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On the Role of a Regional Lender of Last Resort

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March 2004

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I. Introduction

The onset of the East Asian crisis in 1997-98 highlighted the importance of appropriate “international financial architecture” in preventing crises where possible and resolving them effectively and efficiently once they occur. At the same time, the idea of wider monetary and financial cooperation at the regional level has been in the air. The framework for regional financial cooperation in East Asia contains the following three (or four) elements.

First, some economists recommend adopting an appropriate “intermediate” exchange rate arrangement that could mitigate the negative effects of “two-corner solutions,” i.e., free floating and hard peg. It is said that a pure float is not desirable for emerging market economies in East Asia because the region depends heavily on trade and foreign investment. Exchange rate stability is key for promoting growth, and a freely floating system is inappropriate due to its potential for excessive volatility in the short term and misalignment in the medium term. Nor is a hard peg (currency boards pegged to the US dollar, for instance) desirable for East Asian emerging economies in light of its susceptibility to fluctuations in effective exchange rates when the dollar-yen rate became volatile during 1995-98. These observations provide the motivation for establishing an “intermediate” exchange rate system, such as an appropriately trade-weighted currency basket that consists of major currencies, as a way of reconciling stability and flexibility (French and Japanese Staff, Ministries of Finance, 2001).

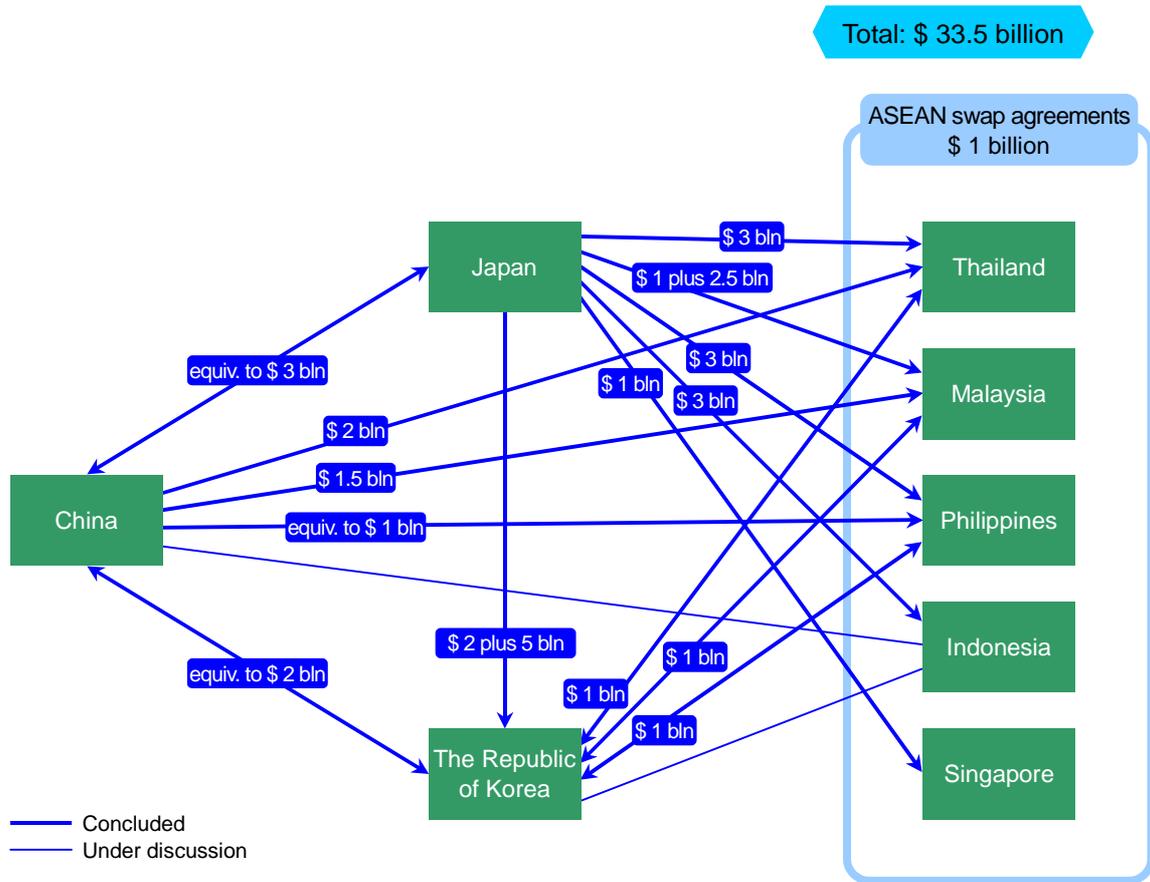
A second set of proposals recommends developing regional local currency-denominated bond markets for reducing the “double mismatch” problem, i.e., the mismatch of maturity and currency, which was at the heart of the East Asian crisis. A high level of indebtedness in foreign currencies made East Asian countries vulnerable to the depreciation in the exchange rate. Similarly, short-term lending by the financial institutions outside the region allowed creditors to exit the country in the event of crisis, thereby worsening the economic downturn due to premature liquidation of long-term investments. By mobilizing the region’s vast pool of savings to be intermediated directly to regional long-term investments, the argument goes, East Asian economies can eliminate the “double mismatch” problem. These observations lead to the recent

creation of the Asian Bond Markets Initiative, which facilitates access to the market through a wider variety of issuers and enhances market infrastructure to foster the market, and the Asian Bond Fund that invests Asia's reserves back into the sovereign bonds issued by Asian governments in international markets.

Lastly, the regional lender of last resort as a way of providing short-term liquidity to crisis countries, subject to appropriate conditions, has been discussed. The proposal was partly motivated by the perception that the crises in 1997-98 had been compounded by the less-than-generous assistance and conditionality of international financial institutions (IFIs) in Washington, D.C. In September 1997, the idea of an Asian Monetary Fund was floated by the Japanese government officials, but was opposed strongly by the United States and the International Monetary Fund (IMF), which feared that a regional fund would undermine the effectiveness of IMF conditionality (Bird and Rajan, 2002; Eichengreen, 2001). Then, in May 2000, the finance ministers of ASEAN+3 (China, Japan, and South Korea) agreed in Chiang Mai to create a regional network of bilateral currency swap arrangements as a firewall against future financial crises. The motivation of the Chiang Mai Initiative (CMI) is similar to an AMF in that it is aimed at providing immediate, temporary liquidity to the crisis-hit member country. The United States and the IMF have expressed support for the CMI, presumably because drawings through this arrangement are basically subject to the IMF conditionality. The linkage of the CMI to global financial arrangements has helped to mollify oppositions from Washington, D.C., but it has blurred the significance of regional financial assistance in addition to the IMF facilities. As of Nov 2003, fourteen bilateral swap arrangements had been concluded in line with the main principles, reaching a total of US\$ 33.5 billion (Figure 1).

The regional lender of last resort as proposed by the CMI would not function properly without effective monitoring and surveillance that would limit the extent of debtor moral hazard. There are several extant regional mechanisms for information sharing, policy dialogue, and economic surveillance in East Asia. Among many, Kuroda and Kawai (2003) cite the ASEAN Surveillance Process, the ASEAN+3 Economic Review and Policy Dialogue Process, and the Manila Framework Group as three major initiatives. Somewhat consistent with the fact that the drawings via the CMI are subject to the IMF conditionality, current regional surveillance mechanisms are complementary

Fig. 1. Progress of the Chiang Mai Initiative (as of Nov. 10, 2003)



Notes: 1. \longleftrightarrow : Two-way swap
 \longrightarrow : One-way swap

2. Japan's agreements with The Republic of Korea and Malaysia include the swap agreements based on the New Miyazawa Initiative. (Korea: \$ 5 billion, Malaysia: \$ 2.5 billion)

to and consistent with the global framework. For instance, the ASEAN Surveillance Process uses the same data provided to the IMF in conjunction with its Article IV consultations and program negotiations. Again, there is a fear that this results in the duplication of international bureaucratic work. Moreover, Asian regional surveillance mechanisms are weakened by the presumption of noninterference peer review process that is an Asian cultural feature¹ (Eichengreen, 2001; Kuroda and Kawai, 2003;

¹ In his speech given at Euro 50 Group Roundtable in Tokyo at June 12, 2003, Deputy Governor of the Bank of Thailand, Thirachai Phuvanatanarubala, stated that:

“We also have a system of mutual surveillance, but Asian culture sometimes does not go for direct confrontation to such particular issues. The best safeguard, in my opinion, is therefore to have stronger structures in Asian countries to deal with financial shocks. This is why I attach much hope in the Asian Bond Markets Initiative being proposed.”

Yoshitomi, 2003). Obviously, the emphasis on noninterference is not compatible with effective surveillance.

Focusing on the last (two) issue(s), this paper theoretically investigates whether there is an additional role for a *regional* financing facility such as an Asian Monetary Fund and the CMI. In so doing, the paper rests on two strands of literature.

First, “international financial architecture” literature varies on the welfare impact of crisis management lending provided by the IFIs. Although such lending can play a positive role in mitigating the costs that the crisis country should incur, this comes at the cost of reducing debtors’ incentives to repay. As Tirole (2002) pointed out as the “topsy-turvy principle,” there is a trade-off between *ex ante* incentives (moral hazard) and *ex post* efficiency (confidence) in general, and the reform proposal aimed solely at reducing the costs of crises ignores the impact on *ex ante* incentives of private agents and the debtor government². In order to make a welfare judgment on the international lender of last resort, be it global or regional, we need a theoretical framework that captures both the *ex-ante* and *ex-post* efficiency of public financing facility. In this paper, I utilize the theoretical framework developed by Gai, Hayes, and Shin (2004) in order to analyze the trade-off between *ex-ante* efficiency and *ex-post* efficiency of public intervention in resolving international financial crises³.

Second, as I noted above, counterarguments against the regional lender of last resort stress the fear that the IMF and an AMF would compete in looser conditionality. Similar concern has been addressed for the organization of bank regulation in the United States in which commercial banks choose among three primary federal regulators: the Federal Reserve System (Fed), the Office of the Comptroller of the

² It is worth noting, in this respect, that the reform proposal aimed at eliminating the “double mismatch” problem such as the Asian Bond Fund may not be as benign as it sounds. It is true that short-term foreign-currency-denominated borrowing increases the probability of crises, but the causality may flow in the reverse direction; a fragile country is forced to borrow at shorter maturities in order to limit debtor moral hazard, because shorter-term debt allows foreigners to run for exits if the debtor agents start misbehaving. If this is the case, then, reform proposals such as the Asian Bond Fund is misguided in treating the symptoms rather than the fundamentals (Tirole, 2002).

³ One might argue that the model of Gai, Hayes, and Shin (2004) is not appropriate for the analysis of Asian financial architecture because their model focuses on the sovereign debt crisis; whereas one of the prominent features of the East Asian crisis was that the debts were mostly private. Note, however, that in the realm of international debt contracts, foreign creditors confront a *dual agency problem*: although creditors conclude a contract with the borrower and not with the government, the latter has both the incentives and the means not to fully protect foreign creditors’ rights (Tirole, 2002). The eventual repayment of funds lent to a private borrower depends crucially on both the borrower’s and the government’s behaviors. Hence, I abstract from distinguishing between private debt and sovereign debt below.

Currency (OCC), and the Federal Deposit Insurance Company (FDIC)⁴. In effect, the U.S. federal bank regulators are in competition with each other, and the question has been raised how this competition affects the efficacy of bank regulation in the United States. On the one hand, one might argue that the regulators will “race to the bottom,” because each regulator will want to attract as many banks into its constituency as possible. There is a concern, then, that this incentive to attract “clients” will outweigh the regulatory agency’s primary objective in controlling bank risk-taking incentives, and this “competition in laxity” will burden excessive costs to the financial system. On the other hand, however, one might argue that the competition among regulators motivates them to perform their tasks as effectively and efficiently as possible. A seminal work by Tiebout (1956) shows that, under certain conditions (including no externalities and costless mobility of local residents), competition among local communities leads to the optimal provision of local public goods. Tiebout’s argument implies that regulatory competition among bank regulators leads to optimal standards setting (no race-to-the-bottom). Motivated by these conflicting views on regulatory competition among bank regulators⁵, this paper examines whether regulatory competition between the two IFIs, an “IMF” (not to be confused with the existing International Monetary Fund which is abbreviated as IMF and bearing no quotation marks) and an “AMF” will enhance the overall efficiency of international financial markets.

The rest of the paper is organized as follows. Section 2 and 3 present a model of international debt contract with and without the “IMF.” These are simplified versions of Gai, Hayes, and Shin (2004). Section 2 derives the incentive-compatible level of lending without the presence of IFI, and illustrates why the reform proposal based solely on reducing the crisis cost is misguided. Section 3 introduces one IFI, which we referred to as the “IMF,” and shows that the amount of incentive-compatible lending

⁴ A bank can choose a national or a state charter, and whether it is a Federal Reserve System member. National banks are regulated by the OCC. A state-chartered bank has the Fed as its primary federal regulator if it is a Fed member and the FDIC otherwise. State banks are regulated by their home states agencies as well.

⁵ In the realm of U.S. banking literature, empirical study by Rosen (2003) finds evidence consistent with Tiebout’s beneficial competition (evidence against a race for the bottom). Weinberg (2002) presents a theoretical model of competition among bank regulators, and finds that the competition leads to efficient policy choice in some cases, while it results in inefficient outcomes in others, depending on the parameter values and the budget constraint that each regulator faces. Especially, Weinberg (2002) stresses that when the regulator does not internalize the effect of regulatory actions on the deposit insurance exposure, competition will lead to the race to the bottom.

becomes smaller with the IMF than without. This is because imperfect monitoring by the IMF cannot substitute for the market discipline in ensuring *ex ante* efficiency; that is, curtailing “strategic” default. Section 3 also derives, by way of numerical examples, the conditions under which expected output is higher with the IMF than without. Expected output can be higher because the IMF can reduce the crisis costs that debtor countries should incur in the event of default, and thus improve *ex-post* efficiency. The welfare effect of providing a more effective safety net is ambiguous, however, because reducing the costs of crisis will weaken the debtor’s incentive to repay, resulting in a more stringent incentive-compatibility constraint. To anticipate how the trade-off between the two will work, an international financial institution is likely to be welfare enhancing if its ability of monitoring and surveillance is strong. Section 4 sketches the welfare effects of the competition between two IFIs, an “IMF” and an “AMF.” Using the framework in the previous sections, I show that the concern for the “race to the bottom” arises because the optimal level of crisis management for debtor countries, which IFIs try to win the favor of, is biased toward a larger safety net than the socially optimal level, in which the creditors’ interests are also taken into account. However, as long as the budgetary cost associated with providing a crisis management tool is proportional to its effectiveness, the scope of “race to the bottom” is limited, at least partially, by each institution’s budget constraint. Section 5 discusses the policy implications of the theoretical analyses, and concludes with the remaining question to be addressed in the future.

II. Basic Model without an IFI

Using the model of Gai, Hayes, and Shin (2004), this section derives the market-solution of international lending with debtors facing the incentive-compatibility constraint.

We consider the transactions between a continuum of small debtor countries, each of which has a production technology that transforms loans into output, and a continuum of small creditors. Each debtor and creditor is assumed to be identical. There are three dates: initial, interim, and final (each date is represented by 0, 1, and 2

respectively). At the initial date (date 0), the debtor makes a contract that grants him a loan of size L , and promises to repay rL (interest and principal) at the interim date (date 1). At date 0, the debtor invests L in the project that generates an interim output, denoted by \tilde{x} , at date 1 and the final output y at date 2.

The interim output \tilde{x} is a random variable that takes the value rL with probability θ , but is uniformly distributed on the interval $[0, rL)$ with probability $1-\theta$. In other words, there is possibility θ that the debtor has sufficient resources to pay back the loan in full. With probability $1-\theta$, however, there are insufficient resources to pay and the amount of the shortage is uniformly distributed over the possible range. We define the *natural* shortfall ratio, denoted by z , at the interim date as:

$$z = \frac{rL - \tilde{x}}{rL} \in [0,1] \quad (1)$$

That is, z is a random variable that takes the value of 0 with probability θ and is uniformly distributed on the unit interval with probability $1-\theta$. Since there are a large number of debtor countries, the following analysis assumes that the probability θ also represents the *fraction* of the countries that have sufficient resources to pay back the loan in full. We also assume no informational asymmetry on the parameters and hence θ is observable to both creditors and debtors.

Output in the final date (date 2) is assumed to be proportional to the scale of the initial investment L , and the amount *actually* repaid by the debtor at date 1, denoted by x . If the debtor pays the full promised amount rL , then the project is allowed to mature without intervention from the creditor. If, however, there is a shortfall in the amount repaid, then creditors can force costly liquidation that is proportional to the amount of the shortfall. We define the *discretionary* shortfall ratio s at the interim date as:

$$s = \frac{rL - x}{rL} \in [0,1] \quad (2)$$

We also assume that the production function for the final output y takes the following specific form,

$$y(L,s) \equiv (1-\alpha s)L^\lambda \quad (3)$$

which is strictly decreasing in s . The parameter $\alpha \in [0,1]$ captures the extent of the damage by the premature liquidation forced by creditors at the interim date. If there is repudiation of s , the output at the final date is reduced by a factor of αs . The parameter $\lambda \in (0,1)$ measures the elasticity of final output with respect to the size of initial investment L .

Whether the *natural* shortfall ratio z coincides with the *discretionary* shortfall ratio s depends on the debtor's will. The debtor may choose to repay the full amount if the interim output is sufficient, but we leave open the possibility that the debtor will choose not to honor its promise and to repudiate some or all of its debt obligations even if it can afford to. In what follows, we assume whether the non-payment at the interim date is intentional or the result of bad luck is not verifiable for the loan contract between debtors and creditors. That is, in the event of a default at date 1, creditors cannot distinguish whether it is a strategic one ($s > z$) or is due to bad luck ($s = z$).

II-1. The Debtor's Problem

The debtor maximizes the expected output net of the repayment costs, taking into account the possible disruptions caused by a default. Denoting by $E(\cdot)$ the expectations operator associated with the random variable z , the optimal size of loan is given by the solution to the following constrained maximization problem:

$$\text{Max} \quad E[y(L, z) - (1 - z)rL] \quad (4)$$

$$\text{subject to} \quad E[y(L, z) - (1 - z)rL] \geq 0 \quad (5)$$

$$\text{and} \quad y(L, z) - (1 - z)rL \geq y(L, s) - (1 - s)rL \text{ for all } z \text{ and } s \geq z \quad (6)$$

The objective function (4) simply states that the debtor chooses the size of L that maximizes the expected output net of repayments. The debtor faces two sets of constraints. The participation constraint (5) requires that the debtor would be better off by making the debt contract than not. Since the production function (3) satisfies $\lim_{L \rightarrow 0} \partial y / \partial L = \infty$, the optimal loan L is given by an interior solution and (5) is a non-binding constraint in our setting. The incentive-compatibility constraint (6) requires that the debtor has an incentive to honor the debt contract at the interim date. That is, if there is no resource shortage ($z = 0$), then the debtor has an incentive to pay back the

full amount to the lender. It also ensures that if there is a resource shortage ($z > 0$), the debtor has no incentive to keep back any of the realized output from the creditor.

II-2. Incentive Compatibility Constraint

The incentive compatibility constraint (6) implies that, at the interim date when z is realized, the debtor would choose s that maximizes

$$(1 - \alpha s)L^\lambda - (1 - s)rL \quad (7)$$

subject to $s \geq z$. By repudiating the debt contract, the debtor can save the repayment costs at the expense of contraction in the final output. Since equation (7) is linear in s , the solution is given by

$$\begin{aligned} s &= z \quad \text{if } \alpha L^\lambda \geq rL \quad (\text{repayment of all available resources}) \\ s &= 1 \quad \text{if } \alpha L^\lambda \leq rL \quad (\text{repudiation of all debts}) \end{aligned}$$

and the set of incentive-compatibility constraints (6) can be reduced to a following single condition on the size of the loan L .

$$L \leq \left(\frac{\alpha}{r} \right)^{\frac{1}{1-\lambda}} \quad (8)$$

Inequality (8) implies that the initial loan must be small enough so that the gains for the debtor from repudiating its debt are smaller than the losses to its output⁶.

II-3. Equilibrium

It remains to determine whether the incentive-compatibility constraint (8) will be binding in the optimal contract. The unconstrained maximization of the objective function (4) entails solving for L that maximizes:

$$\theta[L^\lambda - rL] + (1 - \theta)\{[1 - \alpha E(z | z > 0)]L^\lambda - [1 - E(z | z > 0)]rL\} \quad (9)$$

where $E(z | z > 0)$ is the expectation of z conditional on its being strictly positive. Since z is uniformly distributed on the unit interval, $E(z | z > 0) = 1/2$. Then, from the first-order condition, the solution is given by:

⁶ Equation (7) implies that the marginal gain of repudiation is linear in s whereas its marginal cost is decreasing in s . Hence the incentive-compatible size of loan is upper-bounded.

$$L = \left\{ \frac{\lambda}{r} \cdot \frac{[2 - \alpha(1 - \theta)]}{1 + \theta} \right\}^{\frac{1}{1-\lambda}} \quad (10)$$

By substituting (10) to the incentive-compatibility constraint (8), the incentive compatibility constraint fails to bind if and only if:

$$\alpha \geq \frac{2\lambda}{1 + \theta + \lambda(1 - \theta)} \quad (11)$$

Equation (11) shows that if α is large enough so that the damage of premature liquidation by the lender is enough to discipline the borrower to honor the initial contract, there are no impediments to borrowing the *ex ante* optimal amount. Conversely, if α is too small, then the incentive problems limit the amount of borrowing. This feature of the model captures the following point made by Dooley (2000) and Tirole (2002): the reform proposal based solely on the consideration of ex post (in our context, lowering α) ignores the impact on the ex ante aggregate flow of international lending due to incentive problems.

To summarize, in an economy without IFIs, the market-solution to the optimal contract is given by

$$L^* = \min \left\{ \left(\frac{\alpha}{r} \right)^{\frac{1}{1-\lambda}}, \left(\frac{\lambda}{r} \cdot \frac{[2 - \alpha(1 - \theta)]}{1 + \theta} \right)^{\frac{1}{1-\lambda}} \right\} \quad (12)$$

III. The Role of IFI in International Financial Markets:

A “Whistle-blower” and a “Firefighter”

The analysis in the previous section reveals that the disciplining role of the threat of a disorderly creditor run (an international financial crisis) allows the borrower greater access to credit. In a similar vein, referring to the key principles of corporate finance, Tirole (2002) argues investor protection is not so much as about protecting investors as about benefiting borrowers: investor protection is about enabling borrowers to have access to funds. In the absence of an international public entity that preserves creditor rights in international debt contracts, however, the threats of crisis serve as the dominant

incentive for repayment (Dooley, 2000). We also have to note that this comes at a substantial cost: if nature (adverse external conditions, say) forces a borrower to default when α is so large, the economy is inflicted by a severe fall in output. An international financial institution such as the IMF can potentially play an important role in mitigating the damage of crises without damaging creditor rights.

In what follows, we assume that an international financial institution, which is referred to as the “IMF,” plays a two-fold role. First, scrutiny from the IMF may substitute for market discipline and help to ensure *ex ante* efficiency. Although the following analysis restricts such “whistle-blowing” role of the IMF to distinguish publicly between “bad luck” and “strategic” defaults, any element regarding the effectiveness of the IMF surveillance such as setting standards for financial market regulation, identifying policies for promoting financial market development, and signaling the potential risks early enough to allow policy responses can also be categorized in this role. Second, IMF can improve *ex post* efficiency by acting as a “firefighter” such as, for instance, providing limited official finance, mediating in workouts, or endorsing temporary controls on capital outflows. The analysis in this section assumes that the IMF can act as a whistle-blower and a firefighter without incurring any cost (that is, no budget constraint).

To be precise, the IMF has no role in the initial period when the loan contract is made, but has a role at the interim date. It receives a signal as to whether the borrower has sufficient resources to pay the loan in full, that is, whether z is zero or positive. Based on this information, the IMF makes an announcement of its view of the current state of fundamentals and a judgment about the need for official intervention. We assume that the IMF’s message space consists of only two messages, {Good, Bad}, where “Good” implies $z = 0$ and “Bad” implies $z > 0$. Moreover, the binary signal that the IMF receives suffers from noise, indicated by ε , where the parameter ε measures the probability of getting a wrong signal (the imprecision of information). For instance, given $z = 0$, the IMF receives an incorrect signal that the fundamentals are “bad” with probability ε . There is an analogous probability of mistaking bad fundamentals for good fundamentals. We assume that $\varepsilon < 0.5$, implying that the signal has some information value on average. The following matrix gives the joint distribution over the messages and the underlying state of fundamentals z .

		Signal that fundamentals are	
		Good	Bad
Fundamentals	Good ($z = 0$)	$\theta(1 - \varepsilon)$	$\theta\varepsilon$
	Bad ($z > 0$)	$(1 - \theta)\varepsilon$	$(1 - \theta)(1 - \varepsilon)$

If there is a shortfall in the repayment to the creditors and the IMF judges that the fundamentals are bad, then the IMF provides financial assistance to the crisis country in order to mitigate the destructive effect of creditor liquidation. We try to capture this “firefighter” effect in our model in reduced-form fashion by the parameter σ , which reflects the extent to which the IMF can reduce the output losses generated by the default crisis. Specifically, we assume that the final output given shortfall ratio s and the IMF has intervened is given by

$$y = (1 - \sigma \cdot \alpha s)L^\lambda \quad (13)$$

where $0 \leq \sigma \leq 1$. In equation (13), the smaller σ implies that the more effective the IMF is in mitigating the output losses. In the extreme case where $\sigma = 0$, the IMF could eliminate all the output losses. Note also that σ can be interpreted as a black-box parameter that measures the efficacy of IMF conditionality as well. For instance, σ can take a larger value if, as the critics argue, the IMF conditionality attached to its financial assistance hurts the economy of a debtor country.

Under the setting above, the welfare effects of IMF intervention can be categorized as the following.

- (i) [Fundamentals, IMF signal] = [Bad, Bad]: As long as the IMF correctly provides financial assistance to the crisis-hit country, it also provides discipline consistent with the incentive-compatibility constraint forced by the market. Moreover, by reducing the costs of disorderly liquidation, the IMF can mitigate the ex post welfare costs.
- (ii) [Fundamentals, IMF signal] = [Good, Bad]: If the IMF mistakenly intervenes by attributing strategic default as having arisen from bad luck, creditors are inappropriately locked into the workout process. By ameliorating the impact of liquidation incorrectly, the debtor obtains gains from cheating.

(iii) [Fundamentals, IMF signal] = [Bad, Good]: When the IMF fails to intervene when it should have done so by believing that the shortfall is due to repudiation of the contract, the debtor country is exposed to the full impact of a creditor grab-race. Notice, however, that the welfare impact of this scenario is exactly the same as the model without the IMF described in the previous section.

In essence, the welfare consequences of introducing the IMF into the model are two-fold. In case (i), the IMF can improve *ex post* efficiency without undermining the disciplining effect of default. However, in case (ii), there is a welfare cost arising from reducing *ex ante* efficiency that leads to a sub-optimal level of initial credit. The net benefit of the IMF arises only if the first effect outweighs the second.

III-1. The Cost of IMF Intervention:

A More Stringent Incentive-Compatibility Constraint

The mere possibility that the IMF will intervene, with some probability mistakenly, entails a more stringent set of incentive-compatibility conditions in the choice of loan size L .

To see this point, let us first consider the incentives facing the borrower with $z = 0$, that is, the borrower who has sufficient resources to repay in full. In this case, the IMF will mistakenly intervene with probability ε . Thus, the debtors' problem at the interim date is to choose s so as to maximize:

$$(1 - \varepsilon)[(1 - \alpha s)L^\lambda - (1 - s)rL] + \varepsilon[(1 - \sigma \cdot \alpha s)L^\lambda - (1 - s)rL] \quad (14)$$

The first term indicates the case where IMF correctly refrains from intervening whereas the second term indicates the case where IMF mistakenly intervenes. This can be rewritten as

$$\{1 - s\tilde{\alpha}\}L^\lambda - (1 - s)rL$$

where $\tilde{\alpha} = \alpha[(1 - \varepsilon) + \sigma \cdot \varepsilon] < \alpha$. Then we have the following incentive-compatibility condition for the debtor with $z = 0$, which is analogous with (8).

$$L \leq \left(\frac{\tilde{\alpha}}{r}\right)^{\frac{1}{1-\lambda}} < \left(\frac{\alpha}{r}\right)^{\frac{1}{1-\lambda}} \quad (15)$$

Comparing (15) with (8), the debtor faces a more stringent incentive-compatibility condition by the presence of the IMF. The result obtains because for the debtor with the resources to repay in full, there exists some potential gains to cheat from the IMF's incorrect intervention. As long as this possibility exists, the temptation to cheat weakens the disciplining effect of disorderly liquidation, so that the debtor's access to the credit market is curtailed.

Let us now consider a debtor with $z > 0$. Notice first that the only event in which cheating may have an effect is when the IMF mistakenly fails to intervene: when the IMF correctly intervenes, the true resources are revealed. When the IMF judges that the fundamentals are good while the true fundamentals are bad, there is no relief from the damaging effect of disorderly liquidation. Hence, the incentive problem for the debtor country with $z > 0$ is exactly the same as the one in the regime without the IMF, and thus the incentive-compatibility condition is identical to (8). Since $\tilde{\alpha} < \alpha$, the constraint (8) never binds in the optimal contract that satisfies (15).

Since the solution to the unconstrained maximization problem for the debtor is also identical to the one without the IMF, given by equation (10), the equilibrium size of loan L is given by

$$\tilde{L}_* = \min \left\{ \left(\frac{\tilde{\alpha}}{r} \right)^{\frac{1}{1-\lambda}}, \left(\frac{\lambda}{r} \cdot \frac{[2-\alpha(1-\theta)]}{1+\theta} \right)^{\frac{1}{1-\lambda}} \right\} \quad (16)$$

where the notation \tilde{L}_* (upper-wave line) indicates the solution in the presence of the IMF.

The difference between \tilde{L}_* and L_* , (12) and (16), depends on two policy factors: the quality of the IMF's judgment regarding the debtor's fundamentals, represented by ε , and the efficacy of the IMF's actions for the crisis management, represented by σ . As the IMF's judgment tends to perfection ($\varepsilon \rightarrow 0$), the discipline of IMF surveillance increasingly substitutes for market discipline, and the lending in the presence of the IMF approaches the market solution ($\tilde{\alpha} \rightarrow \alpha$ so that $\tilde{L}_* \rightarrow L_*$). Conversely, the lower the effectiveness of the IMF involvement in reducing the cost of disorderly liquidation ($\sigma \rightarrow 1$), the more irrelevant in reducing *ex post* inefficiency as

well as in enhancing debtor moral hazard (potential gains from cheating). Hence once again we see that $\tilde{L}_* \rightarrow L_*$.

III-2. Welfare Analysis

We now examine the beneficial aspect of the IMF's presence, namely its ability to mitigate the *ex post* inefficiencies due to a bad luck default. To analyze, notice that if we define the social welfare function as the sum of the payoff functions of debtor countries and creditors, it reduces to the total expected output, gross of the repayment on the loans. Denote by W the (ex ante) total expected output in the regime without the IMF, and by \tilde{W} the (ex ante) total expected output in the presence of the IMF. Then, from equations (12) and (16) and the assumption that $E(z | z > 0) = 1/2$:

$$W = L_*^\lambda \left\{ \theta + (1-\theta) \left(1 - \frac{\alpha}{2} \right) \right\} \quad (17)$$

$$\begin{aligned} \tilde{W} &= \tilde{L}_*^\lambda \left\{ \theta + (1-\theta) \left[\varepsilon \left(1 - \frac{\alpha}{2} \right) + (1-\varepsilon) \left(1 - \frac{\sigma\alpha}{2} \right) \right] \right\} \\ &= \tilde{L}_*^\lambda \left\{ \theta + (1-\theta) \left(1 - \frac{\alpha}{2} [\varepsilon + \sigma(1-\varepsilon)] \right) \right\} \end{aligned} \quad (18)$$

Although $L_* > \tilde{L}_*$ (the size of the loan is smaller with the IMF), we also have $\alpha > \alpha[\varepsilon + \sigma(1-\varepsilon)]$ (the effect of default is mitigated with the IMF), so there is no general ranking of expected output in the two cases. Whether the IMF has a net beneficial effect depends on the parameters of the model. In the following, we will focus on how the variance in the noise parameter ε and the crisis management parameter σ will affect the welfare level in the presence of the IMF.

III-2-(1). The Welfare Effect of the Quality of IMF Signal ε

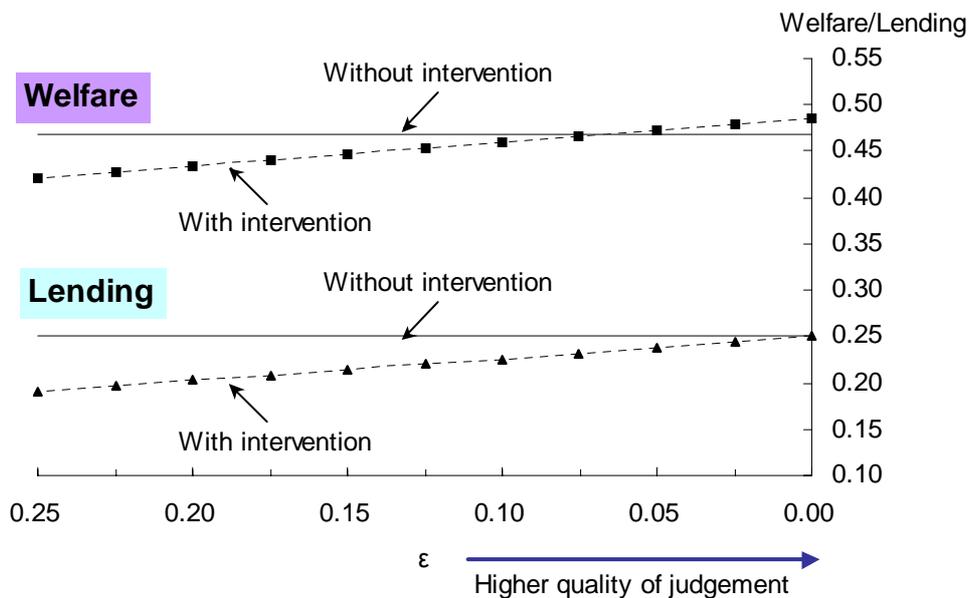
From equation (18), the expected output in the presence of the IMF depends on ε in the following two ways.

$$\frac{\partial \tilde{L}_*}{\partial \varepsilon} = \frac{1}{1-\lambda} \left(\frac{\tilde{\alpha}}{r} \right)^{\frac{\lambda}{1-\lambda}} \frac{\alpha}{r} (-1 + \sigma) < 0$$

$$-\frac{\partial\{\varepsilon + \sigma(1 - \varepsilon)\}}{\partial\varepsilon} = -1 + \sigma < 0$$

The first equation shows that the size of the loan is decreasing in ε ; when ε is large, the imprecision of the signal provided by the IMF is significant and reduces the access to the credit market for the borrower, due to a more stringent incentive compatibility constraint. The second equation shows that, the larger the probability of the IMF mistakenly not to intervene, the less effective the IMF is in reducing the cost of disorderly liquidation by the creditors. Taken together, the expected output in the presence of the IMF is a strictly decreasing function of ε . Figure 2, which is adopted from the Fig. 1 of Gai, Hayes, and Shin (2004), presents a numerical example that the welfare level as measured by the ex ante expected output is enhanced as the quality of the IMF in judging the state of the debtor countries improves. This makes intuitive sense: the more effective the IMF is in its surveillance, the larger the initial size of debt contracts and so does the welfare level. As mentioned above, there is no general ranking of expected output in the two regimes. For sufficiently large ε , a regime with public intervention is welfare reducing in comparison with a regime without the IMF.

Fig. 2. The Impact of ε on Lending and Welfare



Note: Other parameter values are set as follows: $\alpha=0.5$, $\lambda=0.5$, $\theta=0.75$, and $\sigma=0.5$.

Source: Chart 1 of Gai, Hayes, and Shin (2001)

III-2-(2). The Welfare Effect of the IMF's Crisis Management Policy σ

The welfare effect of the IMF's crisis management policy σ is non-linear, as presented by the following equations.

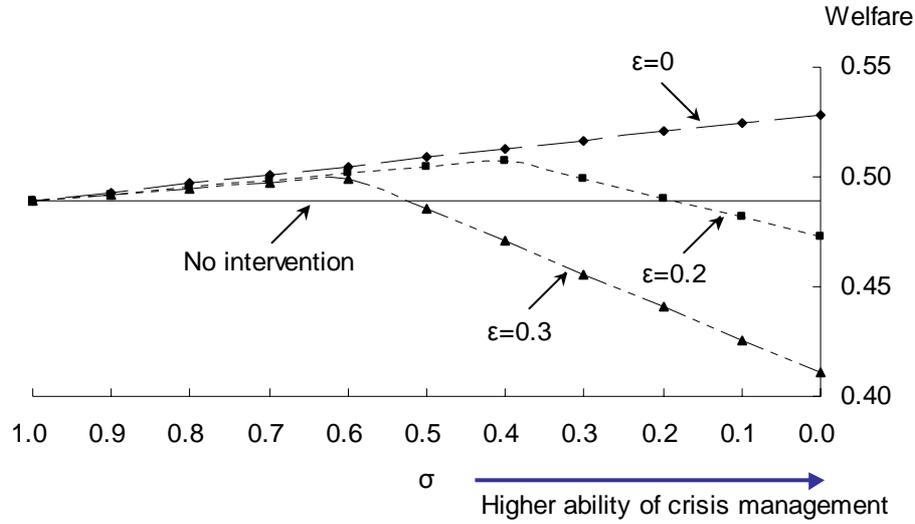
$$\frac{\partial \tilde{L}_s}{\partial \sigma} = \frac{1}{1-\lambda} \left(\frac{\tilde{\alpha}}{r} \right)^{\frac{\lambda}{1-\lambda}} \frac{\alpha \varepsilon}{r} > 0$$

$$-\frac{\partial \{\varepsilon + \sigma(1-\varepsilon)\}}{\partial \sigma} = -1 + \varepsilon < 0$$

The first equation shows that the larger σ , implying the IMF is less effective in the crisis management, increases the debtor's access to the credit market, because the debtor moral hazard created by the IMF intervention is curtailed by its poorer ability. However, this effect is offset, at least partially, by the fact that the larger σ also increases the ex post cost of default, as described by the second equation. Whether the enhanced ability of the crisis management (smaller σ) has a net beneficial effect on expected output depends on the other parameters of the model.

It is important to note the interaction between ε and σ : the effectiveness of the IMF as a firefighter crucially depends on its ability as a whistle-blower. To see this point, Figure 3 examines the effects of varying the efficacy of crisis management policies (σ), for given levels of judgment error (ε). It is assumed that the output cost α is large ($\alpha = 0.6$). As can be seen from Figure 3, in the case where the IMF's judgment is perfect ($\varepsilon = 0$), improvement in the ability of IMF's crisis management ($\sigma \rightarrow 0$) increases the overall welfare level. However, if the IMF is less than perfect in judging the debtor country's fundamentals ($\varepsilon = 0.2, \varepsilon = 0.3$ in Figure 3), then the welfare level in the IMF regime falls below the one in a no-IMF world as σ approaches to zero. The result obtains because the debtor moral hazard created by the combination of weak monitoring and extremely effective crisis management overwhelms the gains from the elimination of the disorderly liquidation problem.

Fig. 3. Welfare and the Efficacy of Measures to Mitigate Crisis Cost



Note: Other parameter values are set as follows: $\alpha=0.6$, $\lambda=0.5$, $\theta=0.75$.
 Source: Chart 3 of Gai, Hayes, and Shin (2001)

IV. Will Competition between IFIs Lead to a “Race to the Bottom”?

The model of Gai, Hayes, and Shin (2004) above illustrates the nature of public intervention in an international debt crisis. With respect to the IMF’s role as a firefighter, the model reveals that the overall welfare effect of providing a larger safety net in the event of default is ambiguous, because it is detrimental to *ex ante* efficiency, resulting in the reduced volume of credit. It is also shown that the efficacy on crisis management depends crucially on the quality of monitoring and surveillance.

This section examines the effect of “regulatory competition” between the two international financial institutions. So far we have taken the precision of the IMF signal ε and the ability of the IMF in mitigating the crisis cost σ as given (exogenous variables). Below we assume that the two policy variables are set by the international financial institutions that are competing with each other and have preference for “regulating” as large a share of the debtor country as possible. As noted above, one primary objection to the creation of a regional lender of last resort is the fear that the competition between the “IMF” and an “AMF” will lead to the race to the bottom (looser conditionality). In our setting, this can be interpreted as two institutions

choosing smaller σ than the social optimum in equilibrium. Hence, our primary concern in this section is how the competition between the two institutions will affect their choices of σ , and whether the competition is welfare enhancing.

IV-1. The Fear of a Race to the Bottom

Suppose there exist an IMF and an AMF that have preference for regulating as large a share of the debtor countries as possible. In order to attract many “clients,” each institution will set the size of a safety net σ_i . We assume that the two institutions have the same noise parameter ε as given, and hence the equilibrium must involve both institutions choosing the same σ (we will omit subscript i hereafter for convenience).

In our setting, the fear of a “race to the bottom” arises because there exists a difference between the social welfare and debtors’ welfare:

$$\tilde{W} = E[y(\varepsilon; \sigma)] \quad (19)$$

$$\tilde{W}_D = E[y(\varepsilon; \sigma) - (1 - z)r\tilde{L}_*(\varepsilon; \sigma)] \quad (20)$$

where \tilde{W}_D denotes the welfare function of the debtor country and is equivalent to equation (4). As has been noticed in the previous section, $\frac{\partial \tilde{L}_*}{\partial \sigma} > 0$ and hence the debtors’ incentives are biased toward smaller σ (more effective crisis management policy) compared to the one that maximizes social welfare given by equation (19). Then the competition between two institutions that tries to win the favor of debtor countries is likely to result in a “competition in laxity.”

Intuitively, the result above obtains because debtors and creditors have divergent goals (notice that the social welfare function is the sum of creditors’ and debtors’ welfare). That is, the benefit of more effective crisis management only accrues to the debtor countries. By providing a more effective safety net, the creditors’ welfare, defined as $\tilde{W}_C = E[(1 - z)r\tilde{L}_*]$, would be reduced since it is increasing in the amount lent. Then, inefficiency in regulatory competition may arise due to the lack of creditors’ interests in the decision problem of international financial institutions. This coincides with the observation of Shleifer (2003) and Tirole (2002) that the fundamental market

failure in international financial markets is the lack of “delegated monitor” who acts as a trustee for foreign interests (creditors) to facilitate the country’s access to international borrowing.

Note also that the race to the bottom does not occur if the two institutions compete in setting ε instead of σ . The result obtains because both creditors and debtors benefit from better signaling ability of IFIs. Creditors are better off because smaller ε increases the substitutability for market discipline and increases the volume of lending; debtors are better off because smaller ε increases the volume of lending, and hence expected output, and reduces the ex post cost of default since the probability of the IFIs mistakenly not to intervene becomes smaller. In choosing ε , the debtors’ interests coincide with that of creditors and the regulatory competition among IFIs results in the socially optimal level of signaling ability (that is, $\varepsilon = 0$).

IV-2. The Role of Budget Constraint: Limiting the Race to the Bottom

The analysis so far assumes that international financial institutions can act as a whistle-blower and a firefighter without incurring any cost. Once we introduce the budget constraint that finances these institutions’ activities, the fear that the IMF and the AMF that are competing with each other will provide a too lenient conditionality may be limited, at least partially.

To see this point, suppose now that the IMF and the AMF set two policy variables, the size of a safety net σ and the fee to finance such a safety net, denoted by π . In particular, consider the case where the fee π is assumed to be a single, non-discriminating “income tax” to all the countries that have resources to pay in full to the creditors⁷. Assuming that the associated cost for the institution in providing a safety net is equal to the net output gains obtained from mitigating the disorderly liquidation by the creditors, it is given by:

$$(1 - \sigma \cdot \alpha s)L^\lambda - (1 - \alpha s)L^\lambda = (1 - \sigma)\alpha sL^\lambda$$

⁷ By imposing the fees only to the non-bankrupt countries, there accrues an additional incentive for a debtor country to strategically default, thereby making an incentive compatibility constraint more stringent. Nevertheless, the main result obtained from the following analysis (namely, the fear of the race to the bottom is limited by the budget constraint) remains.

Then, noting that the possibility of having sufficient resources to make a full repayment, θ , also represents the *fraction* of the countries that have resources to pay in full, each institution has to meet the following budget constraint:

$$\pi \cdot \theta L^\lambda = \frac{(1-\theta)}{2} \alpha (1-\sigma) L^\lambda$$

The equation above states that fees collected from solvent countries must cover the costs of mitigating the disorderly liquidation that the defaulted countries will suffer. This reduces to:

$$\pi = \frac{(1-\theta)}{2\theta} \alpha (1-\sigma) \tag{21}$$

Equation (21) says that the fee for providing a safety net becomes higher, the higher the fraction (probability) of the countries going “bankrupt” $((1-\theta)/\theta)$, the larger the cost of disorderly liquidation (α) , and the more effective the institution is in mitigating the cost of crisis (smaller σ).

The budget constraint (21) has an important implication for the nature of competition between international financial institutions: as long as the cost associated with providing emergency financing facilities is proportional to its size, the scope of the race to the bottom (providing a too lenient safety-net) is limited, at least partially, by each institution’s budget constraint. In setting σ , an IFI has to take into account a delicate balance between the beneficial effects of crisis management facilities for the debtor and the costs accruing to it.

V. Concluding Remarks

Using the theoretical framework of Gai, Hayes, and Shin (2004), this paper has analyzed the welfare effects of a regional lender of last resort, such as an AMF or the Chiang Mai Initiative (CMI). As in Gai, Hayes, and Shin (2004), the paper first confirms that the overall welfare effect of a larger safety net that would reduce the costs of crisis (ex post efficiency) is ambiguous because it would also weaken the debtor’s incentive to repay, resulting in a more stringent incentive compatibility constraint (ex

ante inefficiency). Then, the paper has discussed that, in the absence of budget constraint, the competition between an “IMF” and an “AMF” would likely yield a “race to the bottom.” This paper has argued that such a concern arises because the optimal level of crisis management for debtor countries, which an IMF and an AMF tries to win the favor of, is larger than the socially optimal level, in which the creditors’ interests are also taken into account. However, when both institutions are subject to budget constraints, the scope of the race to the bottom is limited as long as the costs associated with providing a crisis management facility are proportional to its effectiveness.

The analysis also highlights that the competition is always beneficial when the two institutions compete in their effectiveness of surveillance (ε in the model). The result obtains because both creditors and debtors benefit from better monitoring of debtor countries. Moreover, whether the two institutions are competing or cooperating, the benefits of a crisis management facility are most likely to accrue if the international financial institutions are able to identify the source of crisis (in the model, smaller σ is more likely to be welfare enhancing as ε approaches to zero). These observations lead us to affirm the argument of Eichengreen (2001) that the case for regional cooperation is strongest in setting standards for financial market regulation, identifying policies for promoting financial market development, monitoring the compliance of countries with recommendations by an AMF, and applying the appropriate diplomatic or pecuniary sanctions to the violators⁸(in short, surveillance).

In light of the analyses above, the current CMI has the following drawbacks with respect to its surveillance and conditionality. First, the present regional surveillance mechanisms such as ASEAN+3 Economic Review and Policy Dialogue Process are too weak to meet the demands of the CMI, presumably because of nonintervention in national affairs that is an Asian cultural feature (Eichengreen, 2001; Kuroda and Kawai, 2003; Yoshitomi, 2003). But the effective surveillance is the key to limit the debtor moral hazard and to minimize the budgetary costs of crisis lending by the CMI. In order to improve the current surveillance process, Yoshitomi (2003) argues that it should specify the minimum information to be exchanged and signal the potential risks early

⁸ Eichengreen (2001) proposes to establish an “Asian Financial Institute” that would provide member countries guidance on how to most effectively meet standards for prudential supervision and regulation in ways consistent with their economic and financial structure. He argues that the ASEAN+3 is a logical organizational basis for such institute.

enough to allow for the policy responses. The analysis in this paper suggests that if international financial institutions are competing each other, they are encouraged to improve their surveillance activities in order to attract “clients” as long as the benefit of effective surveillance is properly appreciated⁹.

Second, since the drawings through the CMI are basically subject to the IMF conditionality, it is difficult to object to those who argue that the CMI is a duplication of international bureaucracy (albeit the benefit that it enhances the size of emergency lending). The linkage of the CMI to the IMF conditionality is based on the fear of the race to the bottom. But, our analysis reveals that such fear should not be overstated, because the softer conditionality would result in a higher “fee” that countries should pay to their member institution. Rather than mimicking the IMF conditionality, the Asian countries should search for the appropriate shape of conditionality that best matches their economic and financial structures.

The case for searching the appropriate conditionality is strong as it has been one of the most arguable issues in the IMF reforms. As summarized by Tirole (2002), economists disagree on the direction of the reform on IMF conditionality: “doves” argue that the traditional IMF policy conditions are often too intrusive and do not respect country ownership, while “hawks” criticize they are renegotiated too often and too quickly, thus undermining their credibility. Mainly responding to the former criticisms, in September 2002, the IMF revised its conditionality guidelines with the aim of streamlining conditionality so as to enhance the effectiveness of Fund-supported programs and to promote national ownership of reforms. However, there remains a concern, from the hawks’ point of view, that streamlining conditionality may imply weakened conditionality.

Is it possible to reconcile conditionality and program ownership? Jeanne and Zettelmeyer (2001) and Tirole (2002) argue conditionality and ownership can be reconciled by separating them temporarily: *ex post conditionality* at the time of crisis lending is compatible with *ex ante* prequalification (sometimes referred to as “*ex ante conditionality*”) that ensures *ex ante ownership*. The idea is to make the emergency

⁹ This might not be true if the Asian countries value the culture of noninterference higher than the effectiveness of surveillance. Our analysis suggests, however, that weaker surveillance would result in a lower level of credit. That is, in order to preserve “Asian culture,” the Asian countries would have to incur the associated costs.

lending conditional on the quality of domestic policies, such as the compliance with a set of standards and good practices, before a crisis erupts. Since the borrower countries that benefit ex ante from such contracts are willing to sign up to these conditions during normal times, the countries' ownership is respected. In addition, by imposing some conditions ex ante rather than ex post and thereby allocating conditionality over time in a more balanced way, it also reduces the intrusiveness of ex post conditionality. The emphasis on the policy ex ante implies that Asian countries should strengthen surveillance as a way of prequalification.

This being said, weighing on the policy before the crisis is not an easy task. The idea has been already embedded in a new IMF lending facility, the Contingent Credit Line (CCL) that has expired in November 2003. The CCL intended to offer a precautionary line of defense against balance of payment problems that might arise from financial contagion, on the basis that eligible countries pursue sound economic policies. But, since its creation in 1999, no country has applied to use the CCL because there is a concern that the application by a country implies a negative signal about its vulnerability to crisis (sometimes referred to as a "first mover" problem). There is also a time inconsistency problem of what the IMF should do when a country's policies deteriorate: the disqualification of a country may itself trigger a crisis (Khan and Sharma, 2001). Nevertheless, there exists some room for further argument. The progress in the adoption of collective action clauses (CACs) in sovereign bonds governed by New York state law is an encouraging sign since the inclusion of CACs faced the first mover problem as well¹⁰. We should also note that the time-consistency problem is not specific to the CCL. Conventional IMF lending facilities face a similar problem since the disbursement of the IMF lending is conditional on whether the performance criteria

¹⁰ CACs refer to the provisions in bond contracts that enable the sovereign that issues the bond and a qualified majority of bondholders to make decisions that become binding on all bondholders. For instance, majority restructuring provisions enables a qualified majority of bondholders to determine the terms of a restructuring agreement that will bind all bondholders within the same issuance. As market custom, sovereign bonds governed by English, Japanese, and Luxembourg law have usually included such clauses but bonds governed by New York law have traditionally not included them. Since 1996, IMF and the official community has encouraged countries that issue international sovereign bonds to include CACs as a way to facilitate the orderly and smooth debt restructuring should the debt burden become unsustainable. Like the CCL, however, the inclusion of the CACs in bond contracts has the signaling problem that has deterred countries from using them. In March 2003, amid intensive discussion within the official community and capital markets communities about the use of CACs, Mexico issued bonds governed by New York law that included majority restructuring provisions and majority enforcement provisions. After the successful issuance of Mexico, a number of emerging countries have shifted toward the use of CACs in international sovereign bonds issued under New York law.

of the program have been met. It looks worthwhile that Asian countries devote their efforts to reshape the conditionality attached to the emergency lending facility, and the competition between the IMF and the CMI (or an AMF) may provide an incentive to do so.

Finally, we should note that the analysis in this paper have left out one important factor that is not encouraging for a regional lender of last resort: externality. As Tirole (2002) points out, financial stability has the character of an international public good that may spill over across the region¹¹. Competition among international financial institutions may also entail a loss in “reputational returns to scale”: the smaller the number of countries that the agency interacts with, the more difficult it is to build a reputation that is a key ingredient for the institution to accomplish its mission successfully. In spite of this caveat, the basic result of the analysis in this paper is likely to remain. The competition among international financial institutions can have beneficial effects as long as the budgetary costs associated with providing a crisis management facility is proportional to its effectiveness.

¹¹ In contrast, Kuroda and Kawai (2003) argue that the regional framework can best address crisis prevention, management, and resolution because economic contagion tends to begin with a geographic focus.

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