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SPECIAL POLICY REPORT 1

The Role of Derivatives in the East Asian Financial Crisis

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Abstract

Derivatives played a key role in the East Asian financial crisis of 1997. Their use developed alongside the growth of capital flows to those developing economies in the 1990s. Derivatives facilitated the growth in private capital flows by unbundling the risks associated with investment vehicles such as bank loans, stocks, bonds and direct physical investment, and then reallocating the risks more efficiently. They also facilitated efforts by some entities in raising their risk-to-capital ratios, dodging regulatory safeguards, manipulating accounting rules and evading taxation. Foreign exchange forwards and swaps were used to hedge as well as speculate on the fixed exchange rate regimes, while total return swaps were used to capture the "carry business" of profiting from the interest rate differential between pegged currencies. Structured notes were used to circumvent accounting rules and prudential regulations in order to offer investors higher, though much riskier, returns. Viewed at the macroeconomic level, derivatives first made the economy more susceptible to financial crisis and then quickened and deepened the downturn once the crisis began. This analysis of the East Asian crisis offers several policy lessons. Financial regulations should contain reporting requirements, capital requirements should be updated to reflect the market risk of derivatives, regulations governing the holding of assets and liabilities should be updated to reflect that they often have attached derivatives, and regulatory incentives should be structured so that derivatives are used to facilitate capital flows and not be used to increase risk-to-capital ratios by out-maneuvering government regulations.

I. DERIVATIVES AND CAPITAL FLOWS

Although many factors contributed to the East Asian financial crisis, this paper focuses on the role of derivatives. There are many studies that focus on other sources of the crisis, and their conclusions usually fall within the following range. There was too much hot money or short-term foreign bank lending. There was too much investment, and this led to excess capacity. There were too many bad investments that led to too many bad loans and later bankruptcies. There were over-valued exchange rates that were defended for too long. There was too much corruption or crony-capitalism. This might be summed up with the words of the great wit and sage Yogi Berra, "They made too many wrong mistakes."

This study is not designed to reaffirm or refute these points, but to add to the overall level of understanding of the crisis by adding an analysis of the role of derivatives. And while this study focuses on the role of derivatives, it will address issues of overall financial market regulation and the composition of foreign capital flows in the form of bank loans, securities and physical investment.

It should be pointed out at the beginning that this study is limited by the lack of data available on over-the-counter (OTC) derivatives markets.¹ Unlike derivatives trading on exchanges, transactions in OTC markets are neither registered nor systematically reported to the public in detail, and so information on them is scarce.²

The Old Way. The financial crisis that engulfed developing economies in the 1990s was significantly different from that which struck in the 1980s. While both crisis periods involved some degree of over-lending, unproductive investing and corruption, there are two key differences between the two crises that provide the more important policy lessons. The first is the different forms of foreign capital that flowed to developing countries during the two periods, and the second is the emergence of derivatives as an integral part of capital flows in the 1990s.

The private foreign capital flows that led up to the crises of the 1980s were largely in the form of dollar denominated, variable interest rate, syndicated commercial bank loans to sovereign borrowers. The loans from private sources were issued by the major U.S. and European banks that were in the process of recycling "petro-dollar" deposits from OPEC surpluses.³ The formation of syndicates to underwrite these loans helped to bind lenders together, and together with cross-default clauses⁴ in the loan contracts, it greatly reduced banks' credit risks. In order to reduce the banks' exposure to market risk, these loans were issued as variable interest rate loans (usually priced as a spread above LIBOR or some short-term interest rate that reflected banks' funding costs), and they were denominated mostly in dollars and otherwise in other G-5 currencies (which reflected the currency denomination of the banks' funding sources).

Foreign capital flows in this form shifted most of the market risk into the hands of the borrowers. The borrowers bore both the foreign exchange risk as well as the interest rate risk. Lending banks in the advanced capital markets, whose liabilities were mostly short-term and denominated in the same currencies as their loans to developing countries, bore little market risk. Their exposure was almost entirely credit risk, and this was substantially mitigated through the syndication of the loans and the inclusion of cross-default clauses.

This distribution of risk laid the foundation for the crisis that began in August of 1982. The crisis began to build when the U.S. central bank decided to increase short-term dollar interest rates. Higher dollar interest rates, which served as the basis for payments on adjustable rate loans, both increased the dollar payments on loans and increased the cost of obtaining those dollars by pushing up the value of the dollar against other currencies in global foreign exchange markets. Together this increased the non-dollar currency cost, especially the local currency costs of debtor countries, of servicing these dollar bank loans. Initially, debtor countries increased their borrowing in order to reduce the burden of servicing higher debt costs. When they were no longer able to increase their borrowing, they were forced into crisis. This was signaled in August of 1982 by the Mexican government's announcement of their inability to make their scheduled foreign loan payments.

Once the crisis was apparent, the developing economy governments, major money center banks, and the IMF and World Bank began developing post-crisis recovery policies. The initial policy solution was to reschedule existing debt, arrange new lending and require the developing economy governments to implement austere fiscal and monetary policies that would make possible the eventual repayment of the still growing debt burden.

Table 1. Composition of Private Capital Flows to Developing Countries
(percentage of total private and public flows)

Type of flow	1973 - 81	1990 - 97
Bonds	3.5%	15.2%
Bank Lending	63.9%	11.7%
Foreign direct investment	16.8%	50.3%
Portfolio Equity	0.3%	16.4%

Source: World Bank. Global Finance Report, 2000.

The New Way. The foreign private capital flows that preceded the 1997 financial crisis were of a substantially different character. Firstly, these flows went to private entities in East Asian and not just sovereign borrowers. Secondly, commercial bank loans, measured as a percentage of total foreign capital flows, were substantially less important than in the earlier period. Instead, capital flows to East Asian were in a myriad of forms that ranged from direct foreign investment to portfolio equity investment (meaning less than 10% ownership), corporate and sovereign

bonds⁵ as well as structured notes, repurchase agreements, and also bank loans to public and private borrowers. (See Table 1.)

This more diversified flow of foreign capital (diversified in the sense that various vehicles were used to channel the capital flows) generated a different distribution of risks. Compared to the bank loans of the 1970s and early 1980s, this more diversified flow of capital tended to distribute risk towards investors in the advanced capital market economies. Stocks and bonds investments shifted market risk and credit risk to foreign investors who bore the risk of changes in interest rates, securities prices and exchange rates. Direct foreign investment in physical capital and real estate similarly shifted market risk and credit risk to foreign investors. Even dollar denominated bonds issued by East Asian governments shifted interest rate risk, as well as credit risk, to foreign investors. The effect was to potentially reduce the developing economies' exposure to the risk of changes in the U.S. interest rates or the relative value of the dollar.

Derivatives trading grew up alongside these new forms of capital flows as part of an effort to better manage the risks of global investing. In doing so, derivatives facilitated this new composition of capital flows by unbundling risk and redistributing it away from investors who did not want it and towards those more willing and able to bear it. At the same time, derivatives created new risks that were potentially destabilizing for developing economies. The following is an analysis of how derivatives played a constructive role in channeling capital from advanced capital markets to developing economies, and how at the same time they played a potentially destructive role in laying the foundations of the crisis.

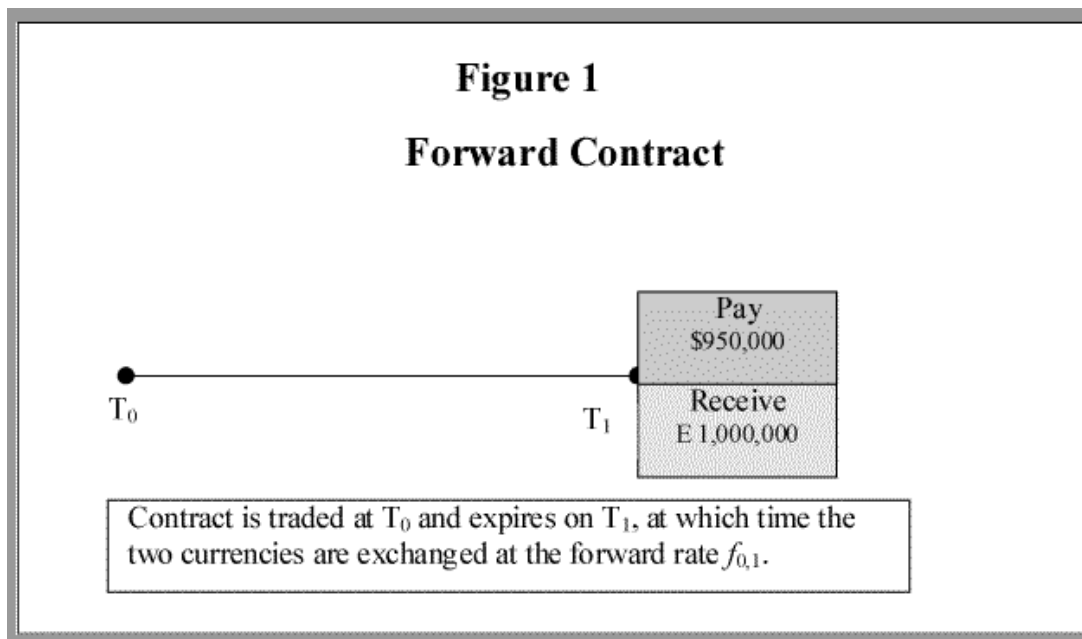
Facilitating Flows. Derivatives facilitated capital flows by unbundling and then more efficiently reallocating the various sources of risk associated with traditional capital vehicles such as bank loans, equities, bonds⁶ and direct foreign investment. Foreign currency loans expose the foreign investor to credit risk and the domestic borrower to exchange rate risk; a fixed interest rate loan exposes the foreign lender to interest rate risk and a variable rate loan exposes the domestic borrower to interest rate risk; and a long-term loan exposes the foreign lender to greater credit risk and a short-term loan exposes the domestic borrower to refunding risk (sometimes called liquidity risk). Equities expose the foreign investor to credit risk along with the market risk from changes in the exchange rate, market price of the stock, and the uncertain dividend payments. Notes and bonds expose the foreign investor to credit risk and market interest rate risk, and in the case of hard currency bonds expose the domestic borrower to exchange rate risk. The financial innovation of introducing derivatives to capital markets allows these traditional arrangements of risk to be redesigned so as to better meet the desired risk profiles of the issuers and holders of these capital instruments.⁷

Facilitating unproductive activities and lowering safeguards. While the risk shifting function of derivatives serves the useful role of hedging and thereby facilitating capital flows, the enlarged presence of derivatives also raises concerns about the stability of the economy as a whole. The use of derivatives can lead to lower levels of transparency between counterparties and between regulators and market participants. They can be used for unproductive activities such as avoiding capital requirements, manipulating accounting rules and credit ratings, and evading taxation. They can also be used to raise the level of market risk exposure relative to capital in the pursuit of higher yielding – and higher risk – investment strategies.

In the event of a large change in the exchange rate or other market prices, the greater the amount of market exposure – possibly created by open positions in derivatives contracts – the greater will be the pace and depth of impact on the financial sector and economy as a whole. In this context, the use of derivatives to reduce the amount of capital that acts as a buffer to market turbulence raises the risk of systemic failure and heightens doubts about the stability of the financial sector and the economy as a whole.

II. DERIVATIVES USED IN EAST ASIA

Derivatives are unlike securities and other assets because with the exception of foreign exchange swaps, no principal or title is exchanged. In their essence, nothing is owned but pure price exposure. They are purely pricing contracts. Their price is derived from an underlying commodity, asset, rate, index or event, and this malleability allows them to be used to create leverage and to change the appearance of transactions. Derivatives can be used to restructure transactions so that positions can be moved off of the balance sheet, floating rates can be changed into fixed rates (and vice versa), currency denominations can be changed, interest or dividend income can become capital gains (and vice versa), payments can be moved into different periods in order to manipulate tax liabilities and earnings reports, and high yield securities can be made to look like conventional AAA investments. The following describes several of the key derivative instruments used in East Asia, and how they were used for hedging (risk shifting) as well as for taking on additional risk in the pursuit of higher returns on capital.



A. Foreign exchange forwards and foreign exchange swaps

Foreign exchange forwards and swaps are an integral part of the global foreign exchange market. Together with spot transactions, foreign currency swaps and foreign exchange options, they make up a market whose daily volume is estimated at \$1.5 trillion. Of this total, \$578 billion is in spot transactions, \$130 billion is in forward transactions, \$734 billion is in foreign exchange swaps, \$10 billion is in foreign currency swaps, and \$87 billion is in foreign exchange options.⁸

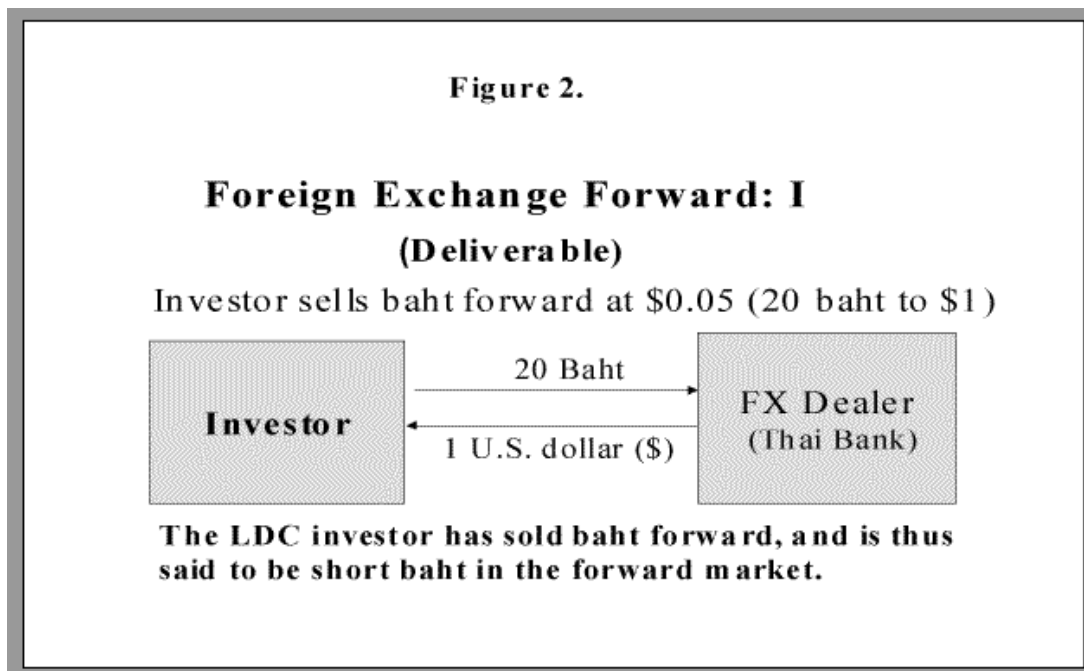
A foreign exchange forward is a contract in which counterparties are obliged to exchange specified amounts of foreign currencies at some specified exchange rate on a specified future

date. The forward exchange rate is the price at which the counterparties will exchange currency on the future expiration date. The forward rate is negotiated so that the value of the forward contract at the time it is traded is zero; in other words, the contract is traded at par. As a result, no money need be paid at the commencement of the contract, although the counterparties may agree to post collateral in order to insure each other's performance of the contract.

For example, party A enters a 180-day forward contract to buy 1,000,000 Euros at the exchange rate of \$0.95. In 180 days party A must deliver \$950,000 to party B who will in turn deliver Euro 1,00,000. In this way, currency is said to be "delivered" in the fulfillment of the terms of the contracts.

Trading in "non-deliverable" foreign exchange forward contracts emerges when cross-border transactions cannot occur due to government restrictions or market failure. A non-deliverable forward market would likely emerge in order to avoid currency transactions taxes such as the "Tobin Tax" because there is no exchange of foreign currencies. Non-deliverable forwards are contracts to exchange not the two currencies but instead an amount of the available currency, for example dollars, based on the change in the exchange rate over the term of the forward contract.

For example, party A enters a 180-day non-deliverable forward to sell 1 million baht for U.S. dollars at \$0.050 (20 baht to the dollar). If the baht were to depreciate to \$0.045 (22 baht to the dollar) when the contract expires in 180 days, then party A would receive the dollar value of 1 million baht times the change in the exchange rate calculated at the new spot rate of \$0.045 – or in other words 1,000,000 times \$0.050 - \$0.045 or \$5,000. The result is equivalent to taking delivery on a normal forward contract and then converting the gains, which are realized in baht, back into dollars at the exchange rate of \$0.045.



A foreign exchange swap is simply the combination of a spot and forward transaction (or possibly two forwards). The start leg of the swap usually consists of a spot foreign exchange transaction at the current spot exchange rate, and the close leg consists of a second foreign exchange transaction at the contracted forward rate. For example, party A enters a foreign exchange swap of baht against the dollar in which it buys 1,000,000 baht today at \$0.050, and contracts to sell 1,000,000 at \$0.045 in 180 days. Party A first receives 1 million baht (in exchange for paying \$50,000), and then upon the swap expiration date pays 1 million baht (in exchange for receiving \$45,000). This 10% loss in dollar terms is due to the depreciation of the baht against the dollar (or appreciation of the dollar against the baht) and reflects the fact that the rate of return from investing in baht is considerably higher than investing in dollars.

Forwards and foreign exchange swaps are not always highly collateralized (measured as a percentage of the principal). Collateral is less likely to be used for trading between the major market dealers, and collateral is lower for less volatile financial instruments such as currency. This exposes foreign exchange derivatives counterparties to credit risk. The largest source of credit losses in the derivatives markets in recent years were due to defaults on foreign currency forwards in East Asia and Russia (Swaps Monitor, 1999).⁹

Foreign exchange forwards and swaps were potentially used in East Asia by both foreign and domestic investors to hedge foreign exchange risk. Foreign investors from advanced capital markets who purchase securities denominated in local East Asian currencies could use foreign exchange forwards and swaps to hedge their long local currency exposure. Similarly, foreign direct investments in physical real estate, plant or equipment were exposed to the risk of local currency depreciation. Local East Asian investors who borrowed in dollars, yen or European currencies and invested in local currency assets were also exposed to foreign exchange risk.

Of course foreign exchange forwards and swaps were also used for speculation in these East Asian currencies. Derivatives enabled speculators to leverage their capital in order to take larger positions in the value of local currencies. It also meant that East Asian central banks had to watch the exchange rate in two markets, the spot and forward, in order to maintain their fixed exchange rates.

B. Swaps

The term swap is sometimes used to refer to OTC derivatives in general. This no doubt arose from the fact that the vast majority of OTC derivatives are swaps of one form or another. The precise meaning of the term, used throughout this chapter, refers to particular method of structuring a derivatives contract.

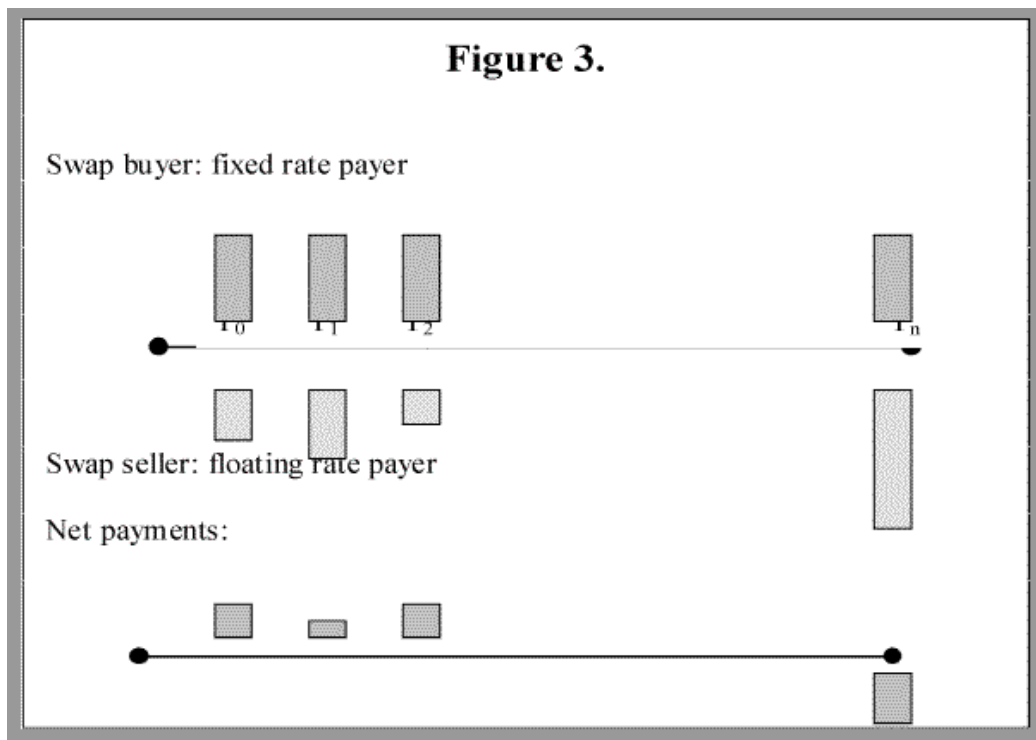
While the above section described the foreign exchange swap as a contract for the sale and repurchase (or alternatively the purchase and resale) of foreign currency, this section will describe the structure of interest rate swaps and total return swaps.

1. Vanilla Interest Rate Swaps

The basic interest rate swap, called a vanilla interest rate swap, is an agreement between two parties to exchange the net of two series of payments. One series of payments is based on a fixed interest rate applied to a notional principal, such as 6% on \$1 million, and the other series of payments is based on a floating rate, such as 3-month LIBOR, applied to the same notional principal. In order to simplify payments and other clearing issues, most swap contracts allow the two parties to pay (or receive) only the net or the difference between these two series on each payment or "drop" date. This is illustrated in Figure 3.¹⁰

A borrower with a variable interest rate loan can hedge their interest rate risk with a swap in which they receive the floating rate and pay the fixed rate (i.e. buy a swap) and thereby swap their floating rate payments for fixed rate payments.

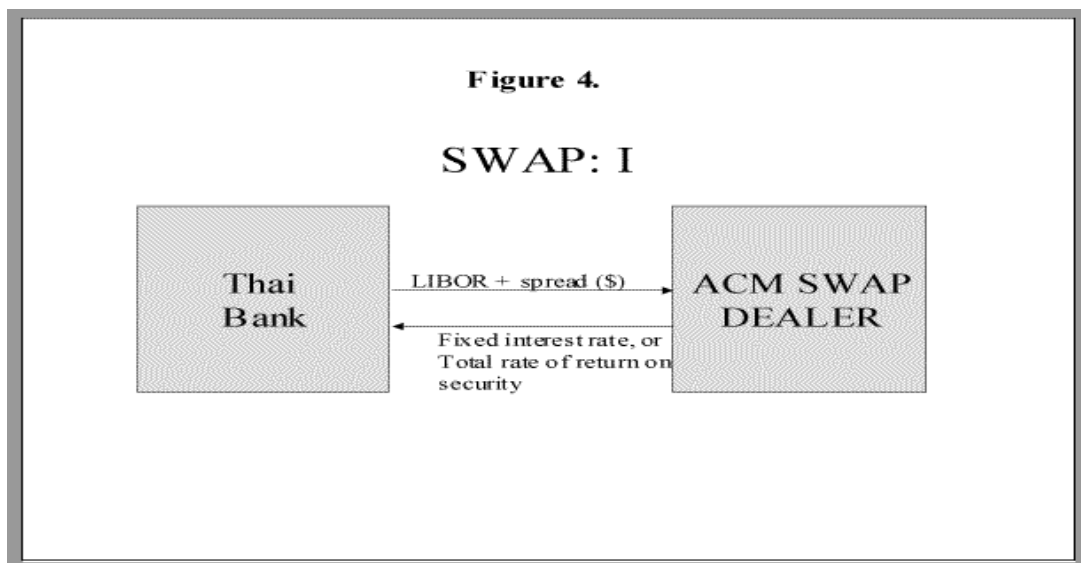
Consider the following example of a short swap position. Every year for the length or tenor of the contract, the swap pays the net of a fixed rate of 6% less a floating interest rate applied to a notional principal of \$1,000,000. If the floating rate were 5%, then the floating payment would be \$50,000, the fixed payment would be \$60,000 and the net payment to the fixed rate receiver would be \$10,000. If the floating rate were to rise to 6%, then the next payment would be zero. If the floating rate were to rise to 8%, then the fixed rate receiver would make a net payment of \$20,000 to the fixed rate payer. This is alternatively illustrated in Figures 4 and 5 below.



Swap agreements often include provisions for collateral. Collateral arrangements usually require that collateral be post in the form of G-5 currencies or government securities (excluding Japanese

government securities). The initial amount is determined by the variance on the instrument, and an adjustment is made for when the position moves out of the money. This reduces counterparty credit risk to the winning side, and thereby reduces the winning side's requirement to hold capital against that credit risk.

Swaps are traded by negotiating a fixed swap rate that will make the present value of the fixed payments equal to the expected present value to the floating payments. The swap rate has traditionally been expressed as a spread above the yield on U.S. Treasury securities or the relevant benchmark instrument to that currency's interest rate. For example, a swap dealer's bid/ask quote of 45/53 basis points on a two year swap means that the fixed interest rate that will enable this swap to trade at par or "at the market" is 45 basis points above the 2-year Treasury note rate if the dealer is to make the fixed payment and 53 basis points if it is to receive the fixed payment. In the past two years, dollar interest rate swaps have come to be quoted as all-in rates, reflecting their ascendancy in U.S. financial markets.¹¹



2. Total Return Swaps

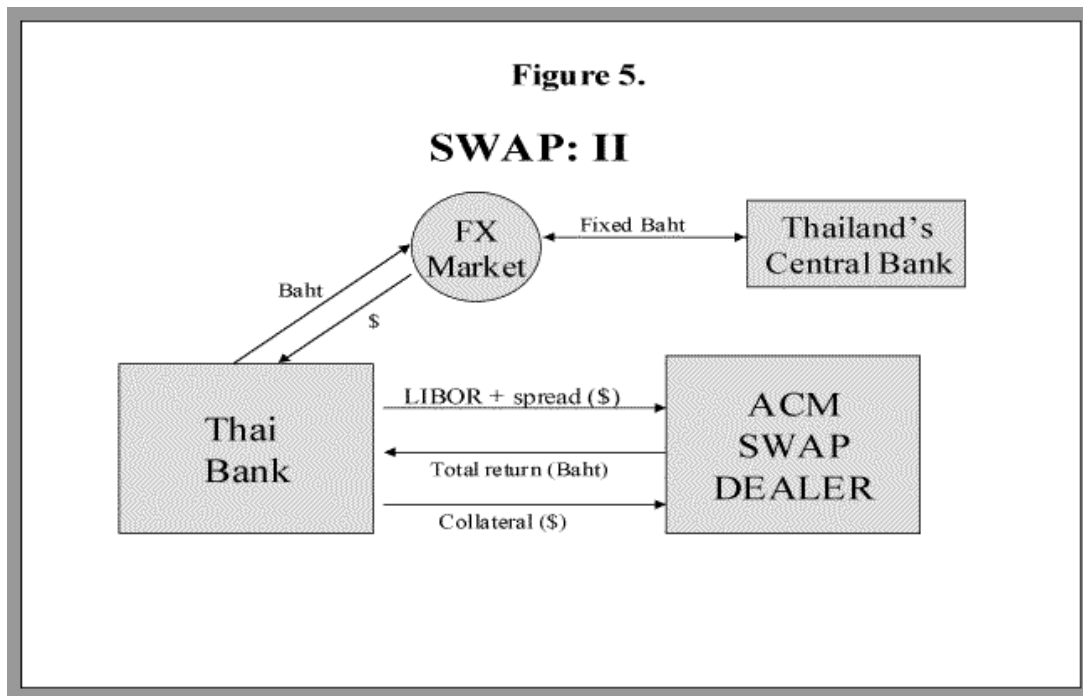
A total return swap (TRS) is a contract in which at least one series of payments is based on the total rate of return (change in market price plus interest or dividend payments) on some underlying asset, security or security index. The other leg of the swap is typically based on a variable interest rate such as LIBOR, but may be a fixed rate or the total rate of return on some other financial instrument. Based upon what is known about the pre-crisis situation in East Asian as well as Mexico, the total return swaps in those situations usually swapped LIBOR against the total rate of return on a government security.

A total return swap replicates the position of borrowing at LIBOR in order to finance the holding of a security or security index. The returns are the same, but unlike the actual cash market transaction, it does not involve ownership or debt. Instead, the only capital involved in a TRS is the posting of collateral. In addition to the reduction in the need to commit capital to the transaction, a TRS also has no impact on a firm's balance sheet and is not subject to regulatory

restrictions on foreign exchange exposure. It would incur a capital charge only if it were to move into the money. In short, TRS allow financial institutions and investors to raise their risks, and potential returns, relative to capital.

One of the uses of total return swaps in East Asia was to capture the gains from the carry trade or carry business. A profitable carry trade exists where exchange rates are fixed and interest rate differentials persist between the two economies. Then it is possible to borrow in the low interest rate currency and lend in the high interest rate currency with no risk other than that of a failure in the fixed exchange rate regime.

In the case of East Asia, the money center banks were willing to lend the major currencies and the East Asian bank were eager to capture carry profits from the interest rate differential of borrowing abroad and lending at home. The profitability of the activity, and ultimately the solvency of the financial institutions conducting this carry business, depended upon the East Asian central banks' ability to maintain the exchange rate peg or at least preventing it from depreciating by more than the interest rate differential.



There were a couple of factors that limited the amount of this profitable carry trade activity. The combination of foreign borrowing and domestic lending created a foreign exchange mismatch on financial institutions' balance sheets. Financial market regulations either strictly limited the extent of this mismatch or they required additional capital charges in proportion to the exchange rate exposure. Other restrictions came from the limits on how much foreign banks were willing to lend to any one East Asian financial institution, and the disincentive for borrowers to swell their balance sheets (which lowered the reported earnings on assets).

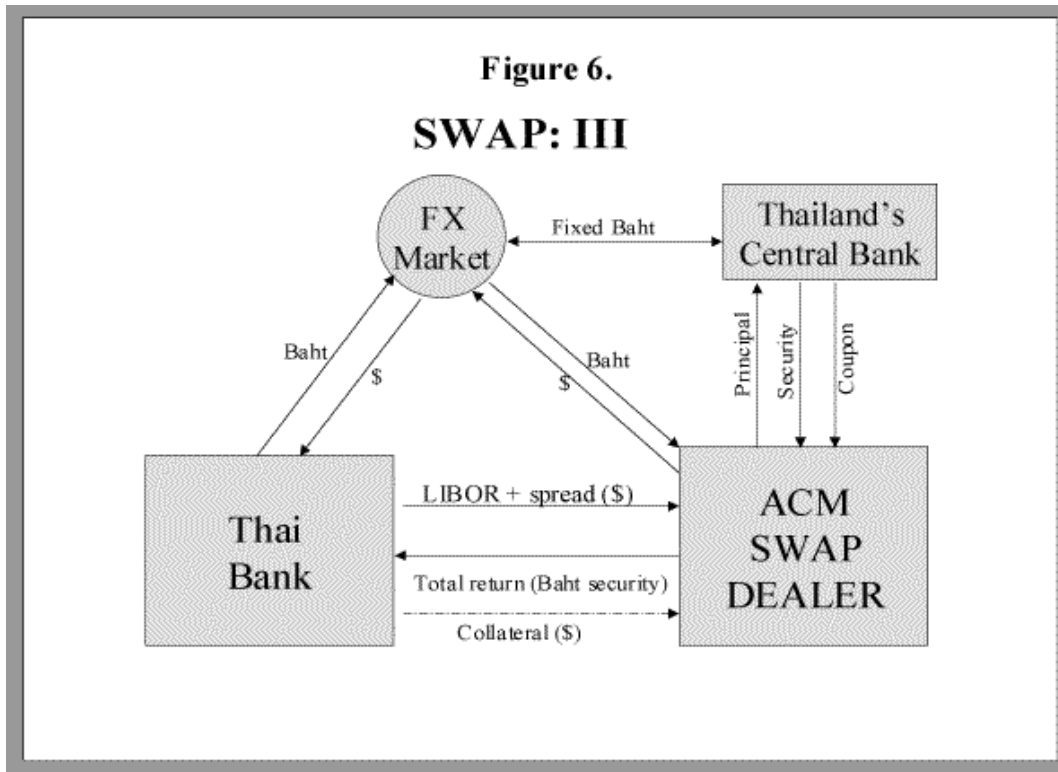
In this context, TRS were used by financial institutions to avoid prudential regulations by taking their carry positions off balance sheet.

Consider the following example. A Thai financial institution borrows dollars for six months, which cost LIBOR plus some spread to cover the lender's credit risk, and uses the proceeds to invest in higher yielding 6-month Thai baht assets. This borrowing in dollars and lending in baht, however, creates a foreign exchange mismatch -- i.e. a short forward position in dollars -- on the Thai institution's balance sheet. This exchange rate exposure, which is the risk of the government failing to maintain the fixed exchange rate, is the cost of capturing the interest rate differential.

In order to avoid government financial regulations, which discouraged this activity by either assessing a special capital charge on excess foreign exposure or expressly restricting the amount of foreign exchange imbalance, a developing economy investor would use a TRS to move this activity off their balance sheets. This is illustrated in Figure 5 entitled "Swap II."

The use of TRS altered the form of capital flows to developing countries. If banks engaged in the carry business by borrowing abroad, then the capital flows were in the form of short-term, hard currency bank loans. If banks pursued the same profit opportunities by using TRS, then it would generate indirect capital flows as swaps counterparties, usually ACM swaps dealers, bought the underlying asset as a hedge against their own position in the TRS. (This point is illustrated in the Chart 6.) As a result, the capital flow was in the form of a local currency denominated security instead of a dollar bank loan. However, the local currency security did not have the effect of shifting foreign exchange risk to advanced capital market investors. Instead, it functioned in conjunction with the TRS to leave the local developing country investors holding the foreign exchange risk (the short dollar position) much like a hard currency bank loan. Not only is the developing economy's foreign exchange exposure the same, but the TRS carry strategy exposures them to even greater surges in foreign currency than with short-term bank loans. The bank loans, except when there are attached put options, are certain for the maturity of the loan. However the collateral arrangements on the TRS can result in a large immediate surge, overnight if not intraday, in foreign currency transfers. If short-term bank loans are considered hot money, then payments to meet margin and collateral requirements are microwave money — they get hot quickly.

The use of TRS also increase the likelihood of contagion. They often involve cross-currency assets and payments and are therefore more likely to transfer disruptions from one market to another. Neftci (1998) claims that one reason that Korean banks engaged in so many Indonesian total return swaps was that they were seeking higher rates of return in response to a rise in their funding costs. "But, note that at the end of this process, Korean banks are being exposed to Indonesian credit. This however, is not visible on their balance sheets. This situation not only creates the possibility for contagion, but may also make the contagion unpredictable and severe."



C. Structured Notes

Structured notes, also known as hybrid instruments, are the combination of a credit market instrument, such as a bond or note, with a derivative such as an option or futures-like contract. Structured notes were part of the new wave of innovation in capital flows to East Asia in the 1990s. They offered issuers and investors either better yields than similarly rated securities, or better combinations or bundles of risk characteristics. In some cases, structured notes were designed to circumvent accounting rules or government regulations so as to allow lower capital charges, greater foreign exchange exposure or greater overall risk to capital.

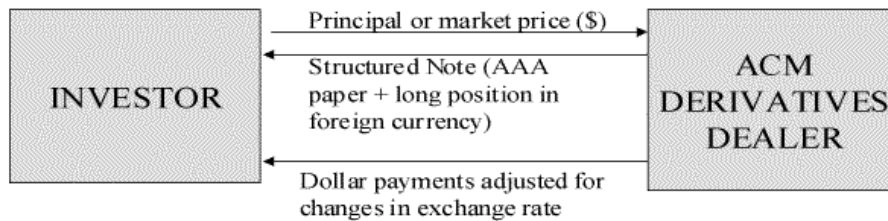
Hybrid instruments include such conventional securities as convertible stocks, convertible bonds and callable bonds. These have long been among the set of traditional securities regularly issued and traded in U.S. financial markets. There is also a history of less conventional hybrids instruments. An early example of structured notes comes from the Treasury of the Confederate States of America. It attached various types of derivatives features to its bonds in order to enhance its borrowing power. In one instance, it structured a bond so that it contained an option that allowed the investor to be paid the principal and interest in either Confederate dollars or New Orleans Middling Grade Cotton. Another more creative Confederate issue was designed as a tri-valued instrument that paid upon maturity, at the purchaser's option, the higher of 100 pounds sterling, 2500 French francs, or 4000 pounds cotton (Markham, 1994).

Figure 7.

Structured Note

PERL - Principal Exchange Rate Linked Note

Principal and interest payments are denominated in dollars, but the value of payments is linked to a futures or option position on a foreign currency exchange rate. Enhanced yield is return for holding foreign currency risk exposure.



Benefits to investor include regulatory and capital treatment as dollar denominated asset and higher yield than similarly rated dollar asset.

The structured notes used in East Asia were usually structured so that their yield was linked to the value of one or more of the currencies or stock indices in the developing economies. The issuers of these structured notes were financial institutions from advanced capital market economies, and the investors were often East Asian financial institutions and investors who were more willing to hold their own exchange rate risk or that of their neighboring developing countries.

One reason given for this is that the local investors were more knowledgeable of their economies and markets than investors from advanced capital markets. An additional reason is that they were inherently long their own currency — long in the sense that if the fixed exchange rate regime were to collapse then the whole economy would contract — and therefore their perceived cost of additional foreign exchange exposure would have been small.

Financial institutions from advanced capital markets were interested in issuing these instruments in order to create long-dated futures and options positions in developing country currencies and securities. Foreign exchange forward and swap markets are short-term markets; the vast majority of transactions in these markets have a maturity of one year or less. The 1998 BIS report on foreign exchange markets showed that only 1.4% of foreign exchange swaps and 3.9% of forwards had maturities in excess of one year, and that the majority were for seven days or less.¹² Faced with the absence of other alternatives, these hybrid instruments were designed to create such a multi-year foreign exchange derivative. The issuer held a long-term short position in a developing country currency for the cost of the 100 or 200 basis points per year on the principal.

The most widely known of these derivatives is called a PERL — principal exchange rate linked note. These instruments were denominated in dollars, but the value of their payments were linked

to a long position in the value of a developing country currency.¹³ (See Chart 7 .) The compensation or premium for holding this exchange rate exposure was a higher than normal yield in comparison to a similarly rated dollar denominated note. If the foreign currency exchange rate remained fixed, or did not decline too far in value, then the higher yield would be realized. A devaluation or a substantial depreciation, however, could cause the return of the note to fall below the norm and in the event of a major depreciation the structured note might realize a negative return.

Financial institutions in developing countries were interested in buying these hard currency denominated assets because they needed hard currency assets to match their hard currency liabilities on their balance sheets.

While it has been noted that derivatives have generally facilitated capital flows to developing economies, in this case they encouraged the reverse. When a developing economy investor or financial institution purchases a high yielding structured note such as the above example of PERL s, then the capital flow is reversed and principal is transferred to the advanced capital markets.

D. "Puttable" debt

The largest threat to financial market stability that did not directly involve foreign exchange exposure was the use of embedded derivatives, called put options, in loan and bond debt contracts. These put options on the debt principal enabled lenders to recall their principal in the event of economic trouble. The effect was to drain the developing country financial markets of liquidity just at the time it was most urgently in need.

It is not unusual for credit instruments to have attached options. Callable bonds are familiar financial instruments in advanced capital markets. They are the combination of a conventional bond and a call option that allows the issuer to recall the principal on the bond at a specified value (usually par) after some future date. Callable bonds are used by borrowers to reduce the risk that they will be locked into higher than market rates of interest on their outstanding debt. Until the 1980s, the U.S. Treasury issued callable 30-year bonds in which the principal was callable at par after 25 years. The Treasury exercised their option on several series of these bonds in the early and mid-1990s.

In the case of East Asian debt, the attached options were usually puts rather than calls. This granted the lenders, not the borrowers, the right to reclaim their principal. Lenders in advanced capital markets attached put provisions to loans and bonds in order to reduce their risk of adverse macroeconomic conditions or other circumstances which would reduce the ability of their borrowers to repay their debts. It also reduced their exposure to increases in dollar or other hard currency interest rates. Yet another motivation involved outflanking tax and regulatory requirements because the puttable loans could be treated like long-term debts even though they potentially functioned like short-term ones.

These put options were in the form of "hard" and "soft" puts. Hard puts, usually attached to a note or bond, gave the lender the right to demand principal repayment after a certain date, e.g. a

five year note might be put-able after one year. Soft puts, usually attached to loans, gave lenders the right to reschedule the terms of their credit in the event of certain adverse "events."

Table 2. Putable Bonds Issued from East Asia

	\$ million due in 1999 or 2000
Hong Kong	\$2,642
Indonesia	963
Korea	3,986
Malaysia	1,730
<u>Thailand</u>	<u>1,313</u>
Total	\$10,634

Most of the "hard" put options were closer to the European rather than the American style option. In these cases, option holders were granted the right to exercise the option only on specific days or perhaps semiannually; in only a very few cases were the options exercisable on a continuous basis like American options.

These attached put options facilitated lending by lowered costs to borrowers and by giving lenders the assurance of obtaining some lending alternatives in the event of adverse market disruptions.

This put-able debt instrument was used widely in the rapidly growing East Asian bond market. The IMF estimated in 1999, using available public databases, that there were \$32 billion in debts putable through the end of 2000 for all emerging countries. Of the total \$23 billion of this is from East Asian issuers, and \$8 billion was from Brazil.¹⁴ Of this \$23 billion, \$10.6 billion was in the form of bonds issued from the East Asian countries listed in Table 2.

Table 3 shows a very similar picture for the case of put options on loan contracts.

Of course a great deal has probably already been put to the borrowers since the crisis began about two years ago. Of this East Asian debt putable through 2000, \$11.5 billion are notes and bonds, and \$12 billion is in loans. An estimated 90% of the total putable debt was issued by private, as opposed to government, borrowers.

According to an IMF memo written in the summer of 1997, there were instances of the use of both call and put options on bond principal and coupons in East Asia. The issuer held the call

option in the event that interest rates fell, and the investor held the put option in the event of a decline in the credit rating of the issuer.¹⁵ Of course it is the put rather than the call options that pose potential problems to financial market stability in emerging economies.

Table 3. Loans with Put Options Issued From East Asia

	\$ million due in 1999 or 2000
Hong Kong	\$1,549
Indonesia	\$2,876
Korea	3,263
Malaysia	547
Philippines	75
Singapore	532
<u>Thailand</u>	<u>1,680</u>
Total	\$10,522

* IMF. 1999. Involving the Private Sector in Forestalling and Resolving Financial Crises.

The presence of put-able debt in lending to developing economies raises several policy concerns. First, the attached put lowers the borrowing costs and this in turn encourages more borrowing and lending. Second, the tax and regulatory treatment of putable debt often incorrectly treats it as long-term debt even though it functions like short-term debt. Third, it creates liquidity shortages in the event of a financial disruption, and it does so just at the time in which liquidity is crucial for the successful functioning of the financial sector. In sum, put-able debt tends to increase indebtedness and does so in a manner that exacerbates financial disruptions.

III. NEW RISKS AND REGULATORY CONCERNS

The above sections described various derivative instruments and how they were used to facilitate capital flows to developing economies. This section analyzes their more conflicting and problematic roles.

A) Reducing transparency.

Derivatives lead to transparency problems in two basic ways. One, they distort the meaning of balance sheets as the basis for measuring the risk profile of firms, central banks and nation accounts. Two, when traded over-the-counter, derivatives lack adequate reporting requirements and government surveillance.

In the absence of off-balance sheet transactions like derivatives, a firm's balance sheet provides a basic picture of its risk exposure. The differences between the maturities of assets and liabilities define interest rate risk, and the differences between the currency denomination of assets and liabilities define foreign exchange rate risk. Credit risk is measured as the creditworthiness of borrowers, customers or clients with payment obligations (i.e. receivables), issuers of securities held and counterparties to other assets.

The introduction of derivatives drives a wedge between total risk exposure and that reflected by balance sheets. Off-balance sheet exposure can reverse, exaggerate or dwarf the risk exposure indicated by balance sheets.

For instance, a Korean corporation's balance sheet may show equal amounts of dollar assets and liabilities reflecting a neutral or balanced dollar foreign exchange position, and yet it may have derivatives that create substantially large short dollar positions off-balance sheet. The result is a delinking of an entity's risk exposure from that reflected in their balance sheets or official reports.

Accounting rules are used to calculate profits and losses, designate assets and liabilities, and determine tax liabilities and capital requirements. A recent survey of U.S. businesses reveals that 42% use derivatives primarily to "manage reported earnings" by moving income from one period to another.¹⁶ In this case the lack of transparency results in distorted market information.

The lack of transparency caused by off-balance sheet positions is also a problem for the public in their efforts to assess a central bank's ability to intervene in the foreign exchange market. The ability to intervene is critical in the context of a fixed exchange rate regime, but it is also important in the context of a floating rate system in order to stabilize the economy following a speculative attack or other financial market disruption. The problem arises when a central bank accurately reports the value of its foreign reserves, but does not report the amount they have contracted to sell in the future through foreign exchange forward and swaps contracts.

This delinking of total risk exposure from balance sheets also occurs in regards to a nation's balance sheet, i.e. their balance of payments accounts. A country's actual exposure to market risk was once reflected in the maturity and currency denomination of its foreign assets and liabilities

in its capital account. That is no longer the case. The currency denomination of assets and liabilities such as foreign loans can be changed with foreign exchange derivatives. Interest rate swaps can alter the interest rate exposure on assets and liabilities. Long-term loans can become short-term ones if attached "put" options are exercised. Even the form of capital or the investment vehicle can be transformed with derivatives. Total return swaps can make short-term dollar loans (liabilities) appear as portfolio investments. Also, the requirement to meet margin or collateral calls on derivatives may generate sudden, large foreign exchange flows that would not be indicated by the amount of foreign debt and securities in a nation's balance of payments accounts. As a result, the balance of payments accounts no longer serve as well to assess country risk.

David Nussbaum (1977) explains that one of the "main challenges facing the IMF due to the spread of derivatives is how to restructure the balance of payments accounting systems of its major member countries." He paraphrases David Folkerts-Landau as saying that "cross-country derivatives positions have played havoc with the balance of payments data" and that "one internal [IMF] estimate has off-balance positions potentially warping emerging market economic data by as much as 25%."

Derivatives also create transparency problems in other ways. The lack of reporting and government surveillance limits the government's and market participants' ability to assess the amount of open interest in the market, large positions held by single entities and the adequacy of collateral and capital. This prevents a dependable assessment of the stability of these markets as well as the markets to which they are linked.

In these ways the presence of derivatives can make it difficult for firms to make an accurate assessment of their counterparties' creditworthiness. Similarly, the lack of information and data on OTC derivatives means that regulatory authorities cannot detect and deter manipulation in the immediate or related markets. In addition, the regulatory authorities cannot know outstanding positions – whether measured gross or net – of their financial sectors or major participants in the financial sector. Thus they cannot know how much risk their financial markets are exposed to in comparison to the capital on hand. As a result, it is difficult for government regulators or supervisors to track the sensitivity of the economy to changes in certain key market variables such as interest rates and exchange rates. The World Bank's Chief Economist put it very well, stating "The increased use of derivatives [in developing economies] is increasingly making the full disclosure of relevant information, or at least the full interpretation of the disclosed information, even more difficult." (Stiglitz, 1998).

B) Outflanking regulatory safeguards.

Investors sometimes use derivatives in order to outflank prudential regulations. Derivatives are used to manipulate accounting rules in various ways, to dodge restrictions on foreign exchange exposure on financial institutions' balance sheets and to lower required capital holdings.

Accounting rules distinguish different types of assets and receivables by their creditworthiness or credit rating. These rules assign capital charges according to their credit risk, and in some cases government regulations prohibit financial institutions from holding certain classes of assets. For

example, structured notes are sometimes designed to manipulate accounting rules so that high yield notes can be treated like top rated credit instruments for the purpose of assigning capital charges. The result is that foreign exchange exposure is not treated as such for regulatory purposes. These types of structured notes have been also used to outflank U.S. regulations that prohibit institutional investors such as pension funds and insurance companies from holding foreign currency assets.

Some tax provisions are designed to enhance regulatory safeguards by raising the relative costs of certain financial activities deemed to be less productive. For instance, long-term capital gains may be taxed at a lower rate than short-term gains in order to raise the reward on long-term investing. Using derivatives, payments, receipts and income can be shifted from one period to another. Transactions can be restructured so that they appear to occur as capital gains instead of interest payments (or vices versa), or as long-term capital gains instead of short-term ones. This problem is doubly important for developing economies whose tax bases are not well established, and where threats to their tax base can put fiscal pressures on the government that can lead to monetary expansion or greater foreign borrowing.

The use of derivatives to circumvent or outflank prudential regulation has been acknowledged by the IMF, World Bank and the OECD amongst others. The IMF's David Folkerts-Landau stated, "Financial restrictions on such positions [domestic equity markets] are being circumvented through derivatives transactions."¹⁷ The World Bank's Global Development Finance 2000 stated it in the following way, "Brazil's complex system of prudential safeguards was easily circumvented by well-developed financial market and over-the-counter derivatives." The point was similarly stated in an OECD Economics Department Working Paper by Blondal and Christiansen (1999), "The expansion of financial derivatives, which regulators have found difficult to control, has also seriously undermined prudential controls on currency exposure."

Another problem is the tendency for derivatives to be used to raise the level of risk relative to capital. This can occur even within the regulatory structure. Derivatives are designed to create price exposure so that risk can be transferred from one party to another without the expense of transferring title and principal as required to buy or short-sell. If the initial payment is thought of as equity or capital, then the size of the notional principal in comparison to capital is the degree of leverage in the derivative instrument. This leverage allows investors to assume far greater degrees of risk per dollar of capital than would be available by purchasing the asset outright or even borrowing in order to purchase the asset outright.

Leverage is a double-edged sword. Leverage enables derivatives to offer a more efficient use of capital for hedging or investing, and at the same time it reduces the amount of capital backing a given amount of price exposure (i.e. the size of a position). Raising the risk-capital ratio weakens the stability of each investor, and in turn it increases everyone else's exposure to the repercussions from investor failure. In short, it increases system risk.

In order to illustrate the point, consider an example of a Thai bank choosing between an outright \$100 million purchase of a Thai corporate security (financed by borrowing abroad) or entering a \$100 million total return swap in which the same security's return is swapped against LIBOR. The purchased securities would be treated as an asset on its balance sheet and receive a capital

charge. At a capitalization rate of 8%, this would require \$8 million in capital. Alternatively, the swap, which takes the same investment position off-balance sheet, would not be assessed a capital charge. Off-balance sheet items are assessed a capital charge based on their market value. Initially swaps are initially transacted "at the market" or at par which means their present value is zero; therefore they are neither in the money¹⁸ nor at negative values. At the market value of zero, swaps are assessed no capital charge. Once a swap moves into the money, a firm would be required to hold capital against the amount of its fair market value. However the capital charge would only reflect the degree to which it moved into the money. If the position increased in value to \$10 million dollars (10% of its notional value), then the capital charge would be \$0.8 million compared to the outright purchase which would now be worth \$110 million and its capital requirement would amount to \$8.8 million.

A more subtle illustration can be drawn from the above example of structured notes called "PERLS." The note would have a rate of return above a similarly rated AAA dollar note because the attached derivative position amounts to the sale of a put whose premium pays for the higher yield. The investor captures a higher yield on the same principle, but from a public interest concern the firm has taken on more market risk without a commensurate change to its capital requirement.

Increasing systemic risk by raising the risk-capital ratio throughout the financial system and the economy as a whole is matter of public concern and provides the economic basis for government's regulatory role to protect the national peace and security. Even if a government were to reject policies of protecting foolish investors from themselves, that government would not be acting inconsistently to be concerned with protecting everyone else from the fools.

This concern has come to the attention of the IMF. An IMF report from 1999 stated, "Third, the growing use of OTC derivatives and structured notes is increasing the ability of institutions to leverage up capital positions. The high levels of leverage may be creating financial systems that are capable of making costlier mistakes during periods of euphoria (exacerbating the boom) and that can magnify the adverse consequences of a negative shock or a reappraisal of risk."¹⁹

C) Threatening the stability of fixed exchange rate systems.

The presence of a market for foreign exchange derivatives can undermine the stability of a fixed exchange rate system in several ways.

Derivatives provide greater leverage (lower capital costs) and lower transactions costs for investors taking a position against the success of the fixed exchange rate. Such investors are often referred to as speculators, attackers or hedge fund operators. Lowering the costs of betting against the fixed exchange rate will only encourage this behavior and strengthen the effects those efforts. The greater the volume of positions that are short the currency, i.e. against the fixed rate regime, the greater the necessary size of central bank intervention or interest rate hikes needed to defend the currency peg.

The presence of foreign exchange markets means that the central bank is faced with the greater task of having to peg the exchange rate in two markets: the spot markets; and the forward or

swap market for foreign currency. Whereas the spot market is generally large in relation to the amount of foreign reserves at the central bank, and thus the central bank's potential for intervention is small in regards to the overall size of the market, the size of the derivatives market is unlimited. Together they increase the critical size for a successful central bank intervention.

Another problem posed by the presence of foreign exchange derivatives markets is that the price discovery process in those markets will, under many circumstances, indicate a future devaluation. There are two reasons for this. First, interest rates in developing countries are in most circumstances higher than in advanced capital market or developed economies. This interest rate differential means that the equilibrium forward or swap rate will always be higher than the spot rate – thus indicating that the currency will depreciate at the rate as the interest rate differential. Second, if the credit market in the developing country is not perfectly efficient, then foreign exchange market makers will not provide forward and swap contracts at rates that do not include a market risk premium.²⁰ If a market risk premium is added to the interest rate differential, then the forward and swap rates will indicate a greater rate of depreciation.

D) Quickening and deepening the crisis.

In the event of a devaluation or a sharp downturn in securities prices, derivatives such as foreign exchange forwards and swaps and total return swaps functioned to quicken the pace and deepen the impact of the crisis.

Derivatives transactions with emerging market financial institutions generally involve strict collateral or margin requirements. East Asian firms swapping the total rate of return on a local security against LIBOR were posting U.S. dollars or Treasury securities as collateral; the rate of collateralization was estimated at around 20% of the notional principal of the swap.

If the market value of the swap position were to decline, then the East Asian firm would have to add to its collateral in order to bring it up the required maintenance level. Thus a sharp fall in the price of the underlying security, such as would occur at the beginning of a devaluation or broader financial crisis, would require the East Asian firm to immediately add U.S. dollar assets to their collateral in proportion to the loss in the present value of their swap position. This would trigger an immediate outflow of foreign currency reserves as local currency and other assets were exchanged into dollars in order to meet their collateral requirements. This would not only quicken the pace of the crisis, it would also deepen the impact of the crisis by putting further downward pressure on the exchange rate and asset prices thus increasing the losses to the financial sector.

As an indication of the potential magnitude of these collateral outflows, Garber and Lall (1996) cite the IMF and "industry sources" which reported that Mexican banks held \$16 billion in tesabono total return swaps at the time of the devaluation of the Mexican peso. The authors calculated that the initial peso devaluation depressed the value of tesabonos by 15%, and that this would have required the delivery of \$2.4 billion in collateral on the next day. This would explain about half of the \$5 billion dollars of foreign reserves lost by the Mexican central bank the day after devaluation. In this way, collateral or margin calls on derivatives can accelerate the pace of

a financial crisis, and the greater leverage that derivatives provide can also multiply the size of the losses and thereby deepen the crisis.

E) Increasing systemic risk and the risk of contagion.

The Bank of International Settlement's report known as the "Lamfalussy Report" defined systemic risk as "the risk that the illiquidity or failure of one institution, and its resulting inability to meet its obligations when due, will lead to the illiquidity or failure of other institutions."²¹ Similarly, contagion is the term established in the wake of the East Asian financial crisis of 1997 to describe the tendency of a financial crisis in one country to adversely affect the financial markets in other, and sometimes seemingly unrelated, economies. It is the notion of systemic risk taken to the level of national and international markets. The term "contagion" amounts to a more dry, clinical variation of the term "tequila effect" which was used to describe the spreading effects of the 1994 Mexican peso crisis.

The presence of a large volume of derivatives transactions in an economy creates the possibility of a rapid expansion of counterparty credit risk during periods of economic stress. These credit risks might then become actual delinquent counterparty debts and obligations during an economic crisis.

The implication is that even if derivatives are used to reduce exposure to market risk, they might still lead to an increase in credit risk. For example, a bank lending through variable rate loans might decide to reduce its exposure to short-term interest rate variability, thus the volatility of its income, by entering into an interest rate swap as the variable rate receiver. If short-term rates were to rise, then the fair market value of the bank's swap position would rise, and thus would increase the bank's gross counterparty credit exposure above that already associated with the loans which were being hedged.

In so far that derivatives increase counterparty credit exposure throughout the economy, they increase the impact of one entity becoming unable to fulfill its obligations. And to the extent that derivatives are not used to reduce firms' market exposure, then the greater leverage brought to speculative investments increases the likelihood of such a failure. In this way derivatives contribute to the level of systemic risk in the financial system.

The presence of derivatives can also increase the global financial system's exposure to contagion through two channels. Regarding the first, derivatives can spread the stress or crisis in one country to another because of the international nature of markets. Many derivatives involve cross-border counterparties and thus losses of market value and credit rating in one country will affect counterparties in other countries. The second channel of contagion comes from the practice of financial institutions responding to a downturn in one market by selling in another. One reason firms sell in other markets is because they need additional funds to purchase liquid G5 currency denominated assets to meet collateral or capital requirements. In order to obtain these assets,²² firms will make a portfolio shift and sell securities in other markets. This demand for collateral assets can be sudden and sizable when there are large swings in financial markets, and thus this source of contagion can be especially fast and strong. Neftci (1998) discusses how OTC derivatives such as total return swaps contribute to contagion in this way.

F) Complicating post-crisis policy making.

The process of policy formation was much more straightforward in the wake of the 1980s' debt crisis. The borrowers were mostly governments, and the private lenders were the large money center banks. This meant there was a single representative borrower for each debtor country,²³ and the key lenders could be gathered into a single room. Together with the relevant multilateral institutions, all the parties could negotiate a plan to restructure debt payments.

The policy making process became much more complicated in the 1990s. There were many different private and public debtors and issuers of securities. There were many investors and many different types of claims on parties in the effected developing countries. Capital flows in the form of stocks, bonds and structured notes meant that there were hundreds of major investors and millions of lesser investors. These claims were all the more complicated because of derivative contracts. Derivatives added to both the number of potential counterparties and raised problems as to who held the first claim on outstanding debts and other obligations.

Moreover, losses on derivatives are not the same as late payments on loans. Debt payment problems do not necessarily have to result in loses to either side. Some loan payment problems are short-term liquidity problems that can be solved by merely restructuring the loan payment schedule. Derivatives losses, in contrast, are already lost and cannot be mitigated. These loses must be paid immediately, although the payments can feasibly be financed by acquiring additional debt. What is more, changes in market interest rates and exchange rates can cause derivatives losses to occur more suddenly, accumulate more quickly and sum to greater magnitudes than the losses associated with dollar denominated variable rate bank loans.

IV. SUMMARY AND LESSONS

Derivatives play a two-fold role in the economy. They provide a useful role in hedging and risk management so as to facilitate capital flows to developing economies. At the same time, however, they create the conditions for the possibility for raising risk in relation to capital through leveraging and by dodging prudential regulatory safeguards. They can also make fixed exchange rate systems less stable, and then later quicken the pace and deepen the impact of a devaluation once it occurs. This functions to increase the systemic risk in financial markets and raises the possibility of spreading contagion amongst economies. In the wake of the crisis they can make the process of post-crisis recovery policy making even more difficult.

There are several policy lessons for financial market regulation. The accounting rules, capital requirements and risk-management requirements of financial institutions must be updated to address the potential role played by derivatives in undermining their intended goal of functioning as regulatory safeguards in the financial system. This means that credit evaluations should consider market risk as well as credit risk. The capital requirement for off-balance sheet items should reflect their market risk and not simply their credit risk. The restriction on foreign exchange exposure should apply equally well to off-balance sheet items as items on the balance sheet. Derivatives markets, both exchange traded and over-the-counter, must become more transparent by reporting requirements for transactions (price, volume and contract type), open

interest (especially large open positions) and collateral and margin standards. Overall, the implication for regulatory policy is that derivatives regulations must contain provisions that shape the structure of the incentives for derivatives trading so that they will be used in proper ways to facilitate capital flows without their being used in destructive ways to increase risk-to-capital and out-manuevering government safeguards.

ENDNOTES

- 1) Derivatives are said to be traded either on exchanges, where trading is public, multilateral and closely regulated by governments and the exchanges themselves, or in over-the-counter markets where trading is non-public and largely outside government regulation.
- 2) Most data comes from the Bank for International Settlements, the U.S. Office of Comptroller of the Currency, some Bloomberg and Reuters quotes, and Swaps Monitor.
- 3) Goodman, Laurie. "Bank Lending to Non-OPEC LDCs: Are Risks Diversifiable?" Federal Reserve Bank of New York Quarterly Review. Summer 1981. Dodd, Randall. "The Rise of Syndicated Eurocredits in North-South Lending." Working Paper, Dept. of Economics, American University. 1989.
- 4) Cross-default clauses mean that a default against one lender is treated as a default against all lenders and thus prevent borrowers from selecting lenders for default.
- 5) The growth of bond issuances was discussed in Ismail Dalla & Deena Khathkate, "The Emerging East Asian Bond Market," IMF-World Bank Finance & Development, December 4, 1997.
- 6) The term bond is used here to mean any securitized credit instrument whether it be a short-, intermediate-, or long-term fixed rate security, a floating rate note or a structured note.
- 7) A good, short exposition of this point is made by John Chrystal (1996).
- 8) Bank for International Settlements, Central Bank Survey of Foreign Exchange and Derivatives Market Activity, 1998.
- 9) The largest source of credit losses by ACM derivatives dealers in 1997 and 1998 were on dollar-ruble foreign exchange forwards made with Russian firms.
- 10) The party whose position is to pay the fixed rate and receive the floating rate is considered long the swap, and the party whose position is to receive the fixed and pay the floating rate payment is the short position or the swap seller. This is opposite from the convention in the credit market where the party receiving the fixed bond or loan payments is considered the long position.

- 11) Fleming, Michael J. 2000. "The Benchmark U.S. Treasury Market: Recent Performance and Possible Alternatives." *Economic Policy Review*, Federal Reserve Bank of New York, Vol. 6, No. 1, April 2000. Pesek, William, Jr. 2000. "Swapping Curves." *Barron's*, September 4, 2000.
- 12) Bank for International Settlements, Central Bank Survey of Foreign Exchange and Derivatives Market Activity, 1998.
- 13) This long position could be in the nature of a futures contract or a short-put position.
- 14) IMF. 1999. *Involving the Private Sector in Forestalling and Resolving Financial Crises*. Policy Development and Review Department. Washington, D.C. Note that the disaggregated figures in the tables do not add to \$23 billion due to rounding and the exclusion of non-crisis countries such as Vietnam.
- 15) IMF Office Memorandum on private market financing for emerging markets: developments for the second quarter of 1997, July 17, 1997.
- 16) Cited in Woolley, Scott. "Night baseball without lights." *Forbes*, November 1, 1999.
- 17) Quoted in David Nussbaum. "Seeing is Believing." *Institutional Investor*, September 1997.
- 18) The term "in the money" means a positive fair market value of the position.
- 19) IMF. *International Capital Markets*. 1999.
- 20) Market makers use the credit market to create synthetic short positions in order to lay-off their exposure in offering short forward and swap positions in the market. They borrow in the local currency, buy the hard currency with the proceeds and they invest in hard currency assets for the maturity of the forward or swap.
- 21) Bank for International Settlements (BIS). *Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten Countries*. Basle, 1990.
- 22) Collateral for OTC derivatives is generally required to be in the form of G5 currencies or their Treasury securities, except for Japanese Treasury securities.
- 23) In some countries, such as Mexico, part of the foreign debt was owed by local or regional governments. However the national government assumed responsibility in debt negotiations.

SOURCES

- Bank for International Settlements (BIS). Report of the Committee on Interbank Netting Schemes of the Central Banks of the Group of Ten countries (known as the Lamfalussy Report). Basle, May 1990.
- Bank for International Settlements (BIS). Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1995. Basle, May 1996.
- Bank for International Settlements (BIS). Central Bank Survey of Foreign Exchange and Derivatives Market Activity 1998. Basle, 1998.
- Bank for International Settlements (BIS). OTC Derivatives: Settlement Procedures and Counterparty Risk Management. Basle, September 1998.
- Bloendal, Sveinbjorn, and Hans Christiansen. "The Recent Experience with Capital Flows to Emerging Market Economies." OECD Working Paper #211. February, 1999.
- Bodnar, Gordon M. and Gunther Gebhardt. 1998. "Derivatives Usage in risk Management by US and German Non-Financial Firms: a Comparative Survey." NBER Working Paper #6705.
- Brown, Stephen, J. Goetzmann, and James Park, "Hedge funds and the Asian Currency Crisis or 1997," NBER Working Paper 6427, February 1998.
- Chew, Lillian. Managing Derivatives Risk. 1996.
- Chrystal, John. "Using Derivative Products to Lower Borrowing Costs." *Latin Finance, Latin Derivatives Supplement* (January/February 1996).
- Clow, Robert. "Risk Rediscovered." *Risk Magazine*, October 1998.
- Clow, Robert. "Safety First." *Institutional Investor* (February 1999).
- Cole, Harold and Timothy Kehoe. "Self-fulfilling Debt Crises." Federal Reserve Bank of Minneapolis, Staff Report 211. December 1996.
- Corsetti, Giancarlo, et al. "What Caused the Asian Currency and Financial Crisis?" manuscript (September 1998).
- Corsetti, Giancarlo, et al. "Paper tigers? A Model of the Asian Crisis." manuscript (September 1998).
- Dalla, Ismail & Deena Khathkate, "The Emerging East Asian Bond Market," IMF-World Bank Finance & Development, December 4, 1997.
- Edwards, Franklin. "System risk in OTC Derivatives Markets: Much Ado About Not too Much." Columbia University Business School Working Paper 94-17. 1994.
- Eichengreen, Barry and Donald Mathieson. "Hedge Funds and Financial Markets: Implications for Policy." In Eichengreen et al. "Hedge funds and Financial Market Dynamics." IMF Occasional Paper 166. IMF, Washington D.C. (1998).
- Figlewski, Stephen. "Derivatives Risks, Old and New." In Robert E. Litan and Anthony M. Santomero, eds., Brookings-Wharton Papers on Financial Services. Washington, D.C.: Brookings Institution Press. 1997.
- Folkerts-Landau, David, Derivatives: The Wild Beasts of Finance, Oxford Press, 1994.
- Folkerts-Landau, David and Peter Garber. "Derivative Markets and Financial System Soundness." In Charles Enoch and John Green, eds. Banking Soundness and Monetary Policy, IMF, Washington, D.C. 1997.
- Garber, Peter and Michael Spencer. "Foreign Exchange Hedging with Synthetic Options and the Interest Rate Defense of a Fixed Exchange Rate System." IMF Staff Papers, Vol. 42, No. 3. September 1995.
- Garber, Peter, 1996, Managing Risks to Financial Markets from Volatile Capital Flows: the role of Prudential Regulation, International Journal of Economics, Vol. 1, July 1996.

- Garber, Peter, 1998, Derivatives in International Capital Flow, NBER Working Paper #6623, June 1998.
- Garber, Peter and Subir Lall, "Derivative Products in Exchange Rate Crises," in Reuven Glick (ed.) *Managing Capital Flows and Exchange Rates: Perspectives from the Pacific Basin*, Cambridge University Press. (Prepared for Federal Reserve Bank of San Francisco conference in 1996).
- Goldstein, Morris, David Folkerts-Landau, Liliana Rojas-Suarez, and Michael Spencer, International Capital Markets, Part I. IMF. April 1993.
- Gordon, Gary and Richard Rosen. "Banks and Derivatives." NBER Working Paper 5100. 1995.
- Grant, Jeremy. "Concern: Hidden Risks in Credit Derivatives." *Financial Times* (November 2, 1998).
- IMF memorandum, Private Market Financing for Emerging Markets: Developments for the Second Quarter 1997.
- Jordan, Bradford and Susan Jordan. "Salomon Brothers and the May 1991 Treasury Auction: Analysis of a Market Corner." *Journal of Banking and Finance*. Vol. 20, No. 1, pp. 25-40.
- Kregel, J.A. "East Asia is Not Mexico: The Difference Between Balance of payments crises and Debt Deflations." Jerome Levy Economics Institute Working Paper 235. 1998.
- Kregel, J.A. "Derivatives and Global Capital Flows: Applications to Asia." *Cambridge Journal of Economics*, Vol. 22, No. 6, November 1998, pp. 677-692.
- Lall, Subir. "Speculative Attacks, Forward Market Intervention and the Classic Bear Squeeze." IMF Working Paper, June 1997.
- Lee, Jang-Yung. "Sterilizing Capital Flows." IMF Economic Issues No. 7, 1997.
- Loomis, Carol. "Cracking the Derivatives Case." *Fortune* (March 20, 1995).
- Markham, Jerry W. "'Confederate bonds,' 'General Custer,' and the Regulation of Derivative Financial Instruments." *Seton Hall Law Review*. 1994.
- McClintock, Brent. "International Financial Instability and the Financial Derivatives Market." *Journal of Economic Issues* 30(1). March 1996.
- Neftci, Salih N. "FX Short Positions, Balance Sheets and Financial Turbulence: An Interpretation of the Asian Financial Crisis." CEPA Working Paper #11. October, 1998.
- Nussbaum, David. "Seeing is Believing." *Institutional Investor*, September 1997.
- Partnoy, Frank. *F.I.A.S.C.O.: The Inside Story of a Wall Street Trader*. Penguin, New York. 1999.
- Rotberg, Eugene. "Derivatives: The Ultimate Freudian Slip-Up." Lecture at the Jerome Levy Institute (April 7, 1995).
- Saunderson, Emily. "Derivatives Aid Development." *Institutional Investor*, September 1997.
- Smithson, Charles W., Clifford W. Smith, Jr., and D. Sykes Wilford. *Managing Financial Risk*. Irwin, New York. 1995.
- Stiglitz, Joseph. "Sound Finance and Sustainable Development in Asia." World Bank Group, keynote address to Asia Development Forum (March 12, 1998).
- Swaps Monitor, edited by Paul Spraul.
- Thorbeeke, Willem. "Financial Derivatives: Harnessing the Benefits and containing the Dangers." Jerome Levy Economics Institute Working Paper 145. August 1995.
- World Bank. "Global Development Finance Report," 1998, 1999, 2000.