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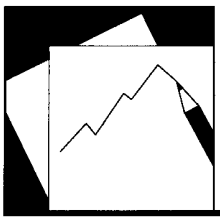

IMF Working Paper

Responding to Banking Crises: Lessons from Cross-Country Evidence

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Responding to Banking Crises: Lessons from Cross-Country Evidence

Prepared by Enrica Detragiache and Giang Ho[1]

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Abstract

A common legacy of banking crises is a large increase in government debt, as fiscal resources are used to shore up the banking system. Do crisis response strategies that commit more fiscal resources lower the economic costs of crises? Based on evidence from a sample of 40 banking crises we find that the answer is negative. In fact, policies that are riskier for the government budget are associated with worse, not better, post-crisis performance. We also show that parliamentary political systems are more prone to adopt bank rescue measures that are costly for the government budget. We take advantage of this relationship to instrument the policy response, thereby addressing concerns of joint endogeneity. We find no evidence that endogeneity is a source of bias.

JEL Classification Numbers: E44, E58, G21, G28

Keywords: Banking crises, banking crisis policies, banking crisis cost

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Contents Page

"Getting the [TARP] legislation through Congress was so tortuous that it undermined confidence in the ability of American democracy to cope with a major financial crisis. (At the Fed, there was more than one conversation about the advantages of a parliamentary system, where the prime minister can count on his party to do whatever he deems necessary at the darkest hour.)"

David Wessel, "In Fed We Trust", (New York: Crowne Publishing), 2009, p. 274.

I. INTRODUCTION

The banking crisis hitting many advanced and some developing countries in the last two years shined the spotlight once again on the fragility of the financial system and its macroeconomic consequences. Among the many questions raised by these events is how the authorities should address the impending illiquidity and insolvency of large segments of the financial sector to minimize the economic consequences of the crisis.[2]

A vast literature has studied banking crises around the world, focusing especially on the common factors associated with the occurrence of crises.[3] There are also several case studies documenting crisis response strategies adopted in different episodes, and attempting to identify what works and what does not.[4] However, research trying to draw more systematic inferences from past experience remains limited, and the question of whether some crisis resolution approaches work better than others remains a very open one.[5]

Perhaps one of the starkest consequences of banking crises is their effect on government finances. As the authorities try to shore up the banking sector, fiscal resources are often deployed to guarantee bank liabilities, provide new capital to cover losses, and offer other forms of assistance. For example, the fiscal cost net of recoveries of the Thai crisis in 1997-98 was about 35 percent of GDP, while the cost of the Turkish crisis in 2000 was about 30 percent of GDP (Laeven and Valencia, 2008). Total support packages from governments and

[2] There is also a debate on whether banking crises have real effects on the economy, and, if so, through which channels. See Dell'Ariccia, Detragiache, and Rajan (2008) for a recent contribution and a discussion of the issues.

[3] See, for example, Demirgüç-Kunt and Detragiache (1998), Kaminsky and Reinhart (1999), Domaç and Martinez Peria (2003), Reinhart and Rogoff (2008).

[4] See, among others, Dziobeck and Pazarbasioglu (1997), Hoelscher and Quintyn (2003), and Calomiris, Klingebiel, and Laeven (2003).

[5] The main contributions are Honohan and Klingebiel (2003), Claessens, Laeven, and Klingebiel (2005), and Cecchetti, Kohler, and Upper (2009). We discuss the methodology and findings of these three studies in throughout the paper, and more specifically in Section III.B. Other contributions are Laeven and Valencia (2008), which focuses on one aspect of the policy response, the extension of blanket guarantees, and Brown and Dinç (2009), which compare bank closure policies in emerging markets in normal times and times of systemic distress.

central banks during the present crisis have reached an estimated 74 percent of GDP in the U.K., 73 percent of GDP in the U.S., and 18 percent of GDP in the Euro area (Haldane and Alessandri, 2009).

In this paper, we ask whether bank support strategies that commit more fiscal resources improve economic performance during the crisis. In other words, we want to explore whether there is a trade-off between the objective of lowering the economic costs of a crisis and the objective of protecting the government budget.

To identify crisis response strategies we rely on the database recently built at the IMF by Laeven and Valencia (2008) (LV henceforth). This database documents many features of banking crises episodes from 1980 to the present, including policies undertaken to shore up the banking system. Using this information, we classify policy measures in two categories: those that involve a commitment of government funds and those that do not. For instance, declaring a bank holiday – a temporary prohibition of bank deposit withdrawals – helps stemming bank runs without putting public funds directly at risk. In contrast, a blanket government guarantee of bank deposits protects banks from runs, but with an explicit commitment of fiscal resources. Similarly, bank recapitalization using government funds commits taxpayers' money, while a strategy of forbearance, by which regulators tacitly allow banks to operate with capital below the regulatory minimum, does not.[6] With this classification, we construct a policy response index that gives positive weight to measures involving an actual or contingent outlay of public money and negative weight to policies that do not. We then regress measures of post-crisis economic performance on this index after controlling for other relevant factors.

This simple test shows that post-crisis economic performance tends to be worse when policymakers adopt policies that are risky for the government budget. This effect is robust and economically sizable. Thus, there seems to be no tradeoff between limiting the economic costs of banking crises and protecting fiscal resources. This finding is broadly consistent with other results in the literature, as both Honohan and Klingebiel (2003) and Claessens, Kliengebiel, and Laeven (2005) fail to find evidence of such trade-off. One important concern in interpreting this result, however, is the endogeneity of the policy response: if policymakers are less likely to put government funds at risk when the crisis is mild, then we may find that policies more protective of taxpayers are associated with lower economic costs simply because they are more likely to be adopted in milder crises.

To tackle the endogeneity of the policy response, we rely on an instrumental variables (IV) approach. To identify suitable instruments, we consider how the political process shapes the crisis response strategy. Specifically, we hypothesize that countries with political institutions that are conducive to larger governments are more likely to choose bank support policies that put fiscal resources at risk. Persson and Tabellini (1999) find that an important determinant of cross-country variation in government size is whether the political system is parliamentary

[6] Of course, forbearance may be followed by recapitalization, nationalization, or other actions that are costly to taxpayers, but per se does not involve a commitment of public money.

or presidential. As it turns out, in our data this country characteristic by itself explains about 40 percent of the sample variation in the banking crisis policy response index. This very strong association not only provides us with a relevant instrument, but it is interesting in and of itself, suggesting that the nature of the political regime heavily influences economic policy decision even in times of crisis.

We find that the results continue to hold after instrumenting the policy index with the political system indicator. In fact, we see no evidence that endogeneity biases the OLS coefficient downward. We take this as evidence against the hypothesis that there is a trade off between a quick recovery from a banking crisis and the objective of limiting the downside risk for taxpayers. As usual, the results should be treated with caution as the analysis has a number of limitations: the sample size is small; we do not have enough information to evaluate the size of taxpayer exposures associated with each of the policy measures; specific conditions may make some response strategies feasible in some countries but not in others; endogeneity concerns are often difficult to fully lay to rest. Hence, while this evidence is suggestive, it should not be taken as an indication that bank support measures requiring large fiscal outlays should be avoided in any circumstance.

The remainder of the paper is organized as follows. Section II explains our methodology and data, including a discussion of how we construct the policy index and how we instrument it. Section III reports the baseline results and sensitivity analysis and relates our finding to the existing literature. Section IV concludes.

II. Methodology and Data

A. Empirical Model

We estimate the following empirical model relating a variable measuring economic performance during the crisis Y_i to an index summarizing the policy response to the crisis P_i and a vector of control variables X_i :

$$Y_i = \alpha + \beta P_i + \delta' X_i + \varepsilon_i, \qquad (1)$$

where *i* denotes a crisis episode. In the baseline specification, the dependent variable, Y_i, is GDP growth over the period [*t, t*+2], where *t* denotes the year when the crisis begins. In an alternative specification, we take as the outcome of interest the duration of the crisis, calculated as the number of quarters it takes output to return to its pre-crisis peak. A peak is defined as the maximum quarterly GDP over a window of four quarters before and after the crisis. We obtain this variable from Cecchetti, Kohler, and Upper (2009) (henceforth CKU). Based on this measure the average duration of a crisis is 11.3 quarters, hence the three-year window used as the crisis window to measure GDP growth is reasonable. In a robustness test we allow for a four-year window.

We condition the estimation on the country's trend GDP growth, so that we effectively focus on departures of growth from its long-term value for the country. Other studies use as the dependent variable measures output loss during the crisis, calculated as the difference

between actual output and either pre-crisis output or trend output (Honohan and Klingebiel, 2003, Claessens, Klingebiel, and Laeven, 2005, Cecchetti, Kohler, and Upper, 2009). By putting trend growth on the right hand side, we obtain a cleaner estimate of the impact of the policy variable and the other control variables on crisis performance.[7]

In sensitivity tests, we repeat our estimation using measures of output loss during crisis calculated by CKU and LV, as well as a measure of crisis "intensity," i.e. the minimum GDP growth rate experienced during the crisis. The LV output loss measure is calculated as (the negative of) the sum of output gaps over the four-year period following the crisis, with potential output calculated using the average growth rate during the three years preceding the crisis. If this number is negative (i.e., there is an output gain rather than a loss), then the LV measure is set to zero. The CKU measure of output loss is calculated as the sum of the deviations of GDP from its pre-crisis peak for the duration of the crisis, where the peak is determined over a four-quarter window before and after the crisis.

Cross-correlations among the various measures of performance used in the baseline tests and the sensitivity analysis are reported in Table 1. GDP growth in crisis times, crisis duration, minimum growth, and the CKU loss measure are strongly correlated, with correlation coefficients ranging from 0.70 to 0.86 in absolute value. The LV measure is less correlated with the other measures.

B. Policy Response Index

We use the information on crisis management strategies described in LV to construct a policy response index. LV collect detailed data on policy measures adopted in both the crisis containment and resolution phase for 40 systemic banking crisis episodes. Policies in the containment phase include deposit freezes, bank holidays, blanket guarantees to bank depositors and other bank creditors, and liquidity support. These policies generally attempt to restore public confidence in the financial system when the financial crisis first breaks out. Crisis resolution policies, such as bank recapitalization or nationalization, aim at restoring the financial health of banking institutions that remain open, so that they can resume their lending function on a sound basis. In constructing our index, we consider both containment and resolution policies. We expect the effects of both policies to be at work during the three-year window in which we examine growth performance.

We classify bank rescue policies along one particular dimension: whether they involve a commitment of financial resources by the government or not. The policy response index for crisis episode *i* is defined as follows:

$$P_i = \sum_{k=1}^{n} w_k d_{ik},$$

[7] With trend growth as a separate control, any correlation between trend growth and other independent variables does not affect the coefficients of the policy variable.

where w_k is the score assigned to policy k and d_{ik} is a dummy variable that takes the value of one if policy k is adopted in crisis episode i and the value of zero otherwise. Policies which shift the financial burden of the crisis from bank stakeholders to the government receive a score of one, while policies that do not commit public funds receive a score of minus one. Thus, the index increases as more policies that commit public funds to bank support are adopted, and it decreases as policies protective of fiscal resources are implemented.

Explicit blanket guarantees, nationalization of banks, bank recapitalizations with public funds, and the setup of an asset management company (AMC) to take over and manage distressed assets are scored as policies that are potentially costly to taxpayers. The announcement of an explicit blanket guarantee entails a sizable fiscal contingent liability to pay off depositors of failed institutions and therefore is not protective of taxpayers.[8] Similarly, the nationalization and recapitalization of banks uses public funds. Recapitalization costs often constitute the largest fraction of the direct fiscal costs of banking crises and can be in the form of cash, government bonds, preferred shares, or purchase of bad loans, etc. The creation of an AMC can also be costly for the government, if – as it is usually the case – assets are transferred to the AMC at a price above their market value, or if the nonperforming assets are ineffectively managed by the AMC. [9]

On the other hand, deposit freeze, bank holiday, and forbearance are bank support policies that do not impose direct fiscal costs, so each of these policies, if adopted, subtracts one point from the index.[10] These measures are intended to give banks the time and flexibility to attempt market-based financial restructuring without directly committing fiscal resources. These polices have potential drawbacks: bank holidays and deposit freezes may grind the payment system to a halt, and, depending on their scope and duration, may lead to a significant decline in consumption. Under regulatory forbearance, banks that should be closed down are allowed to continue to operate; as a result, they may "gamble for resurrection," eventually causing larger losses to depositors, other creditors, and shareholders. On the other hand, these strategies may give banks some "breathing room," allowing them to find the liquidity and capital necessary to remain in business. They may also buy the time necessary for information about the quality of bank assets to reach investors, allowing markets, after the initial phase of panic, to distinguish between healthy and unhealthy institutions.[11]

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[8] Both Honohan and Klingebiel (2003) and Laeven and Valencia (2008) found that blanket guarantees significantly increase the fiscal costs of a crisis.

[9] Klingebiel (2000) reviews seven episodes in which asset management companies were used in crisis resolution, and concludes that these companies were largely ineffective in expediting bank and corporate restructuring. In a robustness test, we exclude AMC from the set of policies considered.

[10] In a robustness test, we give a score of zero for implementing policies that do not commit public funds, thereby equating such policies to a strategy of no intervention (Section III.E below).

[11] If forbearance magnifies bank losses, and losses are ultimately borne by the government, then it might be argued that forbearance is not really protective of taxpayers. Our index would be reduced by the forbearance measures, but it would increase as a result of the bailout measures.

Our index does not consider liquidity support to banks because it is not clear *a priori* whether this policy puts government financial resources at risk. Unlike bank recapitalization, this type of emergency lending is often accompanied by collateral requirements and/or penalty interest rates. Empirical evidence also shows that in a number of past crises these loans were eventually repaid.[12] Nevertheless, in the sensitivity analysis we consider a version of the index including liquidity support as a policy that puts taxpayers at risk. Table 2 summarizes the construction of the policy response index, and Figure 1 shows its frequency distribution.

Table 3 shows the value of the policy index for all the crisis episodes in our sample. The list of crises, which is taken from the LV database, includes episodes of systemic distress both in advanced and developing countries since 1980. The most recent crises that started in the United States and the United Kingdom in 2007 are also documented with preliminary data. However, since both crises are ongoing we do not yet have a complete picture of the policy response as well as the economic and fiscal costs involved. We therefore do not consider them, and our final sample consists of 40 crisis episodes. The policy response index ranges from a low of -2 (Argentina, 1989) to a high of 4 (Jamaica, 1996; Sweden, 1991; and Turkey, 2000). The mean value of the index is 1.33, the standard deviation is 1.47, and the mode value of the index is 1 (1/4 of the episodes).

An alternative to summarizing the policy response through an index is to introduce individual dummies for each of the policy measures. This is the approach used in other studies, such as Honohan and Klingebiel (2003), Claessens, Klingebiel and Laeven (2005), and Cecchetti, Kohler, and Upper (2009). In principle, this approach is richer than the one we offer here, as it allows the researcher to disentangle the effect of each category of policy measures on the outcome. However, because the sample is small, there may not be enough information in the data to analyze the effects of each policy separately.[13] Our approach of constructing an index that reduces differences in crisis response strategies to one dimension (whether they put fiscal resources at risk), while less ambitious, is less demanding on the data. In addition, it makes it feasible to address the endogeneity of the policy variable.[14]

The LV database includes some information on the intensity of interventions under each category (for instance, the size of liquidity support operations relative to total bank assets),

[12] Another concern is the accuracy of the data. LV constructs this variable based on the size of deposit money bank claims on the central bank. An increase in the value for these claims, however, does not necessarily indicate crisis-related liquidity support operations. It might instead result from the sterilization of foreign reserves losses during a speculative attack against the currency, or simply the loosening of monetary policy for reasons unrelated to financial distress.

[13] In the regressions explaining the output cost of the crises, Honohan and Klingebiel (2003) finds only one of the policy measures (liquidity support) to have a significant effect.

[14] Honohan and Klingebiel (2003) recognize the potential endogeneity of the policy response, and in one set of regressions they instrument two of the policy dummies (liquidity support and government guarantees). However, it is not clear why the other policy dummies are not instrumented. In addition, first stage regressions are not shown and there is no discussion of the strength of the instruments. The other studies do not address the endogeneity problem.

but this information is too sparse to attempt to distinguish among different degrees of intervention. We acknowledge that this is a limitation of our analysis. Our index also disregards possible differences in how various policies are implemented. Policymakers would probably argue that with crisis intervention often "the devil is in the details," such as the timing, sequencing and implementation of various measures. However, this over-simplification in our approach is necessary to maximize the number of crises included in the sample, since disaggregated information on policies is not always available for many episodes.

C. Control Variables

The vector X of control variables includes a set of country characteristics around the time of crisis that may influence its post-crisis performance. The first characteristic is the country's long-run growth potential, which we calculate as the average growth rate over 1960 to 2007 excluding the three crisis years.[15] In a robustness test, we use the average rate of growth over the three years prior to the crisis as a gauge of potential growth. This is not our preferred measure of potential growth, however, because countries might experience rapid and unsustainable growth in the run-up to the crisis. Also, for some transition countries such as Russia, the pre-crisis period included years of large negative growth associated to the transition process.

The other control variables in the baseline specification are the world economic growth over the crisis period and a dummy variable for the presence of an IMF-supported program. We expect crisis performance to be stronger when world economic growth is high, as export demand growth, foreign direct investment, and other foreign finance should help the recovery. On the other hand, the presence of an IMF-supported program indicates that the banking crisis was associated with balance-of-payments problems and possibly fiscal solvency problems, which would compound the effects of banking sector difficulties.[16] We expect this variable to be negatively related to economic growth during the crisis.

Because our sample is small, we choose a parsimonious baseline specification, and then check whether the results are sensitive to the inclusion of additional control variables in robustness tests. Among the variables we introduce in these tests is the volatility of GDP, as countries with more volatile output may experience a sharper downturn following a crisis irrespective of the policy response. A dummy variable for the presence of a deposit insurance scheme before the crisis is an alternative additional control, as deposit insurance removes (or limits) a potential source of instability during a crisis, depositor runs, and should therefore facilitate crisis management.[17]

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[15] For some countries the data do not go back as far as 1960, so we use a shorter time series.

[16] This variable is reported in LV.

[17] By undermining the disciplining effect of depositor monitoring, however, deposit insurance may make crises more likely. Demirgüç-Kunt and Detragiache (2002) finds empirical support for this effect.

Other alternative control variables are pre-crisis GDP per capita, the ratio of private credit to GDP, and the degree capital account liberalization. GDP per capita captures the country's institutional quality and/or the administrative capability of the government, and might be positively associated with performance during a banking crisis.[18] The ratio of private credit to GDP measures the importance of the banking sector as a source of funds for the private sector. Countries where the banking sector plays a more important role may be more severely affected by a banking crisis (Kroszner, Laeven, and Klingebiel, 2007). Finally, countries with fewer restrictions on international capital flow may find it easier to weather a crisis because they have access to alternative sources of capital.[19]

D. The Instrument

As mentioned above, a simple OLS estimation of equation (1) may produce biased results due to possible reverse causality. Specifically, a severe crisis may trigger the adoption of more extreme measures that require committing more fiscal resources. To make sure that our result is not contaminated by simultaneity issues, we need to instrument the policy response index.

We use as instrument a political system variable (SYSTEM) taken from the World Bank's database of political institutions. The variable SYSTEM, measured as of the crisis year, classifies countries in terms of their form of government, taking on the value 2 if a country has a parliamentary system, 1 if it has an assembly-elected president, and 0 if a presidential regime. In a presidential regime, citizens directly elect the top executive, while in a parliamentary regime, an elected parliament appoints the executive – the "government." Most Scandinavian countries (Finland, Norway and Sweden) have a parliamentary regime, but so do Japan, Czech Republic, Jamaica, and Turkey, etc. The majority of countries in our sample have a presidential system, such as Argentina, Ghana, Korea, and Russia, etc.

A valid instrument has to explain a substantial fraction of the variation in the endogenous variable (the policy index) as well as satisfy the exclusion restriction, i.e. it must affect post-crisis performance only through the policy response. How does the SYSTEM variable fare in both respects? Table 3 shows the value of SYSTEM for our sample of crisis episodes. We see quite a striking pattern. The simple correlation between SYSTEM and the policy index is 0.6. The average index value is 2.7 for parliamentary countries, 2 for countries with an assembly-elected president, and 0.7 for presidential regimes. That is, parliamentary governments are associated with policies that are riskier for the public finances. This strong relationship is consistent with the finding that parliamentary systems tend to have larger governments (Persson and Tabellini, 1999, and Persson, Tabellini, and Roland, 2000).

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[18] Claessens, Klingebiel, and Laeven (2005) find that institutional quality is positively correlated with post-crisis performance.

[19] We use a zero-to-ten index of capital control from Fraser Institute's Economic Freedom of the World database, with higher values of the rating corresponding to freer capital markets.

Persson, Roland, and Tabellini (2000) develop a theoretical model that explains this finding. In this model, in presidential systems there is more separation of power between the executive and the legislature; in addition, parliamentary majorities are less cohesive. This results in more accountability to the electorate, which limits the size of public expenditures in rents to politicians. In addition, less cohesive majorities make it more difficult to reach the consensus necessary for the provision of public goods. Both these effects result in lower government spending. The fiscal outlays associated with attempts to forestall insolvencies in the banking system can be viewed as expenditures necessary to provide a public good (financial stability). They could also be viewed as measures that redistribute resources from taxpayers to specific interest groups, such as bank shareholders or managers, bank bondholders, bank employees, or bank depositors. In either case, the theory proposed by Persson, Roland, and Tabellini (2000) would predict that these expenditures should be higher in parliamentary systems than in presidential systems.

Regarding the exclusion restriction, the form of government is clearly exogenous with respect to output growth during a banking crisis, since it is determined by rarely-modified political constitutions. Also, while the form of government may affect growth during the crisis period through its effect on the country long-run growth potential, this does not affect our estimation, since long-run growth potential is a control variable in the regression. One concern might be that the political regime may affect the fiscal stance during the crisis, and this, in turn, may affect growth. For instance, countries with larger governments may have stronger fiscal automatic stabilizers or may be more prone to use countercyclical fiscal policy during a downturn. Section III. F below shows that the form of government has no relationship with the fiscal stance during banking crises, suggesting that this concern can be dismissed.

A heterogeneity effect may arise from the fact that we are instrumenting a constructed index that includes several components. If the instrumental variable is correlated with some but not all of the components in the policy index, then the IV coefficient will be driven only by the effects of the correlated components.[20] To make sure there is little heterogeneity effect, Table 4 shows the correlations between SYSTEM and the policies that contribute to the policy response index. Each policy is a dummy variable that is one if the policy is implemented (as documented in the LV database) and zero if it is not. We see that correlation with the instrument is sizable for all policies, with the absolute value of the correlation coefficient ranging from 0.18 to 0.49.

[20] Specifically, suppose the index has two components $X = X_1 + X_2$ and the instrument is Z. It can be shown that $\hat{\beta}_{IV} = \beta_1 \frac{\text{cov}(Z, X_1)}{\text{cov}(Z, X)} + \beta_2 \frac{\text{cov}(Z, X_2)}{\text{cov}(Z, X)}$. If *cov*(Z, X_1)=0 then $\hat{\beta}_{IV} = \beta_2 \frac{\text{cov}(Z, X_2)}{\text{cov}(Z, X)}$.

III. THE RESULTS

A. Results from Baseline Specification

Table 5 presents the baseline results. For the two performance indicators (output growth during the crisis and crisis duration), we report the results from both OLS and IV estimation. In both IV regressions the policy response index is instrumented with the variable Political system. In addition to Political system, all exogenous variables in the second stage are included in the first stage regressions, though they are not reported in the table. We also report selective statistics of the first-stage estimation.

The control variables behave as expected. Countries with higher growth potential perform better in the post-crisis period, although this variable is significant only when crisis duration is the dependent variable. Better economic conditions worldwide, as captured by the variable world growth, significantly boost post-crisis growth and speed up crisis recovery. Based on our estimated coefficient, a shortfall of 1 percentage point in world growth is associated with a growth shortfall of 2.6 percentage points in the banking crisis country, post-crisis period. This suggests that global crises tend to be especially painful. As expected, IMF programs are associated with worse performance during crises, as recourse to IMF financial support occurs only when crises are accompanied by balance-of-payments or fiscal problems.

Turning to the main variable of interest, the policy response index, we find that its coefficient is negative and significant in both specifications, so that bank-support policies that commit government resources tend to be associated with worse economic outcomes. The economic effects are quite large. For example, an increase in the policy index by one (equivalent to the addition of one policy risky for the government budget) reduces output growth by almost 0.8 percentage points per year on average for three years, and it increases the duration of the crisis by almost three quarters.[21]

Is this result just a reflection of the fact that policymakers are more willing to put fiscal resources at stake when crises are more severe? Our IV regressions suggest that this is not the case. When we instrument the policy index with the political system variable, we find that the coefficient of the index continues to be statistically significant in both the growth and the duration regression. In addition, the magnitude of the coefficient increases rather than decreases as it would be the case with endogeneity bias. Based on the IV coefficients, an increase of 1 in the policy index reduces growth by 0.94 percentage points per year and increases the length of the crisis by 4.4 quarters. Larger IV coefficients may arise because IV estimation corrects for attenuation bias due to measurement error.

[21] These results continue to hold if we bootstrap the standard errors of the policy index estimate to correct for small sample bias. With 10,000 replications in the output growth regression the standard error becomes 0.352, while in the duration regression it becomes 0.976. The coefficient of the policy index remains significant at the 5 percent confidence level in the growth regression and at the 1 percent confidence level in the duration regression.

To take the IV estimation seriously, it is necessary to ascertain that it is not affected by the weak instruments problem. According to Staiger and Stock (1997), instruments may be deemed weak if the first-stage F-statistic is less than ten. In our case, this statistics is 17, clearly above the Staiger-Stock threshold. Stock and Yogo (2002) provide a more rigorous analysis, with critical values for decision rules based on the number of instruments and the number of endogenous variables. Based on these critical values, the bias of the IV estimator relative to OLS is approximately 10 percent or less, while the maximum size distortion of the conventional α -level Wald test based on IV statistics is no more than five percent.[22]

Thus, it appears that there is no tradeoff between the objective of a speedy crisis recovery and the objective of limiting the fiscal burden of the banking crisis.

B. Comparison with Other Results in the Literature

How do our findings relate to those in previous studies of banking crises? To our knowledge, this is the first study to consider crisis containment and resolution policies from the perspective of the potential burden they impose on taxpayers, as well as the first to carefully address the endogeneity of the policy response.

Honohan and Klingebiel (2003) use a sample of 38 crisis episodes (which does not fully coincide with the LV one) and focus primarily on the fiscal cost of the crisis. The main finding is that liquidity support, more extensive forbearance by regulators, and the extension of guarantees to bank depositors are associated with higher fiscal costs, while other policies have no significant relationship. The authors conclude that more "accommodative" policies tend to make banking crises costlier. Our study differs in some key aspects from Honohan and Klingebiel (2003): first, our crisis and policy intervention sample is somewhat different, as it is based on LV. Second, our main interest is in the economic performance during the crisis, not in the fiscal cost of the crisis. Third, we differentiate among policies based on their financial risk to the government. Fourth, we carefully instrument the policy variable to rule out endogeneity bias.

Claessens, Klingebiel, and Laeven (2005) explore the relationship between intervention policies and the economic and fiscal costs of crises. Costs are measured by the output loss relative to trend during the crisis episode. The main finding is that policies that support the banking system do not seem to reduce the output cost of banking crises, while good institutions, captured by an index of overall quality of institutions, an index of corruption, and an index of judicial efficiency, tend to have a positive effect.

In a recent paper, Cecchetti, Kohler, and Upper (2009) consider possible determinants of crisis performance. Concerning banking sector policies, the paper finds the use of an AMC is associated with longer crises, while a policy of forbearance is associated with larger output

[22] Small sample size can also make IV estimation problematic. McFadden (1999) indicates that the asymptotic distribution of the IV estimator is a reasonable approximation when the sample size minus the number of instruments is forty or larger. In our regression, this number is 39, which we take as ground for comfort.

losses. The paper does not discuss the robustness of these results, the role of other policy measures, or possible endogeneity bias.

C. Sensitivity Analysis: Additional Controls

In Table 6 we consider whether results are robust to controlling for additional factors that may be associated with economic performance during the crisis and are omitted in the baseline specification. For brevity, we restrict attention to regressions in which the dependent variable is post-crisis output growth.

A possible omitted variable is the volatility of GDP growth: countries with more volatile growth rates may also be more likely to experience a deep recession following a banking crisis, everything else being equal. We use the standard deviation of GDP growth during the period 1960-2007 as the volatility measure. When we include growth volatility in the regression, we find that it is not significant, and that the coefficients of the other variables do not change. In the second alternative specification, we control for the presence of a deposit insurance scheme at the onset of the crisis, as deposit insurance should prevent runs and may therefore facilitate crisis management. This control variable is also not significant and does not alter the rest of the regression. Thirdly, we control for the occurrence of a currency crisis and a sovereign debt crisis around the time of the banking crisis, as proxies for the severity of the shock. [23] Again, these variables are not significant and the regression is unchanged, possibly because the IMF program dummy does a better job at picking up sovereign/external insolvency problems.

In the final test, we control for the size of the banking sector (proxied by the ratio of bank credit to the private sector to GDP), the general level of development of the country (captured by GDP per capita), and the degree of liberalization of international capital flows. While the coefficients on private credit and capital control variables are significant and have the expected signs, the coefficient on the policy response remains large and statistically significant at the five percent level both in the OLS and IV regressions.

D. Sensitivity Analysis: Alternative Measures of Crisis Performance

In this section, we explore whether our conclusion about the effects of alternative bank-support policies are sensitive to the definition of economic performance during the crisis (Table 7).

First, we extend the crisis window to four years instead of three years and examine output growth during [*t, t*+3]. Just as with measuring the costs of a crisis, there is considerable uncertainty over crisis dating. The marking of the crisis start and end dates is more of an art than a science, relying heavily on subjective opinions of experts. It follows that, although we

[23] Hutchinson and Noy (2005) explores output costs of currency and banking crises. As an interesting side note, in a specification not reported we find that the occurrence of a currency crisis is significantly negatively correlated with crisis intensity, measured as the minimum GDP growth rate observed in the crisis.

choose to examine growth performance during a three-year window [*t, t*+2] where *t* is the start year of the crisis, many banking crises may last more (or less) than three years. In addition, the menu of crisis responses we consider includes several crisis resolution policies whose impacts may take time to materialize, such as nationalization of banks. However, we find that this modification does not change the estimated coefficients much, but the fit of the regression is worse compared with the baseline.

Second, we measure the country's growth potential using an average growth rate for the three pre-crisis years rather than an average of all available data points (excluding crisis years), since a problem with including post-crisis growth data in the estimation of trend growth is that trend growth may have shifted because of the crisis.[24] Also in this case, the coefficient of the policy index remains very close to the baseline value. Interestingly, pre-crisis growth is positively and significantly associated with growth during the crisis.

In a third alternative regression, we measure crisis performance with the minimum real GDP growth rate of a country observed during the crisis, which could be interpreted as a measure of the intensity of the crisis. This variable has a mean value of -4.2 percent, and ranges from -21.6 percent in Estonia in 1992 to 4.8 percent in Vietnam in 1997. The policy response index is significantly and negatively correlated with crisis intensity in the OLS regression, while in the IV regression the standard error increases substantially and the coefficient is not significant. Based on the OLS estimates, an increase of one in the policy index results in a decline in the minimum growth rate of over one percentage point.

Finally, bank support policies that are riskier for the government are also positively associated with the output loss measures of CKU and LV (though the IV coefficient of the CKU measure is significant only at the 10.6 percent level). Thus, the relationship identified in the baseline regression seems to be robust to alternative definition of economic performance during the crisis.

E. Sensitivity Analysis: Alternative Policy Response Indexes

In Table 8 we present regressions using alternative versions of the policy index, to explore in more detail what is driving the relationship uncovered in the baseline regression. The first alternative version of the index gives a zero weight to the use of an AMC, on the grounds that if AMCs acquire distressed assets at prices close to their ultimate recovery value they do not result in losses for the government.[25] In the second version of the index we consider liquidity support in addition to other policies, and treat it as a policy that puts fiscal resources at risk.[26] Finally, the third variant of the index gives a score of zero to deposit freezes, bank holidays, and regulatory forbearance (as opposed to minus one in the baseline), essentially giving such policies the same weight as doing nothing.

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[24] Cerra and Saxena (2008) find that following financial crises output growth returns to its long-run level, but the output *level* remains permanently lower.

[25] Even in this case, however, through the AMC the government takes on risk.

[26] As discussed in Section II above, we have concerns about how this variable is constructed in the LV database.

Our baseline results are robust to these modifications. Dropping the AMC from the policy menu has no effect on the coefficient of the policy index, but worsens a bit the fit of the regression. Results from IV estimation also go through. Taking into account liquidity support yields results very close to the baseline for both the OLS and IV regressions, though the first-stage F statistic is a bit lower. Finally, the third variant of the index is also negatively correlated with economic performance during the crisis, both in the OLS and the IV estimation, and the coefficient is larger than in the baseline. However, in the IV estimation the instrument is not as strong.

Finally, we explore whether the effect of policy orientation on crisis performance may be nonlinear by interacting the policy index with world growth and with the IMF program dummy (in separate regressions). In this regression, we test whether policies that put more government funds at risk, while detrimental in general, may be less adverse or even helpful to growth when crises are especially severe because they occur during times of worldwide economic slowdown or in situations of balance-of-payment problems. We do not find any evidence of such non-linearities (results not reported).

F. Fiscal Policy during the Crisis

In the regressions we do not control for the stance of fiscal policy. If parliamentary systems are more prone to relax fiscal policy during a crisis, and expansionary fiscal policy has a positive effect on growth, then the omission of fiscal policy from the regression may generate a correlation between the instrument and the residual in the second stage, invalidating the identification strategy. Inserting some measure of the fiscal policy stance in the equation is problematic, because the fiscal stance is jointly endogenous with output growth: GDP affects most tax revenues, as the tax base is positively correlated with aggregate income; in addition, some expenditures, such as unemployment subsidies, move automatically with the economic cycle. On the other hand, according to traditional Keynesian theory, a fiscal policy expansion increases output in the short-run by increasing aggregate demand. [27]

Rather than controlling for the fiscal policy stance directly in the baseline regression, we take a different route and run a separate test to see if the nature of the political system influences the fiscal policy stance during banking crises. More specifically, we regress the fiscal expansion during the crisis on the political regime index and other control variables, including GDP growth. Since the latter variable is endogenous, we instrument it using world GDP growth. The identifying assumption is that world growth affects the fiscal policy only through its effect on domestic growth, which seems reasonable. Perotti (2004) and Alesina, Campante, and Tabellini (2008) make a similar identifying assumption in studies of the pro-cyclicality of fiscal policy.

[27] If we include fiscal expansion as an additional regressor in the baseline regression of Table 4, this variable has a negative and significant coefficient and we continue to find a negative and significant association between our policy index and growth during the crisis both in OLS and IV regressions.

Fiscal expansion is defined as the difference between the average fiscal deficit (as a share of GDP) during the years of the crisis and the fiscal deficit in the year before the crisis. Thus, a positive value of the fiscal variable corresponds to an increase in the deficit during the crisis. Once we control for the IMF program dummy and GDP growth (instrumented with world growth), the political regime has no independent effect on the fiscal policy variable during the banking crisis (Table 9). A similar conclusion is reached if we control for the occurrence of a debt crisis or for our policy response index.[28] Hence, we conclude that there is no evidence that fiscal policy tends to be more expansionary during crises in parliamentary political systems, even though such systems tend to have larger governments. This may be because automatic stabilizers are not necessarily larger in parliamentary systems, or because the willingness and ability to use discretionary fiscal policy as a countercyclical policy tool is not necessarily larger in such systems.[29]

IV. CONCLUSIONS

Policymakers are faced with difficult choices when large segments of the banking system experience financial distress. On the one hand, there is the imperative of forestalling a catastrophic collapse of the financial system. On the other hand, there is a need to ensure that unsound banking practices are punished, so as to avoid moral hazard in the future. Crisis response strategies also need to restructure the banking sector to ensure its long-run viability. Last but not least, policymakers need to contain the fiscal consequences of the rescue, which can often be staggering. The record shows that countries experiencing banking crises, while often following similar general intervention principles, have chosen to respond in a variety of different ways. What can we learn from this experimentation?

In this paper we have set up a simple empirical framework to test whether bank rescue policies that put more fiscal resources at risk – namely blanket guarantees, bank recapitalization with public funds, bank nationalization, or asset management companies – result in better economic performance following a crisis. In other words, we test whether there is a trade off between committing large fiscal resources and a quick economic recovery. We find that there is no trade off: policies that are bad for fiscal soundness result in lower output growth and delayed recovery.

We also find that these policies are more likely to be adopted in countries with parliamentary (rather than presidential) political regimes. This is consistent with evidence that

[28] It might be argued that, if parliamentary regimes adopt crisis response policies that put more fiscal resources at risk, as we have argued, then these fiscal costs should be reflected in an increase in the fiscal deficit during the three years of the crisis. In fact, this need not be the case, depending on how the bailout policies are structured and on the accounting conventions used to compile government statistics. Bank support operations are often recorded "below the line," causing the debt to increase while the deficit remains unchanged. Other measures, such as blanket guarantees to depositors, may be reflected in the deficit only if there is an actual payment to depositors. Other measures still may be carried out outside the perimeter of the central government, for instance by the monetary authorities.

[29] Akitoby and Stratman (2008) study the relationship between spreads on sovereign debt, fiscal policy, and political institutions.

parliamentary regimes are associated with bigger governments (Persson and Tabellini, 999). The strong relationship between political regime and crisis response provides us with an instrument to address endogeneity of the policy response. Our tests indicate that the association between crisis response and crisis performance is not explained by reverse causality, i.e. policymakers choosing measures that are more risky to taxpayers when crises are more severe: when we instrument the policy response variable using an indicator of the political regime, the effect becomes larger, not smaller.

While our results are robust to a number of sensitivity tests, we acknowledge several limitations in our approach. First, our sample of 40 crisis episodes is small. Once the current financial crisis has fully played out, it will be possible to bring much more evidence to the table. Second, our approach to differentiate among crisis response policies based on just one dimension, whether they put public money at risk, is quite simplistic. Nonetheless, we think this is an important dimension, often at the center of the political debate. And it is intriguing that even a crude characterization yields such clear-cut results.

Our findings raise the question of why crisis response policies that are risky for taxpayers might also be costly to the economy. One possibility is that readiness to deploy fiscal resources may hinder private efforts to carry out financial sector restructuring, thereby delaying crisis resolution. Also, these measures may give politicians too much influence over credit allocation, causing scarce financial resources to be channeled to politically favored enterprises or sectors, and thereby undermining efficient economic restructuring. It could also be that episodes in which large taxpayer bailouts were avoided were episodes in which the authorities intervened effectively at an early stage, thereby preventing panic and widespread asset liquidation. Clearly, more research is needed to shed more lights on these potential channels.

Table 1. Correlation among Crisis Performance Measures

	Output growth	Crisis duration (CKU)	Output loss (CKU)	Output loss (LV)	Minimum output growth
Output growth	1.000				
Crisis duration (CKU)	-0.861	1.000			
Output loss (CKU)	-0.814	0.783	1.000		
Output loss (LV)	-0.379	0.427	0.228	1.000	
Minimum growth	0.797	-0.712	-0.714	-0.461	1.000

Table 2. Construction of the Policy Index

Bank support policy	Point in index
More risk to taxpayers	
Blanket guarantee	1
Nationalization	1
Recapitalization	1
Asset management companies	1
Less risk to taxpayers	
Deposit freeze	-1
Bank holiday	-1
Forbearance	-1

Figure 1. Distribution of the Policy Index

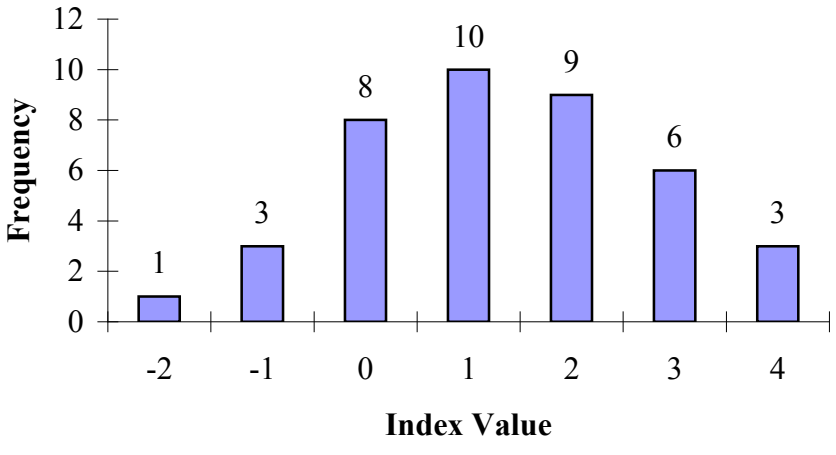

Table 3. Crisis Episodes, Policy Response, and Political System

No.	Crisis episode	POLICY INDEX	SYSTEM
1	Argentina 1980	0	0
2	Argentina 1989	-2	0
3	Argentina 1995	1	0
4	Argentina 2001	-1	0
5	Bolivia 1994	1	0
6	Brazil 1990	-1	0
7	Brazil 1994	0	0
8	Bulgaria 1996	2	1
9	Chile 1981	0	0
10	Colombia 1982	2	0
11	Colombia 1998	2	0
12	Cote d'Ivoire 1988	1	0
13	Croatia 1998	2	0
14	Czech Republic 1996	2	2
15	Dominican Republic 2003	0	0
16	Ecuador 1998	1	0
17	Estonia 1992	2	1
18	Finland 1991	3	2
19	Ghana 1982	1	0
20	Indonesia 1997	3	1
21	Jamaica 1996	4	2
22	Japan 1997	3	2
23	Korea 1997	3	0
24	Latvia 1995	0	2
25	Lithuania 1995	2	0
26	Malaysia 1997	3	2
27	Mexico 1994	2	0
28	Nicaragua 2000	2	0
29	Norway 1991	1	2
30	Paraguay 1995	0	0
31	Philippines 1997	0	0
32	Russia 1998	1	0
33	Sri Lanka 1989	0	0
34	Sweden 1991	4	2
35	Thailand 1997	3	2
36	Turkey 2000	4	2
37	Ukraine 1998	-1	0
38	Uruguay 2002	1	0
39	Venezuela 1994	1	0
40	Vietnam 1997	1	1
	Mean	1.33	0.6
	S.D.	1.47	0.87

Note: For the definition of POLICY INDEX, see Table 2. SYSTEM = 2 for parliamentary regime; 1 for assembly-elected president; 0 for presidential regime

Table 4. Cross-Correlations between Political System and Crisis Policies

	SYSTEM	Blanket guarantee	National-ization	Recapitali-zation	AMC	Deposit Freeze	Bank holiday	Forbear-ance
SYSTEM	1.000							
Blanket guarantee	0.495	1.000						
Nationalization	0.306	0.453	1.000					
Recapitalization	0.237	0.222	0.385	1.000				
AMC	0.332	0.423	0.330	0.293	1.000			
Deposit freeze	-0.264	-0.083	0.019	-0.158	-0.154	1.000		
Bank holiday	-0.233	-0.036	0.118	-0.020	-0.068	0.882	1.000	
Forbearance	-0.178	-0.048	0.210	0.301	0.134	-0.247	-0.146	1.000

Table 5. Baseline Results

	(1) Output growth during crisis		(2) Crisis duration	
	OLS	IV	OLS	IV
POLICY RESPONSE	-0.783**	-0.936*	2.804***	4.381***
	(0.292)	(0.479)	(0.827)	(1.421)
TREND GROWTH	0.252	0.276	-1.243**	-1.489**
	(0.207)	(0.204)	(0.586)	(0.604)
WORLD GROWTH	2.573***	2.588***	-5.901***	-6.056***
	(0.703)	(0.662)	(1.992)	(1.961)
IMF PROGRAM	-2.651***	-2.781***	7.239***	8.580***
	(0.835)	(0.852)	(2.365)	(2.527)
Constant	-5.068**	-4.924**	24.929***	23.439***
	(2.189)	(2.089)	(6.201)	(6.193)
Observations	40	40	40	40
R-squared	0.430	0.426	0.434	0.375
First Stage Results (Endogenous variable is POLICY RESPONSE)				
Political system		0.945***		0.945***
		(0.229)		(0.229)
Observations		40		40
Adjusted R-squared		0.359		0.359
First-stage F statistic		17.02		17.02
Prob > F		0.000		0.000

Excluded instrument in IV regressions is SYSTEM. Other exogenous variables in first stage regressions are not reported. Standard errors are in parentheses.

* Significant at 10%; ** significant at 5%; *** significant at 1%

Table 6. Additional Control Variables

	(1) Output growth during crisis		(2) Output growth during crisis		(3) Output growth during crisis		(4) Output growth during crisis	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Policy response	-0.784**	-0.939**	-0.786**	-0.937**	-0.746**	-0.889*	-0.856***	-1.016**
	(0.297)	(0.482)	(0.295)	(0.477)	(0.311)	(0.516)	(0.293)	(0.531)
Trend growth	0.246	0.263	0.273	0.297	0.247	0.268	0.484**	0.509**
	(0.276)	(0.259)	(0.211)	(0.205)	(0.213)	(0.204)	(0.231)	(0.220)
World growth	2.583***	2.606***	2.610***	2.625***	2.567***	2.600***	2.505***	2.537***
	(0.758)	(0.704)	(0.712)	(0.660)	(0.770)	(0.707)	(0.757)	(0.684)
IMF Program	-2.642***	-2.764***	-2.749***	-2.878***	-2.730**	-2.860***	-2.608***	-2.717***
	(0.884)	(0.876)	(0.857)	(0.494)	(1.046)	(1.028)	(0.786)	(0.771)
Growth volatility	-0.010	-0.020						
	(0.280)	(0.260)						
Deposit insurance			0.514	0.521				
			(0.823)	(0.494)				
Currency crisis					0.059	0.105		
					(1.045)	(0.962)		
Debt crisis					0.631	0.473		
					(1.296)	(1.272)		
Private credit							-0.027**	-0.269***
							(0.012)	(0.010)
Per capita GDP							0.091	0.097
							(0.077)	(0.070)
Capital controls							0.227*	0.243**
							(0.130)	(0.125)
Constant	-5.027*	-4.843**	-5.450**	-5.133**	-5.150**	-5.057**	-6.131**	-6.190***
	(2.490)	(2.352)	(2.291)	(2.150)	(2.423)	(2.225)	(2.461)	(2.211)
Observations	40	40	40	40	40	40	39	39
R-squared	0.430	0.426	0.437	0.432	0.435	0.431	0.546	0.541
First Stage Results (Endogenous variable is Policy response)								
Political system		0.942***		0.945***		0.897***		0.947***
		(0.233)		(0.232)		(0.098)		(0.298)
Adjusted R-Squared		0.341		0.341		0.347		0.349
First-stage F statistic		16.35		16.53		14.30		10.05
Prob > F		0.0003		0.0003				

Dependent variable is post-crisis output growth. Estimation method is OLS. Standard errors in parentheses.
* Significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. Alternative Measures of Crisis Performance

	(1) 4-year window		(2) Pre-crisis trend		(3) Minimum growth		(4) CKU output loss		(5) LV output loss	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Policy response	-0.722***	-0.847**	-0.795***	-0.899**	-1.080**	-0.945	5.775*	7.958	6.618**	8.799**
	(0.243)	(0.400)	(0.268)	(0.430)	(0.461)	(0.755)	(2.984)	(4.917)	(2.754)	(3.545)
Trend growth	0.248	0.267	0.226**	0.230***	-0.061	-0.082	-2.421	-2.761		
	(0.172)	(0.169)	(0.087)	(0.082)	(0.327)	(0.321)	(2.114)	(2.089)		
World growth	1.813***	1.825***	2.479***	2.489***	2.905**	2.891***	-15.703**	-15.917**	-13.526*	-13.864**
	(0.585)	(0.550)	(0.658)	(0.618)	(1.111)	(1.042)	(7.188)	(6.787)	(6.937)	(6.626)
IMF Program	-1.582**	-1.688**	-2.384***	-2.473***	-7.621***	-7.506***	24.038***	25.894***	11.712	13.615*
	(0.695)	(0.709)	(0.789)	(0.797)	(1.319)	(1.343)	(8.534)	(8.744)	(8.297)	(8.256)
Constant	-2.495	-2.376	-4.326**	-4.173**	-6.555*	-6.683	50.921**	48.860	42.388**	39.367**
	(1.822)	(1.738)	(1.961)	(1.908)	(3.458)	(3.291)	(22.374)	(21.430)	(20.353)	(19.763)
Observations	40	40	40	40	40	40	40	40	37	37
R-squared	0.372	0.367	0.503	0.500	0.526	0.525	0.293	0.282	0.222	0.207
First Stage Results (Endogenous variable is Policy response)										
Political system		0.945***		0.971***		0.945***		0.945***		1.283***
		(0.229)		(0.228)		(0.229)		(0.229)		(0.231)
Adjusted R-Squared		0.359		0.352		0.359		0.359		0.485
First-stage F statistic		17.02		18.15		17.02		17.02		30.93
Prob > F		0.0002		0.0001		0.0002		0.0002		0.0000

Estimation method is OLS. Standard errors in parenthesis.
* Significant at 10%; ** significant at 5%; *** significant at 1%

Table 8. Alternative Policy Indexes

	(1) Drop AMC Output growth during crisis		(2) Add liquidity support Output growth during crisis		(3) 0-1 score Output growth during crisis	
	OLS	IV	OLS	IV	OLS	IV
POLICY RESPONSE	-0.748*	-1.170*	-0.746***	-0.952**	-1.032***	-1.298**
	(0.371)	(0.632)	(0.264)	(0.485)	(0.293)	(0.632)
TREND GROWTH	0.229	0.284	0.241	0.272	0.305	0.351*
	(0.215)	(0.216)	(0.204)	(0.202)	(0.197)	(0.210)
WORLD GROWTH	2.413***	2.366***	2.423***	2.403***	2.522***	2.529***
	(0.732)	(0.699)	(0.697)	(0.659)	(0.663)	(0.628)
IMF PROGRAM	-2.456***	-2.722***	-2.426***	-2.548***	-2.471***	-2.597***
	(0.861)	(0.884)	(0.805)	(0.799)	(0.765)	(0.772)
Constant	-5.133**	-4.751**	-4.218*	-3.779*	-3.933*	-3.450
	(2.282)	(2.225)	(2.225)	(2.279)	(2.117)	(2.254)
Observations	40	40	40	40	40	40
R-squared	0.384	0.362	0.440	0.431	0.493	0.481
First-stage F statistic		16.00		12.54		8.34
Prob > F		0.000		0.001		0.007

Dependent variable is post-crisis output growth. Excluded instrument in IV regressions is SYSTEM.
Standard errors in parenthesis.
* Significant at 10%; ** significant at 5%; *** significant at 1%

Table 9. Fiscal Policy Response and Political System

	(1)		(2)		(3)	
	Fiscal expansion in crisis		Fiscal expansion in crisis		Fiscal expansion in crisis	
	OLS	IV	OLS	IV	OLS	IV
Political system	0.434	0.155	0.249	-0.952**	0.460	0.304
	(0.766)	(0.854)	(0.773)	(0.485)	(0.915)	(0.900)
Output growth in crisis	-0.621***	-0.887**	-0.588***	-0.880**	-0.623***	-0.867**
	(0.218)	(0.456)	(0.218)	(0.449)	(0.225)	(0.422)
IMF program	-3.469**	-4.100***	-3.171**	-3.891**	-3.490**	-4.124***
	(1.366)	(1.633)	(1.374)	(1.642)	(1.438)	(1.661)
Debt crisis			-2.473	-2.165		
			(1.926)	(1.894)		
Policy response index					-0.030	-0.135
					(0.554)	(0.550)
Constant	3.630	4.317	3.864	4.580	3.666	4.408
	(1.231)	(1.585)	(1.234)	(1.533)	(1.422)	(1.745)
Observations	40	40	40	40	40	40
R-squared	0.284	0.255	0.316	0.281	0.493	0.260
First-stage F statistic		9.84		9.66		12.13
Prob > F		0.003		0.004		0.001

Dependent variable is fiscal expansion in crisis. Endogenous variable is Output growth in crisis.
Excluded instrument in IV regressions is World GDP growth.
Standard errors in parenthesis.
* Significant at 10%; ** significant at 5%; *** significant at 1%

References

Alesina, Alberto, Felipe Campante, and Guido Tabellini, 2008, "Why is Fiscal Policy Often Pro-Cyclical?," *Journal of the European Economic Association*, 6, 1006-38.

Akitoby, Bernardin, and Thomas Stratman, 2008, "Fiscal Policy and Financial Markets," *Economic Journal*, 118, 1971-1985.

Brown, Craig, O., and I. Serdar Dinç, 2009, "Too Many to Fail? Evidence of Regulatory Forbearance When the Banking Sector is Weak," *Review of Financial Studies*, forthcoming.

Calomiris, Charles, Daniela Klingebiel, and Luc Laeven, 2003, "A Taxonomy of Financial Crisis Restructuring Mechanisms," in Patrick Honohan and Luc Laeven (Eds., Systemic Financial Crises: Containment and Resolution, (Cambridge: Cambridge University Press).

Cecchetti, Stephen, G., Marion Kohler, and Christian Upper, 2009, "Financial Crises and Economic Activity," Paper prepared for the 2009 Federal Reserve Bank of Kansas City's symposium at Jackson Hole.

Cerra, Valerie, and Sweta Saxena, 2008, "Growth Dynamics: The Myth of Economic Recovery," *American Economic Review*, 98, 439–457.

Claessens, Stijn; Klingebiel, Daniela and Luc Laeven, 2005, "Crisis Resolution, Policies, and Institutions: Empirical Evidence", in Patrick Honohan and Luc Laeven (Eds., Systemic Financial Crises: Containment and Resolution, (Cambridge: Cambridge University Press).

Dell'Ariccia, Giovanni, Detragiache, Enrica, and Raghuram Rajan, 2008, "The Real Effect of Banking Crises,"*Journal of Financial Intermediation*, 17, 89–112.

Demirgüç-Kunt, Asli and Enrica Detragiache, 1998, "The Determinants of Banking Crises in Developing and Developed Countries," *IMF Staff Papers,* 45, 81–109.

Demirgüç-Kunt, Asli and Enrica Detragiache, and Poonam Gupta, 2006, "Inside the Crises: An Empirical Analysis of Banking Systems in Distress," *Journal of International Money and Finance*, 25, 702–718.

Domaç, Ilker and Maria Soledad Martinez Peria, 2003, "Banking Crises and Exchange Rate Regimes: Is There a Link?," *Journal of International Economics* 61 pp. 41–72.

Djankov, Simeon; McLiesh, Caralee and Andrei Shleifer, 2007, "Private Credit in 129 Countries," *Journal of Financial Economics* 84, pp. 299–329.

Dziobek, Claudia, and Celia Pazarbasioglu, 1997, "Lessons from Systemic Bank Restructuring: a Survey of 24 Countries," IMF Working Paper 97/161.

Frydl, Edward, 1999, "The Length and Cost of Banking Crises", IMF Working paper 99/30

Hoelscher, David, and Marc Quintyn, 2003,"Managing Systemic Banking Crises," IMF Occasional Paper, No. 224.

Hoggarth, Glenn, Reis, R., and Victoria Saporta, 2002, "Output Costs of Banking System Instability: Some Empirical Evidence," *Journal of Banking and Finance*, 26, 825–55.

Hoggarth, Glenn, and Jack Reidhill, and Peter Sinclair, 2003, "Resolution of Banking Crises: A Review," Bank of England Financial Stability Review, December, 109–121.

Honohan, Patrick, and Daniela Klingebiel, 2003, "The Fiscal Cost Implications of an Accommodating Approach to Banking Crises," *Journal of Banking and Finance*, 27, 1539–1560.

Hutchinson, Michael M., and Ilan Noy, 2005, "How Bad Are Twins? Output Costs of Currency and Banking Crises," *Journal of Money, Credit, and Banking*, 37, 725–752.

Kaminsky, Graciela L. and Carmen M. Reinhart, 1999, "The Twin Crises: The Causes of Banking and Balance of Payments Problems," *American Economic Review* 89, pp. 473–500.

Klingebiel, Daniela, 2000, "The Use of Asset Management Companies in the Resolution of Banking Crises: Cross-Country Experience," World Bank Policy Research Working Paper No. 2248.

Kroszner, Randall S., Luc Laeven, and Daniela Klingebiel, 2007, "Banking Crises, Financial Dependence, and Growth," *Journal of Financial Economics*, 84, 187–228.

Laeven, Luc, and Fabian Valencia, 2008, "Systemic Banking Crises: A New Database," IMF Working Paper No. 08/224.

_____, 2008, "The Use of Blanket Guarantees in Banking Crises", IMF Working Paper 08/250.

McFadden, Daniel L., 1999, Econometrics/Statistics Reader, available on the internet at http://www.econ.berkeley.edu/~mcfadden/e240b_sp03/e240b.html.

Perotti, Roberto, 2004, "Estimating the Effects of Fiscal Policy in OECD Countries." Working Paper, IGIER-Bocconi.

Persson, Torsten and Guido Tabellini, 1999, "The Size and Scope of Government: Comparative Politics with Rational Politicians," *European Economic Review*, 43, 699–735.

Persson, Torsten; Roland, Gerard and Guido Tabellini, 2000, "Comparative Politics and Public Finance," *Journal of Political Economy*, 108, 1121–1161.

Reinhart, Carmen M., and Kenneth S. Rogoff, 2008, "Banking Crises: An Equal Opportunity Menace," National Bureau of Economic Research Working Paper 14587.

Staiger, Douglas and James H. Stock, 1997, "Instrumental Variables Regression with Weak Instruments," *Econometrica*, 65, 557–586.

Stock, James and Motohiro Yogo, 2002, "Testing for Weak Instruments in Linear IV Regression", NBER Technical Working Paper No. 284.

Appendix

Table A1. Variable Definitions and Data Sources

Variable	Definition	Source
	I. Cost of crisis measures	
Output growth during crisis	Average growth rate of real GDP over the period [t,t+2], where t is the start year of crisis	WDI
Crisis duration	Number of quarters until GDP reverts to pre-crisis peak	Cecchetti et al. (2009)
CKU output loss	Cumulative GDP decline during crisis duration	Cecchetti et al. (2009)
LV output loss	Sum of output gaps over [t,t+3], where potential output is calculated by extrapolating trend GDP growth rate during 3 pre-crisis years	LV database
Minimum growth rate	Minimum observed growth rate during crisis	LV database
	II. Policy and instrument	
Policy response index	An index constructed by scoring policies based on the degree of risk imposed on taxpayers	Authors' calculation
System	Indicator of a country's political system: 2=Parliamentary; 1=Assembly-elected president; 0=Presidential	WB database of political institutions
	III. Control variables	
Trend growth (long-term)	Average trend growth rate of real GDP over 1960-2007, excluding three crisis years	WDI
Trend growth (pre-crisis)	Average growth rate over 3 pre-crisis years	WDI
World growth during crisis	Average growth rate of world real GDP over the period [t,t+2]	WDI
IMF program	Indicator variable (0,1), a value of 1 indicates that an IMF program was put in place in response to the crisis	LV database
Growth volatility	Standard deviation of GDP growth, 1960-2007	WDI

Deposit insurance	Indicator variable (0,1), a value of 1 indicates that a deposit insurance scheme was in place at the start of crisis	LV database
Currency crisis	Indicator variable (0,1), a value of 1 indicates that a currency crisis occurred during [t-1,t+1]	LV database
Debt crisis	Indicator variable (0,1), a value of 1 indicates that a sovereign debt crisis occurred during [t-1,t+1]	LV database
Private credit to GDP	Ratio of bank credit to private sector to GDP, averaged over 3 pre-crisis years	WDI
Per capita GDP	GDP per capita as of t-1	WDI
Capital controls	0-to-ten rating based on degree of international capital control and foreign ownership/investment restrictions, measured at most 5 years before crisis year	"Economic Freedom of the World" database, Fraser Institute

Table A2. Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Output growth during crisis (%)	40	0.65	3.12	-10.45	6.03
Crisis duration (# quarters)	40	11.35	8.86	0	33
CKU output loss (%)	40	18.43	28.61	0	129.3
LV output loss (%)	37	19.91	25.91	0	97.66
Minimum growth rate (%)	40	-4.16	5.40	-21.6	4.8
Policy response index	40	1.33	1.47	-2	4
System	40	0.6	0.87	0	2
Trend growth (long-term) (%)	40	3.65	1.99	-3.27	8.02
Trend growth (pre-crisis) (%)	40	1.38	4.43	-13.15	8.66
World growth during crisis (%)	40	2.84	0.57	1.35	3.78
IMF program	40	0.55	0.50	0	1
Growth volatility	40	4.68	2.10	1.57	9.89
Deposit insurance	40	0.5	0.51	0	1
Currency crisis	40	0.58	0.50	0	1
Debt crisis	40	0.13	0.33	0	1
Private credit to GDP (%)	40	49.93	44.39	1.77	205.15
Per capita GDP ($ thousand)	40	8.84	7.14	0.89	32.12
Capital controls	39	4.53	3.26	0	10

Table A3. Cross Correlations among Variables

	Trend growth	Pre-crisis growth	World growth during crisis	IMF program	Growth volatility	Deposit insurance	Currency crisis	Debt crisis	Private credit	GDP per capita	Capital controls
Trend growth	1										
Pre-crisis growth	0.6083	1									
World growth during crisis	0.0208	0.0542	1								
IMF program	-0.0702	-0.1629	0.0564	1							
Growth volatility	-0.6122	-0.5024	0.2499	0.2941	1						
Deposit insurance	-0.1374	0.0213	-0.07	0.1777	-0.1052	1					
Currency crisis	0.0688	0.0543	-0.2448	0.5283	-0.0859	0.1257	1				
Debt crisis	-0.0182	-0.0811	0.0581	0.1824	0.0149	0.0669	0.1639	1			
Private credit	0.465	0.2301	-0.0971	-0.2262	-0.3893	-0.1013	0.069	-0.218	1		
GDP per capita	0.0856	0.0134	-0.3857	-0.2544	-0.3044	0.3552	-0.0383	-0.1552	0.5481	1	
Capital controls	-0.0185	0.1033	0.1939	-0.1046	-0.011	0.1001	-0.1687	-0.0425	0.1153	0.3027	1