Derivatives and global capital flows: applications to Asia

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The role of derivatives contracts in explaining the existence of a number of puzzles associated with the Asian financial crisis is investigated. The shift to short-term commercial bank lending in a region that traditionally relied on direct investment, the allocation of resources to low return uses in an area considered to be highly profitable, lax prudential supervision in systems that had introduced financial reforms early, and the co-movement of asset prices and exchange rates, which was to have been eliminated by direct equity investments, are all linked to the characteristics of derivative contracts used to provide lending to Asia.

1. Introduction: four puzzles

There are four factors involved in the current financial crisis in Asia that have caused surprise. This paper suggests that an understanding of the role of derivatives contracts in facilitating the financial flows to Asia may provide a key to understanding them.

The Latin American debt crisis of 1982 was thought to have been aggravated by the dominance of syndicated lending by commercial banks. Developing-country borrowers were thus encouraged to increase their reliance on non-bank lending, in particular private direct investment flows. The dominance of direct investment flows to a number of Asian countries was used as an example of the greater stability of such lending. Yet, the Asian crisis appears to have been precipitated by the reversal of short-term private bank lending which had come to dominate capital flows to the region.

Second, the flows of capital to Asia have been used as an example of the benefits of free international capital markets in directing resources to the most productive uses. Yet, in the aftermath of the crisis, it appears that total returns on equity investments in Asia have in fact been lower than in most other regions throughout the 1990s.

Third, it appears that in a number of Asian countries the majority of international lending was between foreign and domestic banks. It has been suggested that the major cause of the crisis is unsafe lending practices by the Asian banks, permitted by inadequate national prudential supervision. But these economies were the most advanced on the road to market liberalisation. One of the cardinal principles of financial liberalisation, formed in the aftermath of the Chilean crisis, is that the creation of institutional structures ensuring the stability of the financial system should precede financial market liberalisation. Indeed, many of the Asian countries were following this advice. It is interesting to note that the developed-country lending banks were generally large, global banks...
employing highly sophisticated risk-assessment procedures. However, they appear to have continued lending well after the increased risks in the region were generally apparent. This suggests that even the most sophisticated operators in global financial markets have difficulties in assessing risk, and that their regulators were no more successful in imposing prudent limits than those in the most advanced markets.

Finally, private portfolio and direct investment flows were considered to be preferable to syndicated bank lending because they were thought to segregate the problem of foreign exchange instability from asset market instability. Syndicated lending was denominated in the currency of the lending bank, and the exchange rate risk was thus borne by the borrower. However, direct equity investors purchase foreign financial assets in foreign currency and thus bear the currency risk. It was suggested that in a crisis the foreign investor would suffer from a fall in asset prices as well as from a decline in the exchange rate, which would discourage sales of security investments, thereby reducing selling pressure in the foreign exchange market. Yet, the linkage between the collapse in exchange rates and equity markets appears to have been even closer in Asia than in other experiences of financial crisis.

One explanation of the crisis in foreign exchange markets is that a large proportion of foreign borrowing by corporates and banks was unhedged because of prevailing expectations of stable exchange rates. When these expectations were disappointed, the scramble to repay these foreign currency loans created a massive market imbalance and a collapse of the foreign exchanges. This absence of generalised hedging of foreign borrowing has been interpreted to mean that financial derivative contracts played little or no role in the crisis. This position has been reinforced by the repeated references to an IMF study which suggests that global hedge funds were not active catalysts in the Asian crisis. However, the recent quarterly reports (for the 4th quarter of 1997 and 1st quarter of 1998) of US money-centre banks, reflecting the initial impact of the Asian crisis on their lending to the area, suggest that most of their initial losses have been related to derivative-based credit swap contracts. Thus, at least in the case of US banks, certain types of derivative contract appear to have played some role in the flows of funds to Asia and thus in the instability of these flows. While bank derivatives are ‘tailored-to-the-client’, ‘over-the-counter’ contracts, and as such are not generally public knowledge, the experience of such contracts in the ‘Tequila’ crisis earlier in this decade provides some indication of the kinds of contract that might have been involved. This short paper thus suggests ways in which bank derivative contracts may have been linked to the rise in short-term bank lending to Asia and contributed to the four puzzles noted above concerning capital flows to the region.

2. Structured derivatives: global allocation of capital, transparency and prudential supervision

Most people are now familiar with the standard derivative contracts used in hedging risk, such as forwards, futures and options. While foreign currency forwards remain the

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1 This frequently cited study was not available in April 1998 when this article was drafted. The summary that appears in the IMF’s *World Economic Outlook* (Part II, Box 1, 1998) suggests that hedge funds mainly attack countries whose ‘macroeconomic variables are far out of line with sustainable values’. Another recent study (Brown, Goetzmann and Park, 1998) suggests that hedge funds did not take major positions against Asian currencies or financial assets and did not make abnormal returns from their operations during the last half of 1997. From this one might conclude that the hedge fund managers did not detect any unsustainable policies in these countries.
province of bank foreign exchange dealers, most basic futures and options contracts are
standardised and traded in organised, regulated markets. Banks also offer derivative
contracts to their clients in what is termed the ‘over-the-counter’ (OTC) market. But
there is no market involved in these contracts, which may involve the stipulation of
standard futures and options contracts outside the organised market on a bilateral basis
with individual clients. However, the majority of OTC activity involves individually
tailored, often highly complex, combinations of standard financial instruments, packaged
together with derivative contracts designed to meet the particular needs of clients. These
contract packages involve very little direct lending by banks to clients, and thus generate
little net interest income. However, since they are often executed through special purpose
vehicles (i.e., specialised investment firms that are independently capitalised), they have
the advantage, under the Basle capital adequacy requirements, of requiring little or no
capital, or of being classified as off-balance-sheet items, because they do not represent a
direct risk exposure for the bank. In addition, they generate substantial fee and com-
mission income. Rather than committing their own capital, the banks serve in these
transactions as intermediaries whose services involve not only matching borrowers and
lenders, but acting as market innovators to create investment vehicles that attract lenders
and borrowers. Nonetheless, these activities often require banks to accept some of the
risks associated with the derivatives created in order to produce packages with the
characteristics desired by final borrowers and lenders. These derivative risks may or may
not be hedged by the bank, depending on its own proprietary investment strategy. When
hedging does occur, it can be done either by physical hedging (i.e., the actual purchase of
an offsetting position in the underlying financial asset), through the purchase of derivative
contracts in organised markets, or by producing a package that involves risks which offset
those involved in other packages (cross hedging or risk matching across clients).

The major objective of active, global financial institutions is thus no longer the
maximisation of profits by seeking the lowest cost funds and channelling them to the
highest risk-adjusted return, but rather in maximising the amount of funds intermediated
in order to maximise fees and commissions, thereby maximising the rate of return on bank
capital. This means a shift from continuous risk assessment and risk monitoring of funded
investment projects that produce recurring flows of interest payments over time to the
identification of riskless ‘trades’ that produce large, single payments, with as much of the
residual risks as possible carried by the purchasers of the package. This process has been
accelerated by the introduction of risk-weighted capital requirements. As a result, banks
have come to play a declining role in the process of the efficient international allocation of
investment funds. Rather, they serve to facilitate this process by linking primary lenders
and final borrowers. This means that the efficient allocation of funds to the highest risk-
adjusted rate of return depends increasingly on assessment of risks and returns by the
lender. Yet, it is the role of most derivative packages to mask the actual risk involved in an
investment, and to increase the difficulty in assessing the final return on funds provided.1
As a result, certain types of derivative may increase the difficulties faced by private capital
markets in effectuating the efficient allocation of resources. By extension, if they make
investment evaluation more difficult for primary lenders, they may also create difficulties
for financial market regulators and supervisors.

These particular aspects can be most clearly seen by reference to structured credit

1 For example, Chew (1996, p. 57) observes that ‘[s]tructured notes are the epitome of how investment
technology helped and continues to help money managers circumvent guidelines that were framed to protect
the interest of small, unsophisticated investors...’
derivative contracts, which expanded dramatically during the 1990s. Most US institutional investors do not face unlimited investment choices. Most are limited to investments in assets with a minimum of risk as represented by an ‘investment grade’ credit rating on the issue, and many are precluded from certain types of risk, such as foreign exchange risks, or foreign credit risk (these often are simply the result of the application of the investment grade restriction). This means that a large proportion of professionally managed institutional investment funds cannot invest in emerging markets or in particular asset classes such as foreign exchange. Structured derivative packages, created by global investment banks, have often provided the means to circumvent these restrictions.

Structured derivative contracts have been used for this purpose in two ways. In 1992 and 1993, in a falling interest rate environment, they provided a means to increase returns for money managers and then, when rates started to rise, to provide borrowers with below-market borrowing rates. They usually involved structured credit notes with embedded options. ‘These notes only carried a higher coupon because they contained an embedded short position in interest rate options. In other words, often when an investor bought a structured note, he simultaneously sold an interest rate option... There is no doubt that some less knowledgeable investors did not realize that by buying these securities, they were selling options or engaging in leveraged bets, because some of these features were quite cleverly concealed’ (Chew, 1996, pp. 54–5). The assumption behind such contracts is that the price of the instrument underlying the contract would not change sufficiently to produce a loss that completely eliminated the premium earned from selling the option.\footnote{The widely reported derivatives losses incurred by Procter and Gamble and Gibson Greeting Cards involved contracts of precisely this type. Their borrowing costs were reduced by the amount of the option premium gained from writing put options on interest rates with a highly levered pay-off profile. Such contracts provided below-market borrowing costs as long as the losses on the option positions did not exceed the premia received from selling the options contracts. However, in the winter of 1994 interest rates rose sharply, leading to net losses. Cf., Chew, 1996.}

An example closer to the present context might involve US government agency dollar-denominated structured notes with the interest payment, or the principal value, linked to an index representing some foreign asset.\footnote{The Federal Home Loan Bank (FHLB), one of the largest issuers of such products in the United States, has more than 175 indexes or index combinations against which cash flows are calculated... Structure notes are primarily issued by government-sponsored enterprises (GSEs), such as the Federal Home Loan Bank (FHLB), Federal National Mortgage Association (FNMA), and Federal Home Loan Mortgage Corporation (FHLMC). Although the credit risk of these securities is minimal, other risks such as interest-rate risk, market (price) risk, and liquidity risk can be material. However, investment banks and the section 20 subsidiaries of banks often act to underwrite structured-note issuances. They are often actively involved in making a market in secondary structured notes... In its heyday, the structured-note market was a by-product of a unique period in financial history. In 1992 and 1993, Wall Street firms engineered debt that allowed borrowers to attain highly attractive below-market funding and that rewarded investors (in large part) as long as interest rates remained low. The incredible and at times implausible array of structure types came into being in response to the investment community’s desire for higher returns during a sustained period of low interest rates. Issuers and investment dealer firms were more than willing to address this need, introducing investors to more attractive (and by definition riskier) securities whose cash flows were linked to, for example, the performance of the yen; the yen’s relationship to the lira; and a host of other indexes, currencies, or benchmarks. Investors’ quest for enhanced yield caused them to adopt, in many cases, very tenuous risk-reward measures with respect to potential investment choices.’ Federal Reserve System, 1996, Section 4040.1, pp. 1, 5, 6.}

The return to these notes would be higher than US domestic rates, but the increased yield would be accompanied by the increased risk due to foreign exchange exposure. Such an asset might be a one-year dollar-denominated note paying a guaranteed above-market interest rate, but with the amount of repayment of...
principal linked to an index, say the Thai baht/dollar exchange rate. Since the asset is
denominated in US dollars, and the interest is guaranteed and paid in US dollars, the
notes carry an investment grade credit rating and would be entered on the balance sheets
of investors as the equivalent of a US Treasury or Agency security, not as a foreign
investment subject to foreign exchange or country risks. Yet, the above-market interest
rate on the note is generated by the sale of a put option on the Thai baht at a strike price
just above the current market rate that is in fact embedded in the contract. This is
equivalent to the buyer having purchased the Thai currency. If the baht exchange rate
remains constant, the written put is not exercised and the option premium received is
retained by the writer and is used to meet the above-market guaranteed interest rate
payable on the contract.

However, if the baht were to depreciate to a value below the strike price, then the buyer
of the put would exercise his right given by the option to sell baht at a price that is higher
than the market price. The writer of the option would thus incur a loss determined by the
difference between the strike price and the market price for baht. Since the interest rate on
the instrument is guaranteed, the loss cannot be reflected in a reduction in the rate of
interest. However, the augmented interest payment produced by the margin over the
market interest rate, and any loss on the option position, would be recovered by means of
a reduction in the principal returned to the purchaser at maturity. An investor seeking to
maximise yield may be attracted by the guarantee on the interest rate, and underestimate
or even ignore the risk of loss in capital value. Since the writer of an option has an
unlimited exposure, a large change in the exchange rate could cause a total loss of capital
invested.

Alternatively, this contract could have been constructed by lending the principal (less
the discounted value of the guaranteed dollar interest payment which is invested in a one-
year Treasury bill) directly to a Thai bank by buying a bank acceptance. Again, the
implicit assumption is that the baht/dollar exchange rate should remain constant so that
the baht interest and principal repayment can be converted at maturity to a dollar value
equal to the original investment of principal. If the baht devalues relative to the dollar,
then the amount available to repay the principal will be lower. The buyer thus has the
entire principal at risk, only the interest is guaranteed. The contract arranged in this way
would provide Thai banks with below-market rate funds, provide US investors with
above-market returns (US rates were in decline from 1991 to 1993) and the banks with
fees and commissions for arranging the trade, but with no commitment of capital (most
US banks were emerging from the experiences of the real estate crisis of the 1980s and
were seeking to rebuild capital).

It is virtually impossible for the US investor to evaluate the use of the funds made by the
Thai bank, and there is little incentive for the US bank to do so, since once the structured
note issue is sold, the foreign credit and foreign exchange risks are borne by the US
investor. The investor is not only subverting prudential controls (on its balance sheet
these assets would be classified as exposure to a US entity, with investment grade credit
risk), but is in all probability evaluating the return without any adjustment for the foreign
exchange risk, even if that risk is recognised as such. There is thus little economic interest
or possibility for the market to assess either the risk or the returns of the investment. There
is thus no incentive for market agents to act so as to ensure that capital is allocated globally
to those uses providing the highest risk-adjusted rates of return.
3. Structured credit derivatives

Structured products have been the basis for the growing market in credit derivative contracts. These contracts usually involve credit swaps embedded in structured notes to form credit-linked notes. The objective of a credit swap is to allow counterparties to exchange the credit risks associated with an instrument, while retaining the cash-flow characteristics. Total return swaps ‘enable counterparties to swap the total economic risk attached to a reference asset without actually transferring the asset itself... Under the terms of the swap, [the first counterparty] pays [the second counterparty] the cashflows generated by the reference asset, including coupon payments and any appreciations in its capital valued calculated on a periodic mark to market basis. [The second counterparty], in exchange, pays a LIBOR-linked margin plus any depreciations in the capital value of the reference asset’ (Ghose, 1997, p. 3; see also the description given in Federal Reserve System, 1998, section 4350.1, pp. 1–2). A credit swap or equity swap thus transfers the credit risk, including the impact of a credit event on the capital value of the asset.

It was the creation of the Brady bond that provided the recipe for the extension of many of these structured loans to emerging markets. A collateralised Brady bond is a variety of structured derivative in which the developing country (Mexico was the first) uses foreign exchange reserves as equity capital to create an investment company (special investment vehicle). The investment company uses the equity (i.e., the foreign exchange) to buy long-term, stripped US Treasury bonds to serve as collateral. The investment company then issues its own fixed-interest liabilities in the form of long-term bonds (which came to be called Brady bonds after the US Secretary of the Treasury who held office at the time), which carry a sovereign government guarantee, in an amount equal to the maturity value of the US Treasury discount bonds. The investment company’s bonds are usually only sold in exchange for the debtor country’s outstanding foreign bank debt at its current market value (in Mexico’s case this represented a discount to its face value of about 35%).

The principal of the bonds issued by the investment vehicle (the Brady bonds) is thus guaranteed or collateralised by the Treasury bonds held, and repayment of principal in full at maturity is riskless. Additional short-term Treasury coupon strips (which provide only payment of coupon interest, without any right to principal repayment) would also be purchased by the investment vehicle to provide a guarantee for the interest payments during the first 18 or 24 months of life of the bonds. After that, interest would have to be paid from the proceeds of the underlying loans or from other government sources. The interest is thus only partially guaranteed and only riskless for the payments backed by the US Treasury strips. Banks that exchanged their participations in syndicated loans to developing countries for ‘Brady bonds’ could then trade those bonds in the open market, with their values determined by changes in the issuing country’s sovereign credit rating and in US interest rates which affect the current value of the underlying collateral—the Treasury bonds.

Although the maturities of the Brady bonds were usually 20 or more years, in the case of a Brady bond with a two-year rolling interest guarantee, it was identical to buying a 20-year discount zero coupon bond, a 6-month zero bond, a 12-month zero, an 18-month zero, and a 2-year zero. These streams were default-free, so they could be considered as AAA. It was only the interest payments to be paid after the second year (which could be represented as 36 zero coupon bonds with maturities running from 30 months to 20 years at six-month intervals) that carried foreign exchange and sovereign credit risk. The Brady structure thus provided complicated market valuation, and it also provided an infinite
number of possibilities for rearranging the various pieces of the bond into more attractive cash-flow structures.

An example would be transferring Brady bonds into a trust structure, rearranging the cash flows and swapping them from floating USD into fixed DEM with a bullet repayment. Investors are thus able to achieve a higher yield than a Latin American DEM Eurobond with essentially the same counterparty risk. The bank arranging the issue is left with a contingent default risk on the underlying Brady bonds. There can be a loss in the case of a default, as the residual value of the Brady bonds in the trust might not be sufficient to cover the bank's potential loss from unwinding the cross currency swap. (Watzinger, 1997, p. 49)

Thus, a company set up to buy Brady bonds could issue its own two-year bonds that would carry a AAA credit rating since the interest payments were backed by US Treasury securities, and another series of bonds with a 20-year guaranteed principal value at maturity and a lower credit rating reflecting the risk on the remaining interest payments. If this second series could be rated investment grade, the final result would be to transform high-risk, impaired, syndicated loans of banks to Latin American governments into low-risk investment-grade bonds that could be sold to institutional investors, with a profit from the price differences reflecting the credit-rating differential, as well as the associated fees and commissions. This is called credit enhancement, and investment banks quickly extended the Brady principle to other types of developing country debt. Since the first Brady issues were in Mexico (J. P. Morgan had produced a prototype of the Brady bond called the Aztec bond in 1988), this extension beyond syndicated bank loans also appears to have started in Mexico.

The problem facing investment bankers was to find structures that allowed improvement in credit ratings of the original issues at minimal cost. The first step in this process was the creation of a special investment vehicle in the form of an offshore trust that would buy a high interest rate domestic bond (say a Mexican government-issued security, such as Ajustabonos or Cetes, which carries an investment grade domestic credit rating), along with some zero coupon US Treasury bonds. These purchases would be financed through the issue of its own dollar-denominated bonds (no longer called Brady). The bonds could be divided into two classes: one class would have its principal collateralised by the Treasury discount bonds in Brady fashion, while the other class, backed by the domestic bonds, would carry no guarantee. The interest would be paid from the income generated by the peso asset. For the rating agencies, these were credit-enhanced peso bonds, and they were assigned a credit rating equal to the Mexican government rating on its peso issues in the domestic capital market. Since a government is always the benchmark, and thus the domestic risk-free rate, it is almost by definition investment grade in its own market. The enhanced bonds issued by the trust were thus given an investment-grade rating. But, as dollar-denominated bonds paying dollar interest rates, they could be sold to US institutional investors. What the investor was in fact buying was a peso-denominated Mexican government bond, and the exchange rate risk on the interest payments. However, on the balance sheet of the US investor, these instruments were represented as if they were US dollar investment-grade bonds. Again, the result was that US institutional investor funds were being invested in emerging market debt, earning above-market interest rates, without their balance sheets necessarily reflecting the actual risk involved. These structures were offered in various combinations, but it still remains true that neither the investor nor the bank intermediary has any direct interest in evaluating either the final use made of the funds, nor the risk-adjusted returns earned by the investments. For the intermediary there was no risk, unless the bank was required to
guarantee that it could convert the interest payments into dollars, which only represented a risk if the foreign currency was to become inconvertible (this is not devaluation risk, but the risk that the currency could not be sold at any price).

This provides one possible explanation of why so much effort was made to prevent Mexico from suspending convertibility in 1994. Structures similar to these were used in Asia, as well as in Latin America. Thus the structured note and the credit-enhanced Brady structure provide simple examples of how funds were moved from developed to developing countries, despite the existence of prudential regulatory barriers, and why there was little effort expended in ensuring that the funds were moving to the highest risk-adjusted uses. The buyers were interested in enhancing yield in a low yield environment, while the intermediaries were interested in producing zero risk, zero capital-using vehicles that would maximise fee and commission income. Earnings on structured vehicles are estimated to have been in excess of 2% of principal.

The result of these packages is to change the credit-risk characteristics of the bonds by shifting the risks to different individuals. They thus allow access for investors whose activities are limited by the credit-risk classification of the assets they can buy.

Emerging market borrowers use total return swaps to get access to funding, or reduce the cost of it. The borrower sells assets to a bank and enters into a total return swap. In this swap, he receives the total return on the assets sold and pays Libor plus spread. Consequently, the borrower raises funds while at the same time still being able to benefit from a price appreciation of the asset sold... Investors use total return swaps to get access to their desired emerging market exposure. In a number of countries, severe restrictions in the cash market prevail. For instance, cumbersome settlement procedures, withholding taxes or minimum holding periods. Total return swaps can be an effective means for investors to structure a way around these restrictions. (Chew, 1996, p. 49)

4. Asset prices and foreign exchange market linkages

Linkage between foreign exchange markets and emerging asset markets may result from the use of some extensions of the structured and credit derivatives contracts discussed above. These extensions generally involve using hard currency exposure to fund a position in an emerging market asset denominated in an emerging market currency. They thus create both currency and emerging asset market price risk.

In an equity swap, the owner of an emerging market asset exchanges its return (i.e., interest or dividend income plus the change in capital value) for a fixed term (or until maturity or perpetuity) against a zero interest loan (which may be in foreign currency) of its current value (or the expected value of the future income stream) of the asset. This is, of course, equivalent to sale of the asset, but without actual transfer of ownership. Such a transaction avoids having to book a loss on the asset (an advantage to a bank in difficulty) or to book a tax event (an advantage to a rich businessman), while liquidating the value of the asset. There is currency risk represented by the receipt of the total return on the asset by the developed country bank, as well as market price risk, represented by the necessity to offset changes in capital value. Thus, both exchange rate risk and asset price risk are present in these contracts.

A variant of this structure is a form of total return swap that was common in the run-up to the 1994–95 peso crisis.¹ A total return swap can be made using any underlying asset as

¹ The use of this particular structure by a large US investment bank is described by Partnoy (1997, ch. 9). It is important to remember that even if no assets or currency are actually exchanged, the impact on the participating banks’ profit and loss position is just as if the funds had actually been lent and/or invested and in the case of leveraged contracts exceed those amounts.
the reference rate which is swapped against the benchmark rate, usually a US dollar rate plus a margin. A US bank may agree to pay the total return (in pesos) on a Mexican government security against the payment by a Mexican bank of a dollar benchmark interest rate plus a spread. The Mexican bank is effectively borrowing dollars and investing them in Mexican securities, earning the spread between dollar and peso interest rates. The advantage in this structure (as opposed to the equity swap discussed above) is that the asset does not appear on the Mexican bank’s balance sheet, while it profits from what is in effect borrowing at a cost below the domestic market interest rate without adding to its risk-adjusted capital requirement.

On the other hand, the US bank is effectively lending dollars against the collateral of an emerging market asset, and paying the total peso return on the foreign asset against receipt of a dollar interest payment. The US bank profits from the spread over market interest rates, which is substantially greater than it could have charged domestic clients. As far as the developing country bank is concerned, it faces foreign exchange risk and possible interest rate or maturity risk, as well as the price risk on the asset (the borrower must compensate the lender for any depreciation in the capital value of the asset). Risk coverage for the US bank would be arranged by buying the underlying asset (this hedges the commitment to pay the interest return on the asset plus any capital appreciation), and then financing the purchase through a repurchase agreement with another US bank; thus getting the asset off its own balance sheet. But exchange rate and convertibility risk exposure still remain on the notional amount of the swap contract. This could be hedged by issuing a floating-rate note at a guaranteed above-market interest rate for the value of the principal, with a clause permitting payment in foreign currency in the event of a suspension of currency convertibility. Thus, both the US and emerging market banks incur currency mismatches, and the profitability of the contract to each depends on movements in the exchange rate as well as the relative movements of US and emerging market interest rates, and thus on asset prices in the emerging market.

Either of these two structures may thus provide an explanation of a direct linkage between exchange rates and domestic asset markets. As already mentioned, most of these instruments were set up on the presumption of stable exchange rates. Any indication that there might be a change in the way a central bank handled exchange rate policy would create the potential for substantial losses to investors. To see this, consider the foreign bank paying dollar interest and receiving total return on the domestic asset. The domestic currency costs of the dollar payments will increase with any increase in the dollar interest rate or any devaluation of the domestic currency. While a rise in domestic interest rates will increase returns, the associated depreciation in the value of the asset will normally more than offset this, so that the financing costs of the position (the cost of carry) in domestic currency terms will increase and profitability decline. When depreciation in the currency is accompanied by rising domestic interest rates, a contract with a positive carry (i.e., a profit on the interest differential paid and received) may be quickly reversed, creating an incentive to unwind the swap or to hedge the foreign exchange risk by going long dollar assets. This creates an increase in the demand for dollars in a market that is already showing excess dollar demand. If the fall in the price of the underlying asset is large, or the devaluation is large, hedging the position may be impossible, or convertibility may be suspended and there is a default.

Further, the natural response for the US bank, recognising the possibility of counter-party default, would be to hedge its dollar exposure represented by the loan against the foreign asset. This would be accomplished by unwinding the hedge of its total return
commitment, i.e., unwinding the repo of the foreign asset, selling that asset in the foreign market and repatriating the proceeds at the best possible exchange rate. The net result is that both parties to the swap will react by selling emerging market financial assets and/or selling the domestic currency proceeds against dollars, providing levered downward pressure on both asset market prices and the foreign exchange market. Extensive use of these contracts would thus explain an increased correlation between exchange rates and asset prices.

Most global investment banks were cognisant of risks that exchange rate instability represented for such contracts. Given this type of exposure, it is perhaps not surprising that the investment banks selling these products continued publicly to express confidence in the prospects for exchange rate stability in countries to which they had large outstanding exposures. Even if they had performed appropriate risk assessment, it would not have been in their interests to inform market participants until they had succeeded in unwinding their derivative positions. It is thus also not surprising that funds continued to flow to countries showing a distinct risk of currency instability, for this is what was required in order for structured positions to be closed without substantial loss.

Since most of these structured products are expressly designed to hide risk exposure by providing credit enhancement, or by being classified as ‘off-balance-sheet’, it is not surprising that bank regulators in emerging economies had difficulty in discovering or controlling them. There is no reason why Asian regulators should be any more efficient than US regulators, who admit to difficulties in evaluating such instruments. Further, Asian banks were being encouraged, just as US thrifts were encouraged in the 1980s, to deregulate, liberalise and to attempt to grow their way out of weakness by investing in assets with higher returns. The regulators accepted this strategy for resolution of the difficulties facing US institutions; it would be difficult not to accept it in emerging markets if it was supported by both the government and the multilateral institutions.

5. Derivatives and Asian capital flows in the 1990s

Although direct information on the role of derivatives in the Asian crisis is scarce, the majority of losses reported by major US money-centre banks on their Asian lending has been listed as due to swaps contracts. Further, the legal suits that have been filed by J. P. Morgan and SK securities in their payments dispute, are reported to relate to total return swaps. It is also the case that the issue of capital market instruments by Asian borrowers surged in 1995 and 1996. For example, Asian issuance rose from $25.2 billion in 1995 to $43.1 billion in 1996. Not only were US banks involved, but much of the success of local

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1 Since they are private, over-the-counter, contracts between banks and their clients, their particulars are not revealed even in reports to shareholders. They do become public if they are subject to litigation and most of the information reported here comes from this source.

2 It is clear that German and French banks were also heavily involved in derivatives trading in the region. Andrews (1998) reports that Deutsche Bank set aside $777 million (double its loss provisions for 1996) to cover losses of as much as $100 million on derivatives trading in South Korea, Thailand, Indonesia and Malaysia. Société Générale is reported to have set aside $164 million, against a total exposure of $6.8 billion (the $4 billion lent in Korea is primarily lending to Korean companies; cf., Lavin, 1998). Commerz has $3 billion in loans (37% of equity), Dresdner 26% of equity and Deutsche 27% of equity in Asian loans.

3 Cf., Korea Times (1998A), which refers to an offshore investment fund created by LG Metal and SK Hannam Investment Securities Fund: "The $18 million fund was called "Diamond Fund", and was guaranteed by Boram Bank... JP Morgan had entered into a swap transaction with Boram in February 1997, involving an exchange of dollars for the Korean currency. [The fund lost an estimated $120 million.] Such derivatives as total return swaps were popular a year ago as they allowed investors to borrow yen at low interest rates and invest in higher-yielding currencies such as the Thai bat [sic] or Indonesian rupiah."
investment banks, such as Hong Kong-based Peregrine securities, was primarily in underwriting and selling debt for Asian corporations. It could only do this if it could provide reasonable guarantees for the placement for these issues. That its liquidation apparently placed a large number of Asian corporates’ foreign currency hedges in jeopardy because of failure of the counterparty suggests that the investment bank Peregrine might have been a major source of the high-return Asian assets which served to form the assets of high-return, special purpose vehicles for banks in Korea and investors in the developed countries. Korean securities houses and investment banks were also apparently actively involved. The Korean Securities Supervisory Board reported that Korean institutions were operating over 100 offshore investment funds with portfolios valued at around $3 billion, two-thirds of which represented Korean assets.¹

The lawsuits that have recently been filed by a number of Korean entities that were swap counterparties of J. P. Morgan shed some light on the nature of these transactions. For example, in one transaction M organ engaged in a $/won currency swap with Boram Bank.² In a straight currency swap, the counterparties exchange principal and interest payments on the currencies, so presumably Boram gave won to M organ in exchange for dollars, and was paying M organ a fixed interest rate linked to the US dollar, while M organ was paying a rate linked to won interest rates (the differential in the rates when the swap was initiated in February 1997 was about 2 to 1, suggesting a substantial profit on the interest rate differential). When the swap is unwound the principal sums are usually returned at a prearranged exchange rate, so that Boram would have had to return dollars that were worth about three times as many won as at the beginning of the swap. To cover this risk, Boram engaged in a series of swaps with SK securities, presumably passing the dollars on to SK securities which now carried the foreign exchange risks, but was borrowing at cheap dollar interest rates, against the won loans it was extending to its clients at domestic market rates. The exchange rate loss on the swap was thus borne by SK, who owed this sum to Boram, who in turn owed it to M organ. The M organ lawsuit places the value at $189 million. Given the changes in exchange rates, the original principal could have been less than $250 million.³ This is a relatively straightforward derivative transaction, but it gives an idea of the potential losses involved, and why there was such pressure on the foreign exchange market to acquire funds to unwind swaps of this nature.

The other transactions relate to swaps between M organ and Korean offshore invest-

¹ The Korean ‘Securities Supervisory Board said that brokerage houses have more than a 10 percent stake in 66 funds. Another 23 funds were invested in by parent offshore funds of securities firms. The offshore funds were reported to have invested 68-3 percent of their money in Korean securities (Korea Times, 1998B). The Board also reports that the losses that SK securities companies and investment trust companies suffered in offshore funds are estimated at 1.5 trillion won (KRW) ($1 = KRW 1,672) as of the end of last year. ‘Four investment trust companies are running 19 offshore funds, which were reported to have suffered about 400 billion won’ (see AP-DJ News Service, 1998A).

² Boram had agreed to a trade of two revenue streams, giving M organ the stream linked to the prevailing US interest rate in return for the revenue from a basket of derivatives linked to the value of South-east Asian securities and the Thai baht. A year ago, investment bankers eagerly pitched derivatives to SK companies. With benchmark Japanese rates at 0.5 percent, it made sense to sign contracts that would allow investors to borrow in yen and invest in higher-yielding Asian currencies, many of which were linked to the dollar until last year. ‘It’s not an accident that a lot of derivatives got sold in Korea’, said John Ellis, head of the Asia derivatives debt at Bank of America in Hong Kong. ‘It was as good as lending money’ (see Wall Street Journal, 1998).

³ Although Boram was prepared to pay M organ, SK filed a suit in a Korean court to block the payment, thus hoping to exonerate it from having to pay Boram the funds which would have ended up being paid to M organ.
ment funds operated by SK securities and Shinsegi Investment Trust. It is highly likely that these transactions involved equity swaps or total return swaps. Thus bonds issued by Korean companies, underwritten by SK, were placed in an offshore, special purpose vehicle, financed by the sale of investment shares to the Korean public or other financial institutions. The offshore trusts also invested in other Asian assets. These assets could then be used by the offshore units to generate dollar loans equal to the value of the assets, plus won interest rate and capital appreciation flows, against payment of dollar interest rates. These dollars could then be used to make further loans to Korean companies, while the won payments received from Morgan would be used to pay the local investors in the offshore vehicles.

Again, the magnitude of the change in the exchange rate witnessed after the decision to float the won would have produced capital losses on the underlying assets and thus negative won inflows, which would have been transformed into larger net dollar interest payments due to Morgan. The offshore trusts would have had to borrow to meet any fixed-interest payments, while the loss on the dollar borrowing would have decimated the capital value of the investment portfolio, irrespective of changes in stock prices. The rush to hedge such exposure thus made the fall in the exchange and asset markets that much worse. The legal cases at this stage simply involve failure of the trusts to meet periodic payments on the swaps. It is reported that more than 40 of the 100 or so such trusts had engaged in similar swaps with Morgan. Of its total of $3·4 billion of exposure to Korea, $2 billion are linked to derivative contracts. This perhaps explains why Morgan was at the forefront of the move to convert Korean banks' short-term debt into sovereign debt.

Another way of identifying the importance of derivatives activity in the Asian crisis is with reference to the Country Exposure Lending Survey for money-centre banks published by the US Federal Financial Institutions Examination Council (FFIEC), which reports figures for total amounts lent by country of borrower, net of derivatives, and the cross-border exposure resulting from revaluation gains on foreign exchange and derivative products after adjustments for guarantees and external borrowings. These figures are given for the amounts outstanding at the end of 1997 and the end of the first quarter of 1998 (in parentheses) (see Table 1). Since derivatives exposure only results when a counterparty default places the bank under a risk of having to replace the instrument at a loss to current market conditions, the figures in the second column represent the profits for US money-centre banks on their derivatives activity plus any increases in the value of their outstanding loans due to changes in exchange rates. Since

1 One of the 30 recently created investment banks, it was suspended by the Korean Government at the beginning of December and closed at the end of the year. In September it was listed as having 66 billion won in equity, 3,125 billion won in total outstanding loans, 3·66% of which were classified.

2 Again, the legal cases are peripheral to these considerations. Housing and Commercial Bank (a government-owned bank ranked 24th in North Asia with over $1 billion in equity in 1996 at 1996 exchange rates) apparently offered credit enhancement by offering to guarantee the foreign exchange payments of the offshore trusts. Morgan has filed a suit against the bank (and SK securities) for failing to make payments missed by the offshore trusts. Housing and Commercial, however, contends that their exposure was limited to a maximum of $50 million for each swap, and is therefore not responsible for the total losses of the trusts. O'Brien (1997, p. D2) suggests that the original maximum was $100 million but that the contract was changed without the knowledge of the bank to unlimited exposure. Morgan contends that an officer of the bank authorised removal of the limiting clause before closure of the contract. According to O'Brien's account, 'SK and M had a close working arrangement. SK had established offshore funds to manage the derivatives, and those funds also purchased other securities directly from Morgan.' SK was also sued as parent of the trusts. The total value of the suit is $300 million.

3 'There are about 40 other local funds that operated in similar agreements with J. P. Morgan... J. P. Morgan has a total exposure of $3·4 billion to Korea, of which $2 billion is to derivatives products' (see Kang, 1998).
US banks’ exposure is primarily in dollars, the majority of these changes should be the result of changes in the valuation of derivatives contracts rather than changes in the dollar value of outstanding direct loans.

In Thailand, for example, the profits from derivatives and currency revaluations far exceed the total amounts owed for traditional lending. This suggests that a majority of the short-term bank funds that entered Thailand were linked to derivative contracts. For Korea, the profit figures are well over half the amount of total lending, leading to a similar conclusion. In Indonesia they are roughly two-thirds. Thus, in all three countries that have had to apply for IMF support, derivatives sold by US banks to domestic institutions appear to have played as large a part as traditional financing activities. While these figures do not allow a calculation of the actual amount of funds that were channelled to Asia via structured derivative products, they do support the view that derivative contracts played an integral role in the rise in short-term flows to the region. Thus, this helps to explain the shift in the composition of lending into the region towards short-term bank flows.

6. Conclusions

Clearly, as the crisis unfolds we shall learn more of the role of derivatives in facilitating the flow of short-term funds to the Asian economies. This note is not meant to argue that all the difficulties created by the volatility of capital flows to Asia were the result of the increased use of derivative instruments or of structured derivative packages. However, the characteristics of these contracts do provide an insight into the four puzzles that were raised in the introductory section.

First, the increased use of over-the-counter derivatives contracts as the vehicle for lending to Asia explains the predominance of commercial banks as lenders, as well as the dominantly short-term nature of the flows. It also explains why the lending was so volatile. Second, the characteristics of the contracts that were most probably involved suggest that they are motivated by factors that are not directly related to the allocation of funds to their highest global returns. Rather, they are linked to attempts

1 The Bank of Korea reported (AP-DJ, 1998B) that trading in financial derivatives by South Korean banks increased by 60-1% in 1997 to $556.5 billion. Foreign exchange forwards comprise about two-thirds of the total. It also reported that Korea’s 26 banks booked losses for 1997 of 3.92 trillion won, while the 39 branches of foreign banks reported net profits of 930.48 billion won (Industrial & Commercial Bank of China and Credit Suisse First Boston were the only foreign banks reporting losses) (Park, 1998).
to circumvent particular prudential regulations and to provide banks with low-risk fee and commission income, rather than to profit from assessing relative risk-adjusted returns. The incentives motivating such contracts provide little support for the common belief in the self-regulating nature of private capital markets in terms of risk assessment or of their ability to allocate capital efficiently. Third, the fact that developed country banks and regulators had difficulty in foreseeing the risks involved in the derivative positions used suggests that the crisis was not completely due to the inability of emerging markets bankers and regulators to provide acceptable risk management. Finally, the way particular swap contracts and credit derivatives combine currency risk and market price risks provides an explanation of why these markets tended to move in sympathy, creating a cumulative causation that produced unexpected declines and excessive instability in both currency and asset markets during the height of the crisis. What evidence there is of derivative contracts that were actually employed in Asia tends to support these conclusions and contradicts the commonly held position that derivative contracts played no role in the evolution of the financial crisis in Asia.

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Appendix

Glossary of terms

Bullet—A security with a payment schedule in which the fixed periodic payments are composed only of interest on principal, with no amortisation of principal, which is due in full at maturity. Used in contrast to a traditional self-amortising mortgage contract in which each payment is comprised of amortisation of principal and interest on the remaining balance.

Cost of carry, carry cost—The difference between the interest cost of borrowing funds to purchase a security and the periodic interest or dividend earned from owning the security. A positive carry position has the latter greater than the former so that the owner profits from the position without committing any capital and irrespective of any change in the price of the asset.

Coupon payments—The fixed periodic payments of interest paid to the owner of a bond until maturity.

Coupon strips—the right to the periodic coupon interest payments that have been removed from the stripped or zero coupon bond; strips pay only periodic interest and no principal at maturity.

Credit derivatives are off-balance-sheet financial instruments that permit one party (the beneficiary) to transfer the credit risk of a reference asset, which it typically owns, to another party (the guarantor) without actually selling the asset. In other words, credit derivatives allow users to ‘unbundle’ credit risk from financial instruments and trade it separately.

Credit event—a change in the conditions of the issuer of an asset affecting its ability to meet its contractual obligations, leading to a change in the credit quality of the asset and usually reflected in a change in the rating assigned by a credit agency.

Credit-enhanced bonds are issued by a special purpose vehicle and have a higher credit rating than the primary assets held by the vehicle because of the inclusion of some higher quality assets or because the primary assets have a higher nominal value than the bonds issued. Brady bonds are credit-enhanced bonds.

Discount bonds—Bonds that pay no coupon interest; their return is determined by the difference between their purchase price and maturity value.

Mark to market valuation—Value of an asset calculated on the basis of prices recorded for recent transactions in the asset, or on the basis of firm offers to buy the asset, in difference from the price paid to acquire the asset (historic cost) or the maturity or redemption value.

Options contracts transfer the right but not the obligation to buy or sell an underlying asset, instrument, or index on or before the option’s exercise date at a specified price (the strike price). A call option gives the option purchaser the right, but not the obligation, to purchase a specific quantity of the underlying asset (from the call option seller) on or before the option’s exercise date at the strike price. Conversely, a put option gives the option purchaser the right, but not the obligation, to sell a specific quantity of the underlying asset (to the put option seller) on or before the option’s exercise date at the strike price.

Reference asset—a derivative instrument derives its value from movements in the value of an underlying or reference security or security index.

Repurchase agreement or repo involves the sale of a security to a counterparty with an agreement to repurchase it at a fixed price on an established future date. At initiation of the transaction, the buyer pays the principal amount to the seller, and the security is transferred to the possession of the buyer. At expiration of the repo, the principal amount is returned to the initial buyer (or lender) and possession of the security reverts to the initial seller (or borrower). The security serves as collateral against the obligation of the borrower and does not actually become the property of the lender.

Stripped bonds (STRIPS) are zero-coupon securities created by the US Treasury by physically separating the principal and interest cash flows. This process of separating cash flows from standard fixed-rate Treasury securities is referred to as coupon stripping. The bonds are sold without the right to receive the periodic payment of coupon interest, thus they have ‘zero’ interest-rate coupons. They are equivalent to discount securities with their return determined by the difference between their purchase price and (higher) maturity value.

Structured notes are hybrid securities, possessing characteristics of straight debt instruments and derivative instruments. Rather than paying a straight fixed or floating coupon, the interest payments of these instruments are linked to the performance of a reference asset’s price or interest rate or

16 This glossary provides definitions of some of the terms employed above. The interested reader is invited to consult Federal Reserve System, 1998, for a more complete listing of terms and instruments.
The derivative contracts are embedded in the security, and may not be presented explicitly as such. They pay a higher interest rate than a straight debt instrument with this differential determined by the value of the embedded option.

Total-rate-of-return swaps are credit derivative contracts in which one counterparty (Bank A) agrees to pay the total return on an underlying reference asset to its counterparty (Bank B) in exchange for a dollar interest rate plus a spread. Most often, the reference asset is a corporate or sovereign bond or a traded commercial loan.