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César Calderón
J.Rodrigo Fuentes

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REMOVING THE CONSTRAINTS FOR GROWTH: SOME GUIDELINES

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J. Rodrigo Fuentes*

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*rfuentes@faceapuc.cl

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REMOVING THE CONSTRAINTS FOR GROWTH:

SOME GUIDELINES

Cesar Calderon
World Bank

J. Rodrigo Fuentes
Central Bank of Chile

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ABSTRACT FOR CALDERON AND FUENTES

One strand of the empirical growth literature has cast doubt on the ability of the policy recommendations from *Washington Consensus* in enhancing growth. They argue that not only the design but also the policy mix has an important country-specific component (e.g. Hausmann, Rodrik and Velasco, 2005 and Zettelmeyer, 2006). We argue that the effectiveness of policies in promoting growth depends upon the set of structural policies implemented or already existing in the country. This paper empirically examines the role of policy complementarities in explaining growth and development from two dimensions. First, we construct a regression-based policy index in the same vein of Burnside and Dollar (2000), and we decompose this index afterwards into domestic and outward policy indices. Second, we evaluate the role of policy complementarities in the growth process by interacting our policy index with specific country characteristics that affect growth. We repeat the same exercise with the domestic and outward policy indices. We found that outward oriented and domestic policies are highly complements to each other. Specifically, the growth effects of trade and financial openness are enhanced when domestic policies are correct and, moreover, financial and trade openness are also complements. Regarding structural factors, we found that human capital increase growth as expected but it is neither a complement nor a substitute of economic policy. On the other hand institutions and financial depth are complements with economic policy. This could be an explanation why some countries have stabilized their economies but they are not growing faster, this could be due to low financial development or bad institutions.

Finally, we should remark that in addition to the Fatas and Mihov (2006) result that policy volatility hurts growth, we find that a good policy environment could propel growth by mitigating the negative effect of aggregate volatility and, more specifically, the volatility of external shocks.

1. Introduction

The relationship between the quality of policy and growth has revived in the last few years. Since the *Washington Consensus* recommendations followed by several countries around the world, people is assessing whether those policies has been indeed growth promoting. There are many examples of economies that exhibit good growth performance introducing the recommended reforms. However there are other examples of economies that have implemented the reforms and they have not received the same return.

A good example of the latter group of economies is Latin America As reviewing by Zettelmeyer (2006) there are three lines of arguments to explain why reformer economies have not been successful in Latin America: the reforms were not deep enough; reforms went too far; reforms went in the wrong direction. The hypothesis in our paper is that the effect of reforms in some areas heavily depends on other structural factor of the economy, i.e. there exist certain complementarities that are quite important to design a strategy to reform. Specifically we rescue the relationship between the quality of macro policy and growth.

The empirical association between economic policy and growth found in different papers[1] has been questioned by Easterly (2005). The main caveats are that for having a measurable impact on growth a large change in macroeconomic policy variables is needed, the results are not robust to econometric methods and the inclusion of institutions. The weak relation between economic policy and growth found in the empirical literature has pushed the discussion toward the idea of complementarities among policies. When considering this idea of policy complementarities nonlinearities show up in the panel or cross country analysis that are not consider in those surveys of the empirical literature[2].

For instance Hausmann, Rodrik and Velasco (2005) argue that the right policy for growth should be contingent to the economic environment. From the perspective of welfare analysis they develop a conceptual framework where removing a restriction for growth have a direct effect on growth, but given that we are in a second best world it is necessary to consider the

[1] Fisher (1993), Easterly and Rebelo (1993a and 1993b), Dollar (1992)
[2] Chang, Loayza and Kaltani (2005) and the references therein.

cross effects of that restriction in other markets. These other effects could be detrimental for growth.

This conceptual framework seems to be an interesting way of seeing the problem that affects the relationship between economic policy and growth. However the implementation is ad-hoc and there is no measure of how much growth will increase when an economy follows their advice[3]. In this paper we attempt to measure how much removing a constraint will enhance growth as a function of some structural variables and other policy variables.
We think that panel data analysis for growth has not been exhausted yet and it can provide important insight for understanding growth. In this paper we estimate a panel data over five-year period from 1965 to 2000 for 76 countries. We pay special attention to econometric techniques that yield consistent parameters and robust estimation in a dynamic panel data. In a first step we use the typical cross country growth regression to construct a policy index in the same vein of Burnside and Dollar (2000). We define an aggregate policy index that includes inflation rate, government consumption, trade and financial openness. Then we define a domestic policy index that considers the first two variables and an outward orientation policy index that uses the contribution of the other two variables. This index shows that countries with bad policies would not experience high growth, meaning that bad policies will never conduct to high growth. But in the other hand, countries that have followed good policies present a wide variety of growth performance.

In a second step we estimate a growth regression using this index and controlling for initial per capita GDP, institutions, human capital and financial openness. Here we investigate the nonlinearities in growth or the complementarities effects. We found that outward oriented and domestic policies are highly complements to each other. Specifically the effect of both openness to trade and financial openness are enhanced when domestic policies are correct and moreover financial and trade openness are also complements[4]. In fact there is a

[3] They analyze the case of Brazil, El Salvador and Dominica Republic in the paper. Hausmann and Velasco (2006) apply the same idea for Latin America as whole. But in non of them a specific measures of the growth effect could be found.
[4] Chang, Katani and Loayza (2005) analyzed policy complementarities with trade openness, finding similar results.

threshold under which financial openness could be detrimental for growth if the economy exhibits a low level of trade openness.

Later we explore the complementarities between the quality of policy and structural factors like human capital institutions and financial depth. We found that the human capital increase growth as expected but it is neither nor a substitute nor a complement with economic policy. On the other hand institutions and financial depth are complements with economic policy. This could be an explanation why some countries have stabilized their economies but they are not growing faster, this could be due to low financial development or bad institutions.

For different regions in the world we take the difference in the average growth rate between 1996-2000 and 1981-1985 periods. We decompose this difference in growth rate in convergence effect, the effects of structural variables (human capital, institutions and financial development) and the effect of policy complementarities. The latter effect is by far the largest East Asian Pacific countries. In Latin America (AMER), Middle East and Northern Africa (MENA) and Industrial Countries the contribution of policy complementarities and structural factors are about the same. For the rest of African countries (Sub Saharan and Southern) the difference in growth rate is explained mainly by structural factor. In conclusion fast growing economies tend to have good policies that complement the efforts made with the structural factors.

The structure of the paper as follows. In next section we discuss the data and the methodology used in the paper. In section 3 we introduce the estimated policy index. Section 4 we analyze the complementarities between domestic policy and structural factors to provide some guidelines for removing constraint to growth. In section 5 we revise the relationship between policy and volatility. Section 6 concludes.

2. Methodology and Data

This section aims to describe the data used in evaluating the role of policy complementarities in the process of economic growth. Our dependent variable is the annual average growth rate in real GDP per capita. The main goal of this paper is three-fold: First, we test the

complementarities between trade and financial openness —that is, we want to contrast whether financial openness enhances the growth effects of trade openness and vice versa. Second, we examine whether the effects of structural factors (such as human capital, financial development, institutional quality) on growth depend on the policy environment of the country. Finally, we evaluate whether good policy environments help mitigate the growth effects of rising volatility —arising from erratic policies or from external shocks.

2.1. Data and Sample

We have collected a panel dataset of 136 countries organized in 5-year non-overlapping observations over the period 1970-2005, and each country having at most 7 observations. Table A.1 presents the list of countries in the sample. In this sub-section we describe the construction and the sources of the data used in our empirical analysis. The focus of our paper is on the effect on economic growth of structural factors conditional on the policy environment. For that reason, we classify the determinants of economic growth into the following groups: (i) transitional convergence, (ii) structural factors, and (iii) policy environment.

Transitional convergence. We include the (log) level of the real GDP per capita at the beginning of the period to test for the existence of transitional convergence. According to the neoclassical model, evidence in favor of traditional convergence implies that the coefficient estimate for the initial output per capita is negative and significant. This would imply that poorer countries may grow faster than richer countries.

Structural Factors. In this group we consider structural factors that may foster long-run growth. Following Loayza, Fajnzylber and Calderon (2005) this group is conformed by proxies of human capital, financial development and governance.

The role of human capital —and, specifically, *education*— in the economic development process is highlighted by ample theoretical and empirical literature. Human capital contributes as a direct input in the production process and it complements other factors of production such as physical capital and natural resources (De Gregorio and Bravo-Ortega, 2002). The level of human capital also enhances the ability of nations to create or adapt new

technologies (Borensztein et al. 1988). Policies directed to raise the level of education and human capital are approximated by the initial gross rate of secondary schooling (in logs) and the data is obtained from Barro and Lee (2001).[5]

Financial development promotes long-run growth through the identification of profitable projects and the ability of domestic financial markets to mobilize savings to these projects. Financial markets reduce investment inefficiencies by solving principal-agent problems through corporate monitoring and by allowing risk diversification through hedging opportunities (Levine, 1997). Our proxy for the level of financial development in the economy is the ratio of domestic credit to the private sector to GDP and it is collected from Beck, Demirguc-Kunt and Levine (2001) and updated using data from the IMF's International Financial Statistics and the World Bank's WDI.

Governance, on the other hand, comprises various areas of the institutional quality of government such as absence of corruption, rule of law, enforcement of contracts, quality of the bureaucracy, democratic accountability, among others. North (1990) argues that weak institutions may hamper growth by reducing the efficiency of investment. Specifically, firms would tend to be small scale, use low-capital technologies and have short-term horizons in business environments with weak enforcement of property rights. Also, institutions may affect growth through falling investment due to rising transactions costs attributed to red tape and rent seeking. In this paper, our proxy of governance is the ICRG index of political risk published in the International Risk Country Guide (ICRG) by the Political Risk Services (PRS) Group.

Policy Environment. We consider economic policies undertaken by the government to guarantee price stability and low government burden, and policies to promote integration to international markets of goods and assets. In addition, we group price stability and government burden into domestic policy environment, and trade and financial openness into outward policy environment.

[5] This "flow" measure captures more closely current policies on schooling and human capital investment than "stock" measures related with educational attainment of the adult population or life expectancy (Loayza et al. 2005).

Lack of price stability is approximated by the average rate of CPI inflation. This variable reflects the quality of monetary and fiscal policies and is positively correlated with other indicators of poor macroeconomic management such as fiscal and current account imbalances.

Government burden refers to the drain imposed by the government on private activity through the imposition of high taxes, the maintenance of ineffective public programs and an enlarged and inefficient bureaucracy, and State intervention in the economy. We use the ratio of government consumption to GDP as a measure of government burden.[6]

Trade openness affects growth through various channels. In fact, trade openness allows production specialization through the exploitation of comparative advantage. It also serves as a tool for technological diffusion and expands the potential markets for the country's goods, among other things. Trade openness is measured as the ratio of real exports and imports to real GDP (all these magnitudes are expressed in local currency at constant prices) and the data is collected from the World Bank's World Development Indicators.

Financial openness may facilitate risk-sharing and enhance production specialization, capital allocation, and economic growth (Obstfeld, 1994; Acemoglu and Zilibotti, 1997). Our *outcome measure* of financial openness involves data on foreign assets and liabilities from Lane and Milesi-Ferretti (2001, 2006). Specifically, we use summary measures of financial openness (Lane, 2000; Lane and Milesi-Ferretti, 2001; Obstfeld and Taylor, 2002),

$$FO_{it} = \frac{FA_{it} + FL_{it}}{GDP_{it}} \text{ and } FOL_{it} = \frac{FL_{it}}{GDP_{it}}$$

where *FA* and *FL* refer to the stocks of foreign assets and liabilities —expressed as a ratio to *GDP*. Note that *FA* and *FL* include stocks of assets and liabilities in foreign direct investment, portfolio equity, financial derivatives and debt (bank and trade-related lending).[7]

[6] The rational for this choice is that much of current (or consumption) expenditures by government do not have a clear social return and, in fact, are mostly devoted to cover the bureaucracy's wage bill (Loayza et. al. 2005).

[7] In this paper we also evaluate the role of the structure of external capital in driving the long-term growth performance of countries. Hence, we will break down our outcome measure of financial openness into

On the other hand, given that international trade in debt instruments may be driven by special factors, we also consider an equity-based measure (Lane and Milesi-Ferretti, 2003):

$$EFO_{it} = \frac{FDIA_{it} + FDIL_{it} + PEQA_{it} + PEQL_{it}}{GDP_{it}} \text{ and } EFOL_{it} = \frac{FDIL_{it} + PEQL_{it}}{GDP_{it}}$$

where *FDIA* and *FDIL* are stocks of foreign direct investment assets and liabilities, while *PEQA* and *PEQL* are the stocks of portfolio equity assets and liabilities, respectively. In short, *EFO* and *EFOL* are indicators of the level of equity (FDI and portfolio) cross-holdings.

Volatility. In this group we consider the effect of aggregate volatility on growth. In addition, we test whether growth effects of aggregate volatility are driven by either policy volatility or the volatility of external shocks. Theoretically, the relationship between growth and volatility can be positive or negative depending on the mechanisms driving the relationship (Imbs, 2007). It has been argued that, in the presence of irreversibilities in investment, rising volatility can lead to lower investment (Bernanke, 1983; Pindyck, 1991) and, hence, to lower growth (Aizenman and Marion, 1993). Ramey and Ramey (1991) also find a negative link between growth and volatility if firms have to commit to their technologies in advance. On the other hand, rising volatility would lead higher savings and, hence, higher investment and growth if there is a precautionary motive for savings (Mirman, 1971). Black (1987) also argues that countries chose between high-variance, high-expected-returns technologies and low-variance, low-expected return technologies so that counties with high average growth would also exhibit high volatility. Empirically, *aggregate volatility* is measured by the standard deviation of growth in real GDP per capita.

Policy volatility is measured by the *volatility of fiscal policy*, $Vol(G_y)$, following the methodology outlined in Fatas and Mihov (2006). Using annual data on general government consumption, we isolate movements in our fiscal indicator that can be attributed to exogenous policy decisions and are not related to the state of the economy. To isolate these exogenous policy changes, we regress for each country the (log of) real government consumption spending (*G*)

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equity- and loan-related foreign liabilities. While the former includes the foreign liability position in foreign direct investment and portfolio equity, the latter includes only the debt liability position. The same calculation is performed for the ratio of foreign assets and liabilities to GDP.

on output growth ($\Delta \ln Y$), the initial level of real government spending, linear and squared inflation (π and π^2) and a deterministic time trend (t),

$$\ln(G_{i,t}) = \mu_i + \eta t + \beta_{i,0} \Delta \ln Y_{i,t} + \rho_{i,1} \ln G_{i,t-1} + \phi_1 \pi_{i,t} + \phi_2 \pi_{i,t}^2 + \varepsilon_{i,t}$$

In addition, to prevent reverse causality from government spending to growth we instrument output growth with lagged values of output growth and current and lagged values of oil prices. We consider the standard deviation of the residual of this regression, Vol($\varepsilon_{i,t}$) as the estimate of the volatility of discretionary fiscal policy. Note that data on government expenditure was obtained from the World Bank's World Development indicators, while inflation and the world price of oil was taken from the IMF's International Financial Statistics. [8]

External volatility captures the volatility of trade- and finance-related exogenous shocks. In this paper we consider: (a) terms of trade volatility, measured as the standard deviation of annual terms of trade changes, (b) external demand volatility as the standard deviation of the GDP growth rate of main trading partners (weighted by their bilateral trade with the domestic country), and (c) world real interest rate volatility captured by the standard deviation of the real interest rate of the base country following the classification in Di Giovanni and Shambaugh (2008). [9]

2.2. Econometric Methodology

In order to estimate our panel data regression model, we use an estimation method that is suited for our purposes. It deals with dynamic regression specifications, controls for unobserved time- and country-specific effects, and takes account for likely endogeneity of some explanatory variables. Assessing the impact on growth of the policy environment, structural factors and their complementarities in our panel dataset poses some econometric issues that can be illustrated in the context of the following dynamic equation:

---

[8] Note that all standard deviation measures were taken for annual changes during 5-year periods.

[9] Note that the base country is defined in Di Giovanni and Shambaugh (2008) as the country to which a country pegs or the country to which it would peg if it were pegged. For non-pegs, the base is determined by previous pegging history, cultural and historical ties, dominant regional economies, as well as a close reading of each currency's history.

$$
\begin{aligned}
y_{it} - y_{it-1} &= \alpha y_{it-1} + \phi' S_{it} + \gamma' P_{it} + \pi' S_{it} \cdot P_{it} + + \mu_t + \eta_i + \varepsilon_{it} \\
&= \alpha y_{it-1} + \beta' X_{it} + \mu_t + \eta_i + \varepsilon_{it}
\end{aligned} \tag{1}
$$

Here *y* denotes the (log of) real GDP per capita, *S* represents *structural factors and institutions* driving growth, and *P* is set of the *policy environment* variables. The terms μ_t and η_i respectively denote an unobserved common factor affecting all countries, and a country effect capturing unobserved country characteristics. The second equality follows from defining $X_{it} = (S'_{it}, P'_{it}\ (S_{it}\ P_{it})'$ and $\beta = (\phi', \gamma', \pi')'$.

The econometric technique deals with unobserved time effects through the inclusion of period-specific intercepts. Accounting for unobserved country effects is not simple due to the model is dynamic and contains endogenous explanatory variables. Here, unobserved country effects are accounted for by differencing and instrumentation. Also, the method relies on instrumentation to control for joint endogeneity. Specifically, it allows relaxing the assumption of strong exogeneity of the explanatory variables by allowing them to be correlated with current and previous realizations of the error term □.

Estimating our regression equations faces the problem of likely endogeneity among the explanatory variables. In fact, this problem may affect our structural factors and policy environment variables (*S* and *P* matrices) since it can be argued that these are jointly determined with the rest of the economy's endogenous variables —that is, the may be subject to reverse causation from income. Also, our regression equation includes the lagged level of real output per capita, y_{it}, which is also endogenous due to the presence of country-specific effects. Since there are no obvious exogenous variables that can be used as instruments in our regression analysis, we rely primarily on *internal instruments* as suggested by Arellano and Bond (1991), and these are provided by suitable lags of the explanatory variables. Nevertheless, we should note that the presence of unobserved country characteristics likely means that $E[X_{is}\eta_i] \neq 0$, and hence lagged levels of the explanatory variables are not valid instruments for (1). Therefore, we first eliminate the country-specific effect by expressing (1) in first differences,

$$y_{it} - y_{it-1} = (1+\alpha)\left(y_{it-1} - y_{it-2}\right) + \beta'\left(X_{it} - X_{it-1}\right) + \left(\varepsilon_{it} - \varepsilon_{it-1}\right) \qquad (2)$$

If we assume that the error term ε_{it} is serially uncorrelated and that the explanatory variables in X are weakly exogenous —that is, they are uncorrelated with future realizations of ε_{it}— then the lagged values of the explanatory variables provide valid instruments.[10] These assumptions imply the following moment conditions:

$$E\left[y_{i,t-s} \cdot \left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0 \quad for\ s \geq 2; t = 3, \ldots, T \qquad (3)$$

$$E\left[X_{i,t-s} \cdot \left(\varepsilon_{i,t} - \varepsilon_{i,t-1}\right)\right] = 0 \quad for\ s \geq 2; t = 3, \ldots, T \qquad (4)$$

Equations (3) and (4) define the *GMM-difference* estimator which, despite its simplicity, has some potential shortcomings. Lagged levels are weak instruments for the regression equation in differences in the presence of persistent explanatory variables (Alonso-Borrego and Arellano, 1999; Blundell and Bond, 1998). This raises the asymptotic variance of the estimator and creates a small-sample bias.[11]

To avoid these problems, below we use the *GMM-system* estimator that combines the regression in differences and in levels (Arellano and Bover 1995, Blundell and Bond 1998). The instruments for the regression in differences are the same as above. The instruments for the regression in levels are the lagged *differences* of the corresponding variables. These are appropriate instruments under the additional assumption of no correlation between the *differences* of these variables and the country-specific effect. Formally, we assume

$$\begin{aligned} &E[y_{i,t+p} \cdot \eta_i] = E[y_{i,t+q} \cdot \eta_i] \quad and \\ &E[X_{i,t+p} \cdot \eta_i] = E[X_{i,t+q} \cdot \eta_i] \quad for\ all\ p\ and\ q \end{aligned} \qquad (5)$$

This leads to additional moment conditions for the regression in levels:[12]

$$E[\left(y_{i,t-1} - y_{i,t-2}\right) \cdot \left(\eta_i + \varepsilon_{i,t}\right)] = 0 \qquad (6)$$

---

[10] Note that this still allows current and future values of the explanatory variables to be affected by the error term.

[11] An additional problem with the simple *difference* estimator relates to measurement error: differencing may exacerbate the bias due to errors in variables by decreasing the signal-to-noise ratio (see Griliches and Hausman, 1986).

[12] Given that lagged levels are used as instruments in the differences specification, only the most recent difference is used as instrument in the levels specification. Using other lagged differences would result in redundant moment conditions (see Arellano and Bover, 1995).

$$E[(X_{i,t-1} - X_{i,t-2}) \cdot (\eta_i + \varepsilon_{i,t})] = 0 \quad (7)$$

Using the moment conditions in equations (3), (4), (6), and (7), we employ a Generalized Method of Moments (GMM) procedure to generate consistent estimates of the parameters of interest and their asymptotic variance-covariance (Arellano and Bond, 1991; Arellano and Bover, 1995). These are given by the following formulas:

$$\hat{\theta} = (\bar{X}' W \hat{\Omega}^{-1} W' \bar{X})^{-1} \bar{X}' W \hat{\Omega}^{-1} W' \bar{y} \quad \textbf{(8)}$$

$$AVAR(\hat{\theta}) = (\bar{X}' W \hat{\Omega}^{-1} W' \bar{X})^{-1} \quad \textbf{(9)}$$

where θ is the vector of parameters of interest (α, β), $\bar{y}$ is the dependent variable stacked first in differences and then in levels, $\bar{X}$ is the explanatory-variable matrix including the lagged dependent variable (y_{t-1}, X) stacked first in differences and then in levels, W is the matrix of instruments derived from the moment conditions, and $\hat{\Omega}$ is a consistent estimate of the variance-covariance matrix of the moment conditions.[13]

Consistency of the GMM estimators depends on the validity of the above moment conditions. This can be checked through two specification tests suggested by Arellano and Bond (1991) and Arellano and Bover (1995). The first is a Sargan test of over-identifying restrictions, which tests the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. Failure to reject the null hypothesis that the conditions hold gives support to the model. Furthermore, validity of the *additional* moment conditions required by the system estimator relative to the difference estimator can likewise be verified through difference Sargan tests.

The second test examines the null hypothesis that the error term $\varepsilon_{i,t}$ is serially uncorrelated. As with the Sargan test, failure to reject the null lends support to the model. In the *system* specification we test whether the differenced error term (that is, the residual of the

[13] In practice, Arellano and Bond (1991) suggest the following two-step procedure to obtain consistent and efficient GMM estimates. First, assume that the residuals, $\varepsilon_{i,t}$, are independent and homoskedastic both across countries and over time. This assumption corresponds to a specific weighting matrix that is used to produce first-step coefficient estimates. Then, construct a consistent estimate of the variance-covariance matrix of the moment conditions with the residuals obtained in the first step, and use this matrix to re-estimate the parameters of interest (i.e. second-step estimates). Asymptotically, the second-step estimates are superior to the first-step ones in so far as efficiency is concerned.

regression in differences) shows second-order serial correlation. First-order serial correlation of the differenced error term is expected even if the original error term (in levels) is uncorrelated, unless the latter follows a random walk. Second-order serial correlation of the differenced residual indicates that the original error term is serially correlated and follows a moving average process at least of order one. This would render the proposed instruments invalid (and would call for higher-order lags to be used as instruments).

3. Empirical Assessment

In this section we will present our baseline regression that will allow us to show the policy complementarities and to construct a policy index. The latter is important for the discussion on removing constraint, since we will have a quality of domestic policy and quality of external policy. The former is related to macroeconomic condition, the latter is related to trade and financial openness. The discussion on removing constraint is postponed for the next section.

3.1 Baseline regression

The baseline regression analysis of growth, structural determinants and the policy environment is reported in Table 1, and we run different specifications using alternative measures of financial openness —see regressions [1] through [4]. Before analyzing the impact of structural factors and the policy environment on growth, we need to highlight that our GMM-IV regressions are valid for statistical inference according to our specification tests. We are able to reject the null of serial correlation of higher order of the error process and we accept the validity of the moment conditions.

[TABLE 1 ABOUT HERE]

We find evidence of transitional convergence; that is, the coefficient of initial GDP per capita is negative and significant throughout the different specifications in Table 1. Hence, conditional on other structural factors and the policy environment, poorer countries tend to grow faster than richer countries.

Regarding our structural factors, we robustly find that growth is enhanced by: (a) faster accumulation of human capital, (b) deeper domestic financial markets, and (c) better institutional quality. In order to have an idea of the economic impact of the structural factors on growth we assume a one standard deviation increase in each of the structural factors affecting growth and we use the coefficient estimates of equation [3] in Table 1. In this context, a one-standard-deviation increase in the gross enrollment rate in secondary schooling would raise the growth rate of the economy by 1.1 percentage points per annum. Similar improvements in the development of local financial markets and in the quality of governance of the country would imply a boost in the rate of economic growth of 0.2 and 1.05 percentage points per year, respectively.

Our indicators of policy environment indicate that growth is higher in environments with: (a) low inflation rates, (b) reduced government burden, and (c) higher integration to international markets of goods. Again, our coefficients are statistically significant and economically relevant. For instance, cutting inflation in half would increase the growth rate of the economy by 1.8 percentage points, while reducing the government burden by half would lead to a surge in the growth rate of 74 basis points per year. On the other hand, doubling the coefficient of trade openness would yield higher growth rate by 11 basis points per year.

Regarding the growth effects of financial openness, we find that when using the ratio of foreign liabilities to GDP as our measure of financial openness yields a negative and significant coefficient —regression [1] of Table 1. This suggests that higher integration to world financial markets may reduce growth by elevating the vulnerability of countries to external shocks. We argue that the negative impact of financial openness on growth may be the result of offsetting forces on growth: holdings of equity liabilities (FDI and portfolio investment liabilities) may have a positive effect on growth, whereas a faster accumulation of holdings of loan liabilities (bank and trade related debt) may have a negative effect. To test that hypothesis we include an interaction term between the ratio of foreign liabilities to GDP and the debt-to-equity ratio of the country. The latter indicator is proxied by the percentage of loan liabilities in total foreign liabilities (equity plus loan liabilities). In regression [2] of

Table 1, we find that the coefficient of financial openness (proxied by foreign liabilities to GDP) is positive and significant whereas the interaction term with debt-equity ratio is negative and significant. This finding basically indicates that for countries with low (high) debt-equity ratio, the impact of financial openness on growth is positive (negative). According to our regression results, higher financial openness has a positive and significant impact on growth for countries with a share of debt in total foreign liabilities smaller than 45%. The result in [2] highlights the importance of the structure of external liabilities in explaining the impact of cumulative foreign financing flows on growth.

Regression [3] in Table 1 includes in our regression the equity-related foreign liabilities to GDP ratio (see equation XX) instead of the ratio of total foreign liabilities to GDP. According to Lane and Milesi-Ferretti (2003) this type of openness seems more relevant for evaluating the relationship between growth and financial openness. We find that equity-related financial openness (proxied by the holdings of FDI and portfolio investment liabilities to GDP) has a positive and significant impact on growth. Economically speaking, the rate of growth per capita would increase by 14 basis points if we double the ratio of equity-related financial openness.

Finally, regression [4] of Table 1 replaced foreign liabilities to GDP with its components: equity-related liabilities and loan-related liabilities, with both components being expressed as a ratio to GDP. Interestingly, we find that the equity-related financial openness has a positive coefficient and statistically significant whereas the loan-related financial openness has a negative and statistically significant effect on growth. This finding confirms the fact the accounting for the structure of external liabilities matters to understand the impact of financial openness on growth. A one standard deviation increase in the ratio of equity-related financial openness would lead to an increase in the growth rate of 47 basis points per year, while a similar increase in the loan-related financial openness would reduce growth by 83 basis points per annum.

3.2 Complementarities between trade and financial openness

Recent literature highlights the interaction between trade openness and financial openness and its nexus to long-term growth. Aizenman and Noy (2007) argue that countries cannot

choose financial openness independently of their degree of trade openness in an era of growing trade integration. More specifically, greater trade openness would increase the cost of enforcing financial repression, thus reducing its use as an implicit tax. Hence, financial reforms become a by-product of greater trade integration. On the other hand, Kalemli-Ozcan, Sorensen and Yosha (2001) find that greater international financial integration would lead to better income insurance. This would induce higher specialization in production and, hence, higher exports and faster growth.

Table 2 expands the results from Table 1 by including the interaction between trade openness and financial openness. We want to test whether financial openness and trade openness are complements or substitutes in the growth process. Regression [1] of Table 2 includes the ratio of exports and imports to GDP, the ratio of foreign liabilities to GDP, and the interaction between these measures of trade openness and financial openness. We find that the coefficient of trade openness and financial openness is negative and significant while the interaction term is positive and significant. Ceteris paribus, we find that the impact of trade openness on growth is positive in countries with higher integration to world capital markets, and that the impact of financial openness on growth is positive in countries with deeper trade integration. According to our regression estimates, the impact of trade openness on growth is positive in countries where foreign liabilities exceed 32% of GDP. On the other hand, the impact of financial openness on growth is positive in countries where total trade (exports and imports) is larger than 89% of GDP.

[TABLE 2 ABOUT HERE]

Regression [2] of Table 2 includes equity-related financial openness instead of the overall degree of financial openness. Again, we find that the coefficient of trade openness and the equity-related financial openness is negative and significant while the interaction term between these variables is positive and significant. This finding implies that trade (financial) openness has a positive impact on the growth rate of the economy for medium to high levels of financial (trade) openness. Specifically, the regression analysis yields a threshold level for financial openness of 8% of GDP and for trade openness of 38% of GDP. This suggests that the impact of trade openness on growth is positive in countries where equity-related

financial openness (proxied by equity-related foreign liabilities) exceeds 10% of GDP, and that the growth effects of financial openness are positive whenever trade openness is the country exceeds 40% of GDP.

Finally, regressions [3] and [4] include interactions between trade openness and equity- as well as loan-related financial openness. Our results show that the impact of trade openness is positive and increasing with the ratio of equity-related foreign liabilities. On the other hand, rising holdings of FDI and portfolio investment liabilities may have a positive impact on growth in countries with medium to high trade openness (i.e. where total exports and imports exceed 33% of GDP).

3.3 Constructing the index of policy environment

The growth effects of the policy environment have been captured by a different set of variables and a wide array of papers has tried to tackle this issue since the work of Fischer (1993). Some studies are skeptical on the role of economic policies on growth (Acemoglu et al. 2003; Easterly, 2005), and the empirical evidence tends to favor the hypothesis that fast growing economies enjoy a good policy environment, but the opposite is not necessarily true. That is, good policies may be a necessary but not sufficient condition for growth.[14] It is somewhat likely to observe in the data countries with good policies and low growth as well as countries with poor policy environment that exhibit high growth rates.

Given that our focus is to find complementarities among the restrictions for growth, having many indicators of the quality of policies (or policy environment) will increase the number of interactions to be used in the right hand side of our growth equation. In order to prevent running into problems with degrees of freedom or excess of moment conditions, we need to find a synthetic indicator of economic policy that summarizes the relevant information for our analysis.[15] In that context, Burnside and Dollar (2000) constructed a policy index based

[14] In fact, Acemoglu et al. (2003) and Easterly (2005) find that, after accounting for institutions, the impact of macroeconomic policies (inflation, the level of government spending, and the overvaluation of the real exchange rate) on growth is not statistically significant.

[15] De Macedo and Martins (2006) constructed an index of complementary of reforms for Central and Eastern European transition economies, based on how to eliminate distortions in a second best context. The indicators are constructed by the EBRD, which assigns subjectively by a number between 1(low level of reform) and 4 (high level) for each concept of reforms (price liberalization, stabilization, financial

on the contribution to growth of different policy variables (inflation, budget deficits and trade openness) by estimating an OLS regression of growth on initial per capita GDP, the set of economic policy variables and other control variables for a panel of countries including time effects. Using the estimated coefficients for the economic policy variables in the baseline regression (without interactions) a weights, they build a policy index. This approach has the advantage that the index is built based on the contribution of each variable to growth, but their main caveat is that the value of the index may vary as you change the control variables. Alternatively, as done by Sirimaneetham and Temple (2006), one can construct an index based on principal components robust to the presence of outliers. The advantage of this method is at the same time its main disadvantage, the weight for each policy variable in the index is unrelated to growth, since they are chosen to maximize the variance of the linear combination of factors subject to a normalization restriction.

In this paper we follow the Burnside and Dollar methodology with some improvements. Instead of using the OLS coefficient of the growth regression, we use the GMM-IV estimate of each coefficient. As explained in section 2 above, this strategy allows us to obtain consistent estimates of the effect of each variable on growth. Hence, to construct our index of policy environment we use the regression [3] of Table 1 where we proxy financial openness with the ratio of equity-related foreign liabilities to GDP. Our policy environment index is constructed as the growth regression-weighted average of the following policy indicators: inflation (*Inf*), government burden (*Govt*), trade openness (*TrdOpn*) and financial openness (*FinOpn*). Using the coefficient estimates of regression [3] in Table 1, we have that our policy environment index (*PE*) becomes:

$$PE_{it} = -2.653 \cdot Inf_{it} - 1.07 \cdot Govt_{it} + 0.158 \cdot TrdOpn_{it} + 0.207 \cdot FinOpn_{it}$$

where "*good policy environments*" (high values of *PE*) are reflected by low inflation, low government burden, and higher degrees of international trade and financial integration. Furthermore, we decompose our policy environment index (*PE*) in two groups: (i) the index of domestic policy environment (*DPE*) that captures the ability of the government to keep price stability and low government distortions, and (ii) the index of outward policy environment (*OPE*) which depicts the degree of outward orientation of the economy to the

reform, mechanisms of exit and mechanisms of entry). That information is not available for a larger set of countries.

international goods and capital markets. Hence, the *DPE* is constructed using the information on the inflation rate and government consumption expenditure, whereas the *OPE* is calculated using data on trade and financial openness. Specifically, using the coefficient estimates of regression [3] in Table 1, $DPE_{it} = -2.653 \cdot Inf_{it} - 1.07 \cdot Govt_{it}$, while $OPE_{it} = 0.158 \cdot TrdOpn_{it} + 0.207 \cdot FinOpn_{it}$. Note that, in both cases, the higher the value of the (*DPE* and *OPE*) indices, the better is the quality of (domestic and outward) policies. Finally, note that all indices (*PE*, *DPE*, and *OPE*) have been normalized so that they take values between 0 and 1, and higher values of these indices imply a better economic policy environment.[16]

Figure 1 shows that countries in the lowest quartiles of the index of policy environment display higher inflation rates, larger government burden, greater international trade and financial integration. On average, countries in the bottom quartile of the distribution of the policy environment (*PE*) index have an inflation rate of 41%, general government consumption of 18.5% of GDP, exports and imports of 44.4% of GDP, and foreign liabilities of 33.3% of GDP. On the other hand, countries in the top quartile of the *PE* distribution have a lower average rate of inflation (6.2%), government consumption of 9.4% of GDP, exports and imports of 64% of GDP, and foreign liabilities of approximately 80% of GDP.

Interestingly, we also show in Figure 1 that the growth rate of GDP per capita rises as the policy environment improves. The rate of economic growth is, on average, 0.7% for countries in the bottom quartile of policy environment ("bad policies") and it is 2.4% for countries in the top quartile of policy environment ("good policies"). On the other hand, we also find that, as the quality of the policy environment improves, growth volatility declines although at decreasing rates.

[16] We normalize the index of policy environment by performing the following operation:
$\widetilde{x} = \dfrac{x - \min\{x\}}{\max\{x\} - \min\{x\}}$ where x represents the *PE*, *DPE* and *OPE* indices. Note that $\max\{x\}$ and $\min\{x\}$ indicate the maximum and the minimum value of the x process.

Next, we evaluate the significance of complementarities between economic policies and structural factors by examining the concordance between economic growth and the policy environment. We observe that 9.2% of our sample of country-periods is conformed by countries with low growth and bad policy environment (both indicators in the lowest quartile of the distribution). Note that as the policy environment moves from the lowest to higher quartiles of its respective distributions, the number of countries with low growth rates declines. Only 4.2% of country episodes display high-quality policy environments and poor growth performance (PE in the top quartile and growth in the bottom quartile). As policy environment improves, the number of countries with higher growth rates increase: 7.1% of the distribution of country episodes have good policies and high growth (both indicators in the top quartile of their respectively distributions). Finally, note that these results hold when we undertake the same analysis for domestic and outward policy environments.

[INSERT TABLE 3 HERE]

In addition, we report the average growth rate for countries with different levels of domestic and outward policy environment. On average, we find that the lowest growth rate in GDP per capita (0.09%) is achieved by countries with poor domestic and outward policy environments (DPE and OPE in the bottom quartiles). If we hold constant DPE at its lowest quartile, better OPE would render higher growth. Analogously, keeping OPE at the bottom quartile, improvements in DPE would render higher growth rates (although not monotonically). Interestingly we find that the growth rate rises monotonically if DPE improves given that the economy is outward oriented (OPE in the top quartile): it jumps from 0.09 to 1.6%. Growth rises although non-monotonically if OPE improves while the economy has achieved macroeconomic stability (DPE in the top quartile). The growth rate, in this case, moves from 1.5% for almost closed economies to 3.44% for very open economies (bottom and top quartiles of the distribution of OPE respectively). In sum, we find some preliminary evidence that good policy environment is a necessary but not sufficient condition for economic growth.

4 Removing the constraints to growth: Economic policy and structural factors

The main goal of the present paper is to evaluate the importance of complementarities in the growth process. Despite the abundant evidence on the drivers of long-term growth, the issue of policy complementarities is not properly addressed in the empirical literature and it is critical in determining whether policies can help promote growth in developing countries. The fact that policies interact in a complex way and that policy complementarities may account for differences in growth experiences implies that rather than focusing on the efficacy of a determined policy alone, we should focus on its success as an integral part of a combination of policies.

This paper proposes to undertake this road by examining: (i) the existence of complementarities between structural factors (such as, human capital, financial development, and governance) and the policy environment (comprised by inflation, government burden, trade openness and financial openness). In this case, we will test whether reforms to promote more accumulation of human capital, deeper domestic financial markets and better quality of governance depend on the level of policy environment in the country. (ii) We also test whether the good quality of macroeconomic policies and the outward orientation of the economy (summarized in the index of policy environment as well as in its domestic and outward components) may help shield the economy from volatile shocks –either from policy or external factors.

Structural factors and the overall policy environment

In regressions [1] through [4] of Table 4, we include our index of policy environment, *PE* (instead of the four policy indicators present in Table 1), and the interaction between the *PE* index and output per capita, human capital, financial development and institutional quality. We introduce these interactions one by one and we find the following results: the *PE* index has a positive and statistically significant coefficient regardless of the specification, while the interaction term between *PE* and each structural factor (introduced one by one) is negative and statistically significant. We first look at per capita income, more precisely at the

interaction between initial GDP per capita and the index of policy environment —regression [1]. The results suggest that the policy environment matters for convergence: the better the policy environment, the faster the convergence of poorer nations. On the other hand, this finding also suggests that the growth benefits of the policy environment are higher in low- and middle-income economies. Next we turn to the interaction between human capital and the policy environment —regression [2]. Again, we find that the interaction is negative while human capital and the policy environment has a positive and significant coefficient. Better policy environments provide higher growth benefits in countries with low to medium levels of human capital, while the impact of human capital on growth is the largest in countries with low to medium policy environments. Regression [3] includes the interaction between *PE* and financial depth and regression [4] adds instead the interaction of *PE* and institutional quality. The results are qualitatively similar: growth effects of *PE* are the largest in countries with low to medium levels of the structural factors and reforms in structural factors renders higher growth benefits in countries with low to medium *PE*.

[INSERT TABLE 4 HERE]

Typically, income per capita, human capital, financial depth and institutions are highly correlated (Barro and Lee, 2001; Beck et al. 2001; Dollar and Kraay, 2003). Furthermore, to the extent that real income per capita may reflect economic development, it usually entails higher levels of educational attainment, more developed domestic financial markets, and stronger institutions. In this context, the findings may lead to rather unsurprising —and policy irrelevant— corollaries: (i) richer countries have smaller marginal benefits from higher quality policy environment, and (ii) the marginal growth effects of structural factors are the highest in low- to medium-income countries. Regressions [5] and [6] dispel these doubts: when we put together all these structural factors, all variables and interactions remain statistically significant. Interestingly, we find that the speed of convergence towards the steady state is higher in countries with better policy environments —see figure 3(i). Also, human capital and governance have a positive effect on growth that dies out in countries with the very high-quality policy environment —see figures 3(ii) and 3(iv).

In contrast, the interaction between financial depth and policy environment is positive and statistically significant. Figure 3(iii) shows that domestic capital market reforms may have a detrimental impact on growth in countries with low-quality economic policies. At the same time, financial market reforms can boost the growth rate of the economy in countries with high-quality policy environments. In addition, we also find that the effectiveness of better policy environments in raising growth is enhanced in countries with deeper financial markets.

Structural factors, domestic and outward policy environment

Table 5 decomposes the overall index of policy environment into its domestic and outward policy components (*DPE* and *OPE*, respectively) and we include the interaction between each structural factor with *OPE* and *DPE*. Again, regressions [1] through [4] includes the interaction of each structural factor (say, income per capita, human capital, financial depth and institutions) with DPE and OPE, separately. Moreover, regressions [5] and [6] include all possible interaction between structural factors and the domestic and outward policy environments.

[INSERT TABLE 5 HERE]

When analyzing each interaction separately we find qualitatively similar results to those of Table 4: first, healthier domestic and outward policy environments enhance growth. Second, countries with better domestic and outward policy environments tend to converge faster to steady state. Third, the marginal effects of healthier *DPE* and *OPE* dies out as the country reaches the highest levels of education, financial development and institutional quality. Finally, the largest potential growth benefits from reforms in education, domestic capital markets and governance are accrued by countries with low to medium policy environment, while the marginal benefits of structural changes for countries with the highest levels of *DPE* and *OPE* are statistically not different from zero. Regressions [5] and [6] of Table 5 include the interaction of the structural factors with *DPE* and with *OPE* and allows to identify whether the interaction between the policy environment (either domestic or outward one) and each of the structural factors does not merely reflect economic development. In what follows, we will focus our discussion in regression [6] of Table 5.

We first look at the impact of initial income per capita. We find that the coefficient of initial GDP per capita is positive and significant, its interaction with *DPE* is negative and significant whereas the interaction of income per capita and *OPE* is negative and not statistically significant. Figure 4(i) shows the growth effect of a one-standard-deviation increase in output conditional on DPE (and with the level of *OPE* constant on the median sample value). Countries with low DPE show a very slow speed of mean reversion to deviations from the steady state, while there is evidence of transitional convergence for countries with medium to high *DPE* (ceteris paribus the level of *OPE*). On the other hand, Figure 5(i) evidence of a negative relationship between initial output per capita and the growth rate conditional on the different levels of *OPE* (and provided that the *DPE* is set at its median level).

Next we look at the impact of human capital on growth conditional on domestic and outward policy environments. Here, we find that the while the coefficient of human capital is positive and significant, their interaction coefficients with DPE and OPE are negative and statistically different from zero. Figure 4(ii) shows that human capital has a positive and significant impact on growth for low and medium levels of DPE, with the effect dying out as the country reaches highest levels of DPE. A one standard deviation increase in human capital at the median values of DPE and OPE would elevate the growth rate by 29 basis points per year (and is statistically significant at the 10% level). Note that beyond the median value of DPE, the growth effect of human capital is statistically insignificant in most cases. Figure 5(ii) shows similar results to 4(ii): the growth impact of rising human capital is positive (but declining) in countries with low to medium levels of *OPE*, and it becomes non-significant in countries with high levels of *OPE*.

The results for financial development are striking. First, the coefficient estimate of domestic credit to the private sector is negative and statistically not significant, its interaction with *DPE* is positive and significant while its interaction with *OPE* is negative and not significant. The growth effect of rising financial depth by one standard deviation conditional on DPE and OPE is depicted in Figure 4(iii) and 5(iii), respectively. Figure 4(iii) depicts the growth response to a one-standard deviation increase in the ratio of private credit to GDP conditional on DPE (while keeping OPE constant at its median value). It shows that

reforms in the domestic financial markets may have a deleterious impact on growth in countries with low levels of DPE —that is, in countries with high inflation and heavy government burden. On the other hand, financial development would boost the growth rate of the economy in countries with low and stable inflation and reduced government burden. Note that conditional on DPE and OPE being at their median values, a one standard deviation increase in private credit would raise the growth rate by 33 basis points. On the other hand, figure 5(iii) illustrates the response of the growth rate to a one-standard deviation increase in financial development conditional on *OPE* (while keeping *DPE* constant at its median value). In this case, the growth effect of financial development is positive and significant in countries with low to medium levels of OPE, and the growth impact dies out as the level of OPE increases to the high quartiles of the distribution. That is, private credit appears to be a substitute factor to trade and financial openness in the growth process. Given an increase in private credit, countries with higher trade and financial openness would reap smaller growth benefits from financial development. The negative interaction between financial openness and domestic financial development could be attributed to the fact that: (a) exporting firms with lack of access to world capital markets may rely more heavily on domestic financing sources, or (b) firms may find more diverse sources of financing in less regulated world capital markets.

Finally, we examine the role of institutions in the growth process. The coefficient of institutional quality is negative and significant, its interaction with DPE is also negative and significant while its interaction with OPE is positive and significant. The conditional response of the growth rate to improvements in governance (*i.e.* a one standard deviation increase in the ICRG index of political risk) conditional on DPE and OPE is depicted in Figures 4(iv) and 5(iv), respectively. We first discuss the response of growth to a one-standard deviation increase in institutional quality conditional on DPE (with OPE constant at the median level). We find that regardless of the level of DPE, the impact of better institutions on growth per capita is positive and significant, with the growth rate being raised by 1.25 percentage points per year conditional on both DPE and OPE being at their median values. Ceteris paribus the *OPE* level (at its median sample value), a one-standard deviation increase in institutional quality would increase the growth rate by 1.52 percentage points for countries with low DPE (10^{th} percentile) and by 0.97 basis points for countries with high

DPE (90th percentile). Figure 5(iv), on the other hand, shows the response of the growth rate to a one standard deviation increase in institutional quality conditional to OPE and given the DPE level. Here we find that institutional reforms may have an adverse effect on growth for countries with low levels of OPE —that is, countries the have closed trade and capital account regimes. However, as economies liberalized their trade regime and their capital account, the impact of higher institutional quality on growth is higher. Hence, institutional quality and the outward orientation policies (in the world markets of goods and capital) are complements in the growth process.

Summary of results

Table 6 summarizes the growth response of a one standard deviation increase in structural factors —say, income per capita, human capital, financial development, and institutional quality— conditional on the quality of economic policies —as proxied by the index of policy environment. In additional, we also report the growth response conditional on the quality of both domestic and outward policies. Note that when we compute the response conditional to bad domestic policies (10th percentile row) and good domestic policies (90th percentile), we keep outward policies constant at the median value. The same approach is undertaken when computing the growth response conditional to good or bad outward policies. Also note that we report the difference in the growth response to a change in a structural factor conditional on good and bad policies as well as the p-value of a Chi-square test that examines the equality of these responses.

[INSERT TABLE 6 HERE]

We first find that the speed of convergence towards steady state is faster in poorer countries with healthy policy environments. In other words, poorer countries tend to growth faster provided that they have a "good" policy environment. We should note that this result is mainly driven by improvements in the domestic policy environment (DPE). Hence, achieving low inflation and reduced government burden is crucial for poorer countries to growth at faster rates and catch-up with richer countries. Second, human capital has a positive and significant impact on growth in countries with good and bad policy environments, although the marginal growth effect is smaller as the policy environment

improves. When breaking down the index of policy environment into its DPE and OPE components, we find that the growth effect of rising human capital dies out in countries with "good" domestic and outward policy environments. A possible explanation of this result relies on the fact that for countries with "good" outward policy environments (that is, high degree of integration to world markets of goods and assets), the expansion of (secondary) education is not a sufficient condition. It may require higher levels of R&D investment as well as an expansion of higher education and on-the-job-training as well as a more efficient allocation of talent towards more productive (instead of rent-seeking) activities. Third, financial market development have a negative or negligible impact on growth in countries with bad policy environments, and the growth effect of financial depth increases as the policy environments improves. For instance, the impact of a one-standard-deviation increase in private credit to GDP on growth is 13 basis points in countries with average policy environment (PE), and 23 basis points in countries with good PE. We should note that this finding is mainly driven by the interaction between financial depth and DPE. We find that the complementarities between policy environment and financial development are mainly explained by the key role of low inflation and reduced government burden in enhancing the effect of deeper domestic financial markets on growth. Here, the impact of a one-standard-deviation increase in private credit to GDP on growth is 33 basis points in countries with average domestic policy environment (DPE), and 57 basis points in countries with good DPE. Finally, we find that the impact of higher quality of institutions on growth is positive regardless of the level of policy environment index, although the growth effect decreases as the PE index rises. This behavior is also exhibited by the interaction between DPE and the quality of institutions. On the other hand, we find that an improvement in the quality of institutions is either detrimental or has a negligible impact on growth in countries with closed trade and capital account regimes. In addition, the impact of better governance on growth is positive and increases as the outward policies render higher degrees of integration to world markets of goods and assets.

5. Aggregate volatility, economic policy and growth

An important strand of research that examines the negative cross-country relation between average GDP growth and output volatility has been developed since the influential work of

Ramey and Ramey (1995). For instance, Hnatkovska and Loayza (2004) provide robust evidence on the negative effect of aggregate volatility on growth, and that this adverse effect is larger in economies with low-income levels, weak institutions and bad policies.[17]

Consistent with the empirical literature, we find a negative relationship between growth and output volatility and our estimates indicate that doubling output volatility would reduce the growth rate by 1.2 percentage points (see Table A.3). We argue that output volatility can be attributed to either policy volatility or the volatility of external shocks. In Table A.3 we report that either rising policy volatility or more volatile external shocks (terms of trade shocks, external demand growth or world real interest rates) would cause a drop in growth rates.

The main goal of this section is to evaluate whether a good policy environment protects the economy from aggregate volatility, and more specifically from more volatile domestic and foreign shocks. Furthermore, we evaluate whether good domestic and/or outward policy environments shield the economy from volatile shocks.

Growth volatility and the policy environment

Table 7 reports the growth regression conditional on structural factors, the policy environment (PE) index, growth volatility and the interaction between growth volatility and the PE index. To address the likely endogenous impact of aggregate volatility on growth we use two different strategies of estimation: (a) *internal instruments*, where we use lagged levels and differences of growth volatility as instruments, and (b) *external instruments*, where we use the (actual and lagged values of) terms of trade volatility, external demand growth volatility and the volatility of world real interest rates as instruments. For the sake of brevity we will focus our discussion on the results with external instruments —regressions [3] and [4] in Table 7.

[INSERT TABLE 7 HERE]

[17] They have also shown that the negative effect of volatility on growth has increased in recent years due to deeper recessions.

Aggregate volatility exerts a negative influence on economic growth, and this adverse effect is mitigated by good policy environments —regression [3] of Table 7. Figure 6(i) depicts the growth response to doubling the standard deviation of growth per capita conditional to the level of the policy environment index. For the representative country in the distribution of the policy environment (PE) index, doubling growth volatility would reduce the rate of economic growth by 1.28 percentage points. The drop in the growth rate would be smaller in countries with better policy environments —say, a growth reduction of 1.2 percentage points for countries in the 90th percentile of the distribution of the PE index.

Regression [4] of Table 7 decomposes the PE index into its domestic and outward policy environment indices (DPE and OPE, respectively). Again, we find that the coefficient of growth volatility is negative and significant (at the 5% level); however, the interaction between DPE and growth volatility as well as between OPE and growth volatility shows an interesting pattern. Note that while the interaction between DPE and growth volatility has a positive and significant coefficient, the coefficient estimate of the interaction between OPE and growth volatility is negative and significant. These results imply that: (i) the adverse impact of aggregate volatility on growth is mitigated by monetary and fiscal policies that maintain inflation and government burden at low levels, and (ii) the growth decline due to rising aggregate volatility is exacerbated in countries with higher trade and financial openness. Regarding the influence of openness on the effect of volatility on growth, Kose et al. (2004) found that both trade and financial openness turn the negative effect of volatility on growth into a positive one. However, Hnatkovska and Loayza (2004) reject an ameliorating influence of international trade integration on the negative volatility-growth effect.

Figure 6(ii) shows that the better the domestic policy environment —that is, the lower the rate of inflation and the government burden are— the lower is the growth reduction due to rising inequality. Doubling aggregate volatility would reduce growth by 67 basis points for the representative countries (with sample median values for DPE and OPE). Conditional on the median value of OPE, we find that growth would decline even further (92 basis points) in countries with poor DPE (10th percentile). On the other hand, the drop in the growth rate due to rising volatility is smaller (41 basis points) in countries with good DPE.

Figure 6(iii) shows that the high OPE (reflected in higher trade and financial openness) might exacerbate the impact of volatility on growth, thus making the economy more vulnerable to volatile shocks to output. Again, conditional on the median value of the DPE we find that doubling volatility would reduce growth by 11 basis points in countries with closed trade and financial openness (10^{th} percentile of OPE) and by 1.14 percentage points in countries with open trade and financial openness (90^{th} percentile of OPE).

Policy volatility and the policy environment

As we said before, rising growth volatility could be attributed to the volatility of economic policy or to sharp fluctuations in external conditions. Fatás and Mihov (2006) argue that policy volatility is a better proxy of the quality of macroeconomic policy than outcome measures that capture the levels of policy instruments. In turn, they suggest that the quality of macroeconomic policies is what matters for long-term growth.[18]

We follow Fatás and Mihov (2006) in constructing an indicator that captures discretionary economic policies. We denote discretionary changes in economic policies to those changes that are unrelated to the economy cycle (see methodology of construction in Section 2). Column [2] of Table A.3 shows the regression of the rate of growth per capita on transitional convergence, structural factors, the index of policy environment and the measure of policy volatility. We find that growth is enhanced by a good economic policy environment and by lower policy volatility. In contrast to the findings in Easterly (2005), we find that both the level and the volatility of macroeconomic policies affect long-term growth.

Next, we include the interaction between the index of policy environment and the policy volatility in our regression equation —see regression [1] of Table 8. Consistent with our results in Table 7, we find that good policy environments foster growth and that high policy volatility deters growth. In addition, we find that the interaction coefficient between the *PE* index and policy volatility is positive and significant. That is, the adverse impact of high

[18] Friedman (1977) suggests that high inflation does not change the natural rate of unemployment. However, rising inflation volatility can generate severe economic inefficiencies and have an adverse effect on long-term performance of the country by raising its natural rate of unemployment.

policy volatility on growth is mitigated in countries with better policy environments. Figure 7(i) shows the growth response to doubling fiscal policy volatility conditional on selected percentiles of the *PE* index. We find that growth declines in countries with very poor PE and that the growth impact becomes statistically negligible in countries with higher *PE* values.

[INSERT TABLE 8 HERE]

Finally, we include the *DPE* and *OPE* components of the *PE* index as well as their interaction with policy volatility in our regression equation —see regression [1] of Table 9. Better domestic and outward policy environments promote growth while higher policy volatility hinders long-term economic performance. In addition, we find that the interaction between *DPE* and policy volatility is positive and significant whereas the one between *OPE* and policy volatility is not statistically different from zero. Our findings suggest that maintaining low inflation rates and a reduced government burden (which reflects higher values of *DPE*) would shield the economy from fluctuations in discretionary fiscal policies. On the other hand, the outward orientation of the economy (as measured by the degree of international trade and financial integration) neither magnifies nor mitigates the adverse effects of policy volatility on economic growth. Figure 8(i) and 8(ii) depict the growth response to doubling policy volatility conditional on domestic and outward policy environment, respectively. Note that while growth declines more in countries with low *DPE*, the growth response to policy volatility remains almost invariant to the level of *OPE*.

[INSERT TABLE 9 HERE]

External volatility and the policy environment

Rising growth volatility can also be explained by sharp fluctuations in external shocks. Here we consider the volatility of terms of trade shocks (*Vdp**), the volatility of external demand (*Vdy**) and the volatility of world real interest rates (*Vdr**). In Table A.3 we run our baseline regressions including each factor one by one (regressions [3] through [5] in Table A.3), including the three volatilities altogether (regression [6] of Table A.3), and putting instead an aggregate index of the volatility of external shocks which we construct from the growth regression estimates in column [6] of Table A.3 as follows:

$$Vdx^* = 0.204\ Vdp^* + 0.679\ Vdy^* + 0.747\ Vdr^*$$

where we only take the absolute value of the coefficients of *Vdp**, *Vdy** and *Vdr** in regression [6] of Table A.3. Note that higher values of our aggregate index *Vdx** implies higher external volatility. Regression [7] of Table A.3 shows that higher aggregate external volatility hampers growth.

Table 8 shows the impact of external volatility on growth conditional on the aggregate policy environment (*PE*) index. Regression [2] shows that good policy environment and lower aggregate external volatility (lower *Vdx**) enhance growth. Also note that the interaction between *Vdx** and the *PE* index is positive although not statistically significant. Figure 7(ii) shows that the growth response to doubling *Vdx** remains almost invariant between the 10th and 90th percentile of the *PE* index. When including *Vdp**, *Vdy** and *Vdr** one by one in our regression framework —regressions [3] through [5] in Table 8— we find that the impact of PE is positive and significant in most cases, whereas the effect of rising volatility in each external shocks is negative and significant. Also note that the interaction between the PE index and the volatility of each external shock (say, *Vdp**, *Vdy** and *Vdr**) is positive and significant. That is, when introducing each external shock one-by-one, the impact of growth is negative but softened in countries with good policy environment.

In regression [6] we include the volatility all external shocks considered here and their interactions with the PE index. Interestingly we still find that fluctuations in external shocks related to trade (say, volatility of terms of trade shocks and external demand volatility) have a negative and statistically significant coefficient, whereas as the volatility of the real world interest rate has a positive and insignificant coefficient. When interacting with the *PE* index, we find that good policy environments help abate the negative impact of higher volatility of terms of trade shocks and higher volatility of external demand growth. However, the coefficient that captures the interaction between the *PE* index and the volatility of world real interest rates is negative but statistically not different from zero. Figures 8(iii), 8(iv) and 8(v) depict the response of the growth rate of the economy to rising volatility in terms of trade, external demand, and real world interest rates, respectively, conditional on the *PE* index. The

figures confirm the results from our regressions: better policy environments cushion the adverse impact on growth of rising terms of trade volatility or external demand volatility. On the other hand, the growth impact of the volatility of world real interest rates is statistically not different from zero regardless of the *PE* level.

Table 9 includes the DPE and OPE indices rather than the aggregate PE index, and interacts both DPE and OPE with the volatility of external shocks. Regression [2] of Table 9 presents the analysis for the aggregate index of external volatility, *Vdx**, and its interaction with *DPE* and *OPE* indices. Our results show that growth is promoted by a good domestic and outward policy environment. We also find that the coefficient of aggregate external volatility is positive although not statistically different from zero. On the other hand, the coefficient for the interaction between *Vdx** and *DPE* is negative while the interaction between *Vdx** and *OPE* is positive. Hence our results suggest that rising aggregate volatility of external shocks can be diversified away in countries with open trade regimes and capital accounts.

Regressions [3] through [5] of Table 9 includes in the growth regression the volatility of each external sector one by one (*Vdp**, *Vdy** and *Vdr**) and their interactions with DPE and OPE. We find that the coefficient of *Vdp**, *Vdy** is negative and statistically significant while the coefficient of *Vdr** is negative and statistically not different from zero. When interacting DPE and OPE with *Vdp**, we find that the growth effect rising terms of trade volatility is cushioned by both good domestic and policy environments —regression [3] of Table 9. The response to rising external demand volatility, on the other hand, is cushioned by good domestic policy environments but exacerbated in countries with open trade and capital accounts —see regression [4] of Table 9. Finally, we find that higher volatility of world real interest rates is cushioned in countries that are highly integrated to world capital and goods markets.

Furthermore, regression [6] includes all three external volatilities (*Vdp**, *Vdy** and *Vdr**) and their interaction terms with DPE and OPE. Interestingly, we find the coefficients of *Vdp**, *Vdy** and *Vdr** are negative and significant, with the exception of *Vdy**. That is, growth is harmed by highly volatile shocks in terms of trade and volatile movements in world real interest rates. We find that the adverse growth effects of rising terms of trade volatility are

diversified away in countries with open trade and capital accounts —see Figure 9.2(i). On the other hand, the impact of rising external demand volatility on growth is exacerbated in countries with open trade and capital accounts —see Figure 9.2(ii)— and abated in countries with good quality monetary and fiscal policies —see Figure 9.1(ii). Finally, we find that the negative growth effects of volatile real world interest rates are mitigated in countries with open trade regimes and capital accounts —see Figure 9.2(iii).

Finally, Table 10 presents the role of the policy environment in either magnifying or reducing the impact of rising volatility on economic growth. Statistically, we find that having a good policy environment may explain the different responses to rising terms of trade volatility and external demand volatility. The same cannot be said about the volatility of world real interest rates.

[INSERT TABLE 10 HERE]

6. Conclusions

This paper has shown the level of complementarities between policies. It is clear that policies interact in a complex way and that policy complementarities may account for differences in growth experiences implies that rather than focusing on the efficacy of a determined policy alone, we should focus on its success as an integral part of a combination of policies. In this paper, starting from a baseline regression using panel data of countries, we construct a policy index, which is divided in two. Domestic policy index is composes by inflation and budget deficit; higher value of the index means low inflation and higher government budget surplus. External policy index comprise trade and financial openness; a more open economy implies a higher value for the index.

First of all, domestic and external policies show a high level of complementarities. This means that doing well in macro (inflation, fiscal budget) will help growth, especially if it is accompanied by openness. Second, the policy environment index constructed shows complementarities with structural factors such as initial GDP, human capital, quality of

institutions and financial depth. Third, good policy environment mitigates the volatility of shocks on the economy.

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Appendix I
Sample of Countries

Latin America and the Caribbean (21): Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Haiti, Jamaica, Mexico, Nicaragua, Panama, Peru, Paraguay, El Salvador, Trinidad and Tobago, Uruguay, Venezuela.

East Asia and the Pacific (7): China, Republic of Korea, Malaysia, Philippines, Papua New Guinea, Singapore, Thailand.

Industrial Economies (22): Australia, Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Italy, Japan, the Netherlands, Norway, New Zealand, Portugal, Sweden, United States.

Middle East and North Africa (8): Algeria, Egypt, Iran, Israel, Jordan, Morocco, Tunisia, Turkey.

South Asia (3): India, Pakistan, Sri Lanka.

Sub-Saharan Africa (15): Botswana, Cote d'Ivoire, Ghana, the Gambia, Kenya, Madagascar, Malawi, Niger, Nigeria, Senegal, Sierra Leone, Togo, South Africa, Zambia, Zimbabwe.

Appendix 2
Sample Statistics
76 countries, 1960-2000 (5-year period observations)

	Average	Std. Dev.	Minimum	Maximum	Correlation with Growth
Growth	1.50	2.65	-7.94	10.13	1.00
Initial GDP per capita (log)	8.55	0.98	6.24	10.24	0.21
Structural Factors and Institutions					
Secondary Enrollment (log)	3.78	0.74	1.30	4.92	0.23
Private Credit (% GDP, log)	3.51	0.84	0.57	5.43	0.26
Institutions (ICRG, log)	4.12	0.29	3.34	4.57	0.34
Policy Environment Variables:					
Inflation Rate (CPI, log differences)	4.74	0.18	4.59	6.14	-0.30
Government Consumption (% GDP, log)	2.68	0.36	1.47	3.64	-0.05
Trade (Export & Import as % GDP, log)	3.92	0.62	2.02	5.79	0.02
Financial Openness (% GDP, log)					
- Foreign Assets and Liabilities	2.54	1.33	-4.40	6.31	0.17
- Foreign Liabilities	2.32	1.25	-4.40	5.54	0.16
Policy Index 1 (PI1)	3.06	0.92	-3.10	5.88	0.24
Policy Index 2 (PI2)	3.11	0.95	-3.43	5.97	0.25

See notes in Tables 2 and 3 in reference to the policy environment index.

Table 1
Policy complementarities and growth: Baseline regressions

Dependent Variable: Growth in real GDP per capita
Estimation method: System GMM-IV including time dummies

Variables	[1]	[2]	[3]	[4]
I. Policy Environment				
1.1 Domestic				
Inflation	-1.964 **	-1.247 **	-2.653 **	-1.369 **
(*CPI, log differences*)	(0.18)	(0.15)	(0.16)	(0.21)
Government Burden	-1.352 **	-0.740 **	-1.070 **	-1.083 **
(*GG Consumption as % GDP, logs)*	(0.15)	(0.14)	(0.14)	(0.09)
1.2 External				
Trade Openness (TO)	0.483 **	0.208 **	0.158 **	0.623 **
(Exports and imports as % of GDP, logs)	(0.08)	(0.09)	(0.08)	(0.10)
Financial Openness (FO)	-0.376 **	2.227 **	..	..
(*as % of GDP, logs*)	(0.11)	(0.34)		
Foreign Liabilities * (Debt/Equity) ratio	..	-0.587 **	..	..
		(0.06)		
Equity-related financial openness	..	..	0.207 **	0.338 **
(*as % of GDP, logs*)			(0.05)	(0.04)
Loan-related financial openness	..	..	..	-1.098 **
(*as % of GDP, logs*)				(0.06)
II. Structural Factors				
Human Capital	1.480 **	1.803 **	1.425 **	1.533 **
(Secondary gross enrollment rate, logs)	(0.13)	(0.15)	(0.13)	(0.12)
Financial Depth	0.424 **	0.369 **	0.242 **	0.156 **
(Private Credit as % of GDP, logs)	(0.05)	(0.05)	(0.06)	(0.05)
Institutions	3.574 **	3.948 **	3.563 **	3.717 **
(ICRG Political risk index, logs)	(0.17)	(0.16)	(0.18)	(0.18)
III. Transitional Convergence				
Initial GDP per capita	-0.786 **	-1.067 **	-0.725 **	-0.755 **
(in logs)	(0.06)	(0.08)	(0.06)	(0.06)
Countries	101	101	101	101
Observations	608	608	608	608
Specification Tests (p-value)				
- Sargan	(0.26)	(0.20)	(0.24)	(0.27)
- 2nd. Order Correlation	(0.85)	(0.83)	(0.75)	(0.92)

*Figures below the coefficient estimates represent robust standard errors. * (**): significant at the 10 (5) % level.*

Table 2
Trade and financial openness: Complements or substitutes?

Dependent Variable: Growth in real GDP per capita
Estimation method: System GMM-IV including time dummies

Variables	[1]	[2]	[3]	[4]
I. Policy Environment				
1.1 Domestic				
Inflation	-1.858 **	-2.720 **	-0.671 **	-1.682 **
(*CPI, log differences*)	(0.19)	(0.19)	(0.14)	(0.23)
Government Burden	-1.304 **	-0.909 **	-1.172 **	-0.958 **
(*GG Consumption as % GDP, logs)*	(0.17)	(0.14)	(0.16)	(0.12)
1.2 External				
Trade Openness (TO)	-2.521 **	-0.836 **	1.383 **	0.882 **
(Exports and imports as % of GDP, logs)	(0.57)	(0.18)	(0.25)	(0.42)
Financial Openness (FO)	-3.257 **	..	0.175	..
(*as % of GDP, logs*)	(0.55)		(0.30)	
Equity-related financial openness	..	-1.476 **	..	-2.150 **
(*as % of GDP, logs*)		(0.21)		(0.33)
Loan-related financial openness	..	..	..	0.642
(*as % of GDP, logs*)				(0.55)
Interaction between TO and FO				
Trade Openness x Financial openness	0.726 **	..	..	..
	(0.14)			
Trade Openness x Equity-related	..	0.406 **	0.083 **	0.612 **
financial openness		(0.05)	(0.02)	(0.08)
Trade Openness x Loan-related	..	..	-0.265 **	-0.458 **
financial openness			(0.05)	(0.14)
II. Structural Factors				
Human Capital	1.440 **	1.540 **	1.270 **	1.657 **
(Secondary gross enrollment rate, logs)	(0.14)	(0.13)	(0.16)	(0.12)
Financial Depth	0.361 **	0.112 *	0.562 **	0.033
(Private Credit as % of GDP, logs)	(0.05)	(0.07)	(0.08)	(0.07)
Institutions	3.483 **	3.660 **	2.759 **	3.880 **
(ICRG Political risk index, logs)	(0.17)	(0.16)	(0.25)	(0.21)
III. Transitional Convergence				
Initial GDP per capita	-0.802 **	-0.734 **	-0.811 **	-0.783 **
(in logs)	(0.06)	(0.06)	(0.08)	(0.07)
Countries	101	101	101	101
Observations	608	608	608	608
Specification Tests (p-value)				
- Sargan	(0.25)	(0.23)	(0.25)	(0.21)
- 2nd. Order Correlation	(0.95)	(0.72)	(0.99)	(0.72)

*Figures below the coefficient estimates represent robust standard errors. * (**): significant at the 10 (5) % level.*

Table 3
Growth, aggregate volatility and the policy environment

3.1 Growth in real GDP per capita 1/

(percent per annum)

		Outward Policy Environment			
		I	**II**	**III**	**IV**
Domestic Policy Environment	**I**	**0.09**	0.36	0.49	1.60
	II	2.43	2.00	1.47	2.29
	III	2.42	1.50	1.73	2.99
	IV	1.53	1.96	1.54	**3.44**

3.2 Growth Volatility 2/

(Std. Dev. Growth in real output per capita, in logs)

		Outward Policy Environment			
		I	**II**	**III**	**IV**
Domestic Policy Environment	**I**	**1.32**	1.16	1.03	0.94
	II	1.15	0.77	0.96	0.57
	III	0.99	0.83	0.84	0.77
	IV	1.13	0.68	0.98	**0.68**

3.3 Concordance between growth and policies 3/

(Number of cases)

		Policy Environment			
		I	**II**	**III**	**IV**
Economic Growth	**I**	**76**	50	46	35
	II	41	63	44	59
	III	41	52	61	55
	IV	49	43	56	**59**

		Domestic Policy Environment			
		I	**II**	**III**	**IV**
Economic Growth	**I**	**101**	45	60	47
	II	55	77	51	68
	III	46	76	67	70
	IV	52	56	76	**69**

		Outward Policy Environment			
		I	**II**	**III**	**IV**
Economic Growth	**I**	**61**	54	58	36
	II	46	52	60	50
	III	47	58	53	52
	IV	53	45	38	**71**

*1/ We report the average growth in real GDP per capita for countries in selected quartiles of the sample distribution of domestic and outward policy environment. The (i, j) entry of the matrix shows the average rate of economic growth for the country in the i-th quartile of domestic policy environment (DPE) and the j-th quartile of outward policy environment (OPE). Note that DPE and OPE are regression-based weighted indices obtained using the regression [5] in Table 1: DPE = -2.653*Inflation - 1.07*Government burden, while OPE = +0.158* Trade openness + 0.207*Financial openness.*

2/ We report the standard deviation of growth in real GDP per capita (in logs) for countries in selected quartiles in a similar fashion as described in 1/.

3/ The (i, j) entry of the matrix reports the number of country observations with economic growth in the i-th quartile and policy environment index in the j-th environment. Note that the index of policy environment (PE) is equal to the sum of DPE and OPE.

Table 4
Complementarities between structural reforms and the policy environment

Dependent Variable: Growth in real GDP per capita
Estimation method: System GMM-IV including time dummies

Variables	[1]	[2]	[3]	[4]	[5]	[6]
I. Structural Factors and Policy Environment						
Human Capital	0.786 **	9.416 **	0.664 **	1.180 **	4.840 **	3.416 **
(Secondary gross enrollment rate, logs)	(0.17)	(1.20)	(0.15)	(0.13)	(1.17)	(1.40)
Financial Depth	0.358 **	0.202 **	2.767 **	0.363 **	-0.951 **	-1.357 **
(Private Credit as % of GDP, logs)	(0.07)	(0.08)	(0.50)	(0.10)	(0.47)	(0.51)
Institutions	3.885 **	3.461 **	4.163 **	14.832 **	12.740 **	11.306 **
(ICRG Political risk index, logs)	(0.32)	(0.36)	(0.34)	(1.40)	(2.80)	(3.30)
Policy environment index (PE) 1/	44.902 **	46.335 **	19.353 **	72.121 **	72.293 **	69.844 **
(*Regression-based weighted average*)	(4.52)	(5.10)	(2.01)	(6.62)	(9.48)	(11.30)
II. Interaction between structural factors and policy environment						
PE * Output per capita	-4.777 **	..	..	..	..	-1.589 *
	(0.57)					(0.84)
PE * Human capital	..	-10.228 **	..	..	-4.978 **	-3.326 **
		(1.40)			(1.36)	(1.61)
PE * Financial depth	..	..	-3.338 **	..	1.300 **	1.770 **
			(0.60)		(0.58)	(0.63)
PE * Institutions	..	..	..	-16.377 **	-13.237 **	-11.494 **
				(1.75)	(3.24)	(3.93)
III. Transitional Convergence						
Initial GDP per capita	3.459 **	-0.277 **	-0.207 *	-0.337 **	-0.175 **	1.180 *
(in logs)	(0.51)	(0.09)	(0.11)	(0.11)	(0.08)	(0.73)
Countries	101	101	101	101	101	101
Observations	608	608	608	608	608	608
Specification Tests (p-value)						
- Sargan	(0.27)	(0.17)	(0.31)	(0.18)	(0.20)	(0.19)
- 2nd. Order Correlation	(0.84)	(0.86)	(0.98)	(0.81)	(0.84)	(0.82)

*Our regressions include a constant and time dummies (not reported but available from the authors). The figures in parenthesis below the coefficient estimates represent robust standard errors corrected for small sample bias (Windmeijer, 2005). * (**) implies that the coefficient estimate is significant at the 10 (5) % level.*
*1/ The policy environment index (PE) is the regression weighted average of the policy variables such as the inflation rate, the government burden, trade openness and financial openness. We use the coefficient estimates of regression [5] in Table 1 as weights such that: PE = -2.653*Inflation-1.07*Government burden+0.158*Trade openness + 0.207*Financial openness. Note that these indices have been normalized such that they take values between 0 and 1, and higher values of these indices signals a better policy environment (as represented by high macroeconomic stability and higher openness).*

Table 5
Complementarities among structural reforms, domestic and outward policy environment

Dependent Variable: Growth in real GDP per capita
Estimation method: System GMM-IV including time dummies

Variables	[1]	[2]	[3]	[4]	[5]	[6]
I. Structural Factors and Policy Environment						
Human Capital	0.377 *	9.241 **	0.388 *	0.418 *	13.562 **	8.816 **
(Secondary gross enrollment rate, logs)	(0.23)	(1.79)	(0.23)	(0.22)	(1.90)	(2.17)
Financial Depth	0.352 **	0.453 **	5.019 **	0.449 **	1.449 **	-0.437
(Private Credit as % of GDP, logs)	(0.10)	(0.11)	(0.81)	(0.12)	(0.65)	(0.92)
Institutions	3.340 **	3.314 **	3.493 **	20.614 **	-9.184 **	-8.827 **
(ICRG Political risk index, logs)	(0.42)	(0.42)	(0.43)	(3.33)	(3.76)	(3.82)
Domestic policy environment index (DPE) 1/	39.053 **	38.585 **	23.342 **	79.934 **	98.069 **	113.061 **
(*Regression-based weighted average*)	(6.90)	(6.55)	(3.00)	(16.90)	(15.61)	(19.24)
Outward policy environment index (OPE) 2/	15.064 **	25.057 **	11.416 **	31.739 **	-124.615 **	-132.262 **
(*Regression-based weighted average*)	(3.40)	(4.61)	(2.15)	(11.33)	(9.28)	(11.47)
II. Interaction between structural factors and policy environment						
DPE * Output per capita	-4.218 **	..	..	..	..	-4.588 **
	(0.96)					(1.70)
OPE * Output per capita	-1.290 **	..	..	..	..	-0.619
	(0.51)					(0.91)
DPE * Human capital	..	-8.187 **	..	..	-11.415 **	-5.534 **
		(1.91)			(2.18)	(2.29)
OPE * Human capital	..	-5.304 **	..	..	-8.209 **	-7.617 **
		(1.25)			(1.61)	(1.72)
DPE * Financial Depth	..	..	-4.910 **	..	2.539 **	4.875 **
			(0.95)		(0.74)	(1.24)
OPE * Financial Depth	..	..	-1.863 **	..	-5.415 **	-5.085 **
			(0.77)		(0.72)	(0.74)
DPE * Institutions	..	..	..	-18.605 **	-14.512 **	-16.845 **
				(4.53)	(4.98)	(5.95)
OPE * Institutions	..	..	..	-6.567 **	43.428 **	45.762 **
				(2.97)	(3.08)	(4.19)
III. Transitional Convergence						
Initial GDP per capita	3.721 **	-0.130	-0.144	-0.202	-0.498 **	3.231 **
(in logs)	(0.73)	(0.15)	(0.15)	(0.17)	(0.13)	(1.27)
Countries	101	101	101	101	101	101
Observations	608	608	608	608	608	608
Specification Tests (p-value)						
- Sargan	(0.26)	(0.32)	(0.18)	(0.20)	(0.29)	(0.36)
- 2nd. Order Correlation	(0.94)	(0.91)	(0.86)	(0.87)	(0.71)	(0.60)

*Our regressions include a constant and time dummies (not reported but available from the authors). The figures in parenthesis below the coefficient estimates represent robust standard errors corrected for small sample bias (Windmeijer, 2005). * (**) implies that the coefficient estimate is significant at the 10 (5) % level.*
*1/ The domestic policy environment (DPE) is equal to -2.653*Inflation-1.07*Government burden (using the coefficient of regression 5 of Table 1).*
*2/ The outward policy environment (OPE) equals 0.158*Trade openness + 0.207*Financial openness, with the weights are coefficient estimates taken from regression 5 of Table 1. Note that these indices have been normalized such that they take values between 0 and 1, and higher values of these indices signals better policy environment (as represented by high macroeconomic stability and higher openness).*

Table 6
Growth effects of structural factors: The role of the policy environment

Growth response to a one-standard deviation increase in structural factors conditional on the policy environment

	Growth effects of:			
	Output per capita	**Human capital**	**Financial depth**	**Institutional quality**
Policy Environment 1/				
10th percentile	-0.048	0.687	-0.007	0.747
Median	-0.261	0.463	0.131	0.455
90th percentile	-0.420	0.295	0.233	0.237
Difference	-0.372	-0.392	0.240	-0.510
(*p-value*)	(0.109)	(0.035)	(0.017)	(0.010)
Domestic Policy Environment 2/				
10th percentile	-0.484	0.527	0.088	1.522
Median	-0.874	0.290	0.327	1.251
90th percentile	-1.273	0.047	0.573	0.973
Difference	-0.789	-0.479	0.485	-0.549
(*p-value*)	(0.027)	(0.094)	(0.005)	(0.003)
Outward Policy Environment 2/				
10th percentile	-0.755	1.026	0.893	-1.265
Median	-0.874	0.290	0.327	1.251
90th percentile	-0.973	-0.325	-0.144	8.068
Difference	-0.218	-1.351	-1.037	9.333
(*p-value*)	(0.551)	(0.000)	(0.000)	(0.000)

1/ Using the regression estimates of column [6] in Table 4, we compute the growth response to a one standard deviation increase in output per capita, human capital, financial depth, and institutional quality conditional on selected percentiles of the sample distribution of the policy environment index (PE). We compute the growth response for the median of the PE index ("median effect") as well as for the 10th percentile (countries with bad policies) and 90th percentile (countries with good policies). Note that the line "Difference" reports the difference bewteen the growth response at the 90th percentile of PE minus the response for countries at the 10th percentile sample distribution of PE. The number in parenthesis represents the Chi-square statistic that tests the equality of these two responses.
2/ We use the regression estimates of column [6] in Table 5 to compute the growth response to a one standard deviation increase in output per capita, human capital, financial depth, and institutional quality conditional on selected percentiles of the sample distribution of the domestic and outward policy environment indices (DPE and OPE, respectively). The growth response for the median of the DPE index (as well as for the OPE index) is reported in the line "Median", while the response for countries with good and bad policies are reported in the lines of 10th and 90th percentile of DPE (and OPE).

Table 7
Can "good policies" mitigate the adverse growth effects of aggregate volatility?

Dependent Variable: Growth in real GDP per capita
Estimation method: System GMM-IV including time dummies

	Internal Instruments		External Instruments	
Variables	**[1]**	**[2]**	**[3]**	**[4]**
I. Structural Factors and Policy Environment				
Human Capital	1.323 **	1.072 **	1.005 **	0.638 **
(Secondary gross enrollment rate, logs)	(0.27)	(0.22)	(0.14)	(0.11)
Financial Depth	0.276 **	0.124	0.530 **	0.751 **
(Private Credit as % of GDP, logs)	(0.12)	(0.08)	(0.07)	(0.08)
Institutions	1.873 **	2.995 **	2.332 **	2.858 **
(ICRG Political risk index, logs)	(0.26)	(0.30)	(0.15)	(0.22)
Policy environment index (PE) *1/*	0.963	..	2.915 **	..
(*Regression-based weighted average*)	(2.26)		(1.43)	
Domestic policy environment index (DPE) *2/*	..	-6.928 **	..	-4.518 **
(*Regression-based weighted average*)		(1.94)		(1.92)
Outward policy environment index (OPE) *2/*	..	12.896 **	..	14.762 **
(*Regression-based weighted average*)		(1.41)		(1.21)
II. Growth volatility and its Interaction with the policy environment				
Growth volatility	-6.003 **	-4.849 **	-3.180 **	-2.223 **
(*Std. Dev. Growth in real GDP per capita*)	(1.26)	(1.01)	(0.69)	(1.02)
PE * Growth volatility	4.969 **	..	1.568 *	..
	(1.45)		(0.81)	
DPE * Growth volatility	..	9.404 **	..	6.536 **
		(1.29)		(0.96)
OPE * Growth volatility	..	-7.200 **	..	-6.496 **
		(1.23)		(0.90)
III. Transitional Convergence				
Initial GDP per capita	-0.395 **	-0.556 **	-0.648 **	-0.616 **
(in logs)	(0.15)	(0.12)	(0.09)	(0.09)
Countries	101	101	100	100
Observations	608	608	590	590
Specification Tests (p-value)				
- Sargan	(0.27)	(0.28)	(0.33)	(0.48)
- 2nd. Order Correlation	(0.25)	(0.23)	(0.45)	(0.54)

*Our regressions include a constant and time dummies (not reported but available from the authors). The figures in parenthesis below the coefficient estimates represent robust standard errors corrected for small sample bias (Windmeijer, 2005). * (**) implies that the coefficient estimate is significant at the 10 (5) % level. We instrument for the volatility of growth in real GDP per capita using: (a) internal instruments (lagged levels and differences of the standard deviation of growth in output per capita), and (b) external instruments (the standard deviation of terms of trade shocks, external demand growth and the standard deviation of world real interest rates). 1/ See note 1 in Table 4. 2/ See notes 1 and 2 in Table 5.*

Table 8
Policy volatility, external volatility and the policy environment

Dependent Variable: Growth in real GDP per capita
Estimation method: System GMM-IV including time dummies

Variables	[1]	[2]	[3]	[4]	[5]	[6]
I. Structural Factors and Policy Environment						
Human Capital	0.805 **	1.336 **	0.871 **	0.911 **	1.124 **	1.271 **
(Secondary gross enrollment rate, logs)	(0.22)	(0.27)	(0.20)	(0.22)	(0.23)	(0.22)
Financial Depth	0.162	0.744 **	0.595 **	0.548 **	0.288 **	0.827 **
(Private Credit as % of GDP, logs)	(0.15)	(0.12)	(0.11)	(0.17)	(0.12)	(0.17)
Institutions	3.808 **	3.521 **	3.376 **	3.986 **	5.857 **	3.269 **
(ICRG Political risk index, logs)	(0.35)	(0.37)	(0.30)	(0.32)	(0.32)	(0.38)
Policy environment index (PE) 1/	5.743 **	8.596 **	2.713	6.104 **	7.617 **	0.111
(*Regression-based weighted average*)	(1.64)	(1.21)	(2.55)	(1.29)	(1.26)	(3.71)
II. Volatility and its Interaction with the policy environment						
Policy volatility 2/	-9.939 **	..	..	..	..	..
	(4.02)					
External volatility 3/	..	-2.400 *	..	..	..	..
		(1.54)				
Terms of trade volatility	..	..	-2.157 **	..	..	-2.911 **
			(0.78)			(1.13)
External demand volatility	..	..	..	-2.553 **	..	-3.837 **
				(1.23)		(1.83)
Volatility of world real interest rates	..	..	..	..	-2.445 **	1.878
					(1.00)	(2.06)
PE * Policy volatility	12.029 **	..	..	..	..	..
	(5.09)					
PE * External volatility	..	1.672	..	..	..	..
		(1.87)				
PE * Terms of trade volatility	..	..	2.142 **	..	..	3.147 **
			(0.90)			(1.30)
PE * External demand volatility	..	..	..	2.443 *	..	3.621 *
				(1.48)		(2.10)
PE * Volatility of world real interest rates	..	..	..	..	2.661 **	-2.145
					(1.20)	(2.56)
III. Transitional Convergence						
Initial GDP per capita	-0.245 *	-0.840 **	-0.488 **	-0.393 **	-0.653 **	-0.920 **
(in logs)	(0.13)	(0.13)	(0.14)	(0.13)	(0.13)	(0.15)
Countries	98	100	100	101	101	100
Observations	593	590	590	608	608	590
Specification Tests (p-value)						
- Sargan	(0.20)	(0.25)	(0.15)	(0.18)	(0.23)	(0.18)
- 2nd. Order Correlation	(0.72)	(0.78)	(0.99)	(0.93)	(0.62)	(0.87)

*Our regressions include a constant and time dummies (not reported but available from the authors). The figures in parenthesis below the coefficient estimates represent robust standard errors corrected for small sample bias (Windmeijer, 2005). * (**) implies that the coefficient estimate is significant at the 10 (5) % level.*
*1/ The policy environment index (PE) is the regression weighted average of the policy variables such as the inflation rate, the government burden, trade openness and financial openness. We use the coefficient estimates of regression [5] in Table 1 as weights such that: PE = -2.653*Inflation-1.07*Government burden+0.158*Trade openness +0.207*Financial openness. Note that this index has been normalized such that they take values between 0 and 1, with higher values of PE indicating better policy environments.*
2/ Policy volatility is calculated using the methodology of Fatas and Mihov (2003, 2006). We regress real government spending (in logs) on output growth, lagged government spending and a time trend, and we instrument output growth with lagged output growth, past inflation (linear and squared), and current and lagged values of oil prices.
*3/ External volatility is computed as the aggregate index of the terms of trade volatility, external demand volatility and the volatility of world real interest rates. The weights of the index are calculated by regression growth on initial GDP per capita, structural and policy variables, and the volatility of external shocks. The regression results (not reported here but available from the authors) yield: External volatility = 0.2037*ToT Volatility +0.6786*External demand volatility +0.7465*Volatility of world real interest rates. We took the absolute value of these coefficients (all have a negative contribution on growth) to construct the index so that higher values of the aggregate index would indicate higher external volatility.*

Table 9
Policy volatility, external volatility, domestic and outward policy environment

Dependent Variable: Growth in real GDP per capita
Estimation method: System GMM-IV including time dummies

Variables	[1]	[2]	[3]	[4]	[5]	[6]
I. Structural Factors and Policy Environment						
Human Capital	0.241 **	0.714 **	0.757 **	1.131 **	0.854 **	0.988 **
(Secondary gross enrollment rate, logs)	(0.12)	(0.28)	(0.16)	(0.13)	(0.27)	(0.29)
Financial Depth	0.268 **	0.738 **	0.615 **	0.513 **	0.422 **	0.538 **
(Private Credit as % of GDP, logs)	(0.09)	(0.10)	(0.06)	(0.09)	(0.16)	(0.15)
Institutions	3.931 **	3.394 **	2.861 **	4.360 **	4.324 **	3.109 **
(ICRG Political risk index, logs)	(0.20)	(0.38)	(0.21)	(0.28)	(0.47)	(0.42)
Domestic policy environment index (DPE) 1/	3.280 **	10.408 **	5.077 **	3.446 **	6.138 **	4.704
(*Regression-based weighted average*)	(1.12)	(0.98)	(2.45)	(1.10)	(1.34)	(4.74)
Outward policy environment index (OPE) 1/	7.022 **	2.290 **	1.959 *	8.199 **	3.525 **	1.530
(*Regression-based weighted average*)	(0.71)	(1.02)	(1.29)	(1.14)	(1.59)	(2.50)
II. Volatility and its Interaction with the policy environment						
Policy volatility 2/	-20.878 **	..	..	..	..	..
	(4.67)					
External volatility 3/	..	0.215	..	..	..	..
		(1.37)				
Terms of trade volatility	..	..	-2.330 **	..	..	-2.671 **
			(0.55)			(1.25)
External demand volatility	..	..	..	-0.265 **	..	-0.070
				(0.10)		(0.13)
Volatility of world real interest rates	..	..	..	..	-0.984	-0.884 **
					(0.28)	(0.23)
Domestic policy environment (DPE)	15.341 **	..	..	..	..	..
x Policy volatility	(4.32)					
Outward policy environment (OPE)	1.261	..	..	..	..	..
x Policy volatility	(9.17)					
DPE * External volatility	..	-4.605 **	..	..	..	..
		(1.65)				
OPE * External volatility	..	3.845 **	..	..	..	..
		(1.53)				
DPE * Terms of trade volatility	..	..	1.410 *	..	..	-3.379 **
			(0.82)			(1.64)
OPE * Terms of trade volatility	..	..	1.552 **	..	..	8.844 **
			(0.38)			(0.95)
DPE * External demand volatility	..	..	..	1.985 **	..	7.717 **
				(0.54)		(1.42)
OPE * External demand volatility	..	..	..	-4.761 **	..	-12.383 **
				(0.67)		(1.90)
DPE * Volatility of world real interest rates	..	..	..	..	-2.991 **	-2.804 **
					(1.14)	(0.89)
OPE * Volatility of world real interest rates	..	..	..	..	3.339 **	3.518 **
					(1.32)	(1.01)
III. Transitional Convergence						
Initial GDP per capita	-0.340 **	-0.615 **	-0.366 **	-0.851 **	-0.372 **	-0.747 **
(in logs)	(0.08)	(0.15)	(0.10)	(0.10)	(0.17)	(0.17)
Countries	98	100	100	101	101	100
Observations	593	590	590	608	608	590
Specification Tests (p-value)						
- Sargan	(0.45)	(0.58)	(0.26)	(0.23)	(0.32)	(0.85)
- 2nd. Order Correlation	(0.52)	(0.65)	(0.91)	(0.44)	(0.67)	(0.75)

*Our regressions include a constant and time dummies (not reported but available from the authors). The figures in parenthesis below the coefficient estimates represent robust standard errors corrected for small sample bias (Windmeijer, 2005). * (**) implies that the coefficient estimate is significant at the 10 (5) % level.*
1/ See footnote 1 in Table 4. 2/ 3/ See footnotes 2 and 3 in Table 8.

Table 10
Growth effects of rising volatility: The role of the policy environment

Growth response to doubling aggregate, policy and/or external volatility conditional on the policy environment

	Growth Volatility	Policy Volatility	External Volatility			
			Overall	Terms of trade	External demand	World rates
Policy Environment 1/						
10th percentile	-1.376	-0.535	-0.781	-0.355	-0.747	0.169
Median	-1.282	0.187	-0.680	-0.166	-0.530	0.040
90th percentile	-1.211	0.727	-0.605	-0.025	-0.367	-0.056
Difference	0.164	1.262	0.175	0.330	0.380	-0.225
(*p-value*)	(0.076)	(0.250)	(0.300)	(0.003)	(0.050)	(0.667)
Domestic Policy Environment 2/						
10th percentile	-0.918	-6.573	-0.575	-0.034	-1.152	-0.595
Median	-0.670	-5.990	-0.749	-0.162	-0.859	-0.701
90th percentile	-0.415	-5.391	-0.929	-0.294	-0.558	-0.810
Difference	0.503	1.181	-0.355	-0.260	0.594	-0.216
(*p-value*)	(0.000)	(0.102)	(0.013)	(0.022)	(0.002)	(0.411)
Outward Policy Environment 2/						
10th percentile	-0.111	-6.098	-1.080	-0.922	0.205	-1.003
Median	-0.670	-5.990	-0.749	-0.162	-0.859	-0.701
90th percentile	-1.136	-5.899	-0.474	0.472	-1.748	-0.449
Difference	-1.024	0.199	0.606	1.395	-1.953	0.555
(*p-value*)	(0.000)	(0.874)	(0.003)	(0.000)	(0.000)	(0.049)

1/ The response of economic growth to doubling aggregate volatility conditional on the policy environment is calculated using: (a) the estimate of regression [3] in Table 7 for growth volatility, (b) the estimate of regression [1] in Table 8 for policy volatility, (c) the estimates of regression [2] in Table 8 for the overall index of external volatility, (d) the estimates of regression [6] in Table 8 for terms of trade volatility, external demand volatility, and the volatility of world real interest rates.

2/ The response of economic growth to doubling aggregate volatility conditional on the domestic and outward policy environment is calculated using: (a) the estimate of regression [4] in Table 7 for growth volatility, (b) the estimates of regression [1] in Table 9 for policy volatility, (c) the estimates of regression [2] in Table 9 for the overall index of external volatility, (d) the estimates of regression [6] in Table 8 for terms of trade volatility, external demand volatility, and the volatility of world real interest rates.

The row "Median" denotes the growth response to doubling (aggregate, policy, and external) volatility conditional on the policy environment of the representative country-period in the sample. On the other hand, the row "10th (90th) percentile" shows the growth response to rising volatility in countries with bad (good) policies. Finally, the row "Difference" reports the difference in the growth response to rising volatility between countries with good policies and countries with bad policies.

Table A.1
Sample of Countries

Latin America and the Caribbean (22)

ARG	Argentina	DOM	Dominican Republic	PAN	Panama
BHS	Bahamas, The	ECU	Ecuador	PER	Peru
BOL	Bolivia	GTM	Guatemala	PRY	Paraguay
BRA	Brazil	HND	Honduras	SLV	El Salvador
CHL	Chile	HTI	Haiti	TTO	Trinidad and Tobago
COL	Colombia	JAM	Jamaica	URY	Uruguay
CRI	Costa Rica	MEX	Mexico	VEN	Venezuela, RB
		NIC	Nicaragua		

East Asia and the Pacific (12)

CHN	China	MNG	Mongolia	SGP	Singapore
HKG	Hong Kong	MYS	Malaysia	THA	Thailand
IDN	Indonesia	PHL	Philippines, The	TWN	Taiwan
KOR	Korea, Rep.	PNG	Papua New Guinea	VNM	Vietnam

Eastern Europe and Central Asia (17)

BGR	Bulgaria	KAZ	Kazakhstan	RUS	Russian Federation
BLR	Belarus	KGZ	Kyrgyz Rep.	SVK	Slovak Rep.
CZE	Czech Republic	LTU	Lithuania	SVN	Slovenia
EST	Estonia	LVA	Latvia	UKR	Ukraine
HRV	Croatia	POL	Poland	YSR	Serbia
HUN	Hungary	ROM	Romania		

Industrial Economies (23)

AUS	Australia	FIN	Finland	LUX	Luxembourg
AUT	Austria	FRA	France	NLD	Netherlands
BEL	Belgium	GBR	United Kingdom	NOR	Norway
CAN	Canada	GRC	Greece	NZL	New Zealand
CHE	Switzerland	IRL	Ireland	PRT	Portugal
DEU	Germany	ISL	Iceland	SWE	Sweden
DNK	Denmark	ITA	Italy	USA	United States
ESP	Spain	JPN	Japan		

Middle East and North Africa (21)

ARE	Algeria	ISR	Israel	OMN	Oman
BHR	Bahrain	JOR	Jordan	QAT	Qatar
CYP	Cyprus	KWT	Kuwait	SAU	Saudi Arabia
DZA	Algeria	LBN	Lebanon	SYR	Syria
EGY	Egypt, Arab Rep.	LBY	Lybia	TUN	Tunisia
IRN	Iran, Islamic Rep.	MAR	Morocco	TUR	Turkey
IRQ	Iraq	MLT	Malta	YEM	Yemen

South Asia (5)

BGD	Bangladesh	LKA	Sri Lanka	PAK	Pakistan
IND	India	NPL	Nepal		

Sub-Saharan Africa (36)

AGO	Angola	GIN	Guinea	RWA	Rwanda
BDI	Burundi	GMB	Gambia, The	SDN	Sudan
BEN	Benin	GNB	Guinea Bissau	SEN	Senegal
BFA	Burkina Faso	KEN	Kenya	SLE	Sierra Leone
BWA	Botswana	LSO	Lesotho	TCD	Chad
CAF	Central African Republic	MDG	Madagascar	TGO	Togo
CIV	Cote d'Ivoire	MLI	Mali	TZA	Tanzania
CMR	Cameroon	MRT	Mauritania	UGA	Uganda
COG	Congo, Rep.	MUS	Mauritius	ZAF	South Africa
ETH	Ethiopia	MWI	Malawi	ZAR	Congo, Dem. Rep.
GAB	Gabon	NER	Niger	ZMB	Zambia
GHA	Ghana	NGA	Nigeria	ZWE	Zimbabwe

Table A.2
Sample Statistics

Sample of 76 countries, 1960-2000 (5-year non-overlapping observations)

Variable	Average	Std. Dev.	Minimum	Maximum	Correlation with Growth
Growth in GDP per capita	1.62	2.76	-11.03	13.66	..
Transitional Convergence					
Initial GDP per capita (*in logs*)	7.71	1.55	4.71	10.53	0.12
Structural Factors					
Human capital (*secondary enrollment, in logs*)	3.75	0.78	1.30	4.99	0.22
Private Credit (*% of GDP, in logs*)	3.42	0.90	-0.02	5.46	0.22
Institutions (*ICRG index, in logs*)	4.10	0.29	3.13	4.57	0.37
Policy Variables					
Inflation Rate (*CPI, in log differences*)	4.76	0.31	4.57	8.05	-0.29
Government Burden (*% GDP, in logs*)	2.66	0.42	1.24	3.82	0.01
Trade openness (*Exports and imports, % GDP, in logs*)	3.97	0.61	1.97	5.75	0.13
Foreign liabilities (*% GDP, in logs*)	4.23	0.73	1.69	6.75	-0.12
Foreign assets and liabilities (*% GDP, in logs*)	4.63	0.74	2.69	7.43	-0.04
Equity-related foreign liabilities (*% GDP, in logs*)	2.47	1.39	-4.88	6.09	0.14
Loan-related foreign liabilities (*% GDP, in logs*)	3.91	0.76	1.44	6.42	-0.21
Equity-related foreign assets and liabilities (*% GDP, in logs*)	2.71	1.46	-4.88	6.45	0.15
Loan-related foreign assets and liabilities (*% GDP, in logs*)	4.37	0.72	2.38	7.07	-0.09
Policy Environment Index					
Policy Environment, overall index (PE)	0.83	0.09	0.00	1.00	0.43
Domestic Policy Environment index (DPE)	0.75	0.08	0.00	1.00	0.38
Outward Policy Environment index (OPE)	0.55	0.11	0.00	1.00	0.23
Volatility					
Growth volatility	0.96	0.81	-1.35	4.01	-0.39
Fiscal policy volatility	0.08	0.08	0.00	0.46	-0.33
External volatility	0.33	0.74	-3.41	2.15	-0.28
Terms of trade volatility	1.68	1.71	-12.17	4.23	-0.19
External demand volatility	0.09	0.52	-2.05	2.00	-0.14
Volatility of world real interest rates	-0.07	0.63	-1.45	1.71	-0.13

Table A.3
Volatility and Growth: Baseline Regressions

Dependent Variable: Growth in real GDP per capita
Estimation method: System GMM-IV including time dummies

Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]
I. Structural Factors and Policy Environment							
Human Capital	0.775 **	0.801 **	0.909 **	0.851 **	1.145 **	1.482 **	1.417 **
(Secondary gross enrollment rate, logs)	(0.13)	(0.12)	(0.21)	(0.21)	(0.22)	(0.25)	(0.29)
Financial Depth	0.486 **	0.203 **	0.514 **	0.555 **	0.334 **	0.463 **	0.540 **
(Private Credit as % of GDP, logs)	(0.07)	(0.09)	(0.11)	(0.17)	(0.11)	(0.11)	(0.13)
Institutions	2.359 **	3.278 **	3.667 **	3.892 **	5.378 **	2.963 **	3.488 **
(ICRG Political risk index, logs)	(0.17)	(0.21)	(0.28)	(0.31)	(0.31)	(0.39)	(0.39)
Policy environment index (PE) 1/	5.432 **	7.208 **	8.174 **	5.953 **	6.879 **	9.181 **	8.644 **
(*Regression-based weighted average*)	(0.58)	(0.76)	(0.80)	(1.28)	(1.43)	(1.02)	(1.07)
II. Volatility and its Interaction with the policy environment							
Growth Volatility	-1.719 **	..	..	..	..	..	..
	(0.07)						
Policy volatility 2/	..	-3.005 **	..	..	..	..	..
		(0.79)					
Terms of trade volatility	..	..	-0.303 **	..	..	-0.204 **	..
			(0.05)			(0.04)	
External demand volatility	..	..	..	-0.516 **	..	-0.679 **	..
				(0.10)		(0.10)	
Volatility of world real interest rates	..	..	..	..	-0.858 **	-0.747 **	..
					(0.32)	(0.21)	
External volatility 3/	..	..	..	..	..	..	-1.258 **
							(0.10)
III. Transitional Convergence							
Initial GDP per capita	-0.396 **	-0.243 **	-0.482 **	-0.362 **	-0.608 **	-0.758 **	-0.627 **
(in logs)	(0.09)	(0.09)	(0.13)	(0.13)	(0.11)	(0.14)	(0.15)
Countries	100	98	100	101	101	100	100
Observations	590	593	590	608	608	590	590
Specification Tests (p-value)							
- Sargan	(0.32)	(0.35)	(0.19)	(0.17)	(0.35)	(0.14)	(0.23)
- 2nd. Order Correlation	(0.52)	(0.59)	(0.93)	(0.91)	(0.56)	(0.79)	(0.82)

*Our regressions include a constant and time dummies (not reported but available from the authors). The figures in parenthesis below the coefficient estimates represent robust standard errors corrected for small-sample bias (Windmeijer, 2005). * (**) implies that the coefficient estimate is significant at the 10 (5) % level.*
1/ 2/ 3/ See footnote in Table 8.

Figure 1
Growth, Volatility and the Policy Environment

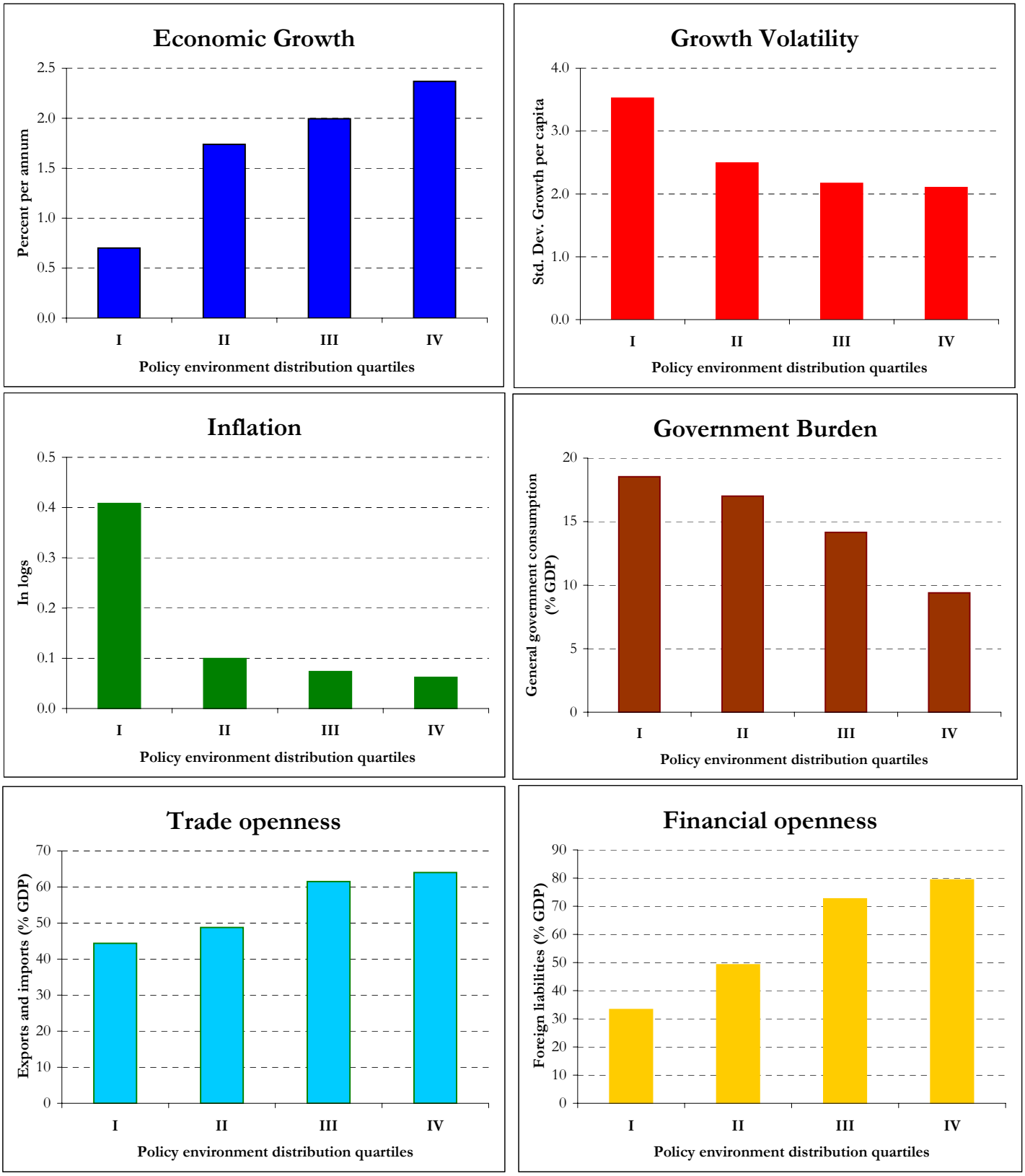
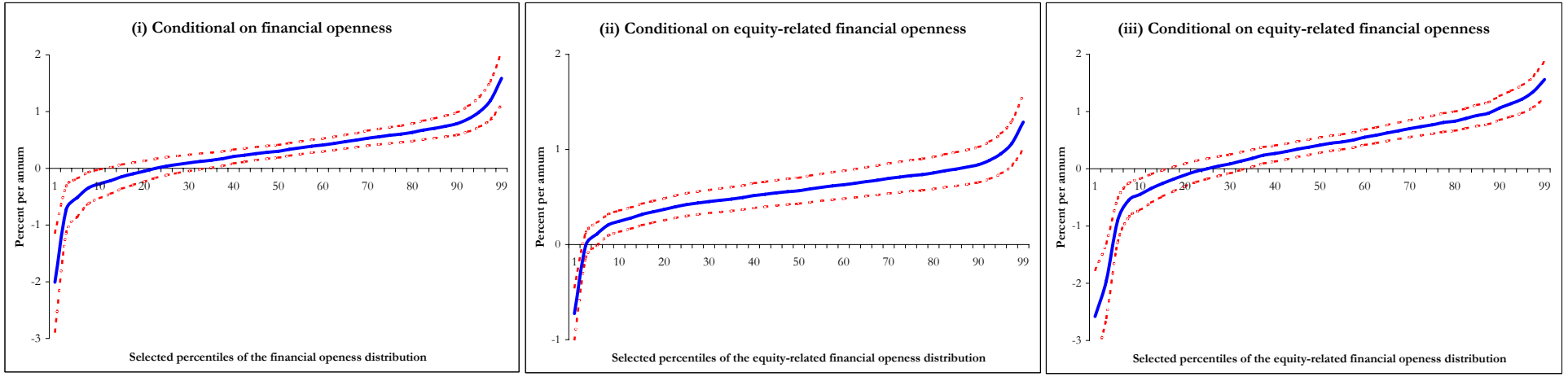
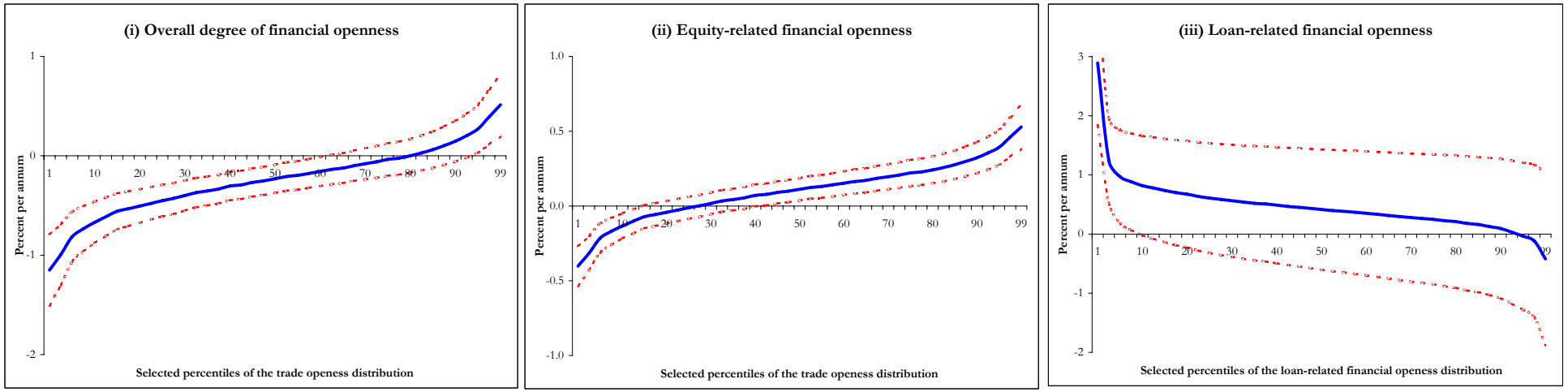


Figure 2
Complementarities between Trade and Financial Openness

2.1 Growth Effect of Trade Openness



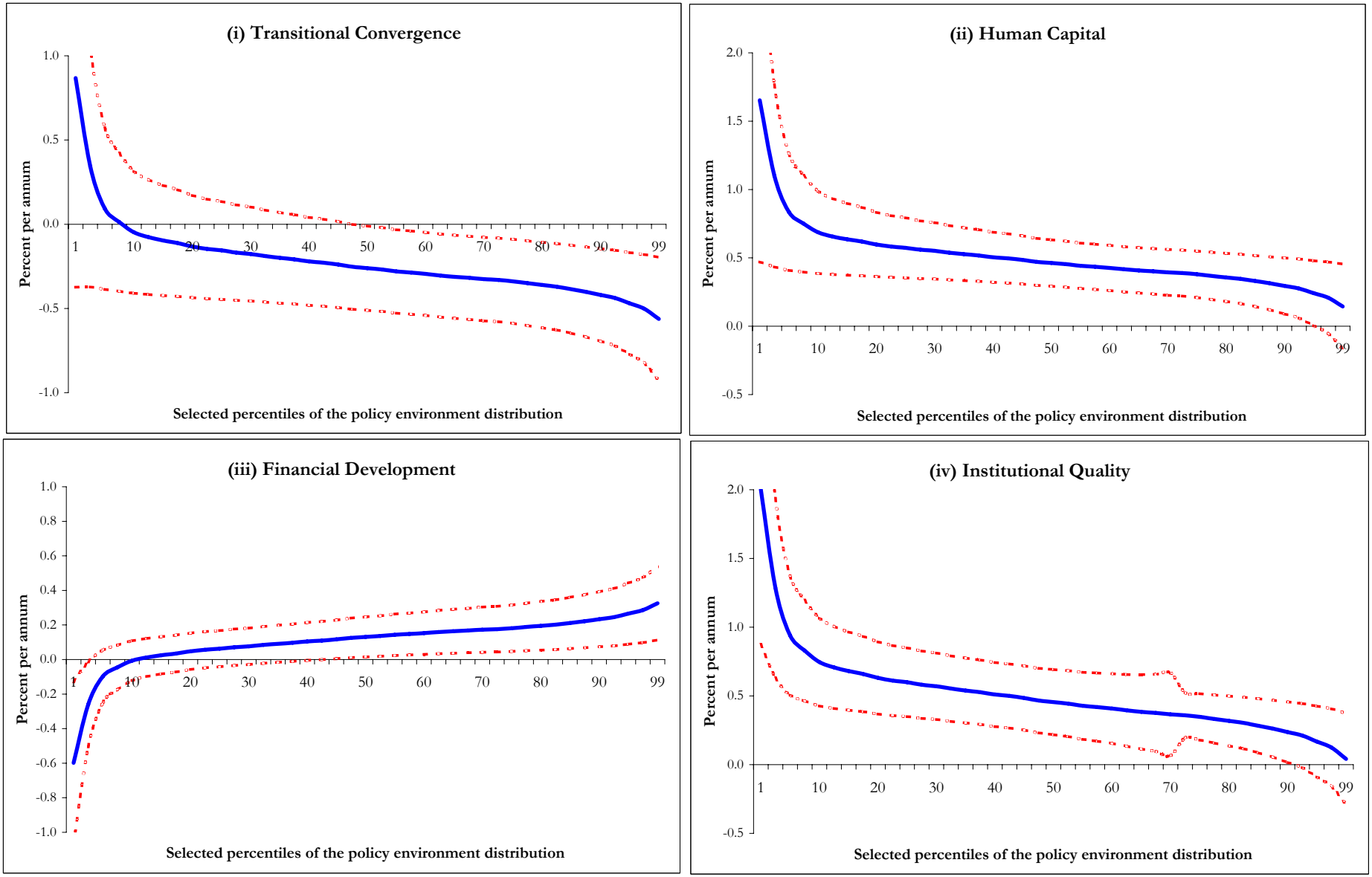
2.2 Growth Effect of Financial Openness conditional on trade openness



Note: We compute the growth effect of doubling trade openness (financial openness) conditional on selected sample percentiles of financial openness (trade openness). The solid line represent the growth effect of higher openness while the dotted lines represent the 5% confidence interval.
Figures 2.1(i) and 2.2(i) are computed using the coefficient estimates and the robust variance-covariance matrix of regression [1] of Table 2. Regression [3] estimates were used to calculate the growth responses in Figures 2.1(ii) and 2.2(ii). Finally, Figure 2.3(i) and 2.3(ii) were computed using the coefficient estimates of regression [7] in Table 2.

Figure 3
Structural Factors, Policy Environment and Growth

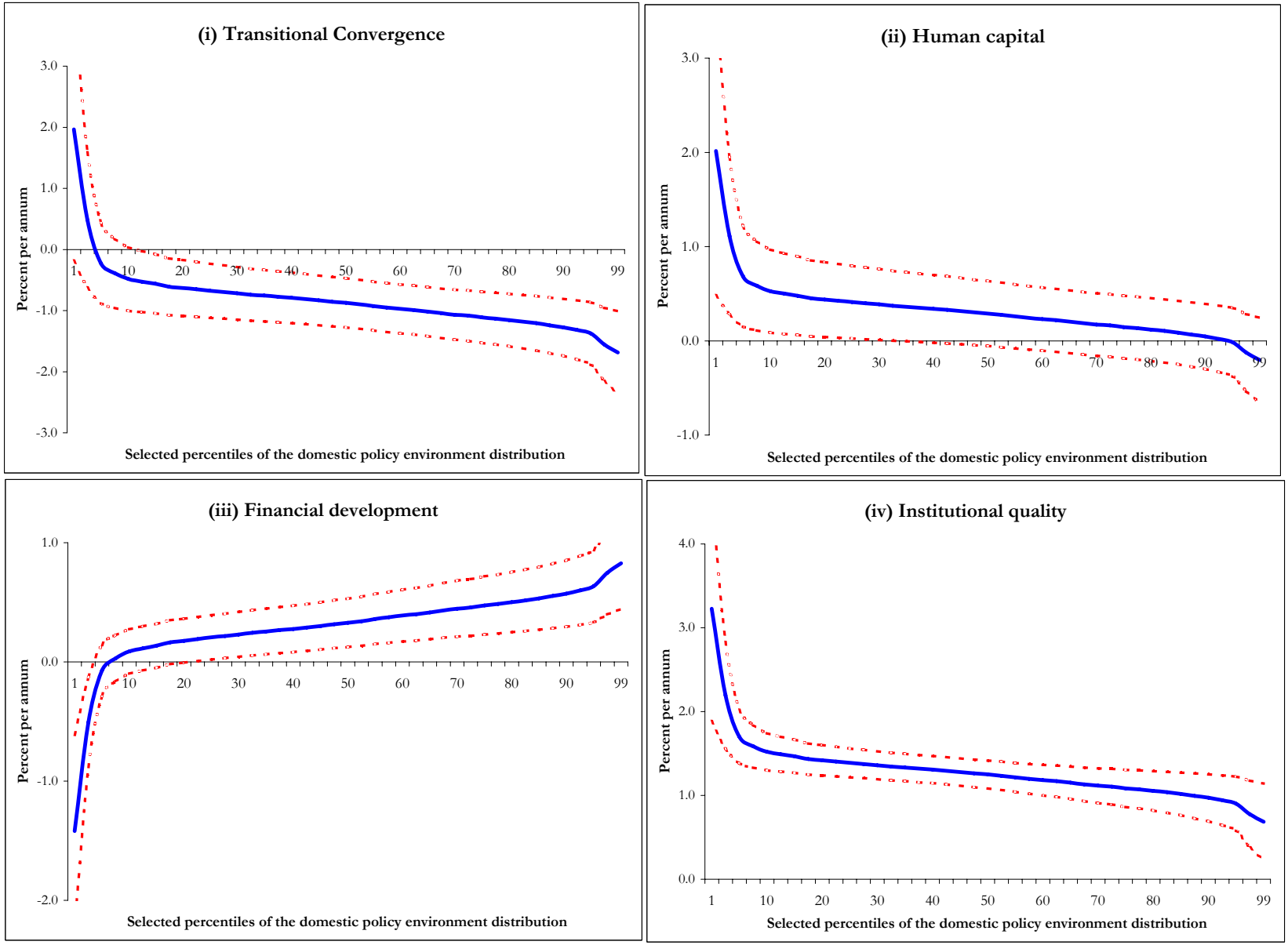
Growth effects of a one-standard deviation increase in the structural factors conditional on the country's economic policy environment



Note: We compute the growth effect of a one-standard deviation increase in real output per capita, human capital, financial development and institutions conditional on selected world sample percentiles of the distribution of our policy environment index. The solid line represents the growth effect of higher values of the structural factors whereas the dotted lines represent the 5% confidence interval. The figures were calculated using the estimates of regression [6] in Table 4.

Figure 4
Structural Factors, Domestic Policy Environment and Growth

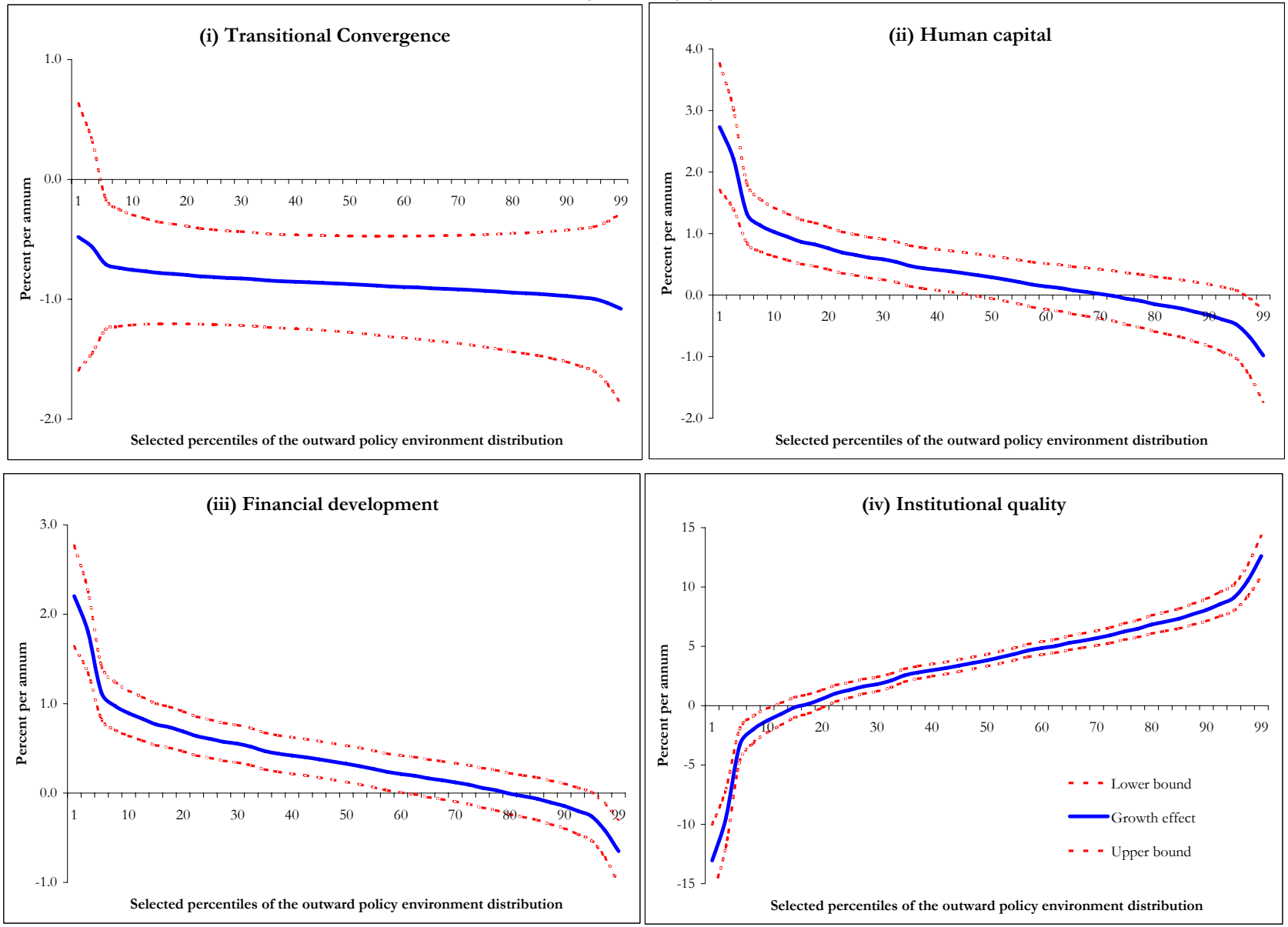
Growth effects of a one-standard deviation increase in the structural factors conditional on the country's domestic policy environment



Note: We compute the growth effect of a one-standard deviation increase in real output per capita, human capital, financial development and institutions conditional on selected world sample percentiles of the distribution of the domestic policy environment index. The solid line represents the growth effect of higher values of the structural factors whereas the dotted lines represent the 5% confidence interval. The figures were calculated using the estimates of regression [6] in Table 6.

Figure 5
Structural Factors, Outward Policy Environment and Growth

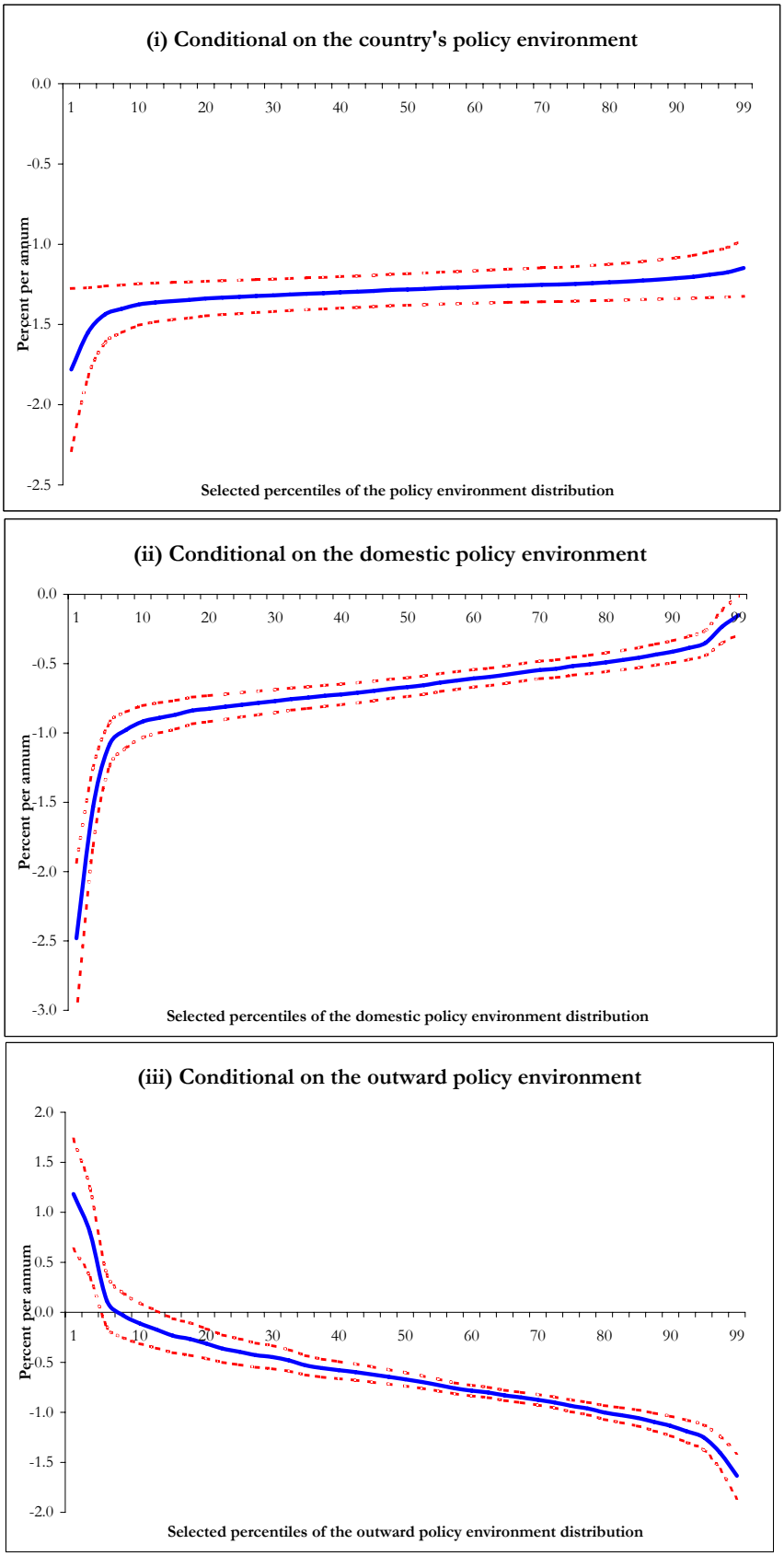
Growth effects of a one-standard deviation increase in the structural factors conditional on the country's outward policy environment



Note: We compute the growth effect of a one-standard deviation increase in real output per capita, human capital, financial development and institutions conditional on selected world sample percentiles of the distribution of the domestic policy environment index. The solid line represents the growth effect of higher values of the structural factors whereas the dotted lines represent the 5% confidence interval. The figures were calculated using the estimates of regression [6] in Table 6.

Figure 6
Growth effects of aggregate volatility conditional on economic policy environment

Growth effects of doubling the volatility of growth in real GDP per capita

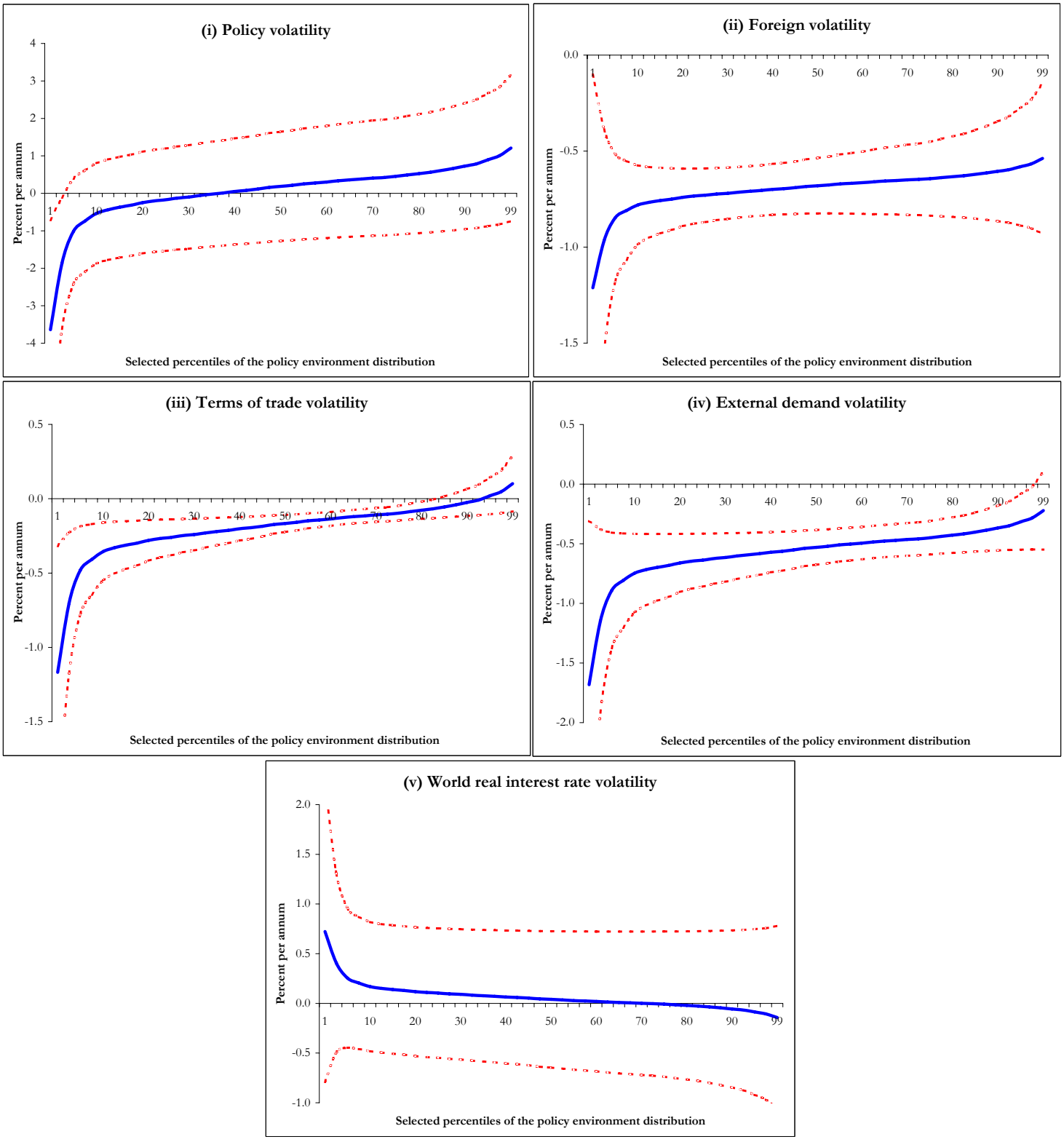


Note: We compute the effects of doubling growth volatility conditional on selected sample percentiles of the distribution of the the overall policy environment index as well as the domestic and outward components of that index. The solid line represents the growth effect of higher volatility whereas the dotted lines represent the 5% confidence interval. The figure (i) is computed using regression [4] of Table 7, while the figures (ii) and (iii) are calculated using the estimates of regression [6] in Table 7.

Figure 7

Growth effects of policy and external volatility conditional on policy environment

Growth effects of doubling policy volatility and the volatility of external shocks conditional on the country's policy environment



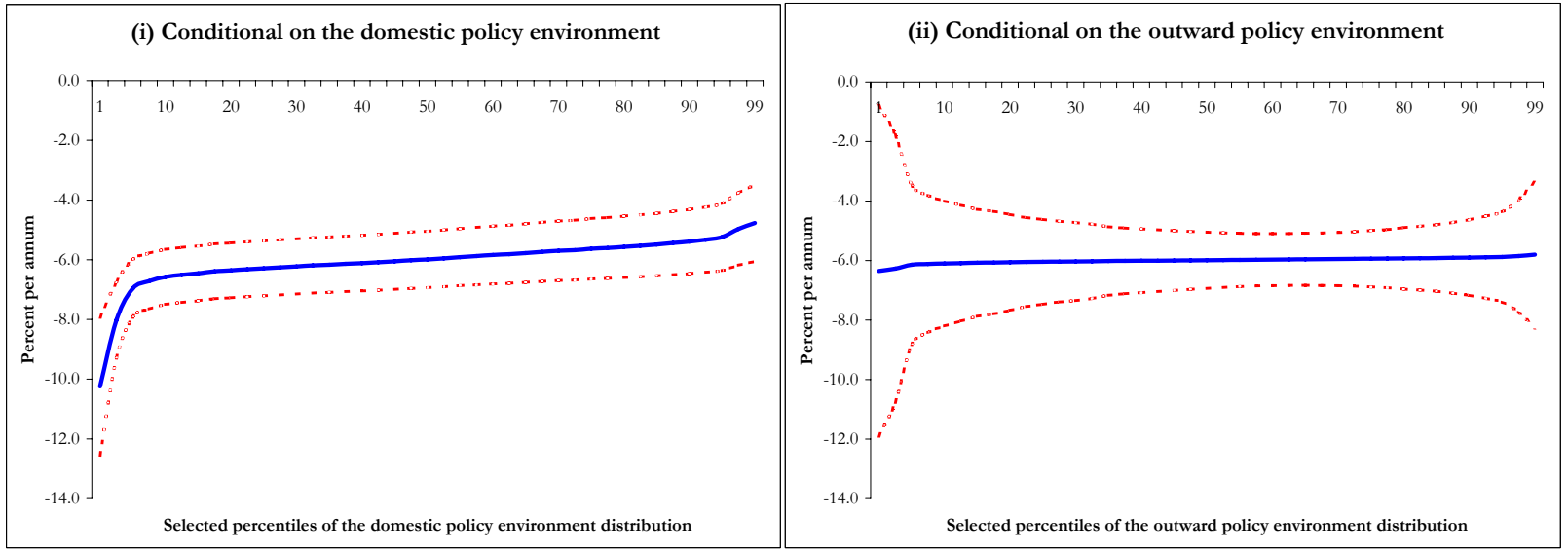
Note: We compute the effects of doubling policy volatility and external volatility conditional on selected sample percentiles of the distribution of the the overall policy environment index. The solid line represents the growth effect of higher policy volatility and external volatility whereas the dotted lines represent the 5% confidence interval. The figure (i) is computed using regression [1] of Table 8 and Figure (ii) is calculated using the regression estimates of regression [6] in Table 8. Finally, figures (iii) through (v) are calculated using the coefficient estimates of regression [5] of Table 8.

Figure 8

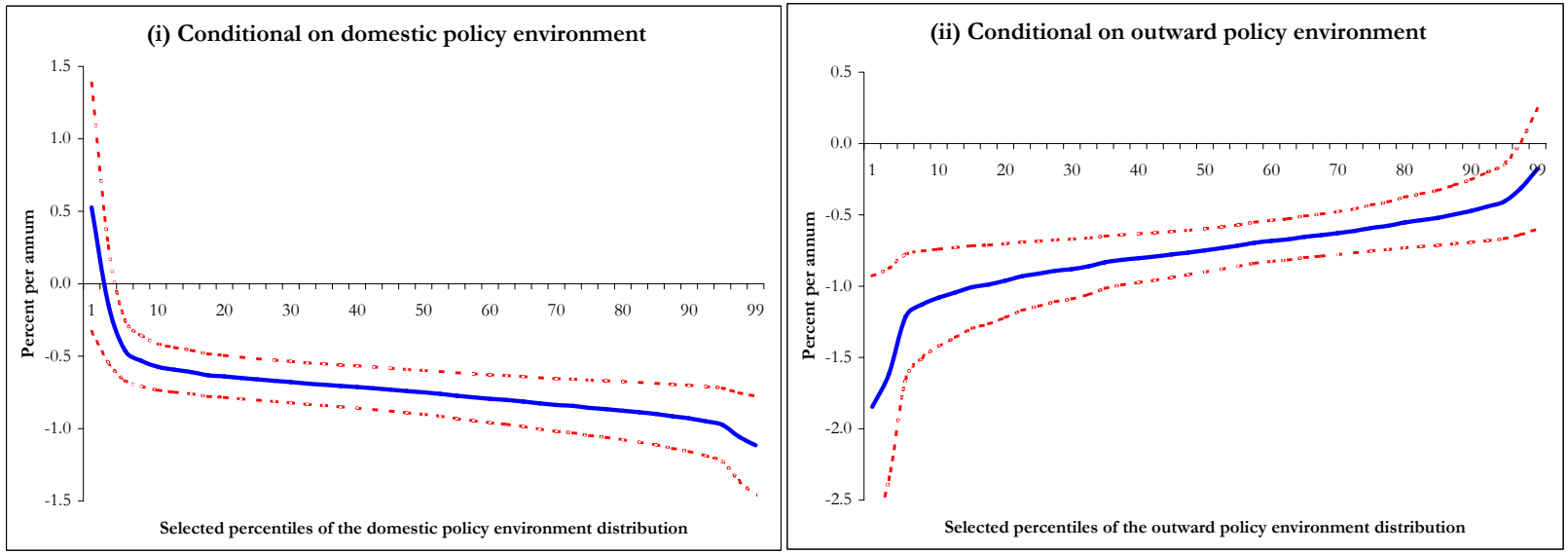
Growth effects of policy and external volatility conditional on domestic and outward policy environment

Growth effects of doubling policy volatility and the volatility of external shocks conditional on the country's policy environment

8.1 Growth effects of rising fiscal policy volatility



8.2 Growth effects of rising external volatility



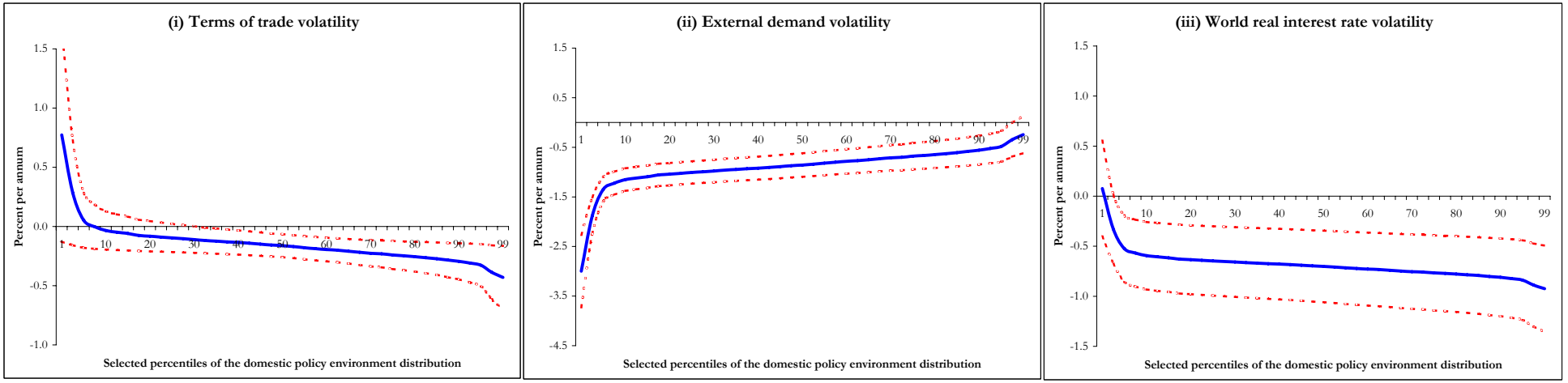
Note: We compute the effects of doubling policy volatility and external volatility conditional on selected sample percentiles of the distribution of the the domestic and outward policy environment index. The solid line represents the growth effect of higher policy volatility as well as rising external volatility whereas the dotted lines represent the 5% confidence interval. The figure 8.1 is computed using regression [1] of Table 10. On the other hand, Figure 8.2 is calculated using the coefficient estimates of regression [6] of Table 10.

Figure 9

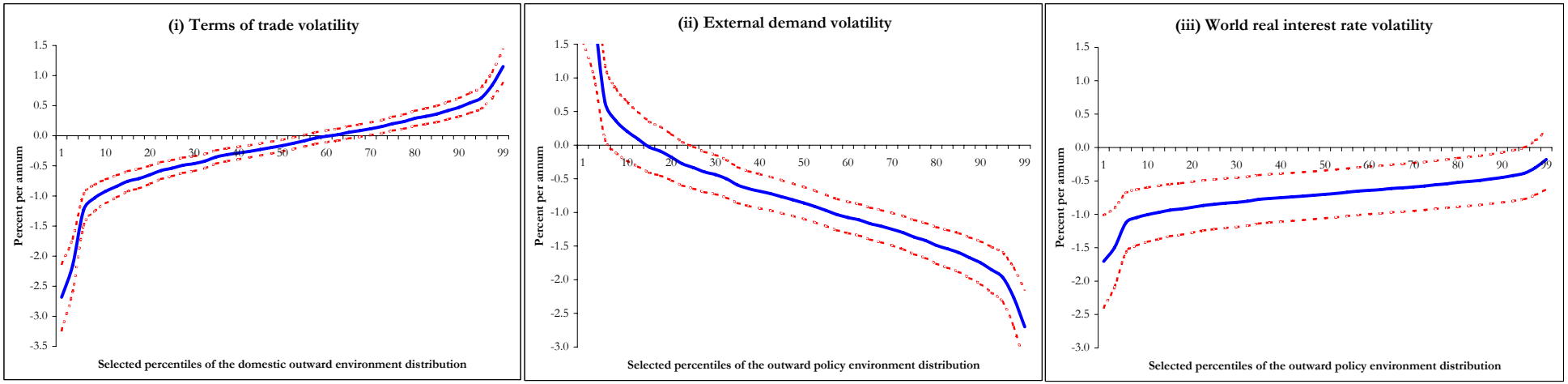
Growth effects of the volatility of external shocks conditional on domestic and outward policy environment

Growth effects of doubling the volatility of external shocks conditional on the country's policy environment

9.1 Conditional on the country's domestic policy environment



9.2 Conditional on the country's outward policy environment



Note: The solid line represents the growth effect of higher volatility of the different (real and financial) external shocks and the dotted lines represent the 5% confidence interval. All growth responses were calculated using the estimates of regression [5] of Table 10.