POLITICAL INSTABILITY AND GROWTH: AN ECONOMETRIC ANALYSIS OF TURKEY, MEXICO, ARGENTINA AND BRASIL. 1985-2004

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Abstract

In this paper, the link between political instability, financial depth and economic growth is investigated in both theorical and emprical model, and the emprical section of paper focus on the relationship between political instability, financial depth and economic growth in emerging countries for 1985-2004 period.

Jel Classification: C32, C3, O47
Key Word: Panel Cointegration, economic growth

1. Introduction

There are almost consensus on the impacts of political instability and financial depth on growth but there is not an exact consensus on the definition of instability. Generally political stability is considered as prevalence of a constitutional order in the country; weakness of radical movements aiming to change the order; actualization of reforms by preserving the costitutional order. Studies conducted in this framework have two different approaches. In the first approach, forcing the current constituional order to change are recognized. In the second one, besides staying within the order, political polarization, coalition governments and turnover rate of governments become significant.

From "political instability" generally murders, strikes, chaos, demonstrations against governments, guerilla warfare, revolutions, government crises, coups, constitutional changes, regime changes, assasinations, cabinet changes, genocides, cout attempts (succesful or

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not), riots, border wars, civil wars and disinfections (predation of opposition) are understood (Ali A.,2001,p.103). On the other hand Bussiéere and Multer define political instability indicators in terms of polarization of parliament, coalition governments, reversion and hesitation of electors, and management and timing of elections (Eren E. and Bildirici M.,2001 and 2001b).

Most significant of explanations on reasons of political instability is that of Alesina and Perotti (1986). They consider the sources of political instability as a) government changes (constitutional or not), b) social unrest and political violence. According to Alesina and Perotti[1], source of social unrest and political violence is income inequality. Income inequality becomes into political violence and actions; political violence and actions become into revolutions, succesful or unsuccesful coups and these bocome into political ambiguity and instability. (Alesina A.and Perotti R.,1996,pp.1203-1226). So the source of political instability is income inequality and weakening of the middle class.[2] Similar views are found in the work of M.J.Gasiorowski. For example this sentence is worth consideration: "In Marx and Lenin, revolution and class conflict is based on income and land inequality. These generate instability (Gasiorowski M.J.,1998,pp.3-19).

Sources of political instability laid down above vary accross countries and they are observed in countries where democracy is subject to arguements. Generally studies on Argentina, Brazil, Uruguay, Chile have found out close relations between inflation and political issues(Eren E.and Bildirici M.: 2001b, p.33). Polarized political parties, strong labour movements, strong tendencies of

[1] Alesina and Perotti, view that frequency of government changes within constitutional lines is not a source of political ambiguity, thus political instability. They exemplify this with Italy.

[2] A special emphasis is put on a recent distinction about income distribution: income inequality and economical polarization. The first means unjustness of income distribution while the second denotes weakening of middle class. Both concepts are important in terms of political instability. (see Eren and Bildirici, 2001b)

governments towards redistribution and etc difficulties in maintaining stability in macroecenomic management increase.

In this study, indicators of political instability are non-democratic governments, violent conflicts, war and civil war, chaos, ethnical heterogeneity, religious fragmentation, insufficience of interior and exterior security and attempts on predating opposition. The relationship between political instability, policy-making and macroeconomic outcomes is very important in economics literature. In theoretical literature, political instability enters as a constraint that alters some critical elements. Instability in macroeconomic models is studied with respect to three points. First is the study of the relation between instability, factor accumalation and growth. Second is the analysis of positive theories of fiscal deficit. Third is the investigation of the impact of instability on monetary (and fiscal) policy (Carmignani F.,2003;p.1). In this paper, it will be investigated impact of political instability and financial depth on growth.

In context of political instability, important papers are Alesina and Tabellini (1990), Persson and Tabellini (1990), Cukierman and Edwards (1992) Cukierman, Edwards and Tabellini (1992), Ozler and Tabellini (1991), Barro (1991), Alesina and Perotti (1996) papers' (Eren E. and Bildirici M. ,2001, p.1-10). Their models have in common the idea that political instability lead to economic inefficiencies. The most popular paper of this idea for economic growth is in Alesina and Tabellini (1989), which examines the effect of political uncertainty on investment and capital flight. Barro (1991) was apply cross-section and was find that political instability was negative effect on growth. . Levine and Renelt (1992) used same method and find no robust correlation with growth and robust (negative) correlation of revolutions and coups with the share of investment in GDP. In Hossain and Chowdhury (1998), political instability is cause to decrease of investment. In Svensson (1998), instituonal quality increases investment, government instability and polarisation reduce instituonal quality, when the investment regression includes both instituonal quality and proxies for instability and polarisation. Annett(2000) found that fractionalism increases instability and higher instability is associated with greater share of

government consumption expenditure, Asteriou et.all (2000) found that lower re-election probability reduces the rate of growth of output and that the effect of instability on growth is negative. Darby et.al(2000) focus whether fragmentation positively correlates with government consumption to total gpvernment expenditure ratio and with the tax revenues to GDP ratio. As Fosu(2001), independent effect of instability on growth is positive. When interacted with physical capital, instability negatively affects growth. Carmignani(2003) found that the effect of fragmentation on growth is negative.

In this study, the relation between political instability and economic growth in countries will be investigated. It will be taken into account the possibility the relationship among economic growth, financial depth and political instability. It will be focused on two point. One of them is the relationship between economic growth and political instability and aim to show negative impact on economic growth. The other is the relationship between economic growth and financial depth. There is no agrement among economists that financial depth is benefical for growth. In researchs, constructed relationship between economic growth and political instability it is accepted to important of political stability for economic growth. Most research shows that economic growth and wealth reduces the likelihood of political instability . As World Bank researcher there are a striking relationship between the wealth of a nation and its chances of having a civil war. There are various explanations for why this is so. The most common is that wealthier societies are better able to protect assets, thus political instability would be less attractive. As T. H. Dixon poverty causes violence, and points to cases where scarcity leads to migrations that result in conflicts between identity groups over resources. (Humphreys M., 2003,p. 2) And in this paper political instability causes economic ineffficient, and economic inefficient leads to underdevelopment. Within this context, examples of Turkey, Mexico, Brazilian and Argentina will be utilized. In the paper, it was accepted the political instability , being cause of inefficient economic performance. It is used time series analysis and Johansen cointegration analysis. Cointegrating vectors are estimated using the fully modified OLS technique for heterogeneous

cointegrating vectors and the paper distinguish between long run and short run causality.

2. Econometric Methodologies

a.Model

In this paper, it was explored the relationship between political instability and growth. The data used in this study is annual and covers the period 1985–2004 for Turkey, Mexico, Argentina and Brazilian. The political instability is defined as P. The reel output (Y) is defined as growth. The political instability series is derived from the Euromoney. The Y are taken from the IMF Economic Outlook, various issues. The B is taken from World Bank. In this paper, it will used model in below.

$$Y_{it} = b_{0i} + b_{1i}P_{it} + b_{2i}B_{it} + e_{it}$$

Y_{it} is reel output in i country, t years. P_{it} is measure of political instability. B_{it} is financial depth and εit is error term.

b.Econometric Methodologies

To investigate long-run relationship by applying cointegrating technique has became popular since Levin and Lin (1992, 1993)papers' and Pedroni(1995) paper's. In this paper, it will be used panel cointegrating procedure.

i. Panel Unit Root Test

The popular panel unit root test is Levin and Lin (1992, 1993, called LL after) panel unit root test. This test allow for fixed effects and unit specific time trends and common time trends. In LLC models allowing for two–way fixed effects, the unit–specific fixed effects are an important source of heterogeneity. The coefficient of the lagged dependent variable is restricted to be homogeneous across all units of the panel. That is, LLC assumes that the individual processes are cross–sectionally independent and LLC focuses on the asymptotic distributions of this pooled panel estimate. The test may

be evaluated as a pooled DF or ADF and they use ADF tests to test for unit roots.

t-statistic is

$$t_\rho = \frac{(\hat{\rho}-1)\sqrt{\sum_{i=1}^{N}\sum_{t=1}^{T}\tilde{y}_{i,t-1}^2}}{\frac{1}{NT}\sum_{i=1}^{N}\sum_{t=1}^{T}\tilde{u}_{it}^2} \qquad s_e^2 = \frac{1}{NT}\sum_{i=1}^{N}\sum_{t=1}^{T}\tilde{u}_{it}^2$$

The Im–Pesaran–Shin (1997, called IPS after) development LL's framework by following for heterogeneity of the coefficient on the lagged dependent variable. Their's test allows for heterogeneity in the value under the alternative hypothesis.(Smith R.P. and Fuertes A.M.,2003,p.40)

Under the null hypothesis, they consider all series in the panel are nonstationary processes; under the alternative, a fraction of the series in the panel are assumed to be stationary. This is in contrast to the LLC test. IPS uses a group–mean Lagrange multiplier statistic to test the null hypothesis. IPS proposes the use of a group–mean bar statistic. IPS allows for a more realistic and flexible alternative hypothesis. Approach used by IPS in context of the standard ADF-test in a panel is:

$$Dy_{i,t} = m_i + b_i t + r_i y_{i,t-1} + \sum_{j=1}^{p} j_{ij}\Delta y_{i,t-j} + e_{i,t}$$

where y_{it} stands for each of the variables presented. The null hypothesis and the alternative hypothesis are defined as:

H_0: $\rho_i = 0$ for all i

H_0: $\rho_i < 0$ for at least one i.

Instead of pooling and assuming that $?_i$ is the same for all N, the IPS methodology uses separate unit root tests for the N. The null hypothesis is tested via the t-bar statistic which is calculated as the average of the individual ADF statistics,

$$\bar{t} = \frac{1}{N}\sum_{i=1}^{N} t_{\rho_i}$$

Maddala and Wu (1999, called MW after) focus on the shortcomings of both the LL and IPS tests. They proposed an alternative test in the spirit of IPS. Like the IPS tests, the MW test is based on *N* independent tests on the *N* individuals and focus on the difficulties inherent in the IPS test. The MW test, following Fisher combines the observed significance levels. MW proposed a more straightforward, nonparametric unit root test.

$$P = -2\sum_{i=1}^{N} \ln\, p_i$$

MW shows that their test dominates that of IPS in that it has smaller size distortions and comparable power, and does not require a balanced panel and is robust to statistic choice, and can use lag length in the ADF regressions, and varying time dimensions for each cross sectional unit.(Moon R.H.,2002,p.12)

In Harris and Tzavalis (called HT after) test the estimates of the unadjusted autoregression coefficient is $\hat{r}$ and the test statistic is $C_{\infty}^{-1/2}\sqrt{N}\tilde{r}$. The *standardised* test statistic $C_{\infty}^{-1/2}\sqrt{N}\tilde{r}$ will be smaller than unity. This will have the effect of drawing the tails of the distribution of the test statistic of asymptotic *T* in, and will thus reduce the empirical size and power of the test (Christopoulos D.K. and Tsionas E.,2003,p.8)

ii. Panel Cointegration Test

Most popular test in panel cointegrating test is Pedroni test. Allowing for heterogeneity of long-run covariance matrix *i* for each *i* and heterogeneity of the slope parameters across all units *i*, Pedroni (1999) derives seven panel cointegration statistics. The first category of four statistics is defined as within-dimension-based statistics and includes a variance ratio statistic, a non-parametric Phillips and

Perron type r statistic, a non-parametric Phillips and Perron type *t*-statistic and a DF type *t*-statistic.

The second category of three panel cointegration statistics is defined as between-dimension-based statistics and is based on a group mean approach. The set includes a Phillips and Perron type r -statistic, a Phillips and Perron type *t*-statistic and finally an ADF type *t*-statistic (Gutierrez L., 2003,p.107) The first category of tests uses specification of null and alternative hypotheses while the second category uses

$$H_0 : p = 1, \quad H_A : p < 1, \quad \text{for all } i.$$

where the statistics now require computing *N* autoregressive coefficient, by using the equation for each *i*th unit, i.e. in this case heterogeneity is permitted under the alternative hypothesis, Pedroni's (1999) statistics require estimating some nuisance parameters from the long-run conditional variances $i\ th$. The standardized statistics converge to a normal distribution whose moments depend on different elements. Finally, under the alternative hypothesis, the first within-dimension based statistic diverges to positive infinity, and the right tail of the normal distribution is used to reject the null hypothesis of no cointegration. For the remaining six statistics, the left tail of the normal distribution is used to reject the null hypothesis (Drine I.and Rault C.; 2002,pp.12-13) Pedroni's panel variance ratio statistic is as below (McCoskey S. and Kao C.,1997, p.9-11, see, Baltagi and Kao;2000)

$$Z_{\hat{U}NT} = \frac{1}{\left(\sum_{i=1}^{N} \sum_{t=2}^{T} \hat{L}_{11i}^{-2} \hat{e}_{it-1}^{2} \right)}$$

$$Z_{\hat{p}NT} = \frac{\sum_{i=1}^{N} \sum_{t=2}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{it-1} \hat{e}_{it} - \hat{l}_i \right)}{\left(\sum_{i=1}^{N} \sum_{t=2}^{T} \hat{L}_{11i}^{-2} \hat{e}_{it-1}^{2} \right)}$$

$$Z_{\hat{p}NT} = \frac{\sum_{i=1}^{N}\sum_{t=2}^{T} \hat{L}_{11i}^{-2}\left(\hat{e}_{it-1}\hat{e}_{it} - \hat{l}_i\right)}{\sqrt{\hat{s}_{NT}^{2}\left(\sum_{i=1}^{N}\sum_{t=2}^{T} \hat{L}_{11i}^{-2}\hat{e}_{it-1}^{2}\right)}}$$

Pedroni was propose the result in below.

$$TN^{3/2}Z_{\hat{U}NT} \Rightarrow \frac{1}{\frac{1}{N}\sum_{i=1}^{N} Q_i^2}$$

$$T\sqrt{N}\left(Z_{\hat{p}NT} - 1\right) \Rightarrow \frac{\frac{1}{N}\sum_{i=1}^{N}\int Q_i\, dQ_i}{\sqrt{\left(\frac{1}{N}\sum_{i=1}^{N}\int Q_i^2\right)\left(1+\frac{1}{N}\sum_{i=1}^{N}\hat{b}_i^{2}\right)}}$$

$$\text{e}T \to \infty, \qquad TN^{3/2}Z_{\hat{U}NT} - \frac{\sqrt{N}}{q_1} \Rightarrow N\left(0, f_{(1)}y_{(1)}f_{(1)}\right)$$

$$T\sqrt{N}\left(Z_{\hat{p}NT} - 1\right) - \frac{\sqrt{N}q_2}{q_1} \Rightarrow N\left(0, f'_{(2)}y_{(2)}f_{(2)}\right)$$

$$Z_{t\hat{p}NT} - \frac{\sqrt{N}q_2}{\sqrt{q_1\left(1+q_3\right)}} \Rightarrow N\left(0, f'_{(3)}y_{(3)}f_{(3)}\right)$$

Finally, Pedroni proposed Fully Modified Ordinary Least Squares (FMOLS) estimator suggested by Philips and Hansen(1990) for heterogenous panel. He suggests an asymptotically efficient estimation procedure (Breitung J., and Hassler U.,2002, pp167-180) and derives asymptotic distributions for residual. The panel estimators of b are solved by FMOLS. The estimator is the average value of FMOLS-coefficients of the single equation estimates

$$\hat{b}_j = \frac{1}{N}\sum_{i=1}^{N} \hat{b}_{ij}$$

where b_{ij} is the FMOLS-estimator. The estimator is denoted by Pedroni (2000) as group-FMOLS-estimator.

In the dynamic OLS (DOLS), the long-run regression is augmented by lead and lagged differences of the explanatory variables. For the panel DOLS estimation, cointegrating regression is as follows.

$$Y_{it} = \alpha_i + \beta_i X_{it} + \sum_{k=-Ki}^{Kt} g_{ik}\Delta X_{it-k} + m_{it}^{*}$$

which is estimated on the country level. Estimated coefficient β is given by

$$b_{DS}^{*} = N^{-1}\sum_{i=1}^{N}\left(\sum_{t=1}^{T} Z_{it}Z_{it}^{'}\right)^{-1}\left(\sum_{t=1}^{T} Z_{it}Y_{it}^{*}\right)$$

$Z_{it} = \left(X_{it} - \overline{X}, \Delta X_{it-k}, \cdots \Delta X_{it+k}\right)$ is *2(K+1)x1* vector of regressors (Basher S.A., and Mohsin M.;2003,p.2)

The panel DOLS assumes a homogeneous cointegration vector. Heterogeneity is limited to fixed effects, time trends and short run dynamics. The panel DOLS estimator arises from the pooled regression. Kao contributed important growth along this line. He examined the behaviour of spurious panel regression and proposed residual-based tests for the null hypothesis of no panel cointegration (see Kao;1999).

3. Empirical result

In this paper, the cointegration analysis of panel data was consisted two step. First, it is test for time series and panel unit root. In time series analysis, it was used three statistic and in panel unit root test, four statistics proposed by LL, IPS, MW and HT are used. Second, it

was tested for cointegration in panel data using: johansen, Pedroni test, FMOLS and DOLS. A vector error correction model (VEC) is used to represent the dynamics of the system. Framework of this paper can be seen as Johansen's cointegrated vector autoregression in panel perpectives.To vary across country of the short-run parameters are allowed and the long-run parameters are homogenous. Time series ADF, PP and KPSS tests are reported in Table1 for all 4 coutries. All time series involved unit roots according to the ADF test. ADF tests in first differences show that their first differences are stationary. Tests are calculated with a constant plus a time trend and they have a null hypothesis of non-stationary against an alternative of stationarity.

Table 1. Unit Root Results for Y, D, and P in Turkey, Tr, Argentina, Ar, Brazil, Br and Mexico, Mx.

	Y			B			P		
	ADF	PP	KPSS	ADF	PP	KPSS	ADF	PP	KPSS
Tr	-6.6	-27.8	0.95	-6.3	-19.7	0.95	-7.2	-89.0	0.93
Ar	-6.6	-14.2	9.01	-9.7	-15.8	0.92	-12.1	-86.4	0.88
Br	-15.6	-25.3	0.94	-6.6	-28.9	0.92	-9.8	-197.3	0.83
Mx	-19.3	-24.9	15.2	-6.9	-41.4	0.97	-8.2	-67.9	1.92

Level show the ADF t-tests for a unit root in levels. Bold number show sampling evidence in favour of unit root. (*), (**) and (***) denote rejection of the unit root hypothessis at the 1%, 5% ve 10% levels.

Panel unit roots tests was reported in Table 2. The result support the hypothesis of a unit root in all variables across countriess, as well as the hypothesis of zero order integration in first differences.

Table 2. Panel Unit Root Test

	MW	*HT*	*LL*	*IPS*
Y	99.99	8.118	-3.12	-6.06
P	81.11	5.44	-3.10	-7.11
B	61.11	7.77	-3.019	-8.09

Country by country Johansen maximum likelihood cointegration results are reported in

Table 3. The hypothesis of no cointegration is rejected for all countries, and the hypothesis of one cointegrating vectors are accepted.

Country	Max.Eigenvalue Statictic Ho: rank=r		
	r=0	r≤1	r≤2
Turkey	98.59	22.82	3.51
Argentina	129.35	21.17	7.71
Brazil	122.58	18.17	8.52
Mexico	145.817	14.9	5.92

Note: r show the number of cointegrating vectors. Results denote rejection of the null hypothesis of no-cointegration at 5% level of significance

Panel cointegrating tests are reported in Table 4. While Fisher's test supports the presence of one cointegrating vector, The HT test support the hypothesis of a cointegrating relation and LL test supports the hypothesis of a cointegrating relation. Both time series and panel-based tests agree that there is cointegrating vector.

Table 4. Panel Cointegration Test

Fisher c^2 Cointegration Test		
r=0	*r£1*	*r£2*
95.33	11.66	8.1
Pedroni Result		
Panel v stat: 9.77	Panel rho-stat= -8.69	Panel pp-stat=-7.12 Panel adf-stat=-6.55
Group rho-stat= -10.41	Group pp-stat= -7.14	Group adf-stat= -7.003
Group FMOLS Result		
2.89	-2.44	
(22.14)	(9.37)	
N=4,	T=20,	
DOLS Result		
2.83	-2.402	
(21.54)	(9.33)	
N=4,	T=20,	

Fully modified OLS estimates of the cointegrating relationship are showed *in* Table 5 on a per country basis and for the panel as a whole. For the panel, the coefficient of political instability is 2.44 with t-statistic of 9.37 so it is statistically significant, and the effect is negative. The share of B has a positive effect and, it seems to be statistically significant. On a per country basis, political instability has a nagetive impact on growth and the relation seems to be statistically significant in countries.

Table 5. Fully Modified OLS Estimates (Y is dependent variable)
(t-stats in parentheses)

	B	*P*
TURKEY	-0.107(2.55)	-1.60(2.81)
ARGENTINA	0.134(2.49)	-1.9(2.32)
BRAZILIAN	0.17(1.32)	-1.33(2.53)
MEXICO	0.01(2.47)	-0.12(3.52)

The hypothesis of short run causality can not be rejected for all countries. It is investigated whether relation between political instability and economic growth is short run. Used ECM model is as follows

$$\Delta Y_{i,t-1} = c_i + \sum_{i=1}^{m} b_i \Delta P_{t-1} + \sum_{i=1}^{m} \Delta c'_{i,t-1} g_i + l\,(Y_{t-1} - c'_{t-1} f - f_0 P_{t-1}) + n_t$$

equilibrium error and/or deviation from the long run are

$$Y_{t-1} - c'_{t-1} f - f_0 P_{t-1}$$

Important problem is whether $l \neq 0$. Other problem is whether $H_0 : b_i = 0$ can be rejected. This point is very important because when it can be rejected, there is no short run causality. The c^2 test for VEC model is given in Table 6.

Table 6. Short Run Causality Between Y and Political Instality: Error Correction Model(ECM)

	Lags of Political Instability	l *p-value*
TURKEY	33.54(0.00)	(0.00)
ARGENTINA	143.48(0.00)	(0.00)
BRAZILIAN	115.38(0.00)	(0.00)
MEXICO	79.325(0.00)	(0.00)
Panel Fisher Test	157.22	298.11

Fisher test is computed based on p-values from individual tests. All value show statistical significance

As result, the short run causality can not be rejected for all country. Estimates and diagnostic statistics for the VEC model are presented in Table 7.

Table 7. Diagnostic Tests for The Vector Error Correction (VEC) Model

	Jarque-Bera Test(JB)	*Lagrange Multiplier Test(LM) p-value*
TURKEY	38.41(0.00)	(0.0007)
ARGENTINA	11.35(0.00)	(0.00011)
BRAZILIAN	69.32(0.00)	(0.00009)
MEXICO	31.01(0.00)	(0.0007)
Panel Fisher Test	101.12	111.11

Jargue-Berra show the Jargue-Bera normality test of errors. Lagrange Multiplier Test(LM) tests the null hypothesis hat there is no second order autocorrelation.

VEC model for panel data is as follows

$$\Delta Y_{i,t-1} = c_i + \sum_{i=1}^{m} b_i \Delta Y_{i,t-1} + \sum_{i=1}^{m} \Delta c'_{i,t-1} g_i + l(Yi,_{t-1} - c'_{,i,t-1} f - f_0 P_{i,t-1}) + n_{it}$$

where ci is fixed country effects. The model can be estimated with instrumental variables. I must use an instrumental variables estimator

to deal with the correlation between the error term and lagged dependent variables ΔY_{t-1}.
Diagnostic statistics for the VEC model was given in Table 8.

Table 8.Panel Error Correction Model

Variable	*Estimate*
DY_{t-1}	8.12
DY_{t-2}	7.14
DB_{t-1}	9.45
DB_{t-2}	6.11
DP_{t-1}	11.223
DP_{t-2}	7.01
Error Cor Ter	1.52
LR	7.78
JB	10.011

As it was seen in the result, there is evidence of short run causality. The most important result is policy recommendation. If it is wanted to increase Y, it should be focused short and long run policies and political stability.

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