Debt and Credit Quality in Central America, Panama, and the Dominican Republic

LaGarda, Guillermo and Prat, Jordi and Solera, Marco and Beverinotti, Javier

Interamerican Development Bank, Boston University

26 July 2016

Debt and Credit Quality in Central America, Panama, and the Dominican Republic*

Guillermo Lagarda[1,2], Jordi Prat[1], Marco Solera[1], and Javier Beverinotti[1]

[1]Inter-American Development Bank
[2]Boston University

July 26, 2016

Abstract

Credit quality has long been associated with the level of indebtedness. But the sole fact that there are countries with high creditworthiness and large stocks of debt suggests that indebtedness is just one of many factors which determine credit quality. In this paper we investigate the role that economic fundamentals have on risk perception of public debt, through both direct and indirect effects. Countries are grouped into four clusters, each corresponding to a different stage of development in their economic fundamentals. We find that the effect of the debt burden on credit quality is conditional on the current level of economic fundamentals and the degree to which they are improving. A transition to stronger fundamentals would require moving to a better cluster but would ease pressure on any debt adjustment necessary to improve creditworthiness. Consequently, there are two types of approaches countries in CAPDR could focus on to improve credit quality. On the one hand, there are a set of actions which could be carried out in the short run to move within a particular group or cluster-*fiscal toolkit*. On the other hand, there are actions, which in the medium term may enable a country to transition to a group with better credit perception -*structural changes*.

Introduction

During the years prior to the international financial crisis of 2008-09, the countries of Central America, Panama and Dominican Republic (from here on, CAPDR or the region) conducted processes of fiscal consolidation, which enabled them to reduce their levels of public debt and create some room for fiscal maneuver. This allowed the authorities to carry out an expansionary fiscal policy to mitigate the effects of the financial crisis. However, the increase in spending in response to the crisis was biased toward rigid current spending in the majority of countries of the region.[1] This dynamic, combined with a reduction in tax revenues, produced persistent fiscal deficits from 2009 onward, and, consequently, significant growth in public debt.

The new fiscal context may increase the region's vulnerabilities. Firstly, the continuous debt growth, without clear signs of fiscal consolidation, and given the lack of reforms to rebuild fiscal space to withstand future crises, has caused investors to increase their perception of risk in the region. This dynamic could raise financing costs and limit access to the international resources needed to resolve the social and productive investment gaps the region faces. Furthermore, it reduces the ability to respond to a new economic downturn.

*This Working Paper should not be reported as representing the views of either the IDB or Boston University. The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IDB or Boston University. Working Papers are published to elicit comments and to further debate. Corresponding author Guillermo LaGarda (glagarda@iadb.org)

[1]Macroeconomic Report for CAPDR, Interamerican Development Bank 2013, Izquierdo et al. (2013)

Given the above, this paper investigates the relationship between the debt levels and credit ratings of the region by identifying the factors affecting this relationship. The literature has explored to some extent the relation between debt and creditworthiness (Reinhart et al., 2003), Bannister and Barrot (2011)). However, there is no detailed analysis of institutional, financial, and productive factors that may also play a key role. We therefore contribute to the literature by incorporating into the analysis a set of factors that explain why some countries should work harder at improving their creditworthiness - a phenomenon known as *debt intolerance*.[2]

To pursue the above, we used a comprehensive cross-country data set covering from 1990 to 2015 and estimated a set of dynamic panel regressions. Unlike other methodologies in the literature, we divided the sample into clusters characterized by economic fundamentals and we discuss the effect of potential non-linearities. Our results suggest two types of policy measures for CAPDR countries: First, it is reasonable to begin with quick gains on the fiscal side, given the greater return they generate on credit perception and their immediate impact. This type of fiscal action could also build confidence to facilitate subsequent areas of change in the longer term. However, it is important not to neglect measures specifically aimed at improving medium and long-term fundamentals, which could have positive short-term effects through their impact on expectations. That is, we present evidence of the desirability for CAPDR countries to simultaneously emphasize progress in debt reduction policies and improvements in institutional quality, the productive structure and the financial sector.

Second, the successful implementation of a program of fiscal and more structural measures could, after a time, enable the country to *graduate* from a particular type of cluster. In any case, countries of the region would most likely need to raise their creditworthiness from their current level in order to shift to a better composition of fundamentals. In return, governments would be able to achieve larger fiscal space at a lower cost in periods of consolidation and, at times of crisis, they would enjoy greater flexibility of response.

The rest of the paper is organized as follows. We begin by describing the data and extract some stylized facts. The latter is followed by a discussion of the methodology and the estimation results. Then, in the context of our findings we discuss a pending agenda for CAPDR. In the last section we present some concluding remarks.

Related Literature

The debt intolerance approach originally discussed in Reinhart et al. (2003) pioneered research aimed at explaining the relation between indebtedness and resilience to shocks. To approach this they used the external balance as a performance indicator and tested their outcomes with different controls, including external debt. Their empirical approach contrasted the Institutional Investor Rating (IIR), their proxy for creditworthiness, on a number of indicators that may be behind debt intolerance, including the debt ratio and the history of inflation and default, to find the marginal effect of an additional unit of debt on the IIR and hence on debt intolerance. This approach proved to be a practical tool as a number of studies including Gabriel (2008), Topalova and Nyberg (2010) have used this approach to address the questions regarding debt thresholds or develop debt targets for countries. Others such as Cecchetti et al. (2011) based on their empirical estimations test indebtedness levels to identify after what particular level debt could become harmful to economic growth (30-40% of GDP for developing countries). Baum et al. (2013) find non-linear effects on growth especially when debt surpasses the 95% of GDP ratio.

A strand of research, closely related to the issue of threshold effects and economic growth, is that of debt sustainability and identifying a maximum sustainable debt ratio. In fact it can be argued that the existence of a debt threshold as it pertains to growth would imply that this is the point beyond which debt become unsustainable. Fund (2003) addressed this issue using a number of interesting approaches. First they estimated fiscal policy reaction functions, where a positive response of the primary balance to debt indicates that the policy stance will allow for long-run solvency. They found that for emerging economies the response of the primary balance stops when debt surpasses 50 percent

[2](Reinhart et al., 2003)

of GDP, compared to a threshold of 80 percent for industrial countries. The paper also employed a methodology that seeks to determine whether a government is "over borrowing", that is, if the existing debt stock is more than the present discounted value of future primary balances. Assuming that the past is the best indicator of future policy action, the average of historical primary balances was used as an estimate of expected primary balances, so that a benchmark debt-to-GDP ratio could be calculated. This benchmark level was found to be 25 percent for emerging markets and 75 percent for industrial economies. Finally, the paper considers uncertainties governments may face, in particular with respect to revenues earned; variability in revenues – especially when revenues are low for a long period – can impact debt sustainability. Fund (2003) conducted simulations for 'typical' emerging market and industrial countries and found that countries with a lower and more volatile revenue base, less ability to adjust expenditures, as well as greater disparity between the real interest and growth rates, are able to sustain lower debt levels. As with the other approaches used, it was found that emerging economies are able to sustain a lower ratio than more advanced countries.

However, rather than relating to growth and debt thresholds, our investigation orbits around credit quality and debt. Usually research covering creditworthiness or ratings seek to explain what factors surrounding debt issuance have more weight on credit rankings. Cantor and Packer (1996) documented one of the oldest exercises to address this question. Their main finding is that both fiscal and external balances are not statistically significant to explain credit ratings. Teker et al. (2013) discuss also the role of institutions. They find that changes in the legal environment have three times more effect on credit ratings. Jaramillo and Tejada (2011) seek evidence supporting the convenience of acquiring investment grade. They find that spreads are 36% lower once a country moves to an investment grade position positively correlated with macroeconomic performance and global economic performance. Similar analysis and conclusions are found in Bissoondoyal-Bheenick et al. (2006), Sy (2002), or Afonso et al. (2011). Our approach is to some extent complementary to these branches of literature as we try to link the correlation between fundamentals and debt tolerance to a story of transition from lower to higher debt tolerance.

Finally, as Bannister and Barrot (2011) we address some of the methodological issues found in the debt intolerance literature. In particular, we employ a dynamic panel approach, account for endogeneity in the regressors, and base the selection of clusters on a dissimilarity criterion for economic fundamentals. Also, to our knowledge, Bannister and Barrot (2011) and us, are the only few to discuss the findings in the context of the CAPDR economies.

What We Learned From the Data

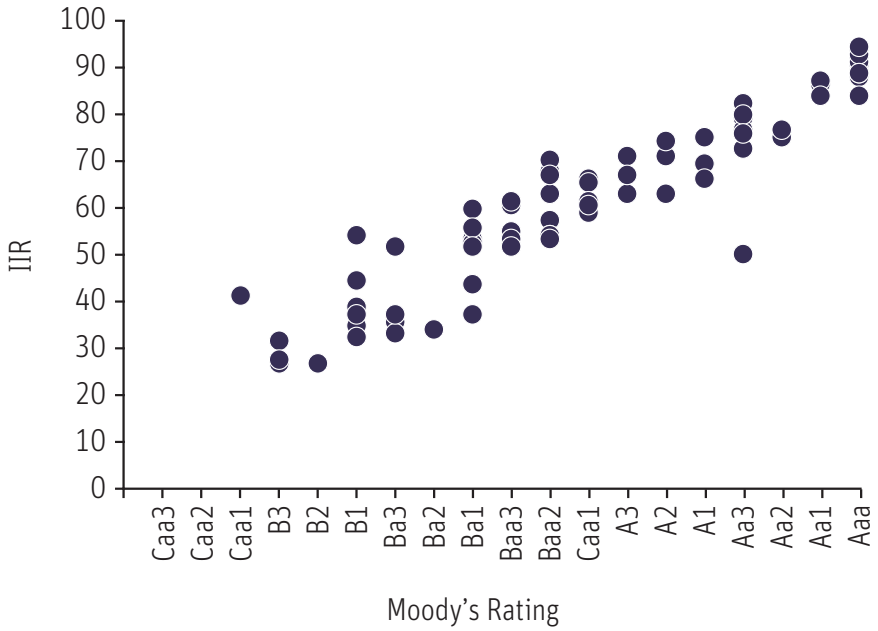
Traditionally, it has been thought that lower levels of indebtedness in an economy are associated with a better risk rating in financial markets, as less debt is associated with greater public sector capacity to meet obligations. However, several studies have found that this negative correlation does not always hold, and that these ratings in fact depend on a large number of factors. So what does the data tell us about creditworthiness? To answer this question, in this section we explore the data from several angles that will provide us with a better understanding about the relationship between credit quality and debt. First, we focus on searching for patterns among countries that may allow us to group them into clusters. Next, we seek if among them, there are statistically significant differences in their economic fundamentals. The section ends with a brief discussion of some trends we observed from other countries of Latin America.

Clusters

To approximate credit quality we use the Institutional Investor Rating (IIR).[3] As shown in Figure 1, this indicator has a high correlation with the risk ratings published by agencies such as Moody's. Examining the relationship between the IIR and the stock of debt for a sample of 104 countries between 1989 and 2015, it can be seen that the relationship

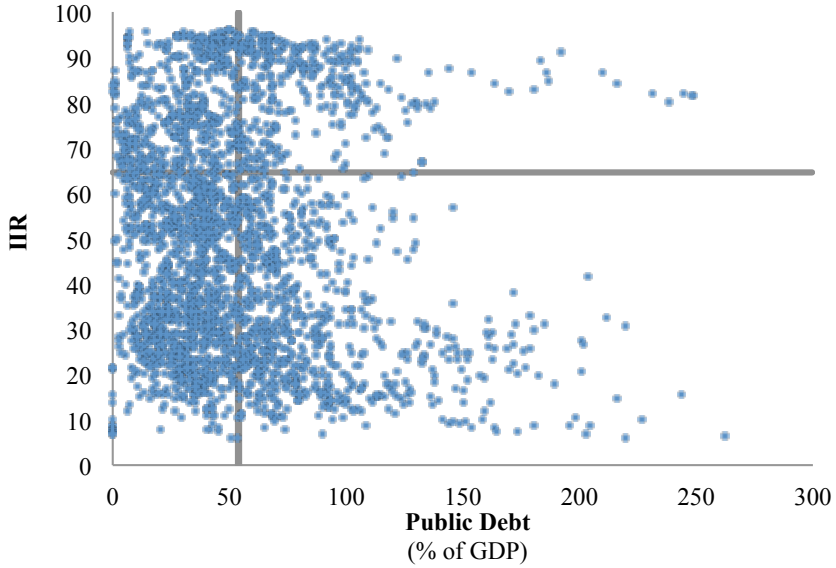
[3]The IIR is an index constructed by Institutional Investor Magazine from semi-annual surveys of economists and sovereign risk analysts from different institutions that assign a score between 1 and 100 per country in accordance with the perceived probability of cessation of payments. The valuations are weighted according to their participating institution's global exposure.

Figure 1: The IIR And Credit Ratings



between these variables is not uniform (Figure 2). We draw 4 hypothetical *locus* to point out some peculiarities: First, there seems to be a horizontal "U" shaped pattern where high-debt countries keep either very high or very low credit quality. So what are the characteristics, beyond the level of debt, that explain the differences in credit perception?

Figure 2: Apparent "Horizontal U-Shaped" Pattern, Sample 1989-2013



To answer this question, we first try to find some patterns that may be compatible with our previous hypothetical grouping. We therefore use a clustering criterion which specifies the dissimilarity of economic variables as a function

of the pairwise distances of observations in sets.[4] Figure 3 plots them for the 2013-2015 period and Figure 4 presents the basic statistics of each group.[5]

Some results extracted from each cluster include:

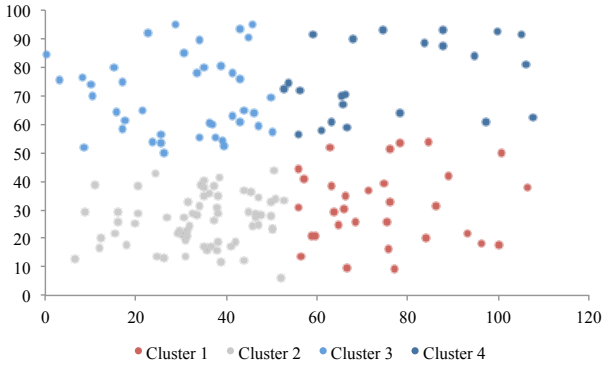
i. Countries with high levels of debt as a percentage of GDP (74%) and low credit rankings. Egypt, Vietnam, Nicaragua and Belize[6] are some of the countries belonging to this group.

ii. Countries with average credit ratings and lower levels of debt (averaging 34%of GDP). Paraguay, Bulgaria, Honduras, El Salvador, Guatemala and Dominican Republic belong to this group.

iii. Countries with high credit ratings and low levels of debt (30% of GDP, on average). Emerging economies such as Mexico, Colombia, Chile, Panama and Costa Rica belong to this group.

iv. Countries with solid economic fundamentals (low levels of inflation, good credit history and high per capita income) with a good credit rating but with high levels of debt (equivalent to 76% of GDP, on average). The United States and United Kingdom belong to this group.

Figure 3: Clusters, Sample 2013-2015



Role of Fundamentals

Are fundamentals significantly different between clusters? To answer this we hypothesize the opposite and perform *t*-test on mean differences. We want to know if, under the null hypothesis, the difference between sample means is unlikely to be as large as the observed difference in our particular sample, that is

$$Ho = m_{f,i} - m_{f,j} = 0, \tag{1}$$

where $m_{f,i}$ corresponds to the observed mean of fundamental f in cluster i and j, respectively.

We consider variables, such as institutional strength,[7] productive structure,[8] income,[9] financial development,[10] as well as their history of inflation and bankruptcy are examined to approximate economic fundamentals in various dimensions. Figure 4 illustrates the relative difference between groups and clusters in terms of the economic fundamentals.[11]

[4]For simplicity, this paper will use the Euclidean Distance. To determine the optimal number of clusters, we estimated the stopping rule based on Caliński and Harabasz (1974) pseudo-*F* index.

[5]Table A1 found in the Annex shows the optimal number of clusters based on Caliński and Harabasz (1974).

[6]The subsequent analysis does not include Belize, given that its IIR data is available only for 2013-2015.

[7]Measured by the control of corruption index from the World Bank's Governance Indicators.

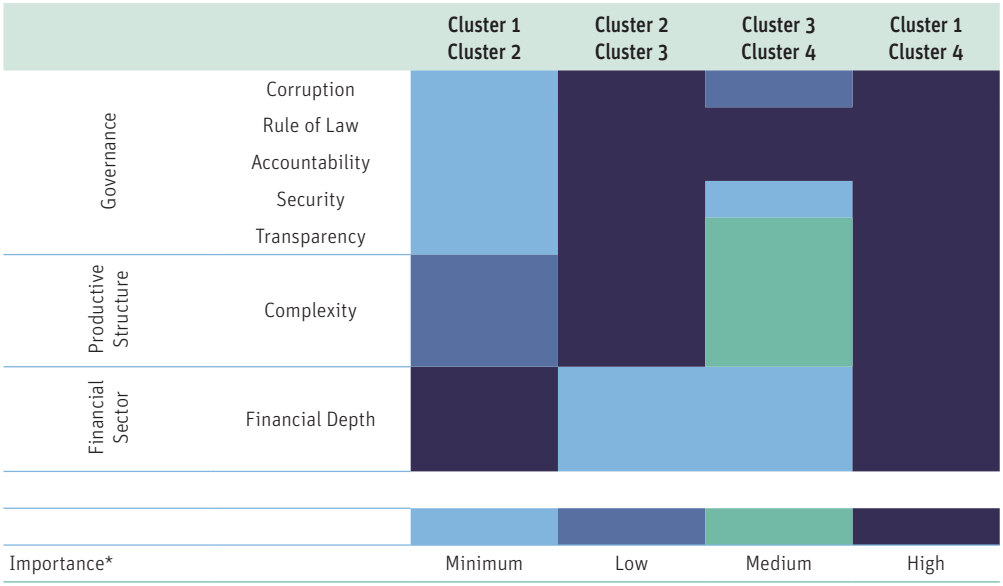
[8]Quantified by the economic complexity index from the Atlas of Industrial Complexity constructed by the John F. Kennedy School at Harvard. The index extrapolates the value added of exports to a measure of industrial complexity for the country.

[9]Approximated by per capita Gross Domestic Product.

[10]Approximated by credit to the private sector as % of GDP.

[11]The formal test results are

Figure 4: Relevance of Factors Between Clusters to Improve IIR



Source: IDB staff.
* Low correspond to a statistical significance between 10% and 15%, Medium between 5% and 9.9%; and High between 0% and 4.9%.

Table 1: Statistics Summary 2010-2015 (Mean in % of GDP, unless otherwise indicated)

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Institutional Investor Rating	31.3	26.4	69.7	75.6
Debt (% of GDP)	74.5	34.2	30.0	76.4
GDP Per Capita	6,498.0	3,095	26,317	32,464
Inflation*	5.8	6.0	2.7	1.9
Corruption**	-0.3	-0.7	0.4	1.1
Credit to Private Sector	49.0	29.9	74.0	90.9

Source: Elaboration with data from the Institutional Investor Rating, International Monetary Fund (World Economic Outlook, April 2016) and World Banks (Worldwide Development Indicators and Worldwide Governance Indicators, 2016)
* Inter annual variation
** Value index from -2.5 (worst) to 2.5 (best)

When comparing Clusters 1 and 2, we find that both have a similar perception of credit quality, in spite of the fact that the second group has significantly lower debt levels than the first. When analyzing the structural characteristics, it is clear that the higher level of debt in group 1 (relative to group 2) seems to be offset by greater financial depth and a more complex productive structure. On the other hand, the institutional strength of both clusters appears to be similar.

The countries of Cluster 3 exhibit credit valuations above those of group 2, despite having higher public indebtedness. This greater capacity to tolerate debt is associated with greater institutional strength, measured by control of corruption, rule of law, accountability, safety, and transparency. Group 3 also has a more diversified productive structure.

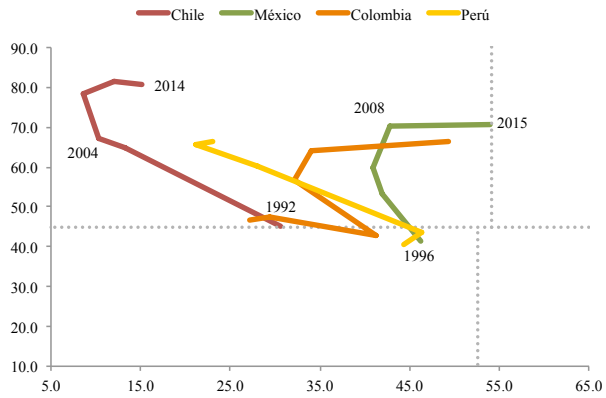
Finally, when comparing groups 3 and 4, we observed the importance of structural factors in the perception of credit quality. Both groups have similar credit rankings despite the higher average levels of debt of group 4 (30% and 76% of GDP, respectively). This suggests that investors appear to be incorporating in their valuation of credit quality

greater institutional strength, higher GDP per capita, and a more diversified productive structure of the countries in group 4.

Transitional Dynamics

The next question we explore is if the data reveals something about dynamics. In Latin America we tracked some interesting cases: Chile, Colombia, Mexico, and Peru. These countries belonged to Clusters 1 and 2 during the 1990s (see Figure 5).[12] From 1997 onward, these countries began to implement fiscal consolidations and structural reforms

Figure 5: The IIR And Credit Ratings 1990-2015, Selected LAC Countries



which have enabled them to achieve more solid fundamentals now, allowing them to gain access to international debt markets at relatively low rates.[13] Currently, all four are considered investment grade and are in Cluster 3 of our classification. Though not synchronized, the trajectory of these three countries toward Cluster 3 showed the same pattern. Initially they focused on actions in the fiscal sphere, implementing measures such as financial responsibility legislation, debt ceilings, and debt management, which constrained the level of public debt. While their fiscal positions improved, reforms were gradually incorporated to strengthen institutions and the financial sector (see Table A2). The combination of debt reduction and structural improvements enabled them to respond successfully to the last international crisis. Although the four countries increased spending, and therefore their debt ratios, their respective credit rating did not deteriorate at all and, in some cases, improved.[14]

Cracking the Secrets Behind the *Debt Intolerance*

About the Framework

There are a number of problems with the traditional approach to estimating the debt intolerance equation. First there is a possible endogeneity of regressors (debt, inflation and default) to the dependent variable (IIR), which may lead to biased estimates of the coefficients. Reinhart et al. (2003) recognize this and use instrumental variable estimations with the same general results as their original estimation. However, there are several pitfalls in their approach. Firstly, there may be endogeneity of IIR groupings (clubs) when these are based on partitions of the dependent variable (as

[12] We draw hypothetical cluster borders, however each country was either in cluster 1 or 2 during late 1990's.

[13] The reduction in financing costs could be attributed to at least two factors: (i) better creditworthiness and (ii) low international interest rates, a product of the recent expansive monetary policies in developed countries.

[14] Mexico's case includes the issue in 2013 of a Perpetual Bond in the markets. At the same time, a set of second and third generation structural reforms were approved, which led to an improvement in creditworthiness.

opposed to the more traditional dummies based on partitions of independent variables.) They may also be correlated with the error term, resulting in biased estimates of the coefficients. Second, any static cross-section estimation does not take into account changes in the IIR and debt over time and a linear relationship between IIR and debt may be restrictive. Third, estimations based only on either external debt or domestic debt might offer partially robust results, while a broader definition that includes domestic debt (i.e. general government debt) might give a better picture of the importance of debt levels for *debt intolerance*. Much of these critiques were addressed in Bannister and Barrot (2011), but we complement them by selecting clusters based on fundamentals through a dissimilarity criterion and enrich the estimation by analyzing non-linearities among macroeconomic fundamentals.

Our sample includes 120 countries, developed and developing, from 1989 to 2015, an unbalanced panel, except for the last 15 years that are fairly complete. To eliminate noise, and following standard practice, we take 4- year averages over 6 periods and one of three years (1989-1992 -4 years; 1993-1996 - 4 years; 1997-2000 - 4 years; 2001-2004- 4 years, 2005-2008- 4 years, 2009-2012- 4 years, and 2013-2015- 3 years). We first describe the methodology and in the next section we discuss the results.

Methodology

Our canonical model is constructed on the basis of the specification proposed by Bannister and Barrot (2011), expanded to include main economic fundamentals. The baseline equation that we estimate is thus:

$$IIR_{i,t} = \rho IIR_{i,t-1} + \alpha_i + z_{i,t}^{'}\beta_1 + x_{i,t}^{'}\beta_2 + \varepsilon_{i,t}, \tag{2}$$

where $IIR_{i,t}$ is the institutional investors rating and $x_{i,t}$ is a measure for economic fundamentals. $z_{i,t}$ corresponds to the set of controls in Bannister and Barrot (2011): i) a dummy for periods of inflation over 10 percent, ii) a dummy for periods of debt restructuring or default, iii) the ratio of debt to GDP, and iv) we also introduce a trend variable to capture time-specific effects. Finally, we introduce the lagged value of the IIR on the right hand side of the equation to capture the persistence of the level of the IIR over time. Intuitively, the past evaluation of creditworthiness/debt intolerance should have a large bearing on the current evaluation.

Furthermore, to gauge the degree of correlation between the variables of institutional strength, the Kaufman World Wide Governance Indicators were taken into consideration and submitted to a decomposition of principal components. As can be seen in Table A2, around 75% of the information is accumulated in the first two components, with the priority distribution as indicated there.[15]

Measurement of the effects by clusters. We proceed to investigate the relation between the IIR and debt by controlling for the clusters we defined previously. To do so we created dummies based on the imaginary lines dividing each cluster. For instance, to generate the dummy indicating cluster 1, we first created a dummy assigning 1 when the debt ratio was high - *debt dummy*(d)-, and then a dummy that assigns 1 if IIR is high- (i). With these set of dummies we carried out the following kxj (k,j=2) estimations:

$$IIR_{i,t} = \rho IIR_{i,t-1} + \alpha_i + z_{i,t}^{'}\beta_1 + x_{i,t}^{'}\beta_2 + \left(i_{i,t}^{j} * d_{i,t}^{k}\right)^{'}\beta_3 + \varepsilon_{i,t}. \tag{3}$$

Expanding with non-linearities.Previously we performed a series of t-tests on mean differences to get a sense of their significance. The test results gave us some grounds to believe that there might exist non-linear effects between them. To corroborate this, we carried out a series of estimations, including interaction between debt and fundamentals.

$$IIR_{i,t} = \rho IIR_{i,t-1} + \alpha_i + z_{i,t}^{'}\beta_1 + x_{i,t}^{'}\beta_2 + \left(debt_{i,t} * f_{i,t}\right)^{'}\beta_3 + \varepsilon_{i,t}. \tag{4}$$

Estimation method. Since a specification of fixed effects in a dynamic panel is involved, various methods are

[15] We used the the relative weight of each factor to select those factors to be included in the estimations.

explored, among them the Fixed Effects, Least Squares, Arellano and Bond (1991) and Arellano and Bover (1995). As a greater number of countries than periods are available, the instruments option in a Generalized Method of Moments results in more consistent estimations, and therefore we will focus our attention on the Arellano-Bond and Arellano-Bover outputs. We performed some checks to validate the use of each model, including the Arellano-Bond AR(1) test for autocorrelation and the Hansen test for overidentification restriction in the Arellano-Bover; they are all reported in the annex.

But You Don't Live on Debt Alone

Economic Fundamentals *Really* Matter

Tables 4-24 present results for a set of panel estimations using OLS, fixed effects, the Arellano-Bond, and Arellano-Bover. As in Bannister and Barrot (2011) we have dropped countries with an IIR below 25, as they usually do not have access to private international debt markets. Regardless of cutting off these countries, our sample size remains sufficiently large, at circa 300 observations. To briefly recap, the estimation uses a panel of four-year periods between 1989 and 2015. We now proceed to discuss our results.

Table 4 shows the basic panel regression using the set of variables as in Bannister and Barrot (2011). Tables 5-8 correspond to the estimations of equation (2). Their coefficients in the estimation are significant and of the expected sign. The coefficient on the lagged IIR is positive circa 0.18 with Arellano-Bond and 0.3 with Arellano-Bover, both suggesting a significant degree of persistence in the IIR. Coefficients on inflation and default variables are negative and the coefficient on per-capita GDP is positive as expected. The coefficient on the debt ratio is negative proving that, on average, higher debt has a negative effect on the perception of creditworthiness. As shown in Table 5 and 6, the negative correlation between the IIR and debt remains of similar magnitude as we expand the controls. All but GDP per capita share this pattern. Interestingly, GDP per capita becomes larger as we run incremental regressions. For instance, in the baseline case the coefficient is 0.19 and 0.17 in Arellano-Bond and Arellano-Bover, respectively. However, after adding financial depth, control of corruption, and economic complexity, the level jumped to about 0.5 in both estimation methods. We included credit to the private sector as a measure of financial depth. This variable resulted in a positive and significant coefficient, signaling the recognition that creditworthiness improves, the more a financial system is robust. Economic complexity renders a similar result; it contributes significantly to a more optimistic judgment regarding credit quality.

We proceed to answer if the debt tolerance of a country is closely related to the cluster where they are located. We estimate equation (3) or equivalently a per cluster procedure. First, we show in Table 9-12 the same set of controls as baseline. In general they keep the same patterns as in baseline regarding the sign when significant. In, both Arellano-Bond and Arellano-Bover estimations, cluster 1ś default dummy was redundant as all countries had a default episode in every one of the 4-year groups. Cluster 2 resulted in a positive coefficient for default; however, its significance was near zero. Furthermore, we observe two important features: i) persistence of the IIR increased in all but cluster 3, and ii) the linear effect of debt seems to be more negative for cluster 3 followed by cluster 4, which is somewhat unexpected. The latter finds a correction once we expand the estimation to include other fundamentals. We therefore continue by adding them one by one. The immediate results are that the negative effect of debt is usually higher as we approach the lower clusters, supporting our hypothesis of debt tolerance (see Tables 11-13). All of the other core controls had the same sign as in baseline when significant. In both estimation methods, GDP per capita seemed to be positively relevant for countries found in clusters 2-4. Inflation turned out to be significant for cluster 2 and default for cluster 3 and 4. These results have the direction and significance that we would expect: In countries with relative low debt and low creditworthiness, factors such as financial sector improvements or the absence of inflationary episodes are used by creditors to assess the chances to repay debts. Moreover, for countries in the *locus* of cluster 3

and 4, inflationary episodes are less likely to affect creditworthiness. On the other hand, defaulting would be the main element for which the markets punish credit quality, in all groups.

Lastly, the other economic fundamentals were mostly significant, conditional on the cluster to which they belonged. Not surprisingly, financial depth is positively correlated with credit quality in cluster 2 and 3. Both cluster 1 and 4 are weakly correlated-above 10%-, although for different reasons. In cluster 1, financial depth is too low to have any link with credit quality. Cluster 4 is the opposite pole: since most of its members are already financially developed it makes no difference to the changes in the IIR. Complexity rendered a positive correlation, as we expected. However, it was significant only for clusters 3 and 4 with Arellano-Bond and for clusters 2-4 with Arellano-Bover. This is an interesting finding, in the sense that a diverse export structure is effectively correlated with more tolerance. This result must be internalizing the expected balancing effects that a more diverse matrix of exports has during shocks. As for the level, complexity seems to contribute more to countries in cluster 2 followed by country 3 and 4.

And What About Indirect Effects?

So far we have found the existence of a direct inverse relationship between debt and creditworthiness. The second set of findings is the relevance of economic fundamentals, albeit conditional on the *stage of progress* - or cluster- they inhabit. Previously, we mentioned the possibility of non-linear effects between clusters, or, in other words, indirect effects that are not being properly identified through a linear expression. We now proceed by placing special attention on the indirect effects originating from improvements in economic fundamentals.

In Equation (5) the marginal effect of the debt ratio on the IIR is determined by

$$\frac{dIIR_{i,t}}{ddebt_{i,t}} = \beta_3 + \beta_4 x_{i,t}, \tag{5}$$

where we would expect β_4 to have a positive sign given the positive spillovers that economic fundamentals might have on debt financing. The results, shown in Tables 19-24, indeed suggest that the observed distinctions between fundamentals among clusters are reflected in the differentiated effects that debt has on creditworthiness. For instance, in both Arellano-Bond and Arellano-Bover, financial depth reduces the negative effects of debt on IIR (see Table 19 and 22). The pattern is clear: as before, cluster 1 and 4 see no significant gains. Regarding clusters 2 and 3, the lower the cluster the larger the positive spillovers from increasing financial depth. Our proxy for institutional strengthening, control of corruption has a similar positive and significant effect (see Table 20 and 23), although it is statistically valid for the four clusters. Complexity turns out to be also relevant for the four clusters. The level of impact is about the same for all clusters, except number 2, which is usually higher (Table 21 and 24). These sets of results present some evidence that the overall effect of changes in debt to GDP ratio are both conditional on the *stage of development* and action to improve economic fundamentals.

Wrapping up cluster by cluster:

- For the countries in Cluster 1, each reduction in debt equivalent to 1% of GDP produces, on average, an increase of about 4% in the creditworthiness index (IIR). Controlling for other fundamentals, the positive effects of reducing debt increases from 1% to about 7%.

- For the countries in Cluster 2, the sensitivity of the IIR to changes in the level of indebtedness is similar. In this group, debt cuts of 1% of GDP improve creditworthiness by 5%, falling to about 4% once controlling for economic fundamentals.

- In Cluster 3 countries, the creditworthiness index rises, on average, by 15% when debt is adjusted by 1% of GDP. However, this estimate reduces when controlling for other factors. In fact, as can be calculated from the information in Table 2, the marginal effects per year would fall to about 3%. This suggests that, compared to

previous cases, the relative importance of other factors, such as institutional quality and the development of the financial system, is greater.

- Finally, in Cluster 4, the estimations show that the sensitivity of the IIR to changes in the debt is even smaller: for each point of GDP adjustment in debt, as we control for other factors the IIR increases even below 2%.

Table 2: Probability of a Cluster Change

		Cluster in the Next Period			
		1	2	3	4
Cluster	1	73.80%	15.70%	7.90%	2.60%
in	2	22.20%	65.30%	12.50%	0.00%
Current	3	5.30%	2.10%	81.00%	11.60%
Period	4	3.40%	0.00%	18.60%	78.00%

Table 3: Marginals Effects of Debt on IIR

	Baseline	Control of Corruption	Nonlinear Control of Corruption	Credit to Private	Nonlinear Credit to Private Sector	Complexity Index	Nonlinear Complexity Index
1	0.165	0.31	$0.26 + 0.10 * CC$	0.27	$0.06 + 0.05 * CPS$	0.31	$0.42 + 0.004 * COM$
2	0.220	0.16	$0.15 + 0.43 * CC$	0.17	$0.38 + 0.07 * CPS$	0.17	$0.40 + 0.009 * COM$
3	0.620	0.12	$0.15 + 0.05 * CC$	0.11	$0.29 + 0.04 * CPS$	0.08	$0.25 + 0.004 * COM$
4	0.290	0.12	$0.04 + 0.01 * CC$	0.08	$0.09 + 0.002 * CPS$	0.01	$0.39 + 0.005 * COM$

Note: Economic Complexity as defined by Hidalgo and Hausmann (2009).

According to our results, in cluster 1 the indirect effects of strengthening institutions would also be accompanied by a larger direct impact from debt reduction on creditworthiness. It is cluster 2 that proves the main winner of these kind of policies. They would increase the positive direct effect of debt on credit quality but also will receive much more credit for their improvement. Rather than only benefiting countries in cluster 2, financial improvements are normally associated with better payoffs for cluster 2 and 3. Under both controls, cluster 4 seem to have a similar level of marginal effect. Contrastingly, with the above results, economic complexity is associated with mostly indirect positive effects.

Paving the Road Towards Better Credit Quality?

For policymakers it is important to assess the transition from a lower to a higher creditworthiness. Evidence presented here suggests that both controlling debt and making some progress with economic fundamentals would provide a path towards a better cluster and credit quality. But how easy is it for a country to move from one cluster to another? To progress with this we tracked the different transitions, as we did to generate Figure 5, and calculated a transition matrix. Using the transition matrix (Figure 6),[16] we observe the following:

- Clusters 1 and 2: As seen in Table 1, countries in Cluster 1 and 2 are not, on average, very different in their structural indicators. The countries of cluster 1 have a higher tax burden, as well as slightly better control of corruption. However, the greater difference between both clusters is their debt levels. In this regard, the average country of Cluster 2 has 60% less debt than the average in Cluster 1.

[16] Four-yearly observations are used to historically evaluate in which cluster a country is found in one period,compared to the cluster in which it was found in an earlier period.

Given that this is the only important difference between the variables in the exercise, the average country of Cluster 1 could gain access to cluster 2 and improve its credit rating by adjusting its debt.[17] Indeed, given that changes in fiscal indicators could be seen as short-term ones compared to the other *fundamentals*, the transition between cluster 1 and 2 is more common than the majority of other transitions between clusters (see Figure 6).

- Clusters 2 and 3: transition between Cluster 2 and Cluster 3 is more costly and takes longer, because structural changes have direct results in the medium or long term. To move between Clusters 2 and 3, fiscal changes would not seem to be sufficient by themselves. To achieve the objective it would also be necessary to carry out a series of important adjustments in the level of integration, productive structure or control of corruption, or in all the indicators at the same time.[18]

- Clusters 3 and 4: As for the transition between clusters 3 and 4, we observe a similar pattern to that of clusters 1 and 2. For example, a transition from Cluster 3 to Cluster 4 is more probable (11.6%) than one from Cluster 3 to 2 (2.1%). This is because the average country in Cluster 3 has a series of solid structural indicators and debt tolerance is greater than in Cluster 2. Indeed, given that the average country in Cluster 4 has a debt of 91% of GDP, it would be possible to cross from cluster 3 to 4 with a near tripling of debt. This implies that once Cluster 3 is reached, structural variables become fundamental when the time comes for "graduation" to Cluster 4.[19]

Implementing policies aimed at improving economic fundamentals usually takes time, although there can be short-term benefits. For example, long processes of political dialogue are often needed to shape reforms and the subsequent institutional adjustments for their implementation. However, although implementation can take time, the legal formulation of these reforms can yield short-term benefits, since it might create positive expectations on future economic performance.

The next section explores the different options that the authorities in CAPDR might want to consider, including structural measures that could have positive effects on investors' credit perception. We also examine debt adjustment policies combined with policies geared toward strengthening structural areas of the economy.

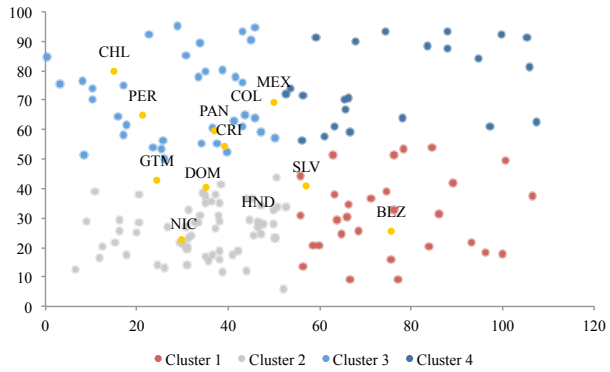
Pending Tasks in CAPDR

On the basis of the results obtained from the estimations we discuss two scenarios for CAPDR. In the first, the only instrument of adjustment is the debt, while there is no other change in any of the economic fundamentals. The second scenario involves a combination of policy measures, including debt adjustments and measures aimed at improving fundamentals. We begin by identifying the *locus* of CAPDR countries. Figure 7 show the 2010-2015 clusters with CAPDR and some selected countries of LAC.

For Cluster 2 countries, such as Honduras, Dominican Republic, Guatemala, and Nicaragua, implementing policies focused on debt reduction, in conjunction with improving institutions and financial system would yield important benefits. In the first scenario, in which there is no structural improvement in the economy, lowering the debt by 1% of GDP yearly, would lead to an yearly average improvement in the creditworthiness index of 5%. If, on the other hand, actions are taken that improve economic fundamentals (for example by climbing up by one position in the ranking of each one of the structural variables), the effect of a debt adjustment would at least double.[20] [21] It is worth highlighting that for this group of countries, improving control of corruption would yield the highest benefits. Thus, implementing

[17] This does not imply that improvement in the structural indicators would not help to make the transition more rapid
[18] These pattern has been observed in other *success stories* in Latin America.
[19] This does not imply that a deficient handling of the fiscal accounts cannot take a country from cluster 3 to 2.
[20] This change assumes that the value of the indexes for the other countries remains unchanged.
[21] It is important to remember that the adjustment would have to be carried out in a period of 4 years.

Figure 6: Clusters, Sample 2010-2015



measures in the countries in the region that would improve this indicator[22] such that they reach todayś average for the Latin America, could yield an increase near to 20% in the IIR.

In the particular case of El Salvador, a country which lies in Cluster 1, under scenario 1 creditworthiness would improve about 4% for each 1% of GDP adjustment in debt. This change by itself has a lower yield than that for the other countries in the region, which belong to Cluster 2. In addition, the impact on the IIR of accompanying the fiscal adjustment with improvements in structural factors such as the indicator of financial sector depth or improving institutions (so that the country climbs by one position in the ranking for each indicator[23]) is above 18%.[24]

In Panama's case, besides the positive effects which debt reduction entails, improvements in transparency and rule of law would contribute to raising the country's credit rating. Panama is the only CAPDR country in Cluster 3, with a low level of debt and high (investment grade) credit rating and, unlike the rest of the countries of the region, it has a deep financial system. Yet it shares some of their deficiencies, such as a low level of industrial complexity and weak institutional indicators. The country should press ahead with reforms to preserve its privileged position and be able to draw closer to the countries of Cluster 4. Bad public debt management or a deterioration in economic fundamentals could lead to scenarios in which a fall from investment grade could happen. Therefore, in the absence of improvements in fundamentals, an increase in debt of 1% of GDP would be reflected in a worsening of creditworthiness by 15%. However, if Panama continues to improve its economic fundamentals the country may see credit quality improving circa 10%. [25] the negative impact on creditworthiness would be of 0.6%.

Evaluating the results for the CAPDR countries, it is clear that setting guidelines for short- and long-term actions would benefit the region. While in the short term reductions in public debt would improve creditworthiness, the creation of a medium and long-term agenda to improve fundamentals would translate into higher credit ratings, which would be reflected in a transition, for example from Cluster 2 to Cluster 3. In summary, better fundamentals would allow access to financing at lower rates. In the future, besides counting on debt reduction as a policy instrument, the CAPDR agenda ought to be capable of identifying which medium and long-term structural measures would offer the highest returns.

[22] In this exercise Costa Rica is excluded given that it is above the Latin American average for control of corruption.

[23] Maintaining constant the value of the indicators for other countries.

[24] The gains from structural reforms are lower in the cluster to which Nicaragua belongs than for the cluster to which the majority of CAPDR countries belong.

[25] As before, assuming unchanged the value of the indicators for all other countries in LAC. The change is from current position to the LAC average.

Conclusions

The analysis of this chapter suggests two types of policy measures for CAPDR countries. First, it is reasonable to begin with quick gains26 on the fiscal side, given the greater return they generate on the IIR and their immediate impact. This type of fiscal action could also build confidence to facilitate subsequent areas of change for the longer term. However, it is important not to neglect measures specifically aimed at improving medium and long-term fundamentals, which could have positive short-term effects through their impact on expectations. That is, it is recommendable for CAPDR countries to simultaneously emphasize progress in debt reduction policies and improvements in institutional quality, the productive structure and the financial sector.

Second, the successful implementation of a program of fiscal and more structural measures could, after a time, enable the country to "graduate" from a particular type of cluster. In any case, countries of the region would most likely need to increase their creditworthiness from their current level in order to shift to a better composition of fundamentals. In return, governments would be able to achieve a larger fiscal space at lower cost in periods of consolidation while, in times of crisis, they would enjoy greater response flexibility.

With focused efforts, CAPDR countries could achieve targets for consolidation and higher credit quality. Although the agenda of plans and measures to be implemented is broad, the region has improved many of its key points [I14]and today is in a better position than it was in the 1990s. The steps taken by other Latin American countries, such as Chile, Colombia, Mexico or Peru, offer possible guidelines to follow. The CAPDR region has major strengths which, channeled in the right direction, provide opportunities for the development of its economies.

References

A. Afonso, P. Gomes, and P. Rother. Short-and long-run determinants of sovereign debt credit ratings. *International Journal of Finance & Economics*, 16(1):1–15, 2011.

M. Arellano and S. Bond. Some tests of specification for panel data: Monte carlo evidence and an application to employment equations. *The review of economic studies*, 58(2):277–297, 1991.

M. Arellano and O. Bover. Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, 68(1):29–51, 1995.

M. G. J. Bannister and M. L.-D. Barrot. *A Debt Intolerance Framework Applied to Central America, Panama and the Dominican Republic*. Number 11-220. International Monetary Fund, 2011.

A. Baum, C. Checherita-Westphal, and P. Rother. Debt and growth: New evidence for the euro area. *Journal of International Money and Finance*, 32:809–821, 2013.

E. Bissoondoyal-Bheenick, R. Brooks, and A. Y. Yip. Determinants of sovereign ratings: A comparison of case-based reasoning and ordered probit approaches. *Global Finance Journal*, 17(1):136–154, 2006.

T. Caliński and J. Harabasz. A dendrite method for cluster analysis. *Communications in Statistics-theory and Methods*, 3(1):1–27, 1974.

R. Cantor and F. Packer. Determinants and impact of sovereign credit ratings. *Economic policy review*, 2(2), 1996.

S. G. Cecchetti, M. S. Mohanty, and F. Zampolli. The real effects of debt. 2011.

I. M. Fund. World economic outlook. *Washington: International Monetary Fund*, 2003.

D. B. Gabriel. A stochastic framework for public debt sustainability analysis. *IMF Working Papers*, 2008.

C. A. Hidalgo and R. Hausmann. The building blocks of economic complexity. *proceedings of the national academy of sciences*, 106(26):10570–10575, 2009.

A. Izquierdo, R. Loo-Kung, and F. Navajas. Resistiendo el canto de las sirenas financieras en centroamérica: Una ruta hacia un gasto eficiente con más crecimiento. 2013.

L. Jaramillo and M. Tejada. Sovereign credit ratings and spreads in emerging markets: does investment grade matter? *IMF Working Papers*, pages 1–17, 2011.

C. M. Reinhart, K. S. Rogoff, and M. A. Savastano. Debt intolerance. Technical report, National Bureau of Economic Research, 2003.

A. N. Sy. Emerging market bond spreads and sovereign credit ratings: reconciling market views with economic fundamentals. *Emerging Markets Review*, 3(4):380–408, 2002.

D. Teker, A. Pala, and O. Kent. Determinants of sovereign rating: Factor based ordered probit models for panel data analysis modeling framework. *International Journal of Economics and Financial Issues*, 3(1):122, 2013.

P. Topalova and D. Nyberg. *What level of public debt could India target?* Number 10-17. International Monetary Fund, 2010.

Annex

Table 4: Debt Intolerance Regression Outputs a la Bannister et al (2011)

	Ordinary Least Squares	Fixed Effects	Arellano - Bond	Arellano - Bover
IIR_{t-1}	0.860**	0.529**	0.216**	0.444**
	(37.48)	(12.47)	(5.49)	(12.42)
Debt (% of GDP)	-0.0769+	-0.326**	-0.422**	-0.311**
	(-1.92)	(-5.60)	(-7.28)	(-5.34)
Debt (% of GDP) Squared	0.0000404	0.00139**	0.00154**	0.000826+
	(0.13)	(3.37)	(3.64)	(1.87)
Inflation (Dummy)	-2.075*	-2.351*	-1.411	-2.495*
	(-2.39)	(-2.38)	(-1.51)	(-2.51)
Default (Dummy)	-3.993**	-3.073*	-1.679	-2.942*
	(-3.97)	(-2.50)	(-1.45)	(-2.46)
GDP Per Capita	0.0000879**	0.0000298	0.0000866+	0.000358**
	(3.27)	(0.66)	(1.92)	(9.78)
Trend	-1.124**	0.201	1.011**	-0.762**
	(-6.26)	(0.75)	(4.11)	(-4.04)
Constant	18.95**	40.37**	57.23**	45.49**
	(10.52)	(14.61)	(22.20)	(18.34)
Observations	346	346	283	346
Adjusted R^2	0.954	0.610		

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 5: Linear Effects of Fundamentals: OLS

	Base	Incremental 1	Incremental 2	Incremental 3
IIR_{t-1}	0.692**	0.650**	0.645**	0.642**
	(27.82)	(23.11)	(22.74)	(22.83)
Debt (% of GDP)	-0.0530**	-0.0526**	-0.0556**	-0.0465**
	(-4.41)	(-4.35)	(-4.50)	(-3.66)
GDP Per Capita	0.0605**	0.0571**	0.0487**	0.220**
	(7.39)	(6.94)	(4.45)	(3.41)
Default (Dummy)	-0.144**	-0.143**	-0.141**	-0.134**
	(-6.16)	(-6.10)	(-6.01)	(-5.73)
Inflation (Dummy)	-0.0560**	-0.0341^{+}	-0.0317	-0.0249
	(-2.91)	(-1.70)	(-1.57)	(-1.23)
Trend	-0.0262**	-0.0255**	-0.0224**	-0.0195**
	(-6.62)	(-6.38)	(-4.65)	(-3.99)
Credit-Private-Sector		0.0436**	0.0417**	0.0422**
		(3.24)	(3.08)	(3.15)
Control of Corruption			0.0148	0.0309*
			(1.17)	(2.23)
Complexity				0.0103**
				(2.69)
Constant	1.082**	1.097**	1.187**	0.454
	(14.65)	(14.76)	(11.10)	(1.56)
Observations	346	335	335	335
Adjusted R^2	0.945	0.944	0.944	0.945

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 6: Linear Effects of Fundamentals: Fixed Effects

	Base	Incremental 1	Incremental 2	Incremental 3
IIR_{t-1}	0.457**	0.596**	0.433**	0.433**
	(13.49)	(20.25)	(12.62)	(12.57)
Debt (% of GDP)	-0.100**	-0.0607**	-0.0889**	-0.0885**
	(-4.94)	(-4.55)	(-4.46)	(-4.39)
GDP Per Capita	0.157**	0.0708**	0.132**	0.143
	(5.40)	(7.49)	(4.50)	(1.64)
Default (Dummy)	-0.0933**	-0.140**	-0.0919**	-0.0920**
	(-3.51)	(-5.87)	(-3.55)	(-3.55)
Inflation (Dummy)	-0.0329	-0.0369^{+}	-0.0203	-0.0198
	(-1.52)	(-1.84)	(-0.95)	(-0.92)
Trend	-0.0262**	-0.0258**	-0.0207**	-0.0203**
	(-3.60)	(-6.70)	(-2.82)	(-2.60)
Credit-Private-Sector		0.0572**	0.0586*	0.0593*
		(3.85)	(2.53)	(2.50)
Control of Corruption			0.162**	0.161**
			(4.41)	(4.40)
Complexity				0.000781
				(0.14)
Constant	1.310**	1.164**	1.263**	1.216**
	(4.55)	(14.26)	(4.52)	(2.83)
Observations	346	335	335	335
Adjusted R^2	0.658		0.688	0.687

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 7: Linear Effects of Fundamentals: Arellano-Bond

	Base	Incremental 1	Incremental 2	Incremental 3
IIR_{t-1}	0.244**	0.178**	0.183**	0.148**
	(7.11)	(4.98)	(5.29)	(4.19)
Debt (% of GDP)	-0.152**	-0.155**	-0.143**	-0.132**
	(-6.61)	(-6.95)	(-6.55)	(-6.06)
GDP Per Capita	0.193**	0.172**	0.167**	0.574**
	(5.81)	(5.14)	(5.15)	(5.65)
Default (Dummy)	-0.0653*	-0.0675**	-0.0618*	-0.0525*
	(-2.38)	(-2.58)	(-2.44)	(-2.09)
Inflation (Dummy)	-0.0388+	-0.0665**	-0.0581**	-0.0484*
	(-1.77)	(-3.08)	(-2.76)	(-2.33)
Trend	-0.0198*	-0.0231**	-0.0174*	-0.00969
	(-2.50)	(-2.97)	(-2.28)	(-1.25)
Credit-Private-Sector		0.126**	0.119**	0.144**
		(4.65)	(4.52)	(5.40)
Control of Corruption			0.156**	0.139**
			(4.12)	(3.70)
Complexity				0.0251**
				(4.17)
Constant	1.989**	1.968**	1.877**	0.249
	(6.12)	(6.34)	(6.23)	(0.52)
Observations	283	272	272	272
Adjusted R^2				

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 8: Linear Effects of Fundamentals: Arellano-Bover

	Base	Incremental 1	Incremental 2	Incremental 3
IIR_{t-1}	0.304**	0.257**	0.257**	0.226**
	(9.64)	(7.90)	(8.01)	(7.07)
Debt (% of GDP)	-0.159**	-0.161**	-0.192**	-0.163**
	(-9.60)	(-9.85)	(-10.65)	(-8.74)
GDP Per Capita	0.176**	0.141**	0.0825**	0.542**
	(12.11)	(7.88)	(3.54)	(5.33)
Default (Dummy)	-0.0526+	-0.0492+	-0.0553*	-0.0394
	(-1.95)	(-1.90)	(-2.16)	(-1.56)
Inflation (Dummy)	-0.0403+	-0.0629**	-0.0597**	-0.0436*
	(-1.89)	(-3.00)	(-2.89)	(-2.13)
Trend	-0.0214**	-0.0176**	0.00106	0.00429
	(-5.26)	(-4.23)	(0.16)	(0.68)
Credit-Private-Sector		0.0926**	0.0745**	0.100**
		(3.91)	(3.12)	(4.20)
Control of Corruption			0.100**	0.119**
			(3.79)	(4.56)
Complexity				0.0267**
				(4.62)
Constant	1.938**	2.063**	2.636**	0.595
	(16.56)	(17.55)	(13.79)	(1.25)
Observations	346	335	335	335
Adjusted R^2				

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 9: Baseline: OLS Regression by Cluster

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR $_{t-1}$	0.726**	0.745**	0.691**	0.789**
	(7.21)	(11.67)	(17.43)	(13.31)
Debt (% of GDP)	0.329	-0.0907	-0.193^{+}	-0.0953
	(1.00)	(-1.44)	(-1.73)	(-0.70)
Debt (% of GDP) Squared	-0.00384	0.000181	0.00106	0.000155
	(-1.49)	(0.43)	(0.75)	(0.17)
GDP Per Capita	0.0000829	0.000231	0.000161**	0.000112^{+}
	(0.93)	(1.04)	(4.73)	(1.71)
Default (Dummy)	0	-1.890	-8.214**	-8.795*
	(.)	(-1.49)	(-3.08)	(-2.24)
Inflation (Dummy)	-2.598	-2.652*	-3.345*	5.061
	(-1.19)	(-2.14)	(-2.47)	(1.26)
Trend	-2.078**	-1.173**	-0.298	-0.897*
	(-3.63)	(-3.11)	(-1.05)	(-2.53)
Constant	19.63*	19.72**	27.58**	24.53**
	(2.31)	(6.30)	(8.26)	(4.33)
Observations	39	80	125	102
Adjusted R^2	0.847	0.809	0.941	0.912

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 10: Baseline: Fixed Effects Regression by Cluster

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR$_{t-1}$	0.726**	0.745**	0.662**	0.781**
	(7.21)	(11.67)	(15.29)	(12.76)
Debt (% if GDP)	0.329	-0.0907	-0.194	-0.140
	(1.00)	(-1.44)	(-1.62)	(-0.99)
Debt (% if GDP) Squared	-0.00384	0.000181	0.000990	0.000355
	(-1.49)	(0.43)	(0.67)	(0.37)
GDP Per Capita	0.0000829	0.000231	0.000162**	0.000112^{+}
	(0.93)	(1.04)	(4.31)	(1.65)
Default (Dummy)	0	-1.890	-8.446**	-9.049*
	(.)	(-1.49)	(-3.14)	(-2.35)
Inflation (Dummy)	-2.598	-2.652*	-3.643*	4.551
	(-1.19)	(-2.14)	(-2.57)	(1.13)
Trend	-2.078**	-1.173**	-0.210	-0.836*
	(-3.63)	(-3.11)	(-0.73)	(-2.36)
Constant	19.63*	19.72**	29.14**	26.94**
	(2.31)	(6.30)	(8.10)	(4.56)
Observations	39	80	125	102
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 11: Arellano-Bond Regression by Cluster

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.527**	0.204+	0.0962+	0.256**
	(4.62)	(1.69)	(1.66)	(3.82)
Debt (% of GDP)	0.163	-0.187*	-0.839**	-0.602**
	(0.45)	(-2.05)	(-6.42)	(-4.22)
Debt (% of GDP) Squared	-0.00385	0.000645	0.00682**	0.00211*
	(-1.35)	(1.09)	(4.36)	(2.16)
GDP Per Capita	0.000377+	0.000577	0.000129*	0.000215**
	(1.87)	(1.06)	(2.39)	(2.61)
Inflation (Dummy)	-2.371	-2.908*	-1.566	0.794
	(-1.02)	(-2.00)	(-1.07)	(0.24)
Trend	-1.905**	-0.117	3.581**	2.565**
	(-2.60)	(-0.20)	(8.10)	(5.25)
Default (Dummy)		0.0755	-8.588**	-6.728*
		(0.05)	(-3.58)	(-2.57)
Constant	35.51**	30.88**	65.47**	82.04**
	(3.40)	(8.10)	(15.43)	(11.93)
Observations	32	64	103	84
Adjusted R^2				

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 12: Arellano-Bover Regression by Cluster

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.520**	0.338**	0.367**	0.583**
	(5.81)	(3.51)	(6.33)	(8.16)
Debt (% of GDP)	0.165	-0.216*	-0.625**	-0.291+
	(0.49)	(-2.46)	(-4.46)	(-1.76)
Debt (% of GDP) Squared	-0.00379	0.000764	0.00506**	0.000697
	(-1.42)	(1.29)	(2.94)	(0.60)
GDP Per Capita	0.000372**	0.000452	0.000249**	0.000209**
	(3.49)	(1.26)	(5.80)	(2.92)
Inflation (Dummy)	-2.333	-3.512*	-3.144+	-4.174
	(-1.14)	(-2.52)	(-1.86)	(-1.03)
Trend	-2.178**	-0.577	0.480	-0.579
	(-3.78)	(-1.40)	(1.51)	(-1.59)
Default (Dummy)		-1.082	-11.46**	-5.122+
		(-0.68)	(-4.44)	(-1.66)
Constant	36.69**	31.48**	51.86**	46.79**
	(3.96)	(8.37)	(11.59)	(6.98)
Observations	39	80	125	102
Adjusted R^2				

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 13: Arellano-Bond by Cluster Including Control of Corruption

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.597**	0.244**	0.226**	0.323**
	(6.06)	(2.63)	(5.07)	(5.78)
Debt (% of GDP)	-0.355**	-0.0528	-0.103**	-0.167**
	(-4.26)	(-0.79)	(-3.85)	(-5.60)
GDP Per Capita	-0.0651	0.254**	0.210**	0.115**
	(-0.55)	(2.94)	(5.53)	(2.81)
Inflation (Dummy)	-0.0452	-0.0822+	0.0133	0.0296
	(-0.94)	(-1.65)	(0.42)	(0.61)
Control of Corruption	0.152	0.249*	0.0313*	0.0812*
	(1.45)	(2.50)	(2.47)	(2.02)
Trend	-0.00653	-0.0364+	-0.00989	-0.00265
	(-0.21)	(-1.68)	(-1.01)	(-0.32)
Default (Dummy)		-0.00444	-0.243**	-0.138**
		(-1.09)	(-5.75)	(-3.33)
Constant	3.566**	1.214	1.690**	2.414**
	(3.38)	(1.54)	(4.35)	(5.83)
Observations	32	64	103	84
Adjusted R^2				

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 14: Arellano-Bond by Cluster Including Credit to Private Sector

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.647**	0.120	0.215**	0.383**
	(6.84)	(1.31)	(4.91)	(5.19)
Debt (% of GDP)	-0.355**	-0.112+	-0.104**	-0.176**
	(-3.77)	(-1.93)	(-3.74)	(-5.84)
GDP Per Capita	-0.0302	0.215*	0.180**	0.131**
	(-0.24)	(2.21)	(4.61)	(3.04)
Inflation (Dummy)	-0.0447	-0.126**	-0.00110	0.0619
	(-0.88)	(-2.77)	(-0.04)	(1.07)
Credit-Private-Sector	0.0493	0.230**	0.0641*	-0.0596
	(0.71)	(2.92)	(2.00)	(-1.43)
Trend	-0.0285	-0.0303	-0.00963	-0.00584
	(-0.87)	(-1.48)	(-0.89)	(-0.68)
Default (Dummy)		-0.0462	-0.238**	-0.138**
		(-1.01)	(-5.77)	(-3.27)
Constant	3.041*	1.183	1.772**	2.417**
	(2.58)	(1.60)	(4.55)	(5.66)
Observations	32	62	96	82
Adjusted R^2				

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 15: Arellano-Bond by Cluster Including Complexity

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.662**	0.262**	0.197**	0.265**
	(7.45)	(2.70)	(4.93)	(4.88)
Debt (% of GDP)	-0.383**	-0.0849	-0.108**	-0.0201**
	(-4.41)	(-1.21)	(-4.30)	(-7.06)
GDP Per Capita	-0.188	-0.0538	0.844**	0.665**
	(-0.56)	(-0.14)	(5.88)	(5.78)
Inflation (Dummy)	-0.0459	-0.0721	-0.0434	-0.0241
	(-0.91)	(-1.39)	(-1.45)	(0.53)
Complexity	-0.00779	-0.0227	0.0382**	0.0313**
	(-0.38)	(-0.86)	(4.49)	(4.95)
Trend	-0.0168	-0.0499*	0.00853	0.00753
	(-0.55)	(-2.19)	(0.85)	(0.90)
Default (Dummy)		0.0146	-0.202**	-0.117**
		(0.26)	(-5.13)	(-2.98)
Constant	3.983*	2.136	-0.789	0.515
	(2.44)	(1.35)	(-1.22)	(0.95)
Observations	32	64	103	84
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 16: Arellano-Bover by Cluster Including Control of Corruption

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.634**	0.345**	0.231**	0.410**
	(8.34)	(3.97)	(5.54)	(7.69)
Debt (% of GDP)	-0.313**	-0.162**	-0.120**	-0.120**
	(-4.73)	(-2.80)	(-4.82)	(-8.54)
GDP Per Capita	0.0435	0.110^{+}	0.150**	0.0859**
	(0.86)	(1.68)	(5.21)	(3.24)
Inflation (Dummy)	-0.0403	-0.0904^{+}	-0.00805	-0.00123
	(-0.91)	(-1.89)	(-0.28)	(-0.03)
Control of Corruption	0.0880	0.187*	0.0274^{+}	0.0443^{+}
	(1.10)	(2.00)	(1.95)	(1.64)
Trend	-0.0425*	-0.0128	0.00264	0.000711
	(-2.49)	(-0.68)	(0.33)	(0.11)
Default (Dummy)		-0.0302	-0.243**	-0.122**
		(-0.60)	(-6.30)	(-3.39)
Constant	2.538**	2.229**	2.232**	2.506**
	(4.86)	(3.34)	(8.42)	(10.98)
Observations	39	80	125	102
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 17: Arellano-Bover by Cluster Including Credit to Private Sector

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.634**	0.273**	0.217**	0.442**
	(8.10)	(3.09)	(5.03)	(6.78)
Debt (% of GDP)	-0.277**	-0.177**	-0.112**	-0.188**
	(-3.91)	(-3.44)	(-4.95)	(-8.07)
GDP Per Capita	0.0639	0.136*	0.138**	0.129**
	(1.55)	(2.39)	(5.96)	(5.92)
Inflation (Dummy)	-0.0214	-0.128**	-0.0123	0.0242
	(-0.47)	(-2.85)	(-0.42)	(0.43)
Credit-Private-Sector	0.0605	0.119*	0.0719*	-0.0356
	(1.05)	(2.12)	(2.55)	(-1.05)
Trend	-0.0517**	-0.0172	-0.00157	-0.00852*
	(-3.59)	(-1.04)	(-0.27)	(-2.18)
Default (Dummy)		0.00297	-0.239**	-0.120**
		(0.06)	(-6.33)	(-3.19)
Constant	2.056**	1.823**	2.108**	2.139**
	(5.35)	(3.20)	(10.29)	(9.76)
Observations	39	79	117	100
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 18: Arellano-Bover by Cluster Including Complexity

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.662**	0.358**	0.224**	0.375**
	(8.74)	(3.90)	(5.74)	(7.04)
Debt (% of GDP)	-0.312**	-0.169*	-0.0850**	-0.0193**
	(-4.45)	(-2.57)	(-3.86)	(-8.89)
GDP Per Capita	-0.133	0.202	0.670**	0.505**
	(-0.41)	(0.53)	(5.08)	(4.25)
Inflation (Dummy)	-0.0315	-0.0873+	-0.0264+	-0.00151
	(-0.72)	(-1.73)	(-1.90)	(-0.03)
Complexity	-0.0122	0.0602*	0.0268**	0.0198**
	(-0.67)	(2.25)	(3.80)	(3.30)
Trend	-0.0500**	-0.0222	-0.00512	-0.00770*
	(-3.40)	(-1.14)	(-1.05)	(-2.14)
Default (Dummy)		-0.0443	-0.218**	-0.0815*
		(-0.80)	(-5.96)	(-2.26)
Constant	3.092*	1.768	-0.294	0.536
	(2.12)	(1.06)	(-0.46)	(0.99)
Observations	39	80	125	102
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 19: Arellano - Bond Regressions by Cluster: Nonlinearity Case 1

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.644**	0.130	0.230**	0.379**
	(6.99)	(1.39)	(5.30)	(5.12)
Debt (% of GDP)	-0.0824	-0.253	-0.298*	-0.453+
	(-0.30)	(-1.36)	(-2.01)	(-1.51)
GDP Per Capita	-0.0819	0.203*	0.174**	0.127**
	(-0.63)	(2.03)	(4.49)	(2.92)
Inflation (Dummy)	-0.0533	-0.125**	0.00147	0.0435
	(-1.05)	(-2.72)	(0.05)	(0.71)
Credit to Private Sector (% of GDP)	0.347	0.0401+	0.114+	0.286
	(1.17)	(1.96)	(1.84)	(1.15)
Credit * Debt	-0.0770	0.0492	0.0461	0.0594
	(-1.04)	(2.82)**	(2.30)*	(1.93)+
Trend	-0.0123	-0.0261	-0.00776	-0.00670
	(-0.35)	(-1.21)	(-0.72)	(-0.77)
Default (Dummy)		-0.0482	-0.212**	-0.126**
		(1.03)	(-4.61)	(-2.83)
Constant	2.349+	1.770+	2.508**	3.539**
	(1.74)	(1.67)	(3.77)	(2.75)
Observations	32	62	96	82
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 20: Arellano - Bond Regressions by Cluster: Nonlinearity Case 2

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.556**	0.246**	0.226**	0.323**
	(5.66)	(2.64)	(5.20)	(5.74)
Debt (% of GDP)	-0.315**	-0.127*	-0.132**	-0.0727+
	(-3.65)	(-2.13)	(-4.50)	(-1.91)
GDP Per Capita	-0.0614	0.274**	0.175**	0.106*
	(-0.54)	(3.07)	(4.29)	(2.55)
Inflation (Dummy)	-0.0496	-0.0787+	0.0205	0.0275
	(-1.07)	(-1.58)	(0.66)	(0.56)
Control of Corruption	0.448+	0.662*	0.0947*	0.343
	(1.72)	(2.65)	(2.03)	(0.63)
Corruption * Debt	-0.0911	-0.102+	0.0401+	-0.0643
	(-1.24)	(1.96)	(1.86)	(0.27)
Trend	-0.00510	-0.0389+	0.000203	-0.00142
	(-0.17)	(-1.78)	(0.02)	(-0.17)
Default (Dummy)		-0.00758	-0.213**	-0.152**
		(-0.15)	(-4.73)	(-3.53)
Constant	3.527**	1.368+	2.060**	2.110**
	(3.49)	(1.66)	(4.89)	(4.39)
Observations	32	64	103	84
Adjusted R^2				

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 21: Arellano-Bond Regression by Cluster Nonlinearity Case 3

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.569**	0.260**	0.203**	0.224**
	(5.86)	(2.72)	(5.06)	(4.05)
Debt (% of GDP)	-0.483*	-0.272+	-0.228*	0.291+
	(-2.23)	(1.95)	(-2.31)	(1.72)
GDP Per Capita	-0.0167	0.533	0.789**	0.691**
	(-0.05)	(0.94)	(5.41)	(6.38)
Inflation (Dummy)	-0.0583	-0.0568	-0.0407	-0.0278
	(-1.23)	(-1.08)	(1.35)	(0.62)
Complexity	-0.0139	0.0498*	0.0404**	0.0145+
	(-0.73)	(2.18)	(4.59)	(1.64)
Complexity * Debt	0.00447+	0.00638+	0.00441+	0.00465**
	(1.71)	(1.29)	(1.24)	(2.95)
Trend	0.00377	-0.0343	0.00923	0.0143+
	(0.12)	(-1.38)	(0.92)	(1.69)
Default (Dummy)		0.00408	-0.186**	-0.158**
		(0.07)	(-4.40)	(-3.84)
Constant	2.294	-1.314	-0.129	-1.390+
	(1.29)	(-0.44)	(-0.16)	(-1.82)
Observations	32	64	103	84
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.12$, * $p < 0.05$, ** $p < 0.01$

Table 22: Arellano - Bover Regression by Cluster: Nonlinearity Case 1

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.626**	0.288**	0.234**	0.442**
	(7.82)	(3.15)	(5.47)	(6.73)
Debt (% of GDP)	-0.0689	-0.379^{+}	-0.294*	-0.099^{+}
	(-0.26)	(-1.92)	(-2.17)	(-1.70)
GDP Per Capita	0.0575	0.130*	0.140**	0.129**
	(1.41)	(2.21)	(6.11)	(5.60)
Inflation (Dummy)	-0.0276	-0.124**	-0.00658	0.0232
	(-0.61)	(-2.68)	(-0.23)	(0.38)
Credit to Private Sector (% of GDP)	0.276	0.163^{+}	0.100^{+}	0.0448
	(0.98)	(1.61)	(1.78)	(0.19)
Credit * Debt	-0.0541	0.0718*	0.0451*	0.00239
	(-0.78)	(2.08)	(2.34)	(0.04)
Trend	-0.0470**	-0.0124	-0.00229	-0.00856*
	(-2.98)	(-0.71)	(-0.41)	(-2.12)
Default (Dummy)		0.00779	-0.215**	-0.119**
		(0.16)	(-5.10)	(-2.94)
Constant	1.288	2.600**	2.717**	2.183^{+}
	(1.28)	(2.74)	(5.45)	(1.87)
Observations	39	79	117	100
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 23: Arellano - Bover Regression by Cluster: Nonlinearity Case 2

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.562**	0.356**	0.233**	0.397**
	(6.85)	(4.05)	(5.79)	(7.38)
Debt (% of GDP)	-0.262**	-0.158*	-0.150**	-0.0429*
	(-3.79)	(-2.34)	(-5.55)	(-2.57)
GDP Per Capita	0.0725	0.111	0.116**	0.0777**
	(1.45)	(1.64)	(3.73)	(2.89)
Inflation (Dummy)	-0.0527	-0.0821+	0.00595	0.00987
	(-1.25)	(-1.69)	(0.21)	(0.21)
Control of Corruption	0.466*	0.193+	0.105+	0.491*
	(1.99)	(0.39)	(-1.59)	(2.42)
Corruption * Debt	0.107+	0.432+	0.0481*	0.0108*
	(1.70)	(1.80)	(2.23)	(2.22)
Trend	-0.0421**	-0.0124	0.0129	0.00201
	(-2.61)	(-0.65)	(1.42)	(0.30)
Default (Dummy)		-0.0316	-0.204**	-0.158**
		(-0.62)	(-4.90)	(-3.98)
Constant	2.370**	2.174**	2.562**	1.977**
	(4.70)	(2.88)	(8.67)	(5.97)
Observations	39	80	125	102
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$

Table 24: Arellano-Bover Regression by Cluster Nonlinearity Case 3

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
IIR_{t-1}	0.572**	0.324**	0.230**	0.296**
	(6.62)	(3.63)	(5.87)	(5.26)
Debt (% of GDP)	0.4226+	-0.404+	-0.249*	0.395*
	(2.00)	(-1.53)	(-2.54)	(2.46)
GDP Per Capita	-0.0225	0.926+	0.609**	0.547**
	(-0.07)	(1.92)	(4.57)	(4.94)
Inflation (Dummy)	-0.0479	-0.0654	0.0242	0.0294
	(-1.15)	(-1.33)	(0.83)	(0.66)
Complexity	-0.0229	0.0163+	0.0305**	0.00102
	(-1.28)	(1.69)	(4.08)	(0.12)
Complexity * Debt	0.00415+	0.00968*	0.00492+	0.00547**
	(1.75)	(2.23)	(1.70)	(3.70)
Trend	-0.0370*	-0.0148	-0.00426	-0.00571
	(-2.38)	(-0.79)	(-0.87)	(-1.62)
Default (Dummy)		-0.0461	-0.196**	-0.145**
		(-0.87)	(-5.05)	(-3.69)
Constant	1.607	-3.113	0.552	-1.803*
	(1.01)	(-1.16)	(0.71)	(-2.38)
Observations	39	80	125	102
Adjusted R^2				

t statistics in parentheses

$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$