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Government bailouts and monetary disequilibrium: common fundamentals in the Mexican and East Asian currency crises

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Abstract

Monetary disequilibrium seems to be a common thread that connects the Mexican and East Asian crises. Both crises have been characterized by governments attempting to minimize the adverse impacts of capital reversals on their domestic financial systems. This backstopping function of the monetary authority is modeled within an escape clause-based currency crisis framework which emphasizes the "nonmechanical" behavior of governments as they trade off various economic policy objectives.

JEL Classification: F30; F32

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1. Introduction

Net capital flows to emerging economies peaked in the mid 1990s, reaching an all-time high of US$190 billion (bn) in 1996, more than ten times the average annual flow between 1984 and 1989 (Table 1). The increasing globalization of finance and capital flows has,

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Table 1
Net capital flows to developing countries ($ billions), 1984–97

	1984–89[a]	1990–96[a]	1994	1995	1996	1997
Private capital flows	17.8	129.4	133.8	148.2	190.4	139.0
Foreign direct investment	12.2	57.9	76.5	86.5	108.5	126.5
Portfolio investment	4.9	51.1	85.7	22.2	52.7	55.5
Other investment[b]	0.6	20.4	−28.4	39.5	29.3	−43.0
Official flows	27.2	16.8	10.3	32.1	3.2	−3.3
Change in reserves[c]	5.1	−54.8	−42.3	−67.1	−95.2	−57.8

[a] Annual average for the period.
[b] May include official flows.
[c] A minus sign denotes an increase.
Source: IMF.

however, not been an unmitigated blessing, as this period has witnessed several episodes of severe financial turbulence in global currency markets. Indeed, since 1992, currency crises seem to have been the norm rather than the exception.

Specifically, in 1992–93, Europe was faced with the very real possibility of a collapse of the European Exchange Rate Mechanism (ERM). In 1994–95, there was the Mexican currency crisis, which saw a steep devaluation of the peso and brought Mexico to the brink of default. There were also some spillover effects to Argentina and Brazil. Between July 1997 and mid-1998, the world experienced the effects of the East Asian crisis. This crisis started somewhat innocuously with a run on the Thai baht, but spread swiftly to a number of other regional currencies, most notably the Indonesian rupiah, Malaysian ringgit, Philippine peso and Korean won. The currencies of other large emerging economies such as Russia and Brazil also experienced periods of significant market selling and required the assistance of the IMF. The Russian ruble was devalued in August 1998, while the Brazilian real peg was eventually broken in January 1999.

These events have generated much interest in currency crisis models and their corresponding policy implications.[1] Dani Rodrik (Rodrik, 1998) has noted that:

> [a] sad commentary on our understanding of what drives capital flows is that every crisis spawns a new generation of economic models. When a new crisis hits, the previous generation of models is judged to have been inadequate (p. 58).

Undoubtedly, each crisis has certain distinctive features and peculiarities. However, in light of Rodrik's observation, it is important to determine what - if any - common elements exist between some or all of these crises, and to develop a general framework that captures these important commonalties. With this in mind, this paper focuses on the two most studied crises in developing economies in the 1990s, namely, those in Mexico and East Asia (Thailand in particular).

The next section stresses monetary disequilibrium as a common thread connecting the Mexican and East Asian crises, as governments attempted to minimize the adverse impact of capital flow reversals on their domestic financial systems. Section 3 formalizes the lender of last resort role of the monetary authorities in Mexico and East Asia in two closely related

Table 2
Claims by monetary authorities on domestic financial institutions in East Asia, Q1:1996–Q3:1997[a]

	Q1–96	Q2–96	Q3–96	Q4–96	Q1–97	Q2–97	Q3–97	Q4–97
Indonesia[b]	15295	15930	16531	15182	16084	19154	21245	67313
Malaysia[c]	6585	6867	5679	5249	5325	5284	5411	5032
Philippines[d]	13.1	13.2	13.6	14.2	14.3	16.1	20.0	34.5
Thailand[e]	38.4	66.0	72.0	90.1	194.0	353.9	597.9	723.4

[a] End of period.
[b] Billions of rupiah.
[c] Millions of ringgit.
[d] Billions of peso.
[e] Billions of baht.
Source: Computed from IMF data.

escape clause models. The final section concludes with a brief discussion of the main-policy implications arising from the models.

2. Monetary disequilibrium: common fundamentals in Mexico and East Asia

Limiting our focus to the Mexican and East Asian crises, an important observation emerging from these episodes is that the monetary authorities sterilized reserve outflows so as to ensure smooth growth of money supply during the crisis period. Calvo (1996), Flood, Garber and Kramer (1996), Sachs, Tornell and Velasco (1996a, 1996b, 1996c) and many others have emphasized that this was the case in Mexico in 1994–95. Rajan (1999, 2000) and the World Bank (1999a) have documented this policy in the case of Thailand (the domino in the East Asian crisis); while McKibbin and Martin (1998) have noted its occurrence in Indonesia (the country most impacted by the East Asian crisis).

This sterilization of outflows is attributable to the monetary authority acting as a lender of last resort in the face of domestic banking fragilities and the threat of an outright collapse of the financial system. In the case of the Thai crisis, this can be partially discerned from Table 2, which reveals a sharp rise in the claims by the Thai monetary authorities (Bank of

Table 3
Monetary base in Thailand (millions of baht and $), December 1995–December 1997[a]

Period	Amount (baht)	Amount ($)
Q1: 96	411057.5	16292.4
Q2: 96	396161.3	15621.5
Q3: 96	403762.7	15883.7
Q4: 96	452924.2	17685.4
Mar-97	462165.8	17796.1
Jun-97	514285.9	19941.3
Sep-97	433848.5	11879.8

[a] End of period.
Source: Bank of Thailand and IMF.

Table 4
Total reserves minus gold in Thailand ($ millions), 1996 and 1997[a]

Period	Amount
Q1: 1996	37,938
Q2: 1996	38,787
Q3: 1996	38,494
Q4: 1996	37,731
March 1997	37,074
April 1997	36,329
May 1997	32,316
June 1997	31,361
July 1997	29,434
August 1997	24,948

[a] End of period.
Source: IMF.

Thailand) on domestic financial institutions from the second quarter of 1996. Thus, the Bank of Thailand's credit to financial institutions rose from 2% of GDP in 1996 to 15% by the end of 1997 (World Bank, 1999a). Consequently, the monetary base saw a sharp rise during that period, as the fall in reserves was more than matched by the rise in domestic credit (Tables 3 and 4). Table 5 reveals a similar pattern in the case of Mexico in late 1994 and early 1995.

The provision of credit to the domestic banks and the concomitant focus on banking fragilities is consistent with what is commonly believed to have been a key problem in East Asia. Importantly, it also provides a reason why activist (i.e., tight) monetary policy to defend the currency may not be a viable/preferred option, given its adverse repercussions on the financial system and the real economy through the Keynesian aggregate demand and the potentially more potent Fischerian debt deflation channels (Calvo and Reinhart, 2000).[2]

In recognition of the foregoing consideration, Calvo (1996) and Flood et al. (1996) have suggested that a Krugman (1979) framework, with its emphasis on monetary disequilibrium, may be pertinent to the Tequila crisis; while Rajan (1999, 2000) suggests the same in the case of some of the East Asian problems, those in Thailand more specifically. Corbett and Vines (1999) have made the following important observation:

> there does not appear to be a need to appeal to self-fulfilling ideas in order to explain Thailand's original devaluation... (However) ... in none of the other economies was overheating or macroeconomic vulnerability nearly as obvious as in the Thai economy.... For these economies, there does appear to be a need to appeal to self-fulfilling currency crisis ideas in order to explain the initial devaluations (pp.167–8).

Of course, this observation does not necessarily invalidate the application of a monetary framework in the context of the rest of the East Asian economies. After all, the earliest multiple equilibria models focused on whether the simple Krugman (1979) framework could generate multiple equilibria rather than unique deterministic outcomes. Hence, the initial devaluation of the Indonesian rupiah and Malaysian ringgit could be partly rationalized in terms of the Obstfeld (1986) model.[3] In this model, the authorities are assumed to follow a stable credit policy (zero credit growth) in the absence of an attack. However, agents expect

Table 5
Monetary base in Mexico (billions of pesos), September 1994–May 1995

Period	Monetary base	International reserves	Net domestic credit
Sep-94	43.81	54.94	−11.14
Oct-94	44.76	59.15	−14.39
Nov-94	49.17	43.03	6.15
Dec-94	56.94	32.74	24.20
Jan-95	51.20	19.84	31.37
Feb-95	49.80	52.41	−2.62
Mar-95	48.81	46.70	2.11

Source: Krueger and Tornell (1999).

the government to pursue a more expansionary monetary policy if the peg is broken, thus making the attack self-validating.[4]

3. New second generation currency crisis models

The foregoing interpretation of the Krugman (1979) model emphasizes the strategic rationale that leads the authorities to maintain an expansionary credit policy rather than adjust the macroeconomic policy mix to prevent a regime collapse.[5] In this manner, one of the more glaring faults of the model, namely, its asymmetric treatment of private agents and government authorities, is at least partially addressed.[6] However, the shift to a discretionary government policy needs to be explicitly modeled.

The "new second-generation" (NSG) models explicitly incorporate maximization by the authorities of a policy function which accounts for the trade-off between the costs and benefits of defending a peg under attack. Unlike the simple monetary models, there is no canonical framework for the NSG models. They do, however, exhibit certain basic traits, including (a) reasons for abandoning the prevailing peg;[7] and (b) reasons for maintaining it. There is thus built-in tension between motives (a) and (b). The decision to abandon the peg is a policy decision made by an optimizing policy-maker who evaluates the tradeoffs.[8] Further common elements include the presence of two or more equilibria corresponding to various magnitudes of the post-crisis depreciation; and expectations that may not necessarily be justified *ex-ante* but are validated *ex-post* by the outcome they bring about.

3.1. Modeling the role of government in Mexico and East Asia

In a popular version of NSG models used by Sachs et al. (1996a) and Velasco (1996), policy makers attempt to offset adverse shocks to government revenue and to inflation.[9] In what follows, we draw on this framework, while focusing on government bailouts of weak financial institutions. Following Chinn, Dooley and Shrestha (1999), Dooley (2000), Flood, Garber and Kramer (1996) and others, we assume that the monetary authority acts as a lender of last resort in the face of an imminent domestic financial system collapse.

The government is assumed to minimize the following single-period, quadratic loss function:

$$L_t = 1/2(\beta\Pi_t^2 + f_t^2) + cZ, \quad \beta > 0 \tag{1}$$

where Π_t is the inflation rate (which is assumed to equal the rate of devaluation so as to maintain purchasing power parity (PPP)); f_t is the size of the fiscal deficit (which is a policy-determined, flow variable)[10]; β is a parameter; and c captures the costs to government of devaluation (loss of reputation and credibility, political costs etc.). Z equals one if devaluation occurs; otherwise it equals zero. Note that government faces a cost only if it devalues, but not if it revalues (the latter being perceived as a sign of strength by private agents), and that the costs of devaluation are fixed and independent of the size of the devaluation.[11]

The resource constraint faced by the government may be written as follows:

$$bo_t - (\underline{a} - a_t) - \psi(\Pi_t - \Pi_t^e) = f_t, \quad \psi > 0 \tag{2}$$

where $(\underline{a} - a_t)$ denotes exogenous net revenue flows (i.e., gross revenue less other fiscal costs); $\underline{a}$ is a constant revenue stream (assumed zero for simplicity); a_t is a stochastic disturbance term representing a fall in net revenue flows, with $E(a_t) = 0$ and $Var(a_t) = \sigma^2_t$; Π^e_t is the rate of devaluation/inflation expected by private agents; bo_t is the size of the bank bailout; and ψ is a parameter.

Eq. (2) merely states that the excess of the fiscal costs of bank bailout over total government revenue, defined as the sum of exogenous revenue flows and inflation taxes, must equal the size of the overall fiscal deficit (f_t). The stochastic element in this model is some kind of fiscal shock to the government budget, such as a fall in gross tax revenues or a rise in expenditure following a domestic downturn.[12] Substituting Eq. (2) into Eq. (1) and solving for the first-order condition, yields:

$$f_t^* = (\beta/\psi)\Pi_t^*, \tag{3}$$

$$\Pi_t^* = (1 - \lambda)[bo_t + a_t + \psi\Pi_t^e], \tag{4}$$

where $\lambda = \beta/(\psi^2 + \beta)$.

The analysis and solution proceeds along lines familiar from escape clause models. Agents form expectations of devaluation/inflation on the basis of the outstanding bailout obligations of the government, which are known with certainty, and the expected revenue shock. The shock occurs and is observed by the government, which then makes its decision. Note that the government possesses an informational advantage over the public.

If the government maintains the prevailing peg, then $\Pi_t = 0$. Thus, from Eqs. (1) and (2), the government loss function from a fixed exchange rate (L^F_t) is:

$$L_t^F = 1/2[bo_t + a_t + \psi\Pi_t^e]^2. \tag{5}$$

To derive the government loss function if it devalues (L^D_t), substitute Eqs. (3) and (4) into Eq. (1). This yields:

$$L_t^D = 1/2\lambda[bo_t + a_t + \psi\Pi_t^e]^2 + c. \tag{6}$$

The government will forsake the policy rule of maintaining the peg and invoke the escape clause and devalue, if $L_t^F > L_t^D$. This implies that:

$$[bo_t + a_t + \psi\Pi_t^e] > k. \tag{7}$$

where $k = [2c/(1 - \lambda)\psi]^{1/2}$. Assume that a_t follows a binomial distribution with a value of $\tilde{a}$ with probability of q and $-\tilde{a}$ with probability $(1 - q)$.

Consider first the case where agents expect no devaluation regardless of the type of shock, thus setting $\Pi_t^e = 0$. Assuming a negative shock (to obtain the ceiling value of bo_t), from Eq. (7) the no-devaluation condition is:

$$bo_t < k - \tilde{a}. \tag{8}$$

If the agents expect a devaluation regardless of the type of shock, $\Pi_t^e > 0$. Assuming rational expectations, Eq. (4) yields:

$$\Pi_t^e = (\psi/\beta)bo_t. \tag{9}$$

Substituting Eq. (7) into Eq. (9) and assuming a positive shock (in order to derive the floor value of bo_t), implies:

$$bo_t > \lambda(k + \tilde{a}). \tag{10}$$

We are left with the intermediate case, in which agents expect a devaluation only if the negative shock hits. Solving for Π_t^e from Eq. (4) produces:

$$\Pi_t^e = [(1 - \lambda)q]/[1 - (1 - \lambda)q](bo_t + \tilde{a}). \tag{11}$$

Substitute Eq. (11) into Eq. (7). Thus, the devaluation condition is now:

$$bo_t > k[1 - (1 - \lambda)q] - \tilde{a}[1 - (1 - \lambda)q]. \tag{12}$$

If there is a positive shock, there is no devaluation. Thus

$$bo_t < k[(1 - (1 - \lambda)q] + \tilde{a}[1 - (1 - \lambda)q]. \tag{12a}$$

Putting Eqs. (12) and (12a) together implies:

$$k[1 - (1 - \lambda)q] - \tilde{a}[1 - (1 - \lambda)q] < bo_t < k[1 - (1 - \lambda)q] + \tilde{a}[1 - (1 - \lambda)q] \tag{12b}$$

We consider the following cases

Case 1. Certain devaluation if $(\Pi_t^e = 0)$:

$$bo_t > k[1 - (1 - \lambda)q] + \tilde{a}[1 - (1 - \lambda)q] \tag{13}$$

Case 2. Uncertain/self-fulfilling devaluation if $(\Pi_t^e > 0)$:

$$k[1 - (1 - \lambda)q] - \tilde{a}[1 - (1 - \lambda)q] < bo_t < (k - \tilde{a}), \text{ or} \tag{14}$$

$$\lambda(k + \tilde{a}) < bo_t < k[1 - (1 - \lambda)q] + \tilde{a}[1 - (1 - \lambda)q] \tag{14a}$$

Case 3. No devaluation/credible peg if ($\Pi_t^e > 0$):

$$bo_t \leq k[1 - (1 - \lambda)q] - \tilde{a}[1 - (1 - \lambda)q] \tag{15}$$

where, by assumption, $k > \tilde{a}$ and $\lambda(k + \tilde{a}) < k[1 - (1 - \lambda)q] + \tilde{a}[1 - (1 - \lambda)q]$. Eq. (13) implies that a devaluation will occur whenever the size of the bailout is "large," such that the fixed exchange rate regime lacks credibility. Eqs. (14) and (14a) imply multiple equilibria, as the expectation of devaluation determines whether the regime will collapse or not. When Eq. (15) is satisfied, this implies full credibility of the fixed exchange rate regime as long as the financial system is "sufficiently healthy" with fiscal costs of a bank bailout "sufficiently low."

3.3. An alternative specification

The above specification, which closely follows Sachs et al. (1996a) and Velasco (1996), highlights the self-fulfilling nature of government bailouts of the domestic financial system. In this section we consider a richer - and probably more realistic - specification. Rewrite Eq. (2) as follows:

$$bo_t + g(\Delta i_t^e) - \psi(\Pi_t - \Pi_t^e) = f_t, \quad \psi > 0 \tag{2^I}$$

where bo_t denotes the size of the *existing* bailout problem and Δi_t^e refers to an unexpected rise in real interest rates. Thus, the overall fiscal cost of the bank bailout in this case is equal to the sum of the existing bailout plus the increase due to an unanticipated hike in interest rates (brought about by efforts to stave off the currency attack). Eq. (2^I) assumes that the exogenous shock now takes the form of an unanticipated rise in interest rates rather than an exogenous negative shock to net tax revenue (as in Eq. (2)).

The model is solved as before. In particular, the aim is to maximize Eq. (1) subject to Eq. (2^I). The first-order conditions are:

$$f_t^* = (\beta/\psi)\Pi_t^*, \tag{3^I}$$

$$\Pi_t^* = (1 - \lambda)[bo_t + g(\Delta i_t^e) + \psi\Pi_t^e]. \tag{4^I}$$

As before, if the government does not devalue, the government loss function from a fixed exchange rate (L_t^F) is:

$$L_t^F = 1/2[bo_t + g(\Delta i_t^e) + \psi\Pi_t^e]^2. \tag{5^I}$$

The government loss function if it devalues (L_t^D) is:

$$L_t^D = 1/2\lambda[bo_t + g(\Delta i_t^e) + \psi\Pi_t^e]^2 + c. \tag{6^I}$$

The government will voluntarily choose to float the currency if $L_t^F > L_t^D$. This implies that:

$$bo_t + g(\Delta i_t^e) + \psi\Pi_t^e > k. \tag{7^I}$$

We consider the following cases

Case 1. Certain devaluation ($\Pi_t^e = 0$ and $g(\Delta i_t^e) = 0$):

$$bo_t > k. \tag{13^I}$$

Case 2. Uncertain/self-fulfilling devaluation ($\Pi_t^e > 0$ and $g(\Delta i_t^e) = 0$):

$$bo_t > \lambda k \text{ and } bo_t < k. \tag{14^I}$$

Case 3. Fully credible peg ($\Pi_t^e > 0$ and $g(\Delta i_t^e) > 0$):

$$bo_t + g(\Delta i_t^e) \leq \lambda k. \tag{15^I}$$

Once again, we have the case of a devaluation with certainty if the size of the bailout is "large" (Eq. (13^I). This occurs as the government undertakes a surprise devaluation, voluntarily pursuing an expansionary monetary policy to bail out the troubled banks, that is, $g(\Delta i_t^e) = 0$.[13] Eq. (14^I) implies multiple equilibria, as an interest rate hike is infeasible (despite $\Pi_t^e > 0$). Case 3 suggests that the peg will not enjoy *full* credibility as long as the central bank functions as a lender of last resort and the financial system is not "rock solid." In order for an interest rate hike to be effective and to be seen as credible in fighting speculative attacks, it should not have "too significant" an adverse impact on the domestic financial system. This is shown by Eq. (15^I), which reveals that *both the cost of the existing bank bailout and the cost of a hike in interest rates determines the full credibility of a peg.*[14]

4. Concluding observations

These were the stylized facts of the Mexican crisis sketched by Calvo (1996):

> (1) during 1994, external and internal factors lead to a lower demand for money; (2) to offset these factors, the central bank pumps in more credit; (3) as a result, monetary aggregates do not fall, but international reserves are lost. . . ; (4) towards the end of 1994, a large gap between short-term government obligations and international reserves. . . is created; (5) an unscheduled devaluation takes place on 20 December (p. 214).

This description broadly fits the Thai crisis in 1997 in particular, and the other East Asian economies to lesser extents.

Two models have been presented in this paper in which the backstopping function of the monetary authority is modeled within an escape clause currency crisis framework that emphasizes the non-mechanistic behavior of government in trading off various policy objectives. The models stress that while speculative attacks are not inevitable, neither are they arbitrary. There must exist some weaknesses in the economic fundamentals of the country for an attack to occur, as the credibility of the fixed exchange rate regime is "less than perfect."[15]

If the economy is either very "good" or very "bad," it will, respectively, never or always be attacked. Within those two extremes - which imply unique equilibrium (i.e., an attack with close to 0 or 1 probabilities) - there is an intermediate range (gray area). Within this range, there may exist some weaknesses in the economy that are neither small enough to completely

preclude a speculative attack on the currency, nor sufficiently great to make an attack unavoidable. Rather, there are a multiplicity of equilibria such that an economy remains on what seems to be a sustainable path (good equilibrium), until some trigger or event coalesces market expectations to an inferior path (bad equilibrium), which is then realized (Obstfeld, 1996a,b).

Thus, in the models presented in this paper, a currency crisis may never (always) occur if the existing stock of the government's *contingent liabilities* is "very low" ("very high") and the domestic economy is "sufficiently immune" to an interest rate hike. However, when the fiscal costs of bank bailouts fall within a certain range (as formalized above), the currency is vulnerable to a crisis.

Notes

1. Recent surveys of the currency crisis literature include Flood and Marion (1998) and Krugman (1998). Also see Rajan (2000) and references cited there.
2. Technically, governments could raise interest rates enough to defend a currency peg (by reducing the monetary base sufficiently), but they must be willing to subordinate all other goals (Obstfeld & Rogoff, 1995).
3. When discussing second generation models, some authors, such as Eichengreen and Wyplosz (1993) and Eichengreen, Rose and Wyplosz (1996), have the Obstfeld (1986) model in mind.
4. In the case of Thailand, the expansionary monetary policy took place *before* the actual crisis, thus making it more akin to a classic first-generation crisis (emphasizing monetary disequilibrium) rather than a self-validating one. However, the expectation of an increase in money creation in Thailand may have been responsible for the intensity of the Thai crisis, while the expected replication of the policy in other regional economies may have made it self-validating (also see McKibbin and Martin, 1998).
5. In the original Krugman model, the monetary disequilibrium arises from monetization of the fiscal deficit.
6. Specifically, in the original Krugman model, while private agents are modeled as rational and forward-looking, the government mechanically engages in persistent money creation, never recognizing its unsustainability. Of course, behavior which appears "irrational" from a purely economic perspective, may be rationalized by adding political economy considerations. For instance, MacIntyre (1999) has detailed the existence of significant policy paralysis in the Thai government (particularly in the finance ministry) during late 1996–1997, which led to the pursuit of policies that were understood to be inherently unsustainable.
7. For the purposes of this paper, we make no distinction between fiscal and monetary/central banking authorities, assuming that the "policy maker" or "government" is a monolithic body.
8. Typically, this class of models employs "escape clauses" à la Flood and Isard (1989)

and Obstfeld (1997), enabling policy makers to use discretion in the event of exceptional circumstances; otherwise they follow a policy rule.

9. In the pioneering NSG model by Obstfeld (1994, 1996b), the government attempts to offset adverse shocks to employment and competitiveness. This model seems to be of particular relevance to developed countries and the ERM crisis in 1992–93 (Jeanne, 1997). Another group of NSG models focuses on the effect of interest rate hikes on devaluation expectations. For instance, see Bensaid and Jeanne (1997) and Drazen (1999). The second model presented in this paper incorporates this interest rate effect.
10. Diaz-Alejandro (1985), who described the Chilean banking crisis of 1982, articulated the fiscal burden of bank bailouts most clearly. Writing about East Asia, Burnside, Eichenbaum and Rebelo (1998) and Corsetti, Pesenti and Roubini (1999) have argued that forward-looking agents may have become aware of the high fiscal costs involved in financial sector restructuring. Thus, even though actual fiscal balances were in surplus, these contingent liabilities implied fairly high prospective fiscal deficits. See Daniel (1997) for a detailed discussion of the fiscal aspects of bank bailouts and restructuring in general. See World Bank (1999b) for a useful discussion and definition of the contingent liabilities of the government and their impact on overall fiscal soundness. Appendix 1 provides recent estimates of the gross costs of financial sector restructuring of governments in East Asia as of 1998.
11. Alternatively, one might assume that costs rise with the size of the devaluation, as the foreign currency liabilities of the domestic financial system balloon (Krugman, 1999).
12. See Asher and Heij (1999) for a discussion of the fiscal implications of the Southeast Asian crisis.
13. In addition, one could assume that the authority sets a ceiling fiscal allocation ($f \leq f_{\max}$) to the bailout of troubled banks. Eq. (13^{I}) would need to be correspondingly modified as follows: $bo_t > \min\{k, f_{\max}\}$.
14. The case of a "partially credible" peg may be defined as one in which an interest rate hike is feasible, but if the defense of the currency is "too costly" (i.e., currency speculation is "too intense"), the authorities will devalue the currency. This condition is $bo_t \leq \lambda k$.
15. This in turn emphasizes the importance of institutional mechanisms and safeguards that enhance the reputation of policy makers. Drazen and Masson (1994) have illustrated the complexities of this task, making an important distinction between the "credibility of policies" versus the "credibility of policymakers".

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Appendix 1

Public debt, restructuring costs, and the fiscal impact in East Asia (% of 1998 GDP unless otherwise noted), 1998

	Indonesia	Malaysia	Korea	Thailand
Public debt, 1997	48.3	10.5	31.6	6.5
Fiscal recapitalization cost to date	37.3	15.8	10.9	17.4
Expected additional fiscal cost	12.7	10.7	5.5	15.4
Total expected public debt burden	98.3	37.0	48.0	39.3
Annual interest payment on this burden	15.4	2.9	1.5	1.2
Interest payment as % of 1998 revenue	91.8	14.0	6.5	6.5
Memo item				
Fiscal deficit (% of GDP), 1999	6.5	5.0	5.5	5.0
Interest rate used (%)	15.7	7.9	3.1	3.0
Revenue/GDP (%), 1998	16.8	21.0	23.1	18.4

Source: Claessens et al. (1999).

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