



WP/05/175

IMF Working Paper

The Political Economy of Seigniorage

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IMF Working Paper

Monetary and Financial Systems Department

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Authorized for distribution by David S. Hoelscher

September 2005

Abstract

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While most economists agree that seigniorage is one way governments finance deficits, there is less agreement about the political, institutional, and economic reasons for relying on it. This paper investigates the main determinants of seigniorage using panel data on about 100 countries, for the period 1960–1999. Estimates show that greater political instability leads to higher seigniorage, especially in developing, less democratic, and socially polarized countries, with high inflation, low access to domestic and external debt financing and with higher turnover of central bank presidents. One important policy implication of this study is the need to develop institutions conducive to greater economic freedom as a means to lower the reliance on seigniorage financing of public deficits.

JEL Classification Numbers: E31, E63

Keywords: Seigniorage; political instability; institutions

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Contents	Page
I. Introduction	3
II. The Political Economy of Seigniorage.....	3
III. Data and the Empirical Model	5
IV. Empirical Results.....	8
A. Main Determinants of Seigniorage Levels.....	8
B. Circumstances Under Which the Effects of Political Instability on Seigniorage Are Stronger.....	10
C. Sensitivity Analysis.....	12
V. Conclusions.....	13
References.....	24
Tables	
1. Seigniorage Across Countries.....	14
2. Descriptive Statistics.....	16
3. Results for Seigniorage.....	18
4. Robustness Tests.....	19
5. Results for Interactions of Cabinet Changes.....	20
6. More Results for Interactions of Cabinet Changes.....	21
7. Results for Interactions of Other Proxies of Political Instability.....	22
8. Sensitivity Analysis	23

I. INTRODUCTION

The purpose of this paper is to identify the main determinants of cross-country and cross-time differences in seigniorage—government revenues from monopoly control over the creation of money. This is a challenge not yet satisfactorily confronted by the economics profession for three reasons. First, several political and institutional variables used as explanatory variables in earlier studies were relatively poorer measures of political instability and of the institutional environment than those available in new datasets such as the Database of Political Institutions (DPI), the Cross National Time Series Data Archive (CNTS), the Polity IV Database, and the Freedom House ratings. Second, our analysis is based on a richer and wider dataset, covering more countries and years than those used in previous studies and includes a larger variety of alternative model specifications. Third, our models are able to identify the circumstances under which the relationship between political instability and seigniorage is stronger, a central topic of our research which is virtually absent from previous empirical studies on the determinants of seigniorage.

Relying upon the theoretical literature and using a dataset covering around 100 countries for the period 1960–1999, we estimate panel data models to investigate the main economic and political determinants of seigniorage. After controlling for the countries' economic structure and for several other variables that may affect seigniorage, we confirm Cukierman, Edwards, and Tabellini (1992) and Click (1998) finding that greater political instability leads to higher seigniorage levels.

This paper's major contribution to the literature is the identification of the circumstances under which the above-referred relationship is stronger. That is, we find that political instability has stronger effects on seigniorage levels in higher inflation than in moderate- and low-inflation countries and also in developing than in industrial nations. In addition, this relationship is also stronger in countries with (i) higher turnover of central bank presidents (lower de facto central bank independence); (ii) higher social polarization, expressed in higher Gini coefficients; (iii) higher domestic debt levels as a percentage of GDP; and (iv) lower access to international financing (expressed in poorer creditworthiness ratings). Finally, authoritarian regimes and countries with low indexes of economic freedom exhibit stronger effects of political instability on seigniorage than democracies and economically freer countries. It is also worth mentioning that besides its effects on the relationship between political instability and seigniorage, economic freedom is by itself a major determinant of seigniorage. Empirical results show quite clearly that higher degrees of economic freedom are associated with lower levels of seigniorage.

The paper is structured as follows. A survey of the empirical and theoretical literature on the relationship between seigniorage, political instability, and institutions is presented in Section II. The dataset and the empirical models are described in Section III. Section IV presents the empirical results, and Section V concludes the paper.

II. THE POLITICAL ECONOMY OF SEIGNIORAGE

Most economists acknowledge that differences in the way countries conduct their fiscal policies are behind the variability of the seigniorage levels they sustain. But this explanation leads to a much deeper and fundamental question, which is, why countries differ in the way they conduct fiscal policies (see Woo, 2003)? In particular, governments that are able to

finance their expenditures through taxes or debt do not need to rely on seigniorage revenues. Several studies have explored the idea that structural features of a particular economy help determine its “taxable capacity.” Chelliah, Baas, and Kelley (1975), for example, provide evidence that countries with larger per capita nonexport income, more open to trade, and with larger mining but smaller agricultural sectors have, on average, a higher “taxable capacity” or ease of collection. This result leads to the conclusion that the countries’ ability to tax is technologically constrained by their stage of development and by the structure of their economies (e.g., size of the agricultural sector in GDP), and as tax collecting costs are high and tax evasion pervasive, countries might use seigniorage more frequently. But what if governments, independently of their countries’ economic structures, find it optimal to finance expenditures using seigniorage rather than levying other taxes (e.g., taxes on output)? The Theory of Optimal Taxation (see Phelps 1973; Végh 1989; and Aizenman 1992) rationalizes government behavior in many countries by showing that it might be optimal for governments to rely on seigniorage if other taxes are highly distortionary. According to this theory, governments optimally equate the marginal cost of the inflation tax with that of output taxes, thereby minimizing the distortions to the economy when choosing the optimal combination of taxes to finance their expenditures. Edwards and Tabellini (1991) and Cukierman, Edwards, and Tabellini (1992) fail to find evidence that this theory applies to developing countries. Click (1998) estimates a model using 90 countries, from 1971 to 1990, and finds that only 40 percent of the cross-country variation in seigniorage can be explained by the Theory of Optimal Taxation. The empirical failure of this theory to explain fully the cross-country differences in the use of seigniorage revenues motivated the use of theoretical and empirical models focusing on the role played by political and institutional variables.

Cukierman, Edwards, and Tabellini (1992) develop a theoretical model in which political instability and polarization determine the equilibrium efficiency of the tax system and the resulting combination of tax revenues and seigniorage governments use. Using a probit model to determine the likelihood of an incumbent government to remain in power, they provide evidence that higher political instability and polarization lead to higher seigniorage. In the empirical analysis of Section IV, we employ alternative and more direct measures of political instability, such as variables that count the exact number of cabinet changes or government crises taking place in a particular year. Moreover, whereas they use a dummy variable for democratic regimes, we use the Polity Scale (ranging between -10 and +10) to measure the degree of democracy in different countries.²

In line with Cukierman, Edwards, and Tabellini (1992), we conjecture that economies with weaker institutions might not be able to build efficient tax systems, which leads them to use seigniorage more frequently as a source of revenue. In the next sections, in addition to the effects of political instability on seigniorage, we also estimate the effects of institutions such as economic freedom and democracy. Besides structural variables accounting for the taxing capacity of the economy and political and institutional variables affecting the use of seigniorage financing of fiscal deficits, we also consider in line with Click (1998) variables

² An additional shortcoming of the analysis in Cukierman, Edwards, and Tabellini (1992) is the use of a cross-sectional dataset using averages from 1971 to 1982 for only 79 countries, while we use a panel dataset covering around 100 countries for the period 1960–1999.

that measure the ability governments have to finance transitory expenditures with domestic or external debt. To the extent that a government is able to finance its expenditure through debt, there is less need to rely on seigniorage.

Our main contribution to the literature is that our models not only identify the main political and economic determinants of seigniorage, but also reveal under which circumstances the effects of political instability on seigniorage are stronger. Our results, derived from simple econometric techniques, indicate that the causal effect of political instability on seigniorage is stronger in developing and high-inflation countries, and in the decades of the 1970s and 1980s. In addition, it is also stronger in socially polarized, less democratic and highly indebted countries. Finally, political instability will have greater effects on seigniorage in countries that have lower de facto central bank independence, lower economic freedom, and lower creditworthiness ratings. In our view, and to the best of our knowledge, there is no comprehensive study in the literature that analyzes fully the relationship between political instability and seigniorage. As it will become clear in the following sections, this paper is an attempt to contribute in this direction.

III. DATA AND THE EMPIRICAL MODEL

The dataset is composed of annual data on political, institutional, and economic variables for the years 1960–1999. Although we have data on seigniorage for 144 countries, missing values for several explanatory variables reduce the number of countries in our estimations to a maximum of 104. The sources of political and institutional data are the *CNTS*, the *DPI 3.0*,³ the *Polity IV* dataset,⁴ Gwartney and Lawson (2002),⁵ and the *Freedom House* ratings.⁶ Economic data were collected from the World Bank's *World Development Indicators* (WDI) and *Global Development Network Growth Database* (GDN),⁷ the International Monetary Fund's *International Financial Statistics* (IFS), the *Penn World Tables* (PWT 6.1),⁸ Cukierman and Webb (1995),⁹ Dollar and Kraay (2002),¹⁰ and Levy-Yeyati and Sturzenegger (2003).¹¹

³ In this database, see Beck and others (2001). Available on the Internet though Philip Keefer's page on the World Bank's site (<http://www.worldbank.org/research/bios/pkeefe.htm>).

⁴ Available on the Internet (<http://www.cidcm.umd.edu/inscr/polity/index.htm>).

⁵ Available on the Internet (<http://www.freetheworld.com/release.html>). This report presents data on the index of economic freedom and its components for 1970, 1975, 1980, 1985, 1990, 1995, and 2000. In order to avoid a large number of missing values in our sample, straight-line interpolation was used to generate annual data.

⁶ Available on the Internet (<http://www.freedomhouse.org/ratings/>).

⁷ Available on the Internet (<http://www.worldbank.org/research/growth/GDNdata.htm>).

⁸ Available on the Internet (http://pwt.econ.upenn.edu/php_site/pwt_index.php).

⁹ Underlying data available on the Internet (<http://www.tau.ac.il/~alexcuk/pdf/WebbPoltime2.xls>).

¹⁰ Underlying data available on the Internet (http://siteresources.worldbank.org/INTRES/Resources/469232-1107449512766/648083-1108140788422/Growth_is_good_for_the_poor_data.zip).

In order to investigate the main political, institutional, and economic determinants of seigniorage levels across countries and time, we estimate panel data models, controlling for countries' fixed effects. Seigniorage is defined in two alternative ways: the change in reserve money (line 14a of the IFS) divided by nominal GDP (line 99b in the IFS) and the change in reserve money (line 14a of the IFS) divided by government revenues (line 81 of the IFS). Table 1 shows the number of observations, means, and standard deviations of these seigniorage measures for all countries for which data are available.¹²

We hypothesize that seigniorage levels depend on the following explanatory variables:

- A set of variables representing political instability and institutions:
 - **Cabinet Changes** (CNTS)—a proxy for political instability—counts the number of times in a year in which a new premier is named and/or 50 percent of the cabinet posts are occupied by new ministers. A positive coefficient is expected, as greater instability should lead to greater reliance on seigniorage revenues.
 - **Index of Economic Freedom** (Gwartney and Lawson, 2002). Higher indexes are associated with smaller governments (Area I), stronger legal structure and security of property rights (Area II), access to sound money (Area III), greater freedom to exchange with foreigners (Area IV), and more flexible regulations of credit, labor, and business (Area V). Since these are characteristics of more advanced economies with lesser need of seigniorage financing, a negative coefficient is expected.
 - **Polity Scale** (Polity IV)—from strongly autocratic (-10) to strongly democratic (10). Although the economic theory is not conclusive, we anticipate that democracy is associated with lower reliance on seigniorage (negative coefficient).
- A set of economic structural variables that reflect characteristics of the countries that may affect their capacity to control inflation:
 - **Agriculture** (in percent of GDP)—share of the value added of agriculture in GDP (WDI, World Bank). According to Chelliah, Baas, and Kelly (1975), a positive coefficient is expected.
 - **Trade** (in percent of GDP)—openness to trade (WDI, World Bank). Since it is associated with larger revenues of import duties, we expect that countries more open to trade rely less on seigniorage revenues (a negative coefficient is expected).

¹¹ Underlying data available on the Internet (http://www.utdt.edu/~fsturzen/base_2002.xls).

¹² There are data on $\Delta RM/GDP$ for 144 countries and on $\Delta RM/GR$ for 122 countries.

- **Real GDP per capita** (PWT 6.1)—Richer countries have more efficient tax systems and thus have a lesser need for seigniorage (negative coefficient expected).
- Variables accounting for economic performance and external shocks:
 - **In percent of change in terms of trade** (WDI, World Bank)—Favorable evolution of terms of trade provides greater tax revenues (negative coefficient expected).
 - **Growth of real GDP per capita** (PWT 6.1)—Larger growth rates are associated with increasing tax revenues, reducing the need for seigniorage (negative coefficient).
- Variables accounting for fixed effects of countries and time:
 - country dummy variables; and
 - dummy variables for each decade—1960s, 1970s, 1980s, and 1990s.

Table 2 presents the descriptive statistics for the above-described dependent and independent variables and for additional/alternative explanatory variables that are used in the empirical analysis.

The empirical model for seigniorage levels can be summarized as follows:

$$S_{it} = \alpha PI_{i,t-1} + Inst'_{it} \beta_1 + Eco'_{it} \beta_2 + EcP'_{it} \beta_3 + v_i + \varepsilon_{it} \quad , \quad i = 1, \dots, N \quad t = 1, \dots, T_i \quad (1)$$

Where S is seigniorage, PI is a proxy for political instability, $Inst$ is a vector of institutional variables, Eco is a vector of economic structural variables, EcP is a vector of variables accounting for economic performance and external shocks, v_i is the fixed effect of country i , and ε_{it} is the error term.

The proxy for political instability ($PI_{i,t-1}$) is lagged one period for two reasons. First, political instability may translate into higher seigniorage only after some time. Furthermore, if a cabinet change or a government crisis occurs at the end of one year, it is very likely to lead to higher seigniorage only in the following year. Second, since from Aisen and Veiga (forthcoming) higher seigniorage leads to higher inflation, which may affect political instability, using the contemporaneous value of political instability could create simultaneity/endogeneity problems. Taking the first lag avoids these problems as current seigniorage does not affect past political instability.¹³

¹³ The contemporaneous values are used for the remaining explanatory variables, since they are taken as exogenous. It is also worth noting that seigniorage is not persistent (its first lag is never statistically significant when included as an explanatory variable) and that the error term of equation (1), ε_{it} , is not serially correlated.

IV. EMPIRICAL RESULTS

The first objective of our empirical analysis is to identify the main political, institutional, and economic determinants of seigniorage levels across countries and time. Then, after finding strong support for our hypothesis that greater political instability leads to higher seigniorage, we try to determine under which circumstances or country characteristics that relationship is stronger. Finally, we perform a sensitivity analysis which checks whether or not the main results hold when an alternative definition of seigniorage is used, when the sample only includes developing countries, and when our main proxy for political instability is defined in a different way.

A. Main Determinants of Seigniorage Levels

The estimation results of the model described in the previous section, using a fixed effects specification,¹⁴ are shown in Table 3. The dependent variable is the change in reserve money as a percentage of GDP. All explanatory variables described in the previous section were included in the estimation reported in column 1. Since the *Index of Economic Freedom* is highly correlated with real GDP per capita and its Area III—Freedom to exchange with foreigners—already represents openness to trade, the variables real GDP per capita and trade (in percent of GDP) were not included in the model of column 2. Then, in column 3, the five component areas of the *Index of Economic Freedom* are included, so that we can determine which have greater effects on seigniorage.

The results reported in the first three columns of Table 3 confirm the hypothesis that greater political instability leads to higher seigniorage levels and show that the effects are sizable—an additional cabinet change increases seigniorage by around 0.24 (an increase of 13 percent relative to the sample mean of 1.87). Economic freedom also has important effects on inflation; a move of one point up the scale (towards greater freedom) reduces seigniorage by roughly 1.2 (a decrease of 64 percent relative to the sample mean). Of its five component areas, only Area III (access to sound money) and Area IV (freedom to exchange with foreigners) are statistically significant, with a negative sign. Democracy does not seem to affect seigniorage levels, as Polity Scale is never statistically significant. Concerning the economic variables, only growth of real GDP per capita has statistically significant negative effects on seigniorage, as expected.¹⁵

The *Index of Economic Freedom*, for which data are available only after 1970, was not included in the last three estimations reported in Table 3. Its exclusion allows for the reintroduction of trade (in percent of GDP) and real GDP per capita in the model and causes several changes in results: the estimated coefficient and the degree of statistical significance of cabinet changes increases; agriculture (in percent of GDP) becomes highly statistically significant, real GDP per capita, although close to zero, becomes highly significant and

¹⁴ Hausmann tests indicate that the fixed effects specification is preferable to a random effects model and to a simple ordinary-least-squares model.

¹⁵ Since the ten-year period dummies were not jointly statistically significant in these three estimations, the results reported are for the models that do not include them.

changes sign relative to column 1; growth of real GDP per capita exhibits lower significance levels; and the ten-year period dummies are highly statistically significant. Although trade (in percent of GDP) has a positive sign and is statistically significant in the estimation of column 4, it is not significant when the alternative definition of seigniorage is used (result not reported). In column 5, the interaction variable external trade shocks, which is the product of trade (in percent of GDP) and percent change in terms of trade, is used instead of those two variables. Since it is not statistically significant, it is not included in the model of column 6, which is the reference for the models of the following tables. The positive and significant coefficients of the ten-year dummies indicate that seigniorage levels were higher in the 1980s, followed by the 1990s and the 1970s. The lowest levels of seigniorage were obtained in the 1960s, whose dummy variable was left out of the models.¹⁶

Results regarding political instability and economic freedom conform to our expectations and are consistent with those found by Aisen and Veiga (forthcoming) for inflation levels, and with the positive relationship between seigniorage and political instability identified by Cukierman, Edwards, and Tabellini (1992) using cross sectional data. Those concerning economic variables are consistent with the findings of previous studies, such as Chelliah, Baas, and Kelly (1975), Edwards and Tabellini (1992), and Click (1998), indicating that larger agricultural sectors and lower GDP per capita levels are associated with greater reliance on seigniorage revenues. Our expectation that lower rates of GDP growth reduce seigniorage also receives empirical support.

The results of a series of robustness tests, based on the model of column 6 of Table 3, are shown in Table 4. In columns 1 and 2, the Freedom House ratings of political rights and civil liberties, respectively, are used instead of the polity scale. Both have positive signs, indicating that higher values, associated with less rights and liberties, lead to higher seigniorage, but only civil liberties is marginally statistically significant. Since this result does not hold when we use the alternative definition of seigniorage, there is no robust evidence that democracy affects seigniorage levels.¹⁷

In column 3, ideological polarization (DPI) is included in the base model. Although it has a positive sign, as expected, it is not statistically significant. The ideological orientation of the executive (higher values stand for more leftist governments) enters the model of column 4. Results indicate that more leftist executives are associated with higher seigniorage levels. This is consistent with Hibb's (1977) hypothesis that left-wing oriented governments are relatively less concerned with inflation than right-wing ones. Results shown in columns 5 to 7 indicate that urbanization, trading partners' GDP growth, and external debt do not affect seigniorage in a statistically significant way.¹⁸ Those of columns 8 and 9 are consistent with

¹⁶ Results are virtually identical when using annual dummies. The same is true when a time trend and time trend squared are included in the estimations instead of the time dummies.

¹⁷ This latter result is not shown. Indicators of executive constraints (CNTS) and of checks and balances (DPI) are not statistically significant when included. All results not shown in the paper are available from the authors upon request.

¹⁸ The same applies to de jure central bank independence, U.S. treasury bill rates, real effective exchange rates, current account balance, and government revenues as a percentage of GDP (these results are not shown).

our expectation that more currency inside banks and exchange rate regimes closer to fixed exchange rates¹⁹ lead to lower seigniorage levels.²⁰ Finally, the results of column 10 confirm Click's (1998) result that seigniorage will be higher when the international creditworthiness of the country is lower.²¹ That is, when external borrowing is less available (or costlier), the government has to rely more heavily on seigniorage revenues.

B. Circumstances Under Which the Effects of Political Instability on Seigniorage Are Stronger

Although our results regarding the relationship between political instability and seigniorage are quite robust, it is possible that they are stronger in some circumstances or in countries with specific characteristics. Aisen and Veiga (forthcoming) found that political instability affected inflation levels especially in high-inflation and developing countries, whereas that relationship was practically nonexistent in low inflation and industrialized countries. In order to check if the same happens with seigniorage, we performed estimations in which cabinet changes was interacted with dummy variables accounting for annual inflation rates above and below 50 percent and for developing and industrial countries. The results shown in columns 1 and 2 of Table 5 are consistent with the results of Aisen and Veiga (forthcoming). That is, greater political instability, expressed in a larger number of cabinet changes, leads to higher seigniorage levels only in high-inflation and developing countries.

According to Woo (2003), social polarization, which can be proxied by income inequality and the quality of institutions are important determinants of budget deficits. In highly polarized societies (where there is high income inequality), there is a high polarization of preferences among political parties and interest groups for different types of government spending. Then, according to the model of Cukierman, Edwards, and Tabellini (1992), high polarization of interests will lead to higher seigniorage, in the presence of high political instability. The quality of institutions is also very important because more stringent and transparent budgetary procedures, independence of the central bank, and greater parliamentary influence in the budgetary process can reduce the government's ability to increase budget deficits and extract seigniorage revenues.

The hypothesis that the relationship between seigniorage and political instability is affected by social polarization (income inequality) is tested in column 3 of Table 5, where cabinet changes was interacted with dummy variables for average Gini coefficients above and below

¹⁹ The result reported in column 9 is for the five-way classification system of de facto exchange rate regimes of Levy-Yeyati and Sturzenegger (2003). Results are the same when their three-way classification system is used instead. Since their data starts only in 1974, the inclusion of this variable results in a large number of missing values. That is why it was not included in the models of the previous tables. When included, it is always statistically significant with a negative sign.

²⁰ More currency inside banks may signal a smaller informal sector, which eases regular tax collection, making seigniorage less necessary to finance government expenses and fixed exchange rates constrain monetary policy to the defense of the fixed parity, and thus make the collection of seigniorage revenues harder.

²¹ Data on the Euromoney creditworthiness index, ranging from 0 to 100, from 1982 to 1999, was kindly provided by Reid Click.

40.²² Results suggest that political instability only leads to higher seigniorage in countries with large social polarization.²³ The hypothesis that institutions affect that relationship was tested in columns 4 to 6, where cabinet changes was interacted with dummy variables for high and low turnover rates of central bank presidents,²⁴ high and low economic freedom,²⁵ and polity scale below and above zero. The results of column 3 imply that greater political instability will lead to higher seigniorage only when there is a high turnover rate of central bank presidents, that is, when the de facto independence of the central bank is low. When independence is high, seigniorage does not increase, as the government is no longer able to affect reserve money.²⁶ Political instability also seems to affect seigniorage only in countries that have a low *Index of Economic Freedom* (column 5). This implies that the establishment of sounder and freer economic institutions is a way to avoid the above-referred relationship.²⁷ More democratic institutions also seem to matter, as the results of column 6 indicate that democracies (polity scale > 0) are associated with lower effects of political instability on seigniorage than authoritarian regimes (polity scale ≤ 0).

Click (1998) showed that when governments face greater constraints to issue domestic and/or external debt, they will tend to resort more often to seigniorage revenues. We hypothesize that the effects of political instability on seigniorage levels also depend on the ratios of domestic debt to GDP and on the country's creditworthiness. That is, when greater political instability leads to higher deficits, the government will resort more often to seigniorage revenues to finance them when domestic or foreign borrowing is more difficult (or costlier). The results of columns 3 and 4 provide empirical support for the above-referred hypothesis, as a greater number of cabinet changes is associated with higher seigniorage

²² The dummy $Gini > 40$ takes the value of one for countries whose average Gini coefficient is above 40, and equals zero for the remaining countries ($Gini \leq 40$) = $1 - (Gini > 40)$.

²³ We also used ethnic diversity as a proxy for social polarization, but the results were far from clear. They depended heavily on the cutoff level of diversity after which we classified it as high.

²⁴ Cukierman and Webb (1995) use this turnover rate as an indicator of de facto central bank independence. The dummy high turnover takes the value of one when the turnover rate is above the sample median of 0.20, and is zero otherwise (low turnover = $1 - \text{high turnover}$).

²⁵ The dummy variable high economic freedom takes the value of one when the *Index of Economic Freedom* is greater than 5, and equals zero otherwise. Low economic freedom = $1 - \text{high economic freedom}$.

²⁶ It is worth noting that this result does not hold when the Cukierman and Webb (1995) legal index of Central Bank Independence is used instead of the turnover rate of presidents (that proxies de facto independence). This may happen because what really matters for the conduct of monetary policy is the de facto independence and not what is written in the central bank law.

²⁷ When the five component areas of the *Index of Economic Freedom* are used, the results (not shown here) are the same for all except the first (size of government). That is, political instability affects seigniorage when there is a weaker legal structure and lower security of property rights, low access to sound money, lower freedom to exchange with foreigners, and less flexible regulations of credit, labor, and business.

only in countries that have high domestic debt (column 3)²⁸ or low creditworthiness (column 4).²⁹

The effects of political instability on seigniorage were felt essentially during the 1970s and 1980s (see column 3), which is consistent with the fact that both political instability and seigniorage levels were higher in these decades. Columns 4 and 5 of Table 6 report the results of interacting cabinet changes with regional dummy variables. Those of column 1 indicate that the positive effect of political instability on seigniorage (defined as the ratio of the change in reserve money to GDP) is statistically significant only for Western Hemisphere (Latin American) countries. But, when the alternative definition of seigniorage (ratio of the change in reserve money to government revenues) is used, there are also significant effects for African countries (column 2).³⁰

C. Sensitivity Analysis

Table 7 shows the results of the interactions of alternative proxies of political instability with annual inflation rates above or below 50 percent. These proxies for political instability are defined as:

- **Government crises** (CNTS)—counts the number of rapidly developing situations in a year that threaten to bring the downfall of the present regime.
- **Executive changes** (CNTS)—counts the number of times in a year that effective control of the executive power changes hands.
- **Index of political cohesion** (DPI)— 0 to 3 index based on Roubini and Sachs (1989) in which greater values imply lower cohesion (coalition or minority governments).

As happened in Column 1 of Table 5, only the interactions with inflation ≥ 50 are statistically significant. Thus, these results are robust to the use of different proxies for political instability.

Columns 1 to 4 of Table 8 report the results obtained for the alternative definition of seigniorage—change in reserve money as a percentage of government revenues. In the models of columns 5 to 7 the sample contains only developing countries, and seigniorage is

²⁸ High domestic debt is a dummy variable that takes the value of one for the countries whose average ratio of domestic debt to GDP is above the countries' median ratio (13.28), and takes the value of zero otherwise (low domestic debt = 1 – high domestic debt).

²⁹ High creditworthiness is a dummy variable that equals one for the countries whose average Euromoney's creditworthiness rating is above 60 (the 75th percentile of the country averages), and equals zero otherwise (low creditworthiness=1- high creditworthiness).

³⁰ We also estimated a series of models for a sample which excluded Western Hemisphere countries in order to further check if the relationship found between political instability and seigniorage was not only applicable to that region. Results, not shown here, clearly indicate that this relationship is also valid for the rest of the world.

defined as in the previous tables. Finally, in the models of columns 8 to 11, a three-year moving average of cabinet changes was used instead of its annual values, in order to better capture eventual persistent situations of political instability. In all cases, results are very similar to those obtained in Tables 3 and 4, meaning that our conclusions regarding the effects of political and economic variables on seigniorage levels remained practically the same.

V. CONCLUSIONS

The main purpose of this paper was to identify the major determinants of the cross-country and cross-time variability of seigniorage. Using a dataset covering about 100 countries, from 1960 to 1999 and applying standard panel data techniques, we found that greater political instability leads to higher seigniorage. This result confirms the findings of previous studies such as Cukierman, Edwards, and Tabellini (1992) and Click (1998).

Our major contribution to the literature is that in addition to the above-referred result, we succeeded in determining comprehensively the circumstances under which political instability has a greater impact on seigniorage, a topic that, in our opinion, is very important but received little attention in previous studies. Our results indicate that the effect of political instability on seigniorage is stronger in high-inflation, developing, highly indebted, less democratic, and socially polarized economies. Moreover, although this relationship is particularly strong in Latin America, it is not exclusive to this region. Finally, we also found that countries with high turnover rates of central bank presidents (with lower de facto central bank independence), lower levels of economic freedom, and poorer creditworthiness ratings, rely more on seigniorage to finance their deficits.

The results of this study have policy implications that greatly contribute to the policy debate in high-inflation (seigniorage) and politically unstable economies. Our results show that countries adopting policies that target greater economic freedom, institutional strengthening—such as new laws governing central bank independence—and reduced income inequality, limit the negative effect of political instability on seigniorage and thus improve their chances of successfully lowering their dependence on seigniorage revenues to finance their governments' deficits. After some time, they should benefit from lower inflation and, consequently, higher growth and economic prosperity.

Table 1. Seigniorage Across Countries

Obs	Mean	StDev	Obs	Mean	StDev	Obs	Mean	StDev
ALGERIA			CHINA, P. R. : MAINLAND			GREECE		
ΔRM/GDP 31	.033	.018	ΔRM/GDP 13	.063	.026	ΔRM/GDP 39	.024	.013
ANTIGUA AND BARBUDA			ΔRM/GR 13	.474	.250	ΔRM/GR 37	.120	.065
ΔRM/GDP 22	.013	.035	CHINA, P. R. : HONG KONG			GRENADA		
ARGENTINA			ΔRM/GDP 8	.007	.005	ΔRM/GDP 26	.017	.027
ΔRM/GDP 38	.060	.078	COLOMBIA			ΔRM/GR 12	.087	.114
ΔRM/GR 18	1.203	1.287	ΔRM/GDP 37	.019	.009	GUATEMALA		
ARMENIA			ΔRM/GR 5	.059	.094	ΔRM/GDP 39	.010	.011
ΔRM/GDP 5	.026	.026	CONGO, DEM. REP. OF			ΔRM/GR 38	.117	.137
AUSTRALIA			ΔRM/GDP 29	.056	.141	GUINEA-BISSAU		
ΔRM/GDP 39	.004	.007	ΔRM/GR 30	.813	1.983	ΔRM/GDP 10	.010	.007
ΔRM/GR 38	.022	.036	CONGO, REPUBLIC OF			ΔRM/GR 6	.436	.214
AUSTRIA			ΔRM/GDP 38	.006	.012	GUYANA		
ΔRM/GDP 38	.005	.002	COSTA RICA			ΔRM/GDP 38	.050	.095
ΔRM/GR 37	.020	.013	ΔRM/GDP 39	.026	.024	ΔRM/GR 37	.139	.259
BAHAMAS, THE			ΔRM/GR 29	.230	.189	HAITI		
ΔRM/GDP 23	.004	.004	COTE D IVOIRE			ΔRM/GDP 39	.015	.021
ΔRM/GR 30	.022	.043	ΔRM/GDP 36	.010	.013	ΔRM/GR 32	.231	.359
BAHRAIN			CROATIA			HONDURAS		
ΔRM/GDP 24	.008	.022	ΔRM/GR 5	.057	.043	ΔRM/GDP 39	.011	.012
ΔRM/GR 24	.031	.073	CYPRUS			ΔRM/GR 39	.074	.074
BANGLADESH			ΔRM/GDP 39	.023	.026	HUNGARY		
ΔRM/GDP 25	.009	.008	ΔRM/GR 33	.127	.138	ΔRM/GDP 13	.025	.045
BARBADOS			CZECH REPUBLIC			ΔRM/GR 13	.052	.088
ΔRM/GDP 32	.009	.014	ΔRM/GDP 5	.035	.036	ICELAND		
ΔRM/GR 25	.035	.047	ΔRM/GR 5	.114	.114	ΔRM/GDP 39	.019	.016
BELARUS			DENMARK			ΔRM/GR 31	.084	.073
ΔRM/GDP 4	.042	.014	ΔRM/GDP 39	.00	.012	INDIA		
ΔRM/GR 4	.134	.047	ΔRM/GR 36	.015	.029	ΔRM/GDP 38	.014	.006
BELGIUM			DOMINICA			ΔRM/GR 38	.132	.049
ΔRM/GDP 39	.005	.005	ΔRM/GDP 22	.015	.053	INDONESIA		
ΔRM/GR 36	.019	.022	DOMINICAN REPUBLIC			ΔRM/GDP 33	.016	.010
BELIZE			ΔRM/GDP 39	.015	.016	ΔRM/GR 29	.081	.056
ΔRM/GDP 22	.010	.012	ΔRM/GR 39	.111	.127	IRAN, I.R. OF		
ΔRM/GR 19	.041	.052	ECUADOR			ΔRM/GDP 34	.032	.026
BENIN			ΔRM/GDP 39	.018	.010	ΔRM/GR 23	.199	.162
ΔRM/GDP 36	.008	.018	ΔRM/GR 39	.147	.084	IRELAND		
BHUTAN			EGYPT			ΔRM/GDP 39	.008	.014
ΔRM/GDP 15	.035	.053	ΔRM/GDP 39	.039	.031	ΔRM/GR 39	.028	.060
ΔRM/GR 13	.184	.294	ΔRM/GR 20	.129	.062	ISRAEL		
BOLIVIA			EL SALVADOR			ΔRM/GDP 38	.086	.121
ΔRM/GDP 39	.026	.031	ΔRM/GDP 39	.013	.018	ΔRM/GR 38	.173	.208
ΔRM/GR 35	.481	1.076	EQUATORIAL GUINEA			ITALY		
BOTSWANA			ΔRM/GDP 12	.001	.059	ΔRM/GDP 36	.007	.003
ΔRM/GDP 22	.005	.011	ESTONIA			ΔRM/GR 36	.040	.028
ΔRM/GR 20	.012	.030	ΔRM/GDP 7	.039	.034	JAMAICA		
BRAZIL			ΔRM/GR 6	.159	.147	ΔRM/GDP 39	.021	.021
ΔRM/GDP 39	.036	.027	ETHIOPIA			JAPAN		
ΔRM/GR 35	.247	.187	ΔRM/GDP 38	.013	.017	ΔRM/GDP 39	.009	.006
BULGARIA			ΔRM/GR 33	.112	.124	ΔRM/GR 34	.084	.062
ΔRM/GDP 7	.068	.036	FIJI			JORDAN		
ΔRM/GR 7	.001	.0001	ΔRM/GDP 35	.008	.015	ΔRM/GDP 39	.044	.043
BURKINA FASO			ΔRM/GR 29	.039	.070	ΔRM/GR 38	.225	.203
ΔRM/GDP 35	.010	.012	FINLAND			KAZAKHSTAN		
ΔRM/GR 26	.096	.109	ΔRM/GDP 39	.002	.002	ΔRM/GR 5	.115	.161
BURUNDI			ΔRM/GR 37	.008	.011	KENYA		
ΔRM/GDP 34	.007	.010	FRANCE			ΔRM/GDP 32	.014	.014
CAMEROON			ΔRM/GDP 39	.004	.004	ΔRM/GR 28	.061	.059
ΔRM/GDP 35	.005	.008	ΔRM/GR 38	.017	.021	KOREA		
ΔRM/GR 20	.021	.058	GABON			ΔRM/GDP 39	.014	.013
CANADA			ΔRM/GDP 37	.005	.010	ΔRM/GR 39	.100	.099
ΔRM/GDP 39	.003	.002	GAMBIA, THE			KUWAIT		
ΔRM/GR 35	.021	.013	ΔRM/GDP 30	.016	.029	ΔRM/GDP 35	.002	.019
CENTRAL AFRICAN REP.			ΔRM/GR 26	.083	.176	ΔRM/GR 31	.005	.044
ΔRM/GDP 37	.011	.018	GERMANY			KYRGYZ REPUBLIC		
CHAD			ΔRM/GDP 39	.004	.002	ΔRM/GDP 3	.015	.007
ΔRM/GDP 28	.010	.020	ΔRM/GR 38	.019	.011	ΔRM/GR 3	.089	.045
ΔRM/GR 17	.089	.232	GHANA			LAO PEOPLE'S DEM.REP		
CHILE			ΔRM/GDP 38	.024	.020	ΔRM/GDP 9	.014	.009
ΔRM/GDP 39	.069	.077	ΔRM/GR 34	.245	.272	LATVIA		
ΔRM/GR 38	.283	.281				ΔRM/GDP 5	.016	.012
						ΔRM/GR 4	.048	.037

Table 1 (contd). Seigniorage Across Countries

	Obs	Mean	StDev		Obs	Mean	StDev		Obs	Mean	StDev
LEBANON				NORWAY				SUDAN			
ΔRM/GR	4	.406	.224	ΔRM/GDP	39	.005	.005	ΔRM/GDP	38	.035	.031
LESOTHO				ΔRM/GR	37	.020	.016	ΔRM/GR	17	202.3	425.5
ΔRM/GDP	18	.019	.024	OMAN				SURINAME			
ΔRM/GR	17	.050	.065	ΔRM/GDP	28	.009	.013	ΔRM/GDP	31	.069	.074
LIBYA				ΔRM/GR	27	.024	.033	SWAZILAND			
ΔRM/GDP	33	.027	.033	PAKISTAN				ΔRM/GDP	23	.016	.027
LITHUANIA				ΔRM/GDP	39	.019	.010	ΔRM/GR	24	.057	.105
ΔRM/GDP	5	.020	.011	ΔRM/GR	39	.126	.069	SWEDEN			
ΔRM/GR	5	.083	.048	PAPUA NEW GUINEA				ΔRM/GDP	39	.005	.011
LUXEMBOURG				ΔRM/GDP	20	.005	.024	ΔRM/GR	39	.015	.034
ΔRM/GDP	35	.003	.015	ΔRM/GR	20	.028	.126	SWITZERLAND			
ΔRM/GR	21	.015	.053	PARAGUAY				ΔRM/GDP	39	.009	.015
MADAGASCAR				ΔRM/GDP	39	.018	.010	ΔRM/GR	39	.110	.172
ΔRM/GDP	36	.011	.013	ΔRM/GR	34	.177	.094	SYRIAN ARAB REPUBLIC			
ΔRM/GR	21	.112	.153	PERU				ΔRM/GDP	34	.050	.039
MALAWI				ΔRM/GDP	39	.034	.029	ΔRM/GR	21	.176	.106
ΔRM/GDP	33	.014	.023	ΔRM/GR	38	.282	.300	TANZANIA			
MALAYSIA				PHILIPPINES				ΔRM/GR	31	.135	.083
ΔRM/GDP	38	.018	.020	ΔRM/GDP	39	.010	.007	THAILAND			
ΔRM/GR	39	.063	.142	ΔRM/GR	39	.074	.054	ΔRM/GDP	39	.010	.004
MALDIVES				POLAND				ΔRM/GR	39	.068	.029
ΔRM/GR	20	.248	.350	ΔRM/GDP	18	.050	.059	TOGO			
MALI				ΔRM/GR	9	.067	.088	ΔRM/GDP	35	.011	.033
ΔRM/GDP	36	.013	.018	PORTUGAL				TONGA			
MALTA				ΔRM/GDP	39	.014	.021	ΔRM/GDP	12	.012	.074
ΔRM/GDP	38	.059	.091	ΔRM/GR	27	.075	.142	TRINIDAD AND TOBAGO			
ΔRM/GR	36	.157	.268	QATAR				ΔRM/GDP	38	.008	.016
MAURITANIA				ΔRM/GDP	31	.005	.006	ΔRM/GR	30	.023	.054
ΔRM/GDP	31	.006	.029	ROMANIA				TUNISIA			
ΔRM/GR	12	.034	.126	ΔRM/GDP	19	.031	.035	ΔRM/GDP	39	.010	.008
MAURITIUS				ΔRM/GR	23	.076	.084	ΔRM/GR	25	.041	.026
ΔRM/GDP	39	.015	.028	RUSSIA				TURKEY			
ΔRM/GR	32	.090	.148	ΔRM/GR	4	.185	.077	ΔRM/GDP	12	.031	.006
MEXICO				RWANDA				ΔRM/GR	29	.179	.052
ΔRM/GDP	39	.022	.024	ΔRM/GDP	34	.006	.008	UGANDA			
ΔRM/GR	27	.235	.220	ΔRM/GR	20	.124	.120	ΔRM/GDP	24	.018	.013
MOLDOVA				SAUDI ARABIA				ΔRM/GR	22	.367	.395
ΔRM/GDP	6	.077	.075	ΔRM/GDP	35	.009	.015	UKRAINE			
MONGOLIA				SENEGAL				ΔRM/GDP	5	.074	.072
ΔRM/GDP	6	.039	.022	ΔRM/GDP	36	.005	.014	UNITED ARAB EMIRATES			
ΔRM/GR	5	.197	.118	SEYCHELLES				ΔRM/GDP	23	.009	.013
MOROCCO				ΔRM/GDP	27	.014	.037	ΔRM/GR	16	4.215	8.255
ΔRM/GDP	39	.015	.009	ΔRM/GR	21	.040	.098	UNITED KINGDOM			
ΔRM/GR	31	.071	.042	SIERRA LEONE				ΔRM/GDP	39	.004	.005
MOZAMBIQUE				ΔRM/GDP	35	.023	.026	ΔRM/GR	36	.013	.015
ΔRM/GDP	11	.074	.049	ΔRM/GR	37	.268	.362	UNITED STATES			
MYANMAR				SINGAPORE				ΔRM/GDP	39	.003	.001
ΔRM/GDP	38	.028	.048	ΔRM/GDP	35	.016	.012	ΔRM/GR	36	.021	.009
ΔRM/GR	33	.332	.516	ΔRM/GR	35	.066	.057	URUGUAY			
NAMIBIA				SLOVAK REPUBLIC				ΔRM/GDP	39	.049	.029
ΔRM/GDP	7	.006	.005	ΔRM/GDP	5	.020	.022	ΔRM/GR	33	.267	.175
ΔRM/GR	3	.016	.023	SLOVENIA				VANUATU			
NEPAL				ΔRM/GDP	5	.010	.003	ΔRM/GDP	14	.012	.017
ΔRM/GDP	39	.014	.008	ΔRM/GR	6	.023	.007	VENEZUELA			
ΔRM/GR	37	.223	.149	SOUTH AFRICA				ΔRM/GDP	39	.015	.016
NETHERLANDS				ΔRM/GDP	39	.007	.015	ΔRM/GR	38	.066	.071
ΔRM/GDP	39	.004	.003	ΔRM/GR	39	.027	.022	YEMEN, REPUBLIC OF			
ΔRM/GR	13	.004	.006	SPAIN				ΔRM/GDP	7	.050	.048
NETHERLANDS ANTILLES				ΔRM/GDP	39	.011	.004	ΔRM/GR	8	.261	.298
ΔRM/GR	23	.066	.178	ΔRM/GR	37	.078	.040	ZAMBIA			
NEW ZEALAND				SRI LANKA				ΔRM/GDP	30	.019	.022
ΔRM/GDP	39	.001	.008	ΔRM/GDP	39	.012	.009	ΔRM/GR	29	.087	.105
ΔRM/GR	37	.006	.029	ΔRM/GR	39	.063	.051	ZIMBABWE			
NICARAGUA				ST. KITTS AND NEVIS				ΔRM/GDP	21	.010	.007
ΔRM/GDP	38	.058	.091	ΔRM/GDP	18	.016	.036	ΔRM/GR	18	.042	.026
ΔRM/GR	39	.255	.370	ΔRM/GR	10	.057	.051				
NIGER				ST. LUCIA							
ΔRM/GDP	36	.004	.010	ΔRM/GDP	22	.012	.014				
NIGERIA				ST. VINCENT & GRENES.							
ΔRM/GDP	35	.014	.016	ΔRM/GDP	22	.015	.034				
ΔRM/GR	34	.136	.168	ΔRM/GR	20	.049	.121				

RM: Reserve Money (IMF-IFS-14a)
GDP: Nominal GDP (IMF-IFS-99b)
GR: Government Revenues (IMF-IFS-81)

Table 2. Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min.	Max.	Source
Dependent:						
Δ Reserve money (in percent of GDP) 1/	4,76	1.87	3.62	-29.40	65.53	IMF-IFS
Δ Reserve money (in percent of government revenues)	3,89	122.22	3,355.86	-380.78	151,882.8	IMF-IFS
Explanatory						
Agriculture (in percent of GDP) 2/	4,255	22.52	16.45	0.13	78.01	WB-WDI
Cabinet changes 3/	5,667	.44	.60	0	5	CNTS
Central bank intelligence 4/	1,942	.34	.12	0.09	0.69	CWN
Change in terms of trade	3,978	220,801	1.5e+7	-6.3e+7	9.8e+8	WB-WDI
Checks and balances 5/	3,397	2.08	1.38	1	15	DPI
Civil liberties 6/	4,356	3.94	1.92	1	7	Freedom H
Creditworthiness	1,988	48.13	25.00	2.01	100	Euromoney
Currency inside banks	5,088	-1.73	27.35	-1,052.28	1.26	IMF-IFS
Current account (in percent of GDP)	3,111	-4.11	10.67	-240.52	58.55	WB-WDI
Debt service (in percent of exports)	2,432	17.25	14.92	0	185.95	WB-WDI
Domestic debt (in percent of GDP)	1,163	200.57	2,588.54	0.12	52,345.17	IMF-IFS
Exchange rate regime 7/	3,345	4.06	1.28	1	5	LYS
Executive changes	5,701	.19	.46	0	4	CNTS
Executive constraints	5,339	3.87	2.41	0	7	Polity IV
External debt (in percent of GDP) 8/	2,975	67.31	85.18	0	1,205	WB-GDN
External trade shocks	3,978	2.6e+7	1.7e+9	-3.4e+9	1.1e+11	WB-WDI
Gini coefficient 9/	693	37.49	10.64	16.63	74.33	DK
Gov. revenues (in percent of GDP)	2,561	19.51	9.64	0	50.57	WB-WDI
Government crises	5,572	.17	.52	0	7	CNTS
Growth of real GDPpc 10/	4,982	2.03	6.72	-41.91	77.69	PWT-6.1
Growth trading partners	5,180	2.37	1.90	-14.61	9.35	WB-GDN
Ideological orientation	3,259	1.41	1.28	0	3	DPI
Ideological polarization	3,213	.30	.69	0	2	DPI
Index of Economic Freedom 11/	2,958	5.70	1.19	2.30	9.05	GL

Table 2. Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min.	Max.	Source
Area I	3,390	5.30	1.63	0.65	9.74	GL
Area II	2,688	5.44	1.87	1.14	9.62	GL
Area III	3,534	6.34	2.14	0	9.86	GL
Area IV	3,063	5.83	1.74	0	9.97	GL
Area V	2,913	5.43	1.11	2.47	8.85	GL
Index political cohesion	3,438	.71	.79	0	3	DPI
Inflation (annual rate)	4,820	40.90	455.16	-36.74	23,773.1	IMF-IFS
Political rights	4,356	3.93	2.22	1	7	Freedom H
Polity scale	5,344	.08	7.62	-10	10	Polity IV
Real effective exchange rate	1,433	116.40	65.75	37.10	921.41	WB-WDI
Real GDP per capita	5,075	5,936.76	6,111.80	281.25	44,008.5	PWT-6.1
Trade (in percent of GDP)	4,815	70.06	46.37	0	439.59	WB-WDI
Turnover rate governors	1,990	.24	.20	0	1.08	CWN
U.S. treasury bill rate	7,298	6.00	2.5	2.38	14.08	IMF-IFS
Urban population (in percent of total)	6,688	43.90	24.25	1.75	100	WB-WDI

1/ IMF-IFS—International Monetary Fund—International Financial Statistics.

2/ WB-WDI—World Bank—World Development Indicators.

3/ CNTS—Cross National Time Series Database.

4/ CWN—based on Cukierman and Webb (1995).

5/ DPI—Database of Political Institutions.

6/ Freedom H—Freedom House Rankings.

7/ LYS—Levy-Yeyati and Sturzenegger.

8/ WB-GDN—World Bank—Global Development Network.

9/ DK—Dollar and Kraay (2002).

10/ PWT-6.1—Penn World Tables (Mark 6.1).

11/ GL—Gwartney and Lawson (2002).

Table 3. Results for Seigniorage

Seigniorage	1	2	3	4	5	6
Cabinet changes (-1)	.239 (1.97)**	.238 (1.96)**	.247 (1.82)*	.318 (2.75)***	.303 (2.65)***	.294 (2.68)***
Index of Economic Freedom	-1.278 (-5.81)***	-1.179 (-5.73)***	---	---	---	---
Area I	---	---	.238 (1.47)	---	---	---
Area II	---	---	.016 (.16)	---	---	---
Area III	---	---	-.228 (-2.57)**	---	---	---
Area IV	---	---	-.721 (-3.68)***	---	---	---
Area V	---	---	-.528 (-1.42)	---	---	---
Polity scale	.040 (1.49)	.041 (1.54)	.017 (.54)	.022 (.87)	.018 (.74)	.023 (.96)
Agriculture (in percent of GDP)	.043 (1.29)	.031 (1.00)	-.028 (-.62)	.082 (3.95)***	.071 (3.79)***	.066 (3.73)***
Trade (in percent of GDP)	.009 (1.08)	---	---	.018 (2.01)**	---	---
Percent change in terms of trade	-2.25e-07 (-.88)	-2.29e-07 (-1.07)	-1.14e-07 (-.62)	-3.34e-07 (-1.10)	---	---
External trade shocks	---	---	---	---	-.24e-09 (-.65)	---
Real GDP per capita	.0001 (1.94)*	---	---	-.0001 (-4.68)***	-.0001 (-4.70)***	-.0001 (-4.64)***
Growth of real GDP per capita	-.052 (-3.01)***	-.052 (-3.01)***	-.073 (-3.02)***	-.027 (-2.23)**	-.024 (-1.91)*	-.021 (-1.81)*
1970s	---	---	---	1.457 (8.62)***	1.554 (9.46)***	1.489 (9.35)***
1980s	---	---	---	2.053 (6.77)***	2.203 (7.07)***	2.079 (7.04)***
1990s	---	---	---	1.634 (5.31)***	1.881 (5.91)***	1.733 (5.69)***
Number of observations	1,558	1,558	1,244	2,221	2,223	2,383
Number of countries	86	86	78	97	97	98
Adjusted R ²	.30	.30	.31	.24	.23	.23

1/ Panel regressions controlling for fixed effects. Seigniorage, the dependent variable, was defined as the ratio of the change in reserve money (IFS, line 14) to nominal GDP (IFS line 99b). Models estimated with a constant. T-statistics are in parentheses. Significance level at which the null hypothesis is rejected—*** 1 percent; ** 5 percent, and * 10 percent.

Table 4. Robustness Tests

	1	2	3	4	5	6	7	8	9	10
Seigniorage										
Cabinet changes (-1)	.353 (2.68)**	.366 (2.77)**	.305 (2.08)**	.338 (2.21)**	.257 (2.48)**	.314 (2.73)**	.435 (2.68)**	.303 (2.73)**	.457 (2.94)**	.357 (1.87)*
Polity scale	---	---	.019 (.64)	.012 (.34)	.031 (1.51)	.020 (.81)	.019 (.69)	.024 (1.05)	-.023 (-.72)	-.020 (-.52)
Agriculture (% GDP)	.061 (2.45)**	.060 (2.42)**	.051 (1.72)*	.063 (2.02)**	---	.067 (3.69)**	.038 (1.39)	.062 (3.47)**	.072 (2.50)**	-.044 (-1.16)
Real GDP per capita	-.0001 (-2.05)**	-.0001 (-2.13)**	-.0001 (-2.11)**	-.0001 (-2.39)**	-.0001 (-6.47)**	-.0001 (-4.88)**	-.0001 (-1.21)	-.0001 (-4.89)**	-.0001 (-1.46)	-.00002 (-.34)
Growth of real GDP per capita	-.030 (-2.11)**	-.030 (-2.11)**	-.029 (-1.87)*	-.032 (-2.02)**	-.036 (-3.36)**	-.024 (-1.96)**	-.028 (-1.94)*	-.021 (-1.83)*	-.025 (-1.60)	-.039 (-2.52)**
Political rights	.026 (.31)	---	---	---	---	---	---	---	---	---
Civil liberties	---	.184 (1.73)*	---	---	---	---	---	---	---	---
Ideological polarization	---	---	.041 (.29)	---	---	---	---	---	---	---
Ideological orientation	---	---	---	.361 (2.51)**	---	---	---	---	---	---
Urban population (in percent of total population)	---	---	---	---	.006 (.46)	---	---	---	---	---
Growth of trading partners GDP	---	---	---	---	---	.064 (1.36)	---	---	---	---
External debt (in percent of GDP)	---	---	---	---	---	---	.006 (1.61)	---	---	---
Currency inside banks (M2-C)/M2	---	---	---	---	---	---	---	-.026 (-2.79)**	---	---
Exchange rate regime	---	---	---	---	---	---	---	---	-.0233 (-2.42)**	---
Creditworthiness	---	---	---	---	---	---	---	---	---	-.037 (-2.18)**
Number of observations	1989	1989	1648	1645	2911	2253	1552	2358	1451	1140
Number of countries	104	104	96	96	100	93	76	97	94	97
Adjusted R ²	.24	.24	.27	.25	.23	.23	.22	.23	.22	.33

1/ Panel regressions with fixed effects. T-statistics are in parentheses. Significance level at which the null hypothesis is rejected—*** 1 percent, ** 5 percent, and * 10 percent. Seigniorage, the dependent variable, was defined as the ratio of the change in reserve money (IFS, line 14a) to total nominal GDP (IFS, line 99b). Models estimated with a constant and three decade dummies (1970s, 1980s, and 1990s). Their estimated coefficients are not shown in order to economize space.

Table 5. Results for Interactions of Cabinet Changes 1/

Seigniorage	1	2	3	4	5	6
[Cabinet changes * (inflation \geq 50 percent)] (-1)	1.632 (2.49)**	---	---	---	---	---
[Cabinet changes * (inflation < 50 percent)] (-1)	.071 (.68)	---	---	---	---	---
[Cabinet changes * (dev. countries)] (-1)	---	.366 (2.71)***	---	---	---	---
[Cabinet changes * (ind. countries)] (-1)	---	-.013 (-.21)	---	---	---	---
[Cabinet changes * (Gini > 40)] (-1)	---	---	.531 (2.67)***	---	---	---
[Cabinet changes * (Gini \leq 40)] (-1)	---	---	.025 (.24)	---	---	---
[Cabinet changes * (high turnover)] (-1)	---	---	---	.475 (1.97)**	---	---
[Cabinet changes * (low turnover)] (-1)	---	---	---	.089 (.91)	---	---
[Cabinet changes * (low econ. freedom)] (-1)	---	---	---	---	.774 (3.41)***	---
[Cabinet changes * (high econ. freedom)] (-1)	---	---	---	---	.100 (.95)	---
[Cabinet changes * (polity scale \leq 0)] (-1)	---	---	---	---	---	.364 (2.13)**
[Cabinet changes * (polity scale > 0)] (-1)	---	---	---	---	---	.222 (1.89)*
Polity scale	.034 (1.49)	.022 (.92)	.020 (.84)	.047 (1.62)	.034 (1.43)	.028 (1.17)
Agriculture (in percent of GDP)	.059 (2.96)***	.066 (3.73)***	.048 (3.72)***	.065 (2.38)**	.073 (3.59)***	.066 (3.71)***
Real GDP per capita	-.0001 (-4.27)***	-.0001 (-4.64)***	-.0001 (-4.34)***	-.0001 (-3.83)***	-.0001 (-3.25)***	-.0001 (-4.61)***
Growth of real GDP per capita	-.027 (-2.04)**	-.021 (-1.77)*	-.017 (-1.46)	-.024 (-1.42)	-.032 (-2.27)**	-.021 (-1.79)*
Number of observations	2260	2383	2311	1779	2102	2383
Number of countries	98	98	98	97	97	98
Adjusted R ²	.25	.23	.27	.22	.24	.23

1/ Panel regressions controlling for fixed effects. Seigniorage, the dependent variable, was defined as the ratio of the change in reserve money (IFS, line 14) to total nominal GDP (IFS, line 99b). Models estimated with a constant and three decade dummies (1970s, 1980s, and 1990s). Their estimated coefficients are not shown in order to economize space. T-statistics are in parentheses. Significance level at which the null hypothesis is rejected—*** 1 percent; ** 5 percent, and * 10 percent.

Table 6. More Results for Interactions of Cabinet Changes 1/

Seigniorage =	Δ RM/GDP	Δ RM/GDP	Δ RM/GDP	Δ RM/GDP	Δ RM/GR
	1	2	3	4	5
[Cabinet changes * (high domestic debt)] (-1)	.676 (2.20)**	---	---	---	---
[Cabinet changes * (low domestic debt)] (-1)	-.064 (-.60)	---	---	---	---
[Cabinet changes * (low creditworthiness)] (-1)	---	.375 (2.59)***	---	---	---
[Cabinet changes * (high creditworthiness)] (-1)	---	-.047 (-.58)	---	---	---
[Cabinet changes * (1960s)] (-1)	---	---	.175 (1.28)	---	---
[Cabinet changes * (1970s)] (-1)	---	---	.353 (1.85)*	---	---
[Cabinet changes * (1980s)] (-1)	---	---	.415 (1.82)*	---	---
[Cabinet changes * (1990s)] (-1)	---	---	.195 (.97)	---	---
[Cabinet changes * (Africa)] (-1)	---	---	---	.143 (.87)	11.363 (2.02)**
[Cabinet changes * (Asia)] (-1)	---	---	---	.072 (.45)	.148 (.11)
[Cabinet changes * (Western Hemisphere)] (-1)	---	---	---	1.183 (2.85)***	12.972 (2.34)**
[Cabinet changes * (other developing countries)] (-1)	---	---	---	.149 (.42)	-1.714 (-.95)
[Cabinet changes * (industrial countries)] (-1)	---	---	---	-.012 (-.18)	-.162 (-.30)
Polity scale	.008 (.29)	.018 (.79)	.023 (.96)	.025 (1.07)	.343 (1.26)
Agriculture (in percent of GDP)	.080 (3.82)***	.044 (3.39)***	.066 (3.72)***	.067 (3.74)***	1.674 (3.67)***
Real GDP per capita	-.001 (-5.18)***	-.0001 (-4.43)***	-.0001 (-4.72)***	-.0001 (-4.66)***	-.001 (-4.45)***
Growth of real GDP per capita	-.023 (-1.52)	-.015 (-1.35)*	-.021 (-1.82)*	-.021 (-1.77)*	-.485 (-2.29)**
Number of observations	1860	2361	2386	2383	1742
Number of countries	97	98	98	98	85
Adjusted R ²	.21	.27	.23	.23	.25

1/ Panel regressions controlling for fixed effects. In columns 1 to 4, seigniorage, the dependent variable, was defined as the ratio of the change in reserve money (IFS, line 14) to total nominal GDP (IFS, line 99b). In column 5, seigniorage is the ratio of the change in reserve money (IFS, line 14) to government revenues (IFS, line 81). Models estimated with a constant and three decade dummies (1970s, 1980s, and 1990s). Their estimated coefficients are not shown in order to economize space. T-statistics are in parentheses. Significance level at which the null hypothesis is rejected—*** 1 percent, ** 5 percent, and * 10 percent.

Table 7. Results for Interactions of Other Proxies of Political Instability 1/

	1	2	3
[Government crises * (inflation \geq 50 percent)] (-1)	3.908 (4.15)***	---	---
[Government crises * (inflation < 50 percent)] (-1)	-.088 (-.94)	---	---
[Executive changes * (inflation \geq 50%)] (-1)	---	1.837 (2.76)***	---
[Executive changes * (inflation < 50 percent)] (-1)	---	.091 (.85)	---
[Index of political cohesion * inflation \geq 50 percent] (-1)	---	---	1.763 (3.73)***
[Index of political cohesion * inflation < 50 percent] (-1)	---	---	.115 (1.38)
Polity scale	.019 (.81)	.019 (.79)	-.001 (-.03)
Agriculture (in percent of GDP)	.059 (3.44)***	.064 (3.62)***	.047 (1.48)
Real GDP per capita	-.0001 (-4.37)***	-.0001 (-4.63)***	-.0001 (-1.87)*
Growth of real GDP per capita	-.018 (-1.62)	-.025 (-2.15)**	-.032 (-1.95)*
Number of observations	2,354	2,356	1,648
Number of countries	98	98	98
Adjusted R ²	.26	.24	.24

1/ Panel regressions controlling for fixed effects. Seigniorage, the dependent variable, was defined as the ratio of the change in reserve money (IFS, line 14) to total nominal GDP (IFS, line 99b). Models estimated with a constant and three decade dummies (1970s, 1980s, and 1990s). Their estimated coefficients are not shown in order to economize space. T-statistics are in parentheses. Significance level at which the null hypothesis is rejected—*** 1 percent, ** 5 percent, and * 10 percent.

Table 8. Sensitivity Analysis 1/

	Complete Sample			Sample of Developing Countries			Three-Year Moving Averages of Cabinet Changes				
	1	2	3	4	5	6	7	8	9	10	11
	Δ Reserve Money/Government Revenue	Δ Reserve Money/Government Revenue	Δ Reserve Money/Government Revenue	Δ Reserve Money/Government Revenue	Δ Reserve Money/GDP	Δ Reserve Money/GDP	Δ Reserve Money/GDP	Δ Reserve Money/GDP	Δ Reserve Money/GDP	Δ Reserve Money/GDP	Δ Reserve Money/GDP
Cabinet changes (-1)	5.041 (2.16)**	4.669 (2.65)**	---	---	.334 (2.26)**	.366 (2.71)**	---	.474 (1.97)**	.557 (2.49)**	---	---
[Cabinet changes * (inflation \geq 50 percent)] (-1)	---	---	30.365 (2.12)**	---	---	---	1.619 (2.48)**	---	---	2.686 (2.42)**	---
[Cabinet changes * (inflation < 50 percent)] (-1)	---	---	1.474 (1.32)	---	---	---	.093 (.70)	---	---	.210 (1.06)	---
[Cabinet changes * (devel. countries)] (-1)	---	---	---	6.266 (2.69)**	---	---	---	---	---	---	.758 (2.70)**
[Cabinet changes * (ind. countries)] (-1)	---	---	---	-.195 (-.37)	---	---	---	---	---	---	-.217 (-2.02)**
Index of Economic Freedom	-5.713 (-2.78)**	---	---	---	-1.376 (-6.07)**	---	---	-1.171 (-5.96)**	---	---	---
Polity scale	.705 (1.61)	324 (1.15)	.348 (1.23)	.308 (1.09)	.042 (1.64)*	.026 (1.05)	.039 (1.62)	.035 (1.38)	.024 (1.00)	.029 (1.20)	.021 (.86)
Agriculture (in percent of GDP)	1.965 (2.69)**	1.699 (3.64)**	1.544 (3.28)**	1.696 (3.64)**	.021 (.69)	.067 (3.64)**	.060 (2.91)**	.026 (.87)	.065 (3.61)**	.054 (2.44)**	.064 (3.60)**
Real GDP per capita	---	-0.01 (-4.61)**	-0.01 (-3.75)**	-0.01 (-4.73)**	---	-0.001 (-2.94)**	-0.001 (-2.61)**	---	-0.001 (-4.33)**	-0.001 (-3.74)**	-0.001 (-4.49)**
Growth of real GDP per capita	-0.731 (-2.32)**	-0.459 (-2.11)**	-0.444 (-1.95)*	-0.449 (-2.06)**	-0.047 (-2.70)**	-0.021 (-1.78)*	-0.029 (-2.09)**	-0.046 (-2.79)**	-0.022 (-1.84)*	-0.026 (-1.96)**	-0.021 (-1.79)*
Number of observations	1,297	1,742	1,694	1,742	1,298	1,982	1,859	1,644	2,343	2,137	2,343
Number of countries	75	85	84	85	70	81	81	87	98	98	98
Adjusted R ²	.26	.24	.27	.25	.28	.21	.22	.31	.23	.26	.23

1/ Panel regressions with fixed effects. T-statistics are in parentheses. Significance level at which the null hypothesis is rejected—*** 1 percent, ** 5 percent, and * 10 percent. Models estimated with a constant and three decade dummies (1970s, 1980s, and 1990s). Their estimated coefficients are not shown in order to economize space. The sample and the definition of seigniorage used (the dependent variable) are indicated in the first row.

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