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Fiscal Spending and Economic Growth: Some Stylized Facts*

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Abstract

Using an "event analysis", this paper complements the cross-country approach to the study of fiscal correlates of growth. Data on fiscal expenditures and growth for a database of 140 countries (118 developing countries) over 1972-2005 are reorganized around turning points providing a summary but encompassing description of "what is in the data". For this sample, the probability of occurrence of a fiscal event is about 10%, and, the probability of a growth event once a fiscal event had occurred is around 26 %. For developing countries, fiscal events followed by growth events occur under situations of (i) significantly lesser deficit, (ii) fewer resources devoted to non-interest General Public Services and (iii) shift in primary expenditures towards Transport & Communication. .../...

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… / … After controlling for the growth-inducing effects of positive terms-of-trade shocks and of trade liberalization reform, probit estimates indicate that a growth event is more likely to occur in a developing country when surrounded by a fiscal event. Moreover, the probability of occurrence of a growth event in the years following a fiscal event is greater the lower is the associated fiscal deficit, confirming that success of a growth-oriented fiscal expenditure reform is associate with a stabilized macroeconomic environment (through limited primary fiscal deficit).

1. Introduction

A renewed focus on fiscal policy and growth has spawned a lively debate over demands for what has been dubbed greater "fiscal space" to support growth. Besides a few case studies (see World Bank, 2007), so far the exploration of fiscal space and performance in developing countries has proceeded along two paths: (i) studies of the efficiency of specific public sector expenditures - e.g. the several studies on infrastructure (Calderon and Serven, 2004) or on other components of social infrastructure (Estache et al., 2007), and (ii) cross-country growth regressions in which government expenditures are included among the regressors (Devarajan et al., 1996 or Adam and Bevan, 2005). Perotti (2007) reviews critically the contributions of the production function and growth regression approches. Among the more interesting lessons from these exercises, Kneller *et al.*, 1999, Bose *et al.*, 2007, and Adam and Bevan, 2005, using dynamic panels have persuasively shown that capital expenditure, as well as spending on education, health, transport and communication can be favorable to growth when the government budget constraint is *simultaneously* taken into account in the equation.

As pointed out in several studies (e.g. Easterly et al., 1993 and Jones and Olken, 2007), growth tends to be highly instable in low-income countries. This makes it difficult to unveil the relation between growth and its fundamentals leading Hausmann, Pritchett and Rodrik (2005) to pay attention to turning points by relying on an event analysis. This paper applies this approach over a large data base of 140 countries over the period 1972-2005 providing a description of the correlates between significant public spending "shocks" and growth accelerations, reorganizing the data around turning points, or "events" (calendar time is transformed into "event time"). This descriptive analysis should be viewed as complementary to the approaches described above.

More specifically, we construct growth "events" along the lines of Hausman, Pritchett and Rodrik (2005). Lacking information on milestone events in fiscal reforms similar to those available for trade reforms as in Wacziarg and Welch (2008), we define an "event" on the fiscal side using an approach similar to the definition of an event on the growth side, i.e. based on conditional changes in primary fiscal expenditures but taking into account the government budget constraint. This descriptive approach should be informative as it provides an easy-to-understand exploration of the correlates between fiscal policy (here fiscal expenditures) and performance (here per capita GDP growth). It avoids imposing a single common linear model for all countries as done in cross-countries regressions. When applied to a large database, as done here, it gives a more

encompassing description of "what is in the data" and is thus complementary to the three other approaches mentioned above.

To highlight the main findings, in this sample, the probability of occurrence of a fiscal event is about 10%, and the probability of a growth event once a fiscal event has occurred is in the 22%-28% range. The probability of occurrence of a fiscal event is higher for the bottom half of the income distribution of countries. For the developing country group which is the focus of this study, fiscal events followed by growth events occur under situations of a significantly lesser deficit, and a shift in discretionary expenditures towards transport & communication is only observed for fiscal events followed by growth events. After controlling for the growth-inducing effects of positive terms-of-trade shocks and of trade liberalization reform, the statistical analysis in which the probability of a growth event is conditioned on the occurrence of a fiscal event in surrounding years confirms that growth events are, on average, more likely when a fiscal event has occurred. Moreover, the probability of occurrence of a growth event in the five years following a fiscal event is greater the lower is the associated fiscal deficit, confirming that success of a growth-oriented fiscal- expenditure package is associated with a stabilized macroeconomic environment (through limited fiscal deficit).

The paper unfolds as follows. Section 2 presents the identification conditions of both growth and fiscal events (with details and sensitivity analysis left to the annex A.3). Section 3 studies the characteristics of growth and fiscal events, and the relation between the two. The descriptive analysis computes fiscal event (unconditional) probabilities and probabilities that fiscal events are followed (or not) by growth events. Section 4 investigate the characteristics of fiscal events, in particular the ones followed by a growth event, in terms of geography, underlying changes in expenditure composition, and in the level of associated primary deficit. Then the statistical analysis turns on the growth side, the objective being to see if, based on probit estimates, growth events are more likely to occur in a developing country when surrounded by a fiscal event. Section 5 concludes.

2. Defining events

We are interested in the relation between a "significant" change in fiscal spending and a "significant" change in GDP growth - what Hausmann, Pritchett and Rodrick (henceforth HPR, 2005), call "growth acceleration". Per capita GDP *growth* and primary fiscal expenditures (in GDP %) *growth* are then our two indicator values. Call these growth indicators, z. Average annual *changes*, $z_{t,n}$, are computed for each year over successive windows of length n. Here, because of the limited sample size for the fiscal data (1972 to 2005) we choose a succession of windows of 5 years ($n = 4$). So we compute $\Delta z_{t,n}$:

$$\Delta z_{t,n} = z_{t,t+n} - z_{t-n-1,t-1}$$

If the change $\Delta z_{t,n}$ in the average indicator value satisfies certain conditions (see below), we will say that an "event" has taken place for z in t. The appendix details how we selected the parameter values defining an event and how sensitive our sample of events is to changes in the conditioning values so here we only describe the conditions for our 'benchmark' set of parameters starting with GDP per capita growth, and then turning to primary fiscal expenditures. In this benchmark case, the sample produces 58 growth events and 95 fiscal events. Sensitivity of the number of events to the choice of parameter values is reported in appendix table A1.

Growth events. As in HPR, a growth event will have taken place in *t* if the following conditions are met :

(i) an increase in the average per-capita growth of 2 ppa or more (percentage points per annum, ppa),

(ii) growth acceleration sustained for at least 5 years *[t;t+4]*,

(iii) an average annual growth rate at least 3.5 ppa during the acceleration period *[t;t+4],*

(iv) a post-acceleration output exceeding the pre-episode peak level of GDP.

With this selection process, several events could follow one another over consecutive years capturing in fact the same event. To select the more "relevant" year, we fit a spline regression and choose the year for which the change in indicator value is statistically the most significant. Finally, we impose the restriction that two events must be separated by at least five years. This method is used for both growth and fiscal events.

Fiscal Events. The core of this study is the definition of a fiscal event. Defining an event was easier for Wacziarg and Welch (WW, 2008) where the objective was to identify when significant reductions in trade distortions took place. Here a fiscal event could be a fiscal policy aimed at stabilizing the economy or a fiscal policy aimed at improving the efficiency of the economy (e.g. expenditures to enhance the productivity of private investment or to devote resources to improve property rights enforcement). While both types of fiscal policy, if successful, would raise the growth rate, in the case of stabilization, the economy would be returning to trend growth while in the second case, the growth rate would go up. Like WW, we have in mind a fiscal policy that has more permanent effects on growth.

Barro's (1990) endogenous growth model provides the framework to identify the growth effects of public expenditures. In this model, productive government capital expenditures increase the marginal productivity of private expenditure. Unless government revenue can be raised in a non-distortionary way -- which is highly unlikely in practice-- increases in government spending can raise or lower steady-state growth. In this model, government expenditures that only provide consumption services are negatively correlated with growth since the government has to raise taxes in a distortionary way.

This framework which puts the emphasis of fiscal policy on growth--the focus of this paper -- underlines the importance of the composition of expenditures and of tax structure. While we can deal with the composition of government expenditures, in our large sample (140 countries over 1972-2005), unfortunately we cannot deal with the growth effects resulting from the choice of tax structure.

While Barro's model provides a useful framework, implementing the event-analysis in the spirit of WW is much more difficult as there is much more fungibility in fiscal policy than in trade policy. This makes it difficult to identify the fiscal space levers, so it is much more difficult to identify the expected effects of changes in these levers. Here, we restrict fiscal reform to a change in total primary fiscal expenditures and, in a second step, we study the underlying evolution of many components of potential interest (e.g. education, health or transport and communication).

Faced with limitations and constraints on data availability, we rely on changes in consolidated central government total fiscal expenditures, TFE (taken from the GFS, see details in annex A1) as "event" changes in government expenditures. Since we are looking for autonomous fiscal expenditures, events are defined on expenditures purged of non-discretionary components such as wages and interest payments, IP.[1] Lacking information on the wage component for each functional expenditure category, we consider as discretionary TFE purged of interest payments. So, we define discretionary fiscal expenditure, DFE, as $DFE = TFE - IP$ which is equivalent to focusing on primary spending. We also compute the primary fiscal deficit*, def,* as the difference between the total revenues and *grants* and the discretionary fiscal expenditure, DFE (so a deficit is negative).

For the developing countries in the sample used here, average DFE is 24% of GDP and average central government primary fiscal deficit, *def*, is -2% of GDP. An increase in DFE will be declaring as fiscal event in *t* when the following conditions are met over the following five year window :

(i) an increase in DFE average growth of 1 ppa (percentage point per annum),

(ii) If in deficit (i.e *def*< -2% of GDP), deficit does not increase,

(iii) If in surplus (or in *def* > - 2% of GDP), the increase in DFE does not lead to a deficit exceeding 2% of GDP

[1] Heller (2006) considers wages and interest payments as the 2 non-discretionary expenditures in developing countries. In our fiscal data set which is decomposed by "function" rather than "economic" use we do not have a wage component for each function so we cannot include wages as non-discretionary. See the annex A1 for the definitions of these components.

The 5-year (rather than a longer period) window was dictated by the length of the time-series and our desire to have enough fiscal and growth events for statistical analysis. Sensitivity of events to parameters in the above conditions is discussed in the appendix.[2]

This first cut at defining a "fiscal event" could be improved upon in several ways. First, the objective is to capture the availability of budgetary room that allows a government to provide resources for a desired purpose "without any prejudice to the susceptibility of a government's financial position" (Heller, 2006). Hence, ideally one would define conditions (ii) and (iii) based on formal tests of debt sustainability such as those used by Chalk and Hemming (2001). However, lack of data on indebtedness lead us to use the value of the deficit level.

Second, unfortunately, the "event" cannot be interpreted as entirely discretionary (or unanticipated). The large set of expenditures included in DFE implies that the fiscal event captures non-discretionary elements in the definition and more restrictive definitions of discretionary fiscal expenditures could certainly be built around one of the functional components of fiscal expenditures, although any greater volatility in narrower series may be difficult to interpret.[3] Thus, the most plausible interpretation of the constructed "events" is as significant changes in fiscal policy and refrain from attributing any government objective to the event – even if in case of developing countries, the pro-cyclicality of fiscal policy (see the discussion on the evidence below) suggests that the discretionary element dominates.

Third, in view of the links we are seeking to establish between fiscal spending events and growth events, one might consider whether the selection of the fiscal event (in particular through conditions (ii) and (iii)) is biased towards selecting as fiscal events those that are followed by growth. Actually, due to the automatic response of government spending and taxes to output growth, a period of growth acceleration soon after the fiscal event will lead, other things equal, to a lower deficit. Hence, by construction, if there is an overlap in the fiscal and growth events definition' periods, we are more likely to select as fiscal events those that are followed by growth since a condition is imposed on the evolution of the fiscal deficit. However, as noted by Ilzetski and Végh (2008) or Perotti (2007) among the papers that have studied the cyclical behavior of fiscal policy in developing countries (see also Frankel et al. 2011, Kaminsky et al., 2004, and Gavin and Perotti, 1997), it is widely accepted that fiscal policy in these countries is typically pro-cyclical, i.e. the budget deficit is positively correlated with economic growth.

[2] Our desire to have a transparent and economically sensible homogeneous framework across countries led us not to use procedures that treat break dates as unknown variables to be estimated (see e.g. Bai and Perron, 1998, 2003). However, all turning points in GDP per capita growth or in primary expenditure growth that are qualified as "event" are significant at a 10% level. Hence, only smaller but statistically significant breaks may be identified by endogenous procedures. Moreover, as shown in the appendix, changes in "event" parameters do not affect results.

[3] As discussed by Perotti (2007), it is very difficult even in developed countries like the US where quarterly data and external information on GDP elasticities of revenues and transfers are both available to apply time-series methodologies to detect a fiscal discretionary policy shock (i.e. an unanticipated shock) in the data. Data requirements are too demanding to apply these (controversial) time-series methodologies to developing countries.

Several explanations have been advanced to explain the procyclicality of fiscal policy in developing countries. Gavin and Perotti (1997) have argued that developing countries face credit constraints that prevent them from borrowing with slow growth. Tornell and Lane (1999) show that competition for a common pool of funds among different units (ministries, provinces) leads to the so-called "voracity effect" whereby expenditure could actually exceed a given windfall. Alesina and Tabellini (2005) show that procyclicality is an optimal behavior in the presence voters with imperfect information and corrupt politicians. (Végh and Vuletin, 2011) give evidence that the other pillar of fiscal policy, taxation, is also pro-cyclical in developing countries. This evidence comes in addition to earlier evidence by Talvi and Vègh,(2005) that the inflation tax falls during expansion.

Hence, according to this pro-cyclical effect, if a growth event occurs in the year following a fiscal event, this should increase the deficit, and hence weaken the probability of observing fiscal events followed by a growth event (recall that an increase in discretionary fiscal expenditure associated with an increase in the fiscal deficit does not qualify as a fiscal event). One might even suspect our definition of fiscal event to underestimate, for the developing countries, the correlation with subsequent growth.

Fourth, we would not want to exclude countries that sought fiscal space through highly concessional borrowing even if this led to an increase in their deficit (since, despite high grant percentage as a share of the loan, such loans are not treated as grants). This suggests that one might wish to take an estimate of the grant component of such loans and include that portion in government revenue thereby relaxing the budgetary constraint. However, there is no data on the grant component of these loans. As an alternative, we redefined our fiscal event with a fourth condition allowing Low-income countries to increase their fiscal deficit during the fiscal spending growth period up to 4% of GDP (considering that for low income countries, external borrowing is likely to be on highly concessional terms). Results are reported in next section.

Finally, with better indicators of performance of government expenditures than GDP per capita growth, this "event-type" analysis could be extended directly to the indicators of fiscal expenditure that concern the debate on fiscal space, e.g. health and/or education expenditures and expenditures on transport & communication capturing then, for instance, event in budget reallocation between government functions for a given amount of total outlays. Unfortunately, as already mention, given the low quality of fiscal data, volatility in narrower series may be more difficult to interpret.

3. Patterns of Fiscal and Growth Events

Keeping in mind the shortcomings of this methodology, we take an exhaustive approach by constructing fiscal events for as many countries as possible. Since we are interested in the various components of fiscal expenditures, the best database is the IMF Government Financial Statistics

(GFS). GFS statistics are available for a large number of countries since 1972 and up to 2005.[4] Following most previous studies on fiscal expenditures we use data on fiscal expenditures by function (instead of expenditures by economic classification---i.e. by current vs. capital expenditures). [5] As described in annex A1, after reconciling the fiscal data, our "fiscal sample" includes 140 countries, of which 118 are developing (i.e. non High Income OECD countries).

For the growth database, we use the Penn World Table PWT 6.2 (see Heston et al., 2006) as our baseline data source.[6] Hence, the "growth" database covers 187 countries over the same period as the fiscal data base, i.e. 1972-2004. Taking into account missing data, the sample includes 5380 observations hence 87% of the potential number of observations (=6171=187 countries*33 years).

Turn now to the construction of growth and fiscal events as defined in section 2 and in the appendix. As mentioned above, due to the limitations imposed by the availability of fiscal data, we choose 5-year periods for both fiscal and growth events, i.e. $n = 4$. This means that the exercise covers the period 1977-2000. Because there is missing data, we have also imposed that data be available for 4 out of the 5 years entering each "window". If this condition is not satisfied, a missing value is entered for that "window". Having computed the fiscal and growth events on their respective databases, we merge the two into a final dataset (see annex A.2 for details, *not submitted for publication*). The resulting database includes 107 countries (84 developing countries, i.e. all non-High Income OECD countries), over 1977-2000. This leads to 1452 observations hence 57% of the potential number (=2568=107 countries*24 years).

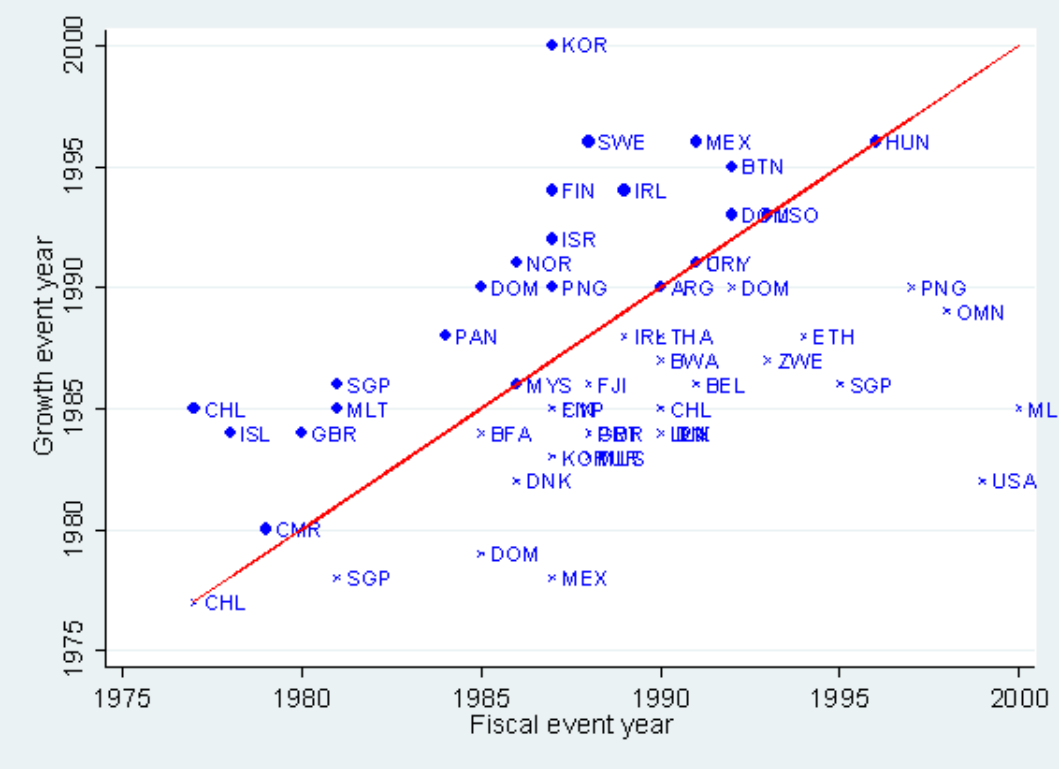
For this sample and for the parameter values selected here, we get 58 growth events and 95 fiscal events. This is our benchmark data set over which exploration takes place. As discussed in table A.1, the number of events is relatively insensitive to a range of plausible parameter values. Nor are changes in the pattern of events surprising when we change parameter values. Figure 1 plots a subset of events in this benchmark case: 25 fiscal events are simultaneous or followed by a growth event, 23 fiscal events are preceded by a growth event. The residual (47) events that are neither followed nor preceded by a growth event are not shown in the figure (also see the details in table A1).

[4] There was a major change in the GFS in 1989 causing concern about the comparability of data before and after that date (see details on the data reconciliation in annex A.1.2, *not submitted for publication*). Using box-plots, we explored the possibility of lack of comparability for the series of interest. Fortunately, as discussed in the annex A.1.2 (see figure A1, *not submitted for publication*), this is not the case.

[5] 86% of the observations rely on data consolidated at the central government sector level and the remainder 14% at the budget central government level. See annex A.1.3 for further discussion.

[6] Using WDI database is an alternative. As shown by HPR, this does not affect the results.

Figure 1. Growth events vs. fiscal events



Notes:

- 19 points strictly above the red line (growth event strictly preceded by fiscal event);
- 23 points strictly below the red line (growth event strictly followed by fiscal event);
- 6 points on the red line (growth event simultaneous to fiscal event, of which 4 in Latin America).

95-48=47 fiscal events with no associated growth events not shown in the figure.

ARG: Argentina; BTN: Bhutan; CHL: Chile; CMR: Cameroon; CRI: Costa Rica; DOM: Dominican Republic; FIN: Finland; GBR: United Kingdom; HUN: Hungary; IRL: Ireland; ISL: Iceland; ISR: Israel; KOR: Korea, Rep.; LSO: Lesotho; MEX: Mexico; MLT: Malta; MYS: Malaysia; NOR: Norway; PAN: Panama; PNG: Papua New Guinea; SGP: Singapore; SWE: Sweden; URY: Uruguay.

Source: *Authors' computation from GFS and PWT 6.2 data.*

Table 1 reports unconditional probabilities of these fiscal events.[7] For the whole sample and given our construction of a fiscal event, the probability of occurrence of a fiscal event is 9.7% and the probability of a growth event once a fiscal event has occurred is 26.3%. Table 1 also reports probabilities across countries ranked according to their income per capita and by region. Column 5 shows that, although the probability of occurrence of a fiscal event is fairly evenly spread across the income quartiles, the probability is higher for the lower quartiles (first and second). It is difficult to interpret this pattern since, as explained above, this definition of a fiscal event does not distinguish between fiscal policy shocks and systematic fiscal policy. If one can assume that fiscal policy shocks are not more prevalent among low and middle income countries, then the pattern would seem to indicate that fiscal policy is more volatile among low-income countries.[8] The probability that a fiscal event is followed by a growth event is much higher for the third quartile (i.e. for middle-income countries which are largely in Latin America). Note however, that the patterns suggest that fiscal policy may be pro-cyclical (but not destabilizing given our definition of fiscal event) in Latin America since, out of the 9 fiscal events associated with growth in Latin America, 4 are simultaneous (see figure 1), which seems to confirm earlier results (see e.g. Gavin and Perotti, 1997, Kaminsky et al. 2004 and Perotti, 2007). At the same time, It is clear that low-income countries have both a higher probability of having a fiscal event, but a lower probability of having a fiscal event followed by a growth event. This pattern is largely reflecting the distribution of fiscal and growth events in the Middle East and Sub-Saharan Africa. Suppose then that the success of a fiscal event can indeed be measured by whether or not it is followed by a growth event. One is then tempted to add that these patterns could reflect the quality of underlying institutions. Indeed, according to many indicators, Sub-Saharan Africa and the Middle East have bad scores on several indicators of institutional quality.

Note that when we use the alternative definition of fiscal event allowing Low-income countries to increase their average fiscal deficit during the fiscal spending growth period up to 4% of GDP, 3 additional fiscal events followed by a growth event are identified: Mali, Mauritius and Burkina Faso. Then, under this scenario, the probability that a fiscal event is followed by a growth event in Middle East and Africa increases from 11% to 21%.

[7] These probabilities are computed by dividing the numbers of events by the number of country-year observations in which an event could have occurred. The latter is calculated by summing all the observations in the sample and eliminating: (i) a 4-year window after the occurrence of each event since our qualifying conditions take this period as belonging to the same episode; (ii) the potential competing dates before the event that have been eliminated by the spline regression.

[8] This in accordance with Vegh and Vuletin (2011) who found that tax policy is more volatile in developing countries than in industrial countries in the sense that developing countries change their tax rates by larger amounts than industrial economies.

Table 1. Fiscal event probabilities *a/*

	Number of fiscal events :				Probability of occurrence :			
	Total fiscal events	Followed by a growth event	NOT followed by a growth event	obs. *b/*	Total fiscal events	Fiscal events followed by a growth event	Fiscal events NOT followed by a growth event	Probability that a fiscal event is followed by a growth event
	(1)	(2)	(3)	(4)	(5)=1/4	(6)=2/4	(7)=3/4	(8)=6/5
Total	95	25	70	977	9.7%	2.6%	7.2%	26.3%
First GDP pc Quartile c/	26	4	22	233	11.2%	1.7%	9.4%	15.4%
Second GDP pc Quartile	27	8	19	228	11.8%	3.5%	8.3%	29.6%
Third GDP pc Quartile	19	9	10	268	7.1%	3.4%	3.7%	47.4%
Fourth GDP pc Quartile	23	4	19	248	9.3%	1.6%	7.7%	17.4%
High Income OECD countries	21	6	15	297	7.6%	2.2%	5.4%	28.6%
Developing countries	74	19	55	680	12.2%	3.1%	9.1%	25.7%
Asia	17	5	12	171	11.0%	3.3%	7.8%	29.4%
Middle East & Africa	28	3	25	198	14.1%	1.5%	12.6%	10.7%
Latin America & Carib.	20	9	11	235	8.5%	3.8%	4.7%	45.0%
Europe & Central Asia	9	2	7	76	11.8%	2.6%	9.2%	22.2%

Notes: High Income country, i.e. with a 2006 GNI per capita (calculated using the World Bank Atlas method) greater than $11,116, Classification of July 2007.

a/ Computations based on benchmark set of parameters from table A.1, row 1 (58 growth events and 95 fiscal events).

b/ Obs. in which a fiscal event could have occurred.

c/ "First GDP pc Quartile" corresponds to "low income" and some "lower middle income" countries.

"Second GDP pc Quartile": "lower middle income" and some "upper middle income" countries.

"Third GDG pc Quartile": "high income" countries.

"Fourth GDP pc Quartile": "upper middle income" countries.

Source: *Authors' computation from GFS and PWT 6.2 data.*

4. Understanding Fiscal Events:

The Anatomy of fiscal Events. The benchmark set of parameters selected 95 fiscal events. Table 2 describes the changes in the composition of fiscal expenditures around these events. The table shows average values and changes for the 5-year period preceding the event and the 5-year following the event, comparing between events that preceded a growth event and events that did not precede a growth event, focusing on "Low and Middle Income" countries.

Table 2: Characteristics of Fiscal Events in Developing countries According to Their Timing with Growth Events [a/]

	fiscal event followed by a growth event			fiscal event NOT followed by a growth event		
	14/63			49/63		
	Average level			Average level		
	Pre-event (1)	Post-event (2)	change pp (3) =(2)-(1)	Pre-event (4)	Post-event (5)	change pp (6) =(5)-(4)
% of public expenditure in GDP	25.4*	24.0*	-1.4	23.0*	21.7*	-1.3
% of public deficit in GDP	-3.4	-0.3*	3.2*	-3.4	-1.2*	2.3*
Expenditures by function (in % of total public exp.)			change % =(2-1)/(1)			change % =(5-4)/(4)
Education	12.8	14.4	13%	14.1	15.3	9%
Health	8.4*	8.8*	5%	5.7*	6.2*	8%
Transport and Communication	6.4	6.6*	3%*	6.3	5.8*	-7%*
General (non interest) public services	16.5*	15.4*	-7%*	21.3*	19.3*	-10%*
Defense	6.0*	5.5*	-8%*	11.7*	10.0*	-14%*
Housing and community amenities	4.5*	4.2	-7%*	2.7*	3.9	43%*
Recreation, culture, and religion	1.5	1.0	-30%	1.7	1.4	-13%
Others (residual)	43.9	44.1	0%	36.5	38.0	4%

Notes: Developing countries are defined as low and middle income countries, with a 2006 GNI per capita (calculated using the World Bank Atlas method) lower than $11,116, Classification of July 2007.

* Test of difference in mean between fiscal event NOT followed by a growth event compared to fiscal event followed by a growth event (i.e. col. 4, 5, 6 compared to col. 1, 2 and 3 respectively). An asterisk indicates significance at 5% level.

a/ Based on the benchmark set of parameters, see table A.1, row 1.

Source: *Authors' computation from GFS and PWT 6.2 data.*

First note that the level of the deficit in GDP is lower during fiscal events followed by a growth event, a result that is corroborated by the regression analysis below.[9]

Three other significant differences appear when one compares the evolution of fiscal expenditure for the two groups of events. First, fiscal events followed by growth events devote fewer resources to general public services. Second, fiscal events followed by a growth event are characterized by a growing share of transport and communication expenditure whereas the pattern is the opposite when the fiscal event is not followed by a growth event. Third, though the difference in means is not statistically significant, there is a higher growth in education expenditures when the fiscal event is followed by a growth event than when it is not (and the opposite pattern holds for health expenditures). These results support findings in a growth regression framework. Easterly and Rebelo (1993), Kneller et al. (1999) or Gupta et al. (2005) found that "balanced budget and investment in transport and communication are consistently correlated with growth in a sample of low income countries" (Gupta et al. 2005). The latter also provide evidence that countries where spending is concentrated on wages tend to have a lower growth.

Correlates of Growth Events. As a final exercise, as in HPR, we check if fiscal events enter the set of growth event correlates. The dependent variable is then a dummy that takes the value of 1 in the 3-year window around the date of growth acceleration (and 0 otherwise), the 3-year window (as in HPR) reflecting the uncertainty attached to the identification of the first year of a specific growth event.[10] The comparison group for a growth event consists of the countries that have not had a growth episode in that same 3 years. We estimate the following probit[11] where the binary dependant variable (the 3-year window around the date of the year of the growth event, GE_{it}) is regressed on several determinants:

$$\Pr\left(GE_{it}=1\right)=\phi\left(\alpha_0+\alpha_1 FE_{it}+\alpha_2 WW_{it}+\alpha_3 TOT_{it}+\alpha_4 HI_{it}+\sum_{t-1}\beta_t D_t\right) \text{ for } i=1..104;\ t=1..24 \qquad (1)$$

where:

ϕ is the cumulative normal distribution;

FE_{it} is a dummy variable that takes the value of 1 at the date of the fiscal event as defined in the benchmark above and during the four years following this date;

WW_{it} is a proxy for trade (and other) reforms, i.e. a dummy taking the value of 1 during the first five years of a transition towards openness as defined by WW (2008);

[9] As discussed in section 2, insofar as the growth event occurs during the 5-year period when the fiscal deficit is computed, there could be a mechanical effect whereby the fiscal deficit will be lower during spells of high growth. On the other hand, the evidence for developing countries shows that fiscal expenditures and fiscal deficits are higher during periods of high growth (more capital inflows and "voracity" effects in the political cycle).

[10] Growth events are computed according to the same benchmark with 58 growth events. Because we are interested in predicting the timing of growth events, we drop all data corresponding to years *t+2...t+4* of a growth event. The sample then consists of all countries for which the relevant data are available, including countries that have not experienced growth episodes.

[11] We also fit a *logit*. Both *probit* and *logit* fit maximum likelihood models with dichotomous dependent variables coded as 0/1. With a *logit* model, equation (1) would be identical except for ϕ which is the cumulative logistic distribution rather than the cumulative normal distribution. It is difficult to theoretically justify the choice between these two models. Note that the logistic distribution being very similar to the normal one, results are usually identical. However, some differences in results could appear in very unbalanced sample, i.e. in a sample in which there are many more 0s than 1s, which is our case. This is why, as a robustness check, we also present logit estimation results.

TOT_{it} is a proxy for any external shock, i.e. a dummy taking the value of 1 if the change in the terms of trade for country i and year t is in the upper 90% of the entire sample. Following HPR, this variable is introduced to capture exceptionally favorable external circumstances;[12]

HI_{it} is a dummy equals to one for High Income countries;

$\sum_{t-1} D_t$ is a full set of year effects.

In equation (1), the year dummies capture the effects of omitted time-related variables like common shocks across countries that could account for a growth event. As to the fiscal dummy event variable, FE_{it}, it is a way to test whether, on average, growth events are preceded by fiscal events. The inclusion of the WW_{it} dummy for trade reform is both to capture the potential growth effects of a trade reform, but also the effects of other ongoing reforms since, very often, trade reforms are part of a broader package of reforms. Finally, as pointed out by Easterly et al. (1993), it is also plausible that many growth acceleration are triggered by favorable external conditions, especially in our context where, due to the short length of time series, we defined growth events over a 5-year window.[13] To control for this, we introduce the TOT_{it} dummy.

[12] The change in the terms of trade is computed as the first difference of the log of the terms-of-trade index , the latter defined as the ratio of export prices to import prices using the current and constant price values of exports and imports from WDI. We use this index instead of the more traditional net-barter index because of its broader coverage. However, this measure has the disadvantage that it includes the service export sector (see the discussion in Loayza and Raddatz, 2007).

[13] Easterly et al. (1993) showed that about 10 percent of the variation in GDP growth and a quarter of the variation in growth volatility can be explained by the observed differences in the volatility of terms-of-trade changes.

Table 3: Probit Estimates of Growth events

Dependent variable: Dummy for the timing of growth events						
	Probit	Probit	Probit	**Probit**	Logit	Logit
Col.	(1)	(2)	(3)	**(4)**	(5)	(6)
FE_{it} *(fiscal event dummy)*	.055*	0.065*	0.075**	**0.094****	0.072**	0.088**
	0.033	*0.04*	*0.035*	***0.044***	*0.034*	*0.04*
$FE_{it} * \overline{def}_{t-4,t-1}$	-	-	0.026**	**0.039****	0.025**	0.043**
			0.010	***0.017***	*0.01*	*0.018*
$\overline{def}_{t-4,t-1}$			0.001	**0.0002**	0.0008	0.004
			0.003	***0.004***	*0.003*	*0.037*
WW_{it} *(Trade liberal. dummy)*	-0.050	-0.082*	-0.038	**-0.051**	-0.031	-0.042
	0.050	*0.037*	*0.053*	***0.052***	*0.054*	*0.722*
TOT_{it} *(Terms of trade dummy)*	0.162*	0.154*	0.153*	**0.139***	0.145*	0.938
	0.105	*0.108*	*0.101*	***0.100***	*0.11*	*0.707*
DC_t *(developed-country dummy)*	0.008	-	0.009	**-**	0.01	-
	0.035		*0.033*		*0.031*	
Year effects	yes	yes	yes	**yes**	yes	yes
Sample	All	non HI	All	**non HI**	All	non HI
Obs.	977	518	977	**518**	977	518
Pseudo R^2	0.07	0.08	0.09	**0.10**	0.09	0.10
observed proportion of GEit=1	13.2%	13.5%	13.2%	**13.5%**	13.2%	13.5%

Estimation by probit. Coefficients are marginal probabilities evaluated at the sample means.

standard errors below coefficients: heteroscedasticity consistent and adjusted for country-level clustering; * : p=0.1, **: p=0.05. See text for definition of variables.

HI stands for "High Income" countries as defined by the World Bank, July 2007.

We allow for a five-year lag between a change in the underlying determinant and a growth event. The timing of the growth event is the three year window centered on the initiation dates.

Source: *Authors' computation.*

Before commenting on the results, one should caution about the endogeneity problems, especially of the fiscal event dummy. It could be that in country-events when growth is anticipated to be unusually high, one might think that policy-makers would increase discretionary public spending (simultaneous bias if this increase occurs with a decreasing associated deficit). Unfortunately, we lack appropriate instruments, so the results should be interpreted accordingly.

Cols. (1) and (2) in table 3 report the marginal coefficients corresponding to the estimation of (1) on the whole and on the "non high income" samples respectively. Hence, the reported coefficients give directly the change in the probability that a growth event occurs for a discrete change of the corresponding dummy variable from 0 to 1.

Col. (1) which reports estimates for *all* countries, shows that the coefficient associated with FE_{it} is significantly positive (at the 10% level) implying that, on average, a fiscal event increases the probability of experiencing a growth event in the five consecutive years by 5.5 percentage points.

Turning to the variable that captures the five years following economic reform (other than fiscal) through trade liberalization, WW_{it}, surprisingly, the coefficient is negative in col. (1) and (2), only significant in col.(2). This coefficient was also negative and not significantly in HPR. However, this surprisingly negative coefficient does not necessarily contradict WW (2003) results since when they study the timing of the growth response to trade liberalization they find that, in the 3 pre-liberalization years, growth is slightly depressed and that, in the 3 years following liberalization, the effect is not significantly different from zero. However, an increase in growth becomes noticeable (of around 1.5 percentage point) after 4 years.[14]

As expected, we observe a strong conditional correlation between external shocks and the probability of a growth event: a large positive terms-of-trade shocks increases the probability of experiencing a growth event by 16.2 percentage points (significant at a 10% level). This confirms that the incidence of external shocks and, in particular, fluctuations in the terms of trade plays an important role. Finally, the high income dummy is not significantly different from zero so that when we limit our sample to "non high income" countries (see col. 2), coefficients remains very similar.

Recent literature assessing the effects of public expenditures on growth (e.g. Kneller *et al.*, 1999, Bose *et al.*, 2007, and Adam and Bevan, 2005) has emphasized the importance of incorporating the budget constraint. Here we then introduce the average deficit in the years preceding the potential growth event, i.e. the deficit/surplus level $\overline{def}_{t-4,t-1}$ (we do not include year *t* in the average to limit the reverse causation bias). The introduction of this variable provides insights on the correlation of the stabilization versus growth objective of fiscal policy and acceleration in growth

[14] Remember that one of the conditions for a growth event in this paper is an increase in the annual growth rate of per capita GDP of at least 2 pp. Hence, if we redefine the dummy WW_{it} in order to capture the years [t+5 and more] after the trade liberalization instead of [t; t+4] as previously, we obtain a positive coefficient but not statistically significant.

which cannot be done by the introduction of the fiscal event dummy alone (as our definition of fiscal event is based on a mix of these 2 objectives).

We also check whether the impact of a fiscal event on the probability of a growth event is directly correlated with the level of the current deficit by introducing the fiscal event dummy FE_{it} interactively with its associated deficit/surplus level.[15]

Results reported in col. (3) and (4) show that, if the deficit by itself is not significant, the interaction coefficient is significantly positive (at 5% level) indicating that the marginal impact of a fiscal event depends on both coefficients (associated to FE_{it} and $FE_{it} * \overline{def}_{t-4,t-1}$). This means that the probability of occurrence of a growth event in the 5 years following a fiscal event is greater the lower the associated fiscal deficit, confirming the prima facie appropriateness of fiscal policy as a stabilizing device.

This also suggests that acceleration in the growth rate is not associated with stabilization alone: it needs to be accompanied by an increase in fiscal expenditure, and more so if the increase in expenditure is geared towards expenditures on infrastructure as we have shown in table 2. Coefficient values associated with WW_{it} and TOT_{it} remain unchanged.

To ease interpretation, table 4 reports for a typical Low and Middle Income country, the relationship between a fiscal event and the occurrence of a growth event for different values of the associated deficit/surplus. As indicated in the table, for a typical Low or Middle Income country and in the absence of a fiscal event in the five preceding years, the probability of a growth event is around 9.7%.[16] This probability is quite higher than in case of a fiscal event with an associated fiscal deficit equals to 3% of GDP (-2.26 percentage point of difference).[17] The probability of a growth event increases to 10.8% in case of a fiscal event in a deficit situation of 2% of GDP, and reaches 26.8% in a surplus situation of 1%, implying an increase in growth event probability of 17.2 percentage point compared to the no-fiscal-event alternative. Remember that to be qualifying as fiscal event this deficit can not increase with public expenditure.

[15] Of course, the fiscal deficit/surplus situation is implicitly already taken into account as one of the conditions defining what we call a "Fiscal event" is that a deficit situation must improve.

[16] Based on results in table 3, col.(4) with $FE_{it} = 0$, all other variables set at their sample mean.

[17] Based on results in table 3, col.(4) with $FE_{it} = 1$, all other variables set at their sample mean.

Table 4: Interpretation of Probit Model Results [a/]

	No Fiscal Event	Fiscal Event associated with an average deficit of:				
		-3%	-2%	-1%	0%	1%
Probability of occurrence of a growth event in the 5 following years b/	9.70%	7.39%	10.75%	15.08%	20.44%	26.80%
Change in growth event probability from a no fiscal event situation		-2.26 pp	1.10 pp	5.43 pp	10.79 pp	17.15 pp

Note: *pp* stands for percentage points.

a/ Evaluation based on coefficients of the equation reported in column 4, table 3.

b/ Evaluation of $\phi\left(\alpha_0 + \alpha_1 FE_{it} + \alpha_1 FE_{it} * def_{t-5,t-1} + \alpha_2 \overline{WW}_{it} + \alpha_3 \overline{DC}_{it} + \sum_{t-1} \beta_t \overline{D}_t\right)$

for different values of FE_{it} and $def_{t-5,t-1}$, all other variables evaluated at their sample mean, ϕ representing the standard cumulative normal distribution.

Source: *Authors' computation.*

Finally, table 5 reports statistics of the predictive ability of this Probit model. It is customary to take a prediction rule with a threshold value is p* = 0.5, on the basis that we would predict a 1 if the model says a 1 is more likely than a zero :

GE_{it}=1 if the predicted probability $\hat{\phi} > p^*$

However, because of the unbalanced sample with many more 0s than 1s, we set p* equal to the proportion of 1's in the sample (which corresponds to the average predicted probability in the sample).

Taking this criterion, table 5 suggests that the basic model as defined in table 3, column (4), successfully predicts 74% of the growth events (i.e. GE_{it}=1) and 56.4% of total cases of no growth events (i.e. GE_{it}=0). Hence, 61.4% of total growth event observations are correctly predicted. Since this measure of goodness of fit depends on the cutoff selected to classify the predicted GE_{it}, one should only interpret the results in table 5 as indicative orders of magnitude.

Table 5: Prediction Accuracy of the Probit Model [a/]

Share of actual GE_{it} predicted by the model

		actual		
		GE=1	GE=0	Total
predicted	GE=1	10.0%	35.1%	45.2%
	GE=0	3.5%	51.4%	54.8%
	Total	13.5%	86.5%	100%

Correctly classified = 61.45%

a/ computation based on coefficients reported in column 4 in table 3 , cutoff =13.4% (value for determining whether an observation has a predicted positive outcome).

Source: *Authors' computation.*

We carry out four robustness checks. First, as discussed above, we estimate a logit function (which has fatter tails and may be more appropriate for our sample with many zero values for the dependent variable). Results in columns (5) and (6) of table 3 show that the logit specification does not change the qualitative conclusions based on results in col. (3) and (4). Second, we change the definition of FE_{it} with (i) the dummy that takes the value of 1 at the date of the fiscal event and during the *9* years following this date (instead of 4), giving more time for the effects of a fiscal event to have an impact on growth and (ii) different parameters in the "fiscal event" definition (corresponding to the sensitivity analysis in table A.1). Third, we reran the benchmark regression without the trade liberalization dummy. Fourth, as fiscal data became more reliable over time, we checked the robustness of our results by restraining the sample to the 1990-2000 period. Fourth, we considered the dependent variable as censored at zero and used a Tobit estimator. Reflecting poor-quality fiscal data, estimates from the Tobit regression using actual values for growth and primary spending yielded large standard errors. In all four robustness checks, the results were largely unchanged, so we do not report them here.

5. Conclusions

This paper constructed growth and primary spending expenditures (i.e.net of interest payments) "events" over the period 1972-2005 for 118 developing and 22 High Income OECD countries. Fiscal expenditures were compiled by Government function, and "events" were sought over 5-year rolling windows. Significant "events" were approximately constructed as follows. For GDP per capita, acceleration in the average annual growth rate of 2 percentage point per annum (ppa) between any rolling 5-year window would qualify for a growth "event". For fiscal expenditures (expressed in GDP%), an increase in the average growth rate of approximately 1 ppa that would

not be accompanied by an aggravation of the (consolidated central government) fiscal deficit beyond 2% of GDP would likewise qualify for a fiscal "event". The resulting benchmark constructed data set (merging both fiscal and growth databases) had 58 growth events and 95 fiscal events over a sample included 107 countries (84 developing countries) over 1977-2000 (1452 observations).

For this sample, the (unconditional) probability of occurrence of a fiscal event is about 10%, and, for a large range of parameter values for the selection of a "significant" event, the probability of a growth event once a fiscal event had occurred is in the 22%- 28% range. The probability of occurrence of a fiscal event is higher for the bottom half of the income distribution of countries, but the probability that this fiscal event is followed by a growth event is higher for the third quartiles, corresponding to middle income countries (which are largely in Latin America). The probability of a fiscal event *not* followed by a growth event is significantly higher for the Africa region, prompting us to note that this result is coherent with the view that the success of a growth-oriented fiscal expenditure package hinges on the quality of the institutional environment.

Concentrating on the Low and Middle Income sample of 84 countries, the paper investigates the differences in the pattern of functional expenditures for fiscal events followed by growth events compared to those not followed by a growth event. In addition to a significantly lower fiscal deficit for fiscal events followed by a growth event (which is partly an outcome of the way events were constructed), three other significant differences appear. First, fiscal events followed by growth events devote fewer resources to general public services. Second, fiscal events followed by a growth event are characterized by a growing share of transport and communication expenditure whereas the pattern is the opposite when the fiscal event is not followed by a growth event. Third, though the difference in means is not statistically significant, there is a higher growth in education expenditures when the fiscal event is followed by a growth event than when it is not.

This description of the anatomy of fiscal events and their relation to growth events is completed by statistical analysis where a few controlling factors are included in a probit estimate of growth events on fiscal events. On average, we find that a growth event is more likely to occur when surrounded by a fiscal event. Second, controlling for the growth-related effects of other reforms and for favorable external conditions shocks, we estimate that for a typical developing country, the probability of occurrence of a growth event in the five years following a fiscal event is increased as the associated fiscal deficit is limited.

APPENDIX

FISCAL AND GROWTH EVENTS: DEFINITIONS AND SENSITIVITY ANALYSIS

Growth acceleration. The criterion is GDP per capita growth at time t over horizon t to $t+n$,. i.e. $g_{t,t+n}$ defined by the following:

$$\ln\left(y_{t+i}\right) = a + g_{t,t+n} * i, \quad i = 0, \cdots, n \qquad (2)$$

y_t being the GDP per capita (from the PWT 6.2, see Heston et al. 2006). The change in the criterion function is given by the change in the OLS estimated growth rate over horizon n across that horizon:

$$\Delta g_{t,n} = \hat{g}_{t,t+n} - \hat{g}_{t-n-1,t-1} \qquad (3)$$

A growth acceleration will be identified when, during rapid growth episodes, the following conditions are all satisfied:

$$\begin{aligned} &\hat{g}_{t,t+n} \geq \alpha \ ppa \quad \textit{growth is rapid} \\ &\Delta g_{t,n} \geq \beta \ ppa \quad \textit{growth accelerates} \\ &y_{t+n} \geq \max\left\{y_i\right\}, i \leq t \quad \textit{post-growth output exceeds pre-episode peak} \end{aligned} \qquad (4)$$

where ppa is percentage points per annum, α is minimum per capita growth that must be satisfied during the period (3.5 ppa for HPR and for us in our base case) and β is the minimum acceleration that must be satisfied (2.0 ppa in the benchmark case). Since several years of events could be following one another, the timing of the initiation of the growth acceleration episode is chosen by fitting for each candidate year the following spline regression:

$$\ln\left(y_{t+i}\right) = a_0 + g_{t-n-1,t+n} * i + a_1 DE + vg_{t+i,t+n} * i * DE, \quad i = -n-1, \cdots, n \qquad (5)$$

where DE is a dummy variable that takes a value of 1 for the candidate event year. Equation (5) is estimated by OLS over each candidate year, and the selected event year is the one for the regression with the highest F-test (i.e. highest R^2).

Fiscal events. From the GFS data , we define primary expenditures (*dfe*) as total fiscal expenditures less interest payments (*ip*). The government budget constraint (small case variables represent variables expressed as a share of GDP) is:

$$trg \equiv dfe + ip + def \qquad (6)$$

with *trg* the total revenue and grants in % of GDP, and *def* the fiscal deficit/surplus in % of GDP.[18] Using the same notation as above to define the length over which changes in the ratio of primary spending takes place:

$$\left(dfe_{t+i}\right) = a + g^{dfe}{}_{t,t+n} * i, \quad i = 0, \cdots, n \tag{7}$$

An acceleration in primary spending will be identified when there is an increase in the estimated growth of ratio of primary expenditures as a percentage of GDP, Δg^{dfe}. Define now $\overline{def}_{t,t+n}$ as the average deficit (as a % of GDP) over the period so that the change in deficit between two adjacent periods is

$$\Delta def_{t,n} \equiv \overline{def}_{t,t+n} - \overline{def}_{t-n-1,t-1} \tag{8}$$

We impose two criteria for an increase in ratio of primary expenditures growth, Δdfe, to qualify as a fiscal "event". The first criterion deals with situations when the increase in expenditures takes place from a situation of fiscal deficit. Take then the case of a fiscal deficit in the period preceding the candidate fiscal event and let δ be the selected threshold value for the central government deficit. In our sample, for developing countries, the average (central government) fiscal deficit was 2%. So, if increasing primary expenditures take place from a situation of deficit, i.e. when $\left(\overline{def}_{t-n-1,t-1} < \delta\right)$, we require an improvement in the fiscal deficit of λ (with $\lambda = 0$ corresponding to a situation of no deterioration) . This gives rise to the condition on the second line of (9).

$$\begin{aligned} &\Delta g^{dfe}{}_{t,t+n} \geq \phi,\ \phi > 0 \quad \textit{discretionary expenditure growth is rapid} \\ &\begin{cases} \Delta def_{t,n} \geq \lambda \ \textit{ if } \ \overline{def}_{t-n-1,t-1} < \delta \ \textit{ a deficit situation must improve} \\ \overline{def}_{t,t+n} \geq \gamma \ \textit{ if } \ \overline{def}_{t-n-1,t-1} > \delta \ \textit{ a limit on a growing deficit} \end{cases} \end{aligned} \tag{9}$$

In the case of a more favorable initial situation (i.e. $\left(\overline{def}_{t-n-1,t-1} > \delta\right)$), we wish to exclude events where the shift to a deficit results in an average deficit in excess of γ during the period $\left(t, t+n\right)$. This is the criterion in the third line of (9).

Sensitivity analysis. Table A1 reports the results of a sensitivity analysis. In the benchmark case, we choose $\alpha = 0.035; \beta = 0.02; y_{t+n} \geq \max\left\{y_i\right\}$ in equations (4). This case reported in row 1 yields 58 growth events. For the corresponding benchmark fiscal events, we settled for

[18] *def*<0 is defined as a deficit and *def*>0 a surplus.

the following fiscal parameter set $\phi = 0.01; \lambda = 0; \gamma = -0.02; \delta = 0$ which yields 95 fiscal events. As shown in table A1, tighter conditions always lead to less qualifying events. However, the ratio of fiscal events followed by a growth event remains in the 22%-28% range, except when we require that the fiscal event be accompanied throughout by a fiscal *surplus* in which case 41% of fiscal events are followed by a growth event (row 8). Likewise, rows 9-13 carry out similar sensitivity analysis for the growth event parameters. Finally, note that if we define periods of 8 years instead of 5 (n=7), the benchmark set of parameters leads to 52 fiscal events and 18 growth events over the reduced period 1980-1997.

Table A.1: Benchmark Events and Sensitivity Analysis

	Total number of events in		**Growth events preceded by a fiscal event**		**Fiscal event**									
					followed by a growth event		*including the ones simultaneous to growth events*		*Also preceded by a growth event*		**only preceded by a growth event**		**w/o any growth event**	Total
	Growth	Fiscal												
	(1)	(2)	(3)	**(3)/(1)**	(3)	**(3)/(2)**	(4)	(4)/(2)	(5)	(5)/(2)	(6)	**(6)/(2)**	(7)	**(7)/(2)**	(3)+(6)+(7)/(2)
Benchmark Growth Event - unchanged $(\alpha = 0.035; \beta = 0.02; y_{t+n} \geq \max\{y_i\})$															
Fiscal Event conditions:															
1. $\phi = 0.01; \lambda = 0; \gamma = -0.02; \delta = 0$	58	95	25	**43.1%**	25	**26.3%**	*6*	*6.3%*	*7*	*7.4%*	23	**24.2%**	47	**49.5%**	100%
2. $\phi = 0.005; \lambda = 0; \gamma = -0.02; \delta = 0$	58	123	28	**48.3%**	28	**22.8%**	*6*	*4.9%*	*6*	*4.9%*	29	**23.6%**	66	**53.7%**	100%
3. $\phi = 0.02; \lambda = 0; \gamma = -0.02; \delta = 0$	58	49	14	**24.1%**	14	**28.6%**	*4*	*8.2%*	*1*	*2.0%*	11	**22.4%**	24	**49.0%**	100%
4. $\phi = 0.02; \lambda = 0; \gamma = -0.02; \delta = -0.02$	58	95	25	**43.1%**	25	**26.3%**	*6*	*6.3%*	*6*	*6.3%*	24	**25.3%**	46	**48.4%**	100%
5. $\phi = 0.01; \lambda = -0.02; \gamma = -0.02; \delta = 0$	58	107	27	**46.6%**	27	**25.2%**	*7*	*6.5%*	*6*	*5.6%*	26	**24.3%**	54	**50.5%**	100%
6. $\phi = 0.01; \lambda = 0.01; \gamma = -0.02; \delta = 0$	58	81	23	**39.7%**	23	**28.4%**	*5*	*6.2%*	*4*	*4.9%*	19	**23.5%**	39	**48.1%**	100%
7. $\phi = 0.01; \lambda = 0; \gamma = -0.02; \delta = 0$; $ge_{t,t+n} > 0$	58	87	21	**36.2%**	21	**24.1%**	*3*	*3.4%*	*8*	*9.2%*	22	**25.3%**	44	**50.6%**	100%
8. $\phi = 0.01$; $\overline{def}_{t,t+n} \geq 0$	58	37	15	**25.9%**	15	**40.5%**	*3*	*8.1%*	*4*	*10.8%*	10	**27.0%**	12	**32.4%**	100%
Fiscal Event condition unchanged $(\phi = 0.01; \lambda = 0; \gamma = -0.02; \delta = 0)$															
Growth Event conditions:															
9. $\alpha = 0.035; \beta = 0.02; y_{t+n} \geq \max\{y_i\}$	58	95	25	**43.1%**	25	**26.3%**	*6*	*6.3%*	*7*	*7.4%*	23	**24.2%**	47	**49.5%**	100%
10. $\alpha = 0.02; \beta = 0.02; y_{t+n} \geq \max\{y_i\}$	74	95	31	**41.9%**	31	**32.6%**	*5*	*5.3%*	*9*	*9.5%*	27	**28.4%**	37	**38.9%**	100%
11. $\alpha = 0.035; \beta = 0.01; y_{t+n} \geq \max\{y_i\}$	70	95	28	**40.0%**	28	**29.5%**	*6*	*6.3%*	*9*	*9.5%*	25	**26.3%**	42	**44.2%**	100%
12. $\alpha = 0.02; \beta = 0.01; y_{t+n} \geq \max\{y_i\}$	95	95	33	**34.7%**	33	**34.7%**	*6*	*6.3%*	*14*	*14.7%*	30	**31.6%**	32	**33.7%**	100%
13. $\alpha = 0.035; \beta = 0.02;$	72	95	29	**40.3%**	29	**30.5%**	*6*	*6.3%*	*6*	*6.3%*	25	**26.3%**	41	**43.2%**	100%

Source: Authors' computation from GFS and PWT 6.2 data.

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ANNEXES

TO

Fiscal Spending and Economic Growth: Some Stylized Facts

Annex A.1 details the construction of the "fiscal" database that serves for the computation of fiscal events. Annex A.2 presents the database used to compute the growth events and the final database resulting from the merging of the "fiscal" and "growth" databases.

A.1. Fiscal Database

A 1.1. Definition of Variables and Conversion of 1986 GFS data into the 2001 GFS format.

A.1.2. Data Consistency Check for the Change in GFS series.

A.1.3. Sector and Data Availability in the Fiscal Database.

A.2 Consolidated Database

A.1. Fiscal Database

To define the fiscal event, we use the IMF Government Financial Statistics (GFS) database. GFS is the main data source for most empirical cross-country studies on government expenditures. The reason for its popularity is that it is the only database offering comparable data on public expenditure for a large sample of countries in the world including many developing countries. As noted by Estache et al. (2006), "this does not mean that the data are good" (see Estache et al. 2006 pages 6-7 for a survey on the main problems with these data). Keeping these limitations in mind, we are able to compute the notion of a fiscal event as defined in body of the paper.

Annex A.1.1 reports in details the definition of the fiscal variables used in the study with notably the classification of expense by function of Government according to the GFS manual 2001. Because there was a major change in the data series between 1989 and 1990 when the definition of variables in the GFS changed, we also explain in detail in annex A.1.1 the conversion of 1986 GFS data (i.e. the GFS system that covers data from 1972 to 1989) into the 2001 GFS format (i.e. GFS system that covers data from 1990 to 2004) for our budgetary variables, i.e., Total Revenue, Total expense (or outlays), and the decomposition of outlays by functions.

Because there was this major change in the data series between 1989 and 1990, we also checked if there was a break in the converted series of interest for this study. The box plots are reported in

Annex A.1.2. To our relief, figure A1 does not indicate a break in the series around 1989-1990 justifying our keeping this year in the sample.

Finally, the countries/years with available data on total revenue, total expenditure, and disaggregated expenditure by function are reported in **Annex A.1.3**, table A3. We use data at the consolidated central government sector level and at the budgetary central government level if the former is not available. Then the "fiscal" database used in the study includes the 140 countries (including 22 High income OECD countries) listed in table A1 and extends over 1972-2005. This amounts up to 1904 observations for each variable.

A.1.1. Definition of Variables and Conversion of 1986 GFS data into the 2001 GFS format.

GFS 1986 data are by definition on a cash basis. Hence, we complete data with GFS 2001 data in the "Statement of sources and Uses of Cash" (and not in the "statement of Government Operations", recorded on an accrual basis). Box A.1(a) gives a description of the Statement of sources and Uses of Cash as defined in the GFS manual (GFSM) 2001.

BOX A.1: Classification of GFSM 2001.

(a) Statement of sources and uses of cash:

Cash flows from operating activities:

1 Cash receipts from operating activities
11 Taxes
12 Social contributions
13 Grants
14 Other receipts

2 Cash payments for operating activities
21 Compensation of employees
22 Purchases of goods and services
24 Interest
25 Subsidies
26 Grants
27 Social benefits
28 Other payments

Net cash inflow from operating activities

Cash flows from investments in nonfinancial assets:

31.1 Purchases
311.1 Fixed assets
312.1 Strategic stocks
313.1 Valuables
314.1 Nonproduced assets

31.2 Sales
311.2 Fixed assets
312.2 Strategic stocks
313.2 Valuables
314.2 Nonproduced assets

Net cash outflow from investments in nonfinancial assets

Cash surplus/deficit

1) Classification of the Function of Government.
2) By sector of the counterparty to the financial instrument.
Source: GFSM 2001.

(b) The classification Coding system for GFS:

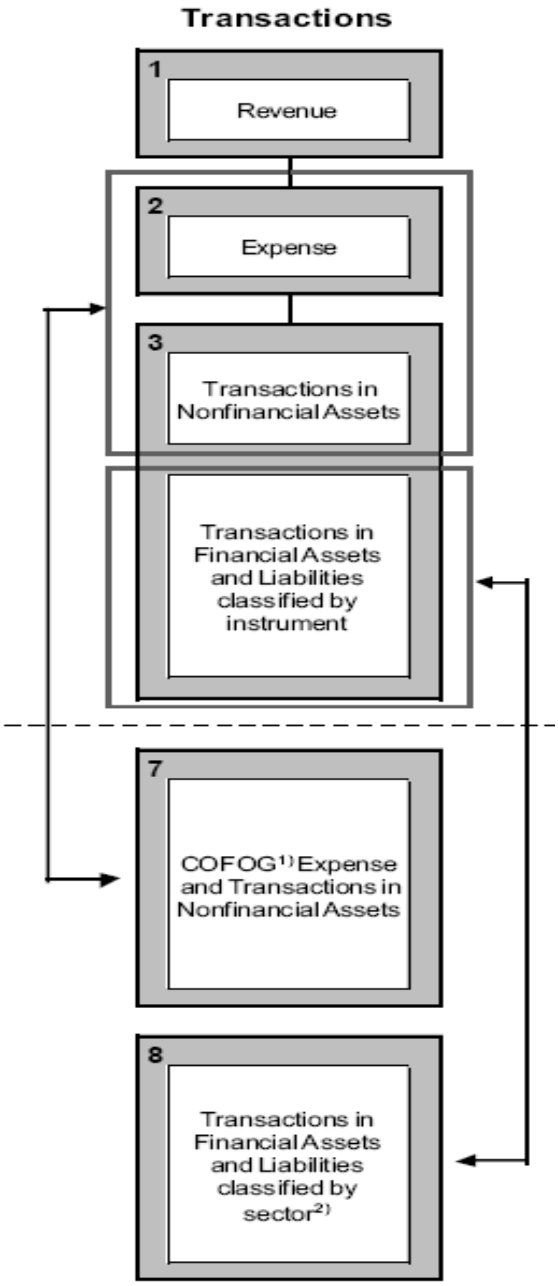


Table A.1 report the conversion of 1986 GFS data into the 2001 GFS format for our budgetary variables, i.e., Total Revenue, Total expense (or outlays), and the decomposition of outlays by functions. The classification of functions of Government (COFOG) is a detailed classification of the functions, or socioeconomic objectives, that general government units aim to achieve through various kinds of outlays. This classification has been published by the United Nations and has been revised. The GFSM 2001 incorporates the revised COFOG (reported in Box A.2) and table A.1 takes also into account the correspondence between different COFOG versions.

Box A.2: Classification of expense by Function of Government

7	**Total outlays**
701	**General public services**
7011	Executive and legislative organs, financial and fiscal affairs, external affairs
7012	Foreign economic aid
7013	General services
7014	Basic research
7015	R&D[1] General public services
7016	General public services n.e.c.[2]
7017	Public debt transactions
7018	Transfers of a general character between different levels of government
702	**Defense**
7021	Military defense
7022	Civil defense
7023	Foreign military aid
7024	R&D Defense
7025	Defense n.e.c.
703	**Public order and safety**
7031	Police services
7032	Fire protection services
7033	Law courts
7034	Prisons
7035	R&D Public order and safety
7036	Public order and safety n.e.c.
704	**Economic affairs**
7041	General economic, commercial, and labor affairs
7042	Agriculture, forestry, fishing, and hunting
7043	Fuel and energy
7044	Mining, manufacturing, and construction
7045	Transport
7046	Communication
7047	Other industries
7048	R&D Economic affairs
7049	Economic affairs n.e.c.
705	**Environmental protection**
7051	Waste management
7052	Waste water management
7053	Pollution abatement
7054	Protection of biodiversity and landscape
7055	R&D Environmental protection
7056	Environmental protection n.e.c.
706	**Housing and community amenities**
7061	Housing development
7062	Community development
7063	Water supply
7064	Street lighting
7065	R&D Housing and community amenities
7066	Housing and community amenities n.e.c.
707	**Health**
7071	Medical products, appliances, and equipment
7072	Outpatient services
7073	Hospital services
7074	Public health services
7075	R&D Health
7076	Health n.e.c.
708	**Recreation, culture, and religion**
7081	Recreational and sporting services
7082	Cultural services
7083	Broadcasting and publishing services
7084	Religious and other community services
7085	R&D Recreation, culture, and religion
7086	Recreation, culture, and religion n.e.c.
709	**Education**
7091	Pre-primary and primary education
7092	Secondary education
7093	Postsecondary nontertiary education
7094	Tertiary education
7095	Education not definable by level
7096	Subsidiary services to education
7097	R&D Education
7098	Education n.e.c.
710	**Social protection**
7101	Sickness and disability
7102	Old age
7103	Survivors
7104	Family and children
7105	Unemployment
7106	Housing
7107	Social exclusion n.e.c.
7108	R&D Social protection
7109	Social protection n.e.c.

[1]R&D = Research and development.
[2]n.e.c. = not elsewhere classified.

source: GFSM 2001, page 76

Table A.1. Conversion of 1986 GFS data into the 2001 GFS format (*Source: Authors based on GFSM 2001 and 1986*)

		2001 GFS CLASSIFICATION			1986 GFS CATEGORY	IMF DATABASE CODE(S)	
Revenue	=	**1**	**Cash Receipts from operating activities** (taxes, Social contribution, Grants, others Receipts including nontax revenue)	= **A.I**	**Total revenue and grants** (tax and nontax revenue, Grants, and Capital revenues including the sales of nonfinancial assets i.e. sales of fixed capital assets, stocks, and land and intangible assets -A13.; A14.; A15.)	1 =	81...zg
	+	**31.2**	**Sales of nonfinancial assets** (Fixed assets, Strategic stocks, Valuables, Nonproduced assets)				
	=	7	**Total outlays**	= **B.I**	**Total expenditure**	7 =	82..zg
			2 cash payments for operating activities (Compensation of employees, Purchases of goods and services, Interest, Subsidies, Grants, Social Benefits, Other payments)	(=C.II)	(Expenditure on goods and services including Compensation of employees, Interest, Subsidies, Capital expenditure including the purchases of nonfinancial assets i.e. Acquisition of fixed capital assets, stocks, and land and intangible assets - C4.; C5.; C6.)		
			31.1 Purchases of nonfinancial assets (Fixed assets, Strategic stocks, Valuables, Nonproduced assets)				
	=	**701**	**General public services** (Executive and legislative organs, financial and fiscal affairs, external affairs, Foreign economic aid, General Services, Basic Research, R&D General public services, Public debt transactions, others)	= B1. + B14.	General public services Expenditures not classified by major group	701 =	82a..zg + 82k..zg
		7017	*Public debt transactions*	*B14.0.1*	*Expenditure on interest payments*	*7017 =*	*82pa.zg*
	+	**702**	**Defense** (Military defense, Civil defense, Foreign military aid, R&D defense, others)	+ B2.	Defense affairs and services	702 =	82b..zg
	+		**Transport and Communication**	+ B12.	Transport and Communication		
		7045	Transport (Road, Water, Railway, Air, Pipeline and others)			7045+	82hi.zg
		7046	Communication			7046 =	*
	+	**706**	**Housing and community amenities** (Housing and Community development, Water supply, Street lighting, R&D , others)	+ B7.	Housing and community amenity affairs and services	706 =	82f..zg
	+	**707**	**Health** (Medical products, appliances, and Equipment, Outpatient services, Hospital services, Public health services, R&D health, others)	+ B5.	Health affairs and services	707 =	82d..zg
	+	**708**	**Recreation, culture, and religion** (Recreational and sporting services, Cultural services, Broadcasting and publishing services, Religious and other community services, R&D, others)	+ B8.	Recreational, cultural, and religious affairs and	708 =	82g..zg
	+	**709**	**Education** (Pre-primary and primary, Secondary, Postsecondary nontertiary, Tertiary Education, Subsidiary services to educations, R&D, others)	+ B4.	Education affairs and services	709 =	82c..zg
Expenditure	+		**Others**				
		703	Public order and safety	B3.	Public order and safety affairs	703 =	82ac.zg
		704	Economic affairs (others than Transport and Communication)	B9-13	Economic affairs	704 =	82h..zg-82hi.zg
		705	Environmental protection	B7.3	Sanitary affairs and services	705 =	*
		710	Social protection	B6.	Social security and welfare affairs and services	710 =	82e..zg

See the GFS Manual 2001 "Classification of GFSM 1986 data to the GFSM 2001 Framework", October 2002 for a full explanation.

* Not separately available from, or does not exist, in the 1986 GFS classifications.

According to the GFS manual (GFSM) 2001, COFOG is applied to government expense and the ***net*** acquisition of nonfinancial assets. In total, these are referred as government outlays (see box A1). With this definition, the GFSM 1986's category of Total expenditure (category B.I) is only a proxy for total outlays (category 7) because Total expenditure includes expenses plus the acquisition of nonfinancial assets and no details exist in GFSM 1986 to classify the sales of fixed assets, stocks, and land and intangible assets (categories A13, A14, A15) to the GFSM 2001/COFOG categories.[19]

However, observation of the data in the GFSM 2001 framework reveals that total outlay is still equal--on a cash reported basis--to "cash payments for operating activities + purchases of nonfinancial assets" (column 1 in table A2: 56 cases out of 77 correspond to this definition in 1995) instead of "operating activities + net cash outflow from investment in nonfinancial assets" assets"(column 2 in table A2: 1 case out of 77 corresponds to this definition).

Table A2. Computation of "Total Outlays" in the GFSM 2001 data for 1995 and 2000

year	(1)	(2)	(3)	(4)	
1995	56	1	12	8	77
	73%	1%	16%	10%	100%
2000	24	9	7	6	46
	52%	20%	15%	13%	100%

(1) Case 1: Outlays= cash payments for operating activities + purchases of nonfinancial assets

(2) Case 2: Outlays= cash payments for operating activities + net cash outflow in nonfinancial assets

(3) Status quo: both cases 1 and 2 are correct as sales on nonfinancial assets are nil.

(4) Both cases 1 and 2 are not correct, but case 1 is always clearly closest to the correct amount of outlays.

Source: *authors' computation, Computed on available data for the Budgetary Central government, from the "statement of sources and uses of cash" and the "outlays by functions of governments, GFS 2001 CD-ROM*

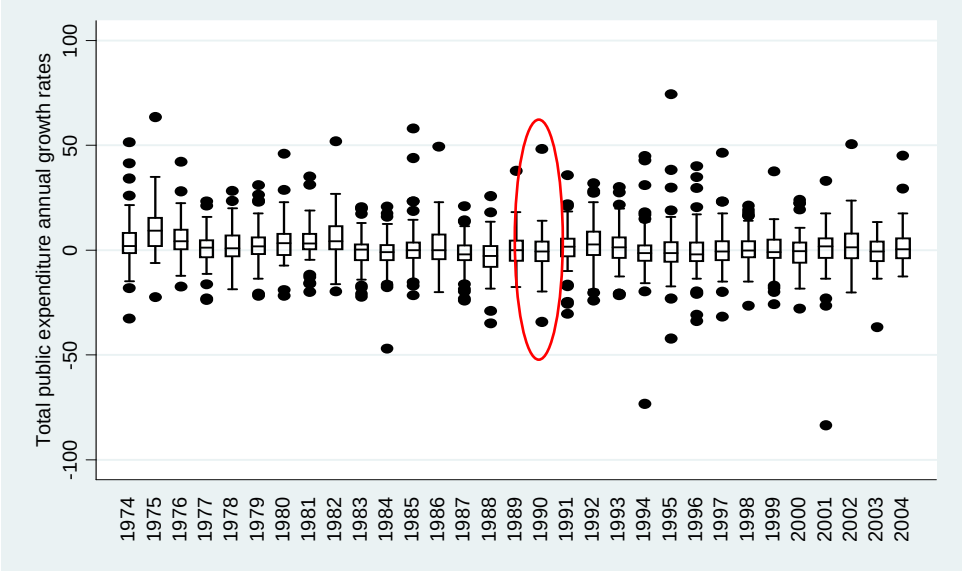
Hence, we take into account this definition of total outlays in GFSM 2001 and adapt the table of the GFSM 1986 conversion as reported in Table A.1, i.e. with the purchase of nonfinancial assets included in Total outlays and sales in nonfinancial assets included in Total Revenue, in both GFSM 1986 and 2001. Note that whatever the definition of outlays and revenue, the overall Deficit/surplus are still defined as Outlays minus Revenue, i.e. the net cash inflow from operating activities minus the net cash outflow from investment in "nonfinancial assets".

[19] See pages 18-19, Classification of GFSM 1986 Data to GFSM 2001 framework, October 2002.

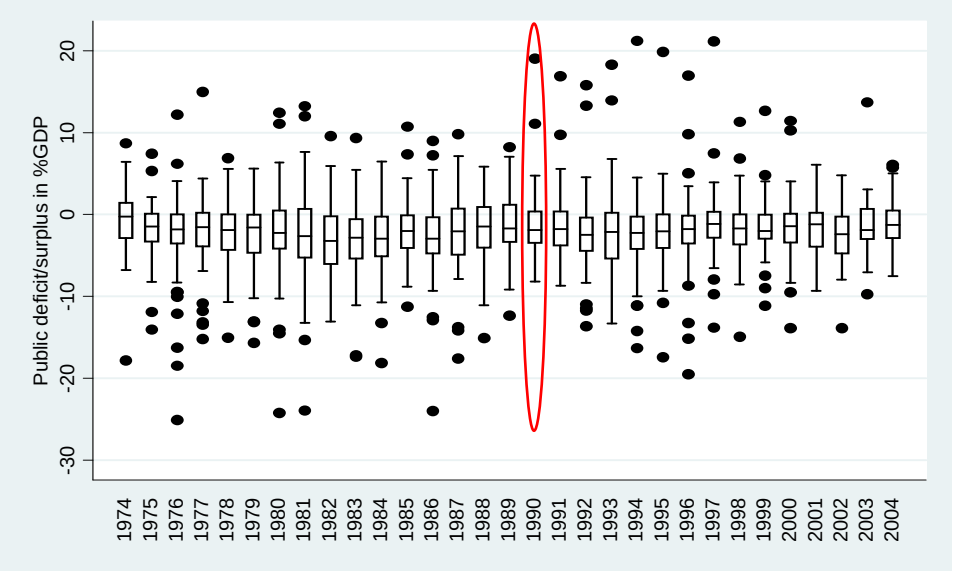
A.1.2. Data Consistency Check for the Change in GFS series.

Figure A.1. Data consistency check for the change in GFS series (check for break in the data between 1989 and 1990)

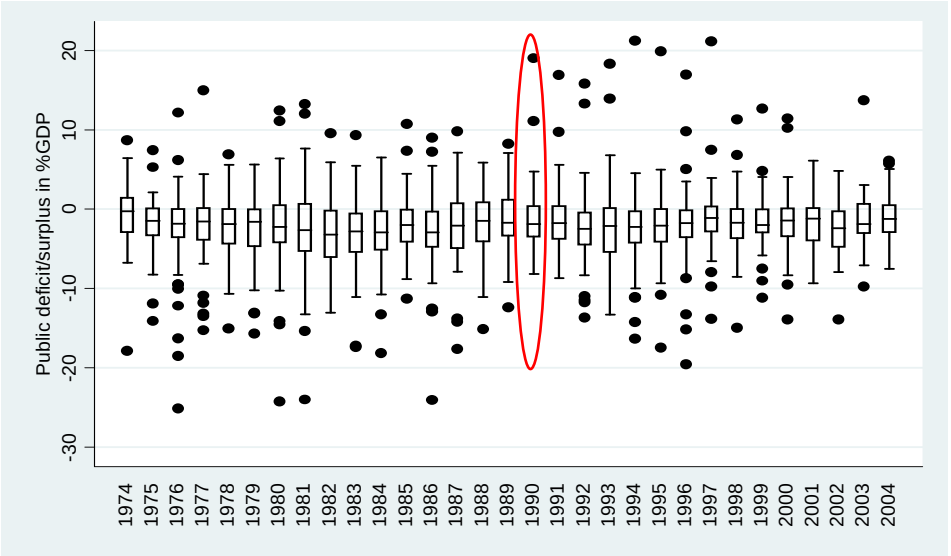
(a) Annual growth rate of total public expenditure in GDP



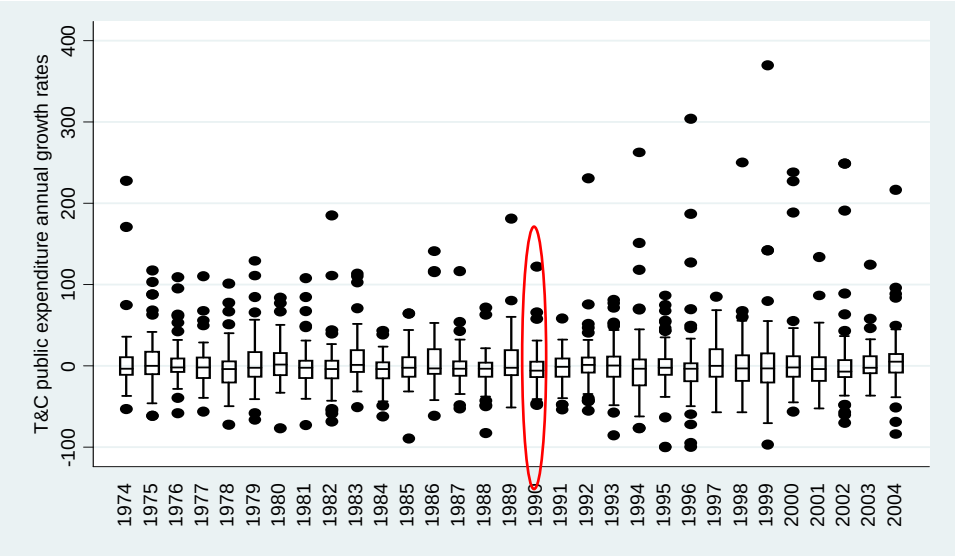
(b) Public deficit in GDP



(c) Annual growth rate of Education expenditure in total public expenditure



(d) Annual growth rate of Transport and Communication expenditure in total public expenditure



Source: *Authors' computation from GFS data.*

A.1.3. Sector and Data Availability in the Fiscal Database

Finally, Table A3 defines the sample used to compute the fiscal event. We keep only the countries/years for which data are available, on a *cash basis of recording*, on total revenue, total expenditure, and disaggregated expenditure by function i.e. expenditure in General public services / Public debt transaction/ Defense/ Transport and Communication / Housing and Communities / Health / Recreation, Culture and Religion/ Education / Others (see definition in details in Annex A.1.1).

We use data at the consolidated central government sector level (CG) and at the budgetary central government level (BA) if the former is not available over the studied period. For each country included in the fiscal database (see column 1), we indicate in column 4 the corresponding government level we use. Note that 73% of the countries have fiscal variables reported at the CG level which corresponds to 86% of the observations.

For each country, the maximum number of observations is 34 (from 1972 to 2005). We report in column (2) the number of observations actually available for each country. On average, by country, the GFS database includes only 14 years over the 34 potential ones (40%). We also indicate in column (5) and (6) the first and last years available, and if the series within this period is continuous (in which case there are zero missing value) or if some years are missing (and if so how many). This information is in column 7.

The resulting "fiscal" database used in the study then includes the 140 countries (including 22 High Income OECD countries) over 1972-2005 with 1904 observations (which represents 40% of the potential number of observations, 140*34=4760).

Note that for OECD countries, data in recent years are rarely available. This is due to the fact that these countries have recently changed from a cash to an accrual basis of recording with no possible conversion.

Table A.3. Fiscal Sample

Country	Country Code	# Obs	Reported Sector a)	Available years b)		Missing Values
				First	Last	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
High Income OECD countries						
AUSTRALIA*	193	27	CG	1972	1998	0
AUSTRIA*	122	23	CG	1972	1994	0
BELGIUM*	124	17	CG	1972	1988	0
CANADA*	156	32	CG	1974	2005	0
DENMARK	128	28	CG	1972	1999	0
FINLAND*	172	26	CG	1972	1997	0
FRANCE*	132	19	CG	1975	1993	0
GERMANY*	134	23	CG	1972	1994	0
GREECE*	174	10	CG	1972	1981	0
ICELAND*	176	26	CG	1972	1997	0
IRELAND*	178	13	CG	1982	1994	0
ITALY*	136	14	CG	1973	1988	2
JAPAN*	158	3	CG	1991	1993	0
LUXEMBOURG*	137	24	CG	1972	1995	0
NETHERLANDS*	138	21	CG	1974	1994	0
NEW-ZEALAND	196	11	BA	1991	2001	0
NORWAY*	142	26	CG	1972	1999	2
SPAIN*	184	22	CG	1972	1994	1
SWEDEN*	144	28	CG	1972	1999	0
SWITZERLAND*	146	25	CG	1972	2002	6
UNITED-KINGDOM*	112	28	CG	1972	1999	0
UNITED-STATES*	111	29	CG	1972	2000	0
Developing countries						
AFGHANISTAN	512	3	BA	2003	2005	0
ALBANIA	914	7	BA	1995	2004	3
ALGERIA	612	6	BA	1994	1999	0
ARGENTINA	213	30	CG	1972	2001	0
AZERBAIJAN	912	6	CG	1994	1999	0
BAHAMAS*	313	16	BA	1990	2005	0
BAHRAIN*	419	32	CG	1974	2005	0
BANGLADESH	513	4	BA	2001	2004	0
BARBADOS*	316	18	CG	1972	1989	0
BELARUS	913	13	CG	1992	2005	1
BELIZE	339	8	BA	1990	1997	0
BENIN	638	3	CG	1977	1979	0
BHUTAN	514	21	CG	1982	2004	2
BOLIVIA	218	15	CG	1987	2001	0
BOTSWANA	616	7	BA	1990	1996	0
BRAZIL	223	19	CG	1972	1998	8
BULGARIA	918	18	CG	1988	2005	0

Country	Country Code	# Obs	Reported Sector a)	Available years b)		
				First	Last	Missing Values
BURKINA-FASO	748	15	CG	1973	1989	2
BURUNDI	618	11	CG	1973	1996	13
CAMEROON	622	13	CG	1976	1994	6
CENTRAL-AFR.-REP.	626	1	CG	1981	1981	0
CHILE	228	15	CG	1972	1986	0
CHINA,P.R.	924	13	BA	1990	2004	2
CHINA-MACAO	546	3	CG	1996	1998	0
COLOMBIA	233	8	BA	1990	1997	0
COMOROS	632	1	CG	1984	1984	0
CONGO-DEM-REP-OF	636	17	CG	1972	1997	9
CONGO-REPUBLIC-OF	634	2	CG	1982	1983	0
COSTA-RICA	238	29	CG	1972	2003	3
CROATIA	960	15	BA	1991	2005	0
CYPRUS*	423	26	CG	1972	1997	0
CZECH*	935	13	CG	1993	2005	0
DOMINICAN-REPUBLIC	243	29	CG	1973	2004	3
ECUADOR	248	1	BA	1990	1990	0
EGYPT	469	22	CG	1975	1997	1
EL-SALVADOR	253	12	BA	1990	2001	0
ESTONIA*	939	11	CG	1991	2001	0
ETHIOPIA	644	12	BA	1990	2002	1
FIJI	819	9	BA	1990	2005	7
GAMBIA	648	1	BA	1990	1990	0
GEORGIA	915	9	CG	1997	2005	0
GHANA	652	8	BA	1990	2004	7
GUATEMALA	258	11	BA	1990	2005	5
HONDURAS	268	8	CG	1972	1979	0
HUNGARY	944	19	CG	1981	1999	0
INDIA	534	28	CG	1977	2004	0
INDONESIA	536	31	CG	1973	2004	1
IRAN	429	33	CG	1972	2005	1
ISRAEL*	436	28	CG	1972	1999	0
JAMAICA	343	6	BA	2000	2005	0
JORDAN	439	16	BA	1990	2005	0
KAZAKHSTAN	916	9	CG	1997	2005	0
KENYA	664	14	BA	1991	2004	0
KOREA, REP.* c)	542	30	CG	1972	2005	4
KUWAIT*	443	23	CG	1972	1999	5
KYRGYZ	917	9	BA	1993	2001	0
LATVIA	941	12	CG	1994	2005	0
LEBANON	446	4	CG	1993	1996	0
LESOTHO	666	16	CG	1972	2004	17
LIBERIA	668	15	CG	1974	1988	0
LITHUANIA	946	8	BA	1993	2000	0

Country	Country Code	# Obs	Reported Sector a)	Available years b)		
				First	Last	Missing Values
MADAGASCAR	674	12	CG	1972	1997	14
MALAYSIA	548	18	CG	1972	1995	6
MALDIVES	556	27	CG	1979	2005	0
MALI	678	8	CG	1976	1988	5
MALTA	181	26	CG	1972	1998	1
MAURITIUS	684	33	CG	1973	2005	0
MEXICO	273	29	CG	1972	2000	0
MOLDOVA	921	10	CG	1996	2005	0
MONGOLIA	948	10	CG	1992	2002	1
MOROCCO	686	24	CG	1972	1999	4
MYANMAR	518	30	CG	1973	2002	0
NAMIBIA	728	3	BA	2001	2003	0
NEPAL	558	33	CG	1972	2005	1
NETHERLANDS-ANTILLES*	353	24	CG	1972	1995	0
NICARAGUA	278	14	CG	1972	1994	9
NIGER	692	5	CG	1976	1980	0
OMAN	449	12	BA	1990	2001	0
PAKISTAN	564	8	CG	1998	2005	0
PANAMA	283	29	CG	1973	2001	0
PAPUA-NEW-GUINEA	853	13	BA	1990	2002	0
PARAGUAY	288	17	CG	1972	1989	1
PHILIPPINES	566	16	BA	1990	2005	0
POLAND	964	7	CG	1994	2000	0
ROMANIA	968	22	CG	1980	2001	0
RUSSIA	922	3	CG	1999	2001	0
SENEGAL	722	6	CG	1975	1984	4
SEYCHELLES	718	13	CG	1993	2005	0
SIERRA-LEONE	724	1	BA	1990	1990	0
SINGAPORE*	576	33	CG	1972	2004	0
SLOVAK	936	7	CG	1996	2002	0
SLOVENIA*	961	13	CG	1993	2005	0
SOUTH-AFRICA	199	4	BA	1995	2003	5
SRI-LANKA	524	16	BA	1990	2005	0
ST.-KITTS-AND-NEVIS	361	3	CG	1985	1987	0
ST.-VINCENT-&-GRENADINES	364	2	BA	1990	1993	2
SUDAN	732	2	BA	1998	1999	0
SURINAME	366	6	CG	1972	1986	9
SWAZILAND	734	2	BA	1999	2000	0
SYRIAN-A.-REP.	463	24	CG	1972	1999	4
TAJIKISTAN	923	4	CG	1998	2001	0
TANZANIA	738	11	CG	1972	1985	3
THAILAND	578	31	CG	1972	2002	0
TONGA	866	10	CG	1980	1989	0
TOGO	742	7	CG	1977	1987	4

Country	Country Code	# Obs	Reported Sector a)	Available years b)		
				First	Last	Missing Values
TRINIDAD-&-TOBAGO*	369	13	CG	1976	2004	16
TUNISIA	744	34	CG	1972	2005	0
TURKEY	186	25	CG	1972	1998	2
UGANDA	746	3	BA	2001	2003	0
UKRAINE	926	5	CG	1999	2005	2
UNITED-ARAB-EM.*	466	3	BA	1997	1999	0
URUGUAY	298	25	CG	1972	2000	4
VANUATU	846	13	CG	1981	1997	4
VENEZUELA	299	6	CG	1999	2005	1
WEST-BANK-AND-GAZA	487	1	BA	2005	2005	0
YEMEN	474	10	BA	1990	1999	0
ZAMBIA	754	10	BA	1990	1999	0
ZIMBABWE	698	19	CG	1976	1997	3

***** means that corresponding countries are classified as a High Income country, i.e. with a 2006 GNI per capita (calculated using the World Bank Atlas method) greater than $11,116, Classification of July 2007

a) Government sectors: CG Central Government (consolidated)/ BA Budgetary Central Government

b) Reports the first and last years available, and if the series within this period is continuous (zero missing value) or if some years are missing (and how many).

c) High income and Signed the Convention founding the OECD in December 1996 but mainly non OECD over the studied period.

Source: *Authors' computation from GFS data.*

A.2. Consolidated Database

The consolidated database is obtained by merging the fiscal database with the growth event database discussed below.

To compute the growth event, we use the Penn World Table PWT 6.2 as our baseline data source. As in HPR 2005 (who use PWT 6.1 over 1950-1999), we eliminate all countries with fewer than 15 data points. Hence, the "growth" database covers 187 countries over the same period as the "fiscal database", i.e. 1972-2004. It includes 5380 observations which amounts to 87% of the potential number of observations (=6171=187 countries*33 years).

Once the fiscal and growth events have been computed on their respective databases, we merge the two into a final dataset. This data set includes 107 countries (84 developing countries), over 1977-2000. This leads to 1452 observations which is 57% of the potential number (=2568=107 countries*24 years).

For the probit estimation, since we drop all data corresponding to years *t+2*...*t+4* of a growth event and due to the lack of availability for the terms of trade variable, the sample we use for estimating equation (1) included 104 countries (71 "non high income" countries), over 1977-2000, and 1127 observations (706 for the "non high income" sample). Note that there are still 50 growth events (29 for "non high income" countries) and 73 fiscal events (54 for "non high income" countries) in this sample, with 22 cases of fiscal events followed by a growth event (14 for "non high income" countries).

FERDI

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