Political instability and economic growth: Evidence from two decades of transition in CEE

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Abstract

This paper examines the nexus between political instability and economic growth in 10 CEE countries in transition in the period 1990-2009. Our results support the contention that political instability defined as a propensity for government change had a negative impact on growth. On the other hand, there was no causality in the opposite direction. A sensitivity analysis based on the application of a few hundred different variants of the initial econometric model confirmed the abovementioned findings only in the case where major government changes were applied to the definition of political instability.

Keywords: political instability, economic growth, CEE transition economies.

Introduction

The factors that determine economic growth are among the most extensively studied subjects in the economic literature. Early contributions on these topics were based mainly on the neoclassical growth model and were concerned almost exclusively with strictly economic determinants of growth. Insufficient data has caused that empirical literature on the relationship between political instability

and economic growth is relatively recent. Having said that, in one of the earliest contributions to the subject, Kuznets (1966) claimed that political disorder may be responsible for a low rate of economic growth, especially in periods of government change. In the early 1990s North (1990) said that a society's institutional framework plays an important role in the long-term performance of an economy. Therefore, the choice of the political and economic system which would be best for the general development of a society (including economic growth), is an important research avenue for economists around the world.

Economists usually stress that an unstable political system may slow down investment or speed up inflation, and in consequence reduce the GDP growth rate. Theoretically, an inverse relationship is also possible. The economic troubles of a country may constitute major factor in social tensions and political instability, which in turn may cause the fall of a government. Until the early 1990s, the world was in general characterized by two models of economic development: socialism: led by the Soviet Union, and capitalism, led by the United States. The breakup of the Soviet Union in the early 1990s brought about remarkable democratic reforms across the globe. In the literature there are many detailed analyses on the impact of political reforms and democratization on economic growth, mostly for the Asian-Pacific region or Latin America. This paper focuses on the effect of political instability on economic growth in the CEE transition countries over the last two decades. Political instability in this region, reflected in relatively frequent government changes and shuffles, was strongly interrelated with the democratization process, which took off at the beginning of the 1990s.

The motivation to analyze the transition economies of CEE is twofold. First, it seems interesting to check whether economic growth in this group of countries, which in last two decades have launched a whole range of political, economic and social reforms, has somehow suffered from the relatively large amount of political manoeuvres, government changes and major cabinet reshuffles which took place in the period 1990-2009. The answering to this question may turn out to provide useful information for researchers and politicians, as it may constitute the initial stage of a more

complex analysis of the economic consequences of various forms of political instability. Second, to the best of our knowledge, this particular group of young democracies has not attracted very much the researchers so far, most likely due to a lack of sufficient data. In this contribution we describe the dependencies between political instability and economic growth in the CEE region using the most recent statistical data and advanced econometric techniques.

In this paper special attention is paid to those problems which are still unclear in the light of the previous literature. The most important issue in this context is the measurement of political instability and the direction of causality between the variables under study. First of all we examine whether political instability is reflected in the rate of economic growth and to what extent this impact is negative. We will also check the existence and sign of reverse causality running from the GDP rate to political instability. Moreover, in contrast to previous papers, we try to use objective criteria to measure the importance of political events (government change).

This paper consists of six sections. The following section reviews the major strands of existing literature on the relationship between political instability, political freedom, democracy and economic growth and it creates a theoretical framework for further empirical analysis. In section 2 the research conjectures are formulated, mainly on the basis of the results of previous papers. In the third section a description of the data used in this study is given. Section 4 contains some remarks on the theoretical models which underpin the assumed relationship along with a brief description of the methodology used (methodological issues are presented in detail in the Appendix at the end of the paper). The empirical results and a discussion of them are presented in section 5. Section 6 concludes the paper and provides some general suggestions for further research.

1. Literature overview

The nexus between political instability and economic growth has been one of the most important topics in empirical research in economics in the last decade. The major goal of this research was to

establish the structure of causal interrelations. Sociologists and economists have tried to test whether a stable political system is a vital precondition for economic growth or whether economic growth creates the foundations of political stability.

According to the earliest contributions by Kuznets (1966, 1973) technological progress is necessary for economic growth, although it must be accompanied by liberal democratic institutions, which provide citizens with political freedom, and which allow them to participate in the political process. This is coupled with economic freedom, which in turn enables their participation in the economy.

In general, previous papers on political stability-growth links may be classified into four groups. The first strand in the economic literature argues that political instability has a negative impact on economic growth, but that there is no causality in the opposite direction (see for example Alesina *et al.*, 1996). Another group of contributions supplies evidence that economic growth causes political stability, but not vice versa (for example Borner and Paldam, 1998). Another tendency in the literature argues that causality in the relationship between political instability and economic growth runs both ways (Zablotsky, 1996; Gyinmah–Brempong and Traynor, 1999). Finally, the last group of papers contains evidence supporting a lack of causality between the variables (see for example Campos and Nugent, 2000). In general, previous investigations also vary with respect to the samples or countries that different contributors investigate.

In some of the previous studies on the relationship between the political instability and economic growth both direct and indirect effects of instability on GDP have been found and discussed (for example Barro, 1991; Levine and Renelt, 1992; Schneider and Frey, 1985). The major conclusion was that because of the negative impact of political instability, there are indirect consequences for most important growth factors such as savings or investment. Another strand of research, also related to indirect effects, was focused on the well-known "brain drain" effect (for example, Adebayo, 1985; Kwasi, 1992), which is the process of declining human capital caused mainly by political disorder.

An issue which is especially related to the nexus between political instability and growth is whether democratic institutions are harmful or conducive to growth. In some previous papers, democracy was made responsible for not providing enough political stability and for slowing down economic growth (for example Yu, 2001; de Haan, 2007). In many democracies the government is based on coalition partners, who are often ideologically opposite to each other. Therefore, any instability in the relationships between coalition partners can easily lead to a withdrawal of support for the government.

Newly-elected governments in democratic countries often tend to make frequent changes in the country's policy in both domestic and international areas. Even if a particular political party hangs onto full executive power, noisy demonstrations on the streets and harsh criticism by the mass media can lead to violent and unexpected political change. Sudden and frequent policy changes with regard to business are likely to deter investment, which in turn may hamper economic growth. Therefore, some contributors think that if democracy leads to this kind of instability, it is unsuitable for developing countries where economic growth and the reduction of poverty are top priorities. It is very likely that these two goals have been deemed, at least to some extent, main priorities in the case of CEE countries as well, especially in the early 1990s.

The different points of view about the impact of political freedom (accompanied by political instability in the early stages of democratization) on the growth rate are widely reflected in the economic literature. Barro (1996, 1999) found that the net effect of more political freedom on economic growth is rather uncertain. He found that democracy speeds up economic growth when the initial level of democracy is relatively low. However, the relationship becomes negative once a moderate amount of political freedom has been attained. Barro stressed that an increase in political rights in the worst dictatorships supports the growth rate and investment as result of limitations on governmental power. However, an attaining a moderate amount of democracy and a further increase

in political freedom hampers economic growth and investment because a serious problem with redistribution arises.

There is controversy on the impact of democracy on growth in many other papers. In the opinion of Clague *et al.* (1996) and Haggard (1997) democracy will support economic growth more than authoritarian regimes. A democratic political system creates conditions conducive to growth because it allows the most active and talented citizens to participate fully in business. Other studies have also found a significant positive association between democracy and economic growth, especially in the direction from democracy to growth (see for example Nelson and Singh, 1998; Pourgerami, 1988; Fedderke and Klitgaard, 1998; de Haan *et al.* 2006). In a contribution by Nelson and Singh (1998) it is emphasized, however, that political freedom and democracy in developing countries could undermine the effectiveness of government policy with discipline, law and order. Therefore, under a democratic system a government may be less efficient in performing its basic obligations and responsibilities, and in supplying basic services. In a paper concerned with economic convergence and government policies, Sachs and Warner (1995) found that in order to catch up with rich countries, poor countries should implement appropriate economic policies, especially to support open foreign trade and to protect private property rights. In the late 1990s Rodrik (1998, 1999) found evidence that countries without internal social conflicts and with strong conflict-managing institutions grow much faster than countries with a divided society and weak institutions of conflict management.

According to the economic literature political freedom plays a crucial role alongside other determinants of economic growth and income convergence. However, views concerning the importance of political freedom in the context of economic growth are often extremely controversial. Sen (1999) defined development as the process of the growth of real freedoms. He stressed that the expansion of freedom, including its political sense, should be the primary end and the principal means of the development of countries. In contrast, Friedman (1962) argued that economic freedom

is itself a component of the general concept freedom, and that it is a necessary precondition for the achievement of political freedom. The most controversial hypothesis albeit quite popular among economists, is known as the "Lee conjecture", named after the former Prime Minister of Singapore, Lee Kuan Yew. In his opinion a lack of political freedom supports rapid economic growth, while democracy and civil rights hamper it. This conjecture was based on the observation that a few authoritarian economies in Asia, that is South Korea, Singapore, Taiwan, and China, grew much faster than their relatively more democratic counterparts. This conjecture was widely discussed by Przeworski and Limongi (1993) and Vasil (2001). Some researchers claim that the Lee hypothesis is also supported by the growth in several authoritarian South American countries, which achieved a mean annual growth rate of 2.15 per cent in the period 1946-1988, while the average world growth was 1.31 per cent in this period.

Besides the discussions on theoretical issues, the controversy on the role of political systems in economic growth is also reflected in the empirical evidence. In one of the earliest empirical studies Scully (1988) used a cross-sectional approach to check the interrelations between institutions and economic growth in 115 economies between 1960 and 1980. He established that the institutional framework had a palpable effect on economic growth. He found that political freedom was the reason for the almost three times faster growth in stable democracies than in economies which were authoritarian or only partly free. By contrast, de Haan and Siermann (1995, 1996) demonstrated (using a sample from the years 1963-1988 and a set of 97 countries) that the positive relationship between political freedom and economic growth detected in most cross-sectional empirical studies was not robust and depended on political and cultural discrepancies. Similarly, Farr *et al.* (1998) and Wu and Davis (1999) found that political freedom had little influence on economic growth. According to these authors most important area of freedom in promoting economic growth is economic freedom.

Xu and Li (2008) collected data for a sample of 104 countries between 1970 and 2003. They found that political freedom has positive effects on economic growth at later stages of social and economic development. They found also evidence for the idea that economic freedom has greater effects on income convergence in the OECD countries, but that political freedom also promotes convergence.

Alesina *et al.* (1996) used growth rates of GDP per capita as the dependent variable and government changes to measure political instability. They examined a panel of 113 countries and found that political instability had negative impact on GDP growth, whereas there was no dependence in the opposite direction. Within a similar research framework Campos and Nugent (2000) found for African countries that political instability was a reason for slower economic growth. However, no relationship was found for any other group of countries.

To summarize, researchers have not yet reached consensus on the role of democracy in economic growth, neither from a theoretical nor empirical perspective. On the other hand, a negative relationship between political instability and growth has been reported quite often, some contributors even claim that it has been established as a "stylized fact".[1] However, empirical studies on political instability-growth links are often criticized due to the large amount of ad-hoc-selected explanatory variables and the lack of rigorous stability analysis of the results.[2] Moreover, most of the previous research in this area was conducted for relatively large groups of countries. This in turn could easily lead to modelling difficulties due to possible heterogeneity bias, which is hard to control in simple models. Where detailed research has been conducted on a particular region,[3] it was usually an analysis of some Latin American or Asian case.

The post-communist CEE economies have not attracted much attention of researchers, mainly due to lack of datasets of sufficient size. To the best of our knowledge, this paper is the first contribution to address the political instability-growth nexus in case of this group of young European democracies. Moreover, this research deals with some typical but often omitted modelling

difficulties, as subjectivity of describing the importance of political events and analysis of sensitivity of empirical results. As already mentioned, these two issues are crucial for obtaining replicable and robust empirical results.

In the next section we will formulate the main research conjectures of this paper. The hypotheses will be formulated on the basis of the empirical results and major suggestions from recent research in the area of political instability-economic growth links.

2. Main research conjectures

As mentioned in the previous section a considerable number of recent papers have emphasized the negative impact of political instability on economic growth. Therefore, our first hypothesis reflects these expectations in the case of CEE economies in transition:

> CONJECTURE 1: Political instability had a significant and negative impact on the economic growth of countries in the CEE region during the period of transition.

Previous research has shown that the opposite relationship is also often observed, that is a slowdown in economic growth may cause a rise in political instability as society puts the poor economic performance of a country down to an inferior executive and wishes to unseat the government. To summarize, our analysis should verify the following:

> CONJECTURE 2: The economic growth of the transition economies in the CEE region was a causal factor for the level of political stability. This impact had a positive sign.

Testing both these conjectures may provide some important information on the nature of the relationship between economic growth and political instability. As well as the direction and sign of any causality, it is also important to examine whether political instability had a tendency to remain at relatively the same level from one year to the next. It can significantly extend the description of the structure of instability-growth links obtained after checking the first two conjectures, because

supplementary information on the dynamic structure of these links may be gained. In general, previous research has not led to a consensus about the importance and sign of the impact of recent political instability on the level of instability in the future. However, following the suggestions of Alesina *et al.* (1996), one may formulate the following:

CONJECTURE 3: Political instability in the CEE region has shown persistence.

All the hypotheses listed above will be tested by carefully selected econometric methods. Details on the dataset are presented in the next section.

3. The dataset and its properties

In this paper we use a dataset consisting of a panel of annual observations for new EU members in transition from the CEE region.[4] In general, the dataset covers the period 1990-2009, although for some countries the first observation is often from later than 1990. In other words, our analysis takes into account first two decades of the transition of CEE economies. Some details on countries and periods included in the analysis are presented in table 1:

INSERT TABLE 1 AROUND HERE

In general, the data applied in this paper may be classified into two main categories. The first group includes economic variables, which are related to measures of the economic growth of CEE transition economies and various proxies of main growth factors.[5] Despite years of research, the existing literature has not yet reached a consensus about a typical set of variables that may affect economic growth. Following previous papers which have reviewed the existing literature (Bleaney and Nishiyama, 2002; Levine and Renelt, 1991; Sachs and Warner, 1997, among others) we have selected a relatively small subgroup from hundreds of the control variables, which are usually considered as most important. The second group of indicators describes various aspects of political

instability. Table 2 provides details on all variables along with a definition of some simple mathematical operators used to transform the variables in further parts of the paper:

INSERT TABLE 2 AROUND HERE

The assessment and measurement of the role of government changes or adjustments is not an easy goal. In this paper we used the concept of measuring the political instability as the propensity for government change, which has attracted a considerable attention in previous research (see for example Alesina *et al.*, 1996). However, our measures of political instability are somewhat different from those of previous papers. The most important difference lies in the fact that we do not formulate any set of subjective criteria to distinguish "major" government changes from the regular transfers of executive power. In our definition government change is said to be a major one if a new prime minister represents a different political party from the previous one. It is clear that this approach reduces the harmful subjectivity bias and allows the use of the most recent data, as no preliminary (that is subjective, time-consuming and sample-size-reducing) discussions on the importance of government change need to be conducted.[7] Moreover, in our opinion this definition is interesting also from an economic perspective. It seems to be adequate to capture the real decisions of investors as they seldom have the time and resources to perform academic deliberations. Instead, they treat a change of prime minister (and the following political reorientation of the executive) as the main indicator of the importance of government change which may have some impact on their future economic activities. Although one may express some doubts on the importance of all-type government change (*GCHANGE*) for the economic performance of a country, since it mainly covers regular elections (which in themselves - except for early elections - are not indicators and/or consequences of political instability), we believe that application of this variable may also provide some interesting conclusions as it allows comprehensive comparisons between the effects of major and regular executive transfers.[8]

Table 3 describes some basis information about our data. In addition, we have presented some preliminary results obtained for particular subsamples of the data, which shed some light on the possibility of the existence of simultaneous relations between economic growth and both indicators of political instability:

INSERT TABLE 3 AROUND HERE

The average growth rate in CEE economies in the period of transition was around 2.5 per cent. On the other hand the average frequency of (major) government change was at a level of 0.46 (0.31), which indicates that there was roughly a (major) government change almost every two years (three years). The second part of table 3 (related to subsample statistics), provides even more interesting results. When we restrict our sample only to years with (major) government change we can see a 1.15 per cent (0.71 per cent) drop in average growth in comparison to election-free period. A negative contemporaneous dependence is also visible from the opposite perspective, as the average frequency of both types of government change rises when we restrict the sample to data points characterized by *GROWTH* not greater than the full-sample average.[9]

However, this basic approach omits many important issues and does not provide any formal evidence for the existence, direction and sign of any causal dependencies between growth and political instability. Therefore, in the next section we will present some details on the econometric procedures which are most suitable for testing causal dependencies in the context of the specification of the variables used.

4. Model specification and methodology

The findings in the previous section provide some evidence for claiming that both variables related to political instability may indeed be simultaneously related with economic growth.[10] Moreover, the propensity for government change is not directly observable, which in the light of the

previous remark requires the application of more sophisticated simultaneous equation models, in which one of the endogenous variables is continuous and the other is dichotomous.

4.1 THE ECONOMETRIC MODEL

The structural form of the model used to examine the dependencies between economic growth and political instability in CEE economies includes two equations, where one endogenous variable stands for political instability and the other represents economic growth. Thus, we consider the following model:

$$(1) \qquad \begin{cases} GROWTH = \gamma_1 PI^* + X\beta_1 + X_1\alpha_1 + \varepsilon_1 \\ PI^* = \gamma_2 GROWTH + X\beta_2 + X_2\alpha_2 + \varepsilon_2 \end{cases},$$

where PI^* is a latent and not directly observable endogenous variable which reflects the actual level of political instability. As usual for models with unobservable variables, we assume that there exists an indicator variable, denote it *PI*, which takes the value of 1 if $PI^* > 0$ and 0 otherwise.[11] The symbol *X* denotes a set of exogenous variables which enter both equations, while X_1 (X_2) stands for a set of exogenous variables which are only in the growth (political instability) equation. As usual, the symbols ε_1 and ε_2 denote error terms with variances equal to σ_1^2 and σ_2^2 respectively, and $\gamma_1, \gamma_2, \beta_1, \beta_2, \alpha_1$ and α_2 are the vectors of parameters to be estimated.

In order to test all the research hypotheses formulated in section 2, one should examine specific forms of model (1). A crucial step is to decide which variables should enter each equation. In general, we assume that the factors determining political instability may be divided into two groups. The first one includes measures of economic performance, while the second one contains indicators of political unrest. Following the suggestions of Alesina *et al.* (1996), the set of economic variables determining political instability in the initial version of our model consists of the contemporaneous growth rate ($GROWTH$), the one-period-lagged growth rate ($GROWTH_{-1}$) and the one-period-lagged world growth rate $(WGROWTH_{-1})$. Since the importance of the first two variables is rather straightforward, because they allow a distinction between the contemporaneous and lagged effects of

economic growth on political instability, the inclusion of the third one may be helpful in determining whether economic performance relative to the rest of the world is relevant to the popularity of a government in a particular country. As for measures of political unrest, in the initial model we used the $\overline{PI_3}$ variable, defined as the average of the past values of PI from a three year period.[12]

The specification of the growth equation includes contemporaneous political instability (*PI*) defined as the propensity for government change, lagged growth (to measure the persistence of the economic growth process), lagged world growth (to capture the possible effect of the world business cycle on the growth rates of individual countries) and changes in the unemployment rate. [13] In the initial model we have used the employment-related control variable mainly because the labour force is assumed to be the most important variable production factor in the short-run (the concept, assumptions and features of so-called *one-factor production functions* are described in Mansfield (1991) and Takayama (1985)). [14]

To summarize, the abovementioned justification of the choice of identification restrictions gives us $X = [GROWTH_{-1}, WGROWTH_{-1}]$, $X_1 = \Delta UNEMPL$, $X_2 = \overline{PI_3}$. Thus, we start our deliberations from an initial econometric model, which may be written as:

$$(2) \qquad \begin{cases} GROWTH = \gamma_1 PI + \beta_{11} GROWTH_{-1} + \beta_{12} WGROWTH_{-1} + \alpha_1 \Delta UNEMPL + \xi_1 \\ PI = \gamma_2 GROWTH + \beta_{21} GROWTH_{-1} + \beta_{22} WGROWTH_{-1} + \alpha_2 \overline{PI_3} + \xi_2 \end{cases}$$

As mentioned in the introductory subsection we use two different specifications for the instability variable, that is we consider *PI=GCHANGE* and *PI=MCHANGE* to indicate a change in the sign of the latent political instability variable.

4. EMPIRICAL RESULTS

In this section the results of testing for causal dependencies between the variables under study are presented. It is important to note that throughout this section we use the notation introduced in table

3 to describe the relevant mathematical operators. As already mentioned, at the initial stage of empirical research we focus on the group of exactly identified models.[15]

5.1 THE NEXUS BETWEEN ECONOMIC GROWTH AND GOVERNMENT CHANGES

In this subsection we consider the case where $PI = GCHANGE$, i.e. we define political instability as a propensity for any type of government change. Table 4 contains the results of the estimation of model (2) through the application of ECONOMETRIC PROCEDURE I:[16]

INSERT TABLE 4 AROUND HERE

Analysis of the results of the estimation of the growth equation provides evidence of a significant (but only at a 10 per cent level) and negative causal impact of *GCHANGE* on *GROWTH*. The coefficients of both lagged growth rates and the unemployment-related variable were also significant (this time even at a 1 per cent level) and had the expected signs, which in turn suggests that in the transition period the effects of the persistence of economic growth, the impact of the world business cycle and the importance of employment were statistically significant.

On the other hand, in the government change equation the *GROWTH* coefficient, although slightly negative, was not statistically significant at any usually considered level. Both lagged growth rate coefficients were negative, but also statistically insignificant. The $\overline{GCHANGE}_3$ coefficient was significant (at a 5 per cent level), and negative, implying that the more unstable was the period from year *t*-3 to year *t*-1 the smaller was the chance of a government change in year *t*. This suggests that the effect of the persistence of political instability was rather negligible.

In order to confirm the major finding reported in table 4, that is a significant unidirectional and negative impact of government change on economic growth with no significant impact of growth (or lagged growth) on government change, we ran some additional regressions. In order to perform a sensitivity analysis we applied a variety of different sets of control variables in the growth model (1). In general, we analyzed all possible ways of constructing X_1 using the control variables (*EDUC*,

OPEN, *UNEMPL*, *INFL*). Besides variables in their levels, we also used the transformations of them, which were obtained after the application of the three operators described in the last three rows of table 3. Therefore, our sensitivity analysis took into account the level, first difference, lagged value and average of the lagged values of each one of the four control economic variables. We focused on cases where X_1 contains one or two elements.[17] By this means we obtained 112 different variants of set X_1: 16 singletons (four variables times four forms of each variable) and 96 two-element combinations (six pairs of variables times four forms of first variable times four forms of the second variable in each pair).[18] For each research variant the ECONOMETRIC PROCEDURE I was applied and then suitable outcomes were analyzed. The ratios of obtaining significant coefficients at a 10 per cent level are presented in table 5:[19]

INSERT TABLE 5 AROUND HERE

As one can see, only some conclusions formulated after the analysis of the outcomes presented in table 4 turned out to be robust with respect to the model specification details. The contemporaneous negative effect of government change on economic growth was confirmed only in 25 out of 112 cases. The inverse contemporaneous relation was clearly rejected (a significant relation reported only in one case). Similarly, the measure of recent political instability ($\overline{GCHANGE_3}$) was found to be significant and negative in the government change equation in less than half of all cases. However, the significant and positive impact of both lagged growth rates turned out to be robust for the growth equation, regardless of the variant of X_1 used.

Since the results presented in tables 4 and 5 provide solid evidence for claiming that economic growth does not significantly enter the political instability equation, in the final stage of the sensitivity analysis we imposed the restriction $\gamma_2 = 0$ and re-estimated all 112 variants of model (1) using the ECONOMETRIC PROCEDURE II.[20] Table 6 contains the ratios of obtaining significant coefficients at a 10 per cent level:

INSERT TABLE 6 AROUND HERE

The empirical results obtained for 112 recursive models are a little different from the results of the sensitivity analysis presented in the previous table. First of all, the government change coefficient in the growth equation was found to be negative and significant in many more cases (75% of the overall amount), although in 28 cases this result was still not confirmed. This time the measure of recent political instability ($\overline{GCHANGE}_3$) was found to be significant in almost 92 per cent of cases. The lagged growth coefficients were positive and significant in all growth equations, and insignificant in each government change equation. To summarize, we found some evidence in favour of Conjecture 1. On the other hand, Conjectures 2 and 3 should rather be rejected.

The results presented in this subsection provide some evidence for claiming that an increase in the propensity for government change has hampered the growth rates of CEE economies during the whole transition period. However, after performing the sensitivity analysis some doubts on the robustness of this finding also arose. This could be due to the fact that the definition of the indicator variable used in this part of the research was strongly influenced by regular government changes, which in general do not reflect political instability. Therefore, in the next subsection we examine the results of analogous research, this time, however, conducted solely for major government changes.

5.2. THE NEXUS BETWEEN ECONOMIC GROWTH AND MAJOR GOVERNMENT CHANGES

In order to examine the structure of causal links between economic growth and political instability, this time defined as a propensity for major government change, we re-estimated the 112 unrestricted models introduced in the previous subsection for $PI = MCHANGE$. In the following table the ratios of obtaining significant coefficients at a 10 per cent level are presented:

INSERT TABLE 7 AROUND HERE

The results presented in table 7 lead to the conclusion that major government changes had a significant and negative impact on economic growth in about 90 per cent of models tested, while for all-type executive transfers this was reported only in about 22 per cent of cases. Similarly, the political unrest coefficient ($\overline{MCHANGE}_3$) was found to be significant and negative in around 73 per

cent of cases, while for its analogue in the previous part of the research ($\overline{GCHANGE_3}$) this ratio was around 47 per cent. On the other hand, the results obtained for lagged growth rates in both equations were similar to the case of models constructed for *GCHANGE* .

Since the results presented in table 7 provide strong evidence for saying that economic growth does not significantly enter the major government change equation (i.e. $\gamma_2 = 0$ in model (1)), in the next stage of the research we re-estimated all recursive models using ECONOMETRIC PROCEDURE II and assuming that *PI = MCHANGE* . Table 8 contains the ratios of obtaining significant coefficients at a 10 per cent level:

INSERT TABLE 8 AROUND HERE

As we can see the results presented in table 8 provide a solid basis for stating that the unidirectional negative effect of executive transfers on economic growth was much stronger for major government changes than for all types of government changes (including regular ones).

The difference between the results obtained for major and overall government changes were even more distinct when all significance tests were re-run at a 5 per cent and 1 per cent levels. A significant negative impact of *MCHANGE* on *GROWTH* was confirmed in nearly all cases, while for *GCHANGE* these ratios were definitely much lower (even below 25% for the sensitivity analysis at 1% level). The ratios of obtaining significant coefficients are presented in table 9:

INSERT TABLE 9 AROUND HERE

As can be seen in table 9, we also found strong evidence in favour of the hypothesis that for government changes, especially major ones, the effect of persistence was not present. To summarize, in the case where major government changes were chosen as indicators of political instability, we found very convincing evidence in favour of Conjecture 1. On the other hand, our analysis confirmed that in this research variant Conjectures 2 and 3 should be definitely rejected.

Finally, we also examined the sensitivity of the results in the case where $X_2 := \overline{PI_2}$. We re-ran all regressions in basic and recursive variants using indicators of major and all-type government

changes. In general, the previous results also turned out to be robust to this re-specification of the *PI* equation, thereby confirming the significant and negative impact of government changes, mainly major ones, on economic growth. [21]

6 Concluding remarks

CEE economies in transition are a particularly interesting group of countries on which to conduct tests on the dependence between political instability and economic growth. Firstly, for the two last decades these countries have been transforming themselves from centrally planned systems into developed market economies. This process was accompanied by various political reforms and a general improvement in social consciousness. The nations of this part of Europe have got new opportunities and striven for a better standard of living. One of the most important preconditions of this is the quality of the executive. Therefore, it is not surprising that in the period of transition there has been quite significant political unrest in CEE countries, as the authorities were forced to satisfy the rising expectations of the voters. This paper was intended to investigate whether this political unrest and government instability, probably inevitable (at least to some extent) in the first years of transition, have indeed hampered the economic growth of this region. Secondly, we wanted to check whether the reverse relationship was also significant, that is whether the economic performance of these countries was a significant factor in their propensity for government change. To the best of our knowledge, all these CEE-related problems have not been investigated by researchers so far.

In this paper we applied a framework within which political instability is defined as the propensity for government change. To distinguish major government changes from regular ones we applied an additional indicator variable related to a change of the ruling party. This had the advantage of reducing the bias of much-criticized subjective measures of the importance of political events. Moreover, we used the most recent time series on economic growth and four economic control variables, usually with data from the very first year of the transition of the CEE countries.

Finally, to check the sensitivity of the empirical results, we examined several hundred possible modifications of the initial and restricted models using suitable and recent estimation techniques.

The empirical results of this paper lead to few major conclusions. First, during the transition period of CEE economies the causal dependence between economic growth and political instability ran only in one direction – from political instability to growth rate. Moreover, we found convincing and robust evidence for saying that this effect was negative and statistically significant for major government changes. In the case of all-type government changes (including regular ones) this negative impact was robust to the model specification when the sensitivity analysis was conducted at a 10 per cent level, although much less convincing results were obtained for a sensitivity analysis conducted at a 5 per cent and 1 per cent levels. Both these findings indicate that political instability, measured as a propensity for major government change, hampered the economic growth of new EU member countries in transition. Another important conclusion is that government changes (major and regular) were not persistent, that is more recent political adjustments have reduced the likelihood of elections in the following year. Although this is not very surprising for regular government changes (as regular elections take place every four years), it has far more important implications for major government changes. When we compare this result with the previous remarks (that is a negative impact of major changes on growth) we can draw a general conclusion of this paper: *Major government changes hindered the economic growth of new EU members in transition. However, these changes were not persistent.* In other words, from the very beginning of the transition of CEE economies it is true that political instability was significantly harmful for economic growth. Having said that, the empirical results of this paper (that is lack of persistence in government changes) seem to confirm that the people of this region have clearly opted for more democracy and stability in politics, which in turn has had an indirect positive impact on economic growth. Finally, the lack of causality in the opposite direction may suggest that after the collapse of the former authoritarian political and economic systems in the CEE, the frequent changes of governments (especially in the

first decade of transition) were not only due to economic crises and poverty, but primarily due to the lack of experienced specialists and politicians who could solve the new problems and face new challenges.

Due to the relatively short time series available, this paper focused solely on short-run dependencies. However, when more data is available, an analysis of the long-run dependencies between economic growth and political instability in CEE transition economies will be an interesting research avenue to extend and supplement the outcomes of this paper.

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NOTES (MAIN TEXT)

[1] This is not obvious for some groups of countries. For example, in the case of Italy the high number of government changes and adjustments over many years was accompanied by relatively high economic growth.

[2] Durlauf and Quah (1998) provide excellent review of the empirical literature on this topic.

[3] The fact that political instability-growth links are strongly region-dependent was underlined by many authors; see for example Campos and Nugent (2000).

[4] In the period 2004-2007 twelve countries joined the EU. However, Malta and Cyprus have not been taken into consideration in this study since the evolution of the economies of these countries is significantly different from that of the ten other new EU members, more importantly, the economies of Malta and Cyprus have never been in a transition phase.

[5] Since for some of the economic control variables used the data is often published with a two-year lag, the sample 1990-2009 was the longest available at the time of preparing this paper.

[6] The impact of human capital on economic growth has frequently been underlined by many authors, see for example Alesina *et al.* (1996), Barro (1991).

[7] This means that the data used in this research is easily obtainable by every Reader, which allows a full reproduction of the results or an analysis of some CEE-related research problems not discussed in this paper.

[8] Note that even if there was no major government change, the pre-election uncertainty could have a significant impact on the performance of an economy (for example an impact on the strategy and decisions of investors based solely on their expectations).

[9] In general, both these findings, that is the lower growth in government change periods and the higher frequency of government change in periods characterized by below-average growth, were also confirmed by the results of similar calculations conducted individually for each country.

[10] The endogenity of measures of political instability and economic growth has been underlined by many authors; see for example Gyinmah–Brempong and Traynor (1999), Blanco and Grier (2009).

[11] For more detail on these types of simultaneous models see Maddala (1983). In this paper we consider two possible definitions of indicator PI , that is in the first case we set $PI = GCHANGE$ and then we set $PI = MCHANGE$. See table 2 for a description of variables $GCHANGE$ and $MCHANGE$.

[12] See table 3 for a description of this operator. This type of variable corresponds to the idea of measuring persistence of political instability presented in Alesina *et al.* (1996).

[13] The average of lagged government changes is not considered in the growth equation as they are assumed to influence growth only indirectly (through a direct impact on the *PI* variable). We will return to this issue when discussing the empirical results.

[14] In the initial model we decided to use a change in unemployment rather than its level, as we focus on growth rates rather than levels of GDP (which are directly influenced by levels of unemployment). However, different choices of control variables will be extensively discussed in a subsequent part of the paper.

[15] In this paper we will also examine examples of overidentified models, allowing X_1 and X_2 to have different numbers of elements.

[16] Details on the econometric procedures applied (ECONOMETRIC PROCEDURE I and ECONOMETRIC PROCEDURE II) are presented in the Appendix. Numbers in round brackets denote the significance levels of estimated coefficients.

[17] In the cases when X_1 was a two-element set and X_2 remained unchanged (singleton), we should formally examine the issue of overidentifying restrictions. This, however, is rather a minor aspect in our research, as our main goal is to describe the causal links between political instability and economic growth in CEE countries. In order to reduce the risk of multicollinearity, we restricted the sensitivity analysis to cases of no more than two growth-specific control variables in the growth equation.

[18] Since an analysis of the significance and signs of the coefficients of the control variables in the growth equation is less important for the main goal of this paper, we do not present these results in tables 5-9. The detailed results of all estimations are available from the authors upon request.

[19] In order to verify the empirical results we were forced to control not only significance levels but also the signs of coefficients. Thus, in tables 5-9 in the round brackets the numbers of significant parameters with expected sign are additionally presented. For example, the notation "48/96 (47-)" denotes finding statistically significant coefficient in 48 out of 96 models examined. Moreover, the signs of the statistically significant coefficients were negative in 47 out of the 48 cases.

[20] Model (1) with the restriction $\gamma_1 = 0$ or $\gamma_2 = 0$ is called a *recursive model*. In such cases the ECONOMETRIC PROCEDURE I should be replaced by a more adequate estimation technique. The suitable estimation method, referred to as the ECONOMETRIC PROCEDURE II, is described in detail in the Appendix at the end of the paper.

[21] These supplementary results are available from the authors upon request.

Appendix

A.1. GENERAL REMARKS

The estimation of model (1) cannot be performed through the application of standard econometric methods (such as 2SLS and so forth), as one of the dependent variables is latent. A suitable estimation procedure was presented in Maddala (1983). Since nowadays this method is a standard econometric procedure, we will only provide a brief description of it.

Because political instability, i.e. PI^*, is not directly observable, in the initial stage one should define[22] $PI^{**} = PI^* \left(\sigma_2\right)^{-1}$ and then rewrite model (1) in the following form:

$$GROWTH = \gamma_1 \sigma_2 PI^{**} + X\beta_1 + X_1\alpha_1 + \varepsilon_1 \tag{3}$$

$$PI^{**} = \frac{\gamma_2}{\sigma_2} GROWTH + X\frac{\beta_2}{\sigma_2} + X_2\frac{\alpha_2}{\sigma_2} + \frac{\varepsilon_2}{\sigma_2}. \tag{4}$$

After defining the set X_{ALL}, which contains all the exogenous variables that occur in both equations in model (1),[23] the following estimation procedure of the system of simultaneous equations should be performed:

ECONOMETRIC PROCEDURE I

STEP 1: Estimate through OLS the model $GROWTH = \Pi_1 X_{ALL} + \eta_1$, where Π_1 stands for the vector of parameters and η_1 stands for error term. Denote the predicted values as $GROWTH^{HAT}$.

STEP 2: Estimate through probit the model $PI^{**} = \Pi_2 X_{ALL} + \eta_2$, where Π_2 stands for the vector of parameters and η_2 stands for the error term. Denote the predicted values as PI^{**HAT}.

STEP 3: In the next stage rewrite models (3) and (4) placing the fitted values obtained in STEP 1 and STEP 2 on the right hand side of both equations:

(5) $$GROWTH = \gamma_1' PI^{**HAT} + X\beta_1' + X_1\alpha_1' + \xi_1$$

(6) $$PI^{**} = \gamma_2' GROWTH^{HAT} + X\beta_2' + X_2\alpha_2' + \xi_2$$

and then use OLS and probit to re-estimate equations (5) and (6) respectively.

STEP 4: After estimating models (5) and (6) it is necessary to correct the standard errors, because the estimation in STEP 3 was based on PI^{**HAT} and $GROWTH^{HAT}$, not on an appropriate PI^{**} and $GROWTH$ variables, which biases the estimators of standard errors (and the results of significance tests). Maddala (1983) provides a relatively simple algorithm for correcting standard errors. To save space we will not present the full details of this method. A practical implementation of this procedure along with a theoretical description may be found in Keshk (2003).[24]

In the next subsection we will characterize the estimation procedures used in cases when a simultaneous effect is present in exactly one of equations in model (1).

A.2. RECURSIVE MODELS

If some preliminary calculations (or economic theory) provide a solid basis for assuming that exactly one of parameters γ_1 and γ_2 equals zero in model (1), then a simultaneous model turns into a recursive model. As a consequence, the general procedure presented in subsection A.1 should be replaced by more adequate methods. The details of estimation procedures depend on which restriction: $\gamma_1 = 0$ or $\gamma_2 = 0$ is imposed.

A.2.1. THE RESTRICTION $\gamma_1 = 0$

This corresponds to the problem of the estimation of a probit model with continuous endogenous covariates. Suitable estimation techniques for this type of model are well-known, thus we will not provide a detailed description. The theoretical fundamentals of these estimation techniques may be found in Newey (1987). The author proposed a suitable application of Amemiya's Generalized Least Squares (AGLS; see Amemiya, 1978) estimator in order to efficiently estimate the parameters of a probit model, when it includes a continuous endogenous regressor. This procedure is currently one of the standard ways of estimating the variant of model (1) discussed above.[25]

A.2.2. THE RESTRICTION $\gamma_2 = 0$

In general the condition $\gamma_2 = 0$ generates two interesting situations. First, if the continuous variable is only observed given some selection criterion defined by the latent endogenous variable, we have an example of what is known as a *sample selection model*. It is clear that this kind of specification cannot be applied in the case of our model (as growth is always observed), so we will not discuss it in detail. For a detailed discussion of such models and their methods of estimation see Barnow *et al.* (1981), Breen (1996), and Maddala (1983).[26]

When there is no solid reason to make use of a sample selection model, the condition $\gamma_2 = 0$ implies a typical recursive model with a continuous and latent variable. Methods for fitting such models are discussed in detail in Maddala and Lee (1976).

In order to briefly describe these estimation procedures consider the initial form of the (recursive) model:[27]

(7) $$y_1 = \gamma_1'' y_2^* + X\beta_1'' + X_1\alpha_1'' + \zeta_1$$

(8) $$y_2^* = X\beta_2'' + X_2\alpha_2'' + \zeta_2$$

In general the maximum likelihood function takes the form (Maddala and Lee, 1976):

(9) $$L = \prod_{y_1, y_2} \left[g(y_1, y_2 = 1)^{y_2} \, g(y_1, y_2 = 0)^{1-y_2} \right],$$

where the joint density function of (y_1, y_2) is defined as:

(10) $$g(y_1, y_2 = 1) = \int_{-\infty}^{X\beta_2'' + X_2\alpha_2''} f\left(y_1 - \gamma_1'' - X\beta_1'' - X_1\alpha_1'', \zeta_2\right) d\zeta_2$$

and

(11) $$g(y_1, y_2 = 0) = \int_{X\beta_2'' + X_2\alpha_2''}^{\infty} f\left(y_1 - X\beta_1'' - X_1\alpha_1'', \zeta_2\right) d\zeta_2$$

and $f(\zeta_1, \zeta_2)$ denotes the joint density function of error term (ζ_1, ζ_2).

If the error terms in (7) and (8) are independent then (9) takes the form:

(12) $$L = \prod_{y_1} f\left(y_1 - \gamma_1'' y_2 - X\beta_1'' - X_1\alpha_1''\right) \prod_{y_2} \left[F(X\beta_2'' + X_2\alpha_2'')^{y_2} \left(1 - F(X\beta_2'' + X_2\alpha_2'')\right)^{1-y_2} \right],$$

where *f* stands for the density functions of error term ζ_1 and *F* denotes the cumulative distribution function of error term ζ_2. Thus, maximizing *L* is equivalent to maximizing likelihood functions for both equations separately. Of course if ζ_1 and ζ_2 are both normally distributed this means that equation (7) may be estimated through OLS and (8) through probit.

From our perspective a much more interesting case is when ζ_1 and ζ_2 are not independent.[28] As mentioned by Maddala and Lee (1976), in this case we have to obtain consistent initial estimates to start the iteration of the maximizing likelihood procedure. If we assume that the error term has a two-dimensional normal distribution:[29]

(13) $$\begin{bmatrix} \zeta_1 \\ \zeta_2 \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & 1 \end{bmatrix} \right)$$

we can get consistent initial estimates for an iteration-based maximization of (9) quite easily after performing the following procedure:

ECONOMETRIC PROCEDURE II

STEP 1: Estimate (8) through probit.

STEP 2: Rewrite (7) in the form:

$$y_1 = X\beta_1'' + X_1\alpha_1'' + \gamma_1''F(X\beta_2'' + X_2\alpha_2'') + \gamma_1''(y_2 - F(X\beta_2'' + X_2\alpha_2'')) + \zeta_1 = \\ = X\beta_1'' + X_1\alpha_1'' + \gamma_1''F(X\beta_2'' + X_2\alpha_2'') + \omega \tag{14}$$

where $\omega = \gamma_1''(y_2 - F(X\beta_2'' + X_2\alpha_2'')) + \zeta_1$. Next estimate the model:

$$y_1 = X\beta_1'' + X_1\alpha_1'' + \gamma_1''F(X\beta_2'' + X_2\alpha_2'') + \omega \tag{15}$$

and denote the vectors of the estimated coefficients as $\hat{\beta}_1''$, $\hat{\alpha}_1''$ and $\hat{\gamma}_1''$. Next denote the estimated residuals of the first equation as $\hat{\zeta}_1 = y_1 - X\hat{\beta}_1'' - X_1\hat{\alpha}_1'' - \hat{\gamma}_1''y_2$.

STEP 3: Calculate a consistent estimator of σ_1^2 using formula $\hat{\sigma}_1^2 = \left[\sum_{i=1}^{T}\left(\hat{\zeta}_1\right)^2\right](T)^{-1}$, where T denotes the sample size.

STEP 4: Regress through OLS the following equation:

$$Z = aU + \eta, \tag{16}$$

where $Z := y_1 - X\hat{\beta}_1'' - X_1\hat{\alpha}_1''$, $U := \left(-\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}\left(X\hat{\beta}_2'' + X_2\hat{\alpha}_2''\right)^2}\right)\left(F\left(X\hat{\beta}_2'' + X_2\hat{\alpha}_2''\right)\right)^{-1}$ and η is the error term. The consistent estimator of σ_{12} is equal to the estimator $\hat{a}$ obtained from (16).

ECONOMETRIC PROCEDURE II provides consistent estimators of the unknown parameters of (7) and (8), which then may be used as initial values in the iterating procedure of maximising the likelihood function (9).[30]

NOTES (APPENDIX)

[22] This is done only for presentation purposes. In general, we could follow the traditional approach and simply at the beginning assume that the error term in the second equation in model (1) has a unit variance.

[23] Using the traditional notation based on an observation matrix this definition could be expressed by the formula: $X_{ALL} = (X +_C X_1) +_C X_2$, where matrices X, X_1 and X_2 are defined in model (1) while "$+_C$" denotes a column-wise concatenation operator, that is if $A = \left[a_{ij}\right]_{\substack{i=1,\ldots,n \\ j=1,\ldots,m}}$ and $B = \left[b_{ij}\right]_{\substack{i=1,\ldots,n \\ j=1,\ldots,k}}$ then

$A +_C B := \left[c_{is}\right]_{\substack{i=1,\ldots,n \\ s=1,\ldots,m+k}}$ where $c_{is} = \begin{cases} a_{is} & \text{if } s \le m \\ b_{ij} & \text{if } s = m + j \end{cases}$.

[24] ECONOMETRIC PROCEDURE I is directly available in STATA software throughout the application of command "cdsimeq".

[25] Professional econometric software (for example STATA) offers several possibilities of estimating such models. However, as mentioned in Adkins (2009) it is also relatively easy to implement this variant of AGLS procedure in all open-source economic software, as long as some basic programming is applicable.

[26] STATA's procedure "treatreg" can perform all the necessary estimations for such models in two-stage and maximum likelihood variants.

[27] To present suitable formulas in a transparent way we use the shortened notation: $y_1 = GROWTH$ and $y_2^* = PI^{**}$ $(y_2 = PI)$.

[28] Compare the indications of significant simultaneity reported in table 3.

[29] As already mentioned, the unit variance of ζ_2 comes directly from the specification of models (3) and (4), but one just might as well assume this condition in model (1) without loss of the generality of further results.

[30] The STATA procedure "cmp" allows an estimation of this type of recursive models. See Roodman (2011) for more details.

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TABLES

TABLE 1. Countries and periods analyzed in this paper

COUNTRY	SAMPLE PERIOD
Bulgaria	1990-2009
Czech Republic	1993-2009
Estonia	1991-2009
Hungary	1990-2009
Latvia	1991-2009
Lithuania	1991-2009
Poland	1990-2009
Romania	1990-2009
Slovakia	1993-2009
Slovenia	1991-2009

TABLE 2. Brief description of data and operators used in this paper

Full name	Abbreviation used	Definition	Unit
ECONOMIC VARIABLES			
GDP growth rate*	*GROWTH*	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2000 U.S. dollars.	%
Tertiary school enrolment*	*EDUC*	Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of tertiary education. This indicator is often used to measure the level of human capital.[6]	%
Trade openness**	*OPEN*	Exports plus imports divided by GDP is the total trade as a percentage of GDP. The export and import figures are in national currencies from the World Bank and United Nations data archives.	%
Unemployment rate*	*UNEMPL*	Unemployment refers to the share of the labour force that is without work but available for and seeking employment.	%
Inflation rate*	*INFL*	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services.	%
World growth rate*	*WGROWTH*	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2000 U.S. dollars.	%
POLITICAL INSTABILITY VARIABLES			
Major government change	*MCHANGE*	This variable is equal to one if there was a substantial government change, that is if new prime minister was representing a different party than the previous one. We also assumed that whenever outgoing or new prime minister was not a member of political party *MCHANGE* took the value 1.	-
Government change	*GCHANGE*	This variable is equal to one if there was any type of government change (major or just regular), and zero otherwise.	-

MATHEMATICAL OPERATORS		
Name	Parameters	The symbol used and result of transforming series $x=(x_t)_{t=1,..,N}$
Lag operator	*p*	$x_{-p} := (x_{t-p})_{t=p+1,...,N}$
Differencing operator	-	$\Delta x := (x_t - x_{t-1})_{t=2,...,N}$
Lagged-average operator	*n*	$\overline{x}_n := \frac{\sum_{i=1}^{n} x_{-i}}{n}$

* data from World Development Indicators provided by the World Bank

** data from Penn World Table 7.0

TABLE 3. Descriptive statistics of examined data

FULL SAMPLE STATISTICS					
ECONOMIC VARIABLES			POLITICAL INSTABILITY VARIABLES		
Variable	Mean	Standard deviation	Variable	Mean	Standard deviation
GROWTH	2.55	5.65	*MCHANGE*	0.31	0.43
EDUC	43.54	19.41			
OPEN	106.83	32.72			
UNEMPL	10.57	4.71	*GCHANGE*	0.46	0.49
INFL	30.24	93.49			
WGROWTH	2.65	1.49			
SUBSAMPLE STATISTICS					
Variable	Mean	Standard deviation	Restriction		
GROWTH	2.11	5.89	*MCHANGE*=1		
	2.82	5.51	*MCHANGE*=0		
	1.95	6.16	*GCHANGE*=1		
	3.10	5.10	*GCHANGE*=0		
MCHANGE	0.28	0.46	*GROWTH* greater than full-sample average		
	0.33	0.47	*GROWTH* not greater than full-sample average		
GCHANGE	0.41	0.49	*GROWTH* greater than full-sample average		
	0.56	0.51	*GROWTH* not greater than full-sample average		

TABLE 4. Results of estimation of model (2) with $PI = GCHANGE$

	COEFFICIENTS ESTIMATES	
	Growth equation	Political instability (government change) equation
GROWTH	-	-0.03 (0.72)
GCHANGE	-2.60 (0.09)	
$GROWTH_{-1}$	0.34 (0.00)	-0.39 (0.28)
$WGROWTH_{-1}$	0.89 (0.01)	-0.07 (0.54)
$\Delta UNEMPL$	-0.52 (0.01)	-
$\overline{GCHANGE}_3$	-	-0.82 (0.04)
Constant	-0.98 (0.26)	0.48 (0.15)

TABLE 5. Sensitivity analysis for model (1) with different control variables and $PI = GCHANGE$

	SINGLETON X_1		TWO-ELEMENT X_1	
	Growth equation	Government change equation	Growth equation	Government change equation
GROWTH	-	0/16	-	1/96 (1-)
GCHANGE	4/16 (4-)	-	21/96 (21-)	
$GROWTH_{-1}$	16/16 (16+)	0/16	96/96 (96+)	0/96
$WGROWTH_{-1}$	16/16 (16+)	0/16	91/96 (91+)	0/96
$\overline{GCHANGE}_3$	-	5/16 (5-)	-	48/96 (47-)

TABLE 6. Sensitivity analysis in recursive models ($\gamma_2 = 0$, $PI = GCHANGE$)

	SINGLETON X_1		TWO-ELEMENT X_1	
	Growth equation	Government change equation	Growth equation	Government change equation
GCHANGE	11/16 (11-)	-	75/96 (73-)	
$GROWTH_{-1}$	16/16 (16+)	0/16	96/96 (96+)	0/96
$WGROWTH_{-1}$	16/16 (16+)	0/16	96/96 (96+)	0/96
$\overline{GCHANGE}_3$	-	15/16 (15-)	-	90/96 (88-)

TABLE 7. Sensitivity analysis for model (1) with different control variables and $PI = MCHANGE$

	SINGLETON X_1		TWO-ELEMENT X_1	
	Growth equation	Major government change equation	Growth equation	Major government change equation
GROWTH	-	1/16 (1-)	-	2/96 (2-)
MCHANGE	15/16 (15-)	-	86/96 (85-)	
$GROWTH_{-1}$	16/16 (16+)	1/16 (1-)	96/96 (96+)	1/96 (1-)
$WGROWTH_{-1}$	16/16 (16+)	1/16 (1-)	95/96 (95+)	0/96
$\overline{MCHANGE}_3$	-	10/16 (10-)	-	72/96 (72-)

TABLE 8. Sensitivity analysis in recursive models ($\gamma_2 = 0$, $PI = MCHANGE$)

	SINGLETON X_1		TWO-ELEMENT X_1	
	Growth equation	Major government change equation	Growth equation	Major government change equation
$MCHANGE$	16/16 (16-)	-	96/96 (96-)	-
$GROWTH_{-1}$	16/16 (16+)	0/16	96/96 (96+)	0/96
$WGROWTH_{-1}$	16/16 (16+)	0/16	96/96 (96+)	0/96
$\overline{MCHANGE}_3$	-	16/16 (16-)	-	96/96 (96-)

TABLE 9. Results of joint sensitivity analysis in recursive models ($\gamma_2 = 0$)

	5 PER CENT LEVEL [1 PER CENT LEVEL]			
	$PI = MCHANGE$		$PI = GCHANGE$	
	Growth equation	Political instability equation	Growth equation	Political instability equation
PI	112/112 (112-) [110/112 (110-)]	- [-]	75/112 (75-) [26/112 (26-)]	- [-]
$GROWTH_{-1}$	112/112 (111+) [112/112 (111+)]	0/112 [0/112]	112/112 (112+) [112/112 (112+)]	0/112 [0/112]
$WGROWTH_{-1}$	112/112 (112+) [112/112 (112+)]	0/112 [0/112]	112/112 (112+) [112/112 (112+)]	0/112 [0/112]
$\overline{PI}_3$	- [-]	112/112 (112-) [112/112 (112-)]	- [-]	110/112 (110-) [106/112 (106-)]