems. However, the standard deviation is surprisingly large which is due to Polity's manner of coding state failures as a -88. There are 109 such instances in the data used in this study and explain the high standard deviations and the relatively low mean. This variable will be used throughout the series of regressions as an attempt to capture the existing political stability or instability in the year before the instability metric's measurement. It is expected to have a positive impact on the instability metric, meaning that the stronger your democracy was last year, the lower level of instability you can expect in this year, *ceteris paribus*.

Trade is a variable from the World Bank and is coded as a percentage of that country's total GDP for the year. It is treated in this study as the difference between a country's exports and a country's imports and thus, a country could have a higher level of trade than they do GDP. Trade is typically seen as a reducer of political instability, as the spread of ideas and the globalization of cultures is seen to both increase personal wealth and allows citizens to interact on a global scale. However, some very high trade observations suggest that there may be a difference between service economies, where people get to interact and have mutually beneficial trade agreements, and lower skilled labor economies, such as Southeastern Asia where many American companies go to get cheaper labor. This kind of "trade" would result in much higher than 100% of a country's GDP but would not be helpful for this economy as the profits are going to executives in foreign countries rather than being shared with the workers. Thus this variable could see an inverted U curve of utility of trade, showing positive results for a country before a

very large percent of the country's GDP and after that, showing negative results for that country. However, trade is important to factor into a model of instability as it tends to raise economies up due to spillover effects of the trade. These spillovers would be impossible to capture using a different variable, so in order to account for that impact of these exploited countries, real GDP will be incorporated to try to control for this inversion.

Youth unemployment is a very standard variable to account for when considering instability. The greater the number of young people who are unemployed, typically the more wealth that gets concentrated in the hands of the elites and the lower the opportunity cost of engaging in political or terror activities. If a young person doesn't have a job, they are both more apt to be frustrated and have more time to act on that frustration. Unfortunately, this variable has the fewest observations of the sample and thus limits the scope of this study. In the regressions where this variable is lacking sufficient observations, the simple national unemployment rate will be used. This variable lacks the additional assumption of political activism or agitation, which limits the ability of this variable to state as much as the youth unemployment variable. But in general, the lower unemployment is, the more stability a country is likely to have.

Data:

The data used in this paper will come from a variety of sources, as there is not one data set that incorporates all the variables this paper will examine. After all the data is collected, it will be compiled into a single file to be run through Stata regressions. The political instability scores will come from the Polity Four dataset, accessible through the Center for Systemic Peace's website. This dataset includes their formula for calculating their scores for each country. From these variables, this paper will also generate a squared Polity score to examine whether there is a nonlinear effect of a one unit change in a Polity score.

This would appear to be likely as a negative 10 to a negative 9 only indicates a slight decrease in how total of a dictatorship a country is while a 1 to a 2 is a movement of a country from a very partial democracy to a stronger one. Countries in the middle area, -3-3, likely will be the most impacted by this nonlinear correlation, so I will create three groupings for countries. The first, relatively stable democracies indicated by a score from 4 to 10, the second, relatively stable autocracies indicated by a score of -4 and -10 and a third, relatively unstable anocracies, indicated by scores between -3 and 3. These groupings will allow me to control which of these groups Variables such as coups and assassination attempts will also be taken from the Center for Systemic Peace's website which tracks these. Data on coups will come from their Coup d'Etat data set which contains data on coups from 1946-2017. These variables will be used as a factor in the dependent variable.

Data for inflation will come from the Penn World Tables website which tracks inflation among a variety of other financial variables across nearly all countries. Inflation will be evaluated on a time path scale and on its level to analyze which has the greater impact on civil unrest. Penn World Tables website contains datasets which runs from 1970 onwards with a nearly perfectly complete set. This website will also provide data for population density which will be used as a control variable.

Data on discrimination will be collected through the Minorities at Risk project which will be used as a factor in the dependent variable. The variable bordering violence will be used as a control variable as well and will be taken from the Center for Systemic Peace's Major Episodes of Political Violence dataset. This set contains an indicator of neighboring violence variable with a full set from 1946 to 2012 and a less complete list from 1946 to 2017.

Some left side variables will also be used from these sources. Economic literature on genocide factors shows that this can be considered the extreme form of political instability. Factors such as assassination attempts, coup attempts, and forced resignations of executives in government may paint a different picture of instability than simply the index created by the Center for Systemic Peace, so each of these will be used as a left side variable with the same right side variables. This approach will show how each left side variable interacts when presented with inflation.

Empirical Results

The results for this empirical analysis seem to be rather mixed. While there are some significant values appearing in some of the initial regressions, the majority of the direct measures of political instability do not show signs of being impacted by inflation in this data. As shown in Table 2 below, not one of the direct measures of instability are significant and in fact, often none of the other variables in the regression are significant either. This could be due to confounding effects of inflation and some of the other economic variables, such as real GDP or unemployment. The following tables were all done in the same fashion, that is that the left side variable is adjusted while the right side remains the same. The right side variables are an attempt to control for the existing levels of instability in a country and are taken from the literature to this end. The variable of interest for this paper will be the one closest to the dependent variables, inflation, with a number of transformations done to it throughout this analysis.

Table 2

Dependent Variables	Inflation (lagged one year)	Real GDP (lagged one year)	Democratic Regime (one year ago)	Trade (as percent of GDP)	Youth Unemployment	National Unemployment

Polity	-0.000116 (0.0000778)	-1.46e-07*** (4.55e-08)	1.455911*** (0.0464351)	-0.0030058*** (0.0009186)	-0.0200883*** (0.0073506)	X
Polity Squared	0.0030741 (0.0023776)	1.54e-06* (8.28e-07)	7.137183*** (0.4507474)	0.0671155*** (0.0118294)	0.3154987*** (0.0651155)	X
Attempted Coups	-2.65e-06 (2.57e-06)	2.18e-10 (2.42e-09)	-0.0008544 (0.0007078)	-0.00002 (0.0000292)	-0.000011 (0.0000359)	X
Successful Coups	-1.15e-06 (1.62e-06)	3.21e-10 (3.47e-10)	-0.0011218 (0.0011173)	-4.01e-06 (4.68e-06)	0.0002114 (0.00021070)	X
Presence of State Failure	-0.0000122 (0.0000128)	-9.92e-11 (1.01e-10)	-0.0000232 (0.0000255)	8.84e-06 (8.90e-06)	X	-0.0000154 (0.0000171)
Presence of Civil Violence	-0.0000273 (0.000024)	5.02e-08* (2.59e-08)	-0.0157193*** (0.005421)	0.0000193 (0.0002366)	-0.0034513*** (0.0013587)	X
Presence and scale of Civil War	-7.24e-07 (2.07e-06)	-2.20e-9 (2.27e-09)	-0.0050095 (0.0049861)	0.0000841 (0.0000847)	-0.0006171 (0.0006179)	X
Presence of International Violence	5.16e-06 (5.72e-06)	-4.80e-9 (4.75e-09)	-0.0034877 (0.0034388)	-0.0000664 (0.0000661)	-0.0008084 (0.0007987)	X
Presence of International War	-8.76e-07 (1.47e-06)	4.54e-9 (4.54e-09)	-0.0009173 (0.0009167)	0.0000335 (0.0000337)	-4.13e-06 (0.0000164)	X
Total Acts of War and Violence	0.0000181 (0.00008491)	1.30e-07 (8.29e-08)	-0.1054299*** (0.021876)	-0.0021025*** (0.0009021)	-0.0198587*** (0.0053657)	X
Successful Assassinations	0.0000161 (0.0000172)	-4.09e-10 (4.11e-10)	-0.0004018 (0.0004022)	3.70e-06 (3.84e-06)	X	-0.0000776 (0.0000785)
Resignations of Executives	-1.72e-06 (1.90e-06)	-2.04e-10 (3.07e-10)	-0.002135 (0.0015021)	0.0000189 (0.000023)	0.0001914 (0.0001456)	X

*Notes: * represents significance on a 90% confidence interval and *** represents significance on a 95% confidence interval. The coefficients are written above and the robust standard errors are denoted in parentheses. Inflation in this regression is lagged by one year. Real GDP is also lagged one year. Democratic regime is a scale variable that represents how democratic a government is. Trade is taken as the percentage of the country's GDP and is lagged by one year. Youth Unemployment is the unemployment value for youths in a given year and is also lagged by one year. Where there are not enough observations for the youth unemployment variable, national unemployment is used instead. Attempted Coups are thwarted attempts at a coup. Polity is an index variable from -10 to 10 and Polity squared is this index squared. Presence of civil violence, presence of civil war, presence of international violence and war and total acts of war and violence are variables a scale from 0-7 indicating the quantity and scale of violence. Resignations represent any transitions from office that are unexpected or forced due to public opinion. Presence of state failures is an indicator variable which represents instances of the current government failing, according to the polity metric.*

The above table details the results of ordinary least squares regressions with unique left side variables while there are five right side variables that stay the same as much as the data allows. For two left side variables, presence of state failures and successful assassinations, there is not sufficient data to complete these regressions. In order to try to maintain as much consistency as possible between these regressions, Youth Unemployment was substituted for National Employment, which yields similar results. As explained in the previous section, this variable does not have as strong of a correlation with instability as youth unemployment tends to have. Each of these regressions were done using robust standard errors. Many of these insignificant values, however, do yield expected signs relating to their variables. Increases to real GDP ought to result in a lower likelihood of left side variables occurring in the following year. This series of preliminary regressions may suggest that there is a nonlinear correlation that is not captured by the OLS regression model. This analysis is then extended beyond the one year margin and examines inflation lagged by five years instead of the one.

Table 3

Dependent Variables	Inflation (lagged five year)	Real GDP (lagged one year)	Democratic Regime (one year ago)	Trade (as percent of GDP; Lagged one year)	Youth Unemployment (Lagged one year)
Polity	-0.0003599 (0.0002961)	-1.32e-08 (5.76e-08)	1.439343*** (0.0465145)	-0.0021625*** (0.0009373)	0.0147401*** (0.007111)
Polity Squared	0.0123811*** (0.0055166)	-1.02e-06 (1.11e-06)	7.510482*** (0.4757839)	0.0754592*** (0.0113894)	0.017497 (0.0727881)
Attempted Coups	-5.14e-06 (4.26e-06)	5.82e-10 (4.47e-09)	-0.0012646 (0.0008124)	-0.0000361 (0.0000349)	-0.0001324 (0.0001156)
Successful Coups	-4.88e-06 (7.02e-06)	-1.73e-09 (1.80e-09)	-0.001553 (0.0013755)	-0.0000181 (0.0000356)	-5.32e-06 (0.0002573)

Presence of Civil Violence	-0.0002169 (0.0001621)	-3.71e-08 (6.28e-08)	-0.001065 (0.0061433)	-0.0025278*** (0.0007605)	0.0013123 (0.0017368)
Presence of Civil War	3.16e-06 (7.28e-06)	-4.62e-09 (4.70e-09)	-0.005331 (0.0053069)	0.0000897 (0.0000903)	-0.0003751 (0.0003807)
Presence of International Violence	-5.35e-06 (6.01e-06)	-6.92e-09* (4.11e-09)	-0.0006769 (0.0005339)	-0.0000569 (0.0000471)	-0.0002137 (0.0001544)
Presence of International War	7.67e-06 (0.0000412)	-3.47e-08 (2.35e-08)	-0.0044756*** (0.0021663)	-0.0002089 (0.0001356)	-0.0011566*** (0.0005779)
Total Acts of War and Violence	-0.000588*** (0.0002772)	2.97e-07* (1.66e-07)	-0.076839*** (0.0224579)	-0.005413*** (0.0011618)	-0.0205229*** (0.0051259)
Successful Assassinations	0.0000125 (0.0000165)	-1.45e-09 (1.46e-09)	-0.0001019 (0.000108)	-0.0000164 (0.0000165)	-0.0000226 (0.0000236)
Resignations of Executives	2.10e-06 (4.69e-06)	-2.15e-09 (1.96e-09)	-0.0027013 (0.0017639)	4.62e-07 (0.0000341)	0.0001219 (0.000198)

*Notes: * represents significance on a 90% confidence interval and *** represents significance on a 95% confidence interval. The coefficients are written above and the robust standard errors are denoted in parentheses. Inflation in this regression is lagged by five years. Real GDP is lagged one year. Democratic regime is a scale variable that represents how democratic a government is. Trade is taken as the percentage of the country's GDP and is lagged by one year. Youth Unemployment is the unemployment value for youths in a given year and is also lagged by one year. Where there are not enough observations for the youth unemployment variable, national unemployment is used instead. Attempted Coups are thwarted attempts at a coup. Polity is an index variable from -10 to 10. Presence of civil violence, presence of civil war, presence of international violence and war and total acts of war and violence are variables a scale from 0-7 indicating the quantity and scale of violence. Resignations represent any transitions from office that are unexpected or forced due to public opinion. Presence of state failures is an indicator variable which represents instances of the current government failing, according to the polity metric.*

Table 3 describes the same regression panel that was used in Table 2, but with the inflation variable lagged this time by five years. The other variables remain lagged by one year as an attempt to control for what levels of instability the country could expect without inflation. This was used to see if inflation could have long lasting impacts on the economic outlook for a particular country and thus impact stability through this channel. There appears to be slightly more significant values from this table but similarly to Table 2, there is not widespread

significance. Interestingly, the scale of total war and violence is significant almost across the board with the exception of the democracy index. However, the coefficient is negative which is surprising as it would mean that the higher inflation was five years ago, the lower the likelihood and scale of total acts of war and violence can be expected. This also occurs with the youth unemployment variable, which is traditionally expected to increase instability. This variable also includes civil acts of war and violence which are often correlated with higher youth unemployment because this means that young people have limited opportunities and ample time to agitate for change. This suggests that while these values may be significant, this model is missing something that may have a bigger impact on the total acts of war and violence variable or there is some confounding effect of the inclusion of the inflation variable.

There is a similar issue with the polity and polity squared regressions for the five year lagged inflation rate. The inflation coefficient is significant on a 95 percent confidence interval but is positive here. This means that if a government is allowing higher levels of inflation five years ago, then they can expect to have a higher polity score, indicating more stability. This is again contradictory to with the theoretical aspect of the regressions. These instability metrics should increase with higher levels of past inflation because this hurts the public's income, wealth, and spending habits. Here, the polity score is showing that there is more stability and more youth unemployment do not correlate to higher instability but rather less instability. This does however suggest that because the relationship is unclear in the ordinary least squares regression panel, it may prove to be clearer in a different model which examines the relationship using logistical regression.

Table 4

Dependent Variables	Inflation (Lagged by one year)	Natural Logarithm of Real GDP (Lagged by one year)	National Unemployment Rate (Lagged by one year)
Indicator of a Stable Democracy	-0.0018129 (0.005302)	0.0022633 (0.1582167)	0.0423643 (0.0462055)
Indicator of a Stable Autocracy	0.0009687 (0.0063446)	0.0231488 (0.2032709)	-0.1689827*** (0.0800985)
Indicator of an Unstable Anocracy	0.0059069 (0.0069943)	-0.1697168 (0.1184401)	0.0532829 (0.0445151)

*Notes: * represents significance on a 90% confidence interval and *** represents significance on a 95% confidence interval. The coefficients are written above and the robust standard errors are denoted in parentheses. Stable Autocracies are governments that scored below a -4 on the Polity scale in a given year, Stable Democracies are governments that scored above a 4 on the Polity scale in a given year, and Unstable Anocracies are governments that scored between -3 and 3 on the Polity scale in a given year. Inflation in this regression is lagged by one year. Real GDP is also lagged one year but here is used as the natural log of the lagged value.*

Table 4 shows the logistic regression pattern and bears some encouraging results. Here, youth unemployment and trade had to be omitted due to insufficient observations, given the parameters of this model. These indicator variables are drawn again from the polity metric but instead of an index from -10 to 10, these are simple binary variables. They are grouped according to hypothesized relative stabilities, with higher absolute value numbers being considered stable. So, the stable autocracy and stable democracy variables are indicators of the polity value being between -4 and -10 and 4 and 10, respectively. The unstable Anocracy is hypothesized to exist within the range of -3 to 3. This would make sense as these governments are considered to be weak or unstable governments leaning either towards autocracy or democracy. Burgeoning governments tend to be more un stable and thus it can be expected that the greatest effect of inflation would fall on these kinds of systems.

The hypothesis stated that there ought to be significance for each of these governments but different coefficients. It would follow that for a stable democracy and autocracy, high levels of inflation would damage their credibility and thus stability, signified by a negative coefficient, while high inflation levels ought to make an unstable anocracy more likely. As these governments tend to be less structurally settled, the impacts of inflation are likely felt more than governments that are stable and thus can be more trusted to bring inflation back into line or are more apt to crush any unrest from the civilian population.

Table 5

Dependent Variables	Inflation (Lagged by five years)	Natural Logarithm of Real GDP (Lagged by one year)	National Unemployment Rate
Indicator of a Stable Democracy	-0.0002642 (0.0002501)	-0.1378369*** (0.0404243)	0.0572311*** (0.0148134)
Indicator of a Stable Autocracy	0.0001963 (0.0003507)	0.2152292*** (0.0506296)	-0.1970157*** (0.0250696)
Indicator of an Unstable Anocracy	0.0004432 (0.0002817)	-0.0632818 (0.0721541)	0.0441688*** (0.0177441)

*Notes: * represents significance on a 90% confidence interval and *** represents significance on a 95% confidence interval. The coefficients are written above and the robust standard errors are denoted in parentheses. Stable Autocracies are governments that scored below a -4 on the Polity scale in a given year, Stable Democracies are governments that scored above a 4 on the Polity scale in a given year, and Unstable Anocracies are governments that scored between -3 and 3 on the Polity scale in a given year. Inflation in this regression is lagged by one year. Real GDP is also lagged one year but here is used as the natural log of the lagged value.*

Table 4 shows the results of an order logistical model run with the same right side variables as previously, but with inflation lagged for five years instead of just one. The left side variables here are the indicator variables for the three different groups of Polity scores, showing relatively stable democracies and autocracies and the hypothesized unstable anocracy governments. These ordered logistical regressions appear to be where inflation's insignificance is put into the spotlight. While the most of the rest of the variables are significant, inflation remains

stubbornly insignificant. This lack of significance implies that the null hypothesis must be accepted and there is no significant causal relationship of inflation on political instability. This model does suggest that a logit model is closer to the real relationship between these variables and political instability, excluding inflation.

Conclusion:

This paper has examined the many possible ways that inflation's impact could be felt through myriad different measures of political instability. However, the preponderance of evidence shows that there may be no causal effect of inflation on instability. The infrequency of inflation's significance in the regressions this paper has presented implies that the null hypothesis that there is not a causal correlation between inflation and instability must be accepted as true. This study was very robust and used a number of different approaches to attempt to capture inflation's significance in the measurements of political instability. It is interesting to note that, while not significant in most of the real-world measures of instability, inflation was found to be significant in the indexes used, the polity score and the polity squared variable.

However, there are opportunities for more research into this topic. Fearon and Laiten's seminal study on the causes of civil war is one of the most cited items in political instability literature and does not include a measure of inflation. Inputting this inflation data into their model of civil war causes may prove to be interesting, as their models are very robust and have strong results. If incorporating inflation into this study still yields such results, then there may prove to be a relationship not discovered by this inquiry into the impacts of inflation on political instability.

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Appendix

TABLE 7: Difference between last year's inflation to this year's inflation

Dependent Variables	Difference in Last Year and this Year's Inflation	Real GDP (Lagged by one year)	Democratic Regime (Lagged by one year)	Trade (as percent of GDP, lagged by one year)	Youth Unemployment (Lagged by one year)
Polity	0.0006065 (0.000269)	-2.14e-07 (5.05e-08)	1.498137 (0.0574613)	-0.0044 (0.0010042)	-0.0032308 (0.0068939)
Polity Squared	-0.003404 (0.0032337)	4.96e-06 (7.02e-07)	6.428093 (0.5983648)	0.0966553 (0.0126812)	0.1922859 (0.0720774)
Attempted Coups	-3.69e-06 (2.93e-06)	1.43e-09 (2.55e-09)	-0.0013573 (0.0010022)	-6.82e-06 (0.0000177)	-0.0000325 (0.0000946)
Successful Coups	-3.65e-06 (3.21e-06)	-1.52e-09 (1.12e-09)	-0.0003534 (0.0002727)	-0.0000109 (0.0000301)	-0.0001538 (0.0001098)
Presence of Civil Violence	-0.0002451 (0.000073)	2.30e-09 (3.30e-08)	-0.0270311 (0.0088474)	-0.0018968 (0.0005843)	0.0013624 (0.0019401)
Presence of International Violence	-0.0000134 (9.42e-06)	-6.01e-09 (3.26e-09)	-0.0051039 (0.0039291)	-0.0000809 (0.0000606)	-0.0006201 (0.000524)
Presence of International War	-0.0000943 (0.0003294)	-2.15e-08 (9.81e-09)	-0.0058476 (0.0028501)	-0.0001377 (0.000076)	-0.0006544 (0.0003368)
Total Acts of War and Violence	-0.0008637 (0.0004742)	-4.66e-08 (8.39e-08)	-0.1138952 (0.0244188)	-0.0051846 (0.000989)	-0.0134449 (0.0041814)
Successful Assassinations	-1.92e-06 (1.98e-06)	-8.92e-10 (8.96e-10)	-0.0001519 (0.0001555)	-0.0000126 (0.0000127)	-5.93e-06 (7.88e-06)
Resignations of Executives	6.48e-06 (0.0000102)	-6.70e-10 (1.21e-09)	-0.0016264 (0.0013558)	4.03e-06 (0.0000289)	0.0000696 (0.0001652)

Notes: * represents significance on a 90% confidence interval and *** represents significance on a 95% confidence interval. The coefficients are written above and the robust standard errors are denoted in parentheses. Inflation in this regression represents the difference between last year's inflation and this year's inflation. Real GDP is lagged one year. Democratic regime is a scale variable that represents how democratic a government is. Trade is taken as the percentage of the country's GDP and is lagged by one year. Youth Unemployment is the unemployment value for youths in a given year and is also lagged by one year. Where there are not enough observations for the youth unemployment variable, national unemployment is used instead. Attempted Coups are thwarted attempts at a coup. Polity is an index variable from -10 to 10. Presence of civil violence, presence of civil war, presence of international violence and war and total acts of war and violence are variables a scale from 0-7 indicating the quantity and scale of violence. Resignations represent any transitions from office that are unexpected or forced due to public opinion. Presence of state failures is an indicator variable which represents instances of the current government failing, according to the polity metric.

TABLE 8: Difference between last year's inflation to this year's inflation, lagged (so is the difference between 2 years ago inflation and last years inflation)

Dependent Variables	Difference in Last Year and this Year's Inflation (Lagged by one year)	Real GDP (Lagged by one year)	Democratic Regime (Lagged by one year)	Trade (as percent of GDP, lagged by one year)	Youth Unemployment (Lagged by one year)
Polity	0.0000114 (0.0000116)	-2.17e-07 (5.04e-08)	1.495997 (0.0581432)	-0.0045134 (0.0010067)	-0.003852 (0.006884)
Polity Squared	-0.0003804 (0.0001972)	4.99e-06 (7.02e-07)	6.450323 (0.6061628)	0.0979413 (0.01273)	0.1998975 (0.0721816)
Attempted Coups	3.55e-08 (1.93e-07)	1.42e-09 (2.55e-09)	-0.001375 (0.0010141)	-6.75e-06 (0.0000176)	-0.0000339 (0.0000949)
Successful Coups	2.50e-07 (2.14e-07)	-1.53e-09 (1.13e-09)	-0.0003641 (0.0002797)	-0.0000109 (0.0000299)	-0.0001548 (0.0001105)
Presence of Civil Violence	0.0000138 (6.52e-06)	1.79e-09 (3.31e-08)	-0.0277287 (0.0089937)	-0.0018837 (0.0005823)	0.001327 (0.0019382)
Presence of International Violence	5.62e-07 (4.35e-07)	-3.46e-09 (2.04e-09)	-0.0012305 (0.0008232)	-0.0000324 (0.000036)	-0.0001071 (0.0001188)
Presence of International War	8.70e-06 (8.83e-06)	-2.17e-08 (9.95e-09)	-0.0060085 (0.0029216)	-0.0001305 (0.0000782)	-0.0006427 (0.0003938)
Total Acts of War and Violence	0.0000567 (0.0000194)	-4.25e-08 (8.39e-08)	-0.1070146 (0.0238118)	-0.005031 (0.0009763)	-0.0123644 (0.0041048)
Successful Assassinations	1.76e-07 (1.78e-07)	-8.97e-10 (9.01e-10)	-0.0001561 (0.0001597)	-0.0000126 (0.0000127)	-6.13e-06 (8.02e-06)
Resignations of Executives	-1.71e-07 (4.58e-07)	-6.89e-10 (1.22e-09)	-0.001648 (0.0013713)	3.16e-06 (0.0000282)	0.0000647 (0.000162)

Notes: * represents significance on a 90% confidence interval and *** represents significance on a 95% confidence interval. The coefficients are written above and the robust standard errors are denoted in parentheses. Inflation in this regression represents the difference between last year's inflation and this year's inflation with a one year lag. This means that this variable actually is the difference between 2 year's ago inflation and last years inflation. Real GDP is lagged one year. Democratic regime is a scale variable that represents how democratic a government is. Trade is taken as the percentage of the country's GDP and is lagged by one year. Youth Unemployment is the unemployment value for youths in a given year and is also lagged by one year. Where there are not enough observations for the youth unemployment variable, national unemployment is used instead. Attempted Coups are thwarted attempts at a coup. Polity is an index variable from -10 to 10. Presence of civil violence, presence of civil war, presence of international violence and war and total acts of war and violence are variables a scale from 0-7 indicating the quantity and scale of violence. Resignations represent any transitions from office that are unexpected or forced due to public opinion. Presence of state failures is an indicator variable which represents instances of the current government failing, according to the polity metric.

TABLE 9: Extreme inflation

Dependent Variables	Instances of Extreme Inflation	Real GDP (Lagged one year)	Democratic Regime (Lagged one year)	Trade (as percent of GDP lagged one year)	Youth Unemployment (Lagged one year)
Polity	-0.035602 (0.1844984)	-2.16e-07 (5.07e-080)	1.498177 (0.057445)	-0.0044888 (0.0010132)	-0.0035083 (0.0069108)
Polity Squared	-16.04599 (2.473493)	4.58e-06 (6.96e-07)	6.438969 (0.5940068)	0.0860807 (0.0121339)	0.1698639 (0.0719261)
Attempted Coups	-0.0032482 (0.0025909)	1.36e-09 (2.55e-09)	-0.0013551 (0.0010011)	-8.64e-06 (0.0000187)	-0.0000359 (0.0000965)
Successful Coups	-0.0039097 (0.0029456)	-1.61e-09 (1.19e-09)	-0.0003509 (0.0002717)	-0.0000132 (0.000031)	-0.0001582 (0.0001129)
Presence of Civil Violence	-0.1423587 (0.0859153)	-1.81e-09 (3.35e-08)	-0.0271147 (0.0089387)	-0.0019871 (0.0006084)	0.0012114 (0.0019091)
Presence of International Violence	0.0115111 (0.029096)	-5.62e-09 (3.43e-09)	-0.0050925 (0.0039358)	-0.0000686 (0.0000713)	-0.000591 (0.000536)
Presence of International War	0.5491168 (0.2277355)	-4.05e-09 (3.28e-09)	-0.0053811 (0.0023825)	0.0003665 (0.0001632)	0.0004559 (0.000374)
Total Acts of War and Violence	1.372599 (0.3684941)	-1.88e-09 (8.23e-08)	-0.1126421 (0.0240339)	-0.0038299 (0.000961)	-0.0103506 (0.0042081)
Successful Assassinations	-0.0019665 (0.0019727)	-9.37e-10 (9.42e-10)	-0.0001506 (0.0001544)	-0.0000138 (0.0000139)	-8.12e-06 (9.75e-06)
Resignations of Executives	-0.0029942 (0.0025711)	-7.48e-10 (1.26e-09)	-0.0016242 (0.0013553)	1.30e-06 (0.0000289)	0.0000627 (0.0001632)

Notes: * represents significance on a 90% confidence interval and *** represents significance on a 95% confidence interval. The coefficients are written above and the robust standard errors are denoted in parentheses. Inflation in this regression is an indicator variable, representing the instances where inflation is in the 95th percentile of its observed values. Real GDP is lagged one year. Democratic regime is a scale variable that represents how democratic a government is. Trade is taken as the percentage of the country's GDP and is lagged by one year. Youth Unemployment is the unemployment value for youths in a given year and is also lagged by one year. Where there are not enough observations for the youth unemployment variable, national unemployment is used instead. Attempted Coups are thwarted attempts at a coup. Polity is an index variable from -10 to 10. Presence of civil violence, presence of civil war, presence of international

violence and war and total acts of war and violence are variables a scale from 0-7 indicating the quantity and scale of violence. Resignations represent any transitions from office that are unexpected or forced due to public opinion. Presence of state failures is an indicator variable which represents instances of the current government failing, according to the polity metric.
