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"*The Political Economy of Seigniorage*"

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The political economy of seigniorage

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Abstract

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.

Keywords: Seigniorage, political instability, institutions.
JEL codes: E31, E63.

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[**] The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy.

1. 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, et al. (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 in also stronger in countries with (i) higher central bank president turnover (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) with 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 2. The dataset and the empirical models are described in section 3. Section 4 presents the empirical results, and section 5 concludes the paper.

2. The political economy of seigniorage

Most economists acknowledge that differences on 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 on 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, et al. (1975), for example, provide evidence that countries with larger per capita non–export 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 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, therefore minimizing the distortions to the economy when chosing the optimal combination of taxes to finance their expenditures. Edwards and Tabellini (1991) and Cukierman, et al. (1992) fail to find evidence that this theory applies to developing countries. Click (1998) estimates a model using 90 countries, from 1971-90, and find that only 40 percent of the cross-country variation in seigniorage can be explained with the Theory of Optimal Taxation. The empirical failure of this theory to fully explain 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, et al. (1992) develop a theoretical model whereby 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 show evidence that higher political instability and polarization lead to higher seigniorage. In the empirical analysis of section 4, 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 (ranged between -10 and +10) to measure the degree of democracy in different countries.[1]

In line with Cukierman, et al. (1992), we conjecture that economies with weaker institutions might be unable to build efficient tax systems leading them to use more frequently seigniorage 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 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 fully analyzing 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.

[1] An additional shortcoming of the analysis in Cukierman et al. (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 1960-99.

3. Data and the empirical model

The dataset is composed of annual data on political, institutional and economic variables for the years 1960 to 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 *Cross National Time Series Data Archive* (CNTS); the *Database of Political Institutions* (DPI 3.0);[2] the *Polity IV* dataset;[3] Gwartney and Lawson (2002);[4] and the *Freedom House* ratings.[5] Economic data was collected from the World Bank's *World Development Indicators* (WDI) and *Global Development Network Growth Database* (GDN),[6] the International Monetary Fund's *International Financial Statistics* (IFS), the *Penn World Tables* (PWT 6.1),[7] Cukierman and Webb (1995),[8] Dollar and Kraay (2002),[9] and Levi-Yeyati and Sturzenegger (2003).[10]

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: (1) the change in reserve money (line 14a of IFS-IMF) divided by nominal GDP (line 99b in IFS-IMF); (2) the change in reserve money (line 14a of IFS-IMF) divided by government revenues (line 81 in

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[2] On this database, see Beck et al. (2001). Available on the Internet though Philip Keefer's page in the World Bank's site (http://www.worldbank.org/research/bios/pkeefer.htm).

[3] Available on the Internet (http://www.cidcm.umd.edu/inscr/polity/index.htm).

[4] 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 great number of missing values in our sample, straight-line interpolation was used to generate annual data.

[5] Available on the Internet (http://www.freedomhouse.org/ratings/).

[6] Available on the Internet (http://www.worldbank.org/research/growth/GDNdata.htm).

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

[8] Underlying data available on the Internet (http://www.tau.ac.il/~alexcuk/pdf/WebbPoltime2.xls).

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

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

IFS-IMF). Table 1 shows the number of observations, means and standard deviations of these seigniorage measures for all countries for which data is available.[11]

-- Insert Table 1 about here --

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% 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 (% GDP)*: share of the value added of agriculture in GDP (WDI, WB). According to Chelliah, et. al (1975), a positive coefficient is expected;

[11] There is data on $\Delta RM/GDP$ for 144 countries and on $\Delta RM/GR$ for 122 countries.

- *Trade (% GDP)*: openness to trade (WDI, WB). 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);
- *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:
  - *% Change in Terms of Trade* (WDI, WB). 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;
  - 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.

-- Insert Table 2 about here --

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

$$S_{it} = \alpha PI_{i,t-1} + \mathbf{Inst}_{it}^{'}\boldsymbol{\beta}_1 + \mathbf{Eco}_{it}^{'}\boldsymbol{\beta}_2 + \mathbf{EcP}_{it}^{'}\boldsymbol{\beta}_3 + \nu_i + \varepsilon_{it} \quad , \; i = 1,...,N \quad t = 1,...,T_i \qquad (1)$$

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, ν_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 in 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.[12]

4. 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,[13] 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

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[12] 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.

[13] Hausmann tests indicate that the fixed effects specification is preferable to a random effects model and to a simple OLS model.

foreigners – already represents openness to trade, the variables *Real GDP per capita* and *Trade (%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.

--- Insert Table 3 about here ---

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 sizeable: an additional cabinet change increases seigniorage by around 0.24 (an increase of 13% 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% 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.[14]

The *Index of Economic Freedom*, for which data is available only after 1970, was not included in the last three estimations reported in Table 3. Its exclusion allows for the reintroduction of *Trade (%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 (%GDP)* becomes highly statistically significant, *Real GDP per capita,* although close to zero, becomes highly significant and 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 (%GDP)* has

[14] 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.

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 (%GDP)* and *%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.[15]

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, et. al (1992) using cross sectional data. Those concerning economic variables are consistent with the findings of previous studies, such as Chelliah, et. al (1975), Edwards and Tabellini (1991), 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

[15] 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.

does not hold when we use the alternative definition of seigniorage, there is no robust evidence that democracy affects seigniorage levels.[16]

--- Insert Table 4 about here ---

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.[17] Those of columns 8 and 9 are consistent with our expectation that more currency inside banks and exchange rate regimes closer to fixed exchange rates[18] lead to lower seigniorage levels.[19] 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.[20] That is, when external borrowing is less available (or costlier), the government has to rely more heavily on seigniorage revenues.

[16] 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.

[17] 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).

[18] The result reported in column 9 is for the 5-way classification system of *de facto* exchange rate regimes of Levi-Yeyati and Sturzenegger (2003). Results are the same when their 3-way classification system is used instead. Since their data starts only in 1974, the inclusion of this variable originates 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.

[19] 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.

[20] Data on the *Euromoney* creditworthiness index, raging from 0 to 100, from 1982 to 1999, was kindly provided by Reid Click.

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% and for developing and industrial countries. 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 higher 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, et al. (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 40.[21] Results suggest that political instability only leads to higher seigniorage in countries with large social polarization.[22] 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,[23] high and low economic freedom,[24] 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.[25] 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.[26] 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*).

--- Insert Table 5 about here ---

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

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[21] 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≤ 40) = 1 – (Gini>40).*

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

[23] 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 – High Turnover*.

[24] 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- High Economic Freedom.*

[25] 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.

[26] 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.

hypothesize that the effects of political instability on seigniorage levels also depend on the ratios of domestic debt to GDP and on the countries'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 only in countries that have *High Domestic Debt* (column 3)[27] or *Low Creditworthiness* (column 4).[28]

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).[29]

--- Insert Table 6 about here ---

[27] *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.*

[28] *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.*

[29] 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.

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%. 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.

--- Insert Table 7 about here ---

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 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.

--- Insert Table 8 about here ---

5. 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 1960-1999, 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, et al. (1992) and Click (1998).

Our major contribution to the literature is that, in addition to the above-referred result, we succeeded to comprehensively determine 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, this relationship is particularly strong in Latin America, but 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), with lower levels of economic freedom, and with 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 targeting 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 improving 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.

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Table 1: Seigniorage across countries

	Obs	Mean	StDev
ALGERIA			
ΔRM/GDP	31	.033	.018
ANTIGUA AND BARBUDA			
ΔRM/GDP	22	.013	.035
ARGENTINA			
ΔRM/GDP	38	.060	.078
ΔRM/GR	18	1.203	1.287
ARMENIA			
ΔRM/GDP	5	.026	.026
AUSTRALIA			
ΔRM/GDP	39	.004	.007
ΔRM/GR	38	.022	.036
AUSTRIA			
ΔRM/GDP	38	.005	.002
ΔRM/GR	37	.020	.013
BAHAMAS			
ΔRM/GDP	23	.004	.004
ΔRM/GR	30	.022	.043
BAHRAIN			
ΔRM/GDP	24	.008	.022
ΔRM/GR	24	.031	.073
BANGLADESH			
ΔRM/GDP	25	.009	.008
BARBADOS			
ΔRM/GDP	32	.009	.014
ΔRM/GR	25	.035	.047
BELARUS			
ΔRM/GDP	4	.042	.014
ΔRM/GR	4	.134	.047
BELGIUM			
ΔRM/GDP	39	.005	.005
ΔRM/GR	36	.019	.022
BELIZE			
ΔRM/GDP	22	.010	.012
ΔRM/GR	19	.041	.052
BENIN			
ΔRM/GDP	36	.008	.018
BHUTAN			
ΔRM/GDP	15	.035	.053
ΔRM/GR	13	.184	.294
BOLIVIA			
ΔRM/GDP	39	.026	.031
ΔRM/GR	35	.481	1.076
BOTSWANA			
ΔRM/GDP	22	.005	.011
ΔRM/GR	20	.012	.030
BRAZIL			
ΔRM/GDP	39	.036	.027
ΔRM/GR	35	.247	.187
BULGARIA			
ΔRM/GDP	7	.068	.036
ΔRM/GR	7	.001	.0001
BURKINA FASO			
ΔRM/GDP	35	.010	.012
ΔRM/GR	26	.096	.109
BURUNDI			
ΔRM/GDP	34	.007	.010
CAMEROON			
ΔRM/GDP	35	.005	.008
ΔRM/GR	20	.021	.058
CANADA			
ΔRM/GDP	39	.003	.002
ΔRM/GR	35	.021	.013
CENTRAL AFRICAN REP.			
ΔRM/GDP	37	.011	.018
CHAD			
ΔRM/GDP	28	.010	.020
ΔRM/GR	17	.089	.232
CHILE			
ΔRM/GDP	39	.069	.077
ΔRM/GR	38	.283	.281

	Obs	Mean	StDev
CHINA,P.R.: MAINLAND			
ΔRM/GDP	13	.063	.026
ΔRM/GR	13	.474	.250
CHINA,P.R.:HONG KONG			
ΔRM/GDP	8	.007	.005
COLOMBIA			
ΔRM/GDP	37	.019	.009
ΔRM/GR	5	.059	.094
CONGO, DEM. REP. OF			
ΔRM/GDP	29	.056	.141
ΔRM/GR	30	.813	1.983
CONGO, REPUBLIC OF			
ΔRM/GDP	38	.006	.012
COSTA RICA			
ΔRM/GDP	39	.026	.024
ΔRM/GR	29	.230	.189
COTE D IVOIRE			
ΔRM/GDP	36	.010	.013
CROATIA			
ΔRM/GR	5	.057	.043
CYPRUS			
ΔRM/GDP	39	.023	.026
ΔRM/GR	33	.127	.138
CZECH REPUBLIC			
ΔRM/GDP	5	.035	.036
ΔRM/GR	5	.114	.114
DENMARK			
ΔRM/GDP	39	.00	.012
ΔRM/GR	36	.015	.029
DOMINICA			
ΔRM/GDP	22	.015	.053
DOMINICAN REPUBLIC			
ΔRM/GDP	39	.015	.016
ΔRM/GR	39	.111	.127
ECUADOR			
ΔRM/GDP	39	.018	.010
ΔRM/GR	39	.147	.084
EGYPT			
ΔRM/GDP	39	.039	.031
ΔRM/GR	20	.129	.062
EL SALVADOR			
ΔRM/GDP	39	.013	.018
EQUATORIAL GUINEA			
ΔRM/GDP	12	.001	.059
ESTONIA			
ΔRM/GDP	7	.039	.034
ΔRM/GR	6	.159	.147
ETHIOPIA			
ΔRM/GDP	38	.013	.017
ΔRM/GR	33	.112	.124
FIJI			
ΔRM/GDP	35	.008	.015
ΔRM/GR	29	.039	.070
FINLAND			
ΔRM/GDP	39	.002	.002
ΔRM/GR	37	.008	.011
FRANCE			
ΔRM/GDP	39	.004	.004
ΔRM/GR	38	.017	.021
GABON			
ΔRM/GDP	37	.005	.010
GAMBIA			
ΔRM/GDP	30	.016	.029
ΔRM/GR	26	.083	.176
GERMANY			
ΔRM/GDP	39	.004	.002
ΔRM/GR	38	.019	.011
GHANA			
ΔRM/GDP	38	.024	.020
ΔRM/GR	34	.245	.272

	Obs	Mean	StDev
GREECE			
ΔRM/GDP	39	.024	.013
ΔRM/GR	37	.120	.065
GRENADA			
ΔRM/GDP	26	.017	.027
ΔRM/GR	12	.087	.114
GUATEMALA			
ΔRM/GDP	39	.010	.011
ΔRM/GR	38	.117	.137
GUINEA-BISSAU			
ΔRM/GDP	10	.010	.007
ΔRM/GR	6	.436	.214
GUYANA			
ΔRM/GDP	38	.050	.095
ΔRM/GR	37	.139	.259
HAITI			
ΔRM/GDP	39	.015	.021
ΔRM/GR	32	.231	.359
HONDURAS			
ΔRM/GDP	39	.011	.012
ΔRM/GR	39	.074	.074
HUNGARY			
ΔRM/GDP	13	.025	.045
ΔRM/GR	13	.052	.088
ICELAND			
ΔRM/GDP	39	.019	.016
ΔRM/GR	31	.084	.073
INDIA			
ΔRM/GDP	38	.014	.006
ΔRM/GR	38	.132	.049
INDONESIA			
ΔRM/GDP	33	.016	.010
ΔRM/GR	29	.081	.056
IRAN			
ΔRM/GDP	34	.032	.026
ΔRM/GR	23	.199	.162
IRELAND			
ΔRM/GDP	39	.008	.014
ΔRM/GR	39	.028	.060
ISRAEL			
ΔRM/GDP	38	.086	.121
ΔRM/GR	38	.173	.208
ITALY			
ΔRM/GDP	36	.007	.003
ΔRM/GR	36	.040	.028
JAMAICA			
ΔRM/GDP	39	.021	.021
JAPAN			
ΔRM/GDP	39	.009	.006
ΔRM/GR	34	.084	.062
JORDAN			
ΔRM/GDP	39	.044	.043
ΔRM/GR	38	.225	.203
KAZAKHSTAN			
ΔRM/GR	5	.115	.161
KENYA			
ΔRM/GDP	32	.014	.014
ΔRM/GR	28	.061	.059
KOREA			
ΔRM/GDP	39	.014	.013
ΔRM/GR	39	.100	.099
KUWAIT			
ΔRM/GDP	35	.002	.019
ΔRM/GR	31	.005	.044
KYRGYZ REPUBLIC			
ΔRM/GDP	3	.015	.007
ΔRM/GR	3	.089	.045
LAO PEOPLE'S DEM.REP			
ΔRM/GDP	9	.014	.009
LATVIA			
ΔRM/GDP	5	.016	.012
ΔRM/GR	4	.048	.037

Table 1 (cont.): Seigniorage across countries

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

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 (%GDP)	4376	1.87	3.62	-29.40	65.53	IFS-IFM
Δ Reserve Money (% Government Revenues)	3189	122.22	3355.86	-380.78	151882.8	IFS-IFM
Explanatory:						
Agriculture (% GDP)	4255	22.52	16.45	0.13	78.01	WDI-WB
Cabinet Changes	5667	.44	.60	0	5	CNTS
Central Bank Independence	1942	.34	.12	0.09	0.69	CWN
Change in Terms of Trade	3978	220801	1.5e+7	-6.3e+7	9.8e+8	WDI-WB
Checks and Balances	3397	2.08	1.38	1	15	DPI
Civil Liberties	4356	3.94	1.92	1	7	Freedom H
Creditworthiness	1988	48.13	25.00	2.01	100	Euromoney
Currency Inside Banks	5088	-1.73	27.35	-1052.28	1.26	IFS-IFM
Current Account (%GDP)	3111	-4.11	10.67	-240.52	58.55	WDI-WB
Debt Service (%Exports)	2432	17.25	14.92	0	185.95	WDI-WB
Domestic Debt (%GDP)	1163	200.57	2588.54	0.12	52345.17	IFS-IMF
Exchange Rate Regime	3345	4.06	1.28	1	5	LYS
Executive Changes	5701	.19	.46	0	4	CNTS
Executive Constraints	5339	3.87	2.41	0	7	Polity IV
External Debt (%GDP)	2975	67.31	85.18	0	1205	GDN-WB
External Trade Shocks	3978	2.6e+7	1.7e+9	-3.4e+9	1.1e+11	WDI-WB
Gini Coefficient	693	37.49	10.64	16.63	74.33	DK
Govern. Revenues (%GDP)	2561	19.51	9.64	0	50.57	WDI-WB
Government Crises	5572	.17	.52	0	7	CNTS
Growth of Real GDPpc	4982	2.03	6.72	-41.91	77.69	PWT-6.1
Growth Trading Partners	5180	2.37	1.90	-14.61	9.35	GDN-WB
Ideological Orientation	3259	1.41	1.28	0	3	DPI
Ideological Polarization	3213	.30	.69	0	2	DPI
Index of Economic Freedom	2958	5.70	1.19	2.30	9.05	GL
Area I	3390	5.30	1.63	0.65	9.74	GL
Area II	2688	5.44	1.87	1.14	9.62	GL
Area III	3534	6.34	2.14	0	9.86	GL
Area IV	3063	5.83	1.74	0	9.97	GL
Area V	2913	5.43	1.11	2.47	8.85	GL
Index Political Cohesion	3438	.71	.79	0	3	DPI
Inflation (Annual Rate)	4820	40.90	455.16	-36.74	23773.1	IFS-IFM
Political Rights	4356	3.93	2.22	1	7	Freedom H
Polity Scale	5344	.08	7.62	-10	10	Polity IV
Real Effective Exch. Rate	1433	116.40	65.75	37.10	921.41	WDI-WB
Real GDP per capita	5075	5936.76	6111.80	281.25	44008.5	PWT-6.1
Trade (%GDP)	4815	70.06	46.37	0	439.59	WDI-WB
Turnover Rate Governors	1990	.24	.20	0	1.08	CWN
U.S. Treasury Bill Rate	7298	6.00	2.50	2.38	14.08	IFS-IFM
Urban Population (%Total)	6688	43.90	24.25	1.75	100	WDI-WB

Notes: IFS-IMF: International Financial Statistics - International Monetary Fund; WDI-WB: World Development Indicators – World Bank; GDN-WB: Global Development Network Growth Database – World Bank; CNTS: Cross-National Time Series Database; DPI: Database of Political Institutions; Freedom H: Freedom House Rankings; GL: Gwartney and Lawson (2002); PWT-6.1: Penn World Tables (Mark 6.1); CWN: based on Cukierman and Webb (1995); LYS: Levi-Yeyati and Sturzenegger (2003); DK: Dollar and Kraay (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 (% GDP)	.043 (1.29)	.031 (1.00)	-.028 (-.62)	.082 (3.95)***	.071 (3.79)***	.066 (3.73)***
Trade (% GDP)	.009 (1.08)			.018 (2.01)**		
% Change in Terms of Trade	-.25e-07 (-.88)	-.29e-07 (-1.07)	-.14e-07 (-.62)	-.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)***
# Observations	1558	1558	1244	2221	2223	2383
# Countries	86	86	78	97	97	98
Adjusted R^2	.30	.30	.31	.24	.23	.23

Notes:
- 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 parenthesis. Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.

Table 4: Robustness tests

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

Notes:
- Panel regressions with fixed effects. T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%;
- 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 3 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

Seigniorage	1	2	3	4	5	6
[Cabinet changes * (Inflation ≥ 50%)] (-1)	1.632 (2.49)**					
[Cabinet changes * (Inflation < 50%)] (-1)	.071 (.68)					
[Cabinet changes * (Dev. Countries)] (-1)		.366 (2.71)***				
[Cabinet changes * (Ind. Cuntries)] (-1)		-.013 (-.21)				
[Cabinet changes * (Gini > 40)] (-1)			.531 (2.67)***			
[Cabinet changes * (Gini ≤ 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 ≤ 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 (% 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)*
# Observations	2260	2383	2311	1779	2102	2383
# Countries	98	98	98	97	97	98
Adjusted R^2	.25	.23	.27	.22	.24	.23

Notes:
- 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 3 decade dummies (1970s, 1980s, and 1990s). Their estimated coefficients are not shown in order to economize space;
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.

Table 6: More Results for Interactions of Cabinet Changes

Seigniorage =	ΔRM/GDP 1	ΔRM/GDP 2	ΔRM/GDP 3	ΔRM/GDP 4	ΔRM/GR 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 (% 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)**
# Observations	1860	2361	2386	2383	1742
# Countries	97	98	98	98	85
Adjusted R^2	.21	.27	.23	.23	.25

Notes:
- Panel regressions controlling for fixed effects;
- In column 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 3 decade dummies (1970s, 1980s, and 1990s). Their estimated coefficients are not shown in order to economize space;
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.

Table 7: Results for Interactions of other proxies of political instability

	1	2	3
[Government crises * (Inflation ≥ 50%)] (-1)	3.908 (4.15)***		
[Government crises * (Inflation < 50%)] (-1)	-.088 (-.94)		
[Executive changes * (Inflation ≥ 50%)] (-1)		1.837 (2.76)***	
[Executive changes * (Inflation < 50%)] (-1)		.091 (.85)	
[Index of Political Cohesion * Inflation ≥ 50%)] (-1)			1.763 (3.73)***
[Index of Political Cohesion * Inflation < 50%)] (-1)			.115 (1.38)
Polity Scale	.019 (.81)	.019 (.79)	-.001 (-.03)
Agriculture (% 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)*
# Observations	2354	2356	1648
# Countries	98	98	98
Adjusted R^2	.26	.24	.24

Notes:
- 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 3 decade dummies (1970s, 1980s, and 1990s). Their estimated coefficients are not shown in order to economize space;
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.

Table 8: Sensitivity Analysis

	Complete Sample Δ Reserve Money / Government Revenues				Sample of Developing Countries Δ Reserve Money / GDP			3-Year Moving Averages of Cabinet Changes Δ Reserve Money / GDP			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Cabinet Changes (-1)	5.041	4.669			.334	.366		.474	.557		
	(2.16)**	(2.65)***			(2.26)**	(2.71)***		(1.97)**	(2.49)**		
[Cabinet changes * (Inflation ≥ 50%)] (-1)			30.365				1.619			2.686	
			(2.12)**				(2.48)**			(2.42)**	
[Cabinet changes * (Inflation < 50%)] (-1)			1.474				.093			.210	
			(1.32)				(.70)			(1.06)	
[Cabinet changes * (Devel. Countries)] (-1)				6.266							.758
				(2.69)***							(2.70)***
[Cabinet changes * (Ind. Countries)] (-1)				-.195							-.217
				(-.37)							(-2.02)**
Index of Economic Freedom	-5.713				-1.376			-1.171			
	(-2.78)***				(-6.07)***			(-5.96)***			
Polity Scale	.705	.324	.348	.308	.042	.026	.039	.035	.024	.029	.021
	(1.61)	(1.15)	(1.23)	(1.09)	(1.64)*	(1.05)	(1.62)	(1.38)	(1.00)	(1.20)	(.86)
Agriculture (% GDP)	1.965	1.699	1.544	1.696	.021	.067	.060	.026	.065	.054	.064
	(2.69)***	(3.64)***	(3.28)***	(3.64)***	(.69)	(3.64)***	(2.91)***	(.87)	(3.61)***	(2.44)**	(3.60)***
Real GDP per capita		-.001	-.001	-.001		-.0001	-.0001		-.0001	-.0001	-.0001
		(-4.61)***	(-3.75)***	(-4.73)***		(-2.94)***	(-2.61)***		(-4.33)***	(-3.74)***	(-4.49)***
Growth of Real GDP per capita	-.731	-.459	-.444	-.449	-.047	-.021	-.029	-.046	-.022	-.026	-.021
	(-2.32)**	(-2.11)**	(-1.95)*	(-2.06)**	(-2.70)***	(-1.78)*	(-2.09)**	(-2.79)***	(-1.84)*	(-1.96)**	(-1.79)*
# Observations	1297	1742	1694	1742	1298	1982	1859	1644	2343	2137	2343
# 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

Notes:
- Panel regressions with fixed effects. T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%;
- Models estimated with a constant and 3 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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