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Francisco José Veiga
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NIPE WP 2 / 2006

NÚCLEO DE INVESTIGAÇÃO EM POLÍTICAS ECONÓMICAS
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Political Instability and Inflation Volatility*

Ari Aisen** - International Monetary Fund

Francisco José Veiga*** - Universidade do Minho and NIPE

Abstract

The purpose of this paper is to empirically determine the causes of the worldwide diversity of inflation volatility. We show that higher degrees of political instability, ideological polarization and political fragmentation are associated with higher inflation volatility.

Keywords: Inflation, volatility, political instability, institutions.

JEL codes: E31, E63.

1. Introduction

Economists generally recognize that high and volatile inflation is harmful to economic growth and society's welfare. This realization had a strong impact on the profession, leading scholars and policy-makers to devote great effort to fully comprehend the inflationary process and attain price stability. However, few studies focused on disentangling the effects of high inflation levels from those of high inflation volatility on growth. This is because higher inflation levels are typically associated with higher inflation volatility.¹ Friedman (1977) attempted to shed some light on the controversy conjecturing that growing inflation volatility would render the economy less efficient by introducing frictions on markets, and creating a wedge between relative prices

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*** Corresponding author: Francisco José Veiga, Departamento de Economia, Escola de Economia e Gestão, Universidade do Minho, P-4710-057 Braga, Portugal. Tel.: +351-253604534; Fax: +351-253676375; Email: fjveiga@eeg.uminho.pt.

¹ For a descriptive analysis showing a high correlation between inflation levels and volatility, see Fischer et al. (2002).

prevailing in the economy and those which would have been determined solely by market forces in the absence of inflation volatility. This suggests that high inflation volatility may be more disruptive to the economy than high inflation levels. While studies on the determinants of inflation are abundant in the literature, scholars have not yet extensively investigated the causes of inflation volatility — surprisingly so, given its well documented ill effects on growth.²

In a recent study, Rother (2004) concludes that volatility in discretionary fiscal policies has contributed to inflation volatility in a panel of 15 OECD countries for a period of 35 years. However, this result does not shed light on the deep determinants of inflation volatility. Why do some countries have more volatile monetary and fiscal policies than others? This paper attempts to provide some evidence on the deep determinants of inflation volatility. In line with Cukierman et al. (1992), Acemoglu et al. (2003), and Aisen and Veiga (2005, 2006), we hypothesize that political and institutional factors are the main determinants of inflation volatility. Politically-unstable countries are often susceptible to political shocks leading to discontinuous monetary and fiscal policies and higher inflation volatility.³ Using a panel dataset covering around 100 countries from 1975–1999, we clearly show that greater political instability, lower economic freedom and higher degrees of ideological polarization and political fragmentation lead to higher inflation volatility.

2. Data and the empirical models

The sources of political and institutional data are: *Database of Political Institutions* (DPI); *Cross National Time Series Data Archive* (CNTS); and *Annual Report of the Economic Freedom of the World* (EFW). Data on economic variables was collected from the World Bank's

² For a recent study on the effects of inflation volatility on growth, see Fatás and Mihov (2005).

³ Woo (2003) shows that political instability and weak institutions are among the determinants of public deficits.

World Development Indicators (WDI) and *Global Development Network Growth Database* (GDN), and from the International Monetary Fund's *International Financial Statistics* (IFS).

To investigate the main political, institutional and economic determinants of inflation volatility across countries and time we estimated panel data models for standard deviations of inflation (taken from the IFS) for consecutive 3-year periods.⁴ Since standard deviations of inflation have very high variability, their logarithms were used as our dependent variable: $\text{Log}[SD(\text{Inf})]$. We hypothesize that these depend on the following explanatory variables:⁵

- Lagged logarithm of inflation volatility (IFS), $L. \text{Log}[SD(\text{Inf})]$;
- Economic structural variables that reflect characteristics of the countries that may affect their capacity to control inflation:
 - *Agriculture (%GDP)*: The share of the value added of agriculture in GDP (WDI);
 - *GDP per capita* in purchasing power parity (WDI);
 - *Trade (%GDP)*: Openness to trade (WDI);
- Variables accounting for economic performance and external shocks:
 - *SD(GDP growth)*: Standard deviation of GDP growth (WDI);
 - *Real Overvaluation*: Real effective overvaluation of the national currency (GDN);
 - *Log(Inflation)*: Logarithm of inflation levels (IFS);
 - *Change in Oil Prices*: Percentage change in oil prices (IFS).
- Variables representing political instability and institutions:
 - *Executive changes* (CNTS): number of times in a year that effective control of the executive power changes hands;

⁴ The periods are: 1975-77, 1978-80, 1981-83, 1984-86, 1987-89, 1990-92, 1993-1995, and 1996-1999.

⁵ Unless otherwise noted, we use 3-year period averages of the explanatory variables. Although we consider that high inflation results in most cases from high budget deficits that are monetized, we decided not to include money growth and deficits in our baseline model because we are searching for the deep determinants of inflation.

- *Index of economic freedom* (EFW). Higher indexes are associated with smaller governments, stronger legal structure and security of property rights, access to sound money, greater freedom to exchange with foreigners, and more flexible regulations of credit, labor, and business;

The empirical model for inflation volatility can be summarized as follows:

$$SD(Inf_{it}) = \mathbf{X}'_{i,t} \boldsymbol{\beta}_1 + \mathbf{W}'_{i,t-1} \boldsymbol{\beta}_2 + \nu_i + \delta_t + \varepsilon_{it} \quad i = 1, \dots, N \quad t = 1, \dots, T_i \quad (1)$$

where $SD(Inf)$ stands for the standard deviation of inflation of country i for the 3-year period t , $\boldsymbol{\beta}_1$ and $\boldsymbol{\beta}_2$ are vectors of parameters to be estimated, \mathbf{X} is a vector of strictly exogenous covariates, \mathbf{W} is a vector of potentially endogenous covariates (which are lagged one period),⁶ ν are country-specific effects, δ are time-specific effects, and, ε is the error term.

3. Empirical Results

We start with a model that includes only the economic variables referred to above. The results of column 1 of Table 1 show that the lagged dependent variable is not statistically significant, which means that inflation volatility is not persistent along 3-year periods. When this lagged dependent variable is excluded we get a static panel data model that can be estimated by the within groups (fixed effects) estimator without incurring in problems of inconsistency.⁷ The logarithm of inflation is highly statistically significant, confirming the result of Fisher et al. (2002) that inflation becomes more volatile at higher levels. But, since the correlation between the average and the standard deviation of inflation for 3-year periods is very high (77.5%), it is more appropriate to exclude $Log(Inflation)$ from the model. There are some changes in results

⁶ $SD(GDP\ growth)$, $Real\ Overvaluation$ and $Executive\ changes$ were lagged one period, as their contemporaneous values can be affected by inflation.

⁷ Hausmann tests clearly indicate that the fixed effects specification is preferable to a random effects model. Furthermore, the country and time-period dummies are globally statistically significant.

when it is excluded: *Trade (%GDP)* and *Change in Oil Prices* are no longer statistically significant, while *Real Overvaluation* becomes significant (column 2).

--- Insert Table 1 about here ---

The remaining columns report a series of tests that consist in adding political and institutional variables to the model.⁸ *Executive Changes* and the *Index of Economic Freedom* are statistically significant and have the expected signs (column 3), indicating that greater political instability and lower economic freedom lead to higher inflation volatility. Furthermore, their effects are sizeable: an additional executive change increases the standard deviation of the inflation rate by a factor of $1.51 \approx \exp(0.410)$, that is by 151%; and a decrease of one point of the *Index of Economic Freedom* increases that standard deviation by a factor of $1.96 \approx \exp(0.672)$. Concerning the economic variables, results indicate that countries with relatively larger agricultural sectors, lower GDP per capita, and overvalued currencies have higher inflation volatility.⁹ Results presented in the following three columns indicate that greater ideological polarization (column 4), lower Herfindhal index (greater fragmentation) of the political parties' shares of seats in Parliament (column 5), and higher fractionalization ratios (column 6) lead to higher inflation volatility.¹⁰ Finally, the results obtained for a sample that only includes developing countries (column 7) are similar to those for the entire sample (column 3).¹¹

⁸ The variables *Trade*, *SD(GDP_gr)(-1)* and *Oil_ch* were excluded from the model. They are never statistically significant when included in the models of columns 3 to 7, and Wald tests allow for their exclusion.

⁹ Their marginal effects on the standard deviation of inflation are, approximately, 5.4%, for *Agriculture (%GDP)*, around -0.01% for *GDP per capita*, and 0.2% for *Real Overvaluation*. They may seem small, but we should take into account that, for example, an increase of one standard deviation (5855 USD) in the *GDP per capita* would reduce the standard deviation of inflation by 58.55%.

¹⁰ These variables were obtained from the DPI (variables *POLARIZ2*, *HERFTOT* and *FRAC*).

¹¹ Results are weaker for industrialized countries: *Executive Changes* and *Real Overvaluation* are marginally statistically significant, and the remaining explanatory variables are not significant. Robustness tests that consisted in adding variables to the model of column 3 revealed that the following are associated with higher inflation volatility: greater turnover of central bank presidents; more leftist governments; lower US Treasury Bill rates; more flexible exchange rate regimes; higher or more volatile external debt as a percentage of GDP; and, more volatile central government debt. When the standard deviation of the annual change in M2 is used as the dependent variable, results are similar to those reported in Table 1. Results not shown in the paper are available upon request.

These results concerning political instability, ideological polarization, and fragmentation of the political system are consistent with the models of Alesina and Drazen (1991) and Cukierman et al. (1992) and with the empirical results of Castro and Veiga (2004) that imply that greater fragmentation, polarization, and political instability lead to the delays of inflation stabilization programs, resulting in higher inflation rates and volatility. They are also consistent with the results obtained by Aisen and Veiga (2006) for inflation levels.

4. Conclusions

Using the within groups (fixed effects) estimator on a sample covering around 100 countries analyzed in the period from 1975 to 1999, this paper finds that lower economic freedom and higher degrees of political instability, ideological polarization, and fragmentation of the political system generate more volatile inflation rates. These results are in line with those obtained by Aisen and Veiga (2006) for inflation levels, and by Cukierman et al. (1992) and Aisen and Veiga (2005) for seigniorage.

Given the high costs in terms of economic growth and welfare generated by inflation volatility, we believe that this is an important contribution, not only for positive economics, but also in a normative way. Policy-makers in developing countries should be aware that, to obtain long-run economic prosperity, it is essential to reform institutions and create viable mechanisms conducive to long-run price stability.

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Table 1: Inflation volatility for 3 year periods

Log[SD(Inf)]	1	2	3	4	5	6	7
Log[SD(Inflation)] (-1)	-.042 (-.92)						
Agriculture (% GDP)	.029 (2.20)**	.067 (3.42)***	.054 (2.75)***	.058 (2.81)***	.028 (1.24)	.028 (1.24)	.051 (2.62)***
GDP per capita	-.00005 (-2.33)**	-.0001 (-8.03)***	-.0001 (-4.59)***	-.0001 (-4.79)***	-.0001 (-3.15)***	-.0001 (-3.18)***	-.0001 (-3.24)***
Trade (% GDP)	-.009 (-2.21)**	.0006 (.13)					
SD(GDP growth) (-1)	-.011 (-.94)	.005 (.32)					
Real Overvaluation (-1)	.001 (.56)	.002 (2.21)**	.002 (2.00)**	.002 (2.03)**	-.001 (-.45)	-.001 (-.45)	.002 (2.21)**
Log(Inflation)	.833 (11.8)***						
Change in Oil Prices	-.042 (-2.40)**	-.004 (-1.31)					
Executive Changes (-1)			.410 (2.59)***	.343 (2.06)**	.444 (2.45)**	.445 (2.46)**	.415 (2.23)**
Index of Economic Freedom			-.672 (-4.33)***	-.606 (-3.90)***	-.647 (-4.13)***	-.649 (-4.15)***	-.679 (-3.94)***
Ideological Polarization				.286 (2.33)**			
Herfindhal Index of Parties' Shares					-.877 (-2.10)**		
Fractionalization Index						.854 (-2.11)**	
# Observations	569	593	563	549	515	515	437
# Countries	97	97	90	90	89	89	69
Adjusted R ²	.69	.51	.58	.60	.60	.60	.54

- Notes:
- Within Groups (fixed effects) estimations;
 - Models estimated with a constant and dummy variables for countries and 3-year periods;
 - T-statistics for heteroskedastic-consistent standard errors are in parenthesis;
 - Level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%;
 - The estimation of column 7 is performed for a sample that only includes developing countries.

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