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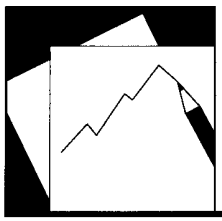

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How Effective is Fiscal Policy Response in Systemic Banking Crises?

Emanuele Baldacci, Sanjeev Gupta, and Carlos Mulas-Granados

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Abstract

This paper studies the effects of fiscal policy response in 118 episodes of systemic banking crisis in advanced and emerging market countries during 1980–2008. It finds that timely countercyclical fiscal measures contribute to shortening the length of crisis episodes by stimulating aggregate demand. Fiscal expansions that rely mostly on measures to support government consumption are more effective in shortening the crisis duration than those based on public investment or income tax cuts. But these results do not hold for countries with limited fiscal space where fiscal expansions are prevented by funding constraints. The composition of countercyclical fiscal responses matters as well for output recovery after the crisis, with public investment yielding the strongest impact on growth. These results suggest a potential trade-off between short-run aggregate demand support and medium-term productivity growth objectives in fiscal stimulus packages adopted in distress times.

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I. INTRODUCTION

The financial crisis that started in the mortgage sector of the United States in 2007 turned into a worldwide credit crunch and subsequently triggered a global recession in 2009. With access to credit markets hampered by financial distress, private consumption falling owing to income and wealth effects, and new investment constrained by the negative economic prospects, governments implemented numerous measures to restore growth and regain market confidence (IMF, 2009a). Governments' policy reactions have focused on fixing the banking system to help reestablish the flow of credit to the economy and implementing fiscal and monetary stimulus packages to sustain aggregate demand and prevent a downward spiral of output (IMF, 2009d). As room for monetary easing rapidly shrank, reflecting limited space for additional interest rate cuts and impaired monetary policy transmission channels, fiscal policy became the principal tool for stimulating economic recovery (Christiano, Eichenbaum, and Rebelo, 2009). To what extent fiscal policy will be effective in supporting growth recovery both in the short term and over time is subject of much debate (Jansen et al., 2008).

Countercyclical fiscal policies—comprising discretionary budget measures and the operation of automatic stabilizers—have generally helped shorten recession spells in advanced economies during previous crisis episodes (IMF, 2009b). The evidence is more mixed in emerging market economies where procyclical spending bias, narrow automatic stabilizers, and limited credit access have constrained governments' ability to provide fiscal stimulus during adverse economic periods (Kaminsky, Reinhart, and Vegh, 2004). Initial fiscal conditions generally play a key role in crisis responses (Alesina et al., 2002) in both advanced and emerging economies. Countries are more likely to adopt countercyclical fiscal policies if sufficient fiscal space was created before the crisis.[1] The success of fiscal policy in restoring growth also depends on the role of accompanying macroeconomic policies and on the design of the fiscal stimulus packages, as the size of multipliers varies across government spending and tax measures.[2]

One of the key findings of the literature is that fiscal responses lead to sustained economic recoveries after the crisis only when financial sector's vulnerabilities are addressed without endangering fiscal sustainability (IMF, 2009a). Crisis resolution measures generally entail costly government restructuring of private sector's balance sheet, including of the financial sector, which can have a lasting negative impact on public debt levels. Furthermore, government interventions to boost private sector credit and domestic demand could leave the economy exposed to the risk of high-inflation and lower private investment growth.

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[1] Creating fiscal space includes bringing public sector debt to manageable levels and improving the liabilities' composition (e.g., by currency and maturity) in the public sector balance sheet.

[2] Fiscal multipliers are typically largest for government consumption, public investment, and transfers to households, while they are relatively smaller for indirect taxes (Spilimbergo, Symansky, and Schindler, 2009).

Therefore, there is a potential conflict between the size of countercyclical fiscal expansions during downturns and their medium-term growth implications.

Against this backdrop the contribution of this paper is twofold. First, we focus on crisis episodes originating in the banking sector, which are of systemic nature (Laeven and Valencia, 2008), to assess the effectiveness of fiscal policy in restoring growth during distress times and sustaining economic expansion in the post-crisis period. While studies have been carried out to assess the role of policy responses during recessions (Claessens, Kose, and Terrones, 2008; IMF, 2009b), detailed evidence on the fiscal policy effects during financial distress periods is lacking. During financial crises, the environment for fiscal policy implementation is made more difficult by the high economic cost associated with the shock. Moreover, financial distress can lead to capital market freezes that make it difficult to access financing for deficit expansions.

Second, we focus on the composition of fiscal policy response to assess its effectiveness during shocks. The composition of government fiscal expansions and its impact on crisis length and post-crisis output recovery have not been dealt with in sufficient detail in the literature. However, one could expect fiscal policy composition to play a key role in determining both the likelihood of exiting a crisis and the medium-term growth prospects, as fiscal multipliers differ across fiscal policy instruments. Moreover, tax and spending measures adopted during financial distress periods can have long-term implications for economic efficiency and productivity growth when the crisis is over (Gali, Lopez-Salido, and Valles, 2005; Ghosh et al., 2009; Rogoff and Reinhart, 2009).

Therefore, the objective of this paper is to answer the following questions:

- What is the effectiveness of fiscal policy in shortening the duration of systemic banking crisis episodes and strengthening economic growth in the medium term?

- Does the composition of the fiscal policy response matter, both in terms of crisis duration and post-shock growth performance?

These questions have not been addressed in the literature, mainly because of lack of comparable fiscal data and difficulties in defining financial crisis episodes. To overcome this problem, we use a recently constructed database on financial crises (Laeven and Valencia, 2008) to assess the efficacy of fiscal policy during these episodes. This database comprises over 100 banking crisis episodes that occurred in the world between 1980 and 2008.

We find that fiscal expansions shorten the duration of these crises. The composition of the fiscal expansion package is, however, key to its success. Public consumption is more effective than public investment in reducing the duration of downturns because of its timely impact on aggregate demand, while cutting consumption taxes is correlated with shorter crises than income tax reductions as the impact of tax reductions on consumers is more

widespread. While countercyclical fiscal expansions have no effect on post-crisis output growth, the composition of fiscal policy responses matters for economic recovery: increasing the share of public investment during shock periods is an effective way for improving medium-term output performance, while government consumption has no significant effect. Cutting the share of income taxes removes distortions that hamper medium-term economic growth, while consumption tax reductions during crises undermine future economic performance. These findings point to a potential trade-off in the use of fiscal policy instruments between short-term and medium-term growth objectives: a result not yet highlighted in the literature. They also stress the importance of fiscal response composition. Insufficient fiscal space and public debt sustainability concerns can, however, limit the effectiveness of fiscal expansions during crises.

The remainder of this paper is organized as follows: Section II reviews the relevant literature. Section III describes the data and the econometric approach. Section IV presents the empirical results followed by robustness tests in Section V. The concluding section summarizes the results and discusses the key policy implications.

II. LITERATURE REVIEW

Until recently, the study of financial crises has typically focused either on historical experiences of advanced countries (mainly the banking panics before World War II), or on more recent episodes in emerging market countries.[3] An important strand of this literature deals with the controversial issue of identifying and classifying different types of episodes that occurred in the last century. There are two major references in this area.

First, Reinhart and Rogoff (2008a, 2008b, 2009) mark banking crises as two types of events: bank runs that lead to the closure, merger, or takeover by the public sector of one or more financial institutions; and if there are no runs, the closure, merger, takeover, or large-scale government assistance for an important financial institution that marks the start of a string of similar outcomes for other financial institutions. With these criteria, they identify 66 cases that occurred between 1945 and 2007. They find that banking crises lead to sharp declines in tax revenues, as well as to significant increases in government spending. On average, they find that government debt rises by 86 percent during the three years following a banking crisis, and at the end of this period, growth resumes slowly to reach an average annual rate of 2½ ercent in the third year after the crisis.

[3] See Calomiris and Gorton (1991) and Gorton (1988) on pre-WWII banking panics; Reinhart and Rogoff (2008a; 2008b) for an analysis of all post-WWII banking crises in advanced economies; Bordo, Eichengreen and Klingenbiel (2001) for an analysis that encompasses both advanced and emerging market economies; and Jacome (2008) on banking crises in Latin America.

The second major reference is the paper by Laeven and Valencia (2008), which introduces a new dataset on banking crises, with information on the type of policy responses implemented to resolve these crises in different countries. Under their definition, in a systemic banking crisis, a country's corporate and financial sectors experience a large number of defaults and financial institutions and corporations face difficulties repaying loans on time. Using this mix of objective data and subjective assessments,[4] they identify 124 systemic banking crises over the period 1970–2007, and estimate that fiscal costs net of recoveries associated with these crises average about 13.3 percent of GDP, while output losses average 20 percent of GDP.

Many authors have also focused on the origins of banking crises. These studies have typically found that crises tend to erupt when the macroeconomic environment is weak, particularly when growth is low and inflation and interest rates are high (Demirgüc-Kunt and Detragiache, 1998; Collyns and Kincaid, 2003).[5] Others have focused instead on the consequences of these crises, including the study by Reinhart and Rogoff (2009) cited above.[6] Claessens, Kose, and Terrones (2008) took the analysis one step further and studied recessions caused by credit contractions, those associated with house price declines, and episodes of equity price declines. Their results show that the interaction between macroeconomic and financial variables can play major roles in determining severity and duration of recessions. Specifically, they find evidence that recessions associated with credit crunches and house price busts tend to be deeper and longer than other recessions.[7]

The analysis of policy responses to these crises constitutes another area of interest for scholars.[8] Some studies have analyzed the type of containment and resolution policies aimed at stabilizing the banking sector during financial crises (Laeven and Valencia, 2008). Others have assessed the macroeconomic policy response. Claessens, Kose, and Terrones (2008) and IMF (2009b) find that both monetary and fiscal policy tend to be countercyclical during recessions, credit contractions, and asset price declines. In these episodes, fiscal policy appears to be more accommodative, suggesting a more aggressive countercyclical fiscal

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[4] Unlike prior work (Caprio and Klingebiel, 1996, and Caprio et al., 2005), they exclude banking system distress that affected isolated banks, but were not systemic in nature.

[5] For a review of the literature on the origins of banking crisis, see also Lindgren, Garcia and Saal (1996), Kaminsky and Reinhart (1999), and Dooley and Frankel (2003).

[6] For a similar analyses of the real effects of banking crises, see Frydl (1999) and Dell´Ariccia, Detragiache and Raghuram (2008).

[7] See Spilimbergo et al. (2008) for a review of historical episodes of financial crises and the conduct of fiscal policy during the shock period.

[8] For an overview of existing literature on how crisis resolution policies have been used and the trade offs involved, see Hoelscher and Quintyn (2003) and Honohan and Laeven (2005).

stance. They also find that expansionary fiscal policy (proxied by discretionary government consumption) tends to shorten the duration of recessions. The lessons from these analyses have stimulated other papers with a more prescriptive approach. For instance, one paper argues that an optimal fiscal package to mitigate the adverse consequences of financial crises should be large, lasting, diversified, contingent, collective, and sustainable (Spilimbergo et. al, 2008).

Finally, the increase in fiscal deficits and public debt linked to fiscal policy expansions during crises have also led to a discussion of the perception of financial markets about fiscal sustainability. Ardagna (2009) shows that financial markets value fiscal discipline, since interest rates on long-term government bonds and stock market prices worsen considerably in periods of fiscal expansion.[9] Looking at the composition of fiscal policy, Akitoby and Stratmann (2008) show that financial markets react to the composition of the budget in emerging market economies. For example, revenue-based adjustments lower government spreads more than expenditure-based ones, and debt-financed spending increases sovereign risks.[10] Baldacci, Gupta, and Mati (2008) find that the composition of fiscal policy matters for government spreads, but debt levels matter as well. They show that spending on public investment contributes to lower government bond spreads, as a long as the fiscal position remains sustainable and the fiscal deficit does not worsen.[11]

Our paper builds on the above literature to assess the relationship between the composition of fiscal policy response during banking crises, duration of these episodes, and post-crisis economic performance. While Laeven and Valencia (2008) report multiple measures of containment and resolution policies, they only use one measure of fiscal policy (the budget balance) and their work is purely descriptive, without causal analysis. Subsequent empirical work (IMF, 2009b; 2009c) also proxies the fiscal policy response using government consumption and primary balance indicators. Instead, we measure the effectiveness of fiscal policy in terms of the different budget categories (both on the revenue and spending side) and the observed characteristics of each episode.

[9] Afonso and Strauch (2004) have similar results using events analysis on a sample of EU countries.

[10] Revenue-based adjustments along with expenditure efficiency measures are also found to sustain fiscal consolidation episodes in emerging market economies (Gupta et al., 2005).

[11] On financial markets reactions to fiscal policy initiatives, and how these developments affect corporate bond spreads, see also Durbi and Ng (2005) and Cavallo and Valenzuela (2007).

III. FISCAL POLICY DURING BANKING CRISES

This section describes the impact of banking crises on budgets. We build a dataset of banking crises from a panel of 182 countries between 1980 and 2008. We follow the criteria established by Laeven and Valencia (2008) and identify 118 episodes of banking crises that occurred in 99 different countries (in some countries up to four times during the period, such as in Argentina).[12] We complement Laeven and Valencia´s database with additional data from the World Economic Outlook (WEO), the Government Financial Statistics (GFS), and the Global Financial Database (GFD).

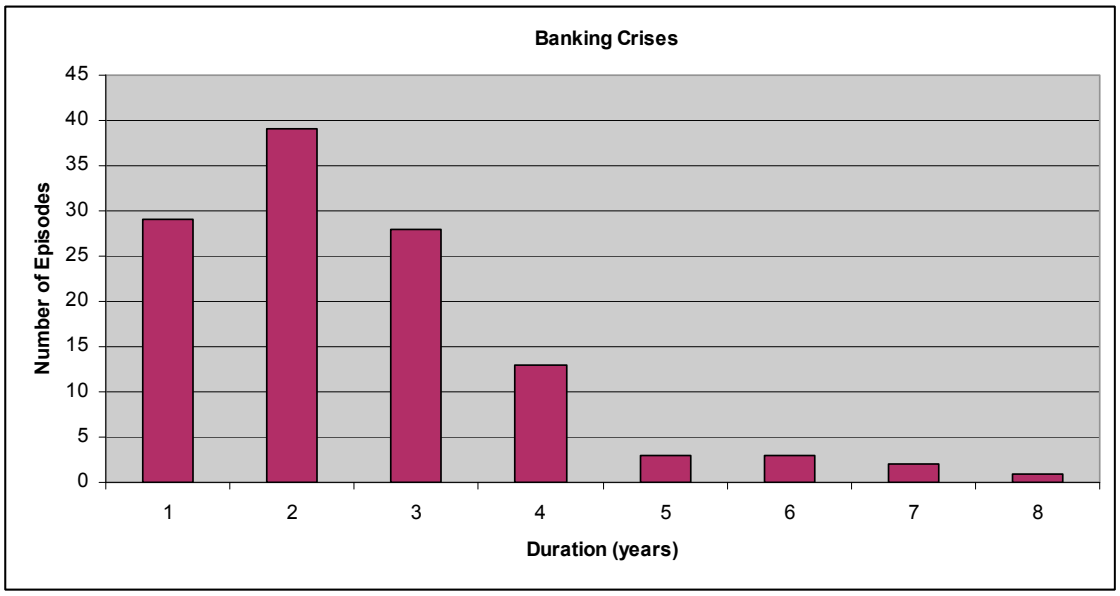
Unlike Laeven and Valencia (2008), we not only identify the start of the crises, but also define their duration. We are aware of the difficulties in identifying the duration of banking crises, since there is no single financial indicator that is valid for all of them. Nevertheless, regardless of the origins and the characteristics of each banking crisis, we assume that a crisis ends after two consecutive years of real GDP growth above ½ percentage points per year. For the purpose of this paper this definition allows us to link the crisis duration with the negative output implication of the crisis. This is consistent with the focus on the effects of fiscal policy responses in restoring economic stability.[13] In Section IV, we test the robustness of our results to a different definition of crisis duration, based on stock market performance.

Using the above criteria, we find that banking crises lasted on average for 2½ years, with 85 percent of the crisis episodes lasting between one to four years, and only one episode lasting eight years (see Figure 1). This is consistent with the findings of Claessens, Kose, and Terrones (2008) who report an average duration of recessions linked to credit crises of 2½ years. Reinhart and Rogoff (2008b) estimate an average duration for their reduced sample of financial crises of about three years.

[12] Laeven and Valencia (2008) identify 124 episodes of banking crises, 208 currency crises, and 63 sovereign debt crises. We use the dataset of 124 banking crises and drop 10 of them due to lack of fiscal data. We come up with a sample of 118 cases by adding 4 cases from their other two datasets. These cases were originally classified as other type of financial crisis (currency crisis or debt crisis), but they triggered a banking crisis.

[13] An alternative measure to the one used in the paper could be the cumulative output loss during the crisis. We find that there is a strong positive correlation between crisis length and output losses during the banking crisis episodes used in the analysis.

Figure 1. Frequency and Duration of Banking Crises



Source: Authors' calculations.

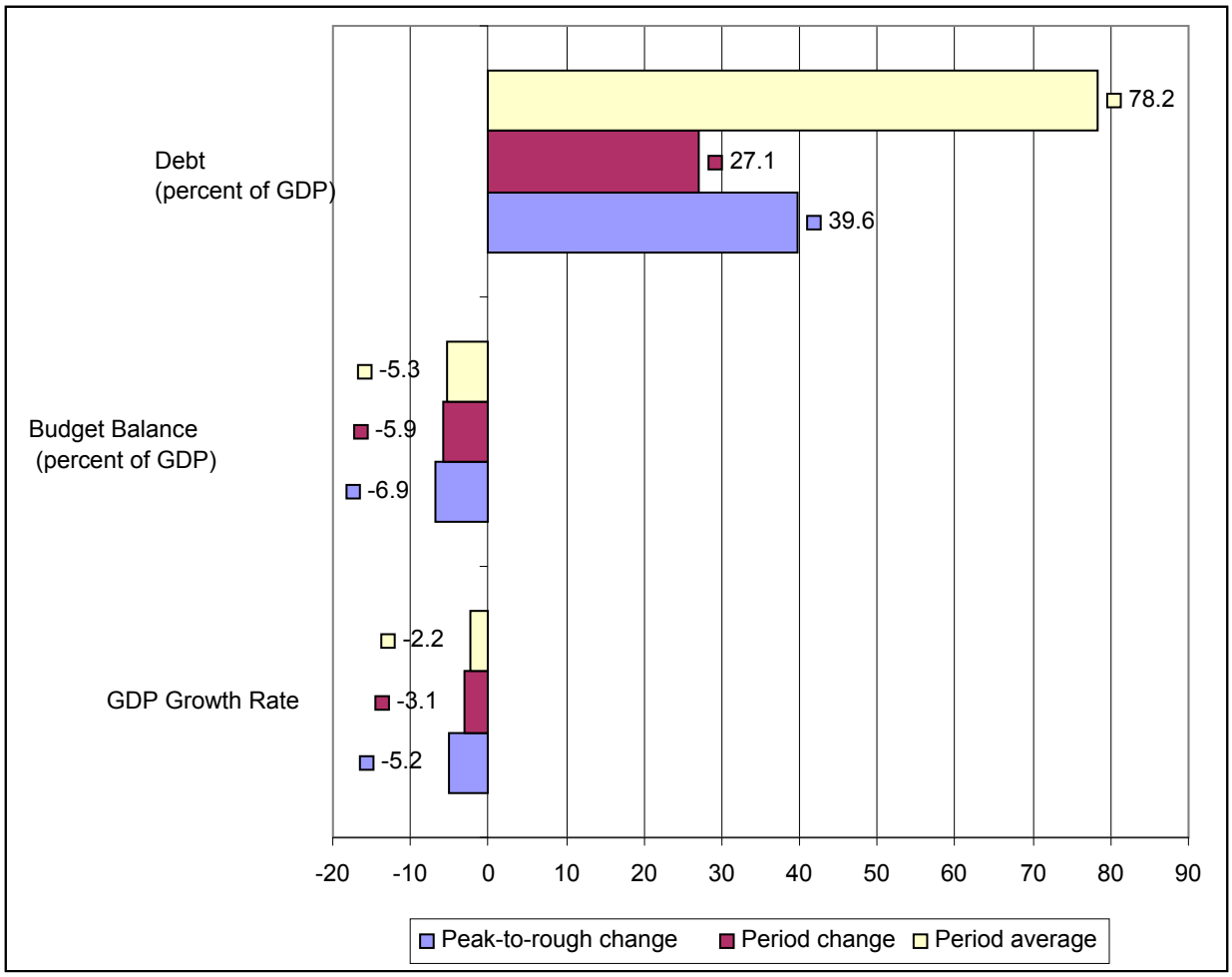
Consistent with previous studies, we also find that banking crises generate large economic costs. Peak-to-trough figures show that the average GDP growth rate fell by more than 5 percentage points during the crisis,[14] general government debt increased by 39 percentage points of GDP and the budget deficits increased by 6.9 percentage points of GDP (see Figure 2).[15] [16]

[14] Real GDP growth fell from 0.4 percent in the year prior to the crisis to an average -2.2 percent during the crisis. In the two-year period following the crisis, annual GDP growth rebounded and reached 4.9 percent per year. However, the level of real GDP was still below the pre-crisis level at the end of the post-crisis period.

[15] Results using alternative measures, such as period changes and period averages yield similar conclusions. This is why in the rest of the paper, we focus only on one definition of crisis effects. We check the robustness of empirical findings to alternative definitions and results still hold. The fiscal balance incorporates the effect of discretionary policy changes (including measures to strengthen the financial system), automatic stabilizers, and other nondiscretionary budget changes. Public debt also incorporates the cost of below-the-line measures to repair the financial system during crises.

[16] The fiscal balance incorporates only "above-the-line" budget measures implemented during the crisis to support the financial sector (e.g., interest rate subsidies) following the GFS methodology. "Below-the-line" measure to help bank recapitalization and support liquidity are included in public sector debt data when governments bear the cost.

Figure 2. Economic Consequences of Banking Crises



Source: Authors' calculations.

Note: Peak-to-trough values are differences between the worst level reached by the variables during the crisis and their pre-crisis value. Period changes denote differences between the last year of the crisis and the pre-crisis year. Period averages show the average value of the variable during the crisis episodes.

To assess the behavior of fiscal variables during crises episodes and in their aftermath, we follow the recent literature (Ardagna, 2009) and calculate the overall change in the variables: (i) in two years prior to the start of the crisis;[17] (ii) during the crisis; and (ii) in the two years after the crisis. Results of descriptive statistics are expressed as a percentage of GDP (Tables 1 to 3) and as a percentage of total revenues or total expenditures (Annex, Tables A2 and A3).

[17] As fiscal variables, in particular revenue, may be affected by asset value increase in the run up to the crisis we also estimated the change over a longer time period. We tried both three years and five years before the crisis and found that results were not substantially affected by the choice of the period length.

Table 1. Fiscal Aggregates

(as percent of GDP)

	Before Crisis *(t-2; t-1)*	During Crisis *(t)*	After Crisis *(t+1; t+2)*
Debt	**-9.2**	**27.1**	**-7.2**
Budget balance	**-0.1**	**-5.9**	**1.5**
Primary budget balance	0.3	-4.9	2.8
Total revenues	**0.8**	**-3.7**	**4.9**
Total expenditures	**0.9**	**2.3**	**2.6**

Source: Author's calculations based on data from WEO and GFS.
Note: Figures in (*t)* show the change in the variables between the last year of the crisis period and the pre-crisis year. Figures in *(t-2; t-1)* show the change in the variables during the two years prior to the start of the crisis. Figures in *(t+1; t+2)* show the change in the variables during the two years following the last year of the crisis.

During banking crises, fiscal deficits increased by almost 6 percentage points (more than 2 percent of GDP per year) and public debt worsened by 27 percentage points of GDP (about ⅓ of the preexisting average debt level,[18] which was on average 78 percent of GDP). Total revenues fell considerably during the crisis period (more than 3½ percentage points of GDP) and government expenditures rose by more than 2 percentage points of GDP.[19]

As shown in Table 2, tax revenue fell sharply during the crisis (more than 2 percent of GDP), especially from income and profits taxes, followed by goods and services and trade taxes. Social contributions also fell considerably in the period, accounting for about ⅓ of the total decline in public revenues. After the crisis, revenue collection improved, in particular, taxes related to the economic recovery and the associated improvement in private income and profits.

In terms of expenditure, there was a significant increase in current expenditure during banking crises (see Table 3). Interest payments, transfers, and government's purchase of goods and services show the sharpest increase. The rise in public sector salaries is weaker

[18] In the pre-crisis period public debt declined as a share of GDP in the sample on account of the favorable growth-interest rate differential.

[19] This in part reflects a decline in output, which raises the ratio of spending to GDP. Nonetheless, cyclically-adjusted spending also rose in the period reflecting discretionary fiscal expansion and automatic stabilizers. In the rest of the paper we use fiscal variables expressed as a ratio to GDP. We test the robustness of this assumption by replacing these indicators with cyclically adjusted variables in Section 5 and find that results hold.

and other expenses fall slightly as a percentage of GDP. Public investment remains broadly unchanged during the crisis, but recovers significantly after the crisis, more than offsetting the decline in other spending items.

Table 2. Budget Composition: Revenues

(as percent of GDP)

	Before Crisis *(t-2; t-1)*	During Crisis *(t)*	After Crisis *(t+1; t+2)*
Taxes	**0.5**	**-2.3**	**4.2**
Income, profits, capital gains	0.2	-1.2	3.8
Payroll and workforce	0.1	-0.3	0.0
Property	0.0	0.0	0.0
Goods and services	0.1	-0.5	0.4
International trade	0.1	-0.3	0.0
Other taxes	0.0	0.1	-0.1
Social contributions	**0.2**	**-1.2**	**0.2**
Other revenues	**0.1**	**-0.2**	**0.5**

Source: Author's calculations based on data from WEO and GFS.
Note: Figures in (*t)* show the change in the variables between the last year of the crisis period and the pre-crisis year. Figures in *(t-2; t-1)* show the change in the variables during the two years prior to the start of the crisis. Figures in *(t+1; t+2)* show the change in the variables during the two years following the last year of the crisis.

IV. The Effectiveness of Fiscal Response

This section assesses the effectiveness of fiscal policy response in: (i) reducing the duration of banking crises and (ii) promoting economic growth following a crisis. The previous section showed that during banking crises fiscal deficits widened, mainly because of an increase in public consumption, a freeze in public investment, and a fall in revenue from income taxation and international trade. This outcome reflects the operation of automatic stabilizers and incorporates the effects of discretionary fiscal policy changes implemented by governments in response to output declines (Gali, 1994).

Table 3. Budget Composition: Expenditures

(as percent of GDP)

	Before Crisis *(t-2; t-1)*	During Crisis *(t)*	After Crisis *(t+1; t+2)*
Current expenditure	**0.9**	**2.2**	**0.1**
Goods and services	-0.1	0.6	-0.5
Employee compensation	0.1	0.2	0.1
Transfers	0.1	0.6	0.3
Interest payments	0.4	1.0	2.3
Other expenses	0.4	-0.2	-0.1
Public Investment	**0.0**	**0.1**	**2.5**

Source: Author's calculations based on data from WEO and GFS.
Note: Figures in *(t)* show the change in the variables between the last year of the crisis period and the pre-crisis year. Figures in *(t-2; t-1)* show the change in the variables during the two years prior to the start of the crisis. Figures in *(t+1; t+2)* show the change in the variables during the two years following the last year of the crisis.

In a standard Keynesian framework, we would expect a fiscal expansion driven by cuts in taxes and increases in public spending to shorten the duration of the crisis and sustain medium-term growth. Higher government spending and lower taxes help boost aggregate demand during downturns associated with banking crises, replacing falling private consumption as a growth engine (Arreaza, Sorensen, and Joshua, 1999). Public investment measures can, at least in part, offset the collapse in private investment (Aschauer, 1989). A simple plot of changes in levels of these variables as a ratio to GDP against the duration of banking crisis episodes supports these hypotheses.[20] Figure 3 shows a strong positive correlation between higher deficits and shorter crisis duration. However, budget composition changes matter as well as the size of the fiscal package. Higher public consumption (as a percentage of total expenditures) and lower income taxes (as a percentage of total revenues) also shorten the duration of banking crises. The contribution of public investment in reducing the crisis length is, however, significantly weaker. This result is somewhat surprising in light of the relative size of estimated fiscal multipliers for various tax and spending measures which point to larger multipliers for public investment than government consumption (Spilimbergo, Symansky, and Schindler, 2009).[21] However, issues related to the timeliness of

[20]As in the previous section, all variables are calculated as the change over the period. Public consumption and public investment are computed as a share of total expenditures, and tax revenues from income and goods and services are computed as a share of total revenues.

[21] In particular, public investment fiscal multipliers are estimated to be larger in size than the corresponding multipliers of government consumption.

disbursements matter: while government consumption has an immediate impact on aggregate demand through the direct purchase of goods and services by the government, public investment may affect the economy with a delay, as procedural bottlenecks and lack of shovel-ready projects may slow down project execution.[22]

Figure 3. Fiscal Policy and Crisis Length

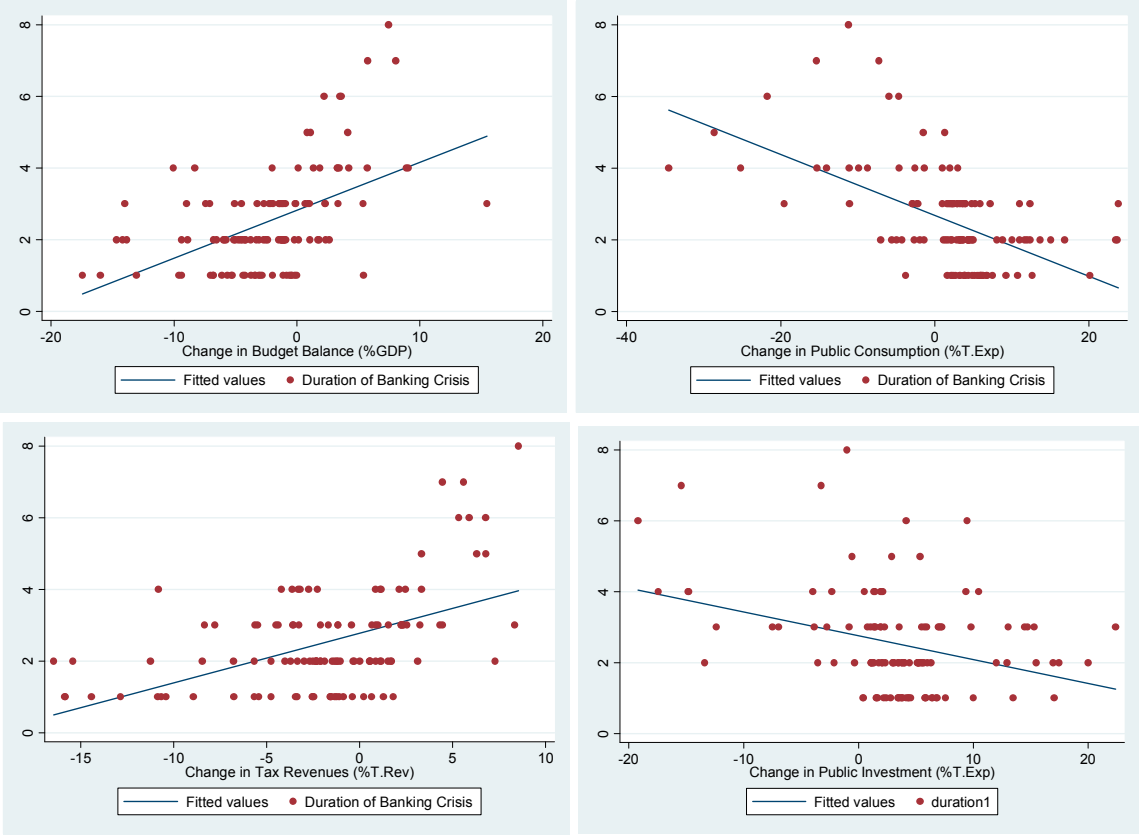


Table 4 presents preliminary evidence from bivariate regressions, which indicate that the composition of the fiscal expansion is also relevant for post-crisis growth. An increase in the share of public investment during the crisis significantly raises post-crisis GDP growth and this increase is more than that brought about by a higher share public consumption in the budget. The most likely reason behind this result is that public investment, particularly in infrastructure, can raise productivity while government's current consumption may crowd out private consumption over time. Reducing income taxation during crises is also beneficial for output growth following the crisis, as the distortionary impact of high tax burdens is

[22] Preliminary evidence on fiscal stimulus package implementation in the United States during the current financial crisis shows that spending execution was slow for capital projects, while it was faster for existing transfer programs.

mitigated. This does not hold for taxes on goods and services; their positive impact on private consumption is more than neutralized by negative expectations of future higher taxes to finance growing fiscal deficits.

In the next step, we use a multiple regression framework to test if the above relationships hold when other covariates of crisis length and output growth are included in the model specification. Along with the budget balance (in percent of GDP), we also use a dummy-variable indicator of large fiscal expansions during the crisis episode to capture only major changes in fiscal policy.

Table 4. Fiscal Expansion Composition and Post-Crisis Growth

	Coefficient	Average Growth (t-t+5)		
		T	R-squared	Obs.
Change in total public expenditures over crisis episode	0.103***	4.5	0.1	118
Change in public consumption (percent of total public expenditure)	0.063*	1.7	0.0	118
Change public investment (percent of total public expenditure)	0.266***	6.8	0.3	118
Change in total public revenues over crisis episode	0.086***	3.9	0.1	118
Change tax revenues (percent of total public revenues)	0.0	-0.7	0.0	118
Change tax from Income (percent of total public revenue)	-0.265***	-3.3	0.1	118
Change tax from Good & Services (percent of total public revenue)	0.319**	2.6	0.0	118

*** significant at 1 percent of; ** significant at 5 percent of; * significant at 10 percent of
Note: Post-Crisis Growth defined as average GDP growth rate during the next five years after end of the crisis.

To build this indicator we follow Laeven and Valencia (2008) and create a variable labeled "expansionary fiscal policy" that takes value equal to 1 if the budget balance worsens by more than 1½ percent of GDP in the first three years following the onset of the crisis, and is equal to zero otherwise.[23]

The following model is used to determine the effect of fiscal policy and other accompanying measures on the duration of banking crises:

$$Duration(t) = \alpha + \beta_1 FiscalExpansion_t + \beta_2 CreditBoom_{t-1} + \beta_3 Containment(Dep.Guarantee)_t + \beta_4 \text{Re}solution(N.BanksClosed)_t + \beta_4 \text{Re}solution(GovtIntervention)_t + \varepsilon_t \quad (1)$$

[23] The interpretation of the regression coefficients in the case of the two fiscal indicators is different. In the case of the budget balance the coefficient provides the change in duration associated with a change in the fiscal balance during the crisis. The fiscal expansion variable measures the effect on the crisis length of large fiscal expansions compared to all the other cases.

where *t* refers to the time period during the episode of banking crisis and *t-1* refers to the year preceding the onset of the crisis. *Expansion* is the indicator of fiscal expansion defined above;[24] *Credit Boom* is a dummy variable that takes value equal to 1, when the banking crises was preceded by an abnormal expansion of credit, and is equal to 0 otherwise; and *Guarantee* is a dummy variable that takes value equal to 1 when there was a freeze of deposits and/or a blanket guarantee in the first phases of banking crises.[25] Finally, we include two measures of resolution policies, captured by the total *Number of Banks Closed* during the episode and the degree of *Government Intervention* in the financial sector.[26]

The dependent variable is of a discrete nature, and takes values ranging from 1 year to 8 years. We estimate a baseline model in a truncated sample of 118 episodes of banking crises, using OLS and Ordered Logit.[27] Results are reported in Table 5 and show that fiscal expansions are a decisive factor for reducing the duration of banking crises. Based on these results, the average fiscal policy response in the sample would reduce the crisis length by more than two quarters.

The variables capturing the role of the accompanying policies have the expected coefficient signs and are statistically significant. Crises tend to be shorter when fiscal expansions are accompanied by decisive actions to guarantee deposits (two to four quarters reduction in crisis length) and to close failed banks (about one year reduction in average crisis length). Crises last about one year longer when preceded by credit booms leading to banking sector vulnerabilities and asset bubbles.[28]

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[24] We also measure the effect of fiscal policy on duration using the change of the general budget balance over the period.

[25] We tried to include other containment policies defined in Laeven and Valencia (2008) but these factors were strongly correlated to the other exogenous variables.

[26] See Laeven and Valencia (2008) for the derivation of these variables.

[27] The ordered logit estimation can be seen as a robust analysis method to control for the influence of outliers (e.g., crises with long duration). We also estimated this equation using a Tobit estimator to account for the non-negativity of the dependent variable. Results are similar to the ordered logit.

[28] While our model measures the direct impact of various financial crisis responses, we do not rule out the possibility of more complex dynamic interactions between fiscal variables and other accompanying policies in response to shocks. However, attempts to add interaction terms do not yield significant results. The good fit of the estimated model confirms that other factors, including interactions, would not add much to the explanatory power of the equation.

Table 5. Fiscal Policy, Resolution Policies, and Crisis Length

	Duration (OLS)		Duration (Ord. Logit)	
	Model 1	Model 2	Model 3	Model 4
Budget Balance(in percent of GDP)	0.072***	--	0.122***	--
	(3.73)	--	(3.22)	--
Expansionary fiscal policy	--	-0.626***	--	-1.023***
	--	(-2.86)	--	(-2.62)
Previous credit boom	0.690***	0.637***	1.036***	0.927**
	(3.40)	(3.04)	(2.82)	(2.53)
Deposit freeze or guarantee	-0.522**	-0.610***	-0.814**	-0.806**
	(-2.53)	(-2.94)	(-2.25)	(-2.23)
Number of banks closed	-0.168***	-0.165***	-0.519***	-0.496***
	(-3.53)	(-3.37)	(-4.91)	(-4.72)
Government intervention	-0.721***	-0.825***	-1.207***	-1.329***
	(-3.52)	(-3.94)	(-3.12)	(-3.46)
Constant	3.514***	3.876***	--	--
	(14.76)	(14.31)	--	--
	--	--	--	--
Observations	118	118	118	118
Adj. R-squared / Pseudo R-squared	0.435	0.407	0.211	0.198

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: length of banking crisis.
Source: Authors' estimates.

The model is then estimated to capture the role of budget composition:

$$Duration(t) = \alpha + \beta_1 FiscalExpansion_t + \beta_2 \sum_{i=1}^{4} FiscalComposition_t + \beta_3 CreditBoom_{t-1}$$
$$+ \beta_4 Containment(Dep.Guarantee)_t + \beta_5 \,\mathrm{Re}\, solution(N.BanksClosed)_t \qquad (2)$$
$$+ \beta_6 \,\mathrm{Re}\, solution(GovtIntervention)_t + \varepsilon_t$$

Results are reported in Table 6 and confirm that a fiscal expansion helps reduce the duration of banking crises.[29] An increase in the share of public consumption in total expenditure reduces the duration of crisis episodes as it stimulates aggregate demand.[30] An increase by

[29] These results hold also, when the budget balance is used instead of the large fiscal expansion indicator. For the sake of space, results are not reported in the paper but are available upon request from the authors.

[30] As mentioned earlier, we define the end of the crisis period on the basis of output growth. This is why fiscal measures associated with aggregate demand boost are effective in shortening crisis duration consistent with the literature on fiscal multipliers (Spilimbergo, Symansky, and Schindler, 2009). This assumption is also tested for robustness using alternative definitions of crisis' end based on financial sector performance. Results reported in the next section show that our findings hold under different definitions of crisis duration.

5 percentage points in this composition variable reduces the crisis length by almost three months. The size of the estimated coefficient is similar for public investment, although its statistical significance is weaker. The results further indicate that governments can actually choose between expenditure-based and revenue-based fiscal expansions, as a declining share of revenues from income taxes and/or from goods and services also help shorten the duration of banking crises. The effect of consumption tax cuts is, however, larger than the impact of income tax reductions, as the former affect a wider number of taxpayers with likely larger impacts on consumption decisions.

As in the previous results, the policy control variables are also statistically significant. Crises that have been preceded by a credit boom tend to last longer. And those in which a guarantee for bank deposits was provided tend to be shorter. Closing failed banks and a strong government intervention is also beneficial to resolving the crisis; all these results are consistent with historical evidence. Overall, the size of the coefficients show that fiscal variables are as important as other accompanying policies in shortening crisis length.

The effectiveness of fiscal policy during banking crises not only contributes to reducing the length of crisis episodes. It also helps create conditions for promoting economic growth following a crisis. We estimate the factors affecting the average GDP growth rate in the five years following the end of the crisis using the following specification:[31]

$$PostGrowth(t) = \alpha + \beta_1 FiscalExpansion_t + \beta_2 \sum_{i=1}^{4} FiscalComposition_t + \beta_3 CreditBoom_{t-1}$$
$$+ \beta_4 Containment(Dep.Guarantee)_t + \beta_5 \text{Re}\, solution(N.BanksClosed)_t \qquad (3)$$
$$+ \beta_6 \text{Re}\, solution(GovtIntervention)_t + \beta_7 \sum_{i¿1}^{3} \text{Pr}\, ivateSector_t + \varepsilon_t$$

In this model, three new variables are included under a common vector that captures the underlying conditions for the activity of the *Private Sector*. These variables are expected to have an important effect on medium-term growth based on the literature. First, we include the change in private investment during the episode as a percentage of total investment to capture the vitality of the private sector in stimulating productivity growth. Second, we include the cost of financing for companies and households (measured by the average difference between long-term interest rates and interbank interest rates) to proxy the cost of capital.[32] Last, we include a dummy (fresh capital injections) from Valencia and Leaven (2008) that takes value equal to 1 for cases where new capital injections into the banking sector were made as part of the resolution policies.

[31] As we focus here on the implications of fiscal responses during shock episodes on post-crisis growth, we do not include current fiscal and monetary policy variables in the equation to avoid endogeneity issues and collinearity among regressors. However, given the potential importance of these factors, we assessed the robustness of the results to the inclusion of the coincident fiscal deficit and short-term nominal interest rate and found that conclusions in the text are not affected.

[32] This variable measures the opportunity cost of investing compared to holding liquidity.

Results for the growth equation are reported in Table 7 and show that fiscal expansions do not have any statistically significant effect on GDP growth in the period following banking crises.[33] Changing the composition of government spending through higher public consumption is also not statistically significant, while an increase in public investment or a reduction in the share of income taxes are both positive for medium-term growth as they boost productivity and eliminate inefficient distortions.[34]

Variables controlling for the origin of the crisis and the accompanying containment and resolution policies loose statistical significance. However, variables capturing the behavior of the private sector are systematically linked with the expected sign to better economic performance. An increase in the share of private investment, a reduction in the cost of financing, and an increase in fresh capital for the banking sector all have a positive impact on medium-term output growth.

Initial fiscal and economic conditions are key to fiscal policy effectiveness during crises. In order to isolate the potential nonlinear effects of initial levels of public debt and GDP per capita on fiscal policy performance, a new augmented specification is estimated. We include two new dummy variables: *Highly Indebted* that takes value equal to 1 when initial public sector debt as a ratio to GDP is above the sample average; and *HighGDP percapita* that takes value equal to 1 when initial GDP per capita (in PPP dollars) is above the sample average.[35] These variables are included in the equation in isolation and they are also interacted with the indicator of fiscal expansion and the budget composition vector.

Consistent with the expectations, the positive impact of fiscal policy and fiscal package composition variables on crisis length weakens substantially when initial conditions are poor (Tables 8 and 9). Countries with higher debt levels and lower per capita income face a higher probability of exiting a banking crisis later than countries with stronger initial conditions. Also, the impact of fiscal expansions on crisis duration is larger once initial economic and fiscal conditions are accounted for: countries with more sustainable public finances have more scope for countercyclical fiscal response during banking crises. While weak fiscal conditions do not affect post-crisis growth, those countries with high initial per capita GDP tend to be associated with a better economic performance in the period immediately following the crises (Tables 10 and 11). In all cases, controlling for initial fiscal and economic conditions leads to higher effects of the budget composition variables on growth.

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[33] Results are confirmed when using the fiscal balance in the place of the fiscal expansion indicator.

[34] This is consistent with previous studies for a sample of crisis and noncrisis episodes (for example, Alesina et al., 2002). The impact of budget composition on output growth in noncrisis countries is also found to be a significant driver of medium-term financial implications of fiscal expansions (Ardagna, 2009) and the sustainability of fiscal adjustments in emerging market economies (Gupta et al., 2005).

[35] Using alternative thresholds for these variables yields similar results.

Table 6. Fiscal Policy Composition, Resolution Policies, and Crisis Length

	Duration of Crisis (OLS)				Duration of crisis (Ord. Logit)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Expansionary fiscal policy	-0.522**	-0.572**	-0.581**	-0.601**	-0.945**	-0.974**	-0.937**	-1.049**
	(-2.45)	(-2.61)	(-2.74)	(-2.85)	(-2.41)	(-2.48)	(-2.39)	(-2.67)
Public consumption (percent of total expenditures)	-0.035***				-0.041**			
	(-3.12)				(-2.11)			
Public investment (percent of total expenditures)		-0.027*				-0.027		
		(-1.82)				(-1.13)		
Income tax revenue (percent of total revenues)			0.076***				0.111**	
			(3.07)				(2.31)	
Goods & services tax revenue (percent of total revenues)				0.119***				0.180**
				(3.19)				(2.71)
Previous Credit boom	0.568**	0.621**	0.590**	0.592**	0.874**	0.936**	0.927**	0.960**
	(2.80)	(2.99)	(2.91)	(2.93)	(2.37)	(2.55)	(2.51)	(2.58)
Deposit freeze or guarantee	-0.555**	-0.563**	-0.461**	-0.568**	-0.782**	-0.752**	-0.664*	-0.803**
	(-2.76)	(-2.72)	(-2.24)	(-2.84)	(-2.16)	(-2.06)	(-1.81)	(-2.20)
Number of banks closed	-0.137**	-0.152***	-0.143**	-0.135**	-0.459***	-0.480***	-0.449***	-0.440***
	(2.86)	(-3.09)	(-2.99)	(-2.82)	(-4.31)	(-4.54)	(-4.24)	(-4.15)
Government intervention	-0.713***	-0.781***	-0.841***	-0.837***	-1.244***	-1.304***	-1.386***	1.408***
	(-3.48)	(-3.74)	(-4.16)	(-4.16)	(-3.21)	(-3.38)	(-3.56)	(-3.61)
Constant	3.737***	3.854***	3.917***	3.731***				
	(14.12)	(14.36)	(14.98)	(14.12)				
Observations	118	118	118	118	118	118	118	118
Adj. R-squared / Pseudo R-squared	0.451	0.419	0.449	0.452	0.211	0.202	0.213	0.219

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: length of banking crisis.

Table 7. Fiscal Policy Composition, Resolution Policies, and Post-Crisis Growth

	Average Growth (t-t+5) (OLS)				Average Growth (t-t+5) (Robust)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Expansionary fiscal policy	0.262	0.251	0.144	0.218	0.262	0.251	0.144	0.218
	(0.38)	(0.40)	(0.21)	(0.34)	(0.39)	(0.45)	(0.2)	(0.36)
Public consumption (percent of total expenditures)	-0.010				-0.010			
	(-0.28)				(-0.36)			
Public investment (percent of total expenditures)		0.229***				0.229***		
		(4.94)				(4.98)		
Income tax revenue (percent of total revenues)			-0.177**				-0.177**	
			(-2.20)				(-2.48)	
Goods &services tax revenue (percent of total revenues)				0.402***				0.402***
				(3.44)				(3.57)
Previous Credit boom	0.033	0.242	0.183	-0.101	0.033	0.242	0.183	-0.101
	(0.05)	(0.40)	(0.28)	(-0.16)	(0.05)	(0.45)	(0.30)	(-0.17)
Deposit freeze or guarantee	1.413**	0.895	1.030	1.529**	1.413**	0.895	1.030	1.529**
	(2.18)	(1.47)	(1.54)	(2.42)	(2.19)	(1.68)	(1.62)	(2.51)
Number of banks closed	0.181	0.094	0.129	0.279*	0.181	0.094	0.129	0.279**
	(1.15)	(0.67)	(0.84)	(1.85)	(1.49)	(0.93)	(1.07)	(2.45)
Government intervention	0.450	-0.004	0.449	0.353	0.450	-0.004	0.449	0.353
	(0.67)	(0.01)	(0.69)	(0.56)	(0.67)	(0.01)	(0.71)	(0.58)
Private Investment (percent of total investment)	7.530**	4.803*	7.220**	6.557*	7.530**	4.803**	7.220***	6.557***
	(2.50)	(1.75)	(2.47)	(2.31)	(2.76)	(2.14)	(2.87)	(3.14)
Cost of financing (a)	-0.121***	-0.074**	-0.109**	-0.122***	-0.121**	-0.074	-0.109**	-0.122**
	(-2.87)	(-1.95)	(-2.71)	(-3.13)	(-1.81)	(-1.20)	(-1.71)	(-1.99)
Fresh capital injections into financial sector	1.453**	0.866	1.246**	1.415**	1.453**	0.866	1.246**	1.415**
	(2.18)	(1.43)	(1.92)	(2.27)	(2.02)	(1.52)	(1.91)	(2.22)
Constant	1.486	2.145**	1.541*	1.149	1.486	2.145**	1.541*	1.149
	(1.57)	(2.56)	(1.71)	(1.31)	(1.44)	(2.44)	(1.60)	(1.25)
Observations	118	118	118	118	118	118	118	118
Adj. R-squared	0.142	0.299	0.178	0.226	0.208	0.353	0.241	0.286

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent

Dependent variable: average GDP growth in the 5 years following the end of the crisis.

Note (a): the cost of financing variable is the difference between the lending interest rates and the interbank interest rates.

Source: Authors' estimates.

Table 8. Explaining Crisis Length Controlling for Initial Fiscal Conditions

	Duration of crisis (OLS)			
	Model 1	Model 2	Model 3	Model 4
Expansionary fiscal policy	-0.676**	-0.907***	-0.791**	-0.947***
	(-2.20)	(-2.92)	(-2.55)	(-3.13)
Expansionary fiscal policy* Highly Indebted (t-1)	0.273	0.564	0.397	0.522
	(0.66)	(1.33)	(0.95)	(1.26)
Public consumption (percent of total expenditure)	-0.055***			
	(-3.22)			
Public consumption* Highly Indebted (t-1)	0.019			
	(0.84)			
Public investment (percent of total expenditure)		-0.029*		
		(1.91)		
Public Investment* Highly Indebted (t-1)		-0.010		
		(-0.34)		
Income tax revenue (percent of total revenues)			0.110**	
			(2.72)	
Income tax revenue* Highly Indebted (t-1)			-0.064	
			(-1.26)	
Goods &services tax revenue (percent of total revenues)				0.090*
				(1.88)
Goods &services tax revenue * Highly Indebted (t-1)				0.057
				(0.71)
Previous Credit boom	0.420**	0.549**	0.531**	0.504**
	(2.03)	(2.60)	(2.53)	(2.42)
Deposit freeze or guarantee	-0.628***	-0.619***	-0.559***	-0.651***
	(-3.15)	(-2.93)	(-2.63)	(-3.15)
Number of banks closed	-0.145***	-0.162***	-0.157***	-0.145***
	(-3.10)	(3.31)	(-3.28)	(2.96)
Government intervention	-0.737***	-0.801***	-0.876***	-0.896***
	(3.62)	(-3.78)	(-4.25)	(-4.33)
Highly Indebted (t-1)	0.798**	0.837**	0.844***	0.672**
	(2.52)	(2.48)	(2.54)	(1.99)
Constant	3.877***	3.907***	3.932***	3.843***
	(11.17)	(10.86)	(11.12)	(11.15)
Observations	118	118	118	118
Adj. R-squared	0.503	0.453	0.475	0.471

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: length of banking crisis.
Source: Authors' estimates.

Table 9. Explaining Crisis Length Controlling for Initial Economic Conditions

	Duration of crisis (OLS)			
	Model 1	Model 2	Model 3	Model 4
Expansionary fiscal policy	-0.676**	-0.907***	-0.791**	-0.947***
	(-2.20)	(-2.92)	(-2.55)	(-3.13)
Expansionary fiscal policy* High GDP per Capita (t-1)	-0.876**	-0.805***	-0.881***	-0.987***
	(-2.39)	(-3.12)	(-2.99)	(-3.63)
Public consumption (percent of total expenditure)	-0.075***			
	(-3.42)			
Public consumption* High GDP per Capita (t-1)	0.122***			
	(4.84)			
Public investment (percent of total expenditure)		-0.129*		
		(1.92)		
Public Investment* High GDP per Capita (t-1)		-0.210***		
		(-2.94)		
Income tax revenue (percent of total revenues)			0.122**	
			(2.72)	
Income tax revenue* High GDP per Capita (t-1)			-0.264***	
			(-3.26)	
Goods &services tax revenue (percent of total revenues)				0.190*
				(1.98)
Goods &services tax revenue * High GDP per Capita (t-1)				0.157**
				(2.71)
Previous Credit boom	0.411**	0.439**	0.331**	0.404**
	(2.33)	(2.60)	(2.63)	(2.32)
Deposit freeze or guarantee	-0.618***	-0.619***	-0.629***	-0.621***
	(-3.15)	(-3.02)	(-3.63)	(-3.45)
Number of banks closed	-0.155***	-0.156***	-0.158***	-0.155***
	(-3.14)	(3.39)	(-3.29)	(2.97)
Government intervention	-0.707***	-0.802***	-0.872***	-0.825***
	(3.63)	(-3.79)	(-4.15)	(-4.13)
High GDP per capita (t-1)	-0.345***	-0.322***	-0.455***	-0.667***
	(-3.02)	(-4.07)	(-4.19)	(-4.31)
Constant	3.017***	3.008***	3.032***	3.033***
	(11.87)	(11.86)	(11.02)	(11.22)
Observations	118	118	118	118
Adj. R-squared	0.501	0.471	0.462	0.485

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: length of banking crisis.
Source: Authors' estimates.

Table 10. Explaining Post-Crisis Growth Controlling for Initial Fiscal Conditions

	Average Growth (t-t+5) (OLS)			
	Model 1	Model 2	Model 3	Model 4
Expansionary fiscal policy	0.363	0.563	0.032	0.201
	(0.44)	(0.86)	(0.14)	(0.29)
Expansionary fiscal policy* Highly Indebted (t-1)	-0.845	-0.042	-0.448	-0.772
	(-0.76)	(-0.05)	(-0.43)	(-0.81)
Public consumption (percent of total expenditure)	(-0.020)			
	(-0.42)			
Public consumption* Highly Indebted (t-1)	0.017			
	(0.27)			
Public investment (percent of total expenditure)		0.259***		
		(5.94)		
Public Investment* Highly Indebted (t-1)		-0.071		
		(-1.02)		
Income tax revenue (percent of total revenue)			-0.237**	
			(-2.28)	
Income tax revenue* Highly Indebted (t-1)			0.028	
			(0.22)	
Goods & services tax revenue (percent of total revenue)				0.558***
				(4.94)
Goods & services tax revenue * Highly Indebted (t-1)				-0.407**
				(2.07)
Previous Credit boom	0.023	0.421	0.466	0.204
	(0.41)	(0.89)	(0.86)	(0.40)
Deposit freeze or guarantee	1.140**	0.631	0.633	1.010
	(2.03)	(1.33)	(1.15)	(2.01)
Number of banks closed	0.187	0.104	0.129	0.320**
	(1.43)	(0.96)	(1.05)	(2.69)
Government intervention	0.063	0.349	0.067	0.146
	(0.11)	(0.74)	(0.13)	(0.29)
Private Investment (percent of total investment)	6.647**	3.755*	5.919**	5.220**
	(2.60)	(1.74)	(2.44)	(2.30)
Cost of financing (a)	-0.069**	-0.018	-0.053	-0.059*
	(-1.90)	(-0.59)	(-1.59)	(1.89)
Fresh capital injections into financial sector	0.955*	0.417	0.787	0.612
	(1.68)	(0.88)	(1.45)	(1.22)
Highly Indebted (t-1)	-0.188	-0.301	-0.014	-0.965
	(-0.22)	(-0.50)	(.0.02)	(-1.23)
Constant	2.621**	3.332**	2.701**	2.774***
	(2.55)	(3.95)	(2.63)	(3.10)
Observations	112	112	112	112
Adj. R-squared	0.298	0.353	0.262	0.342

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: average GDP growth in the 5 years following the end of the crisis
Note (a): the cost of financing variable is the difference between the lending interest rates and the interbank interest rates.
Source: Authors' estimates.

Table 11. Explaining Post-Crisis Growth Controlling for Initial Economic Conditions

	Average Growth (t-t+5) (OLS)			
	Model 1	Model 2	Model 3	Model 4
Expansionary fiscal policy	0.163	0.463	0.132	0.241
	(0.64)	(0.36)	(0.44)	(0.39)
Expansionary fiscal policy* High GDP per Capita (t-1)	0.545*	0.442	0.456	0.572*
	(1.86)	(1.55)	(1.34)	(1.91)
Public consumption (percent of total expenditure)	-0.234			
	(-0.52)			
Public consumption* High GDP per Capita (t-1)	0.117*			
	(1.57)			
Public investment (percent of total expenditure)		0.259***		
		(5.94)		
Public Investment* High GDP per Capita (t-1)		0.371***		
		(6.52)		
Income tax revenue (percent of total revenue)			-0.037	
			(-0.88)	
Income tax revenue* High GDP per Capita (t-1)			0.028***	
			(2.22)	
Goods& services tax revenue (percent of total revenue)				0.358***
				(4.94)
Goods& services tax revenue * High GDP per Capita (t-1)				0.407***
				(5.07)
Previous Credit boom	0.123	0.321	0.326	0.324
	(0.51)	(0.92)	(0.89)	(0.60)
Deposit freeze or guarantee	0.610**	0.631	0.637	0.910*
	(2.03)	(1.53)	(1.56)	(2.01)
Number of banks closed	0.227	0.214	0.219	0.213**
	(1.43)	(0.96)	(1.05)	(2.69)
Government intervention	0.333	0.359	0.337	0.316
	(0.14)	(0.75)	(0.17)	(0.19)
Private Investment (percent of total investment)	4.647**	3.701*	5.034**	5.330**
	(2.64)	(1.94)	(2.24)	(2.20)
Cost of financing (a)	-0.089**	-0.088	-0.083	-0.089*
	(-2.90)	(-1.59)	(-1.62)	(1.99)
Fresh capital injections into financial sector	0.905*	0.407	0.707*	0.602*
	(1.98)	(0.98)	(1.95)	(1.92)
High GDP per capita (t-1)	0.237*	0.215*	0.219*	0.233**
	(1.86)	(1.96)	(2.05)	(2.71)
Constant	2.600**	3.302**	2.700**	2.704***
	(2.56)	(3.99)	(2.69)	(3.19)
Observations	112	112	112	112
Adj. R-squared	0.382	0.397	0.363	0.373

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: average GDP growth in the 5 years following the end of the crisis
Note (a): the cost of financing variable is the difference between the lending interest rates and the interbank interest rates.
Source: Authors' estimates.

V. ROBUSTNESS ANALYSIS

This section assesses the strength of the above results on the basis of three robustness analyses:

- A different definition of duration: In the baseline model, the definition of duration is based on recovery of GDP growth. This means that the end of the banking crises can only be registered when output growth resumes. However, this definition may be inappropriate if the banking sector problems are resolved quickly, but GDP growth lags due to other cyclical or structural impediments. Therefore, the baseline definition of duration is potentially biased towards longer durations of crisis episodes. As an alternative, the end of the crisis is defined as the first year in which the stock market index returns to its precrisis level. Under this definition, episodes' duration is shorter because the stock market tends to recover faster than real output in our sample. Results of regressions using the alternative definition of crisis length are reported in Table A5 in the Annex and show that baseline results are robust to alternative definitions of duration.

- A different index of discretionary fiscal policy: The index of fiscal expansion created by Laeven and Valencia (2008) and used in the baseline model is appropriate for identifying sizeable fiscal expansions (those beyond 1½ percent of GDP). But this index is incapable of differentiating between fiscal expansions which are discretionary and those which are the unintended result of a dramatic collapse of GDP growth. We calculated an indicator of discretionary fiscal policy following Blanchard (1990).[36] Results are reported in Table A6 and show that baseline results are consistent with this new formulation.

- Testing for endogeneity between duration and fiscal policy: Since fiscal policy and output growth are correlated, baseline results could be biased due to endogeneity as GDP growth enters the definition of crisis length. In order to control for this factor, a new model is estimated using a Two-Stage Least Square (TSLS) estimator, employing all other independent variables and a measure of liquidity support as instruments. Results are reported in Table A7, suggesting that the main findings hold.

[36] Blanchard (1990) defined this indicator as follows: "the value of the primary surplus which would have prevailed, were unemployment at the same value as in the previous year, minus the value of the primary surplus in the previous year." Both variables are expressed as a percent of GDP. When this change was greater than -1½ percent of GDP, we labeled the year as a fiscal expansion (value 1), and zero otherwise.

VI. Conclusion

This paper assessed the effects of fiscal policy responses during 118 episodes of systemic banking crises in advanced and emerging market economies. The results indicate that timely countercyclical fiscal responses (both due to discretionary measures and automatic stabilizers), accompanied by actions to deal with financial sector weaknesses, contribute to shortening the length of crisis episodes. During crisis caused by financial sector distress, fiscal expansions increase the likelihood of earlier exit from a shock episode. Expansionary fiscal policies reduced the crisis duration by almost one year. These results hold for different definitions of crisis duration and alternative specification and estimation methods. The findings are consistent with recent studies that highlight the importance of countercyclical policy in response to recessions associated with financial sector problems (Classens, Kose, and Terrones, 2008; IMF, 2009b; IMF, 2009c).

Initial fiscal conditions matter for fiscal performance during shocks. In countries with high precrisis ratios of public sector debt to GDP, lack of fiscal space not only constraints the government's ability to implement countercyclical policies, but also undermines the effectiveness of fiscal stimulus and the quality of fiscal performance. In countries with high debt, crises lasted almost one year longer. The effect of high public debt on duration completely offset the benefits of expansionary fiscal policies in these countries. Similar results are found for countries with lower per capita income, as poor implementation capacity and high macroeconomic risks limit the scope and the effects of fiscal expansions during crises (Botman and Kumar, 2006). These findings point to the importance of creating fiscal space and enhancing macroeconomic stability in tranquil times to limit the risk of falling into crises and to enhance the effectiveness of policy responses when exogenous shocks hit countries (Tavares and Valkanov, 2001). In emerging market economies, attention needs to be paid to strengthening fiscal institutions, reduce political risks and improve budget execution capacity to reap the benefits of countercyclical fiscal policies (Baldacci, Gupta, and Mati, 2008).

The composition of fiscal expansions matters for crisis length—a point that has not been studied in the literature. Stimulus packages that rely mostly on measures to support government consumption are more effective in shortening the crisis duration than those based on public investment. A 10 percentage point increase in the share of public consumption in the budget reduces the crisis length by three to four months. Reducing the share of income taxes is less effective than consumption taxes in shortening the length of a banking crisis. These results suggest that tailoring the composition of fiscal response packages is important for enhancing the effectiveness of countercyclical fiscal measures in both advanced and emerging market economies (Spilimbergo et al., 2008; IMF, 2009).

Fiscal expansions do not have a significant impact on output recovery after the crisis though. Crises can have long-term negative effects, damaging human and physical capital with

negative implications for productivity and potential output growth. Early recovery from a crisis is therefore important, to minimize output losses in the short term and enhance medium-term growth prospects. This calls for timely fiscal responses during downturns. However, fiscal policy responses may not be effective when initial fiscal conditions are poor and fiscal space is limited. High public debt levels and past macroeconomic instability limit the scope for countercyclical deficit expansions and hamper the effectiveness of fiscal stimulus measures as markets perceive the higher future fiscal risks entailed by larger deficits (Balduzzi, Corsetti, and Foresi, 1997; Uribe, 2006).

The quality of the fiscal stimulus package matters most for post-crisis growth resumption, with fiscal responses relying largely on scaling up the share of public investment in the budget showing the largest positive effect on medium-term output growth. A one percent increase in the share of capital outlays in the budget raised post-crisis growth by about ⅓ of one percent per year. Income tax reductions are also associated with positive growth effects.

The results of the short-term and medium-term impacts of fiscal policy during financial crises highlight a potential trade-off between short-run aggregate demand support measures and medium-term productivity growth objectives in fiscal policy response to shocks. Implementation lags for government investment, which were documented also during the current crisis, may be, at least in part, responsible for these results. They also point to careful consideration of the composition of fiscal stimulus packages, as different short-term and medium-term fiscal multipliers can affect fiscal policy performance during the crisis and in its aftermath (Spilimbergo, Symansky, and Schindler, 2009).

The results of the paper also call for further research. Economic theory predicts that, in normal circumstances, fiscal expansions tend to crowd out private investment and increase the cost of financing for the private sector. However, the empirical findings presented here indicate that an increase in the share of public investment (as a percentage of total public spending) is compatible with an increase in the share of private investment (as a percentage of total investment) during banking crises, and both can have a positive contribution to long-term growth in the subsequent period. This constitutes a very preliminary evidence of the crowding-in effects potentially attributed to fiscal policy in situations of financial stress (Aschauer, 1989). But a proper test of this hypothesis was beyond the scope of this paper.

Appendix Table A1. Episodes of Banking Crisis in the World, 1980–2008

Country	Episodes	Duration (1)	Duration (2)	Country	Episodes	Duration (1)	Duration (2)
Albania	1994	4	3	Jordan	1989	2	1
Algeria	1990	4	4	Kenya	1985	1	1
Argentina	1980	3	3	Kenya	1992	2	2
Argentina	1989	2	2	Korea	1997	2	1
Argentina	1995	1	1	Kuwait	1982	1	1
Argentina	2001	2	1	Kyrgyz Republic	1995	1	1
Armenia	1994	6	5	Latvia	1995	1	1
Azerbaijan, Rep.	1994	2	2	Lebanon	1990	1	1
Bangladesh	1987	2	1	Lithuania	1995	1	1
Belarus	1994	3	2	Macedonia, FYR	1993	3	2
Benin	1988	2	2	Madagascar	1988	4	3
Bolivia	1986	1	1	Malaysia	1997	2	2
Bolivia	1994	3	2	Mali	1987	2	1
Bosnia & Herzeg.	1992	2	2	Mauritania	1984	2	1
Brazil	1990	1	1	Mexico	1981	6	4
Brazil	1994	3	3	Mexico	1994	2	2
Bulgaria	1996	4	3	Morocco	1980	4	3
Burkina Faso	1990	1	1	Mozambique	1987	6	4
Burundi	1994	3	3	Nepal	1988	2	2
Cameroon	1987	3	2	Nicaragua	1990	4	3
Cameroon	1994	2	2	Nicaragua	2000	3	3
Cape Verde	1993	4	4	Niger	1983	2	2
Central African R.	1994	3	3	Nigeria	1991	1	1
Chad	1983	5	3	Norway	1991	3	3
Chad	1992	2	2	Panama	1988	1	1
Chile	1981	2	2	Paraguay	1995	8	6
China, P.R.	1998	2	2	Peru	1983	1	1
Colombia	1982	1	1	Philippines	1983	3	3
Colombia	1998	2	1	Philippines	1997	2	2
Congo, Dem. Rep.	1983	3	1	Poland	1992	1	1
Congo, Dem. Rep.	1991	3	1	Romania	1990	3	3
Congo, Republic	1992	3	1	Russia	1998	1	1
Costa Rica	1987	2	2	São Tome & Principe	1992	1	1
Costa Rica	1994	3	3	Senegal	1988	3	3
Côte d'Ivoire	1988	5	4	Sierra Leone	1989	4	3
Croatia	1998	2	2	Slovak Republic	1998	2	1
Czech Republic	1996	3	3	Slovenia	1992	1	1
Djibouti	1991	7	5	Sri Lanka	1989	1	1
Dominican Repub.	2003	1	1	Swaziland	1995	7	5
Ecuador	1982	1	1	Sweden	1991	3	3
Ecuador	1998	2	1	Tanzania	1987	3	3
Egypt	1980	2	1	Thailand	1983	3	3

Appendix Table A1. Episodes of Banking Crisis in the World, 1980–2008 (concluded)

Country	Episodes	Duration (1)	Duration (2)	Country	Episodes	Duration (1)	Duration (2)
El Salvador	1989	1	1	Thailand	1997	2	2
Equatorial Guinea	1983	4	3	Togo	1993	3	3
Eritrea	1993	3	2	Tunisia	1991	3	2
Estonia	1992	1	1	Turkey	1982	1	1
Finland	1991	2	2	Turkey	2000	2	1
Georgia	1991	4	3	Uganda	1994	5	4
Ghana	1982	2	2	Ukraine	1998	2	2
Guinea	1985	2	2	United Kingdom	2007	2	2
Guinea	1993	2	2	United States	1988	4	3
Guinea-Bissau	1994	2	1	United States	2007	2	2
Guyana	1993	3	2	Uruguay	1981	4	4
Haiti	1994	1	1	Uruguay	2002	1	1
Hungary	1991	1	1	Venezuela, R. Bol.	1994	3	3
India	1993	1	1	Vietnam	1997	3	2
Indonesia	1997	2	2	Yemen, Republic	1995	2	2
Jamaica	1996	3	2	Zambia	1995	4	3
Japan	1997	2	2	Zimbabwe	1995	1	1

Source: Author's calculations based on Laeven and Valencia (2008).
Note 1: Duration 1, counts the number of years between the start of the crisis (as identified by Laeven and Valencia, 2008) and the start of two consecutive years of GDP growth above 0.5 percent of per year.
Note 2: Duration 2, counts the number of years between the start of the crisis (as identified by Laeven and Valencia, 2008) and the year in which the stock market (measured by its major index) recovered the level previous to the crisis. Data for these stock market values comes from the Global Financial Database (2009).

Appendix Table A2. Budget Composition: Revenues
(in percent of total revenue)

	Before Crisis *(t-2; t-1)*	During Crisis *(t)*	After Crisis *(t+1; t+2)*
Taxes	1.45	-14.21	1.84
Income, profits, capital gains	1.39	-8.31	1.74
Payroll and workforce	0.19	-1.29	0.09
Property	0.14	-1.16	-0.18
Goods and services	0.15	-2.13	0.48
International trade	-0.37	-1.67	-0.08
Other taxes	-0.05	0.35	-0.21
Social contributions	1.32	-7.83	1.61
Other revenues	1.67	-2.09	3.17

Source: Own elaboration. Data: WEO and GFS.
Note: Figures show the change in the variables during the period compared to the precrisis year.

Appendix Table A3. Budget Composition: Expenditures
(as percent of total expenditure)

	Before Crisis *(t-2; t-1)*	During Crisis *(t)*	After Crisis *(t+1; t+2)*
Current Expenditure	0.10	-9.51	2.43
Goods and services	-0.24	-1.78	0.35
Employee compensation	-1.89	-4.04	-0.53
Transfers	0.11	-2.54	1.12
Interest payments	0.76	0.33	1.46
Other expenses	1.36	-1.47	0.03
Public Investment	-0.24	0.98	0.77

Source: Own elaboration. Data: WEO and GFS.
Note: Figures show the change in the variables during the period compared to the precrisis year.

Appendix Table A4. The Relationship Between Containment and Resolution Policies and Crisis Length
(OLS Estimates)

	Duration			
	Coefficient	**T-stat**	**R-squared**	**Observation**
Initial Conditions and Containment Policies				
Credit Boom (t-1)	0.933***	3.75	0.11	118
Deposit Freeze	-0.951***	-3.83	0.12	118
Bank Holiday	-0702**	-3.13	0.06	118
Blanket Guarantee	-0.721**	-3.21	0.07	118
Liquidity Support	0.769**	3.44	0.08	118
Resolution Policies				
Forbearance	0.787**	3.51	0.08	118
Government Intervention	-0.973***	-3.91	0.11	118
Number of Bank Closures	-0.289***	-5.45	0.19	118
Fresh Private Capital	-0.321	-1.48	0.01	118
Number Foreign Sales	0.482***	4.81	0.16	118
Bank Agency	-0.932***	-4.24	0.11	118
Public Recapitalization	0.803**	3.49	0.08	118

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: length of banking crisis.
Source: Authors' estimates.
Note: Laeven and Valencia (2008) report containment and resolution policies data for 42 cases. We complemented their database using inference analysis where concrete data was not available from IMF country reports.

Appendix Table A5. Robustness Estimations: Different Definition of Crisis Duration Based on Stock Market Recovery
(OLS Estimates)

	Duration of Crisis (2)			
	Model 1	**Model 2**	**Model 3**	**Model 4**
Expansionary fiscal policy	-0.709***	-0.756***	-0.740***	-0.751***
	(-3.91)	(-4.12)	(-4.12)	(-4.19)
Public consumption (percent of total expenditures)	-0.018*	--	--	--
	(-1.89)	--	--	--
Public investment (percent of total expenditures)	--	-0.003	--	--
	--	(-0.26)	--	--
Income tax revenue (percent of total revenues)	--	--	0.038*	--
	--	--	(1.80)	--
Goods & services tax revenue (percent of total revenues)	--	--	--	0.058*
	--	--	--	(1.84)
Previous Credit boom	0.193	0.226	0.205	0.058*
	(1.12)	(1.30)	(1.19)	(1.84)
Deposit freeze or guarantee	-0.287*	-0.310*	-0.241	-0.294*
	(1.69)	(1.77)	(-1.38)	(-1.73)
Number of banks closed	-0.091**	-0.110**	-0.101**	-0.097**
	(-2.39)	(-2.67)	(-2.48)	(-2.37)
Government intervention	-0.421**	-0.474**	-0.487***	-0.485***
	(-2.43)	(-2.71)	(2.84)	(-2.83)
Constant	3.147***	3.215***	3.238***	3.147***
	(14.02)	(14.30)	(14.60)	(14.00)
Observations	118	118	118	118
Adj. R-squared	0.335	0.314	0.333	0.334

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: length of banking crisis.
Source: Authors' estimates.

Appendix Table A6. Robustness Estimations: Focusing on Discretionary Expansionary Fiscal Policy

(OLS Estimates)

	Duration of crisis			
	Model 1	Model 2	Model 3	Model 4
Discretionary Expansionary fiscal policy	-0.370*	-0.418*	-0.437**	-0.458**
	(-1.76)	(-1.94)	(-2.08)	(-2.19)
Public consumption (percent of total expenditures)	-0.377***	--	--	--
	(-3.25)	--	--	--
Public investment (percent of total expenditures)	--	-0.030*	--	--
	--	(-1.98)	--	--
Income tax revenue (percent of total revenues)	--	--	0.079***	--
	--	--	(3.16)	--
Goods & services tax revenue (percent of total revenues)	--	--	--	0.123***
	--	--	--	(3.25)
Previous Credit boom	0.562**	0.615***	0.582**	0.583**
	(2.72)	(2.90)	(2.82)	(2.83)
Deposit freeze or guarantee	-0.557**	-0.561**	-0.457**	-0.567**
	(-2.72)	(-2.65)	(-2.17)	(-2.77)
Number of banks closed	-0.148***	-0.163***	-0.155***	-0.148***
	(-3.06)	(-3.31)	(-3.22)	(-3.05)
Government intervention	-0.675***	-0.741***	-0.805***	-0.800***
	(-3.26)	(-3.51)	(-3.94)	(-3.92)
Constant	3.637***	3.757***	3.826***	3.633***
	(13.83)	(14.05)	(14.65)	(13.80)
Observations	118	118	118	118
Adj. R-squared	0.436	0.404	0.434	0.436

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: length of banking crisis.
Source: Authors' estimates.

Appendix Table A7. Robustness Estimations: Controlling for Endogeneity
(2SLS Estimates)

	Duration of Crisis			
	Model 1	Model 2	Model 3	Model 4
Expansionary fiscal policy	-0.522**	-0.572**	-0.581**	-0.602**
	(-2.45)	(-2.61)	(-2.74)	(-2.85)
Public consumption (percent of total expenditures)	-0.035***			
	(-3.12)			
Public investment (percent of total expenditures)		-0.027*		
		(-1.82)		
Income tax revenue (percent of total revenues)			0.076***	
			(3.07)	
Goods & services tax revenue (percent of total revenues)				0.119***
				(3.18)
Previous Credit boom	0.568**	0.621***	0.590***	0.592***
	(2.80)	(2.99)	(2.91)	(2.93)
Deposit freeze or guarantee	-0.555**	-0.563**	-0.461**	-0.568***
	(-2.76)	(-2.72)	(-2.24)	(-2.84)
Number of banks closed	-0.137**	-0.152***	-0.143***	-0.135**
	(-2.86)	(-3.09)	(2.99)	(-2.82)
Government intervention	-0.713***	-0.781***	-0.841***	-0.837***
	(-3.48)	(-3.74)	(-4.16)	(-4.16)
Constant	3.737***	3.854***	3.917***	3.731***
	(14.12)	(14.36)	(14.98)	(14.12)
Observations	118	118	118	118
Adj. R-squared	0.450	0.419	0.449	0.452

*** significant at 1percent; ** significant at 5 percent; * significant at 10 percent
Dependent variable: length of banking crisis.
Source: Authors' estimates.
Note: Instrumented variable: Expansionary fiscal policy; Instrument; and Liquidity Support.

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