Sources of Economic Instability: Are Institutional factors the most important?*

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Abstract
In this study we put into question the result found by Acemoglu et al. (2003) who emphasize that distortionary macroeconomic policies reflect the institutional environment, which would be the main and ultimate cause of volatility. This result seems to arise from institutional differences among developed and developing countries. Thus, we find similar outcome in our worldwide sample of 115 countries, though we find different one in our sub-sample of 38 developing countries because of the importance of other factors, such as fiscal volatility and interest rate volatility, at explaining economic instability.

JEL CLASSIFICATION: E32, O11, O23

Keywords: Macroeconomic volatility, institutions, macroeconomic policy, external shocks

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1. INTRODUCTION

There is a thriving and recent strand of literature on economic volatility which stems from the well-documented observation\(^1\) of a big drop on GDP growth rate volatility in the United States since the first half of the 1980’s decade\(^2\). This phenomenon has been documented in others countries as well, though for different periods\(^3\).

Similarly, De Ferranti et al. (2000) show that there are significant geographical differences in output volatility. Developing regions are more economically unstable that developed regions (see Figure 1)

![Figure 1: Long run volatility of GDP growth rate (% points)](image)

Economic instability could mainly stem from the macroeconomic policies that have been carried out in each country since the distortionary macroeconomic policy may translate into higher inflation rates, misaligned real exchange rates and unsustainable fiscal deficits. These economic policies are dynamically inconsistent because of their implication on financial crises and force adjustments which are reflected in huge GDP growth rate changes and a lower average growth. Several papers support this hypothesis, such as Blanchard and Simon (2002) and Martin and Rowthorn (2004).

However, Acemoglu et al. (2003) have rebutted this hypothesis, and emphasized that distortionary macroeconomic policies actually reflect institutional factors. This would be the ultimate source of economic instability. An possible interpretation of Acemoglu’s hypothesis is that countries with a poor institutional environment do not have strong

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\(^2\) Blanchard and Simon (2001) have explained that the drop has been happening since 1950, although interrupted temporally during the 1970’s decade.

\(^3\) See Dalsgaard et al. (2002), Dijk et al. (2002) among others.
states that can guarantee the order in a market economy, inducing economic agents to take advantage of governments (state’s capture), which is then reflected in distortionary macroeconomic policies.

Beginning with North’s work (1990), institutions are conformed by rules, including social norms of behavior, mechanisms of fulfillment and action of the organizations that encourages propitious ways of behavior for society. For instance, monetary and fiscal policy rules that restrict the power of governments help minimize possible distortions on the implementation of macroeconomic policy are also part of the institutional baggage of a country. In that sense, it is possible to understand macroeconomic policies as determined by institutions.

Besides, the literature has emphasized the role played by external shocks in economic instability, particularly in some regions which are usually small and open economies, such as Latin America, Asia and Africa. It would be interesting to compare the hypothesis that external shocks are the main determinants of economic instability, with the hypothesis that focuses on the role played by domestic policies which stem from the institutional environment.

Consequently, what is the importance of higher or lower growth rate volatility? A branch of the economic growth literature has pointed out the influence that could play a high cyclical volatility on average growth rate\(^4\). For instances, Fatas (2002 y 2000) develops a theoretical relationship between business cycle and growth, while Loayza et al. (2002) find that business cycle volatility has had a negative impact on growth for a panel sample in Latin America (see Figure 2). Ramírez Rondán et al. (2004) show that business cycle volatility and inflation crises have had a negative impact on Total Factor Productivity (TFP) growth in Latin America.

**Figure 2. - Per Capita GDP Growth and Volatility in Latin America 1960-2002**

![Figure 2. - Per Capita GDP Growth and Volatility in Latin America 1960-2002](image)

Note: For every country, we compute the per capita GDP growth from 1960 to 2000 through Ordinary Least Square (OLS) estimation of the logarithm of per capita GDP against a constant and a linear trend. We use the linear trend as rates of economic growth. We compute economic volatility through the standard deviation of the annual rate of economic growth.


Thus, the economic growth literature suggests that a mishandling of economic policy that induces a higher economic volatility would have a negative impact on long run growth and productivity. Then, we can raise the following question: To what extent is it possible to explain growth rate volatility with factors of domestic economic policy and not by exogenous external shocks (that is, out of the influence of economic authorities)?

In the present paper we confront both of these hypotheses of the sources of economic instability. We build an empirical model that attempts to explain GDP growth rate volatility in terms of macroeconomic and institutional variables and external shocks, but indeed we attempt to confront the hypothesis of Acemoglu et al. (2003) who emphasize that institutional environment is main and ultimate cause of volatility. As a consequence, we raise the following question: Is institutional environment the most important source of growth rate volatility as in developed as developing countries?

The paper is divided into the following parts: in the second part we discuss the theoretical framework, exploring the possible causes for output growth rate volatility. The third part discusses the empirical methodology and data used. In the fourth part we show the estimation’s results and, finally in the fifth part, we state some conclusions.

2. THEORETICAL FRAMEWORK

An outstanding reference of the economic instability literature is Stock and Watson’s work (2002) where they imply that the main cause of the fall in U.S. output growth volatility was not structural changes in the economy, or a better handling of economic policy but less frequent occurrence of shocks. These have been entitled the “good luck” explanation for the changes in economic volatility.

However, Blanchard and Simon (2001) and Martin and Rowthorn (2004), despite their agreement with the whole idea of the existence fewer economic shocks; they also suggest that the decrease in output growth volatility is more complex that the “good luck” explanation would suggest. Moreover, they state that the clue to lower economic instability is to be sought on monetary policy, since its management could amplify or minimize the business cycle. The mismanagement of monetary policy causes higher inflation rates, affecting inflation expectations, which distorts spending decisions by agents and causes greater output growth rate volatility. That is, this distortionary policy affects particularly the most volatile components of GDP, such as private investment. This hypothesis is demonstrated by Martin and Rowthorn (2004) and Bean (1998), using a formal model.

Instead, if monetary policy authorities are committed to keeping low inflation rates and increasing their credibility, so inflationary expectations would be reduced. In other words, these hypothesis states that output growth rate volatility depends mainly on the stability of the monetary sector, which is mainly a macroeconomic factor. Blanchard and Simon (2001) and Martin and Rowthorn (2004) confirm these hypothesis empirically through econometric analysis.

Nevertheless, this is just the first part of the economic instability analysis, because there is a recent branch of the literature that has focused on institutional factors, emphasizing
that distortionary macroeconomic policies reflect the institutional environment, which would be the main and ultimate cause of volatility. For instance, Acemoglu et al. (2003) suggest that countries with a low level of institutional development not have a strong state to guarantee the rules of the game in a market economy, inducing economic agents to take advantage of government to their own welfare (state’s capture), which is reflected in distortionary macroeconomic policies.

Douglass North (1981) defines institutions as “a set of rules, compliance procedures, and moral and ethical behavioral norms designed to constrain the behavior of individuals in the interest of maximizing the wealth or utility of principal” (see also Glaeser, 2004). The key word in this definition is the term *constrain*, since it emphasizes the need of using means to restrict government actions as well as mechanisms to guarantee property rights, and therefore encouraging a good investment environment. These constraints are able to limit the extent of possible government capture, and ultimately limit the power of some agents to introduce distortionary economic policies. Thus, institutions may be interpreted as the rules of the game in a society or, more formally, as the constraints placed by society to shape human interactions.

The concept of organization is different from that of an institution, because whereas institutions describe the rules of an organization, the former is related to groups that work according to a certain institutional framework (rules).

Anyway, the main issue regarding to institutional design is to determine the most appropriate set of institutions (both, political and economic) for a specific society. However, this task is a very complex process, since a set of institutions may be appropriate or not depending on each political, social and economic context. Of course, this makes it hard to recommend specific policies for the improvement of the institutional environment without a detailed knowledge of the problems that each society faces. Yet, it is still possible to point out some common problems and symptoms.

The theoretical framework in Acemoglu et al. (2003) suggests that macroeconomic and institutional variables be actually different factors. Instead, we argue that macroeconomic policies and institutions are the same factor, since they have similar roots, and which is supposed to be considered when we attempt to explain economic instability.

In fact, a large part of the monetary and fiscal policy literature produced during the last two decades has shown that there are important benefit coming from the use of rules as constraints to the power of government, particularly when this are prone to state capture. Then, since we are understanding institutions as *rules*, it is straightforward to concede the relationship between institutions and macroeconomic policy on economic instability.

Moreover, the relationship between the design of monetary policy and institutional design has also been studied by Kydland and Prescott (1977) in the well-known concept of *dynamic inconsistency*, which states that the implementation of discretionary macroeconomic policies often causes a higher inflation, even when the monetary authority is committed to doing otherwise.
Weak institutions not only undermine monetary policy, for they also stimulate an unsustainable increase in public debt and mishandling of fiscal policy. An appropriate institutional structure includes a system of restrictions (rules) that makes it difficult for the government to incur irresponsible policies of public spending. For example, fiscal policy in developing countries tends to be procyclical. This pattern is consistent with the use of state’s resources for crony politics.

Likewise, fiscal deficits tend to be unsustainable in economies with weak institutional constraints. It is necessary to take account that the fiscal deficit is the difference between unpopular taxes and popular expenditure. That’s why the fiscal deficit reflects, among other factors, the degree of the state’s strength against political pressures. A strong state can usually establish responsible fiscal rules and fulfill them.

Also, a weak separation of powers within the state is an incentive for the implementation of distortionary macroeconomic policies, for it increases the power of the executive branch of government. This translates into macroeconomic instability, and a succession of crises and adjustments that restrict productivity and economic growth.

This implies that the institutional design matters when economic policies are elaborated. Nevertheless, it is necessary to recall that there is a dilemma between the credibility of economic policies (via the establishment of policy rules) and their flexibility to respond to a changeable environment. The more rigid a policy rule is, it may cause more problems than not. The credibility of economic policy is not a goal on its own; rather, it is a way to limit the discretionary element of policy in order to achieve macroeconomic stability. In this sense, the institutional design, for example, by means of simpler rules of macroeconomic policy that are more transparent and verifiable, is an important step toward achieving economic stability.

Therefore, we regard it more useful to assess the influence of domestic policies against external factors as determinants of economic instability. In the first group, we would consider both institutions and macroeconomic policy rules. In the second group, we include the incidence of several exogenous shocks, which is what Stock and Watson (2002), among others, state as main factors of economic instability. The difference between both set of determinants is that the first one depends mainly on domestic policy decisions within each country, whereas the second one depends more on factors which are independent from domestic policy in each country.

This difference is particularly interesting for regions like Latin America and Africa, since one of the stylized facts of the literature dealing with the economic performance of those regions emphasizes the role played by exogenous shocks in shaping the output growth rate volatility in this region. Thus in this work, the hypothesis is that institutional factors and domestic policy also play an important role, which could even be greater than the one played by "luck".

Anyway, how would the design of institutional policy interact with external shocks? A hypothesis is that institutional rules can also amplify or reduce the effects that economic shocks can have on GDP growth rate volatility. Then, the emphasis of our investigation should be on the roll played by what Rodrick (2000) calls "market-supporting institutions", which are institutions for handling conflicts, macroeconomic stabilization
and regulation. Institutions for handling conflicts are important because they determine how a country adjusts its macroeconomic policy when it is hit by sudden shocks. Meanwhile, institutions of macroeconomic stabilization and regulation are reflected in certain monetary and fiscal policy rules.

3. EMPIRICAL STRATEGY

3.1. DATA

The data spans from 1963 to 2002 and is treated as two empirical strategies, the first one considering a worldwide sample of 115 countries and second one isolating a sub-sample of 38 developing countries. Most of the variables come from the World Development Indicators (2004) data base compiled by the World Bank. The data is grouped in 5-year period, so we have 8 time periods.

As a special case of study we consider a sub-sample of 38 developing economies for testing the hypothesis of Acemoglu et al. (2003): Argentina, Bangla Desh, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Gambia, Ghana, Guatemala, Haiti, Honduras, India, Indonesia, Israel, Kenya, Republic of Korea, Madagascar, Malaysia, Mexico, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, South Africa, Sri Lanka, Thailand, Togo, Trinidad and Tobago, Tunisia, Uruguay, Venezuela, and Zambia.

From the discussion of the previous part, we concluded that economic volatility depends on two main factors: Macro-institutional factors, external factors. Nevertheless, it is difficult to deal with institutional variables at the empirical level because they resist quantification. Since institutions are rules, their nature is fundamentally qualitative, rather than quantitative.

The surge of academic interest in institutional variables has made tangible the need for better datasets to measure them. However, most results seem to be dubious. Glaeser et al. (2004) argue that most datasets assembled to measure institutions have two main problems:

1) They are endogenous, that is, they are positively correlated with per capita GDP.
2) They are very volatile.

We believe that these critics seem to stem from the fact that most of these datasets are constructed from surveys, so that they capture results from policies, rather than rules themselves.

In fact, outcomes from a political process may depend on a huge array of variables, some of which are indeed not even related to institutions themselves. So, the assumption that political or economic outcomes are a good proxy for institutions is quite strong. Therefore, an adequate measurement of institutions must focus on the quality on the rules, not on the quality of the outcomes. Nonetheless, often quality of the rules is a variable not directly observable and hardly quantifiable. Therefore, even if we believe
that one variable is measuring the quality of the rules, caution is due as we interpret the results.

The choice of the variable to be used must take these critics into account. In that sense, the POLITY IV database, by Monty Marshall and Keith Jaggers (Marshall and Jaggers, 2002) would seem to be one on the best attempts to measure rules and institutional conditions, instead of measuring results.

As the authors indicate:

“The unit of analysis is the “polity.” Webster’s New World College Dictionary defines a “polity” as a “political or governmental organization; a society or institution with an organized government; state; body politic.” Eckstein and Gurr (1975, 26) provide a “simple, general definition of all ‘polities’ (or ‘governments’) as subsets of the class of ‘authority patterns.’” They further point out that “all authority patterns are ‘equivalents’ of state-organizations.” (25) Authority patterns are defined as “a set of asymmetric relations among hierarchically ordered members of a social unit that involves the direction of the unit....The direction of a social unit involves the definition of its goals, the regulation of its members’ behavior, and the allocation and coordination of roles within it.” (22) They go on to identify three salient norms as bases of regime legitimacy: personal (executive recruitment), substantive (directiveness and responsiveness–executive constraints), and participation (political competition)...

…the Polity project focuses specifically on the more or less institutionalized authority patterns that characterize the most formal class of polities, that is, states operating within the world’s state system.” (Marshall y Jaggers 2002, Page 1).

The POLITY provides with an ample array of useful variables for measurement of institutional factors. As it is stated in Glaeser et al. (2004), this database is one of the best attempts done to measure the institutional context.

We use two alternative variables to measure institutions:

Parcomp: it is used to describe the degree of political participation and competition among political groups. It has been defined as the degree to which groups nonpertaining to elites are able to have access to the institutional structures for political expression. Based on subjective assessment of political experts, this variable investigates if political participation is: (a) competitive, (b) transitional, (c) factional, (d) suppressed, or (e) repressed. A greater value of Parcomp indicates a greater degree of political participation, which suggests the existence of certain institutional rules, such as the mechanisms for handling political conflicts, which allow balancing different objectives from the diverse groups that participate in society. The intuitive idea behind this variable is that increased possibilities of political participation of groups that do not belong to elites, necessarily implies greater quality in the rules, particularly those that
regulate civil interaction. Yet, its main problem is the fact that it is constructed from subjective assessments, even though these may be “expert’s assessments”.

\textit{Xconst:} it is used to describe the degree of institutional restrictions imposed on the Executive body of government. That is, it gathers the degree of discretion that the Government has in setting policies. Those restrictions usually come from Congress. Therefore, this variable focuses on the degree of balance of power between the different bodies of the State. A high degree of discretion in the executive branch could be signalling a lack of care for the rules of civil interaction in a society. A greater value of \textit{Xconst} implies a balance between the powers of the State and that the Government must fit its policies to a set of predetermined rules. This variable captures a different dimension of the institutional or political environment than \textit{parcomp}, but they are the same in the sense that they both attempt to measure the quality of rules. So, it offers an alternative way of measurement of the quality of institutions, to the one offered by \textit{parcomp}.

The selected variables are not totally immune to the critics stated before. Nevertheless, they are both two of the best measures of institutions available, since they consider the concept of restriction and rules against discretion.

On the other hand, according to our theoretical model, macroeconomic variables that reflect the discretion of economic policy, such as inflation and the fiscal deficit, partly reflect the quality of institutions. However, macroeconomic outcomes reflect not just institutional factors. That why, we will include separately in the empirical analysis a measure of inflation rate volatility, measured as the standard deviation of the inflation rate in five years (\textit{volinf}). This is intended to reflect the instability coming from bad macroeconomic policy management. The fiscal deficit is not taken into account by lack of data and because this variable depends too much on exogenous factors to domestic policy, such as the international interest rate. In addition, macroeconomic theory has established that there should be a significant relation between inflation and the fiscal deficit.

In any case, for the purpose of our research, both macroeconomic and institutional variables could be grouped as they reflect domestic factors of instability, which we intend to separate from exogenous factors.

From the previous section, our dependent variable should be the GDP growth rate volatility (\textit{volgdp}), measured as the standard deviation of GDP growth rate in five years. Finally, volatility of the external shock can be captured in two ways:

- Terms of trade volatility (\textit{tot}). This variable determines aggregate demand through exports, as well as the balance of balance of payments of an economy.
- International interest rates volatility. We consider that the best measure here is the Federal Funds rate (\textit{fed}), set by the U.S. Federal reserve. This variable affects the level of capital flows and the cost of external saving, both for the public sector and the private sector.

3.2. PANEL DATA MODELS
The main advantage of data panel models is that they allow having a greater amount of observations than could be attainable solely on the basis of time series or cross section analysis.

3.2.1. OLS ESTIMATORS IN PANEL DATA

Considerer the model (1):

\[ y_{it} = x_{it}' \beta + \eta_i + u_{it} \]

Where \( x_{it} \) is a \( K \times 1 \) of regresors. \( x_{it} \) may include time dummies to capture the effect of aggregate shocks:

\[ x_{it}' \beta = \gamma_i + z_{it}' \delta \]

\( \eta_i \) and \( u_{it} \) independent unobservable with zero mean and

\[ \eta \sim iid(0, \sigma^2_\eta) \]

The unobservable \( \eta_i \) is called “individual effect” or “unobserved heterogeneity”. The unobservable \( u_{it} \) is called “transitory shock”.

This model assumes strict exogeneity, i.e.:

\[ E[x_{it}u_{st}] = 0 \quad \text{for any } (t, s) \in \{1, \ldots, T\} \]

This assumption does not hold for models where the set of regressors includes predetermined endogenous variables (dynamic panel data models).

One of the most important issues in the estimation of panel data models is endogeneity due to correlation between the regressors and the individual effect.

\[ E[x_{it}\eta_i] \neq 0 \]

There have been two approaches to control for this endogeneity problem: the fixed effects approach and the random effects approach.

The fixed effects methods are based on some transformation of the model (1) that eliminates the individual effects. And the random effects methods is based on some assumption about the joint distribution of \( x_{it} \) and \( \eta_i \). For instance:

\[ \eta_i = \lambda_{i1}x_{i1} + \lambda_{i2}x_{i2} + \ldots + \lambda_{iT}x_{iT} + \epsilon_i \]

Where \( \epsilon_i \) is independent of \( \{x_{i1}, x_{i2}, \ldots, x_{iT}\} \); Based on this assumption, we estimate the parameters \( \beta \) and \( \lambda \)'s.
Some times use the term "random effects" model to refer to the case in which \( x_i \) and \( \eta_i \) are assumed not correlated: \( E[x_i \eta_i] = 0 \). This is a very particular assumption on the joint distribution of \( x_i \) and \( \eta_i \).

The fixed effect approach is more robust because it does not depend on additional assumptions, if the assumption of the random effect is not correct the random effect estimator will be inconsistent. For some models the fixed effect approach, e.g. some linear models, there is not any transformation that eliminates the individual heterogeneity from the model. The fixed effect transformation also eliminates sample variability that is exogenous and that it would be useful to estimate the model that is not the case in the random effect approach.

In this paper we are interested in identifying the effect of macroeconomic policy variables and institutions. There are two different problems in using ordinary least squares (OLS) regression: both institutions and macro policy variables are endogenous, so we may be capturing reverse causality; and both institutions and policy variables are measured with error, or in the case of institutions, available measures correspond only poorly to the desired concept (Acemoglu et al., 2003). So we are using two-stage least squares (2SLS) estimators with lagged variables as instrument in order to take account these problems.

3.2.2. GMM ESTIMATORS IN PANEL DATA

The regression equation can be expressed at the following form:

\[
y_{i,t} = \theta w_{i,t-1} + \gamma z_{i,t} + \eta_i + u_{i,t}
\]

Where \( y \) represents the dependent variable, \( w_{i,t-1} \) represents a set of lagged explanatory variables, and \( Z \) represents a set of contemporaneous explanatory variables. \( \mu \) is the unobserved country specific effect, \( \lambda \) is time specific effect, \( \varepsilon \) is the time varying error term, \( i \) and \( t \) represent the country and time period respectively. This model is called “Dynamic Panel Data”, nevertheless if the model didn’t include lagged variables, we would be in the static model like the Hausman and Taylor’s model.

The dynamic panel data estimators use internal instruments, defined as instruments based on previous realization or sample path of the explanatory variables, considering better, thus, the potential joint endogeneity of the regressors.

Nevertheless, this method does not control the complete endogeneity, but for a weak type of this it does. To be practitioners, we assumed that the explanatory variables are only weakly exogenous, that mean they may be affected by contemporary and past realization of growth rate volatility, but not being correlated with future realization of the error term. Then, the weak exogeneity assumption implies that future growth rate volatility innovations do not affect the contemporary institutions variables.
Arellano and Bond (1991) suggest the first difference of regression equation to remove the country specific effect, as it follows:

\[ y_{i,t} - y_{i,t-1} = \alpha (w_{i,t-1} - w_{i,t-2}) + \beta (z_{i,t} - z_{i,t-1}) + (u_{i,t} - u_{i,t-1}) \]  

This procedure solves the econometric problem, namely the country specific effect, but it introduces a correlation between the new error term \( u_{i,t} - u_{i,t-1} \), and lag of the dependent variable \( y_{i,t-1} - y_{i,t-2} \), when this is included in \( w_{i,t-1} - w_{i,t-2} \). In order to indicate this correlation and endogeneity problem, Arellano and Bond (1991) propose to use lags of the explanatory variables in levels like instruments. Under assumption there is no serial correlation in the error term \( u \), in addition to the explanatory variables \( P \), where \( P = [w, z] \), are weakly exogenous, we can use the following moments conditions:

\[ E\left[ P_{i,j,t-1} (u_{i,t} - u_{i,t-1}) \right] = 0, \quad \text{for } s \geq 2; \quad t = 3, ..., T. \]  

Using these moments conditions Arellano and Bond (1991) propose a GMM estimator in two stages. In the first stage, the error terms are assumed to be independent and homoskedastic, between countries and on the time. In the second stage, the obtained first stage residual are used to construct a consistent estimation of variances and covariances matrix, so that independence and homoskedasticity assumptions are relax.

There are several problems with the estimator in difference. Alonso-Borrego and Arellano (1999) and Blundell and Bond (1998) show that if lag of the dependent variable and the explanatory variables are persistent on the time, lags of the levels of these variables are weak instruments for the regression in differences. Simulation studies show that the estimator in difference has a great bias in finite samples and a poor precision.

In order to indicate these problems, an alternative method that jointly estimates the regression in difference with the regression in levels, proposed by Arellano and Bover (1995). Using Monte Carlo experiments, Blundell and Bond (1998) show that the system estimation reduces the potential bias in finite samples and the associated asymptotic imprecision with the estimation in difference. The key reason for this improvement is the inclusion of the regression in levels that does not eliminate the transversal variation and intensifies the error measurement power. In addition, the variables in levels maintain a strong instruments correlation, that the variables in differences. However, use of the regression in levels comes with the cost of requiring an additional assumption. This requirement occurs because the regression in levels does not directly eliminate the country specific effect. Instead of it, the appropriate instruments must be used to control the country specific effect. The estimator uses lags of explanatory variables difference like instruments that are suitable ones under assumption that the correlation between \( \eta \) and the explanatory variables levels are constant on the time, such that:

\[ E\left[ P_{i,t+p} \cdot \eta_{i} \right] = E\left[ P_{i,t+q} \cdot \eta_{i} \right], \quad \text{for all } p \text{ and } q. \]  

Under this assumption, there is no correlation between the differences of the explanatory variables and country specific effect, e.g., this assumption implies that
inflation could be correlated with country specific effect, but this correlation does not change throughout time. Then, under this assumption lags of the variables in differences are suitable instruments for the regression in levels, and the moments conditions for the regression in levels are as it follows:

\[ E\left[ (P_{t-s} - P_{t-s-1}) \cdot (u_{t,i} + \eta_i) \right] = 0 \quad \text{for} \quad s = 1; \quad t = 3, \ldots, T. \]

Then, system makes up of the joint regression in differences and levels, with the moments conditions of the equation (12) applied to the first part of system, the regression in differences, and moments conditions of the equation (13) applied for the second part, the regression in levels. Since lags of the variables in levels are used like instruments in the regression in differences, only the most recent differences are used like instruments in the regression in levels. As in the estimator in differences, the model is estimated in two stages having generated consistent and efficient coefficients.

However, in the two step estimates of the standard errors tend to be severely downward biased (Arellano and Bond 1991; Blundell and Bond 1998), a finite-sample correction to the two step covariance matrix derived by Windmeijer (2000), it corrects this problem.

The GMM estimator consistency depends on the assumptions validity that the error term, it does not exhibit serial correlation and the instruments validity. We used two types of tests propose by Arellano and Bond (1991) to prove these assumptions. First it is a Sargan test of restrictions over-identification, which tests the overall validity of the instruments by analyzing the sample analogous of the moment conditions used in the estimation procedure; this proves minimized value of the one step GMM criterion function, but the Sargan test is not robust to heteroskedasticity or autocorrelation. However, for two-step estimation, the Hansen \( J \) test is more appropriate, this proves minimized value of the two step GMM criterion function, and is robust. Under the null hypothesis of the validity of the instruments, these tests have a distribution \( \chi^2 \) with \((J-K)\) freedom degree, where \( J \) is the number of instruments and \( K \) number of regressors. The second test examines the no serial correlation assumption of the error terms. It tests if the differentiated error term is serial correlated of second order. By construction, the error term probably is correlated of first order. It is not possible to be used the error terms of the regression in levels, since they include the country specific effect. Under the null hypothesis of no second order serial correlation, this test has a standard normal distribution.

4. RESULTS

We find, in our worldwide sample of 115 countries, the both institutional variables (parcomp and xconst), we have chosen, have the expected signs (negative effect on GDP growth rate volatility) and they are very significant (at 1% of statistical significance) even more than macroeconomic variable - measured by inflation- (at 10% of statistical significance). This result was foreseeable according to our theoretical framework, since inflation volatility (volinf) could be measuring the same factors as any
of both institutional variables. This evidence implies that our macroeconomic variable (standard deviation of inflation rate) reflects a weak structure of incentives or weak institutional performance of economic policies which also suggests that the relation identified by Blanchard and Simon (2001) and others is, in fact, reflecting ultimately the effect of institutions, specifically by means of rules of monetary policy, as outlined within our theoretical framework. Similarly, volatility of international interest rates is more significant than volatility of the external shock (volatility of terms of trade - tot) which confirms the results of previous empirical works (Hoffmaister and Roldós 1997). Overall, our results in worldwide sample show support for the hypothesis that economic instability stems from institutional factors (domestic policies) as from exogenous shocks (See Figure 3).

**FIGURE 3.- SOURCES OF GROWTH VOLATILITY WORLDWIDE**

<table>
<thead>
<tr>
<th>Dependent variable: GDP per capita growth volatility</th>
<th>GMM Estimation</th>
<th>GMM Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanatory variables:</td>
<td>Two step</td>
<td>Two step</td>
</tr>
<tr>
<td>Inflation volatility</td>
<td>2.92e-06***</td>
<td>2.93e-06***</td>
</tr>
<tr>
<td>St. Dev. [Inflation rate]</td>
<td>(1.79e-06)</td>
<td>(1.80e-06)</td>
</tr>
<tr>
<td>Terms of trade volatility</td>
<td>0.0002**</td>
<td>0.0002**</td>
</tr>
<tr>
<td>St. Dev. [Difference of terms of trade]</td>
<td>(0.0001)</td>
<td>(0.0001)</td>
</tr>
<tr>
<td>International interest rate volatility</td>
<td>0.0038*</td>
<td>0.0035**</td>
</tr>
<tr>
<td>St. Dev. [FED fund rate]</td>
<td>(0.0014)</td>
<td>(0.0014)</td>
</tr>
<tr>
<td>Democracy (Xconst)</td>
<td>-</td>
<td>-0.0018*</td>
</tr>
<tr>
<td>(Parcomp)</td>
<td>(0.0008)</td>
<td>(0.0005)</td>
</tr>
<tr>
<td>Participation</td>
<td>-0.0040*</td>
<td>-</td>
</tr>
<tr>
<td>(Parcomp)</td>
<td>(0.0008)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.0330*</td>
<td>0.0276*</td>
</tr>
<tr>
<td>(0.0043)</td>
<td>(0.0041)</td>
<td></td>
</tr>
<tr>
<td>Hansen over identification Test</td>
<td>0.237</td>
<td>0.219</td>
</tr>
<tr>
<td>Second order autocorrelation Test</td>
<td>0.50</td>
<td>0.40</td>
</tr>
<tr>
<td>Number of countries</td>
<td>115</td>
<td>115</td>
</tr>
<tr>
<td>Number of observations</td>
<td>553</td>
<td>553</td>
</tr>
</tbody>
</table>

*, ** and *** significance to 1%, 5% and 10%, respectively. Standard Deviations are among parentheses.

Nevertheless, when we estimate the same empirical equation as Figure 3 for a sub-sample of 38 developing countries, assessing the hypothesis of Acemoglu et al. (2000), we find that the two institutional variables, participation and democracy, have the expected sign, but their effects seem not to be significant. Our results do not probably show the dichotomy that developed countries have higher institutional development and lower output growth volatilities, and developing countries have lower financial development and higher output growth volatilities. Consequently, our results possibly do not show the change of institutional factors because of the existence of low institutional development among developing countries in our sub-sample (see Figure 4).
In Figure 4, we show that institutions seem not to be significant in developing countries. Thus, we put into question whether other factors explain growth volatility in developing countries. We find, in domestic factors, fiscal volatility has a positive and significant effect on growth rate volatility, while inflation volatility seems not to have a significant effect on growth rate volatility. Among external factors, we find international interest rate volatility has a positive and significant effect on growth rate volatility while volatility of terms of trade seems not to have a significant effect (see Figure 5). Therefore, we don’t support, in our sub-sample of 38 developing countries, the hypothesis of Acemoglu et al. (2000) because of key role play by other factors such as fiscal volatility and interest rate volatility at explaining economic instability.
FIGURE 5.- SOURCES OF GROWTH VOLATILITY

<table>
<thead>
<tr>
<th>Explanatory variables:</th>
<th>GMM Estimation One step</th>
<th>GMM Estimation Two step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation volatility</td>
<td>2.93E-06</td>
<td>3.52e-06</td>
</tr>
<tr>
<td>St. Dev. [Inflation rate]</td>
<td>(3.78E-06)</td>
<td>(6.20e-06)</td>
</tr>
<tr>
<td>Fiscal volatility</td>
<td>0.002***</td>
<td>0.002*</td>
</tr>
<tr>
<td>St. Dev. [Government consumption (% GDP)]</td>
<td>(0.001)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Terms of trade volatility</td>
<td>0.0002</td>
<td>0.0002</td>
</tr>
<tr>
<td>St. Dev. [Difference of terms of trade]</td>
<td>(0.0002)</td>
<td>(0.0002)</td>
</tr>
<tr>
<td>International interest rate volatility</td>
<td>0.002***</td>
<td>0.002***</td>
</tr>
<tr>
<td>St. Dev. [FED fund rate]</td>
<td>(0.0012)</td>
<td>(0.0010)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.017*</td>
<td>0.016*</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.003)</td>
</tr>
</tbody>
</table>

Sargan over identification Test: 0.76
Hansen over identification Test: -
Second order autocorrelation Test: 0.61
Number of countries: 38
Number of observations: 304

* ** and *** significance to 1%, 5% y 10% respectively. Standard Deviations are among parentheses

Note: we estimate with a lag of GDP growth volatility for controlling by persistence effects of volatility which we don’t report on the Figure. Similarly, we do the estimation considering the correction for infinitive samples of Windmeijer (2005).

4. CONCLUSIONS

This paper introduced an empirical framework that relates economic volatility to macroeconomic and institutional variables and external shocks in worldwide sample of 115 countries and in a sub-sample of 38 developing countries. On this purpose, we estimate a model in dynamic panel data approach put out by Arellano-Bover (1995) from 1963 to 2002. We find, in our worldwide sample, that the lack of suitable institutions significantly increases GDP growth rate volatility. Similarly, a greater exposure to external shocks significantly increases GDP growth rate volatility as well.

An important result of our empirical model is that the impact of the volatility of macroeconomic policies (measured by the inflation rate volatility) on output growth rate volatility is less significant than institutional ones. Our explanation is that some of the effect of macroeconomic policy is absorbed by the importance of the institutional design, that is, part of the discretionary impact of macroeconomic policy is mainly explained by a poor institutional environment.

On the other hand, when isolating a sub-sample of 38 developing countries, we find that institutional factors have the expected sign, but their effects seem not to be significant so that we do not support the hypothesis of Acemoglu et al. (2000), as a consequence, there are other factors that play a key role, such as fiscal volatility and interest rate volatility (which would imply the existence of higher fluctuations of capital mobility in developing countries), at explaining economic instability.
REFERENCES


