



"Determinants of Budget Projection Errors in Latin America and the Caribbean"

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Abstract

This paper analyses the effects of two relatively new budget institutions, a Treasury Single Account and a Medium-Term Fiscal Framework, on government budget projection errors. We use a new data set covering a panel of 30 Latin American and Caribbean countries for the years 2010-2014. Our empirical findings show that improvements in these budgetary institutions are associated with a lower probability of having expenditure projection errors as well as with lower levels of both expenditure and revenue projection errors. Other macro-fiscal and political variables such as the economic growth rate, the ratio between government expenditure and GDP, the inflation rate, and the President's election year are also significant determinants of the projection errors.

Resumen

Este trabajo analiza empíricamente la influencia de dos instituciones fiscales relativamente recientes, la Cuenta Única del Tesoro y el Marco Fiscal de Mediano Plazo, sobre los errores de pronóstico de los presupuestos públicos. Se utiliza un nuevo conjunto de datos que incluyen 30 países de América Latina y el Caribe para el periodo 2010-2014. Los resultados empíricos muestran que mejoras en estas instituciones fiscales se asocian con una menor probabilidad de observar errores de pronóstico de gastos como, además, observar menores magnitudes tanto de los errores de pronóstico de los gastos como de los ingresos fiscales. Otras variables macro fiscales y políticas también ayudan a explicar significativamente los errores de pronóstico: la tasa de crecimiento, el gasto público en porcentaje del producto, la tasa de inflación y el año en el que se realizan elecciones para Presidente.

1. INTRODUCTION

The influence of political and institutional factors on the overall fiscal balance is a current topic of research and analysis. Two approaches, which are not mutually exclusive, are often used to explain this influence (von Hagen, 1998). The first, focusing on government weakness associated with a high degree of political polarization, unstable governments and the existence of coalitions between different parties or involving transitory alliances, was first espoused by Roubini and Sachs (1989), Roubini (1991), and Alesina and Perotti (1995). The second, emphasizing institutional factors relating to the context in which fiscal decisions are adopted in the framework of the political economy of the budget process, was initially put forward in papers by von Hagen (1998) and von Hagen and Harden (1995).

This paper provides an empirical analysis of the influence of two relatively new budget institutions, the medium-term fiscal framework (MTFF) and the Treasury single account (TSA), which have become widely used in Latin American countries in the past decade. We use a new fiscal data set covering a panel of 30 Latin American and Caribbean countries and Canada for the years 2010-2014. We also use data from two recent publications of the World Bank and of the Inter-American Development Bank and International Monetary Fund. The first quantifies the progress countries have made with the implementation of MTFFs (World Bank, 2013) and the second does the same for the TSA (Fainboim et al., in Pessoa and Pimenta, 2015).

In addition to our innovation in terms of the databases mentioned, we have also introduced a new dependent variable. As indicated by Kontopoulos and Perotti (1999), empirical analyses of the influence of institutional and political variables on fiscal aggregates have used fiscal policy variables, including expenditure, revenue, the deficit and debt, as dependent variables. Until the publication of Kontopoulos and Perotti's paper, almost all empirical studies focused on the fiscal deficit as an explanatory variable. As the authors point out, there are important theoretical motivations that make it useful to analyze the determinants of expenditure separately from the determinants of fiscal revenues. Not least, this makes it possible, for example, to identify the effects of political fragmentation, which, according to the theory, operates through expenditure and does not necessarily impact fiscal deficits. Similarly, disaggregating revenue and expenditure provides a better platform than focusing on the deficit to detect channels of transmission of institutional and political variables.[‡]

In this sense, our paper differs from the literature in that it focuses on budget projection errors as the central analysis and explanatory variable. By projection errors we mean the difference between the executed fiscal aggregates and the fiscal aggregates included in the budget covering the fiscal year in which those aggregates are executed. Two fiscal aggregates are used: total revenue and total expenditure. The budget projection errors are useful for

[‡] Kontopoulos and Perotti, pp. 88.

analyzing fiscal policy in two important ways: first, the broad budget coverage of expenditures mandated by the organic budget laws; and second, the *de jure* (legal fiscal rules) or *de facto* limitations (showing deficits *ex ante* is seen as politically counterproductive) on presenting constrained deficit levels in the budget laws.

In Latin America and the Caribbean, almost all countries have organic budget laws or fiscal accountability laws that delineate the expenditure process in the budget, with extra-budgetary expenditure being a relatively less important factor than in countries outside the region.⁵ In most countries, this legislation makes the execution of expenditure that does not have a corresponding budgetary appropriation an offense, in some cases even a criminal offense. This means that there must be a budget line item for every expenditure commitment.

At the same time, governments face restrictions created by (some) fiscal rules or political concern for showing deficit levels in the draft budget that are compatible with the requirements of the political negotiations in the cabinet and legislature or with private sector fiscal austerity concerns. Two different budgetary approaches can be taken in such circumstances. On the one hand there are countries with a top-down budgetary process, in which the Ministry of Finance calculates the aggregate expenditure level compatible with macro-fiscal stability and communicates budgetary ceilings to the line agencies. The ceilings are defended in the dialogue with the legislature and incorporated in the approved budget. In other countries a bottom-up process prevails, in which line agencies prepare their budgets without being inhibited by institutional restrictions or in which the Legislative Branch increases the budget proposed by the Executive Branch, both when it approves the budget and in budget amendments throughout the year.

Both aspects mentioned—the broad coverage of expenditure in the budget and the political need to limit fiscal deficits—create differing scenarios for budgetary procedures. In the top-down approach, the projected level of income and the aggregate ceiling on expenditure determine a single level for the fiscal deficit. In a bottom-up approach, in contrast, a particular *ex ante* fiscal deficit is compatible with infinite levels of budgetary revenue and expenditure.

These budgetary procedures are reflected in budget projection errors. A budget that is based on realistic projections, with solidly financed aggregate expenditure, and that is prepared using a top-down approach can be expected to have smaller projection errors than an unrealistic, partially financed budget.

The literature has assigned particular importance to projection errors. Frankel (2011) analyzes growth rate and fiscal balance projections for 33 government agencies and concludes that projections on average are positively skewed and that such over-optimism in the

⁵ Many countries in Central America and the Caribbean incorporate the financial public sector (including the central bank) in the budget. Moreover, the organic laws of many countries make it mandatory to include government contributions to trust funds and other extrabudgetary entities in the budget.

projections can help to explain fiscal deficits. Von Hagen (1998) argues that weak finance ministries can be tempted to manipulate fiscal data, concealing revenue and skewing tax collection projections downward in order to contain expenditure demands. Poterba and von Hagen (1999) assert that it is crucial that the fiscal targets be established at the very beginning of the budget process, that these initial agreements not be changed by legislative amendments, and that the monitoring of the fiscal and treasury (cash) operations of the line agencies be rigorous to avoid noncompliance with the initial budgetary agreement.

For their part, Alesina and Perotti (1999) note that it is a common practice to adopt excessively optimistic projections for the macroeconomic variables in order to overstate revenue and underestimate expenditure, so that at the end of the year having additional unexpected fiscal deficits can be attributed to “bad luck.” The authors also warn against the strategic use of budget protections. They note that the baseline scenario is key and that by inflating this scenario politicians can purport to show fiscal prudence without having to impose a real cost on the electorate. This approach creates a fiscal illusion: they appear to be fiscally responsible by appearing not to have to reduce expenditures that benefit the voters. Stein, Talvi and Grisanti (1999) maintain that a government that wishes to hide a deficit will have an incentive to overestimate the economic growth rate. They also note that, conversely, a conservative finance minister would wish to conceal fiscal revenues from his or her colleagues in the cabinet and the legislature.

During the period analyzed in this paper (2010-2014), a total of 22 countries showed revenue and expenditure projection errors in at least 4 of the 5 years by more than 2 percent of budgetary execution. Half of them, 11 countries, recorded overestimates of both revenue and expenditure, one country had revenue overestimates and expenditure underestimates, one country recorded underestimates of both revenue and expenditure, 2 countries showed overestimates of expenditure, another 2 recorded underestimates of expenditure, 2 had overestimates of revenue and 3 showed underestimates of revenue (Table 7). The reality thus varies and since most of the countries studied overestimated revenues, as the literature clearly shows, our aim in this paper is to understand the determinants of those projection errors.

2. THE LITERATURE ON THE QUALITY OF FISCAL PROJECTIONS, THEIR CAUSES AND CONSEQUENCES

This section presents a summary of the empirical literature on projection biases, possible explanations for these biases, and their impact on finances and financial management. While the literature on these topics has been growing rapidly since the 1990s, there is much less research on the projections made by the fiscal authorities in developing and emerging countries (with the exception of Chile). Among the many reasons mentioned are the limited data available and the fact that some of the key emerging economies only became more transparent in their budgets after the crisis in the 1990s.

The studies carried out to date can be classified in at least four groups. First, there are studies of the statistical characteristics (quality) of the projections and other technical aspects. These include, in particular, analysis of the rationality of the projections, understood as an absence of bias, and their efficiency (i.e., whether they use all of the data available). The second group consists of works that focus on the existence of optimism in the projections of the *variables that determine revenue* (particularly optimism in the GDP growth projections).

Third, we can mention analyses of the political influences on revenue projections, which can be classified in turn as: (i) the political economic cycle; (ii) the theory of political parties or the partisan theory; (iii) the effects of political fragmentation; and (iv) the impact of reelection prospects. The fourth group consists of studies focusing on the effects of fiscal rules (e.g., the Stability and Growth Pact (SGP) in the European Union and the particular rules in individual countries) and the existence of independent agencies that prepare the projections (or issue a nonbinding opinion on the quality of those projections). Finally, there are various analyses on the consequences of projection errors for the fiscal balance, the effects of forecasting practices on the preparation of the projections, and the implication of the institutional configurations of the budget process for revenue projections. This section summarizes the results obtained and is organized according to the groups mentioned (Frankel, 2011).

a. Technical aspects of projections: absence of bias and efficiency

The empirical literature in this case focuses more on the quality of the revenue projections than on other fiscal variables. Most of the existing studies focus on technical aspects, such as the existence of rationality in the projections. Auerbach (1994) found that the official projections of the United States were overly optimistic in the decade prior to 1993, while Auerbach (1999) found a tendency for the U.S. Office of Management and Budget (OMB) to overestimate revenue in its half yearly projections from 1986 to 1993, but detected a trend to underestimate in the subsequent period (1993-1999). McNab et al. (2007) found that the OMB's one-year U.S. fiscal revenue projections were biased during the period 1963-2003. They suggest that the bias could be strategic: various administrations sought to achieve particular objectives, such as exaggerating the balance when they were trying to increase revenue or reduce taxes.

Canada underestimated its fiscal deficits in the late 1980s and early 1990s, but subsequently (1994-2004) overestimated them, presumably to reduce the risk of not achieving the balanced budget objective resulting from a strengthened institutional framework (O'Neill, 2005; Mühleisen et al., 2005). Ashiya (2005, 2007) shows that official growth projections in Japan were biased upward and were much less accurate than private sector forecasts.

Strauch et al. (2009) found a statistically significant optimistic bias for some euro members (France, Italy, Portugal) during the period 1991-2002, and for Germany, Italy, Greece, Luxembourg and Portugal when the data were updated to 2004. The United Kingdom, Finland

and Sweden, on the other hand, tended to underestimate their deficits. Brück and Stephan (2006) explicitly concluded that the governments of the euro zone have manipulated deficit projections prior to elections since the introduction of the Stability and Growth Pact (SGP).

Most of the authors mentioned argued that systematic optimism in the ex ante projections translates directly into higher ex post deficits, particularly higher deficits than indicated in the SGP framework. Beetsma et al. (2009) found that most ex post fiscal balances among the SGP countries were systematically lower than the ex ante official plans. Marinheiro (2010) added another complete business cycle to the SGP framework data and again found that the fiscal projections of the European authorities were on average overly optimistic.

This evidence is not consistently strong for all of the 15 countries of the European Union (EU), but the bias is marked for France, Italy and Portugal over all of the forecasting horizons. Beetsma et al. (2011) break down the general optimistic bias in the fiscal projections of the E.U. governments into a group in which the bias arises between the initial planned values and the first-release outcomes, and a group in which the bias emerges between the first-release outcomes and the ex post outcomes.

b. Optimism in the projections of the variables that determine revenue: the empirical evidence

Studies on the economic growth projections of the U.S. government agencies in the 1960s and 1970s generally reveal that these projections were not biased and showed a degree of accuracy similar to private sector projections. However, subsequent analyses encountered biases, generally toward optimism. Frenreis and Tatalovich (2000) found that the U.S. administrations (Office of Management and Budget, OMB) are less accurate in their projections of economic growth, inflation and unemployment than the independent Congressional Budget Office and the Federal Reserve Board. These authors found a partisan bias, which they interpreted as resulting from Republican administrations overestimating inflation and Democratic administrations overforecasting unemployment.

Frankel (2011) studied projections of real growth rates and fiscal balances by official government agencies in 33 countries. A series of findings emerged from his study: (i) official projections are biased upward, and this bias is stronger for longer time horizons. On average, the gap between the projected fiscal balance and the observed balance was 0.2 percent of GDP for a one-year horizon, 0.8 percent for a two-year horizon and 1.5 percent for a three-year horizon; (ii) one of the reasons for this optimistic bias in the official fiscal projections was the optimistic bias in the economic growth forecasts. A country's economic growth rate is an important determinant of the fiscal balance over the three time horizons, which means that excess optimism in the economic growth forecast is linked with excess optimism in the prediction of the fiscal balances. On average, the tendency to optimism in the growth forecast is 0.4 percent for a one-year projection, 1.1 percent for a two-year horizon and 1.8 percent for a

three-year horizon; and (iii) the bias is stronger during booms than in normal conditions. These results can help to explain excessive fiscal deficits and, more specifically, the inability to generate surpluses during high-growth periods: if a boom is expected to last indefinitely, then saving for a rainy day deficit is unnecessary.

c. Political economy of tax revenue forecasts

This literature studies the way in which some of the characteristics of countries' political economy affect their revenue projections. Among the characteristics examined were: (i) the overestimation of revenue by the government in power to show its fiscal competency during election years in order to achieve reelection; (ii) the adoption of a partisan platform that maximizes the reelection prospects. Once elected, the government party deviates from its announced platform and executes its preferred policies; (iii) in a scenario of political fragmentation and coalitions, more optimistic projections facilitate the budget negotiations within the government as financial resources are assumed to be greater; and (iv) overestimation of fiscal revenue when the party in power is unlikely to be reelected.

d. The political business cycle

This theory is based on the supposition that opportunistic governments are primarily interested in being reelected (Nordhaus, 1975) and therefore have an incentive to stimulate the economy before the elections to appear competent to the voters and thus increase their reelection prospects. Higher expenditures or tax cuts can lead to greater production and/or lower unemployment in the short term, increasing the popularity of the government. Voters can be impressed by large spending plans in the budget and may assume that this planned higher expenditure will bring production and unemployment to the desired target. This makes it more likely that they will vote for the government in power.

Normally this strategy works only if there is fiscal illusion. When voters are short-sighted, they do not (fully) anticipate two aspects: first, that forecast expenditures may not be fully realized and therefore production and unemployment may not behave in the desired manner; and second, that higher expenditure can lead to higher debt and consequently to an increase in the debt burden to be borne after the elections. Rogoff and Sibert (1988) demonstrate that there can also be political business cycles with rational expectations. Their theoretical approach is based on temporary information asymmetries between the government and the voters. By keeping expenditure constant and overestimating taxes, the government tries to exploit its informational advantage through budget execution that appears to be lower than it actually is. The government in power thus gives a signal of fiscal competency since it can appear that expenditures can be executed or provided for more efficiently (i.e., with a lower deficit).

e. Partisan theory

According to this theory, government policy is driven primarily by ideological beliefs, with the theory predicting a more expansionary policy for left-wing governments than for right-wing governments as governments on the left tend to be more inclined to implement redistributive policies. Public spending can be used to mitigate income inequality by increasing transfers. Left-wing parties also tend to be more disposed to incurring deficits since their voters benefit more from lower unemployment than they feel they are harmed by debt or higher inflation (see, for example, Hibbs, 1977).

As parties are also concerned with winning the next election, it can be short-sighted to assume that a party's policy responds exclusively to ideological beliefs. In an election, both parties are equally well-informed and are concerned with winning the election, and they will adopt the same platform: i.e., the one that maximizes the reelection prospects. Once elected, the governing party will deviate from its announced platform and execute its preferred policies. Irrational voters may not anticipate the incentive of the party to deviate and partisan effects may win out. Alesina (1988) extended this theory to rational voters. He found that partisan politics can also occur under rational expectations if the discount factor for the parties is low, i.e., they are in a situation in which reputation plays only a minor role. As mentioned above, in these theories, overestimating fiscal revenue can be substituted for generating deficits.

f. Political fragmentation

In the theoretical literature as well as in political discussion, fragmentation of the political decision-making process is often considered to be responsible for expansionary fiscal policies (see, for example, Roubini and Sachs, 1989a, b; Volkerink and de Haan, 2001; Perotti and Kontopoulos, 2002). The latter define "fragmentation" as the degree to which every politician internalizes the cost of a unit of aggregate expenditure. In a coalition government, for example, each member of the coalition tries to allocate the largest possible proportion of the budget to its followers. The members of the coalition put forward asymmetrical expenditure proposals in which the benefits are primarily directed at their preferred interest groups while the costs are distributed equally among all members of the coalition. As a result, the costs are not fully internalized.

In contrast with the theoretical frameworks described above, the political fragmentation approach does not distinguish between short-sighted voters or politicians and rational voters or politicians. Instead, the entire theoretical basis of the tragedy of the commons is rational behavior. The tragedy of the commons is likely to increase with the number of members of the coalition, as the fraction of the costs internalized declines with the size of the coalition.

Most political fragmentation theories are based on the supposition that governments prepare the budget and, since they tend to have a majority in the legislature, have de facto

control over the establishment of the final budget. However, the legislature can influence draft government budgets. Depending on factors such as the size of the majority, the fragmentation of the opposition parties or the parliamentary political culture, its influence on the final budget may be substantial.

The idea of political fragmentation can be also applied to fiscal revenue forecasts. More optimistic forecasts facilitate budget negotiations within the government as financial resources appear to increase. A larger number of members of the coalition or more spending ministries can result in (prioritize) policies to satisfy their respective electorates, which facilitates the preparation of the budget and avoids difficult budget negotiations. Similarly, the execution of the budget in the legislature simply facilitates the overestimation of fiscal revenues.

g. Reelection prospects

If the government in power does not expect to be reelected, it has an incentive to use the debt strategically. By raising the debt to an inefficiently high level prior to the elections, the current government can implement more spending programs or tax cuts and thus limit the scope of action available to the successor government (Persson and Svensson, 1989). Rather than immediately increasing the debt, the current government may be tempted to overestimate fiscal revenue, which provides opportunities for more spending programs that will result in higher deficits later.

Similarly, the strategic use of the debt can also limit the scope of action of the successor government. As a result, an overestimation of tax revenue is expected when the reelection prospects for the party in power are small. This theory is known as the “stubborn conservative government” hypothesis (Tabellini and Alesina, 1990). The conservative government in power wishes to prevent its left-wing successor from dedicating resources to expenditure that it believes is unnecessary (Pettersson-Lidbom, 2001; Sutter, 2003). Jochimsen and Lehman (2015) focus on determining whether projections are influenced by factors in a country’s political economy. They analyze whether the tax revenue forecasts in 18 OECD countries are biased as a result of political distortions for the time period from 1996 to 2012. They test whether tax revenue forecasts are systematically biased with the electoral cycle for different ideological compositions of the governments, a higher degree of political fragmentation, or a smaller likelihood of reelection.

h. Impact of projection errors on the fiscal balance

International comparative studies focus primarily on the impact of projection errors on the fiscal balance. For the European Union, Strauch et al. (2004) examine whether projection errors are triggered by the Stability and Growth Pact. Political bias in gross domestic product (GDP) forecasts in the European Union is discussed by Jonung and Larch (2006) and by Brück

and Stephan (2006). Piña and Venes (2011) and von Hagen (2010) explore the political and institutional influences on forecasts of the budget balance. The study conducted by Jong-A-Pin et al. (2012) focuses on 25 OECD countries using real-time data. Rather than analyzing forecasting errors, they use various current revenue data generations to identify distortions in the data resulting from revisions throughout the electoral cycle. Another study that focuses on real-time data is Cepparulo et al. (2014). An extensive survey of the various forecasts and fiscal policy is provided by Cimadomo (2015).

i. The institutional framework for revenue forecasting: independence of the forecasters, timeliness, tax structure and centralization

The characteristics of the budget process or its institutional configurations can have an impact on the preparation of projections. An important institutional aspect of revenue projection is whether the projections are independent of the political actors and their influence. Some revenue projections are carried out in the ministries of finance; the majority are assigned to agencies with widely varying levels of political independence. The least independent option involves assigning the responsibility for the projections directly to the government, such as a department in the Ministry of Finance, as is the case in France, Iceland, Italy, Japan, New Zealand, Norway and Switzerland. In these cases, political actors can directly influence the fiscal revenue forecasting results.

In other countries, responsibility is divided between the government, academia and the central bank (for example, Germany) or between various government agencies as is the case in Australia. By delegating revenue forecasting entirely to independent research institutes, the Netherlands have limited the influence of the Executive Branch (Büttner and Kauder, 2010).

The independence of revenue forecasting can also be at issue if macroeconomic forecasts produced by the government or by government agencies are used in the revenue projection process. The key macroeconomic variable for tax revenue forecasting is the GDP projection. Consequently, governments can influence revenue forecasts indirectly by requiring forecasting agencies, including independent agencies, to base their forecasts on the GDP projected by the government.

A second institutional characteristic of revenue projection is the technical and organizational conditions, such as the estimating methods or the number of taxes that are forecast. Estimating methods range from simple extrapolation methods based on past trends to quite sophisticated econometric methods such as time series analyses. All countries use a combination of various forecasting methods, particularly because fiscal revenue forecasts are disaggregated for many types of taxes. Austria, for example, mostly uses the extrapolation of trends, while Canada depends significantly on elasticity methods and the United Kingdom on microsimulations (Büttner and Kauder, 2010).

Third, the point in the budget process at which the projections are made can affect their quality. The lapse of time between the point at which fiscal revenue projections are made and the point at which the budget is approved (or the fiscal year begins) varies from country to country. While in Ireland, the United Kingdom and Sweden revenue projections are made less than one month before budget execution begins, tax revenues are forecast around eight months before the budget is submitted to the legislature in Germany and the United States.

Finally, there is considerable variation in institutional structures between countries. First, countries' tax structures differ. Rather than relying on a few major taxes, a country may have many smaller taxes. This can reduce forecasting errors, as long as the tax bases for these taxes are not closely correlated (Büttner and Kauder, 2010). Second, centralization varies from country to country. Canada, the United States, Belgium, Switzerland, Germany and Spain, for example, are fiscally decentralized (federalist) countries, in which not only the central government has taxation powers but regional or local jurisdictions do as well. This can give rise to less accurate tax revenue forecasts if actors at different levels of government must be involved in the forecasting process since the coordination required increases considerably. However, in Germany, Belgium and Switzerland, for example, tax revenue forecasting is entirely centralized, although they are all fiscally decentralized countries. The effects of the centralization of tax revenue forecasting may thus be insignificant.

3. NEW PUBLIC FINANCE MANAGEMENT TOOLS AND THEIR IMPACT ON REVENUE AND EXPENDITURE PROJECTIONS

As mentioned above, the literature has emphasized institutional factors related to the context in which fiscal decisions are adopted within the framework of the so-called political economy of the budget process in explaining the fiscal variables. In this paper, we incorporate two budget variables that reflect budget instruments adopted relatively recently in Latin America: the Treasury single account (TSA) and the medium-term fiscal framework (MTFF).

These instruments were introduced or strengthened in part to counteract the negative effects of poor budget projections since Treasuries are ultimately responsible for ensuring that the financial commitments assumed by the government are honored. If revenue projection errors are positive and/or expenditure projections are negative, there will either be fewer resources to cover the authorized expenditures or expenditures that are higher than programmed. This would force Treasuries to restrict budget execution (cash rationing) to ensure that the deficit is kept within the limits established in the approved budget. Otherwise, deficits will increase given that the Treasury does not have the power to contain expenditure.

The TSA consists of a single bank account (or various related bank or sub-accounts) used by the public sector to process collections and payments. It was created in response to evidence that the dispersion of resources in multiple bank accounts was less efficient and more expensive than consolidating financial resources under the centralized administration of the

Treasury. The TSA avoids the Treasury having to borrow on the financial market to cover payments due when there are idle balances on bank accounts outside its control. The TSA provides a consolidated financial position at the end of each day. In a broader sense, the TSA implies a set of processes, rules and systems for the government's financial management (Fainboim and Pattanayak, 2011). An efficient TSA should cover all public sector flows, both budgetary and extrabudgetary.

The Ministry of Finance, via the Treasury, can thus consolidate cash flows that enter and exit from the TSA, which makes it possible to ensure full fungibility of all monetary resources. The TSA enables the government to conduct transactions more efficiently and effectively, reduces the use of cash in public sector transactions, lowers short-term borrowing, reduces the likelihood of corruption and allows for automated bank reconciliations (Fainboim and Pattanayak, 2011).

From the standpoint of budgetary and macro-fiscal projections, the TSA facilitates the cash planning process. Budget allocations (during the budget preparation phase, immediately following approval by the legislature, and even in the execution phase during the year) can be transferred in a database that serves as the basis for cash projections which, once aggregated institutionally, define the TSA balance (Gardner and Olden, 2013).

The interaction of the projection departments of the main entities and public agencies with the Treasury are much facilitated, resulting in better cash projections, which, conversely, feed into the budget projections prepared during the budget preparation phase. It is also very important—and the Latin American experience shows much progress in this area—that there is a budgetary control system at the commitment level. Once budget commitments are assumed, in the form of the signing of a contract, for example, the dates and amounts anticipated for the accrual and payment phases can be estimated more realistically. In this way, an interaction develops among the institutions and individuals responsible for the government's budget process that helps to improve both cash and budget projections.

The most obvious impact of the TSA is that Treasuries gain the capacity to identify the financial cost of budget projections with significant errors more rapidly and accurately, and are therefore better able to put pressure on budget centers to make their projections more prudent.

The medium-term fiscal framework (MTFF), for its part, arose out of the need to have a medium-term outlook for public policies, planning and the budget. In this sense, the MTFF consists of a set of institutional agreements to present, manage and prioritize revenue and expenditure over a multiyear horizon. A key aspect of the MTFF is that it includes a top-down estimate of the budget envelope for the public sector consistent with the macroeconomic stability objective that is integrated with a bottom-up estimate of the costs of existing and future budget programs. The compatibility between these costs and the budget envelope is the

result of an iterative process focusing on the adoption of policies across the spectrum of budget entities (Harris, Hughes, Ljungman and Steriale, 2013).

An MTFF allows the public sector to analyze the impact of existing and future policies over a multiyear period, identify budget priorities, and achieve better control over public spending. A modern MTFF thus includes systems, rules and procedures to analyze government fiscal plans over a medium-term horizon. The MTFF is less subject to manipulation of the macroeconomic variables in that the effects of errors are multiplied as the horizon for the projections is increased. In a World Bank study (2013), variables were included to reflect countries' progress with their MTFFs as well as explanatory variables for the fiscal balance and expenditure for a panel of countries. This study sought to identify empirically whether the TSA and the MTFF generate incentives to improve budget forecasting.

a. Empirical estimation

This section aims to analyze the determinants of projection errors using two approaches: a cross-country model including 30 countries, and panel data models. In the first approach, data was used for each of the countries, defined as the average for each variable during the period 2010-2014. For the panel data estimates, the same countries were analyzed for the period 2010-2014. The panel estimates thus distinguish not only between different countries, as in the previous model, but also have the advantage of making it possible to analyze the behavior of projection errors throughout the 2010-2014 period and their determinants in each country. For purposes of the empirical analysis, projection errors are defined as follows:

$$\text{Projection Error } X_{t+1} = \frac{(\text{Estimate } X_t^{t+1} - \text{Ex post value } X_{t+1})}{\text{Ex post value } X_{t+1}}$$

Where:

Projection Error X_{t+1} : is the projection error for the budget variable X in the year $t + 1$;
Estimate X_t^{t+1} : is the estimate made in the year t of the value that will be taken by the variable X in the year t+1; and
Ex post value X_{t+1} : is the value taken by the budget variable X in the year t+1.

In this way, for example, the total expenditure projection error in the budget is:

$$\text{Expen projection error}_{t+1} = \frac{(\text{Expen estimate } t^{t+1} - \text{Expen ex post value }_{t+1})}{\text{Expen ex post value }_{t+1}}$$

Where:

Expen projection error $_{t+1}$ is the total budget expenditure projection error for the year $t + 1$;

$Expen\ estimate_t^{t+1}$: is the budget appropriation for total expenditure published in the budget approved at the end of the fiscal year that will be in effect in the year $t+1$; and
 $Expen\ ex\ post\ value_{t+1}$: is the expenditure executed during the year $t+1$.
Total budget revenue projection errors are defined similarly.

The variables to be explained (dependent variables) are the budget revenue and expenditure projection errors. Both variables can take positive or negative values so that four different cases are analyzed (Table 1): budget revenue overestimates (positive revenue projection errors), budget revenue underestimates (negative revenue projection errors), budget expenditure overestimates (positive expenditure projection errors), and budget expenditure underestimates (negative expenditure projection errors).

Table 1. Projection Errors

	Positive	Negative
Revenue projection errors	Overestimation of fiscal revenue	Underestimation of fiscal revenue
Expenditure projection errors	Overestimation of fiscal expenditure	Underestimation of fiscal expenditure

b. Data

Total budget revenue and expenditure projection errors were calculated for 30 countries: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominica, the Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, Trinidad and Tobago, Uruguay, and Venezuela. The official figures published by the economic and fiscal authorities on institutional webpages were compiled for these countries. Projection errors were calculated for each country for the years 2010-2014 so that the data covered five years for each country.

Various explanatory variables were used. The first is a binary variable capturing whether the country being analyzed had a Treasury single account or not. Alternative versions of this variable were used: the variable *tsa1*, which takes the value 1 in countries whose Treasury single account covers ministries, the judiciary, the legislature and autonomous agencies, and the variable *tsa2*, which takes the value 1 in countries whose Treasury single account covers ministries, the judiciary and the legislature. The source for these two variables is Pessoa, M. and Pimenta, C, (2015).^{**}

The second is a variable that captures whether countries have a medium-term fiscal framework. For this variable, two alternatives were also used: *mtffwb* is a variable that takes

^{**} M. Pessoa and C. Pimenta, eds, "Public Financial Management in Latin America," IDB and IMF, 2015.

four possible values (0, 1, 2 and 3) and reflects the progress of countries in the development of their medium-term fiscal frameworks, and *mtfffun* is a binary variable from the IMF database that takes the value 1 in countries that have a developed and complete MTFF.^{††} Third, a binary variable was used that takes the value 1 in years in which general elections for the president of the country took place.^{‡‡} Finally, a series of macroeconomic and macro-fiscal variables were used such as the GDP growth rate, the inflation rate, the unemployment rate, gross debt as a percentage of GDP, and general government expenditure as a percentage of GDP, all of which are available in the IMF's *World Economic Outlook* database.

Table 2. Descriptive Statistics

VARIABLES	N	mean	sd	min	max
revproer	127	0.165	13.51	-50	30.6
expproer	134	0.317	12.42	-40.3	29.9
posrevproer	74	8.395	7.225	0.2	30.6
negrevproer	52	-11.54	11.76	-50	-0.1
posexpproer	77	7.818	7.266	0.3	29.9
negexpproer	57	-9.816	10.61	-40.3	-0.1
mtffwb	145	0.724	0.829	0	3
mtfffun	150	0.167	0.374	0	1
tsa1	150	0.1	0.301	0	1
tsa2	150	0.2	0.401	0	1

Where:

Revproer: means revenue projection error;

Expproer: means expenditure projection error;

Posrevproer: means positive revenue projection error;

Negrevproer: means negative revenue projection error;

Posexpproer: means positive expenditure projection error;

Negexpproer: means negative expenditure projection error;

Mtffwb: is a variable that takes four values (0, 1, 2 and 3) and reflects countries' progress in developing a medium-term fiscal framework;

Mtfffun: is a binary variable that takes the value 1 in countries that have developed a complete medium-fiscal framework;

tsa1 is a binary variable that takes the value 1 in countries whose Treasury single account covers ministries, the judiciary, the legislature and autonomous agencies; and

^{††} The variable MTFF World Bank is published in World Bank, "Beyond the Annual Budget: Global Experience with Medium-Term Expenditure Frameworks," 2013.

^{‡‡} Available at <http://www.idea.int/es/vt/viewdata.cfm>.

tss2 is a binary variable that takes the value 1 in countries whose Treasury single account covers ministries, the judiciary and the legislature.

Two types of empirical estimates were made. First, a cross-country analysis in which the five-year average for each of the variables was taken for each country. This establishes a coverage of 30 observations for the countries of Latin America and the Caribbean, one for each country, although the unavailability of some of the variables reduces the coverage of countries depending on the specification for the explanatory variables. This cross-country estimate is used to analyze the determinants of expenditure projection errors (both positive and negative). Second, a panel of 30 countries during the period 2010-2014 is used to analyze the determinants of budget revenue and expenditure projection errors (both positive and negative).

Having a panel of data for 30 countries over five years makes it possible to empirically analyze the determinants of projection errors, bearing in mind the heterogeneity of the countries making up the sample. Within this heterogeneity, there are differences in budget coverage, in tax and expenditure structures, in budget execution procedures, in financial management organic laws, in the lapse of time between the preparation and approval of the budget, and in the guidelines for the involvement of the legislative authorities during the approval phase of the budget, both for the initial budget and for supplementary budgets.

c. Result of the cross-country analysis of 30 countries

A first important question is why particular countries have negative expenditure projection errors (initial budget lower than execution) and other countries have positive expenditure projection errors (initial budget higher than execution). For this purpose, the countries were divided into three groups. The first group consists of countries that did not present expenditure projection errors (EPEs) (those in which the absolute EPE is less than 2 percent of ex post executed expenditures): Bahamas, Barbados, Belize, Canada, Chile, the Dominican Republic, Ecuador, Jamaica, México, Nicaragua, Trinidad and Tobago, and Uruguay. The second group includes countries with negative EPEs (underestimates): Argentina, Dominica, El Salvador, Honduras, Peru, St. Kitts and Nevis, and Venezuela. The third group consists of countries with positive EPEs (overestimates): Bolivia, Brazil, Colombia, Costa Rica, Grenada, Guatemala, Guyana, Panama, Paraguay, and St. Lucia.

Two estimates were made. The first had a binary variable, which took the value 0 if the countries did not have an EPE and the value 1 if they had a negative EPE, as the variable to be explained (dependent variable). The second estimate had a variable with the value 0 if the country did not have an EPE and a value of 1 if the country had a positive EPE as the dependent variable.

Table 3 presents the results of the estimates. Columns 1, 2 and 3 correspond to the dependent variable *negative EPE*. The explanatory variables include the initial inflation rate (in 2009), the average inflation rate, the initial deficit as a percentage of GDP, the growth rate as a percentage of GDP, the initial net public debt as a percentage of GDP and two binary variables: *tsa1* and *tsa2*. *Tsa1* takes the value 1 when countries have a TSA that covers ministries, the judiciary, the legislature and autonomous agencies. The second (*tsa2*) involves countries whose TSA covers ministries, the judiciary and the legislature. It is assumed that the countries of the Caribbean do not have a TSA. Finally, the last explanatory variable, *mtffwb*, is an index prepared by the World Bank that reflects the progress countries have made in the development of a MTFF.

Our preferred estimate for negative EPEs is the estimate in column 3. It shows that countries that have a broad TSA (*tsa1*) have 65 percent less probability of underestimating their expenditures. Moreover, for each percentage point of initial inflation, the probability of having a negative EPE increases by 4.5 percent. Similarly, an additional percentage point of fiscal deficit increases the probability of having a negative EPE by 9.7 percent.

The regressions that explain *positive EPEs* are presented in columns 4, 5 and 6. The results show that an additional percentage point of GDP growth is associated with an 11.9 percent increase in the probability of overestimating expenditures. Both having a TSA and improving the MTFF reduces the probability of a positive EPE, although the coefficients of these variables are not significant at standard confidence levels.

Table 3. Estimate Results

VARIABLES	(1) Negative Error	(2) Negative Error	(3) Negative Error	(4) Positive Error	(5) Positive Error	(6) Positive Error
inflat	0.0266 (0.0155)					
initialdeficit	0.0723* (0.0412)	0.0890* (0.0441)	0.0965* (0.0454)			
tsa2	-0.499 (0.289)	-0.549* (0.285)				
initialinflat		0.0395* (0.0207)	0.0446* (0.0213)			
tsa1			-0.654* (0.350)	-0.0730 (0.380)	-0.0934 (0.316)	-0.0906 (0.293)
gdpgrowth				0.0967 (0.0623)	0.119* (0.0637)	0.120* (0.0591)
netinitialdebt				0.00894* (0.00477)		
unemploy					0.00793 (0.0476)	0.00502 (0.0395)
mtffwb					-0.0341 (0.134)	
Observations	19	19	19	15	17	18

R-squared	0.304	0.330	0.323	0.278	0.284	0.299
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Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Where:

inflat: is the average inflation rate;
initialdeficit: is the fiscal deficit as a percentage of the initial GDP;
tsa1 is a binary variable that takes the value 1 in countries whose Treasury single accounts cover ministries, the judiciary, the legislature and autonomous entities;
tsa2 is a binary variable that takes the value 1 in countries whose Treasury single accounts cover ministries, the judiciary and the legislature;
initialinflat: is the initial inflation rate;
gdpgrowth: is the average GDP growth rate;
unemploy: is the average unemployment rate; and
mtffwb: is a variable that takes four values (0, 1, 2 and 3) and reflects the progress countries have made in developing a medium-term fiscal framework.

d. Results of the panel estimates

The model to be estimated is based on equation (1). The dependent variable is the projection error for the budget variable Y , Z is a vector of explanatory variables referring to the budget process, X is a vector of macro-fiscal explanatory variables, η_i represents an element of the country's heterogeneity i and is constant over time, and ε is the random term.

$$Y_{i,t} - Y_{i,t-1}^t = \alpha + \Gamma Z_{i,t} + \Phi X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (1)$$

This section presents the results of estimating a panel of 30 countries over a five-year period (2010-2014). Two estimation methods are used simultaneously: panel ordinary least squares with heteroscedasticity-consistent (White) standard errors, and panel estimation with random effects. These two estimation methods were selected to analyze the robustness of the estimated coefficients. One assumption in our work is that the heterogeneity of countries is an important aspect to be borne in mind. If so, the estimation using the pooled ordinary least squares method (Pooled OLS) provides inconsistent estimators. However, reiterating the argument recently expressed, the results using this method are included for purposes of comparison. The results presented below have average projection errors measured in percentage points as the dependent variable.

e. Expenditure projection errors

Table 4 presents the results, distinguishing between countries with positive expenditure projection errors (initial budget higher than execution) and those with negative projection errors (initial budget lower than execution).

The results show the decisive influence of fiscal institutions associated with the MTFF and TSA on *positive projection errors*. Columns 1 to 4 show that an improvement of one unit in the World Bank scale for the MTFF is associated with a reduction of the projection error by 3.04, 3.33, 2.46 and 2.42 percentage points, respectively. Moreover, countries with a TSA have lower levels of overestimation of expenditure by 4.48 and 5.78 percentage points of executed expenditure, while the coefficients estimated in columns 3 and 4 are not significant at standard levels of confidence even though they have a negative sign.

Table 4. Expenditure Projection Errors

VARIABLES	(1) Positive Error OLS	(2) Positive Error OLS	(3) Positive Error Random ef.	(4) Positive Error Random ef.	(5) Negative Error OLS	(6) Negative Error Random ef.
tsa1	-4.485* (2.637)	-5.780** (2.352)	-3.182 (3.520)	-2.433 (3.642)		
mtffwb	-3.042*** (0.953)	-3.330*** (0.911)	-2.458* (1.295)	-2.419* (1.468)	1.774 (1.742)	1.420 (1.939)
gengovexp	0.313** (0.134)	0.344*** (0.123)	0.189 (0.164)	0.123 (0.160)	-0.416** (0.179)	-0.481** (0.191)
grossdebt	-0.0309 (0.0255)		-0.0162 (0.0350)			
unemploy		-0.793*** (0.251)		-0.324 (0.370)		
inflatsqr					-0.0237*** (0.00475)	-0.0194*** (0.00500)
gdpgrowth					-1.310** (0.525)	-1.304*** (0.498)
tsa2					-4.472 (3.568)	-3.565 (4.117)
Observations	75	56	75	56	53	53
R-squared	0.150	0.344			0.490	
No. of countries			24	19		22

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Where:

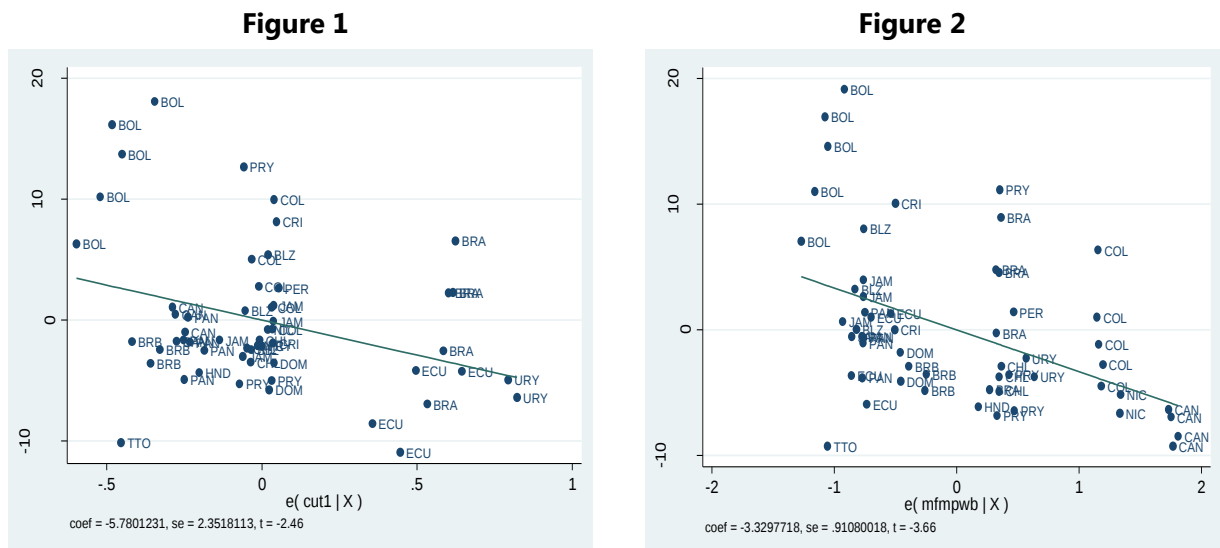
gengovexp: is general government expenditure as a percentage of GDP;

mtffwb: is a variable that takes four values (0, 1, 2 and 3) and reflects the progress countries have made in developing a medium-term fiscal framework;

tsa1: is a binary variable that takes the value 1 in countries whose Treasury single account covers ministries, the judiciary, the legislature and the autonomous agencies;

tsa2: is a binary variable that takes the value 1 in countries whose Treasury single account covers ministries, the judiciary and the legislature;
Grossdebt: is gross public debt as a percentage of GDP;
Unemploy: is the unemployment rate;
Inflatsqr: is the squared inflation rate; and
Gdpgrowth: is the GDP growth rate.

Figures 1 and 2 show the association between positive projection errors and the variables *tsa1* (Figure 1) and *mtffwb* (Figure 2) based on the estimates in column 2.



For countries with *negative expenditure projection errors*, columns 5 and 6 identify the GDP growth rate as a relevant explanatory variable. A one percentage point increase in the growth rate is associated with a 1.30 percentage point increase in the underestimation of expenditures by these countries. Both the inflation rate (squared) and the level of expenditure as a percentage of GDP seem to directly influence the negative projection errors (we note that when the projection errors of these countries are negative, a negative coefficient implies that, for example, in the event of increases in inflation or expenditure, the projection error will become even more negative).

f. Revenue projection errors

The results shown in Table 5 indicate that having an MTFF reduces positive revenue projection errors by between 9.01 and 8.02 percentage points. In this estimate, the MTFF variable is a binary variable with the value 1 for countries with satisfactory MTFFs that were prepared by IMF analysts. The *gengovexp* (expenditure as a percentage of GDP) variable

positively affects revenue projection errors. This effect is statistically highly significant. The *presidentelection* variable is a binary variable that takes the value 1 in years in which general presidential elections take place in a country. Its effect is significant and positive for positive revenue projection errors, which is consistent with the literature and previous empirical analyses. For negative revenue projection errors, the squared inflation variable is significant in the estimates in Table 3 (similar to the results in the case of negative expenditure projection errors).

Table 5. Revenue Projection Errors

VARIABLES	(1) Positive error OLS	(2) Positive error Random ef.	(3) Negative error OLS	(4) Negative error Random ef.
<i>gengovexp</i>	0.286*** (0.0869)	0.278** (0.116)		
<i>unemploy</i>	-0.209 (0.167)	-0.0511 (0.245)		
<i>mtfffun</i>	-9.010*** (1.908)	-8.018*** (2.628)	-0.396 (3.300)	0.203 (3.570)
<i>tsa1</i>	2.385 (2.295)	3.415 (3.292)	-1.861 (3.570)	-1.649 (3.950)
<i>presidentelection</i>	4.977** (1.938)	4.244*** (1.454)		
<i>inflatsqr</i>			-0.0314*** (0.00529)	-0.0294*** (0.00550)
Observations	55	55	51	51
R-squared	0.442		0.433	
No. of countries		19		22

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Where:

Gengovexp: is general government expenditure as a percentage of GDP;

Mtfffun: is a binary variable from the IMF database that takes the value 1 for countries that have a developed and complete medium-term fiscal framework;

tsa1 is a binary variable that takes the value 1 in countries whose Treasury single accounts cover ministries, the judiciary, the legislature and autonomous agencies;

unemploy: is the unemployment rate;

inflatsqr: is the squared inflation rate; and

presidentelection: is a binary variable that takes the value 1 in years in which the country has held general presidential elections.

Table 6 below summarizes the effects of the explanatory variables on the six dependent variables: (i) the probability of positive EPEs; (ii) the probability of negative EPEs; (iii) the size of the positive EPEs; (iv) the size of the negative EPEs; (v) the size of the positive revenue projection errors (RPEs); and (vi) the size of the negative RPEs.

Table 6. Summary of the Effect of the Explanatory Variables

Explanatory variables	TSA	MTFF	Presidential election	GDP growth	Inflation	Expenditure (% GDP)	Fiscal deficit (% GDP)
Probability of + EPE				+			
Probability of - EPE	-				+		+
+ EPE	-	-				+	
- EPE				+ (absolute value)	+ (absolute value)	+ (absolute value)	
+ RPE		-	+			+	
- RPE					+ (absolute value)		

Table 7 presents a classification of the countries analyzed on the basis of their projection errors. The table has been prepared for countries that present two characteristics: (i) they have projection errors exceeding 2 percent (absolute value); and (ii) those projection errors are present in at least four of the five years for which the database covers the countries. The table shows that most of the countries with projection errors overestimate both their revenue and their expenditure.

Table 7. Classification of Countries Based on Their Projection Errors

		EXPENDITURE PROJECTION ERRORS		REVENUE ERRORS BUT NO EXPENDITURE ERRORS
		POSITIVE	NEGATIVE	
REVENUE PROJECTION ERRORS	POSITIVE	Antigua Bolivia Brazil Colombia Costa Rica Dominica	Grenada Guatemala Guyana Jamaica Panama	Bahamas Barbados
	NEGATIVE		Argentina	Peru Trinidad and Tobago Uruguay
EXPENDITURE ERRORS BUT NO REVENUE ERRORS		Ecuador St. Lucia	Honduras St. Kitts and Nevis	

4. Conclusions

Various conclusions can be drawn from the empirical results. The cross-country analysis, which focused on explaining the determinants of the EPEs, provides two lessons. First, countries that overestimate their budgetary expenditures have a greater likelihood of doing so if their economies are growing and their levels of economic activity are expanding. Second, countries that underestimate their budgetary expenditures will have a lower likelihood of doing so if they have a Treasury single account or if they have lower inflation rates and fiscal deficits.

Four lessons can be learned from the results of the panel analysis. First, positive EPEs decline significantly if countries have a TSA and an MTFF. Second, negative EPEs are higher in countries whose GDP is growing, which have high inflation, or which have high levels of expenditure as a percentage of GDP. Third, positive RPEs are smaller for countries with an MTFF and higher for those whose levels of expenditure as a percentage of GDP are high. An interesting result is that these projection errors increase sharply in years in which general presidential elections are held. Finally, negative RPEs are explained by the inflation rate.

The empirical analysis helps to identify countries that have the potential to reduce their projection errors by means of fiscal institutions that affect both the overestimation of expenditures (TSA and MTFF) and the overestimation of revenue (MTFF). As well, countries with high expenditure coefficients as a percentage of GDP are also identified by the empirical results as likely to be in this large group of nations. Without being the only possible explanation, the problem of unrealistic budgets that affect various countries in the region (characterized by expenditure aspirations that are higher than the fiscal context will allow) can be explained in part by this twofold overestimation (revenue and expenditure) and, moreover, generates issues of payment delays and of accrual and cash ceilings that explain a differential between the initial budget and the executed budget.

We would also like to note that the empirical analysis also focuses attention on the impact of presidential elections on the overestimation of revenue, this being an important aspect to bear in mind. Another important situation to analyze is the case of Argentina, which is the only country that systematically and significantly underestimated both its revenue and its expenditure during the reference period. In this case, the high inflation rates in Argentina and the key role that this variable plays in the empirical analysis help to focus the explanation on macrofiscal issues in inflationary contexts. The empirical results in fact identify inflation as an important variable in explaining the underestimations of both revenue and expenditure. Moreover, a high expenditure-GDP ratio, which is also a characteristic of Argentina, is associated with a greater underestimation of budgetary expenditures.

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