Fiscal Crises

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Abstract

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A key objective of fiscal policy is to maintain the sustainability of public finances and avoid crises. Remarkably, there is very limited empirical analysis on fiscal crises. This paper presents a new database of fiscal crises covering different country groups, including low-income developing countries (LIDCs) that have been mostly ignored in the past. Countries faced on average two crises since 1970. We also shed some light on policies and economic dynamics around crises. Surprisingly, advanced economies face greater turbulence, with half of them experiencing economic contractions. Fiscal policy is usually procyclical around fiscal crises and we also find that the decline in economic growth is magnified if accompanied by a financial crisis.

Keywords: fiscal crisis, sovereign debt, economic growth, twin crises

I. Introduction

We fear fiscal crises, but do not know much about them. The term, coined by James O'Connor (1973), came to prominence in the wake of the oil crisis and the breakdown of the Bretton Woods system to denote a "structural gap" between public revenues and expenditures when growth plummeted, and unemployment and inflation surged. Yet, fiscal crises may be triggered by other imbalances in the economy or exogenous shocks.[3] In addition, in the aftermath of the global economic and financial crisis of the late 2000s, there

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[3] For example, a financial crisis may put the budget under pressure either directly due to a need to bail out banks (e.g., Ireland in 2010) or via a sharp economic deterioration and subsequent fall in tax revenues.

is greater interest in how to avoid fiscal crises, including via well-designed fiscal adjustments (Mauro, 2011). However, there is little empirical research about fiscal crises. What is the frequency and duration of crisis episodes? How disruptive are they? Do they have a persistent impact on economic growth? These are just some of the questions that need answers to better understand and prevent these periods of heightened fiscal distress, which can be accompanied by large and abrupt declines in growth (Figure 1.1).

Figure 1.1. Ten of the Worst Crises Since 2005
(decline in the real GDP p.c. growth rate, percentage points)
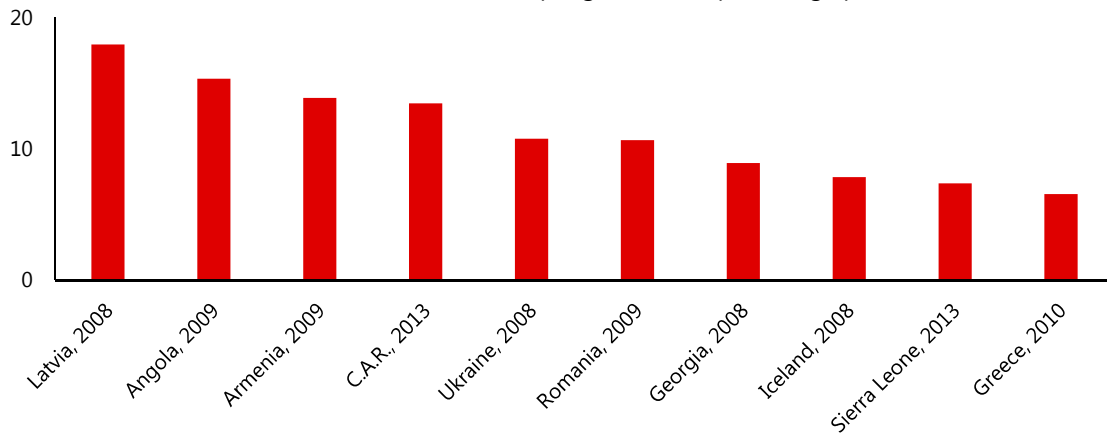
Source: Authors' own calculations, based on IMF data.
Note: difference in simple averages of real GDP p.c. growth rate of the three years preceding a crisis and the three years after the onset of the crisis.

The literature, with rare exceptions, focuses on identifying public debt crises triggered by external default episodes (e.g., Detragiache and Spilimbergo, 2001; Chakrabarti and Zeaiter, 2014). This was complemented by large-scale official financing (e.g., Manasse, Roubini, and Schimmelpfennig, 2003) and, to a very limited degree, evidence on domestic public debt defaults (e.g., Reinhart and Rogoff, 2009 and 2011; Gourinchas and Obstfeld, 2012). While defaults are an important part of the story, they do not capture all periods of fiscal crisis.

In this paper, we take a broader approach to identify and build a new database of fiscal crises. We look at periods of extreme fiscal distress, when large fiscal imbalances led to the

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adoption of extreme measures (e.g., debt default and monetization of the deficit). We develop a new database building on the work by Baldacci and others (2011),[4] however, our approach relies on enhanced criteria to identify fiscal crises.

Our database includes developing countries, which remain underrepresented in the literature and where fiscal crises have unique characteristics. We expand the country coverage to 188 countries, over 1970-2015, more than double the size of the sample relative to many other studies. We identify 436 fiscal crisis episodes with countries facing on average two crises between 1970 and 2015. LIDCs have the highest frequency of crises, while advanced markets (AMs) have the lowest. Surprisingly, however, the decline in growth around crisis periods is larger in AMs.

We use the database to better understand the patterns of fiscal crises and their economic impact across different country groups and crisis identification triggers. While not necessarily implying causality, our findings shed some light on the crisis periods. In terms of policies, we find that crises are accompanied by disruptive fiscal adjustments—countries must curtail spending growth at a time when economic conditions are worsening. Importantly, taking exceptional measures (e.g., debt default, monetization of the deficit) does not appear to eliminate the need for a fiscal adjustment. This is consistent with the finding that public debt tends to rise in the first years of the crisis and only gradually decline afterwards. However, when the crisis is associated with credit events that only involve official creditors, debt falls quickly. The data also suggest economic growth usually declines

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[4] Baldacci and others (2011) compile a set of criteria to identify fiscal crises over 1970-2010. Bruns and Poghosyan (2016) extend the dataset through 2015. These papers focus on assessing the likelihood of entering a crisis, and do not study the crisis period itself. Also, their sample is limited to advanced and emerging markets.

sharply at the onset of crises. AMs and emerging markets (EMs) face the deepest contraction in the growth rate and about half of them go through recessions. Lastly, we find that twin (fiscal and external) deficits usually deteriorate in the pre-crisis years.

The evidence also shows that twin crises (fiscal-financial) experience a deeper decline in growth than stand-alone fiscal crises. Finally, we assess whether fiscal crises have a persistent effect on output and public debt using impulse response functions (IRFs). The data suggests a negative permanent impact on real GDP across all countries, while the impact on public debt varies.

The remainder of the paper is organized as follows. The next section presents the new database and criteria used to identify fiscal crises, as well as key patterns of the crisis episodes. Section III takes advantage of the database to study the macro-fiscal dynamics around fiscal crises. Section IV concludes.

II. Database of Fiscal Crisis Episodes
A. Conceptual Framework

We use the term fiscal crisis to describe a period of heightened budgetary distress, resulting in the sovereign taking exceptional measures. In normal times, a government collects revenues and borrows to fund its expenditures. A country may experience fiscal distress, when large imbalances emerge between inflows and outflows. These imbalances may lead to a fiscal crisis if the country is not able to sufficiently adjust its fiscal position—i.e., it may face an acute funding distress and need for exceptional and disruptive actions (e.g., default on its debt or print money to finance the deficit). More concretely, this can be thought of as a disruption in the normal debt dynamics:

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$$d_t = d_{t-1} * (r_t - g)/(1 + g_t) - p_t + SF_t$$

where the debt-to-GDP ratio d_t depends on the initial stock of debt in t-1, effective interest rate r_t (derived from the interest expense in t divided by the debt stock in t-1), nominal GDP growth rate g_t, the primary balance-to-GDP ratio p_t, and a residual reflecting stock-flow adjustments SF_t. (capturing e.g., exchange rate movements or materialization of contingent liabilities).

A fiscal crisis can happen for several reasons. As the debt equation shows, there may be several factors driving a country to unsustainable fiscal positions, including policies or economic shocks. First, the buildup of large budgetary imbalances may make the debt path unsustainable and lead to a loss of market access. Second, changes in key macro-financial variables (such as the cost of borrowing, exchange rate, and economic growth) can trigger a fiscal crisis. Large fiscal imbalances can also arise due to exogenous shocks, for example arising from a banking crisis or large drops in commodity prices (see IMF, 2015a).[5]

Our focus is on extreme and disruptive episodes of fiscal policy. We are not including cases where countries managed to address imbalances via large fiscal adjustments, while avoiding a fiscal crisis. While these periods may involve some distress, it would be difficult to objectively separate "normal" fiscal adjustments from the more painful ones. Even if a threshold was set, it would also be difficult to appropriately measure fiscal policy adjustments across countries and time, as variations in fiscal balances could reflect many

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[5] For a discussion of factors that may help predict a period of fiscal distress see also Cottarelli (2011), IMF (2011), or Baldacci and others (2011).

factors that are not under the control of policymakers.[6] As such, our empirical strategy focuses on identifying the extreme cases, when countries adopt exceptional measures.

B.   Identification Methodology and Data Issues

In order to empirically identify fiscal crises, our focus is on periods of extreme funding difficulties. The identification strategy, partly building on Baldacci and others (2011), employs a combination of four distinctive criteria: (1) credit events associated with sovereign debt (e.g. outright defaults and restructuring); (2) recourse to large-scale IMF financial support; (3) implicit domestic public default (e.g., via high inflation rates); and (4) loss of market confidence in the sovereign. These criteria are complementary, as individual indicators may not capture all fiscal crises.

This paper advances the identification methodology, and data quality, from the literature in several ways. We increase the country coverage to include 188 countries across all levels of development between 1970 and 2015. We expand the set of criteria and use new data sources.[7] We add two new sub-criteria: accumulation of domestic arrears and a measure of loss of market access. The credit event criterion is more comprehensive and takes advantage of quantitative estimates of sovereign defaults.

Identification Criteria

(1) Credit events
This criterion captures any year in which the actions of the sovereign reduce the present value of its debt owed to official or other creditors. Due to data limitations, the focus is

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[6] For example, the ex-post adjustment in the fiscal balance could reflect large variations in revenue due to economic growth or commodity prices. Trying to correct for these would imply being able to assess potential GDP and identify policy measures, among others, which would be difficult given data limitations.
[7] See Annex 1 for details on the data, coverage, and sources.

mainly on external debt. This criterion relates the most to the literature on sovereign defaults (e.g., Detragiache and Spilimbergo, 2001; Chakrabarti and Zeaiter, 2014). However, apart from publicly disclosed outright defaults, it can be difficult to determine if a sovereign debt operation (such as a debt equity swap or buybacks) reduced the present value of debt and made creditors incur a loss. Previous attempts at identifying crises also faced the problem of dealing with technical defaults and their continued reporting.[8]

Unlike previous approaches, we take into consideration the defaulted amounts to better identify credit events. We use the Bank of Canada's (BoC, 2016) annual database on the aggregated nominal stock of sovereign debt obligations in default, with the latter defined as any debt operation that inflicts an economic loss on creditors.[9] The database includes sovereign defaults to both private and official creditors (e.g., Paris Club or international financial institutions). With local currency defaults only reported sporadically, the database mainly contains external defaults on sovereign debt denominated in foreign currency.

Our approach refines the credit event criterion in two ways. First, we exclude small-scale technical defaults (default amounts below 0.2 percent of GDP)[10] and also cases of continued reporting of previously defaulted amounts (i.e., defaulted nominal amounts that grow by less than 10 percent per year). This helps avoid signaling a perpetuation of a crisis only because of factors such as lengthy regularization procedures and the accumulation of late interests.

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[8] Technical defaults include those related to debt payment delays due to administrative procedures and debt management capacity issues. Continued reporting of default captures those related to delayed regularizations due, for instance, to legal and negotiation reasons. This is a common phenomenon among many countries (see also Reinhart and Rogoff, 2011a).

[9] We complement the database with other sources as needed. See Annex 1 for more details.

[10] The threshold is relatively robust. Lowering it to 0.1 percent of GDP increases the number of fiscal crisis episodes by 11. In contrast, increasing it to 0.25 percent of GDP lowers the number by 6.

(2) Exceptionally large official financing

An alternative to outright default or other exceptional measures for countries is recourse to large official financing, captured by financial support from the IMF.[11] This support is usually for countries that are unable to pay their international debt and have associated balance of payments problems. In many occasions, fiscal distress is behind a country's inability to keep its financial obligations. Indeed, IMF program data shows that all high-access financial arrangements had fiscal adjustment as an overarching program objective.

This criterion captures any year under an IMF financial arrangement with access above 100 percent of quota and fiscal adjustment as a program objective.[12] The threshold is consistent with established IMF access rules and was also used by Baldacci and others (2011). We only include precautionary agreements when they became active with access above our threshold.

(3) Implicit domestic public debt default

Countries may also opt to default implicitly on domestic debt or their payment obligations. Data on these events are very scarce and the limited literature on this topic relies almost exclusively on implicit defaults via inflation.[13] We adopt a similar strategy, but complement it with data on domestic arrears when available. Specifically, this criterion intends to capture periods where governments have difficulty meeting their obligations and resort either to running domestic payment arrears or printing money to finance the budget. We identify these

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[11] IMF programs can have a catalytic effect, i.e. other governments and international agencies will join efforts to provide additional official financing. IMF loans typically involve lower borrowing costs.

[12] Available financing under an IMF program depends on the size and nature of a country's financing need over the course of the program period, the strength of the reform program, and the access limits. With the latter being restricted both per program request and on a cumulative basis, access also becomes a strategic choice.

[13] A rare exception is Reinhart and Rogoff (2011b), who list 42 cases of explicit domestic default. Those include not only credit events (e.g., Russia's debt default in 1989-99), but also other forms of default (e.g., Mexico's forcible conversion of USD deposits to pesos in 1982). Our database covers all their 42 cases.

episodes by looking at periods of (a) very high inflation (when the sovereign resorts to seigniorage to finance the fiscal deficit) and/or (b) accumulation of domestic arrears.

(3a) *Very high inflation*. Following Baldacci and others (2011), we set an inflation rate threshold of 35 percent per year for AMs, based on the average haircut on their public debt (Sturzenegger and Zettelmeyer, 2006).[14] We apply the same criterion to small developing states (SDSs) as their inflation patterns are similar to AMs. In contrast, we use a threshold of 100 percent yearly for EMs and LIDCs following Fischer, Sahay, and Vegh (2002). Those authors show that the relationship between the fiscal deficit and seigniorage is strong only in the high-inflation countries (inflation above 100 percent).

(3b) Domestic arrears accumulation. In the absence of consistent and readily available data, we use a steep increase of "other account payables" (OAP) as a proxy. We require the OAP-to-GDP ratio to grow more than 1 percentage point per year. The threshold is in line with evidence from Checherita-Westphal and others (2015), which shows that increased delays in public payments affect private sector liquidity and profits, and ultimately economic growth. The OAP data is available for most OECD countries at least from the early 1990s onwards.

(4) Loss of market confidence
This criterion captures any year with extreme market pressures. Our two sub-criteria catch both periods of low/no volume and sovereign yield spikes.

(4a) Loss of market access. IMF (2015b) defines market access as "the ability to tap international capital markets on a sustained basis through the contracting of loans and/or

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[14] This threshold is similar to the 95th percentile of the inflation distribution and lies between the 20-40 percent thresholds in the literature (Reinhart and Rogoff, 2011; Khan and Senhadji, 2001; or Bruno and Easterly, 1995).

issuance of securities across a range of maturities, regardless of the currency denomination of the instruments, and at reasonable interest rates." Guscina, Sheheryar and Papaioannou (2017) compile an indicator of loss of market access (LMA): when sovereigns default or stop issuing bonds, controlling for financing needs and previous patterns of issuance. We complement the data with additional information from Gelos, Sahay, and Sandleris (2004) and rating agency reports. However, the loss of market access criterion is only applied to a country that regularly accesses international markets—i.e. it has to have enjoyed two consecutive years of market access and maintained it for at least one fourth of the time.[15]

(4b) Price of market access. We set an absolute threshold at 1,000 basis points (bps) for the spreads, which is widely seen in practice as market participants' psychological barrier (Sy, 2004; Baldacci and others, 2011). It roughly corresponds to the 95th percentile of the spreads distribution. Any other abnormally high spreads for a country, given its history, are captured by the loss of market access criterion. Where available, we consider the JPMorgan Emerging Market Bond Index (EMBI). For a smaller number of cases, we fill the data gaps with spreads estimated as the 10-year local-currency bond yield spread to the 10-year US treasury adjusted for inflation. We also look at 5- and 10-year credit default swaps (CDS) spreads.

Identifying a Crisis

We consider a year to be a fiscal crisis year when at least one of the four criteria is met. To separate crisis year episodes into distinct crisis events, we require at least two years of no fiscal distress between the distinct crisis events. If only one year of no distress lies between crisis year episodes, we lump them together in one event. This approach helps identify the

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[15] Under the precondition of maintaining market access for one fourth of the time covered by the sample for sub-criterion (4a), criterion 4 is triggered 82 times. Changing to one half of the time reduces the number to 69.

start and end years of crisis episodes, which we later use to draw inferences on duration.[16] Non-crisis years are all other years for which we have data for at least one of the criteria.

C. Key Characteristics of Fiscal Crises

We use our database to highlight some of the characteristics of fiscal crises across country groups (Appendix Table 1), such as on frequency, triggers, duration, and overlap with financial crises.

Stylized Facts of Fiscal Crises

The database identifies 436 fiscal crisis episodes, implying that countries faced on average two crises since 1970 (Table 2.1). They occurred most often in LIDCs (with an average of 3.4 crises per country) and least often in AMs (less than 1 per country). 37 countries experienced no fiscal crisis at all, of which the majority were AMs. For some countries, the absence of a crisis may reflect lack of sufficient data to make an assessment. In some cases, countries undertook large fiscal adjustments to prevent a fiscal crisis based on our criteria (e.g., oil exporters like Saudi Arabia and the U.A.E.). At both ends of the sample period, 32 crises were already ongoing at the beginning and 36 were still ongoing at the end. Crisis times are relatively frequent, with crisis years representing almost ⅓ of all observations.

Table 2.1 Number of Identified Fiscal Crisis Episodes (1970-2015)

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[16] We do not assign start and end dates to episodes ongoing at both ends of the sample period. The exception is if (i) previous indicators identified start dates in 1970-71 (Baldacci and others, 2011; Cruces and Trebesch, 2013; or sovereign defaults from Laeven and Valencia, 2012) or (ii) recent data confirms end dates in 2014.

	Total	AM	EM	LIDC	SDS
With start date within sample period	**436**	25	154	171	86
Average per country	**2.3**	0.7	2.2	3.4	2.6
With start and end date within sample period	**400**	23	143	154	80
Average per country	**2.1**	0.7	2.0	3.1	2.4
Memorandum items:					
Ongoing at sample period start	**32**	1	22	9	0
Ongoing at sample period end	**36**	2	11	17	6
Number of countries with no fiscal crisis	**37**	20	9	1	7

Source: Authors' calculations.

Compared to past studies, our sample has more than double the number of countries and crisis episodes (Table 2.2). This mainly reflects the inclusion of LIDCs and SDSs, which have been excluded from previous analyses. In addition, past studies mainly focused on sovereign debt defaults. Even when compared with Bruns and Poghosyan (2016), which are closer to our definition of crisis, we have a significantly larger number of events thanks to the larger sample of countries and new data.

Table 2.2. Comparison of Identified Fiscal Crisis Episodes (1970-2015)

|	Fiscal Crises Database (this paper)	Bruns and Poghosyan's (2016) update of Baldacci et al. (2011)	Laeven and Valencia's (2012) debt crises	Reinhart and Rogoff's (2011b) external debt crises	Reinhart and Rogoff's (2011b) domestic debt crises
Number of events	436	201	67	75	26
Number of common events		*141*	*67*	*65*	*22*
Number of countries	188	80	157	69	69

Note: We consider events to overlap when the start date is within one year of our start date, or the event falls within our crisis period.

LIDCs and EMs have the longest fiscal crises. A fiscal crisis lasts on average almost 6 years, albeit with sizeable differences depending on countries' development stage.[17] LIDCs and EMs endure the longest crises, while SDSs face the shortest crises. Thirty of the countries in our sample have been in a crisis for more than half of the sample period. The majority are

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[17] LIDCs (averaging 6.6 years), EMs (6 years), AMs (3.8 years), and SDS (3.2 years). When assessing duration, we do not consider the crisis periods that are ongoing at the start (or end of the sample period), because we cannot determine the exact start (or end) date if it precedes (or outlasts) our sample period.

LIDCs, but there are also some EMs (including Brazil, Peru, and Egypt). The common thread among many of these cases is a history of heightened political instability and weak institutions.

The most turbulent decade was the 1990s (Figure 2.1). However, the 1980s saw the largest rise in the number of crises, especially among EMs, possibly reflecting the large fall in commodity prices (many EMs being commodity exporters), as well as the rise in global interest rates in the early part of the decade. The 1980s and 1990s were also periods of high inflation, especially among EMs and LIDCs, for which the average hovered around 100 percent before dropping to single digits during the first decade of the present century. The pattern of crises across decades is similar across the four criteria. Credit events are the most frequent in all decades. Exceptional high-access financing from the IMF was the second most important criterion to identify crises. There was a spike in exceptional access to Fund programs between 2006 and 2010 owing to the global economic and financial crisis.

FIGURE 2.1. NUMBER OF CRISIS CRITERIA TRIGGERED PER DECADE (1970-2015)
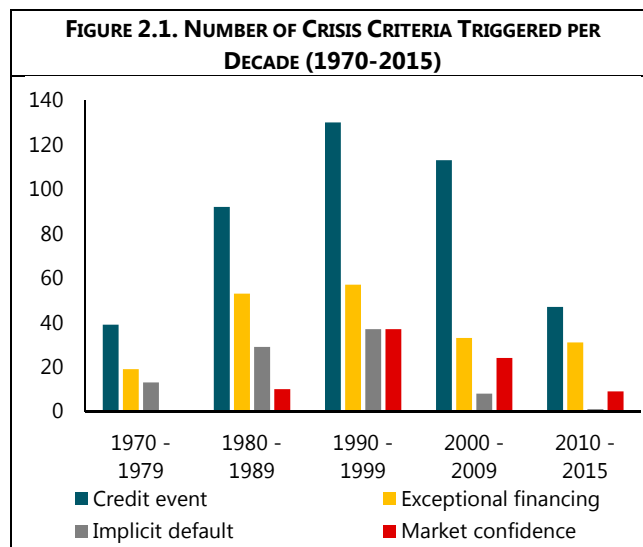
Most crises in non-AMs are associated with credit events (Table 2.4) and tend to involve both official and private creditors. For these countries, credit events are the first criterion met almost three quarters of the time. This could be explained by the "the original sin" (Eichengreen and Hausmann, 1999), as many developing economies have difficulty borrowing in their own currency. Both official and private creditors are affected in the majority of credit events—about 90 percent of the times involved official creditors, while about two-thirds of credit events included private creditors.[18] Strikingly, credit events never signal the start of a crisis for AMs, the crisis identification triggers are broadly equally divided among the other three criteria.

Table 2.4. Triggering Criteria per Country Groups

	AM	EM	LIDC	SDS
Credit event	0	85	141	71
Official financing	11	40	29	6
Implicit default	13	18	9	7
Market confidence	7	25	4	3

Source: Authors' calculations.

Several of the identification criteria tend to overlap during the crisis period. When looking at crisis years, at least two criteria overlap more than one quarter of the time.[19] In contrast, only about 9 percent of fiscal crisis episodes start with more than one criterion. This highlights the relevance of using the different criteria in parallel. Amongst non-AMs, EMs show the highest rates of overlap of different criteria in the sample. In 17 crises, their start years are identified by two or more criteria. Crises in AMs and EMs show two or more active criteria around one third of the time, compared to a quarter of the time in LIDCs. This is relevant as the data

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[18] For example, excluding defaults involving official creditors would reduce the number of crises from 436 to 337. The fall in the number of crises is mitigated because other identification triggers would still help detect some of the crises. The official creditor-led events affect mainly SDSs and to a lesser degree LIDCs and EMs.
[19] For example, out of the 10 crisis episodes in AMs that start with high-access IMF programs, 3 led to credit events within the same crisis period (Greece, Ireland, and Portugal).

suggest that economic growth was lower in crisis periods when more than one criterion was met.

Fiscal and Financial Crises

The data also shows some overlap of fiscal and financial crises (Figure 2.2).[20] Close to a fifth of fiscal crises happen at the same time as either a banking or currency crisis, three percent of them even coincide with both.

The majority of fiscal-banking crises occurred in AMs and EMs. This could suggest that in countries with large financial sectors, a fiscal crisis may be triggered by banking sector problems. Laeven and Valencia (2012) find that the fiscal cost of banking crises net of recoveries averages 13⅓ percent of GDP. Gross fiscal outlays related to the restructuring of the financial sector can even be larger than 30 percent of crisis-year GDP (e.g., Indonesia 1997, Argentina 1980, Iceland 2008). In addition, IMF (2014) argues that banking crises have larger fiscal costs in countries with deeper and more leveraged banking sectors that rely more on external funding. On the other hand, a fiscal crisis could spill over to the banking system. Alter and Beyer (2014) find heightened risks of spillover from sovereign distress to the banking system for European countries. It is possible both effects are present (Acharya and others 2014) when government bailouts to the financial sector increase fiscal stress, in turn fueling sovereign credit risk and spreads.
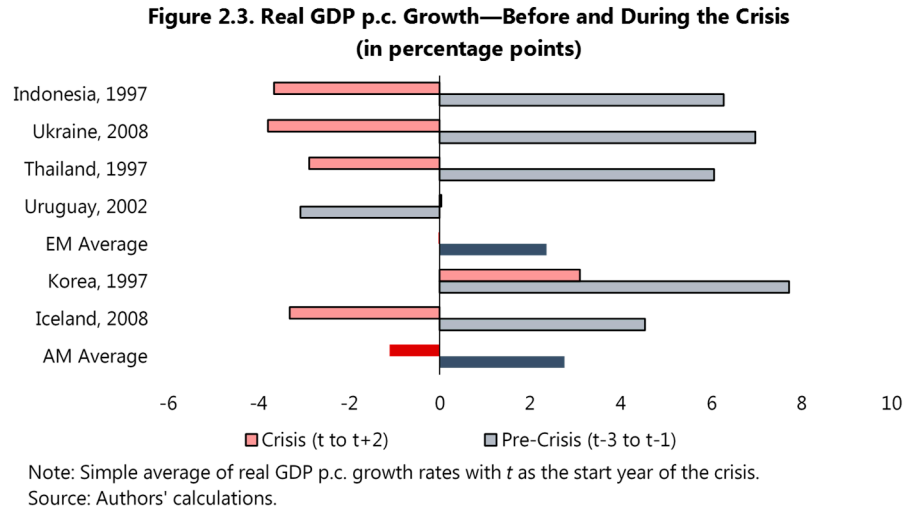
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[20] We use Laeven and Valencia's (2012) dummies for banking and currency crises. We only consider fiscal crises up to 2012 to match their sample. A twin fiscal-banking (or fiscal-currency) crisis in year t is defined as a fiscal crisis in year t combined with a banking (currency) crisis during the period [t -1, t +1]. A triple fiscal-banking-currency crisis in year t is defined as a fiscal crisis in year t, combined with a currency crisis and a banking crisis during the period [t -1, t +1].

Figure 2.2. Different Crises

Fiscal crises
352

23   47

14

Banking crises   28   **Currency crises**
82   122
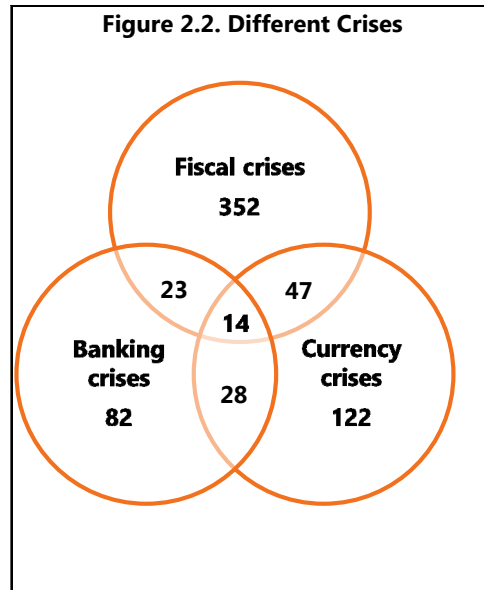
More than half of the fiscal-currency crises occurred in EMs. Their public debt generally has a relatively high share of FX debt, exposing them to the risk of sudden stops. For example, in the Dominican Republic, that share amounted to 80 percent prior to the start of a fiscal crisis in 2002. A currency crisis followed in 2003, nearly doubling the public debt ratio. Another example is Malaysia (1998), which underwent an abrupt depreciation of roughly 30 percent and a surge in spreads despite major fiscal tightening between 1997 and 1999.

The triple crises are associated with particularly turbulent times. AMs experienced three of those triple crises, while EMs experienced the other 11. These periods tend to be accompanied by substantial declines in growth. In 6 of the cases, the fiscal crisis was signaled by more than one criterion. In most cases, they turn out to be some of the worst in terms of economic growth once the crisis started (Figure 2.3). The exception was Uruguay, where the crisis was preceded by a severe recession. In several other cases, the economy contracted at a fast pace in the first years of the fiscal crisis: in Korea (1997), growth fell to -

5.4 percent in 1998, and in Iceland, it fell from 9½ percent in 2007 to 1½ in 2008 and -4⅔

percent in 2009. This suggests the overlap of crises may be particularly damaging.

Figure 2.3. Real GDP p.c. Growth—Before and During the Crisis
(in percentage points)

Note: Simple average of real GDP p.c. growth rates with *t* as the start year of the crisis.
Source: Authors' calculations.

III. Economic Outcomes and Policies Around Fiscal Crises

To better understand the nature of fiscal crises, it is worth looking at the behavior of some

economic variables around fiscal crises.[21] At first glance, they deteriorate with the onset of a

crisis (Table 3.1). The deterioration is especially large for economic growth and the fiscal

deficit, while the current account deficit remains large but stable. The changes around fiscal

crises vary considerably across country groups. For example, AMs suffer the largest growth

decline. Their pre-crisis years show large external imbalances, which improve afterwards.[22]

In contrast, EMs experience the largest increases in fiscal deficits around the onset of the

crisis, and their current account balance deteriorates the most. LIDCs have the smallest

decline in economic growth, albeit starting from the lowest pre-crisis level.

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[21] We compare the period before (t-3 to t-1) and after the onset of a crisis (t to t+2).

[22] This provides support for the twin deficits hypothesis, i.e. the link between the budget and current account deficit (see Ghosh and Ramakrishnan, 2006).

Table 3.1. Key Macro Variables Before and During Crises

		Pre-Crisis*	Crisis**
Full Sample	Overall Fiscal Balance	-4.0	-6.3
	Current Account Balance	-5.6	-5.6
	Real GDP p.c. growth	2.2	0.4
AM	Overall Fiscal Balance	-1.9	-3.6
	Current Account Balance	-6.5	-2.5
	Real GDP p.c. growth	2.7	-1.6
EM	Overall Fiscal Balance	-5.0	-9.1
	Current Account Balance	-3.0	-4.3
	Real GDP p.c. growth	2.3	0.0
LIDC	Overall Fiscal Balance	-3.9	-5.1
	Current Account Balance	-5.8	-6.2
	Real GDP p.c. growth	1.6	1.1
SDS	Overall Fiscal Balance	-2.6	-3.5
	Current Account Balance	-11.5	-9.1
	Real GDP p.c. growth	2.4	1.4

Note: *t-3 to t-1. **t to t+2.
Source: Authors' calculations.

We now use the new database to examine economic developments around fiscal crises in a more formal way. First, we study the behavior of macro-fiscal outcomes around fiscal crises using an event study approach. Although not necessarily implying causality, the results help to understand the context in which fiscal crises occur, particularly when differentiating along country groups and crisis identification triggers. We also study what happens to growth and debt around twin crises. Finally, we assess the long-term impact of fiscal crises on economic growth and public debt using panel impulse response functions (IRF).

A. The Dynamics Around Fiscal Crises

We start by analyzing the behavior of key fiscal and macro variables that—as discussed in Section II.A—can undermine fiscal and debt sustainability triggering a crisis. The aim is to assess the different dynamics between the crisis period and the out-of-window *normal* (non-crisis) period.

Model Specification

Following the literature, we use an event study to analyze the behavior of key variables during an 11-year window around the start of the crisis by comparing the dynamics of variables within the (pre- and post-crisis) time window with that of an out-of-window normal period.[23] Following most closely Gourinchas and Obstfeld (2012), we specify fixed-effects panel regressions with a discrete-choice time window around the crisis start year as specified in:[24]

$$y_{i,t} = \alpha_i + \sum_{j=-5}^{5} \beta_j \, D_{t+j} + \varepsilon_{i,t}$$

where y is a list of variables, α_i the crisis fixed-effect, D_{t+j} the 11 dummy variables taking the value of 1 in period $t+j$ (where t is the crisis start year), and β_j the conditional effects of a crisis over the event window relative to tranquil times. Below we discuss the main findings, but the appendix shows detailed results for the whole sample, across levels of development, and across identification triggers (Appendix Figures 1-3).

Results

A fiscal crisis tends to be preceded by loose fiscal policy. In the run-up to the crisis, there is robust (above normal times) real expenditure growth (Appendix Figure 1). Once the crisis begins, governments try to contain expenditure growth aggressively, indicating fiscal policy is procyclical as economic conditions are weaker during this period. The adverse environment could explain why budget revenues grow at a weaker pace and the fiscal

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23 There are many applications. For instance, Eichengreen and others (1995) evaluate the causes and effects of turbulent times in foreign exchange markets. Kaminsky and Reinhart (1999) assess the link between banking and currency crises. Gourinchas and Obstfeld (2012) show that domestic credit expansion and real currency appreciation precede sovereign default, banking, and currency crises.
24 We do not find evidence for time-variant factors (like in Gourinchas and Obstfeld, 2012).

balance continues to worsen.[25] However, this varies considerably across country groups.
Expenditure policy tends to be more procyclical especially among AMs and EMs in the
period around the crisis. The primary balance deterioration in crisis years is strongest in EMs.
AMs and SDSs face a more temporary deterioration in the primary balance around the time
of the crisis, which they are able to undo at a faster pace thanks to a large upfront
deceleration in expenditure growth. Crises signaled by credit events and implicit defaults are
the ones with the largest increases in the post-crisis budget deficit as expenditure growth
tends to react less (initially) than in other types (Appendix Figure 3).

Economic growth falls sharply at the onset of the crisis. In the crisis run-up, economic
growth is generally higher than in normal times (Appendix Figure 1). As the crisis starts, it
declines sharply. Economic growth tends to slow down in the year preceding the crisis and
fall significantly with the onset of the crisis. Fiscal crises triggered by implicit default come
with a more severe economic deterioration than all others (Appendix Figure 3). This may be
because high inflation can be particularly damaging for domestic activity. We also find that
the growth pattern for credit events is mainly driven by the cases when private creditors are
involved (whether official creditors also participate or not). When only public creditors are
involved, the decline in growth from pre-crisis years is much smoother and growth converges
to normal times.

Surprisingly, AMs experience the largest fall in real growth in the first two years of the crisis.
EMs have the second largest fall (Appendix Figure 2). The fall in growth for these two
groups varies between 3 and 6 percentage points in the first two years of the crisis. Almost

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[25] The results for revenues and overall balance are not shown in the charts, but are available upon request.

half of AMs and EMs experience negative growth in the first and second year of the crisis (Appendix Table 2). While LIDCs have the highest frequency of crises, the observed adverse effects on the real economy are milder although a third of the countries still face negative growth in the first year of the crisis. A possible explanation may be that LIDCs receive more international support to weather the crisis,[26] but more research will be needed to explore the reasons.

Public debt rises and remains elevated during the first years of the crisis (Appendix Figures 1-2). At the crisis onset, public debt ratios rise substantially, especially in AMs and EMs. These countries experience a large increase in their debt burden, which only falls very gradually several years after. In contrast, in LIDCs, debt falls with the start of the crisis (from above-average levels), in many cases reflecting debt defaults.

Crises associated with credit events where official creditors dominate show the most pronounced fall in public debt. While public debt tends to remain elevated during the first years of the crisis, this appears to be mainly driven by events involving private creditors (Appendix Figure 3). Most credit events involve both private and public creditors, but in the cases where only public creditors are affected, the debt levels usually fall quickly—possibly showing that debtor countries manage to obtain better conditions in such cases. On the other hand, debt levels remain significantly higher when crises are signaled by a loss of market confidence and only start declining a few years later.

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[26] Although LIDCs' credit events involve in most cases both private and public creditors, they have been beneficiaries of significant international support in periods of distress, including debt relief operations.

Countries seek IMF support to help manage the crisis when facing twin (fiscal and external) deficits. In cases where crises are identified by access to IMF programs or a loss of market confidence, they are usually accompanied by larger external imbalances. IMF programs involve a substantial upfront effort to reduce public expenditure growth and there is a large improvement in the external current account (Appendix Figure 3). After rising at the crisis onset, post-crisis public debt ratios stabilize around the average for normal periods. Possibly reflecting the larger imbalances (twin deficits), the drop in economic growth is larger than for credit events, but less pronounced relative to other triggers (Appendix Figure 3). Crises associated with a loss of market confidence tend to be similar. However, when market confidence falters, economic growth declines more sharply.

Twin deficits also worsen in the crisis run-up (Appendix Figure 1). This pattern dominates in AMs and EMs, with the post-crisis adjustment in the current account being largest in AMs (Appendix Figure 2). Among EMs, many are resource-rich countries that suffer from dramatic losses in resource exports, making their current account adjustment more difficult.

B.   Twin Crises

Building on the evidence in Section II.B, we investigate the existence of an amplification effect of twin fiscal-financial crises on macro-fiscal variables.

Model Specification

We apply a fixed-effect model à la Gourinchas and Obstfeld (2012) and Reinhart and Rogoff (2011) with two separate crisis dummies to identify the interactions. Specifically, we follow the fixed-effect difference-in-difference (DID) analysis with the banking crisis dummy B_j and the currency crisis dummy C_i:

$$y_{i,t} = \alpha_i + \sum_{j=-5}^{5} \beta_j D_{t+j} + \sum_{j=-5}^{5} \gamma_j D_{t+j} B_i + \sum_{j=-5}^{5} \delta_j D_{t+j} C_i + \varepsilon_{i,t}$$

where, during an 11-year time window around a fiscal crisis, γ_i indicates an additional effect as a result of twin fiscal-banking crises, and δ_i a similar effect caused by twin fiscal-currency crises (as defined in footnote 20).

Results

The evidence suggests that fiscal crises that overlap with other crises are accompanied by a more pronounced decline in economic growth and leave a country more indebted than fiscal crises alone.

Sovereigns' indebtedness levels rose more steeply during twin fiscal-currency crises than during stand-alone fiscal crises. In fiscal-currency crises, debt rises by around an additional 10 percent of GDP relative to a fiscal crisis (Appendix Figure 4), but the effect tends to dissipate after some years. While the rise in public debt is common to all country groups, the pattern and size vary significantly. LIDCs usually see a large buildup of public debt in the pre-crisis years, reflecting to some extent periods of high political instability and economic turbulence.[27]

The decline in economic growth is magnified in twin fiscal-currency crises. Growth is lower by an additional 3 percentage points on average for fiscal-currency crises in the first two years of the crisis (Appendix Figure 4). This is driven by the experience of EMs and some

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[27] For instance, Haiti (1991) is a twin fiscal-currency crisis that was preceded by political instability, including a series of coups between 1988 and 1990. This contributed to a sharp increase in public debt levels and a fall in the real growth rate.

AMs.[28] In LIDCs, the economic behavior is quite different, as twin crises tend to be preceded by economic turbulence as discussed above.[29]

C. The Long-Term Growth and Debt Impact

Fiscal crises are associated with lower economic growth and public debt tends to be above normal periods, but are these trends persistent or are they transitory? Some countries indeed do not go back to their pre-crisis trend (Figure 3.1). Some have not only faced a deep recession, but have also remained unable to recover to pre-crisis growth rates in the aftermath of fiscal crises, while others have recovered partially from the crisis and returned to similar growth rates over time. In addition, countries appear to struggle to contain (and reverse) the rise in public debt. We now examine if fiscal crises have long-term effects.

Figure 3.1. **Actual Deviation of Real GDPpc from Trend (normalized to 100 in the crisis start year)**
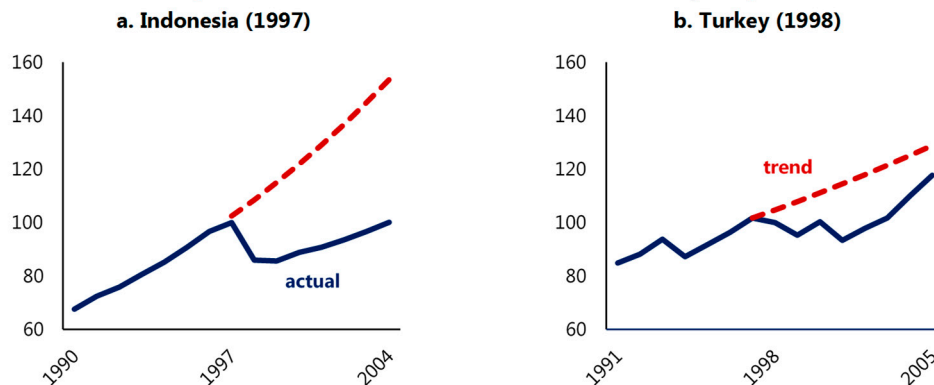
Note: The Figure plots actual deviations of real GDP p.c. from the long-term trend over the 7-year time window after the onset of 2 fiscal crises episode (i.e. Indonesia 1997 and Turkey 1998). The projected long-term trend is based on the pre-crisis growth rate that is the average growth during [*t-5, t-1*] where *t* is the start year of a fiscal crisis. The value of real GDP p.c. is normalized to 100 in year *t*.

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[28] Examples of twin fiscal-currency crises in AMs include Israel (1975), Iceland (1975, 2008), Portugal (1983), Estonia (1991), Latvia (1991), Lithuania (1991), and Korea (1997).
[29] We found similar effects on public debt and economic growth for fiscal-banking crises.

Model Specification

We specify an impulse response function (IRF) analysis à la Cerra and Saxena (2008)[30] to estimate a fixed-effect AR(p) model that accounts for both lagged dependent variables $y_{i,t-j}$ and lagged exogenous shocks $D_{i,t-s}$:

$$y_{i,t} = \alpha_i + \sum_{j=1}^{p} \beta_j\, y_{i,t-j} + \sum_{s=0}^{q} \delta_s\, D_{i,t-s} + \varepsilon_{i,t}$$

Note that $y_{i,t}$ denotes the public debt ratio or real GDP p.c. growth depending on the specification, so that the cumulative deviations in the growth rate from the pre-crisis path is the permanent loss in real GDP p.c. We derive the IRFs with a one-standard-error band drawn from a thousand Monte Carlo simulations. For our exercise, we set $p = 1$ and $q = 4$.[31]

Results

The impact on public debt ratios varies across country groups, but on average, public debt returns to similar levels as the pre-crisis trend (Appendix Figure 5). This average masks differences across country groups. In AMs, which have fewer defaults, their public debt ratio rises by around 10 percentage points of GDP at the onset of a fiscal crisis. In the long-term, the ratio remains about 4 percentage points of GDP above the pre-crisis level. In contrast, EMs experience a rise in public debt, but eventually converge to the pre-crisis level. In LIDCs and SDSs, public debt first falls but also returns to levels similar to pre-crisis periods.

The results suggest fiscal crises are associated with a permanent loss of real GDP of around 2 percent (Appendix Figure 5). While AMs and EMs experience greater output losses during a

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30 Cerra and Saxena (2008) derive the cumulative changes in real GDP p.c. in the aftermath of financial and political crises to show that output fails to catch up with the pre-crisis real GDP trend.
31 To capture the output variable's dependence on its previous values, we choose 1 lag (i.e. p=1) for the dependent variable and 4 lags for the independent variable (i.e. q=4). This is broadly robust with other choices of p and q (such as Cerra and Saxena's, 2008, choice of q=4 and p=4).

fiscal crisis, they tend to recover half of the initial output losses. LIDCs and SDSs, on the

other hand, face a more gradual fall in GDP, but no recovery, converging to pre-crisis growth

rates over time.[32]

IV. Conclusion

This paper provides a new comprehensive database of fiscal crises and analyzes economic

developments around them. This is an area that has not been researched systematically in the

past. We advance the research in two key areas. With few exceptions, the literature has

focused on sovereign debt defaults. While this is an important feature of fiscal crisis, it is not

the only one. We improve the identification methodology by compiling a more

comprehensive set of criteria. Second, we extend significantly the country coverage.

Our database allows the analysis of crises across all levels of economic development. This is

especially relevant as LIDCs are the most prone to crisis. While countries on average have

had two crises since 1970, LIDCs suffered at least three. Surprisingly, the decline in growth

around crisis periods is lower in LIDCs and larger in advanced economies (AMs). We also

find that crises are predominantly linked to credit events, with the majority involving both

private and official creditors.

We also used the data to highlight some other patterns associated with a fiscal crisis. While

the findings do not necessarily imply causality, they provide insight how policies and key

economic variables evolve around these exceptional periods. We find that fiscal policy

appears to be procyclical, especially in AMs and EMs. Crises are preceded by loose fiscal

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[32] These results show an impact somewhat lower than what Cerra and Saxena (2008) find for stand-alone financial crises. They find that the output impact of a banking crisis is nearly twice as a large (7½ percent loss) as a currency crisis.

policy, as expenditures grow above average. Once the crisis starts, countries tighten expenditure growth as economic conditions deteriorate. Second, economic growth tends to sharply decline at the onset of the crisis and there seems to be a permanent decline in GDP. AMs and EMs face the deepest contraction in growth and about half of them experience recessions. The decline in economic growth is particularly large when crises are triggered by high inflation. Third, public debt tends to rise and remain elevated during the first years of the crisis. An exception is when the crisis is identified by credit events that only involve official creditors. Fourth, fiscal crises are usually associated with both fiscal and external imbalances. The data also show that fiscal-financial twin crises experience a deeper decline in growth than stand-alone fiscal crises.

Overall, the evidence supports the adoption of prudent macro-fiscal policies to avoid the need for a disruptive fiscal adjustment as the crisis starts. Namely, defaulting on debt or financing the deficit by printing money should not be seen as costless alternatives to more prudent policies. While a crisis may be either because of complacency or difficulty in implementing a necessary fiscal adjustment, the evidence suggests countries will be forced to tighten fiscal policy once the crisis arrives in a difficult economic environment.

Lastly, the new database could contribute to future research and better understanding of fiscal crises and how to prevent them or mitigate their impact. Our paper raised several specific issues that will require further analysis, but future research could also focus on better identifying the economic and policy factors that lead to a crisis, including developing early warning indicators.

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Appendix A

The database covers 188 countries (Appendix Table 1) and 46 years (1970-2015). We group

countries in advanced economies, non-small emerging economies, non-small low-income

developing economies, and small developing states. Most variables come from the IMF

(WEO and Historical Public Debt Database).

The remainder data are from:

- *Sovereign defaults database* is from Bank of Canada's CRAG:

As discussed in Beers and Chambers (2006), BoC (2016) considers that a sovereign default

occurs "when debt service is not paid on the due date (or within a specified grace period),

payments are not made within the time frame specified under a guarantee, or, absent an

outright payment default, in any of the following circumstances where creditors incur

material economic losses on the sovereign debt they hold: (i) agreements between

governments and creditors that reduce interest rates and/or extend maturities on outstanding

debt; (ii) government exchange offers to creditors where existing debt is swapped for new

debt on less-economic terms; (iii) government purchases of debt at substantial discounts to

par; (iv) government redenomination of foreign currency debt into new local currency

obligations on less-economic terms; (v) swaps of sovereign debt for equity (usually relating

to privatization programs) on less-economic terms; (vi) conversion of central bank notes into

new currency of less-than-equivalent face value."

The database covers 136 countries from 1970-2015. Data gaps were closed by identifying countries that never defaulted using rating agency reports and by deriving lower bound estimates of sovereign debt in default from available components of BoC's data. Those include, for instance, restructured amounts from Cruces and Trebesch (2013), rescheduled and relieved amounts from the World Bank.

- *IMF financial program data* are from an IMF database from 1952 to 2015. The *other account payables* (OAP) data (proxy for arrears) are from Eurostat and the OECD.

- *Yields* data are from IFS. EMBI are from Reuters Datastream. CDS Spreads are from Bloomberg. For criterion 4 we prioritize the use of EMBI spreads when available.

- *Loss of market access* dummies are from Guscina, Sheheryar, and Papaioannou (2017), for 57 countries from 1990 onwards. For years prior to 1990 and missing observations, we use Gelos, Sahay, and Sandleris (2004) database for 140 countries from 1980 through 2000.

- *Currency and banking crises* are taken from Laeven and Valencia (2012).

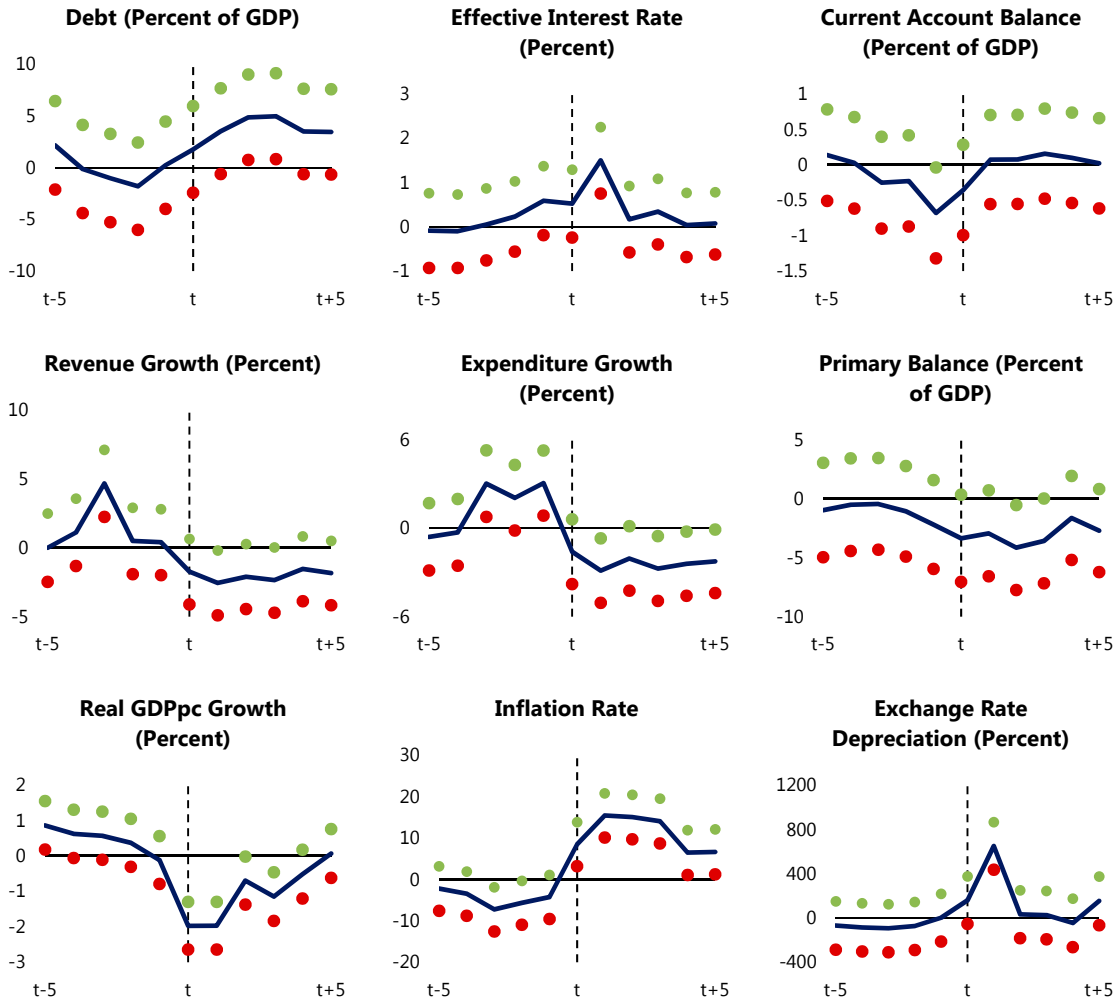**Appendix Table 1. Sample Countries**

AMs (35)	EMs (70)		LICs (50)		SDS (33)
Australia	Albania	Kosovo	Afghanistan	Madagascar	Antigua & Barbuda
Austria	Algeria	Kuwait	Bangladesh	Malawi	Bahamas, The
Belgium	Angola	Lebanon	Benin	Mali	Barbados
Canada	Argentina	Libya	Burkina Faso	Mauritania	Belize
Cyprus	Armenia	Macedonia, FYR	Burundi	Moldova	Bhutan
Czech Republic	Azerbaijan	Malaysia	C.A.R.	Mozambique	Cape Verde
Denmark	Bahrain	Mexico	Cambodia	Myanmar	Comoros
Estonia	Belarus	Mongolia	Cameroon	Nepal	Djibouti
Finland	Bolivia	Morocco	Chad	Nicaragua	Dominica
France	Bosnia & Herzegovina	Namibia	Congo, Dem. Rep. of	Niger	Fiji
Germany	Botswana	Nigeria	Congo, Republic of	Papua New Guinea	Grenada
Greece	Brazil	Oman	Cote D'Ivoire	Rwanda	Guyana
Iceland	Brunei Darussalam	Pakistan	Eritrea	Senegal	Kiribati
Ireland	Bulgaria	Panama	Ethiopia	Sierra Leone	Maldives
Israel	Chile	Paraguay	Gambia, The	Somalia	Marshall Islands, Rep.
Italy	China, Mainland	Peru	Ghana	South Sudan	Mauritius
Japan	Colombia	Philippines	Guinea	Sudan	Micronesia
Korea, Rep. of	Costa Rica	Poland	Guinea-Bissau	Tajikistan	Montenegro
Latvia	Croatia	Qatar	Haiti	Tanzania	Palau
Lithuania	Dominican Republic	Romania	Honduras	Togo	Samoa
Luxembourg	Ecuador	Russian Federation	Kenya	Uganda	São Tomé & Príncipe
Malta	Egypt	Saudi Arabia	Kyrgyz Republic	Uzbekistan	Seychelles
Netherlands	El Salvador	Serbia	Laos	Yemen	Solomon Islands
New Zealand	Equatorial Guinea	South Africa	Lesotho	Zambia	St. Kitts and Nevis
Norway	Gabon	Sri Lanka	Liberia	Zimbabwe	St. Lucia
Portugal	Georgia	Syria			St. Vincent & the Grenadines
San Marino	Guatemala	Thailand			Suriname
Singapore	Hungary	Tunisia			Swaziland
Slovak Republic	India	Turkey			Timor Leste
Slovenia	Indonesia	Turkmenistan			Tonga
Spain	Iran	U.A.E.			Trinidad & Tobago
Sweden	Iraq	Ukraine			Tuvalu
Switzerland	Jamaica	Uruguay			Vanuatu
United Kingdom	Jordan	Venezuela			
United States	Kazakhstan	Vietnam			

Appendix Table 2. Percent of Episodes with Negative Real GDP p.c. Growth

	Total crisis episodes	Percent of country group episodes with negative real GDP per capita growth					
		t-3	t-2	t-1	t	t+1	t+2
Total	**436**	**24.8**	**25.5**	**28.2**	**40.6**	**33.9**	**29.8**
AM	25	12.0	28.0	28.0	48.0	60.0	48.0
EM	154	22.1	20.8	28.6	49.4	40.3	29.2
LIDC	171	29.8	28.1	28.1	33.9	29.2	29.8
SDS	86	23.3	27.9	27.9	36.0	24.4	25.6

Source: Authors' calculations.

Appendix Figure 1. Event Study—Key Macro-Fiscal Variables

Debt (Percent of GDP)

Effective Interest Rate (Percent)

Current Account Balance (Percent of GDP)

Revenue Growth (Percent)

Expenditure Growth (Percent)

Primary Balance (Percent of GDP)

Real GDPpc Growth (Percent)

Inflation Rate

Exchange Rate Depreciation (Percent)

Note: The Figure plots the estimates of β_j for each variable during the 11-year time window (solid line), together with the 95 percent confidence interval (dotted lines). Following Gourinchas and Obstfeld (2012), we measure the difference between values during the 11-year time window and "normal" period average. The x-axis is the time distance to the start of fiscal crises. We drop one outlier (i.e. Zimbabwe 2000).
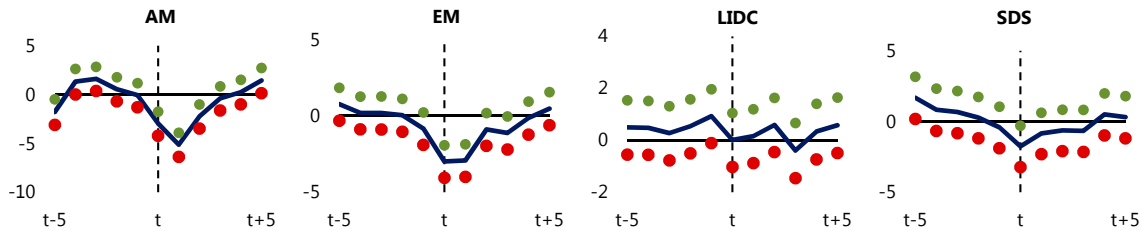
APPENDIX FIGURE 2. EVENT STUDY ALONG COUNTRY GROUPS

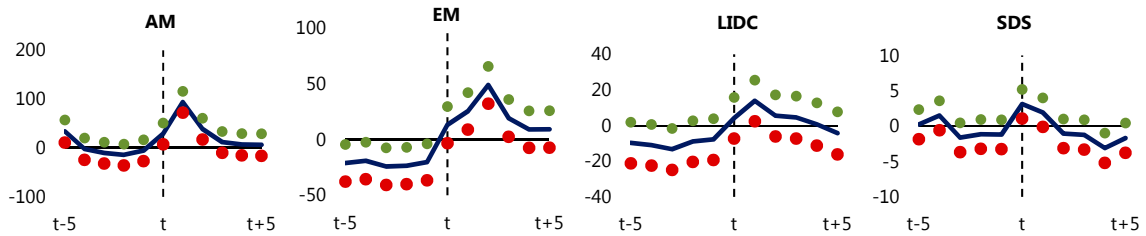a. **PUBLIC DEBT RATIO**
(IN percentage points of GDP)

AM

EM

LIDC

SDS
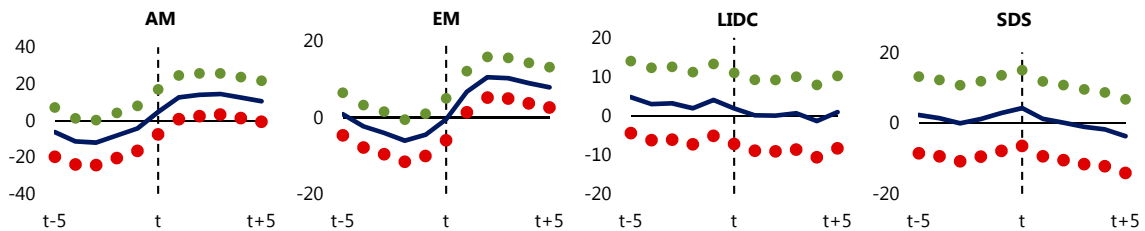
APPENDIX FIGURE 2. CONTINUED
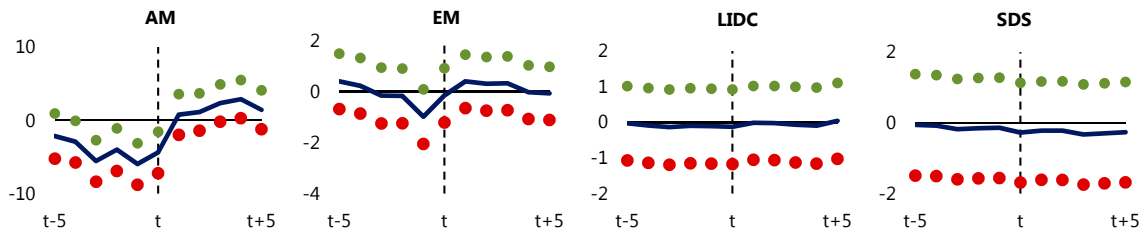
b. REAL GROWTH
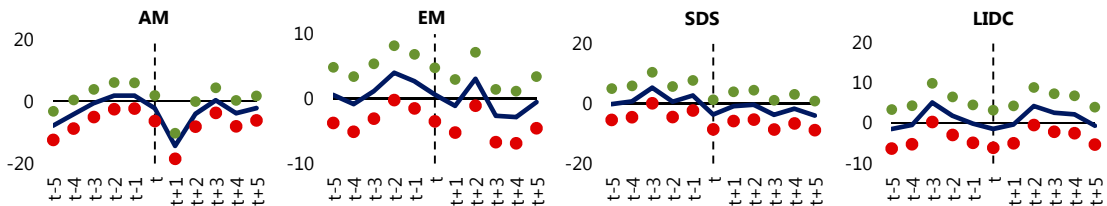**(REAL GDPPC, IN PERCENT)**

c. INFLATION
(IN PERCENT)

d. CURRENT ACCOUNT
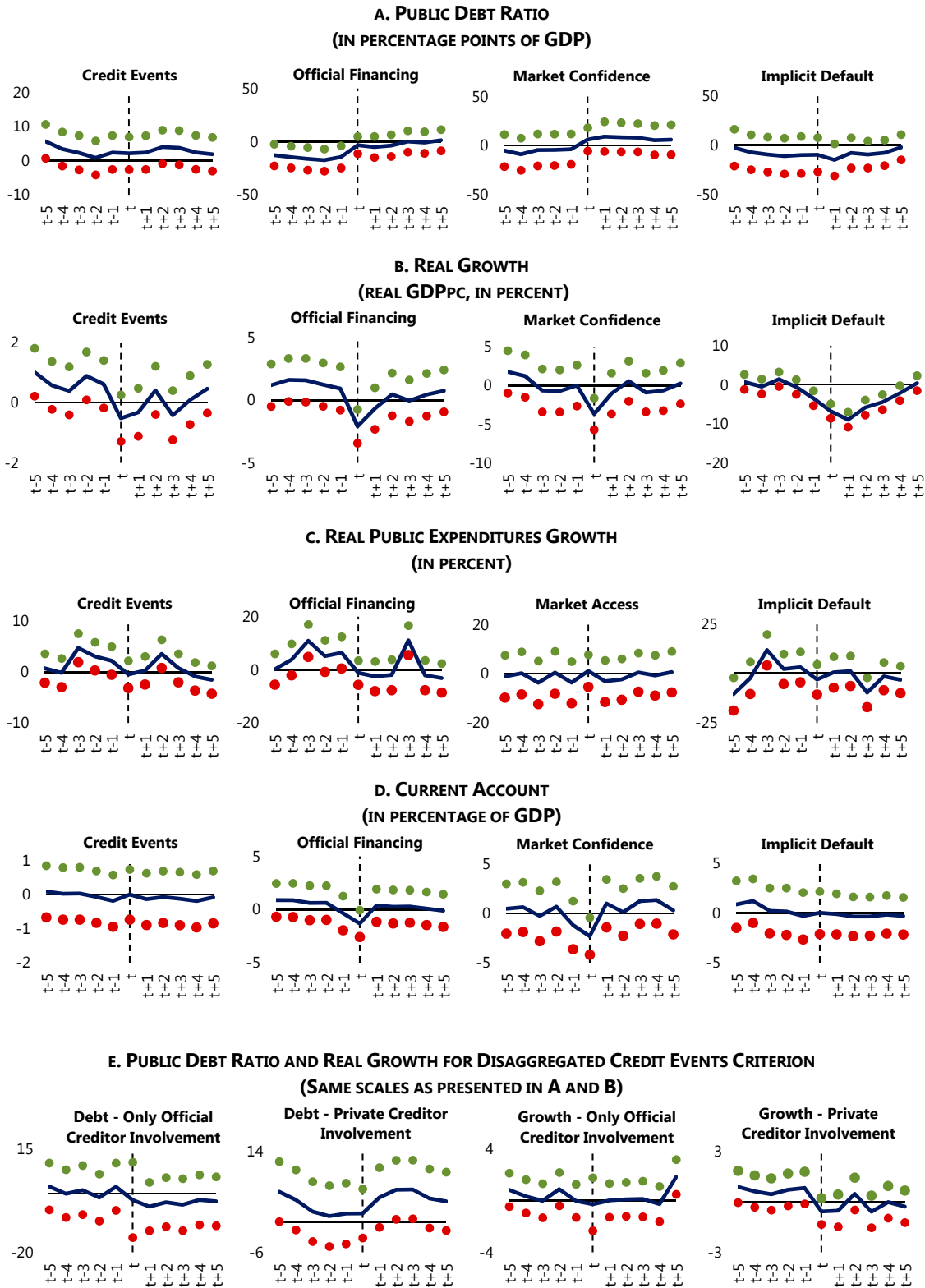**(IN PERCENTAGE POINTS OF GDP)**

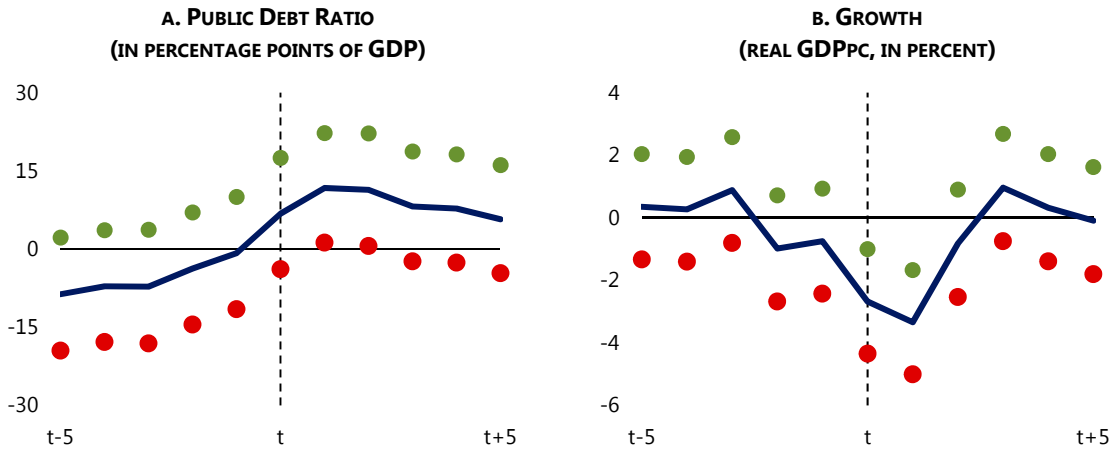**e. REAL PUBLIC EXPENDITURES GROWTH**
(IN PERCENT)

Note: The Figures plot the estimates of β_j along four country groups (i.e. AMs, EMs, LIDCs, and SDSs) during the 11-year time window (solid line), together with the 95 percent confidence interval (dotted lines). Following Gourinchas and Obstfeld (2012), we measure the difference between values during the 11-year time window and "normal" period average. The x-axis is the time distance to the start of fiscal crises.

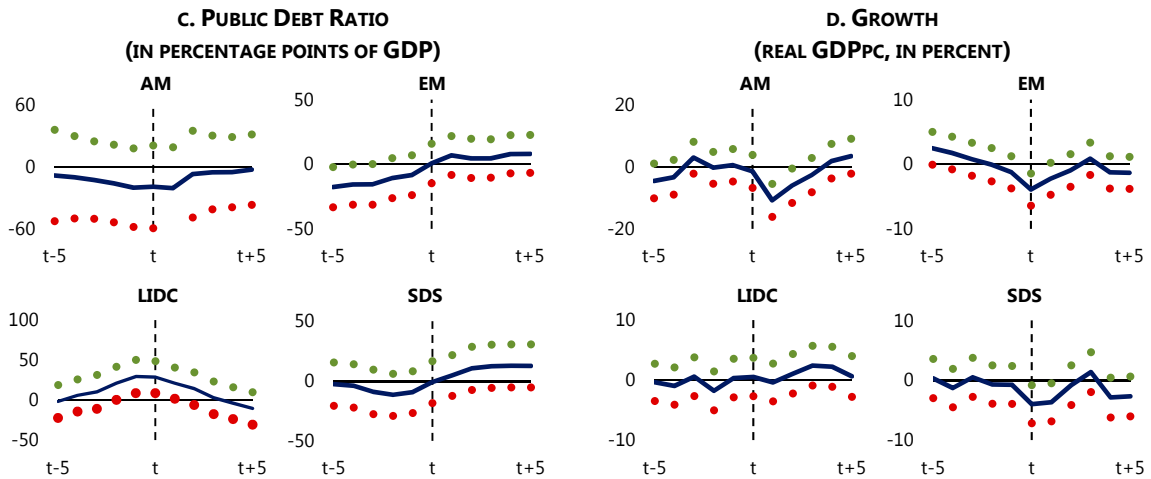**APPENDIX FIGURE 3. EVENT STUDY ALONG CRISIS CRITERIA—KEY MACRO-FISCAL VARIABLES**

A. PUBLIC DEBT RATIO

(IN PERCENTAGE POINTS OF GDP)

B. REAL GROWTH

(REAL GDPPC, IN PERCENT)

C. REAL PUBLIC EXPENDITURES GROWTH

(IN PERCENT)

D. CURRENT ACCOUNT

(IN PERCENTAGE OF GDP)

E. PUBLIC DEBT RATIO AND REAL GROWTH FOR DISAGGREGATED CREDIT EVENTS CRITERION

(SAME SCALES AS PRESENTED IN A AND B)

WHOLE SAMPLE

A. PUBLIC DEBT RATIO
(IN PERCENTAGE POINTS OF GDP)

B. GROWTH
(REAL GDPPC, IN PERCENT)

ALONG COUNTRY GROUPS

C. PUBLIC DEBT RATIO
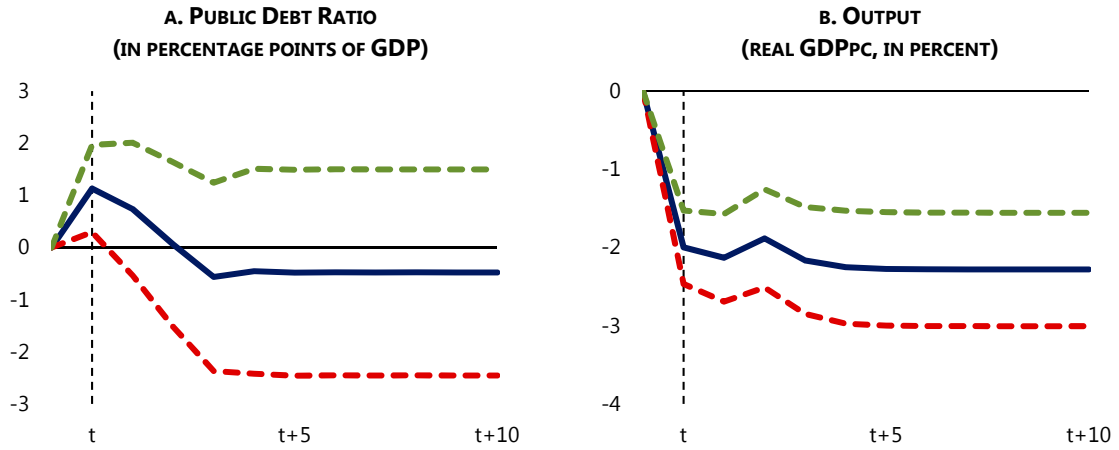**(IN PERCENTAGE POINTS OF GDP)**
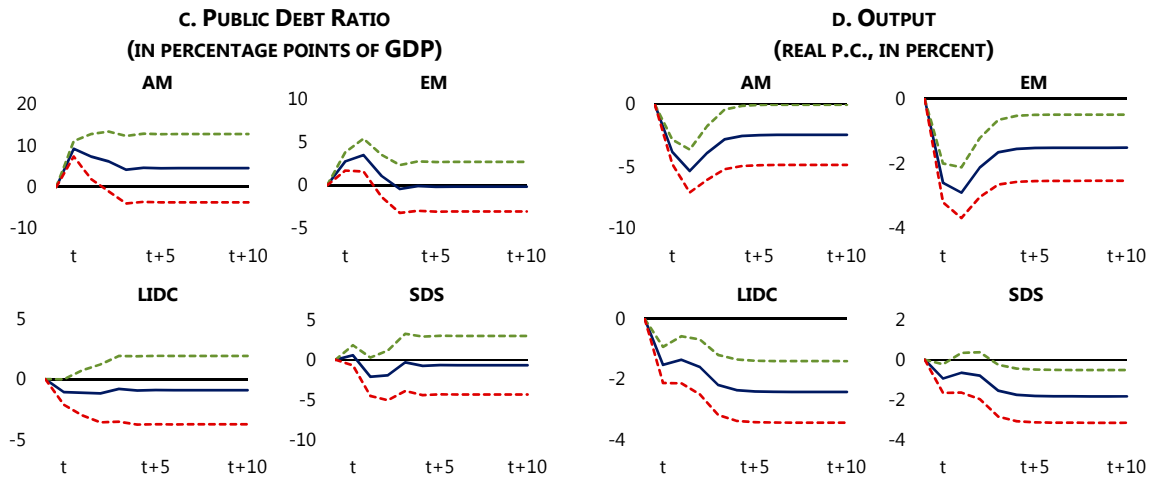
D. GROWTH
(REAL GDPPC, IN PERCENT)

Note: The Figure plots the estimates of δ_j, the additional effect on public debt ratio and real GDP per capita growth rate by twin fiscal-currency crises, during the 11-year time window (solid line), together with the 95 percent confidence interval (dotted lines). We extend the event study approach in Gourinchas and Obstfeld (2012) with difference-in-difference estimations. A twin fiscal-currency crisis occurs if a currency crisis happens during [t-1, t+1] where T is the start year of a fiscal crisis. The horizontal axis is the time distance to the start of fiscal crises.

APPENDIX FIGURE 5. FISCAL CRISIS RESPONSE—CHANGES IN PUBLIC DEBT AND OUTPUT

WHOLE SAMPLE

A. PUBLIC DEBT RATIO
(IN PERCENTAGE POINTS OF GDP)

B. OUTPUT
(REAL GDPPC, IN PERCENT)

ALONG COUNTRY GROUPS

C. PUBLIC DEBT RATIO
(IN PERCENTAGE POINTS OF GDP)

AM   EM

LIDC   SDS

D. OUTPUT
(REAL P.C., IN PERCENT)

AM   EM

LIDC   SDS

Note: The Figure plots the response of public debt ratio and real GDP per capita to a one period exogenous fiscal crisis shock after Monte Carlo simulations. We follow Cerra and Saxena (2008) in estimating a fixed-effect AR(p) model to simulate the impulse response functions. The figure presents the mean of simulations, together with a one standard deviation corridor.

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