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The fiscal cost implications of an accommodating approach to banking crises ☆

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Abstract

In recent decades, a majority of countries have experienced a systemic banking crisis requiring a major – and expensive – overhaul of their banking system. Budgetary outlays, whether immediate or deferred, have exceeded 50% of GDP in some cases. This paper uses cross-country econometric evidence to examine whether the design of crisis containment and resolution policies can systematically influence the overall magnitude of fiscal costs. We find that accommodating policies such as blanket deposit guarantees, open-ended liquidity support, repeated partial recapitalizations, debtor bail-outs and regulatory forbearance all tend to add significantly and sizably to fiscal costs.

JEL classification: E53; G21; G33
Keywords: Banking crisis; Lender of last resort; Crisis management

1. Introduction

In recent decades, a majority of countries – rich and poor alike – have experienced a systemic banking crisis requiring a major – and expensive – overhaul of their banking system. The costs come in various forms. One of the most conspicuous is the budgetary outlays that are typically entailed. These have amounted to as much as

☆ The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent.

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50% of GDP or more in some circumstances. Meeting these outlays entails deadweight efficiency losses through higher taxation and curtailed provision of public services. Other dimensions of the economic costs involved in crises of bank insolvency include the waste of misallocated resources that is revealed by loan losses and often the subsequent output dips resulting, for example, from credit contraction or loss of investor confidence.

When a crisis breaks, as revealed typically either through audits uncovering widespread bank insolvency or through liquidity squeezes and depositor withdrawals, governments are faced with the task of containment and resolution. Either of two broad approaches can be pursued. One possibility is an accommodating approach, involving such measures as: liberal liquidity support to banks with cash-flow difficulties; depositor guarantees; forbearance by tolerating violations of bank solvency and minimum capitalization rules; debtor support schemes that help to prop-up bank borrowers who might otherwise default. The alternative is to eschew accommodation and to stick to the rules, requiring banks either to meet standard capitalization requirements or face official intervention that will constrain their operations. The accommodating approach can have the merit of restoring or sustaining depositor confidence and of buying time to allow the situation to correct itself. It is often thought that this can save taxpayers' money in the long run as well as limiting wider economic costs of the crisis. But the heightened moral hazard entailed by the accommodating approach could be equally costly, if not more so.

This paper examines the empirical evidence. Specifically, we seek to quantify the extent to which fiscal outlays incurred in resolving banking system distress can be attributed to crisis management measures adopted by the government during the early years of the crisis. We do this by analyzing some 40 crises around the world, which represents all of those for which we have information both on the fiscal costs of the crises and on the nature of the crisis management policies pursued.

We find no evidence that accommodating policies will reduce fiscal costs. Instead, each of half a dozen accommodating measures examined seem to be associated with higher fiscal costs. Specifically: blanket deposit guarantees, open-ended liquidity support, repeated (and thus initially inadequate or partial) recapitalizations, debtor bailouts and regulatory forbearance add significantly and sizably to costs. Using the regression results to simulate the effects of these policies, we find that if countries had not pursued such accommodating policies, average fiscal costs in our sample could have been limited to about 1% of GDP – little more than a tenth of what was actually experienced. On the other hand, policy could have been worse: had each country engaged in all of the above policies, the regression results imply that fiscal costs in excess of 60% of GDP would have been the result.

Causality between output declines and banking crises can go both ways; often it is an output decline that triggers onset of the banking crisis. We find no indication that incurring fiscal costs through these accommodating measures has bought a reduction in the scale of output loss following the crisis.

Our interpretation of these findings is in terms of the moral hazard that is entailed by the use of accommodating policies. Our model also takes account of the independent role of macroshocks both in contributing to and in revealing bank insolvency,

and of the fact that a bad resolution strategy can be more damaging when the origins of the crisis are chiefly microeconomic in nature.

The remainder of the paper is organized as follows: Section 2 reviews the nature and extent of banking crisis costs. Section 3 discusses the alternative crisis resolution tools characterizing the choice between strict and accommodating policy. Section 4 presents our empirical evidence measuring the extent to which costs are influenced by these policy choices. Section 5 concludes.

2. The costs of banking crises

No type of economy has been free of costly banking crises in the last quarter century. The prevalence of banking system failures has been at least as great in developing and transition countries as in the industrial world. By one count, 112 episodes of systemic banking crises occurred in 93 countries since the late 1970s and 51 borderline crises were recorded in 46 countries (Caprio and Klingebiel, 2002). [1]

It is governments – and thus ultimately taxpayers – that have largely shouldered the direct costs of banking system collapses. Fiscal costs arise from using public funds to support depositors and possibly other bank stakeholders. These costs have been large: In our sample of 40 episodes governments spent on average 12.8% of national GDP to clean up their financial systems. The percentage was even higher (14.3%) in developing countries. Some crises have led to much larger outlays: Governments spent as much as 40–55% of GDP in the early 1980s crises in Argentina and Chile. A substantial part of the costs of the East Asian crisis of 1997–1998 – now projected in the region of 20–55% of GDP for the three worst-affected countries – will ultimately fall on national budgets. Despite the fact that their economies are small, developing economies as a group have suffered cumulative fiscal costs in excess of $1 trillion. Among industrialized countries, Japan's long drawn-out banking crisis is likely to prove the costliest.

Fiscal outlays are not the only dimension in which banking collapses impose costs on the economy. Indeed, to the extent that bailing-out depositors amounts to a transfer from taxpayers to depositors, this is not a net economic cost at all. But when a government makes the bank's claimants whole, the fiscal costs incurred tend to be correlated with the true economic costs. For one thing, the deficiency to be covered reflects the prior waste of investible resources from bad loan decisions. Furthermore, the assumption by government of large and unforeseen bail-out costs can destabilize the fiscal accounts, triggering high inflation and currency collapse – costly in themselves – as well as adding to the deadweight cost of taxation.

Nevertheless, it is acknowledged that fiscal costs do not include costs borne by depositors and other creditors of failed banks (in some cases) and also do not take into

[1] Our description of the nature, cost and resolution of recent crises draws inter alia on Baer and Klingebiel (1995), Benston and Kaufman (1995), Caprio and Honohan (1999), Claessens (1999), Demirguç-Kunt and Huizinga (1999), Honohan (2000), Kaufman (1994), Klingebiel (2000), Sheng (1996), World Bank (2001).

account that part of the burden borne by depositors and borrowers in the form of widened intermediation spreads charged by banks (where they can) in an attempt to compensate for the bad loans that were left on banks' balance sheets. Moreover, they do not reflect costs that arise from granting borrowers some monopoly privilege or other means to improve their profits and thereby repay their loans. And finally, these estimates do not capture the slowdown in economic activity when resources are driven out of the formal financial sector (and into less efficient uses), bank credit curtailed, investment plans cut back and stabilization programs derailed.

Obtaining an estimate of fiscal costs is not straightforward; there is no generally universally methodology and even obtaining the underlying components of the information required is usually problematic. Typically the costs arise in one of four different ways. First, defaults on liquidity loans by the monetary authority to a bank which proves to be insolvent; second, the cost of bond or equity injections into an insolvent bank to restore its capital or to make it salable to a sound bank: this is often done through purchase of part of the bank's loan portfolio at face value, whereas the recoverable value of the loans is much lower; third, capitalized value of subsidized lending to insolvent banks, or to their borrowers; fourth, cost of payout to depositors and other claimants, including foreign creditors. [2] Our data mostly come from evaluations of these amounts made at a time when the crisis has been detected and is being contained. They represent the estimates formed at that time of the net present value of prospective government outlays to restore banks' capital position, and to make depositors and creditors whole where the government has extended guarantees to them.

If it is hard to obtain reliable data on the fiscal cost of banking crises, it is even more difficult to pinpoint the other dimensions of cost. Attempts have been made to capture a rough estimate of the additional flow economic costs, typically by comparing actual output with some hypothetical "no crisis" output path. But it is very hard to guess what part of the output slump is caused by the banking crisis – often a latent banking crash only becomes evident when it is triggered by an exogenous economic shock that also directly contributed to recession. One approach to estimating the cost of the subsequent output dip was proposed by IMF (1998), and has been widely quoted. [3] Using this measure, output dip is correlated with measured fiscal costs, and intriguingly is of the same order of magnitude on average (Fig. 1). [4]

Examining the role of policy in influencing fiscal costs is of interest whether or not the fiscal costs represent a good measure of total costs. But if incurring the fiscal costs helps reduce other dimensions of cost, then the policy implications would be quite different. In what follows we also look at the influence of the same accommo-

[2] Note that this approach does not attempt to calculate the total net fiscal flows going to the banking system. Repressed banking systems often involve a sizable flow of resources to the government outside of crisis times.

[3] Hoggarth et al. (2002) discuss alternative ways of measuring the subsequent output dip.

[4] If three outliers are discarded, the correlation is 0.7 and a regression line implies an approximate one-to-one relationship between flow output costs and fiscal costs. Of course, these correlations do not imply causation.

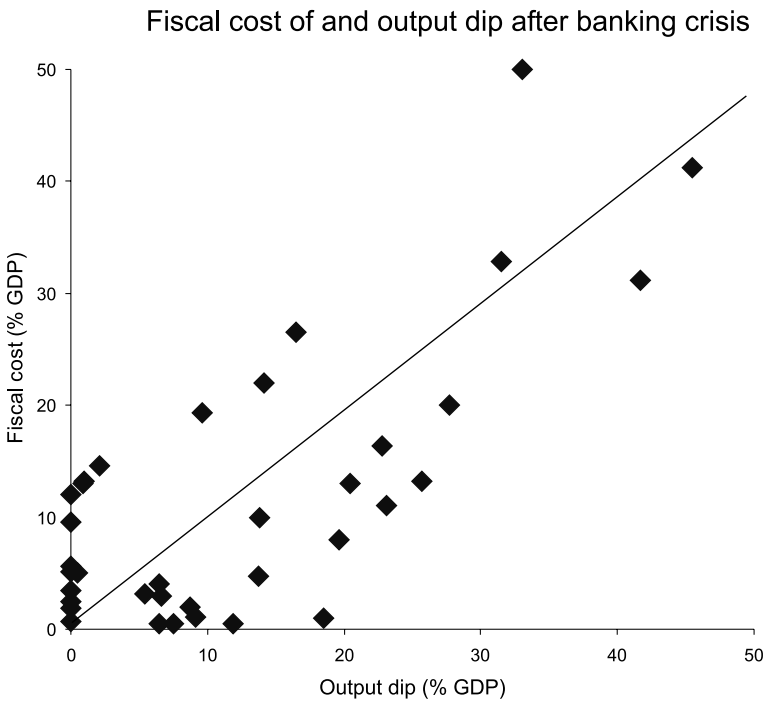

Fig. 1. Estimates of fiscal costs and of the output dip for 39 banking crises (% of GDP).

dating policies on output dip, using the IMF (1998) measure. There is no indication that they reduce the output dip; some accommodating measures actually increase the dip.

3. Accommodating and strict crisis management policies

As a banking system comes under stress in the early phases of a crisis, a wide range of policy options is available to the authorities, as has been evident from recent experience worldwide.

Liquidity pressure is often the first overt sign of a banking crisis, and at this stage, government action is typically characterized by attempts at containment. A strict application of standard prudential regulations would seem to require intervention restraining the actions of a bank that gets into severe and prolonged liquidity difficulties, and which cannot provide first-rate collateral for any liquidity loans. Mandatory corrective action by the bank's management would be required if it is to be allowed to continue to accept deposits. In practice, however, the authorities often adopt a more accommodating approach, making extensive liquidity loans even to banks of doubtful solvency in order to enable illiquid banks to meet their cash obligations as they arise. Additionally, in order to stem withdrawals from nervous depositors, bank depositors can be given a blanket government guarantee.

As the crisis matures and the authorities accumulate more accurate information about the solvency condition of the banks, policy moves to a resolution phase, whose goals are to meet the problem of bank insolvency or inadequate capitalization. Here again a choice of strict or accommodating alternatives is possible. The strict policy would require banks promptly to raise sufficient additional capital to meet standard capital adequacy requirements. Failing that, the strict policy would have the authorities intervening for example to restrain bank management, insisting on personnel changes, selling the bank to a sound institution, injecting sufficient public funds to restore the bank's capital, and/or proceeding to a liquidation.

In practice, however, governments often decide to allow banks considerable time to strengthen their capital base through increased profits, even though this involves implicit or explicit forbearance in that capital adequacy requirements are being waived. Another type of accommodating policy is for the authorities to provide a subsidized program of debtor relief, providing the resources to enable delinquent bank borrowers to repay their loans, thereby indirectly restoring bank profitability.

It is not immediately obvious which of the strict or accommodating policy approaches will reduce the overall cost of the banking crisis to the budget. As stressed by many observers, an accommodating stance creates moral hazard problems which can be expected to worsen the eventual cost to the budget. Bankers, relieved from the need to convince depositors of the soundness of their portfolio, will be free to gamble with depositors' funds or even to loot the bank. The longer the period of accommodation, the greater the expected loss from such gambling. From this perspective, only by ensuring prompt corrective action to bring the banks' capital back to adequate levels can this moral hazard be contained.

On the other hand, the loss of confidence, possible failures of the payments system and contraction in the availability of credit which might accompany a strict policy could trigger a recession that would deepen overall economic costs of the crisis, as well as feeding back on bank solvency and adding to net budgetary costs. This can be the basis of an argument in favor of an accommodating approach. [5]

The relative importance of the moral hazard and confidence effects cannot be determined on an a priori basis. It requires empirical evidence.

4. The empirical evidence

Having considered the various intervention and resolution policy tools that governments can adopt and that may influence the fiscal costs of the crisis, we now turn to the empirical evidence. Perhaps there are no unique answers to these questions: The specific country circumstances may determine what is the correct policy choice.

[5] Proponents of accommodating policies point to models showing that optimal regulation should be state contingent, and that relaxation in response to macroeconomic downturns can provide better overall ex ante risk sharing, as well as sheltering bank customers from the disruption to financial services (including credit crunches) that may result from widespread suspensions and bank closures (cf. Dewatripont and Tirole, 1993).

But we can look at the statistical relationship between policy choices and crisis costs. Modeling the cross-country variation in the size of the fiscal costs requires us to take account both of policy variables and exogenous variables. The severity of a triggering macroeconomic recession and other factors unrelated to the management and resolution policy can obviously increase the overall financial distress independently of the policies adopted, and we need to take account of this if we are not to risk assigning too much importance to the role of policy. Thus, the estimating equation may need to include macroeconomic factors as controls, as well as the policy variables. Furthermore, the size of the coefficients may depend on whether microeconomic weaknesses are pervasive. This section describes the data we have assembled to estimate these effects and reports on the regression results.

4.1. A model of delayed intervention, moral hazard and fiscal costs

But first it may be helpful to sketch a simple model of the fiscal cost of a banking crisis under moral hazard. This fiscal cost can be seen as the product of the ultimate capital deficiency of the banking system and the proportion of that cost which is assumed by the government. The choice of crisis management policies contributes to both of these elements, but is not the only determinant. The main idea in the model is that early intervention in an undercapitalized bank should reduce the expected scale of insolvency.

Let $z_i(t)$ be the net worth at time t of each bank $i(i = 1–n)$ and suppose that each $z_i(t)$ evolves over time depending on the degree of risk assumed in the portfolio, on the quality of management and on the size of exogenous shocks. [6] The moral hazard of allowing an undercapitalized bank to operate without special restrictions is captured by assuming that the expected change in capitalization depends on the degree to which the bank is capitalized. Additionally, there is dependence of an indicator m of microeconomic or management deficiencies:

$$z_i(t) = f(z_i(t-1), m) + u_i(t) \tag{1}$$

where u is a zero-mean stochastic process with variance σ; $f(z, m)$ is an increasing function of z and m, $f(z, 0) = z$ for large positive values of z (well-capitalized bank), $f(z) < z$ for negative values of z (declining expected value of insolvent bank over time).

At some date T an insolvent bank is intervened and the process (1) comes to a halt. [7] The probability of intervention at time t, $P(z_i(t), R)$ is a function of latent

[6] Compare with the empirical modeling of crisis probability by Demirguç-Kunt and Detragiache (1998, 1999).

[7] The standard Basel approach to bank regulation limits fiscal exposure by insisting on a minimum value of $z_i(t)$ conditioned on the degree of risk, and monitors compliance periodically (Caprio and Honohan, 2001). The policy can be seen as one of limiting *ex ante* the value of the implicit rolling put option granted by the state to the banking system (Merton, 1977); ex post the fiscal costs represent the maturity value of the option.

variable $z_i(t)$ and of the regulatory policy stance R (higher value meaning more accommodating, less strict). Both first derivatives of P are negative: a higher financial strength of the banks lowers the probability of intervention, as does a weaker policy stance R. [8,9]

Absent information on the $z_i(t)$, the expected value (at any given time t) of the bank's net worth at the date of intervention depends not only on the size of the adverse shocks u it has encountered, but also on the regulatory policy stance R and the microeconomic and management environment m.

If this story can be aggregated to the system as a whole, it suggests that aggregate fiscal costs can be expected to depend on: first, the scale of adverse shocks U in the period before the date of intervention T; second, the degree R to which intervention policy is a relaxed one (or the value of the implicit put option offered by the regulator); third, the quality of the microeconomic management environment. [10]

This discussion suggests an estimating equation of the general form

$$F = F(U, R, M) + \varepsilon, \tag{2}$$

where U, R and M represent sets of explanatory variables for which proxies are developed as discussed below, and ε is a disturbance term.

4.2. Sample and variables

A major challenge has been to develop an adequate data set, not only to characterize the regulatory policies that were in effect, and other causal factors, but also the actual fiscal costs, for which most data sources are not very reliable. The sources and methods for the data are described in Appendix A.

The sample of countries consists of 34 countries (25 of them developing or transition economies, namely nine Latin American, five Eastern European, five African or Middle Eastern, and six Asian countries) which have experienced significant fiscal costs from bank failures during 1970–2000. Why these countries? Simply because they are the entire set of countries for which we have been able to assemble sufficient information both on fiscal costs and on regulatory practice. In six of these countries, two distinct episodes can be identified, and these are treated separately, to give 40 distinct country experiences.

[8] The model reflects the moral hazard view that, in an ideal world of accurate measurement, and frequent monitoring, banks that are unable to comply will be intervened promptly and the probability of fiscal costs arising will be low and confined to instances of unusually severe shocks.

[9] Note that in the regressions we have data only for intervention and resolution policy, and not on other aspects of preventative policy: the omission of variables capturing preventative policy may tend to bias the results in the direction of exaggerating the importance of intervention and resolution per se.

[10] The fiscal outlay may also depends on the effectiveness of post-intervention asset recovery and on the generosity of payout policy: it may be smaller than $z_i(T)$ if other claimants are made to absorb losses.

The variable to be explained is the estimated total direct fiscal cost of the banking crisis as a percentage of GDP. [11] The explanatory variables can be divided into three groups (fuller definitions are in Appendix A).

4.2.1. Crisis resolution policy variables

In line with the discussion of the previous section, we employed six variables measuring resolution policy and instruments used. These are all dummy variables taking the value 0 when policy was strict and 1 when the more relaxed option was chosen. They correspond to R (above).

LIQSUP indicates whether the Central Banks or other government agencies (for example the deposit insurance agency) provided liquidity support to financial institutions. It takes the value 1 if the government provided open-ended and extensive support often at below market rates to financial institutions regardless of their financial position. We define the support as open-ended and extensive if governments extended support for longer than 12 months and the overall support outstanding is greater than total banking capital (happened in 23 of our 40 cases) at which point it is no longer temporary liquidity support but rather solvency support.

GUAR is a dummy variable which takes on the value of 1 in cases where governments either issued an explicit blanket guarantee to depositors and creditors after the initial onset of the crisis or in cases where market participants were implicitly protected from any losses if public banks' market share exceeded 75% (also 23 cases).

Two measures of forbearance: FORB-A = 1 if some banks were permitted to continue functioning despite being technically insolvent; FORB-B = 1 if some of a wider set of bank prudential regulations such as loan classification and loan loss provisioning standards were suspended or not fully applied. The number of cases of forbearance in our sample are 9 and 26 respectively.

An additional indicator of forbearance is where banks have been repeatedly recapitalized. Ex post such events suggest that the initial recapitalization was inadequate and effectively amounted to unacknowledged capital forbearance. We therefore employ a dummy indicating where banks were repeatedly recapitalized REPCAP (9 cases).

Finally, we have a dummy indicating where governments implemented an across-the-board public debt relief program PRDP (9 cases), whereby government aid was provided to bank borrowers, helping them to service their debts. This can be seen either as a further form of accommodation likely to generate moral hazard.

As indicated, the most commonly used crisis resolution tools in our sample of financial crises were forbearance, liquidity support and blanket government guarantees on bank deposits. Interestingly, authorities were selective as to which dimensions to relax: Thus the policy choices along different dimensions are not strongly

[11] Strictly speaking, the log of this cost. With this transformation the skewness of the dependent variable is greatly reduced, but it has the drawback that it is undefined as cost goes to zero. Alternative functional forms such as $\log(1+\cos t)$ and $\cos t/(1+\cos t)$ were also explored with qualitatively similar results.

Table 1
Correlation matrix for individual policy measures

	LIQSUP	GUAR	FORB-A	FORB-B	REPCAP	PDRP
LIQSUP	1	0.28	−0.02	0.22	0.1	0.10
GUAR		1	−0.14	0.32	0.46	−0.02
FORB-A			1	0.27	−0.14	0.28
FORB-B				1	0.27	0.27
REPCAP					1	0.00
PDRP						1

correlated (see Table 1). That means, for example, that governments which used liquidity support did not necessarily employ any particular other crisis tool.

4.2.2. Macroeconomic indicators

Of course many crises were triggered or exacerbated by exogenous macroeconomic conditions (entering as U in the model of the previous section). In order to control for the impact of macroshocks on the fiscal costs we explored a variety of alternative indicators (listed in Appendix A). In practice, most of these controls proved insignificant, and excluding them had little impact on the other coefficients. The regressions reported here only include at most two control variables, the real interest rate REALINT and the change in equity prices STOCKPRICE (taken to the third power to increase the contribution of large values), both averaged over the year before the crisis.

4.2.3. Indicators of the nature of the bank failures

We employ a composite variable MICRO, aggregating indicators of the microeconomic management described in Appendix A. This is used as a slope dummy with some of the policy variables.

4.3. Regression results

The main results are summarized in Tables 2–4. [12] We find that the explanatory variables employed – mainly the policy variables – can explain between 60% and 80% of the cross-country variation in fiscal costs. And the estimated policy impact is sizable as well as statistically significant.

Beginning with the parameter estimates for the macroindicators, we see that macrodifficulties, as indicated by high real interest rates and falling equity prices, do tend to increase total fiscal costs of a banking crisis. (Other macrovariables were explored,

[12] Tables 2 and 3 exclude the observations for Argentina, 1980 and Egypt: These proved to be large outliers in all of the regressions where they were included – Argentina providing a large positive residual and Egypt a large negative one. There is particular doubt about the reliability of the costs data in each of these cases; in the event, their exclusion improves the fit without much altering the results in terms of size and significance of coefficients. Another case, Czech Republic, is excluded from these results because of some missing data. Results including the outliers are reported in the working paper version.

Table 2
Main regression results

Variable	Equation															
	2.1		2.2		2.3		2.4		2.5		2.6		2.7		2.8	
	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
REALINT			0.430	(2.77)	0.419	(2.77)	0.367	(2.43)	0.425	(2.84)	0.506	(3.34)	0.433	(2.89)	0.502	(3.40)
STOCKPRICE					−0.019	(−1.67)			−0.020	(−1.73)					−0.020	(−1.72)
LIQSUP	0.878	(2.70)	0.996	(3.32)	0.867	(2.88)	0.975	(3.37)	0.790	(2.61)	0.967	(3.21)	0.945	(3.22)	0.831	(2.75)
FORB-A	0.513	(1.38)	0.826	(2.32)	0.760	(2.17)	0.791	(2.25)	0.632	(1.77)	0.937	(2.73)	0.864	(2.51)	0.877	(2.62)
FORB-B	1.230	(2.77)	0.994	(2.40)	1.081	(2.66)	0.782	(1.95)	1.006	(2.49)						
REPCAP							0.752	(1.99)					0.690	(1.79)		
GUAR	0.504	(1.55)	0.746	(2.41)	0.817	(2.69)	0.443	(1.30)	0.863	(2.86)	0.917	(3.05)	0.610	(1.78)	1.005	(3.39)
PDRP							0.410	(1.17)	0.489	(1.39)			0.456	(1.31)		
FORB-B*MICRO											1.150	(2.46)	0.886	(1.92)	1.261	(2.75)
Constant	3.084	(8.38)	3.426	(9.58)	3.409	(9.79)	4.122	(9.25)	3.674	(9.35)	3.535	(10.11)	4.196	(9.61)	3.527	(10.39)
R^2/Adjusted R^2	0.491	0.429	0.589	0.525	0.623	0.550	0.656	0.575	0.646	0.812	0.592	0.528	0.655	0.574	0.627	0.555
SER/SSR	0.928	28.43	0.847	22.94	0.824	21.05	0.800	19.22	0.812	−41.52	0.844	22.79	0.802	19.28	0.819	20.80
log likelihood/DW	−48.41	1.583	−44.33	1.867	−42.70	1.697	−40.96	1.755	−41.52	1.904	−44.20	1.792	−41.03	1.733	−42.47	1.700
F-statistic/Prob(*F*)	7.948	0.000	9.171	0.000	8.535	0.000	8.164	0.000	7.807	0.000	9.278	0.000	8.120	0.000	8.699	0.000

Notes: The sample includes 38 episodes not including Argentina (I) and Egypt. Dependent variable is log(cost) with mean 1.583 and standard deviation 1.228. All explanatory variables included are shown. Method is OLS. SSR = sum of squared residuals.

Table 3
Main regression results (method: two-stage least squares)

Variable	Equation									
	3.1		3.2		3.3		3.4		3.5	
	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
REALINT			0.461	(2.84)	0.459	(2.83)	0.371	(2.36)	0.459	(2.66)
STOCKPRICE					−0.062	(−0.27)			−0.124	(−0.62)
LIQSUP	0.907	(2.00)	1.005	(2.63)	1.023	(2.80)	0.983	(2.78)	0.839	(2.20)
FORB-A	0.573	(1.29)	0.882	(2.88)	0.874	(2.88)	0.795	(2.34)	0.716	(2.17)
FORB-B	1.132	(2.62)	0.926	(1.96)	0.932	(1.97)	0.777	(1.57)	0.871	(1.96)
REPCAP							0.742	(2.25)		
GUAR	0.780	(2.22)	0.923	(2.99)	0.906	(2.88)	0.459	(1.27)	0.988	(3.22)
PDRP							0.410	(1.14)	0.565	(1.37)
Constant	3.251	(5.72)	3.539	(10.24)	3.534	(10.11)	4.127	(10.50)	3.809	(9.17)
R^2/Adjusted R^2	0.478	0.415	0.584	0.520	0.587	0.507	0.656	0.575	0.614	0.523
SER/SSR	0.940	29.146	0.851	23.196	0.862	23.037	0.800	19.218	0.848	21.570
Durbin–Watson stat	1.596		1.910		1.908		1.758		1.746	
F-statistic/Prob(*F*)	6.606	0.001	7.251	0.000	6.098	0.000	6.955	0.000	5.729	0.000

Notes: The sample includes 38 episodes, not including Argentina (I) and Egypt. Dependent variable is log(cost). All explanatory variables included are shown. Method is TSLS; instruments for LIQSUP and GUAR are: CORRUPT, LAWORDER and (14) dummies for the date on which crises began. SSR = sum of squared residuals.

Table 4
Regression results for GDP output growth dip and recovery time

Variable	Dependent variable			
	Growthdip (4.1 (OLS))		Recoverytime (4.2 (Logit))	
	Coefficient	*t*-Statistic	Coefficient	*z*-Statistic
REALINT	0.024	(1.02)	0.487	(1.06)
STOCKPRICE	0.003	(0.12)	0.470	(1.28)
LIQSUP	0.090	(2.00)	1.956	(2.27)
FORB-A	−0.048	(−0.88)	−0.744	(−0.69)
FORB-B	0.006	(0.09)	0.151	(0.13)
REPCAP	0.059	(1.00)	1.636	(1.41)
GUAR	−0.016	(−0.29)	−0.334	(−0.33)
PDRP	0.058	(1.08)	0.372	(0.35)
Constant	0.211	(2.96)	1.700	(1.21)
R^2/Adjusted R^2	0.247	0.054	0.231	
SER/SSR	0.128	0.510	0.482	7.204
log likelihood/DW	30.50	1.958	−21.32	
Mean/S.D. of depvar	0.125	0.132	0.500	0.506
F-statistic/Prob(*F*)	1.276	0.292		
LR-statistic/Prob(LR)			12.81	0.118

Notes: The sample includes all episodes except Cote d'Ivoire (i.e. $N = 39$). McFadden's pseudo R^2 shown for the Logit, SSR = sum of squared residuals. All explanatory variables included are shown.

as listed in Appendix A, but it is these two that survive as significant.) However, the function of including these variables is mainly to ensure that the omission of macrofactors does not bias the estimate of policy variables. [13]

In interpreting the main results, note that the sign of the policy parameters is set so that a positive coefficient indicates that the accommodating policy choice has increased fiscal costs. The major finding is that each and every significant coefficient is positive. In other words we found no specification where an accommodating policy choice significantly *reduced* fiscal costs. [14] Varying the specification by including or excluding explanatory variables does not significantly affect the size of the coefficients. This applies also to whether or not the macrovariables are included or not (compare (2.1) with (2.2) or (2.3)).

The most consistently significant explanatory variables are LIQSUP and the two FORBs; GUAR is also consistently significant. Of the regressions in Table 2, (2.2) is a parsimonious one almost achieving the lowest standard error of the regression (SER). But a lower SER and higher R-bar squared is achieved by including all of the policy variables as in (2.4) (although here GUAR and PDRP are not significant at conventional levels). Replacing FORB-B by its product with the dummy MICRO

[13] The fact that these variables are both lagged relative to the start of the crisis should minimize any endogeneity bias.

[14] But note that no significant effect was found for the two other resolution policies explored, namely a deposit freeze and establishment of a public asset management company.

achieves a small improvement relative to 2.2, only modestly supporting the hypothesis that that employing regulatory forbearance as a crisis resolution tool will result in even greater fiscal costs in those countries where the micro-environment is weak.

The policy message from Table 2 seems clear enough: open-ended liquidity support, regulatory forbearance and a blanket guarantee for depositors and creditors are all significant contributors to the fiscal cost of banking crisis.

We need to acknowledge one obvious potential problem of simultaneity here, in that really big crises may have triggered adoption of policies such as blanket guarantees or liquidity support (especially if these policies can be seen to some extent as being analogous to burying one's head in the sand). In order to verify that our results are not contaminated by such reverse causality, we employed an instrumental variables approach.

The two types of pre-determined instrument used employed political/institutional and timing information respectively. The political/institutional instruments were those published by International Country Risk Guide (ICRG) and measuring corruption in the government system (CORRUPT) and law and order tradition (LAWORDER). A correlation between these and the policy instruments could be rationalized by an assumption that such policy choices reflect in part wider governance conditions in the economy.

The timing variables are dummy variables for the dates on which crises began (there are 14 such dates: each year-dummy takes the value 1 for the countries whose crisis began on that year, zero otherwise). The time dummies could be valid instruments to the extent that choice of accommodating policies on a particular date could be influenced by global fashions or overall world conditions at that date.

As shown in Table 3, two-stage least squares estimates of the main equations using these instruments come out close to the ordinary least squares results. [15] This implies that the predicted degree of accommodation from the first stage regressions is an equally strong predictor of fiscal costs as the actual degree of accommodation. A regression of the residuals on the instruments is not significant, providing some reassurance that the instruments are indeed pre-determined. All in all, then, this evidence suggests that reverse causality is not a problem for the interpretation of our results.

We experimented with alternative functional forms – several different forms give a similar fit without dominating the one shown (though as noted below, the exact functional form does have implications for the size of out-of-sample predictions).

4.3.1. The scale of the cost implications

Our empirical findings reveal that accommodating policies add significantly and sizably to costs. If we were to take the regression results literally (Eq. (2.4) – see Table 2) and to simulate the effects of "uniformly strict" and "uniformly accommodating" policy packages, we would obtain rather extreme results. Thus Eq. (2.4) implies that a country which did not have blanket deposit guarantees, open-ended

[15] The first stage regressions have R^2 values of between 0.3 and 0.4, too low to suggest overfitting.

Table 5
Estimated fiscal cost of an accommodating approach to resolution policies

Type of accommodating measure (and % of cases where it was used)	Cost of adopting each accommodating measure (% of GDP)
Forbearance (Type A) (24%)	6.7
Repeated recapitalization (24%)	6.3
Liquidity support (58%)	6.3
Forbearance (Type B) (84%)	4.1
Debt relief (21%)	3.1
Blanket guarantee (55%)	2.9

Notes: The table shows how much each accommodating measure can add to fiscal costs. For example, permitting insolvent banks to stay open (forbearance of Type A, see text), pushes up predicted fiscal costs by 6.7% of GDP – double the sample mean (each calculation uses the sample mean value of the other variables).

liquidity support, repeated recapitalizations, debtor bail-outs or regulatory forbearance, would have a predicted fiscal cost of only about 1% of GDP; on the other hand, a country which adopted the reverse policy in each case would have a predicted fiscal cost in excess of 60% of GDP. In as much as they are calculated beyond the range of the sample, and also taking into account their sensitivity to the functional form of the equation, these limiting projections should probably not be taken too literally.

Nevertheless, the more realistic calculations of Table 5 showing the estimated individual impact of each individual policy measure assuming the other measures are employed with their actual frequency also show sizable effects. They indicate that among the different accommodating measures, liquidity support and forbearance seem to be the costliest measures, contributing several percentage points of GDP. The equation predicts that, if deposit guarantees, forbearance and repeated recaps are employed, not extending liquidity support could halve the expected fiscal cost.

Another caveat worth reiterating is that we have not included variables measuring pre-intervention preventative policy in the final regressions. To the extent that such policy is important (and to the extent that they would be correlated with the included policy variables), their omission from the equation may have the effect of biasing the estimated coefficients of the included policy variables. An accommodating pre-crisis policy which had allowed financial institutions to take big risks might well be associated with an accommodating intervention and resolution policy which allowed the post-crisis losses to mount.

4.3.2. Is there a trade-off between fiscal costs and economic recovery?

We also explored whether there was any obvious trade-off between fiscal costs and subsequent economic growth recovery. In other words, might countries that employed these accommodating policy measures experienced a faster subsequent macreoconomic recovery? Using a standard approach (IMF, 1998) to measuring the size and duration of the output dip following the crisis, regressions (summarized in Table 4) using the same structure as for fiscal costs fail to uncover any evidence that this is

the case. Except for liquidity support, all of the policy variables proved insignificant. And in the case of liquidity support, the positive coefficient indicates that extension of liquidity support actually appeared to have *prolonged* the crisis as crisis recovery took longer (a finding consistent with that reported in Bordo et al. (2001)). Furthermore, the estimated size of the output dip was bigger.

5. Conclusion

We have made a first attempt to understand whether and what kind of particular crisis resolution measures are effective in lowering the fiscal costs of banking crises. While much discussion suggests that the costs of banking crises chiefly represent exogenous shocks, we find evidence to support the views that (i) resolution policies do matter and (ii) employing strict crisis resolution policies reduces fiscal costs.

Of course it may also be that the underlying policy philosophy that tends to generate "strict" policy choice is also associated with a wider environment which has helped contain moral hazard, and thus limited the accumulation of hidden embedded costs in the pre-recognition phase, i.e. before the crisis is recognized as such. By the time containment and resolution policies come into play, some of the damage will have already have been done.

Indeed, although we have emphasized intervention and resolution policy, it is not really possible to draw an unambiguous line between these and prevention policies. To the extent that these have been explicitly included, our estimates may somewhat exaggerate the separate role of intervention and resolution as opposed to prevention.

The data on which we depend are tentative, and one should not rely too heavily on the precise coefficient estimates. But the effects we model are nevertheless statistically significant, have a consistent sign and are economically large. In particular, open-ended liquidity support, regulatory forbearance and a blanket guarantee for depositors and other creditors are all significant contributors to the fiscal cost of banking crisis. Countries which avoid these policies can expect to reduce the costs of any future crises by a very considerable amount.

Containment and resolution of banking crises is not an easy matter, and the exact policy approach cannot be dictated by the results of a model simplified in order to be adapted to econometric testing. We can hardly claim to have proved what the best policy choice is in all circumstances. Nevertheless, our findings clearly tilt the balance in favor of a "strict" approach to crisis resolution, rather than an accommodating one. At the very least, they emphasize that regulatory authorities which choose an accommodating or gradualist approach to an emerging crisis need to be sure that they have some other way of controlling risk taking.

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Appendix A. Data appendix

A.1. Dependent variables

Fiscal cost: The dependent variable fiscal cost is the estimated net present value of the budgetary cost of the crisis based on official or expert assessments, expressed as a percentage of GDP. (Table 6) The first date shown for the crisis is the date at which the existence of the crisis became publicly known. The fiscal cost figure includes both fiscal and quasi-fiscal outlays for financial system restructuring, including the recapitalization cost for banks, bailout costs related to covering depositors and creditors and debt relief schemes for bank borrowers.

Sources for fiscal cost and for date of crisis: The World Bank has been assembling estimates from published sources and from discussions with national experts for the last several years. The set of estimates here being used draws on those previously reported by Caprio and Klingebiel (1996, 1997, 2002), and Lindgren et al. (1996). Conflicts between different sources have been reconciled with the help of consultations with country experts.

Output dip: We also use data on the size of the output growth dip following the banking crisis, employing the approach of and data from IMF (1998) and update it for the more recent crises (see Table 7). This approach calculates the output growth dip as the cumulative deviation of output from its previous trend growth during the duration of the dip defined as the period over which the output growth rate remains below the trend value. As in IMF (1998), *recovery time* is one *plus* the duration of the dip in years. As mentioned in the text, alternative dip measures have been proposed by Hoggarth et al. (2002).

A.2. Data on crisis resolution tools

In order to characterize the main components of a crisis resolution strategy, we use dummy variables (shown in Table 6) characterizing each government's approach along the following five dimensions.

Issuance of a blanket government guarantee GUAR: Did the government issue an explicit and unlimited guarantee for depositors and creditors; or were market participants implicitly protected as deposits of state-owned institutions account for more than 75% of total banking deposits?

Open-ended and extensive liquidity support to insolvent institutions. LIQSUP: Did the government or its agencies (typically the Central Bank or a Deposit Insurance Agency) provide open-ended and extensive liquidity support (at preferential rates) to financial institutions regardless of their financial standing? (Support is open-ended

Table 6
Intervention/resolution policy tools

Country	Period	Fiscal cost (% of GDP)	Blanket guarantee for depositors and creditors GUAR	Extensive liquidity support to FIs LIQSUP	Forbearance		Repeated recaps RECAP	Public debt relief for borrowers PDRP
					FORB-A	FORB-B		
Argentina (I)	1980–1982	55.1	Yes	No	No	Yes	No	Yes
Argentina (II)	1995	0.5	No	No	No	No	No	No
Australia	1989–1992	1.9	No	No	No	Yes	No	No
Brazil	1994–1996	13.2	No	No	Yes	Yes	No	Yes
Bulgaria	1996–1997	13.0	Yes	Yes	Yes	Yes	No	No
Chile	1981–1983	41.2	No	Yes	No	Yes	No	Yes
Colombia	1982–1987	5.0	Yes	Yes	No	No	No	No
Cote d'Ivoire	1988–1991	25.0	No	Yes	Yes	Yes	No	No
Czech Republic	1989–1991	12.0	Yes	No	No	Yes	Yes	No
Ecuador	1996–ongoing	13.0	No	No	Yes	Yes	No	Yes
Egypt	1991–1995	0.5	Yes	Yes	No	Yes	No	No
Finland	1991–1994	11.0	Yes	Yes	No	Yes	No	No
France	1994–95	0.7	No	No	No	Yes	No	No
Ghana	1982–1989	3.0	Yes	Yes	Yes	Yes	No	Yes
Hungary	1991–1995	10.0	Yes	Yes	No	Yes	Yes	No
Indonesia (I)	1992–1994	3.8	No	No	No	Yes	No	No
Indonesia (II)	1997–ongoing	50.0	Yes	Yes	No	Yes	Yes	No
Japan	1992–ongoing	20.0	Yes	Yes	No	Yes	Yes	No
Malaysia (I)	1985–88	4.7	No	Yes	No	Yes	No	No
Malaysia (II)	1997–ongoing	16.4	Yes	No	No	Yes	Yes	No
Mexico	1994–ongoing	19.3	Yes	Yes	No	Yes	Yes	Yes
New Zealand	1987–1990	1.0	No	Yes	No	No	No	No
Norway	1987–1993	8.0	Yes	Yes	No	Yes	No	No
Paraguay	1995–ongoing	5.1	Yes	Yes	No	Yes	No	No
Philippines (I)	1983–1987	13.2	No	Yes	Yes	Yes	No	Yes
Philippines (II)	1998–ongoing	0.5	No	No	No	No	No	No
Poland	1992–1995	3.5	Yes	Yes	No	Yes	No	No
Senegal	1988–1991	9.6	Yes	Yes	No	Yes	No	Yes
Slovenia	1992–1994	14.6	Yes	No	Yes	Yes	No	No
South Korea	1997–ongoing	26.5	Yes	Yes	Yes	Yes	Yes	No
Spain	1977–1985	5.6	No	Yes	No	Yes	No	No
Sri Lanka	1989–1993	5.0	Yes	No	No	Yes	Yes	No
Sweden	1991–1994	4.0	Yes	No	No	No	No	No
Thailand (I)	1983–1987	2.0	No	No	No	Yes	No	No
Thailand (II)	1997–ongoing	32.8	Yes	Yes	No	Yes	No	No
Turkey (I)	1982–1985	2.5	No	No	No	No	No	No
Turkey (II)	1994	1.1	Yes	No	No	Yes	No	No
United States	1981–1991	3.2	No	No	Yes	Yes	No	No
Uruguay	1981–1984	31.2	Yes	Yes	No	Yes	Yes	Yes
Venezuela	1994–1997	22.0	No	Yes	No	Yes	No	No

and extensive if it was provided for longer than 12 months and greater than total banking capital).

Table 7
Microindicators and output dip

Countries	Growth in credit/ GDP(I)	Real deposit interest rate(II)	Loan classification[a] (III)	Enforcement of creditor rights[b] (IV)	Loan to deposit ratio(V)	MICRO (0 if mean of I–V $\geqslant$ 2.4)	Output growth dip[c] (% GDP)	Duration[c] of dip (years)
Argentina (I)	3	1	2	2	3	1	16.6	4
Argentina (II)	1	2	3	4	2	0	11.9	3
Australia	3	3	3	4	2	0	0	1
Brazil	2	–	3	3	2	1	1	0
Bulgaria	4	1	3	–	4	0	20.4	3
Chile	1	3	3	4	1	0	45.5	9
Colombia	3	2	2	1	3	1	65.1	5
Cote d'Ivoire	4	1	1	2	1	1		
Czech Republic	2	3	1	3	–	1	0	1
Ecuador	1	4	3	2	3	0	0.9	1
Egypt	4	1	–	1	4	1	6.5	5
Finland	3	2	4	4	1	0	23.1	7
France	4	2	4	4	1	0	0	1
Ghana	4	1	1	1	4	1	6.6	2
Hungary	4	2	1	3	1	1	13.8	3
Indonesia (I)	1	4	1	1	2	1	42.3	9
Indonesia (II)	3	4	2	3	2	0	33.0	4
Japan	2	2	4	3	2	0	27.7	9
Malaysia (I)	1	4	2	3	2	0	13.7	4
Malaysia (II)	2	3	2	3	2	0	22.8	4
Mexico	1	4	2	2	1	1	9.6	2
New Zealand	2	2	4	2	4	0	18.5	7
Norway	1	4	1	4	2	0	19.6	8
Paraguay	2	3	3	4	3	0	0	1
Philippines (I)	3	3	2	1	1	1	25.7	5
Philippines (II)	1	3	3	2	3	0	7.5	3
Poland	2	1	1	2	4	1	0	1
Senegal	4	4	1	1	1	1	0	1
Slovenia	–	4	1	4	3	0	2.1	2
South Korea	2	3	2	2	1	1	16.5	3
Spain	3	1	1	2	4	1	0	1
Sri Lanka	1	2	–	1	3	1	0.5	3
Sweden	1	2	3	4	1	1	6.5	3
Thailand (I)	2	3	1	1	3	1	8.7	2
Thailand (II)	3	4	1	2	1	1	31.5	4
Turkey (I)	3	1	1	4	4	0	0	1
Turkey (II)	4	1	3	4	4	0	9.1	2
United States	2	3	4	4	2	0	5.4	3
Uruguay	3	1	–	2	3	1	41.7	6
Venezuela	4	4	2	1	4	0	14.1	4

[a] Coded as follows: "4" = forward-looking provisioning criteria; "3" = provisioning required at 90 days overdue; "2" and "1" = 120 day and 360 day thresholds, respectively.

[b] Based on La Porta et al. (1998); thresholds set at scores of 6 ("1"); 12 ("2"); 18 ("3").

[c] IMF (1998) methodology; see text.

Forbearance FORB: Did the government forbear in any of the following progressively less liberal ways?

- Forbearance Type A: Banks observed to be in open distress, e.g. unable to pay depositors' rejected at clearing; no access to interbank market; widely believed to be insolvent (except for public banks) are allowed to continue to operate without any restrictions for at least a 12 months period.
- Forbearance Type B: Either Forbearance of Type A or regulations (in particular loan classification and loan loss provisioning) are relaxed or the current regulatory framework is not enforced for at least a 12 months period.

Repeated recapitalizations REPCAP: Did banks undergo more than one round of government-sponsored recapitalizations?

Public debt relief program PDRP: Did the government implement a broad debt relief program for corporates and/or other types of borrowers, including through an exchange rate guarantee program or rescue of corporates?

Sources for crisis resolution measures: We extended the dataset from Caprio and Klingebiel (1996) in terms of countries and policy variables. Information on the policy variables was obtained from official country sources, from the World Bank Regulatory Database (Barth et al., 2001; Garcia, 1999) and unpublished IMF reports and interviews with country experts. Data is now available for 40 episodes involving 34 countries, and this represents the constraint on inclusion of episodes.

A.3. Control Variables

We employed data summarizing (i) macroeconomic conditions; (ii) the degree of government intrusion; and (iii) indicators of the regulatory and management environment affecting bank management (''microindicators'').

Macroindicators (average for one or †two years before the crisis date).

- real interest rate* (could also be a micro indicator);
- real GDP growth;
- percentage change of stock market prices*;
- fiscal balance as a percentage of GDP†;
- current account as percentage of GDP†;
- short-term external debt as share of GDP and
- percentage change in the terms of trade.

Government intrusion indicators:

- bank reserves (cash plus with central bank) as percentage of deposits;
- share of government in total claims of banks;
- bank borrowing from central bank as percentage of their total deposits.

Microindicators:

- growth in bank credit relative to GDP (as proxy for relaxed credit risk standards);
- real deposit interest rate (possible proxy for financial system distress as banks bid up rates to stay afloat);
- loan classification rules (proxy for quality of regulation; see note to Table 7);
- enforcement of creditor rights (proxy for the effectiveness of the legal system; see note to Table 7); and
- bank average loan to deposit ratio (proxy for liquidity risk).

Each continuous control variable was normalized to zero mean and unit standard deviation. The variable MICRO is a composite of the micro indicators: it takes the value 1 when the country has a low average value of the micro indicators mentioned above relative to other countries; otherwise zero. [16]

Note that, of the macro and government control variables, only the two marked with an asterisk (*) were significant in the regressions; the others were then excluded from all reported regressions.

Sources for control variables: International Financial Statistics (bank data refers to deposit money banks); IFC Emerging Markets Database; La Porta et al., 1998) (for enforcement of creditor rights). These were supplemented from national sources.

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[16] Specifically, each country was scored 1, 2, 3 or 4 for each of the microvariables corresponding to the quartile score (with lower value indicating weaker conditions); the mean for each country of these quantized scores was then computed and MICRO set to 1 for countries lower than the median across countries. MICRO is thus 1 when the micro conditions are weak.

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