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How does political instability affect economic Growth?

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Abstract
The purpose of this paper is to empirically determine the effects of political instability on economic growth. Using the system-GMM estimator for linear dynamic panel data models on a sample covering up to 169 countries, and 5-year periods from 1960 to 2004, we find that higher degrees of political instability are associated with lower growth rates of GDP per capita. Regarding the channels of transmission, we find that political instability adversely affects growth by lowering the rates of productivity growth and, to a smaller degree, physical and human capital accumulation. Finally, economic freedom and ethnic homogeneity are beneficial to growth, while democracy may have a small negative effect.

Keywords: Economic growth, political instability, growth accounting, productivity

Introduction
Political instability is regarded by economists as a serious malaise harmful to economic performance. Political instability is likely to shorten policymakers' horizons leading to suboptimal short term macroeconomic policies. It may also lead to a more frequent switch of policies, creating volatility and thus, negatively affecting macroeconomic performance. Considering its damaging repercussions on economic performance the extent at which political instability is pervasive across countries and time is quite surprising. Political instability as measured by Cabinet Changes, that is, the number of times in a year in which a new premier is named and / or 50 percent or more of the cabinet posts are occupied by new ministers, is indeed globally widespread displaying remarkable regional differences (see Figure 1).

The widespread phenomenon of political (and policy) instability in several countries across time and its negative effects on their economic performance has arisen the interest of several economists. As such, the profession produced an ample literature documenting the negative effects of political instability on a wide range of macroeconomic variables including, among others, GDP growth, private investment, and inflation. Alesina *et al*. (1996) [6] use data on 113 countries from 1950 to 1982 to show that GDP growth is significantly lower in countries and time periods with a high propensity of government collapse. In a more recent paper, Jong-a- Pin (2009) [27] also finds that higher degrees of political instability lead to lower economic growth.1 As regards to private investment, Alesina and Perotti (1996) [6] show that socio-political instability generates an uncertain politico-economic environment, raising risks and reducing investment.2 Political instability also leads to higher inflation as shown in Aisen and Veiga (2006) [4]. Quite interestingly, the mechanisms at work to explain inflation in their paper resemble those affecting economic growth; namely that political instability shortens the horizons of governments, disrupting long term economic policies conducive to a better economic performance.

This paper revisits the relationship between political instability and GDP growth. This is because we believe that, so far, the profession was unable to tackle some fundamental questions behind the negative relationship between political instability and GDP growth. What are the main transmission channels from political instability to economic growth? How quantitatively important are the effects of political instability on the main drivers of growth, namely, total factor productivity and physical and human capital accumulation? This paper addresses these important questions providing estimates from panel data regressions using system-GMM3 on a dataset of up to 169 countries for the period 1960 to 2004. Our results are strikingly conclusive: in line with results previously documented, political instability reduces GDP growth rates significantly.

An additional cabinet change (a new premier is named and / or 50 percent of cabinet posts are occupied by new ministers) reduces the annual real GDP per capita growth rate by 2.39 percentage points. This reduction is mainly due to the negative effects of political instability on total factor productivity growth, which account for more than half of the effects on GDP growth. Political instability also affects growth through physical and human capital accumulation, with the former having a slightly larger effect than the latter. These results go a long way to clearly understand why political instability is harmful to economic growth. It suggests that countries need to address political instability, dealing with its root causes and attempting to mitigate its effects on the quality and sustainability of economic policies engendering economic growth.

The paper continues as follows: section II describes the dataset and presents the empirical methodology, section III discusses the empirical results, and section IV concludes the paper.

Data and the empirical model

Annual data on economic, political and institutional variables, from 1960 to 2004 were gathered for 209 countries, but missing values for several variables reduce the number of countries in the estimations to at most 169. The sources of economic data were the Penn World Table Version 6.2 – PWT (Heston *et al*., 2006) [9], the World Bank's World Development Indicators (WDI) and Global Development Network Growth Database (GDN), and the International Monetary Fund's International Financial Statistics (IFS). Political and institutional data were obtained from the Cross National Time Series Data Archive – CNTS (Databanks International, 2007), the Polity IV Database (Marshall and Jaggers, 2005) [14], the State Failure Task Force database (SFTF), and Gwartney and Lawson (2007).

The hypothesis that political instability and other political and institutional variables affect economic growth is tested by estimating dynamic panel data models for GDP per capita growth (taken from the PWT) for consecutive, no overlapping, five-year periods, from 1960 to 2004.4 Our baseline model includes the following explanatory variables (all except Initial GDP per capita are averaged over each five-year period):

- Initial GDP per capita (log) (PWT): log of real GDP per capita lagged by one five-year period. A negative coefficient is expected, indicating the existence of conditional convergence among countries.
- Investment (percent of GDP) (PWT). A positive coefficient is expected, as greater investment shares have been shown to be positively related with economic growth (Mankiw *et al*., 1992) [15].
- Primary school enrollment (WDI). Greater enrollment ratios lead to greater human capital, which should be positively related to economic growth. A positive coefficient is expected.
- Population growth (PWT). All else remaining the same, greater population growth leads to lower GDP per capita growth. Thus, a negative coefficient is expected.
- Trade openness (PWT). Assuming that openness to international trade is beneficial to economic growth, a positive coefficient is expected.
- Cabinet changes (CNTS). 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. This variable is our main proxy of political instability. It is essentially an indicator of regime instability, which has been found to be associated with lower economic growth (Jong-a-Pin, 2009) [27]. A negative coefficient is expected, as greater political (regime) instability leads to greater uncertainty concerning future economic policies and, consequently, to lower economic growth.
- In order to account for the effects of macroeconomic stability on economic growth, two additional variables will be added to the model:
- Inflation rate (IFS). 6 A negative coefficient is expected, as high inflation has been found to negatively affect growth. See, among others, Edison *et al*. (2002) [10] and Elder (2004) [11].
- Government (percent of GDP) (PWT). An excessively large government is expected to crowd out resources from the private sector and be harmful to economic growth. Thus, a negative coefficient is expected.
- The extended model will also include the following institutional variables: 7
- Index of Economic Freedom (Gwartney and Lawson, 2007). Higher indexes are associated with smaller governments (Area 1), stronger legal structure and security of property rights (Area 2), access to sound money (Area 3), greater freedom to exchange with foreigners (Area 4), and more flexible regulations of credit, labor, and business (Area 5). Since all of these are favorable to economic growth, a positive coefficient is expected.
- Ethnic Homogeneity Index (SFTF): ranges from 0 to 1, with higher values indicating ethnic homogeneity, and equals the sum of the squared population fractions of the seven largest ethnic groups in a country. For each period, it takes the value of the index in the beginning of the respective decade. According to Easterly, *et al*. (2006), "social cohesion" determines the quality of institutions, which has important impacts on whether pro-growth policies are implemented or not. Since higher ethnic homogeneity implies greater social cohesion, which should result in good institutions and pro-growth policies, a positive coefficient is expected.8
- Polity Scale (Polity IV): from strongly autocratic (-10) to strongly democratic (10). This variable is our proxy for democracy. According to Barro (1996) [12] and Tavares and Wacziarg (2001) [13], a negative coefficient is expected.
- Descriptive statistics of the variables included in the tables of results are shown in Table 1.

Table 1: Descriptive Statistics

Variable	Obs.	Mean	St. Dec.	Min.	Max.	Source
Growth of GDP per capita	1098	0.016	0.037	-0.344	0.347	PWT
GDP per capita (log)	1197	8.315	1.158	5.144	11.346	PWT
Growth of Physical Capital	1082	0.028	0.042	-0.122	0.463	PWT
Physical Capital per capita (log)	1174	8.563	1.627	4.244	11.718	PWT

Growth of 7FP	703	0.000	0.048	-0.509	0.292	PINT, BL
7FP (log)	808	8.632	0.763	5.010	12.074	PWT, BL
Growth of Human Capital	707	0.012	0.012	-0.027	0.080	BL
Human Capital per capita (log)	812	-0.308	0.393	-1.253	0.597	BL
Investment (pnto?: of GDP)	1287	14.474	8.948	1.024	91.964	PWT
Primary School Enrollment	1286	88.509	27.794	3.000	149.240	WDI-WB
Population Growth	1521	0.097	0.071	-0.281	0.732	PWT
Trade (percent of GDP)	1287	72.527	45.269	2.015	387.423	PINT
Government (percent of GDP)	1287	2x.164	10.522	2.552	79.566	PWT
Inflation f=b;(1+Im7100)7	1080	0.156	0.363	-0.056	4.178	IFS-IMF
Cabinet Changes	1322	0.044	0.358	0.000	2.750	CNTS
Regime Instability Index I	1302	-0.033	0.879	-0.894	8.018	CNTS-PCA
Regime Instability Index 2	1287	-0.014	0.892	-1.058	7.806	CNTS-PCA
Regime instability Index 3	1322	-0.038	0.684	-0.813	6.040	CN. IS-PCA
Violence Index	1306	-0.004	0.786	-0.435	4.712	CNTS-PCA
Political Instability Index	1302	-0.004	0.887	-0.777	6.557	CNTS-PCA
Index of Economic Freedom	679	5.682	1.208	2.004	8.714	EFW
Area 2:Legal Structure and Security of Property Rights	646	5.424	1.846	1.271	9.363	EFW
Polity Scale	1194	0.239	7.391	-10.000	10.000	Polity IV
Ethnic Homogeneity Index	1129	0.583	0.277	0.150	1.000	SFTF

Sources:
BL: Updated version of Barro and Lee (2001) [16].
CNTS: Cross-National Time Series database (Databanks International, 2007).
CNTS-PCA: Data generated by Principal Components Analysis using variables from CNTS.
EFW: Economic Freedom of the World (Gwartney and Lawson, 2007).
IFS-IMF: International Financial Statistics - International Monetary Fund.
Polity IV: Polity IV database (Marshall and Jaggers, 2005) [14].
PWT: Penn World Table Version 6.2 (Heston *et al*., 2006) [9].
SFTF: State Failure Task Force database.
WDI-WB: World Development Indicators–World Bank.
Notes: Sample of consecutive, non-overlapping, five-year periods from 1960 to 2004, comprising the 169 countries considered in the baseline regression, whose results are shown in column 1 of Table 2.

The empirical model for economic growth can be summarized as follows:

$$\ln Y_{it} - \ln Y_{i,t-1} = \gamma \ln Y_{i,t-1} + \boldsymbol{\beta}' \mathbf{X}_{it} + \delta PI_{i,t} + \boldsymbol{\lambda}' \mathbf{W}_{it} + \nu_i + \mu_t + \varepsilon_{it}$$

$$i = 1,\ldots,N \qquad t = 1,\ldots,T_i \qquad (1)$$

One problem of estimating this dynamic model where Ye_t stands for the GDP per capita of country i at the end of period *t*, Xit for a vector of economic determinants of economic growth, *Pia* for a proxy of political instability, and Wi_t for a vector of political and institutional determinants of economic growth; a, P, 4 and are the Parameters and vectors of parameters to be estimated, si are country-specific effects, p_t are period specific effects, and, $\%_t$ is the error term. With a =1 + equation (1) becomes:

$$\ln Y_{it} = \alpha \ln Y_{i,t-1} + \boldsymbol{\beta}' \mathbf{X}_{it} + \delta PI_{i,t} + \boldsymbol{\lambda}' \mathbf{W}_{it} + \nu_i + \mu_t + \varepsilon_{it}$$

$$i = 1,\ldots,N \qquad t = 1,\ldots,T_i \qquad (2)$$

using OLS is that *Yi,t-1* (the lagged dependent variable) is endogenous to the fixed effects (*vi*), which gives rise to "dynamic panel bias". Thus, OLS estimates of this baseline model will be inconsistent, even in the fixed or random effects settings, because *Yi,t-1* would be correlated with the error term, *εit*, even if the latter is not serially correlated. If the number of time periods available (T) were large, the bias would become very small and the problem would disappear. But, since our sample has only nine non-overlapping five-year periods, the bias may still be important. First-differencing Equation (2) removes the individual effects (*vi*) and thus eliminates a potential source of bias:

$$\Delta Y_{it} = \alpha \Delta Y_{i,t-1} + \boldsymbol{\beta}' \Delta \mathbf{X}_{it} + \delta \Delta PI_{i,t} + \boldsymbol{\lambda}' \Delta \mathbf{W}_{it} + \Delta \mu_t + \Delta \varepsilon_{it}$$

$$i = 1,\ldots,N \qquad t = 1,\ldots,T_i \qquad (3)$$

But, when variables that are not strictly exogenous are first-differenced, they become endogenous, since the first difference will be correlated with the error term. Following Holtz-Eakin, Newey and Rosen (1988) [17], Arellano and

Bond (1991) [7] developed a Generalized Method of Moments (GMM) estimator for linear dynamic panel data models that solves this problem by instrumenting the differenced predetermined and endogenous variables with their available lags in levels: levels of the dependent and endogenous variables, lagged two or more periods; levels of the predetermined variables, lagged one or more periods. The exogenous variables can be used as their own instruments.

A problem of this difference-GMM estimator is that lagged levels are weak instruments for first-differences if the series are very persistent (see Blundell and Bond, 1998) [18]. According to Arellano and Bover (1995) [8], efficiency can be increased by adding the original equation in levels to the system, that is, by using the system-GMM estimator. If the first-differences of an explanatory variable are not correlated with the individual effects, lagged values of the first-differences can be used as instruments in the equation in levels. Lagged differences of the dependent variable may also be valid instruments for the levels equations.

The estimation of growth models using the difference-GMM estimator for linear panel data was introduced by Caselli *et al*. (1996) [19]. Then, Levine *et al*. (2000) [20] used the system-GMM estimator12, which is now common practice in the literature (see Durlauf, *et al*., 2005, and Beck, 2008) [21-22]. Although several period lengths have been used, most studies work with non-overlapping five-year periods.

Empirical results

The empirical analysis is divided into two parts. First, we test the hypothesis that political instability has negative effects on economic growth, by estimating regressions for GDP per capita growth. As described above, the effects of institutional variables will also be analyzed. Then, the second part of the empirical analysis studies the channels of transmission. Concretely, we test the hypothesis that political instability adversely affects output growth by reducing the rates of productivity growth and of physical and human capital accumulation.

Political instability and economic growth

The results of system-GMM estimations on real GDP per capita growth using a sample comprising 169 countries, and nine consecutive and non-overlapping five-year periods from 1960 to 2004 are shown in Table 2. Since low economic growth may increase government instability (Alesina *et al*., 1996) [6], our proxy for political instability, Cabinet changes, will be treated as endogenous. In fact, most of the other explanatory variables can also be affected by economic growth. Thus, it is more appropriate to treat all right-hand side variables as endogenous.

The results of the estimation of the baseline model are presented in column 1. The hypothesis that political instability negatively affects economic growth receives clear empirical support. Cabinet Changes is highly statistically significant and has the expected negative sign. The estimated coefficient implies that when there is an additional cabinet change per year, the annual growth rate decreases by 2.39 percentage points. Most of the results regarding the other explanatory variables also conform to our expectations. Initial GDP per capita has a negative coefficient, which is consistent with conditional income convergence across countries. Investment and enrollment ratios14 have positive and statistically significant coefficients, indicating that greater investment and education promote growth. Finally, population growth has the expected negative coefficient, and Trade (percent of GDP) has the expected sign, but is not statistically significant.

Table 2: Political Instability and Economic Growth

	(1)	(2)	(3)	(4)	(5)
Initial GDP per capita (log)	-0.0087** (-2.513)	-0.0125*** (-3.738)	-0.0177**• (-4.043)	-0.0181*** (-4.110)	-0.0157*** (-4.307)
Investment (percent of GDP)	0.0009** (2.185)	0.0008*** (2.649)	0.0007** (2.141)	0.0012*** (2.908)	0.0014*** (3.898)
Primary School Enrollment	0.0003*** (3.097)	0.0002* (1.743)	0.0003 (1.616)	0.0001 (1.134)	0.0001 (0.756)
Population Growth	-0.184*** (-3.412)	-0.273*** (-5.048)	-0.232*** (-4.123)	-0.271*** (-5.266)	-0.245*** (-5.056)
Trade (percent of GDP)	6.70e-05	0.0001**	2.63e-05		-0.00003
	(0.9571	(2.344)	(0.414)		(-0.683)
Inflation		-0.0091*** (-2.837)	-0.0027 (-0.620)		-0.0081** (-2.282)
Government (percent of GDP)		-8.22e-05 (-0.229)	9.72e-06 (0.0302)		-0.0004 (-1.366)
Cabinet Changes	-0.0239*** (-3.698)	-0.0164** (-2.338)	-0.0200** (-2.523)	-0.0244*** (-2.645)	-0.0158** (-2.185)
Index of Economic Freedom			0.0109*** (2.824)	0.0083** (2.313)	
Areal: Legal structure and security of property rights					0.0030U* (1.681)
Number of Observations	990	851	560	588	527
Number of Countries	169	152	116	120	117
Hansen test (p-value)	0.229	0.396	0.366	0.128	0.629
ARI test (p-value)	1.15e-00	9.73e-05	1.04e-05	2.71e-00	0.00002
AR2 test (p-value)	0.500	0.365	0.665	0.745	0.491

Sources: See Table 1.

Notes: System-GMM estimations for dynamic panel-data models. Sample period: 1960–2004.

- All explanatory variables were treated as endogenous. Their lagged values two periods were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation.
- Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction).
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1 percent; **, 5 percent, and *, 10 percent.

The results of an extended model which includes proxies for macroeconomic stability are reported in column 2 of Table 2. Most of the results are similar to those of column 1. The main difference is that Trade (percent of GDP) is now statistically significant, which is consistent with a positive effect of trade openness on growth. Regarding macroeconomic stability, inflation and government size have the expected signs, but only the first is statistically significant.

The Index of Economic Freedom15 is included in the model of column 3 in order to account for favorable economic institutions. It is statistically significant and has a positive sign, as expected. A one-point increase in that index increases annual economic growth by one percentage point. Trade (percent of GDP) and Inflation are no longer statistically significant. This is not surprising because the Index of Economic Freedom is composed of five areas, some of which are related to explanatory variables included in the model: size of government (Area 1), access to sound money (Area 3), and greater freedom to exchange with foreigners (Area 4). In order to avoid potential collinearity problems, the variables Trade (percent of GDP), Inflation, and Government (percent of GDP) are not included in the estimation of column 4. The results regarding the Index of Economic Freedom and Cabinet Changes remain essentially the same.

An efficient legal structure and secure property rights have been emphasized in the literature as crucial factors for encouraging investment and growth (Glaeser, *et al*., 2004; Hall and Jones, 1999; La-Porta, *et al*., 1997) [23, 24, 25]. The results shown in column 5, where the Index of Economic Freedom is replaced by its Area 2, Legal structure and security of property rights, are consistent with the findings of previous studies.

In the estimations whose results are reported in Table 3, we also account for the effects of democracy and social cohesion, by including the Polity Scale and the Ethnic Homogeneity Index in the model. There is weak evidence that democracy has small adverse effects on growth, as the Polity Scale has a negative coefficient, small in absolute value, which is statistically significant only in the estimations of columns 1 and 3. These results are consistent with those of Barro (1996) [12] and Tavares and Wacziarg (2001) [13] 17. As expected, higher ethnic homogeneity (social cohesion) is favorable to economic growth, although the index is not statistically significant in column 4. The results regarding the effects of political instability, economic freedom, and security of property rights are similar to those found in the estimations of Table 2. The most important conclusion that we can withdraw from these results is that the evidence regarding the negative effects of political instability on growth are robust to the inclusion of institutional variables.

Considering that political instability is a multi-dimensional phenomenon, eventually not well captured by just one variable (Cabinet Changes), we constructed five alternative indexes of political instability by applying principal components analysis.

Table 3: Political Instability. Institutions, anti-Economic Growth

	(1)	(2)	(3)	(4)
Initial GDP per capita (log)	-0.0216*** (-4.984)	-0.0237*** (-5.408)	-0.0188*** (-4.820)	-0.0182*** (-3.937)
Investment (Percent of GDP)	0.0011*** (3.082)	0.0006* (1.773)	0.0018*** (5.092)	0.0014*** (5.369)
Primary school enrollment	0.0003** (2.106)	0.000.3** (2.361)	0.0002 + 1.784	0.0001 (0.853)
Population growth	-0.255*** (-5. 046)	-0.195*** (-3.527)	-0.228*** (-4.286)	-0.215*** (-3.494)
Trade (percent of GDP)	-5.94e-05 (-1.020)	1.63e-05 (0.241)	-8.00e.-05 (-1.219)	-4.16e-05 (-0.771)
Inflation		-0.0018 (-0.373)		-0.0087*** (-2.653)
Government (percent of GDP)		-0.0002 (-0.984)		-0.0004* (-1.655)
Cabinet Changes	-0.0321*** (-3.942)	-0.0279*** (-3.457)	-0.0302*** (-4.148)	-0.0217*** (-3.428)
Index of Economic Freedom	0.0085** (2. 490)	0.0080** (2.255)		
Area2: Legal structure and security of property rights			0.0040** (-2.297)	0.0033* (1.895)
Polity Scale	-0.0006* (-1.906)	-4.22e-05 (-0.105)	-0.0009* (-1.864)	7.60e-06 (0.0202)
Ethnic Homogeneity Index	0.0449** (2.316)	0.0560*** (3.728)	0.0301* (1.671)	0.0201 (1.323)
Number of Observations	547	520	517	494
Number of Countries	112	108	113	109
Hansen test (p-value)	0.684	0.998	0.651	0.992
AR.1 test (p-value)	3.81e-06	2.56e-05	1.10c-05	4.38e-05
AR.2 test (p-value)	0.746	0.618	0.492	0.456

Sources: See Table 1.

Notes: System-GMM estimations for dynamic panel-data models. Sample period: 1960–2004.

- All explanatory variables were treated as endogenous. Their lagged values two periods were used as instruments in the first difference equations and their once lagged first-differences were used in the levels equation.
- Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction).
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1 percent; **, 5 percent, and *, 10 percent.

The first three indexes include variables that are associated with regime instability, the fourth has violence indicators, and the fifth combines regime instability and violence indicators. The variables (all from the CNTS) used to define each index were:

O Regime Instability Index 1: Cabinet Changes and Executive Changes.

O Regime Instability Index 2: Cabinet Changes, Constitutional Changes, Coups, Executive Changes, and Government Crises.
O Regime Instability Index 3: Cabinet Changes, Constitutional Changes, Coups, Executive Changes, Government Crises, Number of Legislative Elections, and Fragmentation Index.
O Violence Index: Assassinations, Coups, and Revolutions.
O *Political Instability Index*: Assassinations, Cabinet Changes, Constitutional Changes, Coups, and Revolutions.

The results of the estimation of the model of column 1 of Table 3 using the above-described indexes are reported in Table 4. While all indexes have the expected negative signs, the Violence Index is not statistically significant.19 Thus, we conclude that it is regime instability that more adversely affects economic growth. Jong-a-Pin (2009) [27] and Klomp and de Haan (2009) [26] reach a similar conclusion.

Table 4: Indexes of political instability and economic growth

	(1)	(2)	(3)	(4)	(5)
Initial GDP per capita (log)	-0.0211*** (-4.685)	-0.0216*** (-4.832)	-0.0221*** (-4.789)	-0.0216*** (-4.085)	-0.0216*** (-5.370)
Investment (percent of CDP)	0.0012*** (3.006)	0.0011*** (3.091)	0.0011*** (2.778)	0.0010*** (3.190)	0.0011*** (3.126)
Primary School Enrollment	0.0003** (2.156)	0.0002** (1.964)	0.0002** (1.972)	0.0004*** (2.597)	0.0003** (2.496)
Population growth	-0.245*** (-4.567)	-0.214** (-4.002)	0.221*** (-4.500)	0.226*** (-3.869)	0.220*** (-4.197)
Trade (percent of GDP)	-7.06e-05 (-1.058)	-8.92e-05 (-1.391)	-8.19e-05 (-1.268)	-9.30e-05 (-1.109)	-8.95e-05 (-1.392)
Regime Instability Index I	-0.0198*** (-4.851)				
Regime Instability Index 2		-0.0133*** (-3.381)			
Regime Instability Index 3			-0.0142*** (-4.246)		
Violence Index				-0.0046 (-1 1071	
Political Instability Index					-0.0087** (-2.255)
Index of Economic Freedom	0.0084**	0.0090**	0.0087**	0.0120***	0.0112***
Polity Scale	(2.251) -0.0005	(2.429) -0.0005	(2.251) -0.0003	(2.935) -0.0010**	(3.324) -0.0008**
Ethnic Homogeneity Index	(-1.356) 0.0497*** (3.150)	(-1.311) 0.0497*** (3.094)	(-0.833) 0.0530*** (3.177)	(-2.296) 0.0429* (1.832)	(-2.060) 0.0376+• (2.349)
Number of Observations	547	547	545	547	547
Numbar of Countries	112	112	111	112	112
Hansen test (p- value)	0.560	0.432	0.484	0.576	0.516
AR1 test (p-value)	3 82e- 06	3.22e-06	3.60e-06	6.63e-06	3.80e-00
AR2 test (o- value	0.667	0.291	0.437	0.280	0.233

Sources: See Table 1.
Notes: System-GMM estimations for dynamic panel-data models. Sample period: 1960–2004;
- All explanatory variables were treated as endogenous. Their lagged values two periods were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation;
- Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction).
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1 percent; **, 5 percent, and *, 10 percent.

Several robustness tests were performed in order to check if the empirical support found for the adverse effects of political instability on economic growth remains when using restricted samples or alternative period lengths. Table 5 reports the estimated coefficients and t-statistics obtained for the proxies of political instability when the models of column 1 of Table 3 (for cabinet changes) and of columns 1 to 3 of Table 4 (for the three regime instability indexes) are estimated using seven alternative restricted samples.20 The first restricted sample (column 1 of Table 5) includes only developing countries, and the next four (columns 2 to 5) exclude one continent at a time.21 Finally, in the estimation of column 6, data for the 1960s and the 1970s is excluded from the sample, while in column 7 the last five-year period (2000–04) is excluded. Since cabinet changes and the three regime instability indexes are always statistically significant, we conclude that the negative effects of political instability on real GDP per capita growth are robust to sample restrictions.

Table 5: Robustness Tests for Restricted Samples

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Proxy of political instability	**Excluding industrial countries**	**Excluding Africa**	**Excluding developing Asia**	**Excluding developing Europe**	**Excluding developing Latin America**	**Excluding the 1960s and 1970s**	**Excluding the 2000s**
Cabinet Changes	-0.0282*** (-3.814)	-0.0285*** (-4.588)	-0.0342*** (-3.583)	-0.0280*** (-3.315)	-0.0282*** (-3.563)	-.0309*** (-3.108)	-.0326*** (-3.693)
Regime Instability Index I	-0.0191*** (-3.795)	-0.0154*** (-4.157)	-0.0198*** (-3.128)	-0.0185*** (-3.686)	-0.0167*** (-3.534)	-.0159*** (-3.326)	-.0136*** (-3.325)
Regime Instability Index 2	-0.0161*** (-3.299)	-0.0107*** (-3.905)	-0.0141*** (-3.717)	-0.0131*** (-3.112)	-0.0117** (-2.553)	-.0160*** (-3.292)	-.0141*** (-3.540)
Regime Instability Index 3	-0.0161*** (-3.686)	-0.0118*** (-3.459)	-0.0148*** (-3.563)	-0.0145*** (-3.369)	-0.0096*** (-2.760)	-0.0165*** (-3.633)	-.0146*** (-3.587)
Number of Observations	415	401	471	506	436	441	488
Number of Countries	92	80	97	97	91	111	112

Sources: See Table 1.

Notes: System-GMM estimations for dynamic panel-data models. Sample period: 1960–2004.
- The dependent variable is the growth rate of real GDP per capita.
- Each coefficient shown comes from a separate regression. That is, this table summarizes the results of 28 estimations. The complete results are available from the authors upon request.
- The explanatory variables used, besides the proxy for political instability indicated in each row, are those of the model of column 1 of Table 3 (for Cabinet Changes) and columns 1 to 3 of Table 4 (for the regime instability indexes).
- All explanatory variables were treated as endogenous. Their lagged values two periods were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation.
- Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction).
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1 percent; **, 5 percent, and *, 10 percent.

The results of robustness tests for alternative period lengths are reported in Table 6. The models of column 1 of Table 3 (for *Cabinet Changes*) and of columns 1 to 3 of Table 4 (for the three regime instability indexes) were estimated using consecutive, non-overlapping periods of 4, 6, 8 and 10 years. Again, all estimated coefficients are statistically significant, with a negative sign, providing further empirical support for the hypothesis that political instability adversely affects economic growth.

Table 6: Robustness Tests for Alternative Period Lengths

	(1)	(2)	(3)	(4)
Proxy of political instability	4-Year Periods	6-Year Periods	8-Year Periods	10-Year Periods
Cabinet Changes	-0.0298* (-1.683)	-0.0229** (-2.470)	-0.0121* (-1.752)	-0.0231** (-2.004)
Regime Instability Index I	-0.0081* (-1.744)	-0.0121*** (-2.842)	-0.0065* (-1.840)	-0.0213** (-2.553)
Regime Instability Index 2	-0.0077** (-2.451)	-0.0081** (-2.291)	-0.0092** (-2.170)	-0.0078*** (-2.590)
Regime Instability Index 3	-0.0065** (-2.150)	-0.0076** (-2.217)	-0.0101** (-2.462)	-0.0069** (-2.133)
Number of Observations	737	488	390	506
Number of Countries	112	110	109	97

Sources: See Table 1.
Notes: - System-GMM estimations for dynamic panel-data models. Sample period: 1960–2004.
- The dependent variable is the growth rate of real GDP per capita.
- Each coefficient shown comes from a separate regression. That is, this table summarizes the results of 16 estimations. The complete results are available from the authors upon quest.
- The explanatory variables used, besides the proxy for political instability indicated in each row, are those of the model of column 1 of Table 3 (for Cabinet Changes) and columns 1 to 3 of Table 4 (for the regime instability indexes).
- All explanatory variables were treated as endogenous. Their lagged values two periods were used as instruments in the first-difference equations and their once lagged first differences were used in the levels equation.
- Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction).
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1 percent; **, 5 percent, and *, 10 percent.

Channels of transmission

In this section, we study the channels through which political instability affects economic growth. Since political instability is associated with greater uncertainty regarding future economic policy, it is likely to adversely affect investment and, consequently, physical capital accumulation. In fact, several studies have identified a negative relation between political instability and investment (Alesina and Perotti, 1996; Mauro, 1985; Özler and Rodrik, 1992; Perotti, 1996) [6, 28, 29, 5]. Instead of estimating an investment equation, we will construct the series on the stock of physical capital, using the perpetual inventory method, and estimate equations for the growth of the capital stock. That is, we will analyze the effects of political instability and institutions on physical capital accumulation.

It is also possible that political instability adversely affects productivity. By increasing uncertainty about the future, it may lead to less efficient resource allocation. Additionally, it may reduce research and development efforts by firms and governments, leading to slower technological progress. Violence, civil unrest, and strikes, can also interfere with the normal operation of firms and markets, reduce hours worked, and even lead to the destruction of some installed productive capacity. Thus, we hypothesize that higher political instability is associated with lower productivity growth. Finally, human capital accumulation may also be adversely affected by political instability because uncertainty about the future may induce people to invest less in education.

Construction of the series

The series were constructed following the Hall and Jones (1999) [24] approach to the decomposition of output. They assume that output, *Y*, is produced according to the following production function:

$$Y = K^{\alpha}(AH)^{1-\alpha}$$

Where,
K denotes the stock of physical capital, A is a labor-augmenting measure of productivity, and H is the amount of human capital-augmented labor used in production. Finally, the factor share α is assumed to be constant across countries and equal to 1/3.

The series on the stock of physical capital, *K*, were constructed using the perpetual inventory equation:

$$K_t = I_t + (1-\delta)K_{t-1}$$

Where,
It is real aggregate investment in PPP at time t, and □ is the depreciation rate (assumed to be 6%). Following standard practice, the initial capital stock, *K0*, is given by:

$$K_0 = \frac{I_0}{g+\delta}$$

Where,
I0 is the value of investment in 1950 (or in the first year available, if after 1950), and *g* is the average geometric growth rate for the investment series between 1950 and 1960 (or during the first 10 years of available data).
The amount of human capital-augmented labor used in production, *Hi*, is given by:

$$H_i = e^{\varphi(s_i)} L_i$$

Where,
si is average years of schooling in the population over 25 years old (taken from the most recent update of Barro and Lee, 2001), and the function φ*(si)* is piecewise linear with slope 0.134 for *si*≤4, 0.101 for 4<*si*≤8, and 0.068 for *si*>8. *Li* is the number of workers (labor force in use).

With data on output, the physical capital stock, human capital-augmented labor used, and the factor share, the series of total factor productivity (TFP), *Ai*, can be easily constructed using the production function (4).22 As in Hsieh and Klenow (2010), after dividing equation (4) by population *N*, and rearranging, we get a conventional expression for growth accounting.

$$\frac{Y}{N} = \left(\frac{K}{N}\right)^{\alpha}\left(A\frac{H}{N}\right)^{1-\alpha}$$

This can also be expressed as:

$$y = k^{\alpha}(Ah)^{1-\alpha}$$

Where,
y is real GDP per capita, k denotes the stock of physical capital per capita, A is TFP, and h is the amount of human capital per capita.

The individual contributions to GDP per capita growth from physical and human capital accumulation and TFP growth can be computed by expressing equation (9) in rates of growth:

$$\boxed{\Delta y = \alpha\Delta k + (1-\alpha)\Delta A + (1-\alpha)\Delta h} \quad \textbf{(10)}$$

Empirical results
Table 7 reports the results of estimations in which the growth rate of physical capital per capita is the dependent variable,23 using a similar set of explanatory variables as for GDP per capita growth.24 Again, *Cabinet Changes* and the three regime instability indexes are always statistically significant, with a negative sign. Thus, we find strong support for the hypothesis that political instability adversely affects physical capital accumulation. Since the accumulation of capital is done through investment, our results are consistent with those of previous studies which find that political instability adversely affects investment (Alesina and Perotti, 1996; Özler and Rodrik, 1992) [6, 28]. There is some evidence that economic freedom is favorable to capital accumulation (column 2), but democracy and ethnic homogeneity do not seem to significantly affect it.

Table 7: Political Instability and Physical Capital Growth

	(1)	(2)	(3)	(4)	(5)
Log Physical Capital Par capital per capita (-1)	0.1000*** (8.963)	0.0716** (6.065)	0.105*** (6-316)	0.105*** (7.139)	0.102*** (7.833)
Log Physical Capital per capita (-2)	-0.109*** (-9.438)	-0.0846*** (-7.860)	-0.106*** (-6.159)	-0.106*** (-6.973)	-0.1034*** (-7.642)
Primary school enrollment	0.0001 (0.764)	0.000.3 (0.292)	0.0001 (0.855)	-0.000 I (0.997)	0.0001 (1.189)
Population Growth	0.299*** (-5.591)	0.272*** (-5.730)	0-.212** (-2.442)	-0.212** (-2.700)	-0.192** (-2.474)
Trade (percent of GDP)	0.0001** (2.427)	0.00005 (1.169)	0.00001 (0.234)	0.00001 (0.230)	0.00002 (0.386)
Cabinets, Changes	-0.0235*** (-2.968)	0.0195*** (-2.969)			
Regime Instability Index l			0.0108** (-2.180)		
Regime instability Index 2				-0.00932** (-2.487)	
Regime instability Index 3					0.00906 (-2.325)
Index of Economic Freedom		0.0070** (2.473)	0.0015 (0.395)	0.0010 (0.282)	0.0004 (0.130)
Polity Scale		-0.0001 (-0.414)	-0.0005 (-1.117)	-0.0005 (-1.151)	-0.0004 (-0.940)
Ethnic Homogeneity Index		0.0343* (1.825)	0.0010 (0.0558)	0.0009 (0.0414)	0.0019 (0.0917)
Number of Observations	899	591	531	531	529
Number of countries	155	108	108	108	107
Hansen east (p-Value)	0.0535	0.553	0.195	0.426	0.213
AR 1 test (p Value)	0.0000009	0.00002	0.0001	0.0002	0.00006
AR 2 test 4 Value)	0.182	0.905	0.987	0.987	0.928

Sources: See Table 1.

Notes: System-GMM estimations for dynamic panel-data models. Sample period: 1960–2004.

- All explanatory variables were treated as endogenous. Their lagged values two periods were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation.
- Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction).
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1 percent; **, 5 percent, and *, 10 percent.

The next step of the empirical analysis was to analyze another possible channel of transmission, productivity growth. The results reported in Table 8 provide clear empirical support for the hypothesis that political instability adversely affects productivity growth, as *Cabinet Changes* is always statistically significant, with a negative sign.26 Economic freedom, which had positive effects on GDP growth, is also favorable to TFP growth. As can be seen in columns 3 to 5, we find clear evidence that regime instability adversely affects TFP growth. Thus, we can conclude that an additional channel through which political instability negatively affects GDP growth is productivity growth.

Table 8: Political Instability and TFP Growth

	(1)	(2)	(3)	(4)	(5)
Initial TFP (log)	-0.0338*** (-2.871)	-0.0344*** (-3.576)	-0.0299*** (-2.796)	-0.0308** (-2.525)	-0.0301** (-2.540)
Population Growth	-0.298*** (-3.192)	-0.149 (-1.639)	-0.202* (-1.837)	-0.189 (-1.367)	-0.156 (-1.150)
Trade (percent of GDP)	0.00007 (0.640)	-0.0001 (-1.375)	-0.0002 (-1.632)	-0.0002 (-1.626)	-0.0002 (-1.312)
Cabinet Changes	-0.0860*** (-2.986)	-0.0243* (-1.685)			
Regime Instability Index. 1			-0.0129** (-1.995)		
Regime Instability index 2				-0.0084* (-1.700)	
Regime Instability Index. 3					-0.0096** (-1.976)
Index of-Economic Freedom		0.0190*** (2.794)	0.0225** (2.380)	0.0225** (2.399)	0.0197** (2.340)
Polity Scale		-0.0005 (-1.062)	-0.0008 (-1.354)	-0.0008 (-1.099)	-0.0004 (-0.592)
Ethnic Homogeneity Index		0.0385* (1.647)	0.0126 (0.513)	0.0216 (0.914)	0.0237 (1.101)
Number of Observations	700	502	502	502	498
Number of Countries	105	91	91	91	91
Hansen test (p-value)	0.501	0.614	0.472	0.253	0.242
A.R1 test (p-value)	0.0064	0.00004	0.00004	0.00005	0.00005
Al22 test (p-value)	0.677	0.898	0.907	0.823	0.811

Sources: See Table 1.

Notes: - System-GMM estimations for dynamic panel-data models. Sample period: 1960–2004.

- All explanatory variables were treated as endogenous. Their lagged values two periods were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation.
- Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction).
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1 percent; **, 5 percent, and *, 10 percent.

Finally, Table 9 reports the results obtained for human capital growth.27 Again, *Cabinet Changes* and the regime instability indexes are always statistically significant, with the expected negative signs. Regarding the institutional variables, democracy seems to positively affect human capital growth, as the polity scale is statistically significant, with a positive sign, in columns 3 to 5. There is also weak evidence in column 4 that ethnic homogeneity is favorable to human capital accumulation. Finally, openness to trade has positive effects on human capital accumulation.

Table 9: Political instability and human capital growth

	(1)	(2)	(3)	(4)	(5)
Initial Human Capital per capita (log)	-0.00608 (-1.313)	-0.0129** (-2.146)	-0.0122** (-2.214)	-0.0106 (-1.592)	-0.0121 (-1.604)
investment (percent of GDP)	-0.0001 (-0.723)	0.0002 (1.093)	0.000146 (0.744)	0.000190 (0.876)	0.0002 (1.074)
Population Growth	-.0608*** (-2.772)	-0.0369 (-1.640)	-0.0280 (-1.161)	-0.0160 (-0.676)	-0.0271 (-1.210)
Trade (percent of GDP)	0.00009** (2.488)	0.00006* (1.868)	0.0000721** (2.081)	0.0000697** (1.976)	0.00006* (1.836)
Cabinet Changes	-0.0113** (-1.976)	-0.00911** (-2.035)			
Regime Instability Index I			-0.00379** (-2.093)		
Regime Instability Index 2				-0.00311** (-2.152)	
Regime Instability Index 3					-0.00292* (-1.847)
Index of -Economic Freedom		-0.0017 (-1.263)	-0.0013 (-0.951)	-0.0016 (-1.171)	-0.0020 (-1.400)
Polity Scale		0.0002 (1.490)	0.0004*** (3.217)	0.0004*** (3.198)	0.0005*** (3.170)

Ethnic Homogeneity Index		0.0103 (1.638)	0.0098 (1.220)	0.00998* (1.675)	0.0101 (1.515)
Number of Observations	704	504	504	504	500
Number of Countries	105	91	91	91	91
Hansen test (p-value)	0.406	0.699	0.672	0.703	0.678
AR.1 test (p-value)	0.0000001	0.00001	0.00001	0.00002	0.00003
AR2 test (p-value)	0.718	0.581	0.525	0.623	0.675

Sources: See Table 1.

Notes: System-GMM estimations for dynamic panel-data models. Sample period: 1960–2004.

- All explanatory variables were treated as endogenous. Their lagged values two periods were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation.
- Two-step results using robust standard errors corrected for finite samples (using Windmeijer's, 2005, correction).
- T-statistics are in parenthesis. Significance level at which the null hypothesis is rejected: ***, 1 percent; **, 5 percent, and *, 10 percent.

Effects of the three transmission channels

The last step of the empirical analysis was to compute the effects of political instability on GDP per capita growth through each of the three transmission channels, using equation (10). The results of this growth decomposition exercise are reported in Table 10, which shows, for each proxy of political instability, the estimated coefficients, 28 the effects on GDP per capita growth, and the percentage contributions to the total effects.

More than half of the total negative effects of political instability on real GDP per capita growth seem to operate through its adverse effects on total factor productivity (TFP) growth, as this channel is responsible for 52.13 percent to 58.40 percent of the total effects. Thus, according to our results, TFP growth is the main transmission channel through which political instability affects real GDP per capita growth. Regarding the other channels, physical capital accumulation accounts for 22.59 percent to 28.71 percent of the total effect, while the growth of human capital accounts for 17.08 percent to 21.11 percent. This distribution of the effects of political instability on GDP growth through the three channels is not surprising. According to the literature on growth accounting, human capital accounts for 10–30 percent of country income differences, physical capital accounts for about 20 percent, and the residual TFP accounts for 60–70 percent (see Hsieh and Klenow, 2010) [30].

Table 10: Transmission Channels of Political Instability into GDP growth

Proxy of Instability Instability		**Growth of Physical Capital pc**	**Channels of Transmission**		
			growth of TEP	**Growth of Human Capital pc**	**Total Effect of the 3 Channels on the Growth of GDP pc**
Cabinet Changes	Coefficient	-0.0195***	-0.0243*	-0.00911**	
	Effect on GDP Percent of Total Effect	-0.0065 22.59%	-0.0162 56.30%	-0.0061 21.11%	-0.0288 1003/4
. Regime Instability Index I	Coefficient	-0.0108**	-0.0129**	-0.00379**	
	Effect on COP Percent of Total Effect	-0.0036 24.44	-0.0086 58.40	-0.0025 17.16%	-0.0147 10034
Regime Instability Incisor 2	Coefficient	-0.00932**	-0.00846*	-0.003114**	
	Effect on GDP Percent of Total Effect	-0.0031 28.71%	-0.0056 52.13%	-0.0021 19.16%	-0.0108 10034
Regime Instability Index 3	Coefficient	-0.00906**	-0.00964**	-0.00292*	
	Effect on GDP Percent of Total Effect	-0.0030 26.51%	-0.0064 56.41%	-0.0019 17.08%	-0.0114 10034

Sources: See Table 1

Notes: - The estimated coefficients were taken from: columns 2 to 5 of Table 7, for the Growth of Physical Capital per capita; columns 2 to 5 of Table 8, for the Growth of TFP; and, columns 2 to 5 of Table 9, for the Growth of Human Capital per capita.

The effects of each channel on the growth of real GDP per capita are obtained by multiplying: the coefficient obtained for the growth of Physical Capital per capita by

A = 1 / 3; the coefficient obtained for the growth of TFP by (1-α) = 2 / 3; and, the coefficient obtained for the growth of Human Capital per capita by (1-α) = 2 / 3. That is, we apply equation (10):

$$\Delta y = \alpha \Delta k + (1- \alpha) \Delta A + (1- \alpha) \Delta h.$$

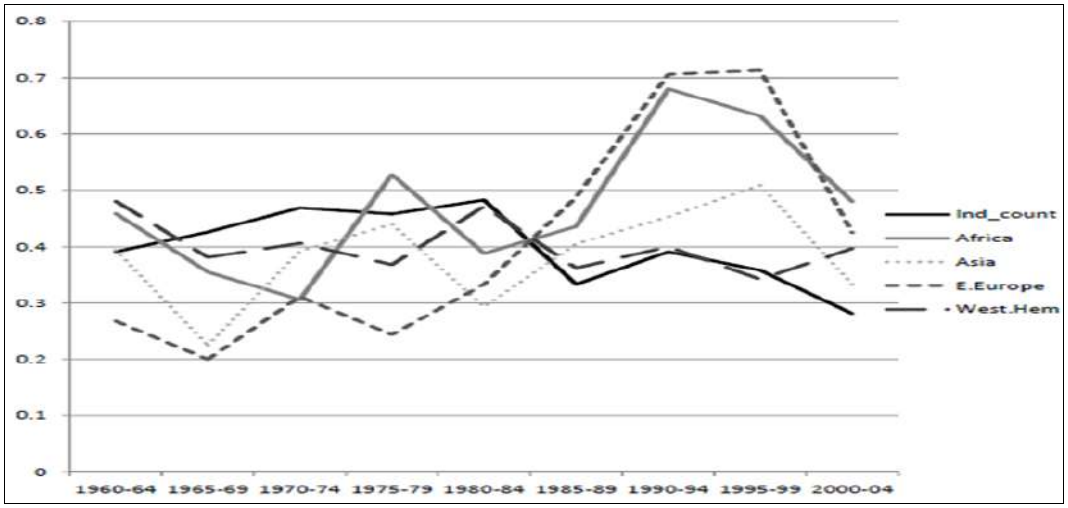
Although the total effects of political instability reported in the last column of Table 10 are somewhat smaller than those obtained for the proxies of political instability in the estimations of column 1 of Table 3 (for Cabinet Changes) and of columns 1 to 3 of Table 4 (for the three regime instability indexes), Wald tests never reject the hypothesis that the coefficient estimated for GDP per capita growth is equal to the total effect reported in Table 10.

Conclusions

This paper analyzes the effects of political instability on growth. In line with the literature, we find that political instability significantly reduces economic growth, both statistically and economically. But, we go beyond the current state of the literature by quantitatively determining the importance of the transmission channels of political instability to economic growth. Using a dataset covering up to 169 countries in the period between 1960 and 2004, estimates from system-GMM regressions show that political instability is particularly harmful through its adverse effects on total factor productivity growth and, in a lesser scale, by discouraging physical and human capital accumulation. By identifying and quantitatively determining the main channels of transmission from political instability to

economic growth, this paper contributes to a better understanding on how politics affects economic performance.

Our results suggest that governments in politically fragmented countries with high degrees of political instability need to address its root causes and try to mitigate its effects on the design and implementation of economic policies. Only then, countries could have durable economic policies that may engender higher economic growth.



Source: CNTS (Databanks International, 2007).

Fig 1: Political instability across the word

Notes: - Five-year averages of the variable *Cabinet Changes* computed using a sample of yearly data for 209 countries.

- *Cabinet Changes* is defined as 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.

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