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A Cross-Country Analysis of Public Debt Management Strategies

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Abstract

This paper analyzes results of a survey on debt management strategies conducted by the Banking and Debt Management Department of the World Bank. The analysis focuses on (1) whether a public debt management strategy exists in a given country, (2) whether it is made public, and (3) in which form it is imparted. The paper analyzes the distribution of the latter characteristics over different regions, income groups, and levels of indebtedness using graphical analysis. Using regression analysis, it investigates the extent to which basic economic factors can explain the characteristics of public debt management strategies across countries.

This paper—a product of the Banking and Debt Management Department—is part of a larger effort in the department to understand the development of public debt management strategies. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Martha Rosenquist, room MC7-126C, telephone 202-458-2602, fax 202-522-2101, email address Mrosenquist@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at mmelecky@worldbank.org. July 2007. (37 pages)

A Cross-Country Analysis of Public Debt Management Strategies[*]

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1 Introduction

Governments have to often borrow in order to finance expenditures on public goods and services that promote growth and increase nations' welfare. The decision of how much to borrow is that of fiscal policy which determines the targeted level of debt based on a sustainability analysis of government debt. One concept of sustainability relates to solvency, the ability of the government to service its debt obligations in perpetuity without explicit default, Burnside (2004). Another concept put forth by Burnside (2004) renders fiscal sustainability a broader scope by relating it to the government's ability to maintain its current policies while remaining solvent. Within the latter concept, one can discuss the types and consequences of fiscal and monetary policy adjustments needed to avoid future insolvency. Even more broadly, this concept can encompass discussions on the optimality of fiscal policy rather than its mere feasibility.

Once the government decides on how much funding needs to be raised, it has to further determine the form in which the funds will be delivered.[1] In other words, the government has to decide which debt instruments are going to be used to raise the intended funding. Similar to any other private borrower, the government will seek the best terms for its borrowing. However, given the size of government borrowing, the analogy to a private investor might be misleading as none of the government's choices or policy actions is considered to be irrelevant for the equilibrium outcome,[2] see e.g. Missale (2000). A government's seeking of the best borrowing terms refers to the aim of minimizing the cost of borrowing within existing constraints while respecting the government's risk preferences (aversion). In other words, the government not only aims to raise funding at low cost but also to structure the composition of its debt portfolio in such a way as to minimize the impact of relevant shocks on its budget

[1] The variety of options that is available to the government certainly varies across countries mainly with regard to their stage of development.

[2] One most common example being the possibility of crowding out effect of government borrowing, see e.g. Briotti (2005) or Elmendorf and Mankiw (1998), but also a crowding-in effect of public finance can be expected, see e.g. Alani (2006) or Friedman B. (1978). Also, given the size of government debt portfolio its financial characteristics may constitute a systemic risk for the domestic financial sector.

or long-term expenditure plan. The debt instruments for financing of government debt are determined by the public debt managers based on the delegated authority from the government.[3] The debt portfolio composition is thus the policy instrument of public debt managers.

The fundamental document that guides debt managers in their decisions and operations is the public debt management *strategy*. The strategy is built upon foundations (goals) stated in government's debt management *objectives*. The debt management objectives are usually expressed along the following lines, see IMF and WB (2001):

> *The main objective of public debt management is to ensure that the government's financing needs and its payment obligations are met at the lowest possible cost over the medium to long run, consistent with a prudent degree of risk.*

The debt management objectives also typically contain sections addressing the government's involvement in domestic bond market development and coordination of its actions with fiscal and monetary policies. The latter relates to the fact that the objectives of fiscal policy, monetary policy, and public debt management differ but there are various interdependencies among their policy instruments, see e.g. Wheeler (2004) or Togo (2007). Missale (2000) argues that the objectives of minimizing the expected cost of debt servicing and minimizing risk are of little help operationally. According to Missale the objectives are also unuseful as principles on which one can construct benchmark portfolios against which the performance of debt managers could be evaluated.[4] He bases his arguments on the fact that meeting government

[3] The process underlying delegation of authority to the debt management office to borrow and execute related transactions in financial markets on behalf of the state is described in more detail in IMF and WB (2001) and Wheeler (2004).

[4] Simple as it seems, it might be a difficult task to evaluate performance of debt managers against a benchmark portfolio as not achieving the benchmark may be desirable on some occasions. One can use the analogy of the role of an inflation forecast in inflation targeting. Although, policy instruments are used to anchor inflation expectations at the targeted level the actual future inflation can end up away from the target due to the effect of unexpected shocks or shocks that the monetary policy does not want to counteract.

objectives is not an easy task to accomplish, especially in the absence of any theory of the appropriate degree of risk-aversion that a government should exhibit, or more generally elicit the preferences of society on this matter. Ideally, the debt management objectives of the government including its risk preference (aversion) guide the debt managers in the design of debt management strategy, and are reflected in the chosen cost-risk trade-off.

Now consider the process by which the strategy comes about in practice. The debt management strategy is proposed by the debt management authority or more specifically its middle office[5] to the minister of finance. The finance minister then reviews and approves the proposed strategy, often based on the input of the advisory board for debt management. The advisory board can comprise representatives of fiscal policy, government administration, monetary policy, and other regulatory and supervising bodies affected by the course of the debt management strategy. The review and approval of a debt management strategy at the level of a minister of finance is aimed at ensuring that the proposed strategy is consistent with the debt management objectives of the government, including its preference for risk.

In general, the formalized debt management strategy can take two basic forms. Either be presented in terms of *guidelines* or constitute a *benchmark* for the optimal government debt portfolio. The former relates to a document which guides the debt managers on types of risks that should be considered as relatively more important, and thus indirectly points to the desired structure of a debt portfolio. Therefore, the guidelines provide directions for future debt management operations rather than quantitative targets. On the other hand, strategic benchmarks state explicitly what are the desired risk characteristics of the optimal debt portfolio in a quantitative manner. The strategic benchmarks can quantify the targeted risk characteristics of the optimal debt portfolio either in terms of specific magnitudes or more often specific ranges. The basic types of risks that debt managers should consider when designing their strategy are discussed in detail in e.g. Wheeler (2004, pp. 17) while various pitfalls arising in debt management and constituting hidden risks are discussed in

[5]See Wheeler (2004) and IMF and WB (2003) for detailed description of the organizational structure of debt management authorities.

IMF and WB (2000, box 2). For the purpose of this paper we consider three basic types of risks: (i) foreign currency (FX) risk, (ii) refinancing (roll-over) risk, and (iii) interest rate risk. Risk type (i) addresses the desired currency composition of the debt portfolio, i.e. the relative weight on domestic currency versus foreign currency debt. Further, the currency composition of the foreign currency debt itself can be also addressed. Risk type (ii) addresses the desired maturity structure and redemption profile of the debt. Risk type (iii) deals with the desired proportion of floating as opposed to fixed interest rate debt or, in some cases, the price-indexed debt.[6]

Another attribute of a debt management strategy that will be considered in this paper is whether such a formal document is made public. The debt management strategy is considered as public if it is published either in the annual report of the debt management body, or made available on the respective website.

This paper aims to summarize and analyze the results of a survey on debt management strategies conducted by the Banking and Debt Management Department of the World Bank. We will focus on three main findings related to the debt management strategies across countries. Namely, (i) whether a public debt management strategy exists in a given country, (ii) whether it is made public, and (iii) in which form it is presented, i.e. either in the form of guidelines or a strategic benchmark. We will analyze the distribution of the latter characteristics over different regions, income groups and levels of indebtedness using graphical analysis. Moreover, we will use regression analysis to investigate to which extent selected economic indicators can explain the characteristics of public debt management strategies across countries. In expectation of the results we would like to set forth the following hypotheses. Namely, that increasing income levels increase the incidence of strategies; that increasing levels of indebtedness show a positive but likely non-linear (hump-shaped) relationship with the incidence of debt strategies; and that countries facing larger shocks show lower incidence of debt strategies. To our knowledge this paper

[6]Regarding the fulfillment of a strategy one can also think of specifying the pace at which the strategic benchmark should be reached, as the latter represents another level of the cost-risk trade-off. More specifically, in order to move the current debt portfolio structure faster towards the benchmark's structure the debt managers would have to proportionally relax their cost considerations as both restructuring of the debt portfolio or hedging can be costly.

is a first attempt to analyze differences in public debt management strategies across countries and contribute to better understanding of the development economics of public debt management.

The remainder of the paper is organized as follows. Section 2 describes the analyzed survey data and its collection. Section 3 contains graphical analysis of the survey data across income groups, regions and levels of indebtedness. Section 4 carries our regression analysis of the survey data using economic indicators as candidate explanatory variables. Section 5 provides a summary of findings and conclusions.

2 The Survey Data

Progressing in the efforts to better understand the development economics of public debt management strategies across different country groups and individual countries, the Banking and Debt Management Department of the World Bank conducted a survey on public debt management strategies. The survey was carried out during the period from August 2006 to February 2007 and covers OECD, IBRD and *Blend* countries.[7] The questionnaire was sent out to and completed by national authorities responsible for public debt management, or if not feasible the questionnaire was completed by the relevant country economist based on a dialog with the national governments. The information from the questionnaire was supplemented by a search through websites of institutions responsible for central government's debt management. The questionnaire asked the following questions[8]

(i) *Has the government established a debt management strategy for the total central government debt portfolio?*

(ii) *Is the debt management strategy document published?*

[7]The applied classification into country groups is that of the World Bank and is available at `http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html`

[8]The survey was made confidential regarding the aswers of individual countries so that no country examples appear in the paper.

(iii) *Have you established a strategic target/benchmark for the total debt portfolio?*

The questions were answered in a Yes/No manner and converted to 1/0 entries for each country, respectively. Regarding point (i), due to the formulation of the question the positive answers may include implicit strategies. After acquiring all observation the data were reviewed and some adjustments made to ensure their consistency across countries.[9] The latter pertains to ensuring that the unobserved quality of debt management strategies which are not made public meets certain criteria. Namely, the emphasis was placed on the fact that a debt management strategy has to address the cost-risk trade-off, not only the cost of fiscal financing. This requirement thus excludes references to purely fiscal expenditure frameworks or frameworks addressing fiscal sustainability. Concerning point (ii) the questionnaire was supplemented by website search to obtain the strategy documents. In point (iii) all countries that appeared to have at least one benchmark target or targeted range for one of the three risks below qualified for a positive answer.

If countries have established a strategic target/benchmark for their public debt portfolio they were asked which types of risks the strategic target/benchmark addresses. Namely, they were asked

(iii.a) *Have you established a strategic target/benchmark for currency risk (% domestic vs. % foreign)?*

(iii.b) *Have you established a strategic target/benchmark for interest rate risk (% fixed vs. % floating; average time to refixing (months); or modified or Macaulay duration (years))?*

(iii.c) *Have you established a strategic target/benchmark for refinancing risk (ceiling on debt maturing within one year (% of total outstanding); or average time to maturity (years))?*

The Yes/No answers to the latter questions were also converted into 1/0 entries.

[9]I am grateful to Lars Jessen and Antonio Velandia for their help in this process and Phillip Anderson, Elizabeth Currie and Tomas Magnusson for their expert inputs.

The entire data set covers 105 countries where the analysis of question (i) is based on all 105 observations, and analyses of questions (ii) and (iii) on 66 observations on strategies. To broadly characterize our sample, we find that out of the total of 105 countries 66 countries have a public debt management strategy, of those 38 communicate their strategies in terms of guidelines, and 28 in terms of benchmarks. Regarding the source of information that provided the basis for our classification 40% of countries responded to the questionnaire either by themselves or via the WB's country office. In case of 9% of the countries the information from needs assessments conducted by the Banking and Debt Management Department was used and updated by means of a website search. Finally, 51% of countries were classified based on information from the relevant websites, 46% of those are OECD countries and the remainder are countries for which a response either to the questionnaire sent out for the PDM forum, the questionnaire sent out directly to the relevant debt management authorities, or to WB's country offices[10] was not recovered. If none of the applied five information channels worked out the country was assigned a response of "No" to question (i), which excluded it from the analysis of questions (ii) and (iii). There are 21 non-OECD countries that were assigned a response of "No" in such a manner.

What concerns the regression analysis presented in section 4, the data sample employed is reduced due to unavailable data for some of the economic indicators used to explain the variation in strategies' characteristics across countries. We discuss the countries included in the regression analysis and the availability of data for estimation in section 4.2.

3 Graphical Analysis

In this section we analyze how the probability of having a public debt management strategy varies across different income groups and regions. We use the World Bank's income classification to divide countries into groups of high income, upper-middle

[10]The WB's country offices were asked to respond after a dialog with the relevant country's authorities or after a thorough assessment of the subject matter.

income, and lower-middle income.[11] Similarly, we use WB's regional classification to divide countries into regional groups of East Asia and Pacific (EAP), Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), Middle East and North Africa (MNA), South Asia (SAR), and Sub-Saharan Africa (AFR).[12] We will discuss the division of countries into groups according to their levels of indebtedness directly in section 3.3.

3.1 Comparison across Income Groups

Figure (1) shows the percentage of countries in our sample that have a public debt management strategy when looking across different income groups. Further, panel B of Figure (1) shows what percentage of strategies is made public, and what percentage of strategies is expressed in terms of a strategic benchmark as opposed to strategic guidelines when looking across different income groups.

Consider first panel A of Figure (1). As expected middle-income countries (MICs) in general fall behind the high-income countries regarding the percentage of countries which have a debt management strategy. This would support the hypothesis that more comprehensive management of public finances comes with a higher stage of economic development. However, it is interesting to observe that across the two subgroups of MICs the pattern does not hold with the same significance, i.e. that countries in the lower MIC group show similar probability of having a debt management strategy as countries in the higher MIC group. A tentative explanation might be that while MICs pursue implementation of more stable (robust) macroeconomic policies, a relatively higher improvement in this respect can be observed in the lower MICs. Nevertheless, the pattern observed in Figure (1) can be to some extent an artifact of the selected conventional income ranges to group the countries for the purpose of constructing a histogram. We explore the relationship between income levels (economic development) and the probability of a country having a strategy using regression analysis later on in this paper.

[11] Recall that low income countries are not included in this analysis.

[12] Footnote 8 provides a link to WB's website containing the list of countries in each income group and region.

The percentage of strategies that are made public across income groups shown in panel B of Figure (1) is positively linked to income levels of individual country groups. This observation implies that at higher stages of development there is more demand for transparency and accountability of public debt management, and also higher capacity to meet such demand. The next characteristic of debt management strategies plotted in panel B of Figure (1) is the percentage of strategies expressed in terms of benchmarks as opposed to guidelines. Before examining the data one can assume two alternative hypotheses. First, one would expect that expressing a debt management strategy in terms of a benchmark requires higher capacity and analytical rigor. This is due to the fact that setting numerical bounds for different types of risks consistent with prudent debt management requires comprehensive risk analysis. Also, MICs may wish to retain greater flexibility afforded by guidelines, as they are more vulnerable to shocks and changing economic environment. This is especially true in the case of developing economies that face various constraints. Second, the MICs could opt for benchmarks more than high income countries since the capacity to effectively manage public debt is rather concentrated at more senior levels so that the strategic benchmark appears to be a more efficient way of guiding the debt management staff in its daily operations. In addition, the range of risks that MICs face is broader than that of high income countries, and this relatively higher complexity of risk management proves to be better handled via benchmarks for all the risks the government wants to address. We can observe in the histogram that the probability of country using a benchmark to express its strategy is positively related to the levels of income, a finding consistent with our first hypothesis.

3.2 Comparison across Regions

We now proceed to look at the distribution of the characteristics of interest across different regions. Panel A of Figure (2) plots the percentage of strategies out of the total number of observations in different regions. Panel B of Figure (2) shows the percentage of strategies made public in each region, as well as the percentage of strategies in each region expressed as a strategic benchmark.

We can observe in panel A that the probability of an OECD country having a debt management strategy is significantly higher than the probability of a non-OECD country having a debt management strategy. This observation can again be seen as a call for higher accountability, at least operational[13], as a country reaches higher stages of development. A strategy is linked to operational accountability through a requirement to report and explain deviations of actions undertaken by debt management from those consistent with the strategy. Even though, the percentage of strategies in place reported for the high income countries does not reach 100% the implicit reference point is in fact 100% as some OECD countries without a debt management strategy show extremely low levels of indebtedness, so that having a debt management strategy is not a priority itself. In addition, some OECD countries may not have a traditional debt management strategy in face of extremely deep and liquid financial markets and stable macroeconomic policies. Consider now the regions in accord with WB's classification. We exclude SAR from our interpretations due only to 1 available observation. Out of the considered regions, ECA appears to be the leading region with the highest incidence of strategies, followed by MNA. As for the remaining regions the percentage of countries having a debt management strategy is below 50% and it is interesting to see that LAC and EAP are falling behind the MICs of Africa.

Consider now panel B of Figure (2). It is interesting to observe that not all of the strategies are made available to the public even in OECD countries, and that certain debt managers prefer a lower degree of transparency in order to preserve more room for their maneuvers.[14] For some countries the non-transparency might have different origins, though. Non-OECD countries again lag behind the OECD countries in the percentage of public strategies. However, ECA not only leads the group of WB's regions regarding the percentage of public strategies, but is as a region more

[13]In a nutshell, operational accountability amounts to reporting and explaining actions with respect to objectives, here those of debt management. See e.g. Buiter (2006) for more elaborate description of operational versus substantive accountabilility.

[14]This preference could be especially justifiable if countries face higher uncertainty and operate within a stringent accountability framework. Even public guidelines could thus be constraining in fact.

transparent that the group of OECD countries. In this respect, EAP and AFR follow after ECA while only MNA fails to cross the threshold of 50% of public strategies.

When we turn to the percentage of strategies expressed in terms of benchmarks the OECD countries dominate in this respect the non-OECD countries, see also section 3.1. From the WB's regions, ECA, followed by LAC shows the highest percentage of strategic benchmarks, a slightly lower one than the corresponding percentage for OECD countries. One could be curious whether the higher incidence of benchmarks in ECA and LAC could be attributed to a relatively higher analytical capacity for risk management in ECA and LAC in comparison with AFR, EAP and MNA.

3.3 Comparison across Levels of Indebtedness

The first row of panels in Figure (3) shows the distributions of the percentage of strategies out of total observations across country groups with different levels of indebtedness. The second row of panels in Figure (3) shows distributions of the percentage of public strategies and benchmarks out of strategies across country groups with different levels of indebtedness. The distributions are constructed using two different bases. In both cases countries were first ordered in ascending order in terms of their levels of indebtedness. The first column of panels in Figure (3) uses the ranges of indebtedness to classify countries into groups. The second column of panels in Figure (3) divides the countries into groups of an equal size. The two slightly different approaches will help us get a better picture about the distribution of the characteristics of interest across levels of indebtedness.

Consider now the first row of Figure (3) which shows the distribution of the percentage of countries with strategies. Starting from the left, we can observe that the relationship between the probability of a country having a strategy and its level of indebtedness is hump-shaped where countries with debt levels as a percentage of GDP higher than 100% have the smallest probability of having a strategy, i.e. smaller than countries with levels of indebtedness between $0-100\%$. However, countries with smallest levels of indebtedness between $0-50\%$ have lower probability of having a

strategy than countries with a medium level of indebtedness ranging from 50 to 100 percent. The second plot in the first row of panels supports the finding of a hump-shaped relationship between indebtedness and an existence of a strategy. However, the story coming from the tails of the distribution appears opposite to that from the first plot. Namely, that countries with high levels of indebtedness have still higher probability of having a strategy than countries with small levels of indebtedness.

The distribution of the percentage of public strategies across levels of indebtedness is shown in the second row of panels in Figure (3). From the first plot it appears that the relationship is rather non-linear and close to the U-shape. However, the second plot contradicts this pattern and shows a strong linear relationship between the percentage of public strategies and levels of indebtedness. This implies that the higher the indebtedness of a country the more likely is the country to be non-transparent about its debt management. We will investigate the latter relationship further using regression analysis later on in this paper to get more definite answers.

Finally, the second row of panels in Figure (3) also shows the distribution of benchmark strategies across levels of indebtedness. The left-hand side histogram suggests a hump-shaped relationship between benchmark strategies and the levels of indebtedness. The hump-shaped relationship implies that as countries are becoming more indebted they use benchmarks more often to express their strategies. However, as countries become highly indebted the use of benchmarks in debt management decreases. Although a non-linearity is also suggested by the plot on the right it follows a U-shape as opposed to a hump-shape thus completely contradicting the implications from the first plot. Again, we hope to find more conclusive insights into this relationship using regression analysis carried out in section 4.

3.4 Further Inspection of Strategic Benchmarks

In this section we further decompose the strategic benchmarks into three basic types of risk that the benchmarks can be addressing. These are namely foreign exchange (FX) risk, interest rate risk and refinancing risk. Using graphical analysis, we examine the relative weight of the three types of risk in the existing benchmarks across

different income groups, regions, and levels of indebtedness. Figure (4) plots the frequency (in percentages) with which a given type of risk is addressed in the benchmarks. Panel A of Figure (4) does so while considering different income groups, panel B different regions, and panels C and D varying levels of indebtedness. In all panels we show an average proportion of all the three different risks addressed in strategic benchmarks, denoted by "average". The latter is computed as the unweighted average of incidence with which each of the three risks is addressed in strategic benchmarks.

It appears that the average number of different risks the benchmarks in MICs address is higher than the average number for high income countries. This is mainly attributable to the fact that high-income countries are not concerned much with FX risk and refinancing risk as they have access to large and liquid debt markets usually in local currencies. It is interesting to observe that the average number of risks addressed in benchmarks by lower MICs is significantly higher than the average number of risks addressed by upper MICs. This may be again due to the fact that lower MICs are more concerned about FX and refinancing risk than upper MICs. This seems to imply that the consideration of refinancing risks in strategic benchmarks is negatively correlated with countries' income levels. This could apply to FX risk as well, however here, the relationship is possibly non-linear as upper MICs show slightly lower percentage of FX risk targets (targeted ranges) in their benchmarks than high income countries. On the other hand, interest rate risk shows rather the opposite tendency, i.e. its presence in strategic benchmarks appears to be more positively correlated with countries' income levels. For high-income countries the interest rate risk is probably the only concern given their financing opportunities, and from the point of view of MICs it is the risk that is supposedly the easiest one to manage.

Panel B looks at the distribution of the three risks addressed in strategic benchmarks using cross-region comparison. The average number of different risks addressed in benchmarks of non-OECD countries seems to be significantly larger than in the case of OECD countries. Again, the evidence shows that this is primarily due to the higher concern of the non-OECD countries about FX and refinancing risks. Neverthe-

less, the proportion of OECD countries concerned about interest rate risk dominates that of non-OECD countries. It is hard to draw any conclusions for some of the WB's regions, as AFR, MNA or even EAP, since there is only one observation available in each case. Our interpretations thus shrink to comparison of ECA and LAC. LAC seems to be leading in the average number of risks addressed in benchmarks. Moreover, once a country in the LAC region employs a strategic benchmark for debt management this benchmark is very likely to include targets (targeted ranges) for all refinancing, interest rate and FX risks. ECA seems to be most concerned about interest rate risk and the risk profile of this region thus more resembles that of the OECD countries.

Panels C and D of Figure (4) show the distribution of benchmarks addressing the three basic types of risk across levels of indebtedness. Panel C uses as the base ranges of indebtedness whereas panel D puts the countries, in ascending order according to their levels of indebtedness, into equally populated groups. We can observe that the average number of different risk addressed in the strategic benchmarks is rather negatively related to the levels of indebtedness, although panel C shows possible presence of non-linearity. Namely, the countries with levels of indebtedness between $50-100\%$ of GDP appear to use a larger number of different benchmarks than low and highly indebted countries. The incidence of refinancing risk being addressed in strategic benchmarks is strongly declining with levels of indebtedness. On the other hand, the incidence of interest rate risk being addressed in the benchmarks appears to be ambiguously related to levels of indebtedness as the story from panels C and D is very different. The relationship between levels of indebtedness and the incidence of exchange rate risk in strategic benchmarks appears to be possibly non-linear based on the evidence across panels C and D. This is since the countries with levels of indebtedness between $50-100\%$ of GDP appear to use targets (targeted ranges) for exchange rate risk most often and the countries in the range of $100\%+$ the least.

4 Regression Analysis

In this section we investigate to what extent the existence of a public debt management strategy in a country can be explained by economic indicators. We will attribute the unexplained part of the event, i.e. a country having a strategy, to political, institutional and idiosyncratic (country specific) factors. The economic indicators employed are of a general character and pertain to, for instance, the stage of economic development, macroeconomic management, indebtedness of a country, flexibility of the applied exchange rate regime, and are described in detail in section 4.1.

Ideally we would be interested in explaining the variation of the quality of debt management strategies, y_i^*, across countries, i.e.

$$y_i^* = X_i\boldsymbol{\beta} + \boldsymbol{\epsilon}_i \tag{1}$$

using economic indicators X_i. However we do not observe y_i^* instead we observe y_i which takes values of 0 or 1 according to the following rule

$$y_i = \begin{cases} 1 \text{ if } y_i^* > \overline{y}^* \\ 0 \text{ otherwise} \end{cases} \tag{2}$$

where the threshold $\overline{y}^*$is set so that the strategy has to at least consider the cost-risk trade-off when meeting government financing needs. It is also assumed that $\boldsymbol{\epsilon}_i \sim N(0, \sigma^2)$. We thus have a vector of y_i with 0 and 1 entries corresponding to a country having or not having a public debt management strategy, and an index $i = 1...81$ denoting the countries in our sample. It can be shown, see e.g. Johnston and Dinardo (2001), that the latent regression in (1) and the rule in (2) generate a PROBIT model.

We are interested in modelling the probability that y_i takes the value of 1 conditional on selected economic indicators X_i, and thus transforming $X_i\boldsymbol{\beta}$ into a probability, i.e.

$$prob(y_i = 1) = F(X_i\boldsymbol{\beta}) \tag{3}$$

where $\boldsymbol{\beta}$ is a vector of parameters and $F(\cdot)$ is assumed to be a cumulative standard Normal distribution. There are two most common alternatives to consider when choosing the functional form of F. These correspond to models of linear probability, and LOGIT. Since it appears that in vast majority of empirical cases the three models seem to produce similar answers (see Johnston and Dinardo, 2001, chapter 13), we choose to focus on the PROBIT model out of convenience[15]. This is due to the fact that unlike the linear probability model the PROBIT model restricts the fitted values to lie between 0 and 1, and we find its functional form more intuitive for our case than that of LOGIT.

4.1 Selected Economic Indicators

We now discuss the economic indicators employed as explanatory variables X_i in the PROBIT model in (3). The selection of those indicators was based on data availability to maximize the coverage of the survey data, and an agnostic approach to collecting basic economic indicators related to public debt management. The selected economic indicators include measures of economic development, the level of indebtedness and regional location in order to extend the graphical analysis of section 3. In addition, we focus on some characteristics of government borrowing such as the proportion of concessional debt, growth of government revenues approximated by GDP growth, flexibility of applied exchange rate regimes, and volatility of domestic and external shocks that may affect cashflows related to the debt portfolio or government primary balance. The volatility of shocks is mainly considered due to the aim of debt management to minimize the shocks' impact on government budget by optimizing the composition of the government debt portfolio. We now discuss the employed economic indicators in detail.

GDP per capita - this variable is used to approximate the stage of development of a country. One may expect that the higher the stage of development the higher the probability that a country has a debt management strategy. A higher stage of

[15] We still compare the estimation results from the PROBIT model to those from the LOGIT and LP models to check for possible misspecification problems.

development is thus assumed to be associated with a better institutional framework including a debt management strategy and its public availability. We used also a quadratic of this variable in the model to capture possible non-linearities, however, it appeared to be insignificant and is not reported in the estimation results. The measure of GDP per capita is the PPP converted gross domestic product from the Penn World Tables (Heston *et al*, 2006).

Indebtedness of government - increases in this variable, defined as the ratio of total government debt to GDP, should result in an effort to consolidate government finances and adopt a debt management strategy. One can also expect that if this indicator reaches high levels the government may give up on debt management and focus on debt renegotiations. Although debt renegotiations could be seen as a part of the debt management strategy we do not include them in our indicator y_i. Therefore, inclusion of a quadratic of government indebtedness into our PROBIT model can be justified. As in the case of the GDP per capita the quadratic term appeared to be insignificant and is not reported in the presented estimation results. The total debt-to-GDP ratio was obtained from the GDF & WDI Central database of the World Bank and the EIU database.

Government share of GDP - this variable is used to approximate the importance of public sector (government) in economic performance of a country. One may expect that a larger share of government on real GDP would result in a greater effort to stabilize government finances in the sake of greater macroeconomic stability. Similarly, if government actions are important for an economy the public will require higher transparency and accountability from the government. Existence of a public debt management strategy is thus deemed to represent increased efforts of the government to stabilize its finances and meet the requirement of the public for higher transparency and accountability. The measure used here is the government's share on real GDP from the Penn World Tables (Heston *et al*, 2006).

Degree of government debt concessionality - this variables is used to capture the percentage of government debt financed by means of concessional resources, e.g. from multilateral and bilateral donors. We assume that the higher the concessional share of government debt the lower the incentive for the government to adopt a strategy

addressing cost-risk trade-offs in financing decisions, most importantly decisions on debt composition. This indicator may appear to be perfectly correlated with GDP per capita, in fact the correlation is estimated to be -0.55. Although the correlation can be regarded as high an exclusion of the degree of concessionality from the regression for strategies was rejected. We use the ratio of concessional debt to total external debt to approximate this indicator. This measure was obtained from the GDF & WDI Central database of the World Bank.

Internal macroeconomic management - the standard deviations of CPI inflation and GDP growth are used to capture quality of internal macroeconomic management. Since price stability is the basic objective and goal of monetary policy we find the standard deviation of inflation indicative of the quality of internal macroeconomic management. Also, the monetary and fiscal policies aim at smoothing fluctuations in economic performance, the economic growth cycle. We again draw the link from sound and successful macroeconomic policy of a government to its likely engagement in sound practice regarding public debt management. However, also in this case the argument can be posed differently. Namely, that the success of a sound macroeconomic policy will depend on the institutional set up of the economy, such as e.g. wage negotiation mechanisms or capital adequacy requirements for firms, that determines the pass-through and size of domestic shocks. Although, the government can influence the institutional set up in the long run, facing larger domestic shocks can lead to adoption of more advanced instruments for public debt management. The CPI inflation and GDP growth series were obtained from the GDF & WDI Central database of the World Bank.

Flexibility of exchange rate regimes - we use the standard deviation of the change in the exchange rate to approximate this indicator. The lower the standard deviation the lower the flexibility of an exchange rate regime. However, varying volatility of exchange rates across countries is also attributable to varying impacts or sizes of external shocks. This would be certainly the case if one dealt only with floating exchange rate regimes. In order to condition on the external shocks we employ other variables such as volatility of current account or the terms of trade, see below. The standard deviation of exchange rate is computed using the exchange rate series from

the Penn World Tables (Heston *et al*, 2006).

External macroeconomic management - we use the standard deviation of the current account-to-GDP ratio (CA/GDP) to approximate this indicator. It may appear that the actual exchange rate deviates from the equilibrium exchange rate that brings the economy to external balance. This is especially true in the case of less flexible exchange rate regimes present in our sample. If the external macroeconomic management (policies) are poor, i.e. there are frequent or large deviations of the actual exchange rate from its equilibrium, this will result in higher variability of external balances, measured here by CA/GDP. We use the quality of external macroeconomic policies as one of the indicators of the overall quality of general government policies and draw a link to the quality of public debt management - existence of a debt management strategy. To set an alternative hypothesis, one may argue that whatever the external policy its success, as measured by the standard deviation of CA/GDP here, depends on the magnitude and frequency of external shocks such as those to the terms of trade and capital flows. Further, one may extend this argument and assume that the higher the importance (impact) of external shocks the more likely is a country to adopt better instruments for public debt management, such as a debt management strategy. The series of CA/GDP was retrieved from the GDF & WDI Central database of the World Bank.

Management of foreign reserves - we measure the quality of management of foreign reserves using the coefficient of variation in the stock of FX reserves-to-imports ratio. Since management of foreign reserves is part of the financial management of the consolidated government balance sheet we assume that its quality can be positively linked to the quality of public debt management. This is especially true if there exist a high degree of coordination between monetary policy and debt management. The series of FX reserves as a percentage of imports was taken from the GDF & WDI Central database of the World Bank.

Volatility of official transfers - more specifically we use the coefficient of variation for net official current transfers. This indicator is employed to approximate the exogenous volatility (risk) in foreign aid that developing countries may face. This volatility may force countries to take some precautionary actions which may include

creation of a buffer stock of finances to smooth out the volatility. Increases in the required offsetting financing could make the country acknowledge the need for a debt management strategy. On the other hand, if the volatility in foreign aid is disrupting the financing plans of the government at some point it could undermine the efficient continuation of a debt management strategy. The series of net official transfers was taken from the GDF & WDI Central database of the World Bank.

Regional dummy variables - we include also regional dummies into the regression to explore the possibility that the existence of a strategy is dependent on the region a country belongs to. The regional classification corresponds to that used throughout the graphical analysis in section 2.[16] When constructing the regional dummy variables we take as a base the LAC region due to the highest number of available observations.

All indicators were calculated using available annual data covering the period from 1990 to 2006.

4.2 Estimation Results

This section reports and discusses the results of PROBIT model estimation. Recall that by using the PROBIT model we try to explain the probability of a country having a public debt management strategy using selected economic indicators discussed in section 4.1. The maximization of the log-likelihood of the PROBIT model[17] is carried out using the Berndt-Hall-Hall-Hausman algorithm. The inference is based on the quasi-maximum likelihood (QML) standard errors due to Huber and White[18]

[16] We have tried to insert a regional dummy taking 1 if the country was an OECD country and 0 otherwise, but this dummy appeared to be insignificant and was dropped from the estimation. This is most likely due to its colinearity of 0.87 with the income levels of the countries.

[17] The log-likelihood function is of the form:

$$l\left(\frac{\boldsymbol{\beta}}{\sigma}\right) = \ln\left(L\right) = \sum_{i}\left\{y_i \ln\left[\Phi\left(X_i\frac{\boldsymbol{\beta}}{\sigma}\right)\right] + \left(1-y_i\right)\ln\left[\Phi\left(X_i\frac{\boldsymbol{\beta}}{\sigma}\right)\right]\right\}$$

where Φ is standard Normal cumulative distribution and σ is the standard deviation of the unobserved shock in the regression underlying the PROBIT model, see e.g. Johnston and Dinardo for further details.

[18] The QML variance covariance matrix is computed as

which are robust to general misspecification of the conditional distribution of y_i. As a check for possible misspecification problems we estimate the LOGIT and LP models for y_i using the same set of explanatory variables. The sample used for estimation includes 81 countries, shown in Table (3) for which data on the employed economic indicators were available. 29 of the countries included in the regression are OECD countries, 7 of them from AFR, 6 from EAP, 19 from ECA, 19 from LAC, and 8 from MNA.[19] The results are reported in Table (1).

The estimation results are broadly consistent across the PROBIT, LOGIT and LP models so that there seems to be no obvious signs of misspecification problems. PROBIT and LOGIT show significantly better fit than the LP model and the estimated coefficients from those models are generally more significant than the estimated coefficients from the LP model.[20] The selected economic indicators can explain about 40% of the incidence when a country has a strategy, and appear to be jointly highly significant. We attribute the unexplained part to political, institutional and country-specific factors. We now discuss the effects of individual variables.

We find significant evidence that as the GDP per capita in the country grows, there is a higher probability that the government will have a public debt management strategy. Also, the level of indebtedness shows significantly positive relationship with the probability of an existing strategy. This implies that as countries get more indebted they put more weight on effective debt management where a strategy document is the basic building block.

The coefficient attached to the share of government on GDP is negative but statistically indifferent from zero. So that increasing importance of government in economic performance of a country does not seem to increase the probability of a

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$$var_{QML}\left(\widehat{\boldsymbol{\beta}}\right) = \widehat{H}^{-1}\widehat{g}\widehat{g}'\widehat{H}^{-1}$$

where $\widehat{H}$ and $\widehat{g}$ are the gradients (scores) and Hessian of the log likelihood evaluated at the ML estimates.

[19] None of the countries from SAR happend to be included in the regression.

[20] Note that the coefficients from the PROBIT and LOGIT model cannot be interpreted as marginal effects of an explanatory variable on the dependent variable as in the case of the LP model. In the case of PROBIT and LOGIT the marginal effect varies with the level of the explanatory variable.

present debt management strategy.

The increasing degree of governments debt concessionality appears to significantly decrease the probability of a country having a debt management strategy. Therefore reliance of a country on multilateral and bilateral donors may act as an disincentive for adopting sound public debt management practice.

On the other hand, higher flexibility of an exchange rate regime seems to increase the probability of a country adopting a debt management strategy. This is due to the fact that under an exchange rate float the country has to deal with FX risk explicitly and cannot rely on the central bank to defend the fixed exchange rate parity as its intermediate policy target. In fact, with increasing flexibility of an exchange rate regime the opportunity for government to contract out some part of the FX risk to the central bank decreases.

The significantly negative coefficient attached to the standard deviation of CA/GDP offers the interpretation that the higher the external macroeconomic vulnerability the lower the probability of sound public debt management policy. In other words, as the volatility of external balances increases the probability of a country having a debt management strategy decreases.

The effectiveness of FX reserves management seems to increase the probability of a country having a debt strategy. Successful management of FX reserves can thus be seen as a positive externality for public debt management, especially if coordinated with the public debt management. Increasing variations in official transfers, yet another type of an external shock that developing countries can face, appear to have a significant negative effect on the probability of a country having a debt management strategy.

Finally, it is interesting to observe that if a country is located in the ECA region its probability of having a debt management strategy increases significantly. This is not true of the other regions considered.

4.3 Extension to Public and Benchmark Strategies

In this section we extend the regression analysis to the binary variables distinguishing between public debt management strategies made available to the public and those not available to the public, and further between strategies formulated in terms of benchmarks and those in terms of guidelines. We thus try to explain two additional binary variables y_i^P and y_i^B defined as

$$y_i^P = \begin{cases} 1 \text{ if strategy made public} \\ 0 \text{ if strategy not public} \end{cases} \qquad y_i^B = \begin{cases} 1 \text{ if strategic benchmark} \\ 0 \text{ if guidelines} \end{cases} \tag{4}$$

Again we opt for the PROBIT model[21] when investigating to what extend can y_i^P and y_i^B be explained by selected economic indicators X_i. Since the number of observations in our sample available for estimation changes noticeably due to a differing number of observations available for each explanatory variable we resort to the specific-to-general approach to build up the final models estimated for y_i^P and y_i^B. We start with GDP per capita and add on other relevant variables according to their significance while maximizing the coverage of the survey data. We first discuss some additional variables that appear in the PROBIT model for y_i^P and y_i^B , and which were not significant when used to explain existence of a strategy, i.e. y_i.

GDP growth - when economy performs well and is experiencing higher growth rates of GDP the government may be more willing to become transparent about its actions and decisions. This argument implies that with higher GDP growth government's capacity in meeting public's demand for higher transparency in public debt management grows as well. The series of GDP growth was obtained from the Penn World Tables (Heston *et al*, 2006).

Terms of trade volatility - this variable captures the intensity of real external shocks that hit the economy. Higher risk of real external shocks, as measured by the standard deviation, creates a genuine dilemma for country authorities of whether to

[21] We have carried out the estimation using LOGIT and LP models as well to check on any mispecification problems. We did not detect any. The estimation results are available from the author.

engage in relatively more accountable frameworks. This is due to the fact that more intense real external shocks make even operational accountability more burdensome, and therefore does not necessarily imply a reluctance of country authorities to be accountable. Following this argument one can expect that higher terms of trade volatility can result in inclination towards debt management guidelines rather than strategic benchmarks for debt management. The series was acquired from the GDF & WDI Central database of the World Bank.

The estimation results for the PROBIT models of y_i^P and y_i^B are reported in Table (2). The respective log-likelihoods were again maximized using the BHHH algorithm and the inference is based on Huber-White QML standard errors.

The estimation results in Table (2) indicate that the probability of a strategy being available to the public can be from about 21 percent explained by selected economic indicators. Similarly, the probability of a strategy being expressed in terms of a strategic benchmark, rather than strategic guidelines, can be from about 47 percent explained by selected economic indicators, a percentage significantly higher than in the case of public strategies. The unexplained part of the probability that $y_i^P = 1$ or $y_i^B = 1$ is attributed to institutional, political and idiosyncratic factors. We now proceed to a more detailed discussion of our results.

Consider first the estimation results for y_i^P in the first column of Table (2). We find that the level of GDP per capita, the level of indebtedness and the average growth rate do not seem to be important in explaining a country's decision to make its debt management strategy public. Further, variations in economic growth seem to negatively impact on the probability of a strategy being made public, however, this impact is not significant at common levels. On the other hand, increasing volatility of domestic prices, as measured by CPI, significantly affects the probability of a strategy being public. This result could be related to the effect of volatility of inflation on the uncertainty pertaining to government revenues. The government in defence of its strategy and for the sake of accountability prefers to make its debt management strategy available to the public so that the effect of an unexpected shortfall in government revenues and the effect of volatile prices on financing premiums are

apparent. Furthermore, increasing standard deviation of the exchange rate seems to be positively influencing the decision to make a debt management strategy public. More flexible exchange rate regimes are often associated with more advanced macroeconomic policy, such as e.g. inflation targeting, the peer pressure within government institutions can result in more transparent public debt management. Volatility of the terms of trade seems to have a significant negative effect on the probability of a strategy being public. If a government is relatively more dependent on tax revenues from tradeable goods and/or its revenues are directly linked to the country's exports, such as commodities, larger shocks to government revenues could make government reluctant to publish its strategy and later be forced to publicly modify it. Variations in CA/GDP seem to be positively related to the probability of making strategy public, though not at common significance levels. When looking over the regional dummies we find that if a country belongs to the ECA region it has significantly higher probability of having made its strategy public. This is not true of the remaining regions.

Consider now the estimation results for y_i^B in the second column of Table (2). The effect of GDP per capita on the probability that $y_i^B = 1$, i.e. a strategy is expressed as a strategic benchmark rather than guidelines for debt management, appears to be negative. This would imply that developed countries do not favour strategic benchmarks. This may be due to the fact that they face only a certain type of risk, most commonly interest rate risk, and even operational staff shows relatively high capacity for managing this risk, so that the relatively strict and more explicit guidance of a strategic benchmark is not necessary. The level of indebtedness appears to be positively related to having a strategic benchmark, however, this effect is not statistically significant at common levels. The results suggest a negative effect of average GDP growth on the probability of a benchmark-type strategy. Tentatively and in relation to developing countries, higher average GDP growth over the period 1990-2006 may indicate less disruptions of macroeconomic performance due to crises episodes and thus the need of addressing basic risks explicitly is not seen as so beneficial. On the other hand, developed countries experience relatively lower average growth rates compared to developing countries which might not have the necessary

analytical capacity to derive benchmark targets. Increasing variation in inflation does not seem to affect the probability of using strategic benchmarks. Higher flexibility of applied exchange rate regimes seems to imply lower probability of a benchmark debt strategy. This result is somewhat puzzling unless one wants to acknowledge the influence of more developed economies on this finding, as most of these apply some type of a floating exchange rate regime and often use guidelines for debt management. Also, the terms of trade volatility impact negatively on the probability of using a strategic benchmark. If developing countries are often hit by large external shocks it may be hard for them to set a conventional benchmark with rather well-defined ranges for selected types of risks. Volatility of CA/GDP appears to be insignificant in explaining the use of strategic benchmarks. Further, governments appear to be less in favor of using strategic benchmarks for debt management once facing increasing variation in official transfers (foreign aid). Increasing variation in official transfers can be seen as a specific kind of an external shock that again results in the lower use of benchmark targets (ranges) for management of the basic types of risk. Finally, when looking across the coefficient estimates attached to regional dummies we find that if a country belongs to the MNA region it has significantly lower probability of using a benchmark strategy.

5 Conclusion

This paper analyzed survey data on public debt management strategies across income groups, regions and levels of indebtedness using graphical tools. Further, regression analysis was carried out to extend the graphical analysis and condition on more economic indicators possibly relevant for public debt management. More specifically, the graphical and regression analyses were focused on explaining how the incidence of (i) public debt management strategies, (ii) the published strategies and (iii) strategic benchmarks varies across income groups, regions, levels of indebtedness and other economic characteristics.

We found that a higher level of income in a country appears to increase its probability of having a debt management strategy. The level of indebtedness seems to

be also positively correlated with the incidence of a strategy where the graphical analysis indicated that the relationship could be non-linear. The latter would imply that as a country becomes more indebted it aims at increasing the quality of debt management, however, after reaching high levels of indebtedness it gives up on debt management and possibly engages in debt renegotiations and focuses on debt sustainability issues. Across the World Bank's regions, Europe and Central Asia appears to stand out in regards to the incidence of strategies. Concerning other factors, the degree of debt concessionality appears to significantly decrease the probability of having a strategy, and so does the volatility of external shocks.

In regards to making strategies public, it appears from the graphical analysis that their incidence is slightly positively related to the income levels, however, the regression analysis finds this effect insignificant. The public strategies seem to be also unrelated to the level of indebtedness. From the regional perspective, it is Europe and Central Asia, followed by East Asia and Pacific, and Sub-Saharan Africa, that leads in terms of transparency (incidence of public strategies) and outperforms in this respect even OECD countries as a group. Concerning other factors, the volatility of domestic and external shocks seems to significantly affect the probability of a present public strategy. In general, the degree to which we can explain the incidence of public strategies is rather low compared to the incidence of strategies and strategic benchmarks.

Incidence of strategic benchmarks seems to be slightly positively correlated with income levels, however, when conditioning on other economic indicators we found a significant negative effect of GDP per capita on a strategy being expressed in terms of a benchmark. The relationship between benchmark strategies and levels of indebtedness appears slightly positive but not significant at common levels. Europe and Central Asia, and Latin America and the Caribbean appear to have the highest incidence of benchmarks among the World Bank's regions. When conditioning on other economic factors we find that countries from the Middle East and North Africa have significantly lower probability of using benchmark strategies compared to other regions. Further economic factors which significantly affect the incidence of a benchmark strategy include average GDP growth and volatility of external shocks,

with a negative effect on benchmarks incidence, and volatility of domestic shocks, with a positive effect on benchmarks incidence.

As mentioned in the introduction, we see this paper as a first attempt to characterize the variations in the survey data on public debt management strategies across countries where establishing a regularly repeated survey would be incredibly beneficial. The follow-up surveys on public debt management strategies could extend the coverage to all low income countries, and focus on distinguishing between implicit and formal strategies by structuring the applied questionnaire accordingly. Although the present work is intended to provide the opportunity for public debt managers to compare themselves to their peers or countries at a similar stage of development, some policy implications could be derived from a similar analysis in the future. In this respect inclusion of some institutional variables would be desirable. Examples could include the number of institutions responsible for public debt management in a given country, the degree of central bank independence, existence of a medium-term expenditure framework, or the degree of transparency of measures concerning domestic macroeconomic policies.

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Table 1: Estimation Results - PROBIT Model for Existing Strategies

	PROBIT		LOGIT		LP	
Variable	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
GDPpc_i	$6.7E$-5	0.0403	0.0001	0.0342	$1.6E$-6	0.8470
Indebt_i	0.0139	0.0421	0.0232	0.0536	0.0019	0.1902
GovShare_i	−0.0269	0.2931	−0.0414	0.3557	−0.0065	0.3558
$(\text{ConsDebt/TotDebt})_i$	−0.0216	0.0962	−0.0329	0.1485	−0.0085	0.0480
$stdev\,(\text{inf})_i$	−0.0004	0.4686	−0.0007	0.5427	$-9.7E$-5	0.6654
$stdev\,(\text{growth})_i$	−0.0649	0.2863	−0.1134	0.2721	−0.0182	0.3182
$stdev\,(\text{ER})_i$	$2.2E$-6	0.1137	$4.4E$-6	0.1261	$2.5E$-7	0.3143
$stdev\,(\text{CA/GDP})_i$	−0.1694	0.0241	−0.3008	0.0264	−0.0222	0.0672
$stdev\,(\text{FXRes/IM})_i$	3.8911	0.0262	7.0172	0.0451	0.5549	0.0467
$\text{coefvar}(\text{OfficTrans})_i$	−0.2400	0.0003	−0.4093	0.0007	−0.0133	0.2825
constant	−0.0231	0.9789	−0.3039	0.8330	0.7743	0.0035
dummy-AFR_i	−0.2648	0.6601	−0.5079	0.6290	−0.0239	0.8837
dummy-EAP_i	0.3947	0.5806	0.7235	0.5543	0.0336	0.8885
dummy-ECA_i	1.2259	0.0704	2.0451	0.0965	0.2284	0.1330
dummy-MNA_i	0.4327	0.5740	0.7880	0.5771	0.1288	0.5920
McFaddens R-squared	0.4039	–	0.3973	–	0.3583	–
No. of Countries	81	–	81	–	81	–
Dependent Variable = 1		57	Dependent Variable = 0			24

Table 2: Estimation Results - PROBIT for public strategies and benchmarks

	Dep.Var. y_i^P		Dep.Var. y_i^B	
Explanatory Variable	Coefficient	p-value	Coefficient	p-value
GDPpc_i	$1.4E$-5	0.6618	-0.0001	0.0228
Indebt_i	-0.0010	0.8748	0.0132	0.1462
Growth_i	0.1566	0.3299	-0.5149	0.0107
$stdev\,(\text{Growth})_i$	-0.1402	0.1568	0.4840	0.0140
$stdev\,(\text{inf})_i$	0.0014	0.0165	$-2.7E$-5	0.9627
$stdev\,(\text{ER})_i$	$1.9E$-6	0.0435	-0.0015	0.0032
$stdev\,(\text{tot})_i$	-0.1339	0.0060	-0.2324	0.0047
$stdev\,(\text{CA/GDP})_i$	0.1525	0.2200	-0.0789	0.6736
$\text{coefvar(OfficTrans)}_i$	na	na	-0.7288	0.0015
constant	0.4155	0.6421	2.6197	0.0471
dummy-AFR_i	1.3422	0.1840	-0.7743	0.4391
dummy-EAP_i	0.7398	0.3510	1.6985	0.1584
dummy-ECA_i	1.5153	0.0228	-0.7142	0.4200
dummy-MNA_i	0.4929	0.4975	-4.3164	0.0024
McFaddens R-squared	0.2055	–	0.4679	–
No. of Countries	60	–	58	–
Dependent Variable = 1	42	–	28	–
Dependent Variable = 0	18	–	30	–

Table 3: A list of countries included in regression analysis

ALBANIA	CANADA	FINLAND	JORDAN	NORWAY	SWAZILAND
ALGERIA	CHILE	FRANCE	KAZAKHSTAN	PANAMA	SWEDEN
ARGENTINA	CHINA	GABON	KOREA	PARAGUAY	SYRIAN ARAB REP.
AUSTRALIA	COLOMBIA	GERMANY	LATVIA	PERU	THAILAND
AUSTRIA	COSTA RICA	GREECE	LEBANON	PHILIPPINES	TRINID. & TOBAGO
AZERBAIJAN	CROATIA	GUATEMALA	LITHUANIA	POLAND	TUNISIA
BELARUS	CZECH REP.	HUNGARY	LUXEMBOURG	PORTUGAL	TURKEY
BELGIUM	DENMARK	ICELAND	MACEDONIA	ROMANIA	UKRAINE
BELIZE	DOMINICAN REP.	INDONESIA	MALAYSIA	SEYCHELLES	UNITED KINGDOM
BOLIVIA	ECUADOR	IRELAND	MAURITIUS	SLOVAK REP.	UNITED STATES
BOSNIA & HERZ.	EGYPT	ISRAEL	MEXICO	SLOVENIA	VENEZUELA
BOTSWANA	EL SALVADOR	ITALY	MOROCCO	SOUTH AFRICA	
BRAZIL	EQUAT. GUINEA	JAMAICA	NETHERLANDS	SPAIN	
BULGARIA	ESTONIA	JAPAN	NEW ZEALAND	ST. VIN. & GREN.	

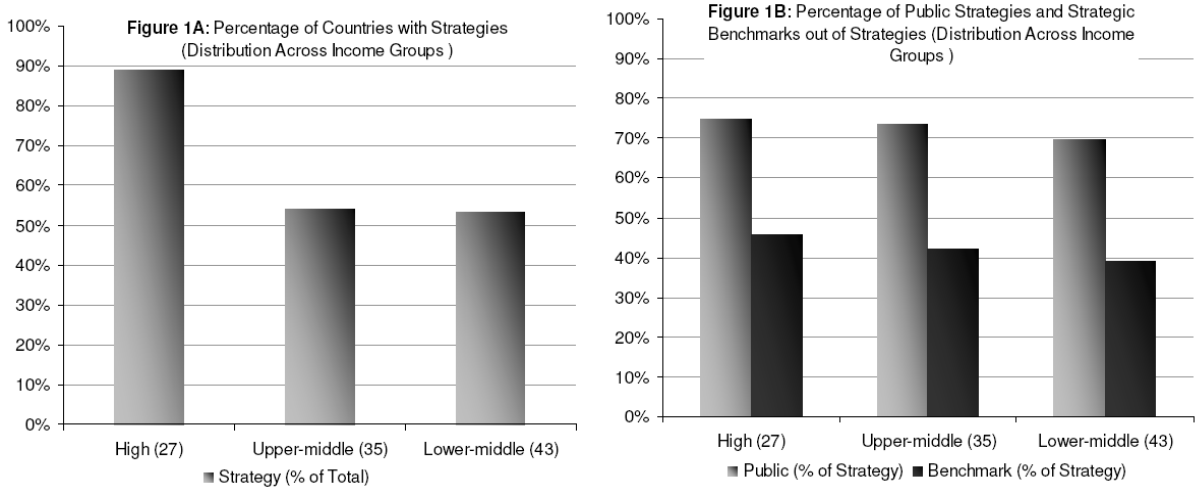

Figure 1: Distribution of the Percentage of Countries with Strategies, and the Percentage of Public Strategies and Strategic Benchmarks out of Strategies Across Income Groups

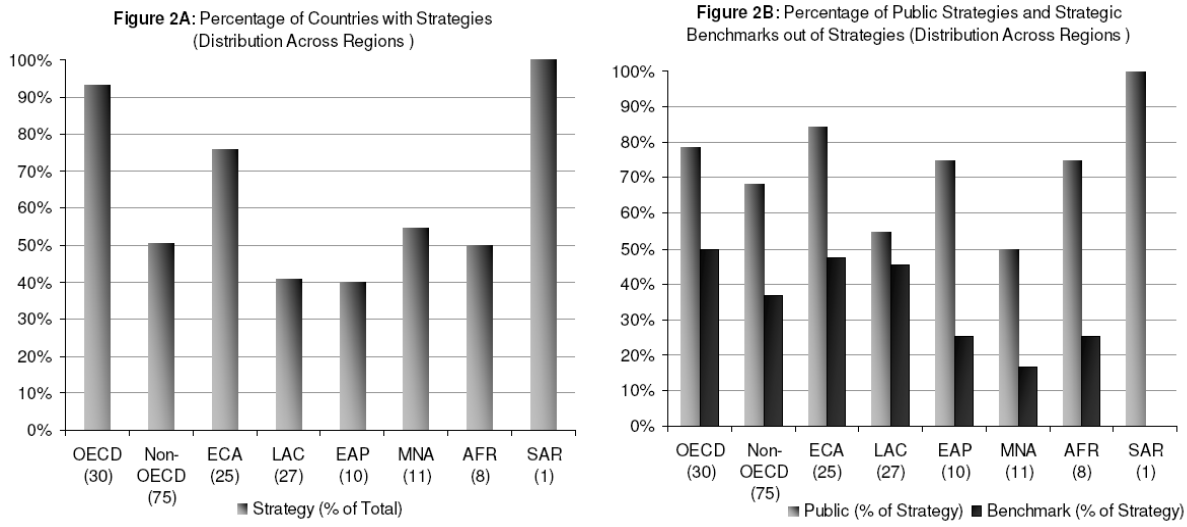

Figure 2: Distribution of the Percentage of Countries with Strategies, and the Percentage of Public Strategies and Strategic Benchmarks out of Strategies Across Regions

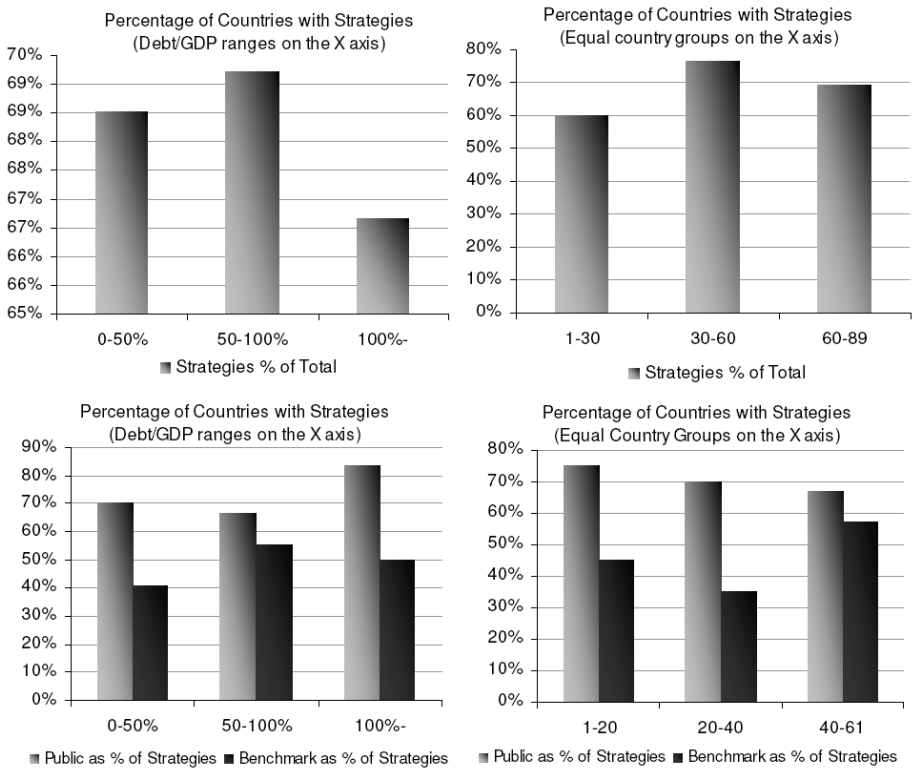

Figure 3: Distribution of the Percentage of Countries with Strategies, and the Percentage of Public Strategies and Strategic Benchmarks out of Strategies Across Levels of Indebtedness

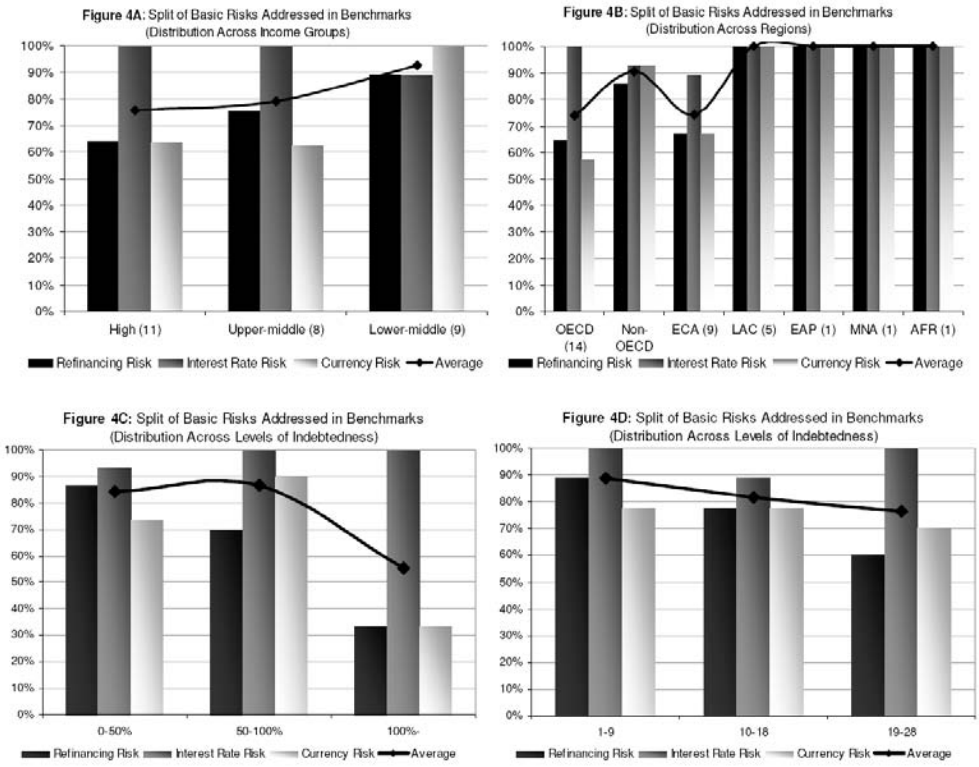

Figure 4: Distributions of the Basic Types of Risk Addressed in Benchmarks Across Income Groups, Regions and Levels of Indebtedness

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