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MANAGING INTERNATIONAL RISK IN DEVELOPING COUNTRIES

Mr. Myrvin Anthony
University of Stathclyde

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MYRVIN L ANTHONY

Department of Economics
University of Strathclyde
Glasgow
G4 0LN
Scotland UK

ABSTRACT

This paper attempts to elucidate the potential benefits to be had, and obstacles to be confronted by developing countries which seek to utilize modern market-based risk management instruments to reduce their exposure to commodity price, exchange rate, and interest rate variation. We point out that, although there are benefits to be gained from the utilization of these risk-sharing instruments for some developing economies, for others (especially small economies), the obstacles to their participation in these insurance markets can be quite formidable.

1. INTRODUCTION

Modern risk management techniques have evolved quite rapidly in the last two decades largely in response to the increased volatility in commodity prices, interest rates and exchange rates. The initial demand, to a large extent, came from multinational corporations whose receipts and payments were subject to wide fluctuations as a consequence of the variability in the prices of internationally traded goods and assets. In response to this demand a rich plethora of innovative instruments - forward, futures, options, and swaps contracts - has evolved, and new instruments keep being added to the list as the innovation in international financial markets continues apace. The bulk of the transactions in these instruments is undertaken by financial and non-financial firms in industrialized countries. On the contrary, neither the private nor public sector in developing countries has made use of these instruments to the same degree, although there has been an increasing - albeit still relatively small - participation in these markets by some developing countries.[1] Yet developing countries' firms and public sector engaged in international transactions face much the same risks as firms and the public sector in developed countries and thus, if feasible, can indulge in the same price risk management techniques as the latter do. The purpose of this paper is to highlight the possible benefits that may accrue to developing countries, and the likely obstacles that they may face in utilizing modern market-based risk management instruments to minimize the price risks which are associated with the engagement in international transactions.

Commodity price, exchange rate, and interest rate variability translate directly and proportionately into variability in export revenues, interest income from foreign assets, import payments and interest (and amortization) payments on foreign liabilities. The oscillation in these prices will impinge on developing countries in two obvious and important ways: first, producers and consumers will suffer variability in their incomes and expenditures; and second, the government's budgetary position will be affected as both its revenues (from taxation, and net profits of state enterprises) and its expenditure on imported commodities and foreign debt-service payments will fluctuate with the vagaries of these international prices. Additionally, the government's foreign exchange reserves will also be affected.

While we focus in this paper on these cash flow implications of international price variation, these are by no means the only (or necessarily the most severe) consequences for developing countries. The impact of international price uncertainty crucially extends to both production and investment decisions - although, theoretically, these effects are not clear for either commodity price or exchange rate fluctuations. On the one hand, uncertainty about future commodity prices should reduce investment because the probability that, ex post, resources will be misallocated as relative prices are realized, would increase. As a result, investors will tend to reduce investment in the presence of large price uncertainty because of the fear of being locked in to, what may turn out be, unprofitable projects. On the contrary, the

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[1] See the examples cited in Claessens (1993) and Masuoka (1993).

convexity of the profit function with respect to commodity prices would imply that the increase in price uncertainty raises the expected profits in the domestic sector and therefore should ultimately lead to higher investment (Claessens and Duncan (1993)). Similar contradictory theoretical arguments are posited for the impact of exchange rate uncertainty on production and investment (see Dixit (1987), and Krugman (1989)). Nonetheless, in the case of commodity price instability, the empirical evidence appears to be in favour of the first set of effects of commodity price volatility on investment and production since there seems to be a strong negative relationship between price volatility and investment (Caballero and Corbo (1989)). The empirical evidence for the impact of exchange rate uncertainty on investment is largely unproven - though there is no support for the contention that it adversely affects trade volumes, a conclusion which primarily reflects the fact that the growth in world trade has outstripped that of world output since the introduction of floating exchange rates in the early 1970s.

International price swings will also have macroeconomic effects ("macroeconomic risks") on the entire economy. In the case of commodity prices, the classic example is the well-known phenomenon of the Dutch disease. Whereas, for the exchange rate, we can cite both the traditional arguments (for example Nurkse (1937), and Marris (1985)) - emphasizing the deleterious and destabilizing effects of floating exchange rates -, and the "modern" arguments (for example, Canzoneri and Gray (1985), and Giavazzi and Giovannini (1989) - stressing the coordination/credibility arguments for a fixed exchange rate regime - as the typical theoretical explanations of the macroeconomic consequences of exchange rate instability.

There already exists a quite extensive literature on managing commodity price (and quantity) risks in developing countries.[2] In this literature the welfare justification for and consequences of using market-based instruments as opposed to non-market stabilization schemes to stabilize commodity earnings has been dealt with and support for the former has been (somewhat controversially?) established.[3] In an application of the analytical framework developed in this literature to the issue of exchange rate instability, Hughes Hallett and Anthony (1993) analyzed the comparative advantage of fixed (or adjustable) exchange rates and market-based hedging instruments as alternative tools for macroeconomic stabilization for various industrialized economies. There it was pointed out that the optimal stragegy - whether to fix nominal exchange rates or use hedging instruements - varied from country to country.

We principally ignore these issues in this paper. In what follows, we implicitly assume that the welfare justification for using market-based risk reduction tools (either in conjunction with or as alternatives to other non-market stabilization schemes) has already been made, and that the issue at hand is therefore the more pragmatic one of which instrument (or combination of instruments) to use to effectively reduce the

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[2] See for example, MacKinnon (1967), Newbery and Stiglitz (1981), Gemmill (1985), Gilbert (1985), Ghosh, Gilbert, and Hughes Hallett (1987), Priovolos and Duncan (1991), and Claessens and Duncan (1993).

[3] For a useful discussion on the various non-market stabilization schemes (international price stabilization schemes, domestic price and quantity stabilization schemes, and compensatory facilities) for developing countries, see Gilbert (1993).

international price exposure of the developing country's net discounted cash flows. Hence our concern in this paper is much more limited, but nonetheless, important.

Alternatively, we can say that our primary interest is to explore the various market-based price hedging tools which developing countries can use to reduce the riskiness of committed decisions (future incomes or payments), by fixing them in advance. The implication of this strategy of hedging future incomes and payments is that it *does not necessarily mean that the developing country will benefit always from increased revenues and incomes and lower payments*. This is because the hedging strategy can result in *either ex post gains or losses* for the economy depending on the future movements in prices which obviously cannot be anticipated with any degree of certainty. Thus hedging is primarily a trade-off between current and predictable costs and future price movements. Consequently, one of the main gains for the developing economy in utilizing these hedging devices is that they provide the opportunity for better management, planning, and budgeting of future cash flows since the magnitude of these flows can be set with certainty. The potential benefits from improving the management of future cash flows can be substantial especially when it is undertaken as part of a structural adjustment package (whether financed by the International Monetary Fund or pursued by the independent initiative of the developing country). It is quite possible that a structural adjustment programme can be blown off course by unanticipated price movements which reduce export revenues, and/or (simultaneously) increase import and debt-service payments.[4] In so far as price risk management can lock in future international prices at known fixed levels it can reduce unexpected variations in important economic variables from their initial projections, thereby complementing efforts to restructure the economy. This point is adequately borne out by the remarks made by an official from the Mexican Ministry of Finance regarding its decision to hedge a significant proportion of Mexico's oil exports:

> "It is extremely important for us that investors know, no matter what happens to the price of oil, the economic program is on for 1991. Regardless of what happens, we have got US$17 a barrel.... and there's enough in the kitty" (Wall Street Journal, March 1991).

Thus, the short- to medium-term stabilization of future cash flows can enhance the credibility of the country's economic programme which may have beneficial implications for the country's credit-rating and its access to international credit markets in the future. Hence, even from the narrow standpoint of stabilizing cash flows in an effort to enhance economic management, it seems pertinent to explore the utilization of various financial hedging instruments to achieve this end.

In section 2 we elaborate on the sources of international price risk facing developing countries. Section 3 deals with the important mechanics of risk management, and section 4 contains a terse discussion of various hedging instruments. In section 5 we discuss the potential benefits to be derived from using the various hedging devices and the associated costs, and we finally conclude in Section 6.

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[4] Mathieson, *et.al.* (1989) provide evidence of IMF structural adjustment programs which were affected by the variability in these international prices.

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2. SOURCES OF INTERNATIONAL PRICE RISK

Developing countries are susceptible to three main types of price risk as a consequence of their transactions in internationally traded goods and financial assets: primary commodity price risk, exchange rate risk, and interest rate risk.

Commodity price risk

Several developing countries are still reliant on a few primary commodities for the lion's share of their export revenues. On the import side, crude and refined oil products constitute a substantial proportion of the import bill of a number of non-oil producing developing countries. These (primary) goods that developing countries export and import are subject to price fluctuations which imply that the domestic currency receipts (from a given volume of exports) and the domestic currency payments (for a given volume of imports) will tend to fluctuate as these commodity prices vary. The greater the volatility of these prices the greater also will tend to be the fluctuations in domestic currency income from the sale of a given volume of exports, and the domestic currency payments for the purchase of a given quantity of imports. Formally we can express these relationships as

$$X = \sum_{i=1}^{N} S_i P_i X_{vi} \qquad i = 1,...,N \qquad (1)$$

$$M = \sum_{i=1}^{N} S_i P_i M_{vi} \qquad i = 1,...,N \qquad (2)$$

where X = value of exports in domestic currency, M = value of imports in domestic currency, S_i = the exchange rate (expressed as the number of units of domestic currency per unit of foreign currency i), P_i = foreign currency price of commodity i, X_{vi} = volume of exports of commodity i, and M_{vi} = volume of imports of commodity i.

From (1) and (2) it can be seen that both the domestic currency value of import and exports, for given exchange rates and export and import volumes, will fluctuate as the foreign currency price of exports and imports vary. Thus exposure to commodity price variation can severely influence the export receipts and import payments of developing countries.

Interest rate risk

Developing countries' firms and public sector acquire foreign assets and liabilities. If these foreign assets and liabilities have variable rates of return then both the interest income from the holding of foreign-currency denominated assets and the interest payments on external liabilities will be affected by the variation in interest rates. Formally, we have

$$IR = \sum_{i=1}^{N}(I_i + \overset{e}{S_i})A_i \qquad i = 1,...,N \qquad (3)$$

$$IP = \sum_{i=1}^{N}(I_i + \overset{e}{S_i})D_i \qquad i = 1,...,N \qquad (4)$$

where IR = interest income (in domestic currency) from foreign assets held by the developing country, IP = interest payments (in domestic currency) on foreign liabilities, I_i = foreign-currency i's interest rate, S^e_i = expected rate of depreciation of the domestic currency with respect to foreign currency i, A_i = stock of foreign assets held, and D_i = stock of foreign liabilities incurred. From (3) and (4) it can be easily seen that for a given level of foreign assets and liabilities, and expected rate of depreciation of domestic currency, the fluctuations in the domestic currency interest income receipts and payments will depend on the extent of variability in the foreign-currency interest rate (I_i).

Exchange rate risk

As can be seen from equations (1) to (4), even in the absence of commodity price and interest rate fluctuations, the domestic currency receipts from exports and foreign assets held and payments for imports and interest on (and amortization of) foreign liabilities will vary as the exchange rate varies. Even if the domestic currency in the developing country is fixed relative to one foreign currency (or a basket of foreign currencies), domestic receipts and payments will nonetheless be affected by exchange rate fluctuations as long as the other currencies in the developing country's transactions portfolio fluctuate with respect to the foreign currency (or basket of foreign currencies) to which the domestic currency is pegged. Since most industrialized currencies either float against each other in a "dirty float" arrangement or in a "target zone" arrangement then it is obvious that exchange rate risk will be an important source of price risk for most developing countries because a significant proportion of their transactions are with developed economies.

Whilst, for the purpose of exposition, we have dealt with the three sources of international price risk separately, in practice they will inevitably have to be dealt with in an integrated framework. This is because there may exist relationships between the various components of international price risks - that is they may be correlated - so it becomes imperative for these risks to be managed within the country's (firm's) integrated framework for external asset and liability management. Additionally, many financial instruments have substantial overlap - for example, commodity price-linked financial instruments which combine both risk management as well as new finance features.

3. RISK MANAGEMENT THEORY

Modern theory of risk management has played a pivotal role in the operations of both financial and non-financial firms in industrialized countries. Since economic agents

cannot predict or know the future with certainty then it is inevitable that any economic undertaking in which decisions are taken today for realizations sometime in the future will entail some degree of risk. In a general sense therefore, the aim of risk management theory is to quantify the riskiness of economic activity and then to suggest appropriate actions to reduce the level of sensitivity of the economic activity to the various sources of risk. There are four important elements in risk management: (a) the identification of an objective function - that is, some measure of the economic performance of the firm or country; (b) the identification and measurement of the degree or extent of risk exposure in relation to the objective function; (c) the determination of an acceptable degree of risk exposure; and (d) the determination of the appropriate strategies to manage the risk exposure.

(a) Identification of an objective function

From the point of view of a firm, the objective function will normally be the future discounted net profits from its operations. Over time net profits will vary as the production, pricing, marketing, and investment strategies of the firm vary as well as with the oscillations in international prices - commodity prices, interest rates, and exchange rates. The risk manager distinguishes the fluctuations in future net profits which are related to variations in international prices, and those which are due to the changes in other (non-price) factors. The first category of risk can be called "financial" or price risks and can be tackled by using various financial instruments to hedge them; whereas the latter category of risk - called "commercial" or "economic" risk - cannot, in general, be handled by recourse to these financial instruments, but by primarily considering the entire operating strategy of the firm.

In a similar way we can consider an appropriate objective function for a country. Generally this objective function will be the country's expected utility function which it is seeking to maximize (see Priovolos and Duncan (1991)); but from a pragmatic standpoint, we can treat the current account balance (net receipts) of the country as the appropriate objective function we wish to target. We can then analogously distinguish between the "financial" and "commercial" or "economic" risks of a country (or the public sector in that country) as we did for the firm. Formally, combining equations (1) to (4), we get

$$CA = (X - M) + (IR - IP) \qquad (5)$$

or

$$CA = \sum_{i=1}^{N} S_i P_i (X_{vi} - M_{vi}) + \sum_{i=1}^{N} (I_i + S_i)(A_i - D_i)$$

where CA = current account balance (in domestic currency), and the other terms are as defined previously. From a general conceptual standpoint, we can regard the economic risks as mainly reflecting the volatility in the current account balance which arises from the variability in the quantity variables in (5) - export and import volumes,

and the stock of foreign assets and liabilities. Measures which aim to stabilize these quantities, such as efforts to diversify the structure of these quantities, are the appropriate strategies to tackle these kinds of economic risk.[5] But these measures will tend to be essentially long-term in nature and will usually affect the entire structure of the domestic economy's engagement in the international economy. The implication here is that cash flow management should be construed as primarily a short- to medium-term undertaking.

It is implicitly assumed that the country does not attempt to speculate on particular assets or commodities, and that its principal goal is to minimize price risks given the expected future cash flows. Also we make the assumption that the proportion of tradeable assets and liabilities is comparatively small relative to the country's overall. assets and liabilities so that hedging the *cashflows* of nontradeable assets and liabilities is much more significant to the country than hedging the *market values* of tradeable assets and liabilities.

(b) Measurement of price risk exposure

Following the identification of the appropriate objective function, an assessment must be made of the extent to which the objective function is susceptible to price fluctuations. Two basic approaches can be used to assess the country's price risk exposure: measurement based on historical data, and measurement based on projections or simulations.

The first approach is geared toward extracting meaningful relationships between the net cash flow and the international prices, usually by means of some time series modelling analysis, for example a multivariate regression or a vector autoregression analysis or some other econometric analysis. Additionally the relationship between the net cash flow and the international prices may also be gauged from past historical patterns. When done econometrically as in (6) the coefficients on the price variables will measure the exposure (sensitivity) of net cash flows - the extent to which a change in the net cash flow is affected by a unit change in the appropriate price.

$$CA = \sum_{i=1}^{N} \alpha_i S_i + \sum_{i=1}^{N} \beta_i P_i + \sum_{i=1}^{N} \gamma_i I_i + \mu \qquad (6)$$

where $\delta CA/\delta S_i = \alpha_i$, $\delta CA/\delta P_i = \beta_i$, and $\delta CA/\delta I_i = \gamma_i$ are the (partial) elasticities of CA with respect to the various international prices, and μ is the error term.

The main limitation of this approach is that it may not necessarily be a very good guide of the future relationship between the net cash flow and the various prices - that is, we may have a parameter instability problem.

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[5] See, Claessens (1992) and Coleman and Qian (1993) for studies which show how developing economies can choose the optimal composition of their external debt.

An alternative approach would be to compute projections of the future cash flows by assuming various forecasts (scenarios) for the respective international prices. By assessing how the net cash flow varies under the different price scenarios, we can generate statistical estimates of the degree of sensitivity of net cash flows to the respective price changes. The quality of this type of sensitivity analysis is obviously crucially dependent upon the assumptions made about future price changes. In practice, both approaches will normally be used and their results are eveluted for consistency and plausibility.

(c) and (d) The determination of an acceptable degree of price risk and the choice of the appropriate risk-reduction instruments

Having estimated the extent of the net cash flow's susceptibility to variations in the respective international prices, it is necessary for the policy- makers in the country (or the financial management in the domestic firm) to make an assessment of whether the magnitude of the estimated price risk exposure implies that further action is required to reduce these risks. The decision made at this juncture will undoubtedly be a function of the country's (firm's) view on price risk - its degree of risk aversion. If the decision is made to reduce the price risks (or a proportion of it) by using the instruments available in international financial markets then the appropriate instrument(s) to be used will have to be selected also.

As was pointed out in section 2, it is pertinent that a country's (firm's) overall international risk management be conducted within an integrated framework. This is obvious from equation (5) and can be best illustrated by looking at the foreign-currency risks that the country (firm) faces. Rearranging terms in (5) we can rewrite the expression for the current account balance as in (7).

$$CA = \sum_{i=1}^{N} S_i (X_{fi} + A_{fi}) - \sum_{i=1}^{N} S_i (M_{fi} + D_{fi}) \qquad (7)$$

where X_{fi}, M_{fi}, A_{fi}, and D_{fi} are respectively the i th foreign currency's value for exports, imports, interest income and interest payments, and the other terms are as defined before. If the country obtains receipts (export revenues and interest income from financial assets held) in currency i and makes payments (import costs and interest income payments on financial liabilities) in this currency, then it is possible than these contra-flows in the foreign currency i can be identical and thus offsetting - that is CA_{fi} = 0. In these instances the country is not exposed to the fluctuations in this particular currency (with respect to the home currency) and does not face currency risk . Even if CA_{fi} is non-zero, the country will only have to consider its *net position and not its gross flows* (either payments or receipts) in foreign currency. Additionally, it is also possible, depending on the country's portfolio of foreign transactions, and the nature of the correlation between the foreign currencies, that the payments and receipts in a set of foreign currencies may offset those in other currencies - that is, $[S_i (X_{fi} + A_{fi}) - S_j (M_{fj} + A_{fj})] = 0$ for any i not equal to j - thereby reducing the amount of net cash flows which is needed to be hedged.

Analogously, we can illustrate why in the presence of commodity price and interest rate risk it is imperative to employ an integrated framework of external risk management. Setting the exchange rates to unity and rewriting (5) we get

$$CA = \sum_{i=1}^{N} P_i(X_{vi} - M_{vi}) + \sum_{i=1}^{N} I_i(A_i - D_i) \qquad (8)$$

From (8) we can see that if commodity prices are strongly positively correlated with foreign interest rates then net foreign receipts will rise simultaneoulsy as net debt-service payments rise. Hence, when net foreign receipts are positive and net debt-service payments are negative the capacity to service these debt payments increases contemperaneously with the debt-service requirements thus reducing (but not necessarily eliminating) the necessity for hedging. On the other hand, when net foreign receipts are negative and net debt-service payments are also negative the capacity to service these debt payments worsens contemperaneously with the debt-service requirements thus increasing the necessity for hedging. Similar illustrations can be drawn for the case in which these two sets of prices are strongly negatively correlated.

4. MODERN RISK MANAGEMENT INSTRUMENTS AND TECHNIQUES

Once the decision has been made to hedge the discounted net cash flows, it becomes pertinent to evaluate the various instruments to use in this strategy. We examine the main characteristics of forward, futures, options and swap contracts which may be employed to manage the international price risks that developing economies face.[6] Table 1 in the Appendix 1 summarizes the main characteristics of these contracts, and table 2 presents the liquidity profile of these contracts.

(a) Forward contracts

The forward contract is an agreement to buy (sell) an asset at a pre-specified price on a future date. At maturity, the spot price may differ from the forward price, in which case the buyer makes a profit when the latter is lower than the former, and a loss when the relationship is reversed. The payoff for the seller is opposite to that of the buyer.

As an instrument for hedging the risk of holding a certain asset (liability), the forward contract provides the holder with "forward cover" because he can fix the revenue (payment) from (for) the future sale (purchase) of the asset at the time the contract is agreed, hence "locking-in" the price of the asset (liability). Thus the benefit to the holder of the contract is obvious: he knows today, what his future revenues (payments) will be.

Forward markets for most major currencies are very liquid for transactions not greater than one-year's maturity. Transactions are handled primarily by the main commercial

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[6] The discussion in this section draws on Quirk, et. al. (1988), Masuoka (1993), Claessens (1993), and Madura (1992).

banks, dealers and brokers , and are completed via the telephone or telex in the inter-bank foreign exchange market.

Forward contracts for international interest rates - called forward rate agreements (FRAs)- are also liquid for transactions not exceeding a year's maturity. In these contracts, the two parties agree to pay (receive) a pre-specified interest rate on a given amount of money in a future period.

Forward markets for commodities are less liquid than those for currencies and interest rates; but similar to the previous two markets, transactions are usually conducted over the telephone or via telex. The London Metal Exchange is one of the largest forward markets for commodities. For some time now, some developing countries - for example Ghana and the Ivory Coast - have consistently sold forward their commodities by entering into these forward commodity contracts.

The main advantage of these forward contracts is their relative flexibility. Forward contracts can be tailor-made to meet the particular needs of the buyer and seller because they do not require any operational clearing house . The date of maturity, and the size of the contracts can both be determined to meet the requirements of the buyer and seller. Additionally, these contracts do not stipulate any up-front cash transfers - that is, no security deposit is required - and cash transfers only take place at the maturity date, thus the participants do not suffer any initial loss in liquidity.

But the absence of cash transfers until the maturity-date implies that these contracts will contain some credit or default-risk - that is, the possibility that, at the maturity date, one party may be unable to fulfil its contractual obligation. This would suggest that for these contracts to be agreed to, both parties will have to be sufficiently convinced that the default risk is negligible, in which case it may depend on the commercial relationship of the two parties - for example, commercial banks and will be more willing to enter forward contracts with clients with whom they normally conduct business, as well as with customers whose credit-ratings are satisfactory.

(b) Futures contracts

A futures contracts is a *standardized* contract which establishes a binding obligation to buy or sell a particular asset or liability at pre-designated price on a *specific* date in the future. Although similar to forward contracts, there are some very important differences between the two.

First, unlike forward contracts, futures are traded openly in organized futures markets. The open trading of these contracts is made possible because of their *standardization*. Contracts are standardized in terms of their sizes, maturity dates, grades etc. The open trading of contracts in futures markets enhances the liquidity of these markets.

Second, once contracts are entered into, the clearing house interposes itself between the two parties to the contract, effectively becoming the counterparty to both sides of the contract. As a result, the clearing house assumes the full credit risk, and only the price risk is left with the buyer or seller. The exchange houses act solely as brokers and

charge buyers and sellers a fixed commission on each deal. This commission mainly covers the cost of entering a contract and of terminating it.

Third, whereas forward contracts establish ownership with regard to the contractual amounts, future contracts do not usually constitute ownership but only an *obligation* to buy or sell a fixed amount, at fixed future date, at a pre-specified price. In recognition of default risk, the clearing houses require traders to put up an initial margin (collateral or security deposit), in order to ensure that the terms of the contracts are respected by the traders. The size of the initial margin requirement will depend, inter alia, on the volatility of the asset being traded, the volume of transactions anticipated, the minimum margin required, the credit worthiness of the traders, the overall position of traders, and the traders' ability to transfer funds quickly. For currency and interest rate futures the margins are about six percent of the contract, and about ten percent for commodity futures contracts.[7]

Fourth, gains and losses on futures contracts are settled daily. At the end of the business day, the clearing house calculates these gains and losses that the traders have experienced as a consequence of the changes in the values of their respective future contracts. This process is called "marking to market". The gains and losses - called "variation margins"- are added to the market participants' futures margin accounts which they are required to hold. If, as a consequence of a loss, the trader's initial margin requirement falls below the clearing house's established minimum maintenance margin, the trader will be required to restore his account to the original balance. By this mechanism traders are not permitted to carry excessive losses and the default risk on contracts is reduced substantially.

Fifth, whereas most forward contracts are settled by actual delivery of the quantity, most futures contracts are closed out by taking out an offsetting contract. Additionally, given the liquidity of these markets traders can close out their positions in the market by undertaking an offsetting transactions on any business day before maturity.

Whilst participants in the futures market may enjoy greater liquidity, relative to forward contracts, they also face greater initial credit constraints as a result of the initial margin requirements and commissions. This can be a severe obstacle for small developing economies.

Chile provides a recent example of a developing country employing futures contracts to reduce the uncertainty in its international prices. In 1988 and 1989, the Chilean Central bank sold Eurodollar futures to hedge against the variability in the interest payments on its foreign debt (variable rate debt constititues a large proportion of Chilean total foreign debt).[8]

(c) Option contracts

An option contract gives the holder the right to buy (call option) or sell (put option) an asset at a pre-specified price at a future date, but does not oblige the holder to exercise this right. Options that can be exercised at any time between the date of writng and

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[7] See Claessens (1993).
[8] See Claessens (1993) and Masuoka (1993) for details of these transactions.

the expiration date are known as "American options"; those which can only be exercised at maturity are called "European options". Similar to futures contracts, options are traded in formal exchanges and like forward contracts, they are also traded informally - "over-the-counter".

The buyer of an option pays a premium to the option writer. This premium is defined in the option contract, and depends, inter alia, on the relationship between the spot price and the strike price - the price at which the option can be exercised - , the length of time before the expiration date, and the potential volatility of the underlying asset on which the contract is drawn.

The exercise prices are standardized, and at any point in time options can be traded at a range of strike prices which are set at intervals below and above the spot rate. This system of strike prices affords option buyers the opportunity to select the degree to which they seek to limit their market risk. Unlike both futures and forward contracts, in which the future price is locked-in, the buyer of an option can take advantage of the favourable movements in the price of the asset and can limit his maximum loss to the premium paid initially to the writer of the option. Thus the premium on the option reflects the cost at which buyers can insure themselves against the price fluctuations of the asset.

Writers of options, being exposed to unlimited market risks, are required to put up a margin which is determined by the exchange depending on whether the contract would currently provide the buyer with a profit or less when exercised.

The markets for currency options with short-maturity are comparatively liquid. Long-term currency options are not actively traded, but are frequently attached to bonds and loans - such as dual currency loans. Interest rate options also trade in liquid markets and come in two forms: options on interest rate-bearing securities and options on interest rates. The latter type of options is effectively a series of options with different dates of maturity. For commodities, there are options on physical commodities and options on commodity futures both of which are predominantly traded at short-maturities. However, it is possible to have commodity options linked to loans as was for currency options.

In 1990 and 1991, Mexico bought put options in an effort to protect its revenues from crude oil exports. This strategy meant that Mexico was guaranteed at least a minimum price of US$17 per barrel of crude oil. In retrospect, this strategy , proved successful for Mexico. Not only did it benefit from the ex ante certainty about oil revenues but it also profited ex post because the gains from the minimum price exceeded the initial cost of purchasing the put options.[9]

(d) Swap contracts

A swap contract is an agreement to exchange specified cash flows at predetermined intervals. To a great extent, swap contracts are principally a series of forward contracts or back-to-back forward contracts, hence they are sometimes called "forward/forward" swaps. Like forward contracts, swaps will not necessarily entail

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[9] See Claessens (1993).

any initial security deposit or collateral, and will typically contain credit or default risks. However, swaps tend to have long-maturity - three years or more. Both currency and interest rate swap markets are comparatively liquid, and maturities in these markets can be extended for as long as ten years. Transactions are usually executed over-the-counter by brokers and dealers. In several respects therefore, these swaps have mainly similar charateristics to forward contracts, with the additional bonus that they can be secured for relatively long-maturities. Thailand, Indonesia, and several Indian private and public-sector firms have all utilized both currency and interest rate swaps recently.[10]

Commodity swaps are fairly recent and while they are intrinsically similar to both currency and interest rate swaps, they nonetheless have one important difference. Commodity swap contracts are purely *financial* and thus do not involve the physical delivery of commodities. There are therefore not a series of commodity back-to-back forward contracts.

5. THE BENEFITS AND COSTS OF MODERN MARKET-BASED RISK MANAGEMENT INSTRUMENTS

The hedging instruments discussed above can play an important role in supporting short-term and medium-term economic management in developing economies. Projections of short-term and medium-term economic performance may hinge crucially on the expectations of the price behaviour of major economic variables such as exports, imports, and foreign liabilities. By locking-in the prices of these variables over a specified time horizon with the use of forward, futures, option or swap agreements, developing economies can benefit from a reduction in the (adverse) variability of export revenues, import and debt-service payments. Such a strategy can serve as an explicit indicator of the commitment of the policy makers to a particular pre-announced objective - for example, the reduction of the current account deficit to a given proportion of Gross Domestic Product. The credibility of the policy makers' strategy can therefore be enhanced. These credibility gains may also lead to a repatriation of capital which might have previously flown from the economy as domestic citizens regain confidence in the economy.

By contributing to a stabler evolution in the current account balance of developing economies, these risk management instruments may also assist in improving the credit worthiness of developing countries in international financial markets. This improved credit-rating can be advantageous in two respects. First, developing economies which were previously excluded from international financial markets (that is credit rationed economies) may regain access. Second, future debt obligations of countries with access to these credit markets could be secured on more favourable terms as international creditors reduce the risk premia and extend the maturities associated with the provision of credit to these developing economies.

The comparatively broad menu of instruments which is (potentially) available on the international markets provide the developing economies with both choice and flexibility in their hedging strategies. This is particularly advantageous for developing

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[10] See Claessen (1993).

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countries because it means that hedging strategies can be for relatively short-time periods - for example three months - or moderately long-time periods - three - five years. Additionally, because the markets for these instruments are quite active, hedging strategies can be implemented with very little costly delay. This degree of flexibility is important for the following reasons. First, hedging strategies can be quickly modified or reversed as and when deemed necessary. This is useful because revisions to the country's estimates of its extent of price risk exposure may be unavoidable since the methodologies used to generate these estimates are far from perfect. Second, this flexibility may make it possible to rectify potentially harmful hedging strategies *without* necessarily damaging the credibility of the country's short- or medium-term economic programme.

These hedging instruments provide developing countries with the opportunity to transfer some of the price risks associated with their international transactions to international markets. In hedging these price risks on the international markets, developing economies secure protection from some or all of the adverse movements in these international prices in exchange for some or all of the possible favourable movements in these prices. This trade-off can be invaluable for developing economies. Given the comparative advantage of the international markets to carry these price risks, developing countries may be able to secure this insurance at substantially reduced costs. In the case of options, developing countries can enjoy an unconventional risk profile: they can limit the maximum loss (equivalent to the premium on these contracts) but still take advantage of any favourable movements in international prices.

Whilst these international markets may have a comparative advantage in offering protection from price risks to developing countries, the costs associated with the use of the various instruments can nevertheless be prohibitive for some developing countries.

First, some developing countries may be judged to be insufficiently credit-worthy, and thus may be unable to gain access to all of these markets (the extreme scenario for countries with dismal credit -ratings), some of these markets, or they may be unable to secure the use of these instruments for fairly long-maturities. In either of the latter two cases, unfavourable credit-ratings may limit some developing countries' access to these markets. This would mean that for developing countries with poor credit-ratings, the degree of choice and flexibility which the range of hedging instruments can potentially offer may be substanially diminished. This does not imply that these economies cannot enjoy some of the benefits from the utilization of these risk-reduction instruments; but rather that the scope for doing so is drastically reduced.

Second, even if some developing countries have relatively favourable credit-ratings, the up-front costs - initial margins or security deposits - associated with these hedging contracts may render them sufficiently expensive that these countries cannot make use of them. Thus, for these countries, access to these markets is restricted because they are too costly.

Third, for some developing countries, their access to these markets may be restricted not necessarily because of their credit-ratings or the costs associated with the use of

these instruments, but mainly because they lack the institutional framework and technical expertise to successfully execute a risk-management strategy based on the employment of these instruments. Technical expertise will be required to investigate the international price risk structure of the domestic economy, identify and evalute the appropriate hedging instruments, and make or supervise the hedging transactions. Additionally, the appropriate institutional structure has to be established in which these tasks can be undertaken. Unfortunately, several developing countries lack this kind of expertise, and its absence in these countries is undoubtedly a hindrance to the utilization of these hedging devices.

Finally, in some developing countries, both private sector firms and state enterprises may face domestic impediments which can preclude them for gaining access to these markets. Legal, regulatory, or institutional barriers - such as exchange controls - may prevent these firms from accessing these international markets.

6. CONCLUSION

Developing countries are vulnerable to the volatility of international prices, and this vulnerabilty can have adverse consequences for the economic performance of these countries. The question then arises as to whether these countries can and should take advantage of the risk-reduction instruments which have been extensively utilized in developed countries. We have argued that, where possible, developing countries should employ these hedging instruments because they can contribute to the improvement in the short- to medium-term management of these economies. The resultant stability in the net cash flows of the country may also enhance its credit - ratings, thereby improving the terms on which it can contract future debt obligations. The (potentially) wide-range of instruments which are available to developing countries provides them with added flexibility in their hedging strategies, and this flexibility may further enhance the credibility of the country's economic program. Moreover, it was pointed out that, in taking advantage of these hedging devices, developing countries are transferring some of the price risks associated with their international transactions to the international markets. Given the comparative advantage which these markets have in dealing with these risks, developing countries may actually benefit from a reduction in the costs related to this protection.

On the contrary, the costs associated with the employment of these risk-reduction instruments may be sufficiently substantial to exclude some developing economies from participation in these markets. Poor credit-ratings, up-front collateral and initial margin requirements may impede some developing countries from gaining access to these markets. Additionally, even in the absence of these cost restrictions, developing countries which lack the necessary technical capability to implement a risk management strategy based on the utilization of these instruments, may nonetheless be precluded from these markets.

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Appendix 1

Table 1: Financial Instruments used in Hedging

INSTRUMENTS	DESCRIPTION	CHARACTERISTICS
(i) Financial Instruments		
Forward	• An agreement to purchase or sell a given asset at a future date at a preset price. • Transactions are made mostly through brokers by telephone and telex. • Typical use is for locking-in a future price.	• No initial cash transfer need. Cash transfer occurs at maturity. • Credit risk involved. • Tailor made contracts available for specific hedging needs. • Contracts available primarily for short-term maturities.
Futures	• An agreement to purchase or sell a given asset at a future date at a preset price. • Transactions are made in formal exchanges via clearing house systems. • Contract terms are standardized. • profits and losses are settled daily, requiring daily cash flows. • Initial margin (collateral) required. • Typical use is for locking-in a future price.	• Initial cash transfer is required for margin money. • Daily cash transfers are necessary. • Credit risk is minimal. • Tailor made contracts are not available. • Contracts available primarily for short-term maturities. • Markets are more active than forward markets for some contracts. • An original position can be closed or reversed easily and quickly.
Options	• The right to purchase or sell a given asset on (or before) a future date at a preset price. • Transactions are made both through brokers by telephone and telex and in formal exchanges. • Typical use is for setting a ceiling or floor for prices.	• A buyer or option contract can limit the maximum loss, but keep open the opportunity to take advantage of favourable price movements. • A buyer has to pay initial premium (cost of the option). • A buyer faces a seller's credit risk. (A buyer has the right; a seller has the obligation). • Tailor made contracts are available for specific hedging needs. • Contracts available primarily for short-term maturities.
Swap	• An agreement to exchange specified cash flows at fixed intervals. • A series of back-to-back forward contracts. • Transactions are made through brokers by telephone and telex. • Typical use is for locking-in a future price.	• No initial cash transfer need. Cash transfer occurs at maturity. • Credit risk involved. • Tailor made contracts are available for specific hedging needs. • Contracts available for medium- and long-term maturities.

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Table 1: Financial Instruments used in Hedging (cont'd).

INSTRUMENTS	DESCRIPTION	CHARACTERISTICS
(ii) Commodity-Linked Instruments		
Commodity Swap	• A swap contract on a certain commodity. An agreement to pay a pre-fixed amount of cash in exchange for a variable amount of cash at fixed intervals, or vice versa. A variable amount of cash is determined by the market for a set quantity of a commodity. A fixed amount is based on a fixed price for the same quantity of the commodity. • Contracts are provided by international banks. • A typical use is for locking-in the price of a commodity for the medium- and long-term.	• No delivery of physical commodities are involved. Transactions are purely financial, as the other swap contracts. • The market is not very active, except for enery and minerals.
Commodity-linked Loans	• A loan in which interest or the amortization amount is linked to the price of a commodity. • A loan can be viewed as the combination of a conventional fixed-rate loan and a commodity swap contract. • Loans are provided by international banks.	• A loan can be regarded as effectively denominated in a commodity. • Credit risk of the loan is lower than that of conventional loan, if used by a commodity producer. A producer can repay the loan even if the price of the commodity falls significantly.
Commodity-linked Bonds	• (Forward type) A bond in which coupons and/or principal are linked to the market price of a certain commodity. • (Option type) A bond to which the right to buy or sell a certain commodity at a pre-set price is attached. • These bonds are underwritten by commercial banks.	• (Forward type) Characteristics are similar to commodity-linked loans. • (Option type) This type is often used by commodity producers to reduce the cost of financing. • The bonds have been issued primarily on gold and oil. Some are available for silver, copper and nickel.

Source: Claessens (1993).

Table 2: Liquidity of Financial Instruments' Markets

		Currency	Interest Rate	Commodity
Forwards	Short-Term	A	A	B
	Long-Term	C	C	C
Futures	Short-Term	B	A	B
	Long-Term	C	C	C
Options	Short-Term	B	A	C
	Long-Term	C	B	C
Swaps	Short-Term	C	A	B
	Long-Term	B	B	C

Notes: A - Highly Liquid; B - Moderately Liquid; C - Not liquid.
        A "liquid" market refers to one in which a counterparty to a transaction can be found easily and the transaction can be made quickly without changing the price of the instrument considerably. In a highly liquid market, a large transaction can be completed in a matter of minutes.
Source: Claessens (1993)

Appendix 2

Table 3: Total Debt, Net Flows, and Currrency Valuation Effects: Barbados, 1985-1992.
(US$ millions)

Year	Total Debt	Net Debt Flows	Currency valuation effect[b]	Currency valuation effect as a share of total debt
1985	457.2	-[a]	-	-
1986	579.5	-	-	-
1987	576.9	-	-	-
1988	703.0	136.2	-9.0	-0.01
1989	643.7	-28.2	-25.4	-0.04
1990	683.0	18.8	18.7	0.03
1991	652.1	-33.9	1.6	0.0
1992	620.6	6.6	-25.8	-0.04

Notes: a. - denotes not available.

b. The currency valuation effect is the change in the dollar value of total debt which results from the fluctuations of other currencies in the which debt stock is denominated against the dollar.
Source: World Bank World Debt Tables 1993-94.

Table 4: Total Debt, Net Flows, and Currrency Valuation Effects: Guyana, 1985-1992.
(US$ millions)

Year	Total Debt	Net Debt Flows	Currency valuation effect	Currency valuation effect as a share of total debt
1985	1,485	-	-	-
1986	1,618	-	-	-
1987	1,719	-	-	-
1988	1,853	119	-14	-0.01
1989	1,921	46	-16	-0.01
1990	1,978	44	34	0.02
1991	1,966	75	-9	0.0
1992	1,879	34	-57	-0.03

Notes: See Table 3.
Source: World Bank World Debt Tables 1993-94.

Table 5: Total Debt, Net Flows, and Currrency Valuation Effects: Jamaica, 1985-1992.
(US$ millions)

Year	Total Debt	Net Debt Flows	Currency valuation effect	Currency valuation effect as a share of total debt
1985	4,068	-	-	-
1986	4,187	-	-	-
1987	4,696	-	-	-
1988	4,532	-64	-123	-0.03
1989	4,536	7	-84	-0.02
1990	4,628	-120	120	0.03
1991	4,480	9	-2	0.0
1992	4,304	-119	-119	-0.03

Notes: See Table 3.
Source: World Bank World Debt Tables 1993-94.

Table 6: Total Debt, Net Flows, and Currrency Valuation Effects: Trinidad & Tobago, 1985-1992.
(US$ millions)

Year	Total Debt	Net Debt Flows	Currency valuation effect	Currency valuation effect as a share of total debt
1985	1,448	-	-	-
1986	1,855	-	-	-
1987	1,802	-	-	-
1988	2,141	238	-59	-0.03
1989	2,187	130	-106	-0.05
1990	2,310	-7	105	0.05
1991	2,329	-16	56	0.02
1992	2,262	-5	-18	-0.01

Notes: see Table 3.
Source: World Bank World Debt Tables 1993-94.

Table 7: Total Debt, and Variable Rate Long-term Debt: Barbados and Guyana: 1985-1992
(US$ millions)

Country:	Barbados			Guyana		
Year	Total Debt (1)	Variable Rate Debt (2)	(2) as a share of (1)	Total Debt (1)	Variable Rate Debt (2)	(2) as a share of (1)
1985	457.2	90.5	0.20	1,485	98	0.07
1986	579.5	109.7	0.19	1,618	103	0.06
1987	576.9	84.8	0.15	1,719	113	0.07
1988	703.0	134.4	0.19	1,853	124	0.09
1989	643.7	113.9	0.18	1,921	166	0.09
1990	683.0	155.8	0.23	1,978	225	0.11
1991	652.1	119.3	0.18	1,966	237	0.12
1992	620.6	81.5	0.13	1,879	144	0.08

Source: World Bank World Debt Tables 1993-94.

Table 8: Total Debt, and Variable Rate Long-term Debt: Jamaica and Trinidad & Tobago: 1985- 1992.
(US$ millions)

Country:	Jamaica			Trinidad & Tobago		
Year	Total Debt (1)	Variable Rate Debt (2)	(2) as a share of (1)	Total Debt (1)	Variable Rate Debt (2)	(2) as a share of (1)
1985	4,068	886	0.22	1,448	486	0.34
1986	4,187	914	0.22	1,855	620	0.33
1987	4,696	1100	0.23	1,802	563	0.31
1988	4,532	1091	0.24	2,141	699	0.33
1989	4,536	1033	0.23	2,187	820	0.37
1990	4,628	1024	0.22	2,310	920	0.40
1991	4,480	991	0.22	2,329	925	0.40
1992	4,304	899	0.21	2,262	953	0.42

Source: World Bank World Debt Tables 1993-94.

Table 9: Share of Exports by Destination: Barbados: 1985-1992.
(per cent)

Share of Total Exports by Destination

Destination[b]	1985	1986	1987	1988	Year 1989	1990	1991	1992
IC	-	64.8	52.7	50.6	40.1	35.4	40.4	36.0
U.S.A	-	45.2	27.7	24.7	21.1	13.5	13.4	13.0
U.K.	-	7.6	17.9	18.1	12.1	16.5	13.1	16.8
Other IC	-	12.0	7.1	7.8	6.9	5.4	13.9	6.2
LDC	-	20.9	27.8	31.6	40.1	34.6	29.7	31.5
WH	-	19.1	26.9	31.1	39.9	34.3	29.5	31.2
Other LDC		1.8	0.8	0.5	0.1	0.3	0.2	0.2
Total	-	85.7	80.5	82.2	80.2	70	70.1	67.5

Notes: See table 10.
Source: IMF Direction of Trade Statistics Yearbook 1993.

Table 10: Currency Composition of Long-term Debt, and Share of Exports by Destination: Guyana: 1985-1992.
(per cent)

Curreny as a percent of Long-term Debt

Currency[a]	1985	1986	1987	1988	Year 1989	1990	1991	1992
DM	0.1	0.0	0.1	0.0	1.5	2.3	2.1	1.8
YEN	0.3	0.3	0.5	0.4	0.4	0.3	0.3	0.3
UK£	11.6	10.7	12.1	11.3	8.3	10.9	11.1	9.8
US$	54.7	54.2	50.6	52.7	66.0	67.2	66.2	65.7
MC	24.7	24.6	24.6	24.5	16.6	14.0	14.1	16.0
SDR	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
OC	8.5	8.2	8.7	8.4	5.7	4.1	4.9	5.3
TOTAL	99.9	98.0	96.7	97.4	98.6	98.9	98.9	99.1

Share of Total Exports by Destination

Destination[b]	1985	1986	1987	1988	1989	1990	1991	1992
IC	-	80.4	80.4	82.2	80.4	83.5	87.2	88.0
U.S.A	-	22.6	22.6	21.8	22.6	20.5	30.5	30.5
U.K.	-	24.2	24.2	29.2	24.2	32.3	27.1	32.9
Other IC	-	33.6	33.6	31.2	33.6	30.7	29.6	24.6
LDC	-	16.8	16.8	14.7	16.8	13.5	10.2	9.7
WH	-	16.4	16.4	14.3	16.4	12.9	8.8	7.9
Other LDC	-	0.4	0.4	0.4	0.4	0.6	1.4	1.8
Total	-	97.2	97.2	96.9	97.2	97.0	97.4	97.7

Notes: a. Currency definition: DM - Deutsche mark, FFR - French franc, Yen - Japenese yen, UK£ - Pound sterling, SRR - Swiss franc, US$ - US dollar, MC - Multiple currency, SDR - Special drawing rights, OC - All other currencies.

b. Destination definition: IC - Industrialized countries, LDC - Developing countries, WH - Western Hemisphere countries (Latin America & the Caribbean), CAN - Canada
Source: World Bank World Debt Tables 1993-94, and IMF Direction of Trade Statistics Yearbook 1993.

Table 11: Currency Composition of Long-term Debt, and Share of Exports by Destination: Jamaica: 1985-1992.
(per cent)

Curreny as a percent of Long-term Debt

Currency				Year				
	1985	1986	1987	1988	1989	1990	1991	1992
DM	1.0	1.2	1.5	1.6	1.7	1.9	2.5	2.6
FFR	0.9	0.8	0.8	0.6	0.6	0.7	0.7	0.6
YEN	3.4	3.9	4.0	3.4	3.5	4.9	6.4	6.6
UK£	3.4	3.8	4.3	4.8	4.6	4.9	4.5	3.3
SFR	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
US$	60.8	56.8	51.8	53.0	53.2	50.5	48.2	51.5
MC	21.3	21.8	22.0	22.6	23.5	23.4	24.3	23.8
OC	8.8	7.9	8.9	9.4	9.2	9.3	9.1	8.2
TOTAL	99.7	96.2	93.3	95.4	96.3	95.6	95.7	96.6

Share of Total Exports by Destination

Destination								
IC	-	83.1	85.8	86.6	85.2	82.0	84.7	86.0
U.S.A	-	34.7	37.2	36.1	36.3	28.4	29.8	42.7
U.K.	-	18.1	17.5	18.7	15.7	17.0	15.9	14.9
CAN	-	16.3	13.7	15.2	12.9	10.7	10.2	10.4
Other IC	-	14.0	17.4	16.6	20.3	25.9	28.8	18.0
LDC	-	11.6	9.4	9.0	12.2	13.2	12.9	11.8
WH	-	10.3	9.4	8.3	9.4	8.4	8.5	7.6
Other LDC	-	1.3	0.0	0.7	2.8	4.8	4.7	4.2
Total	-	94.7	95.2	95.6	97.4	95.2	97.6	97.8

Notes: See table 10.
Source: See table 10.

Table 12: Currency Composition of Long-term Debt, and Share of Exports by Destination: Trinidad & Tobago: 1985-1992.
(per cent)

Curreny as a percent of Long-term Debt

Currency	1985	1986	1987	1988	1989	1990	1991	1992
DM	0.1	5.0	9.0	7.1	6.6	6.6	5.6	4.2
FFR	6.1	5.3	4.9	3.3	3.5	3.9	3.4	2.9
YEN	24.9	24.3	32.2	43.6	37.4	37.5	37.2	34.0
SFR	4.2	4.4	5.4	3.9	3.9	0.0	0.0	0.1
US$	60.7	57.2	44.4	38.8	44.4	46.3	45.0	47.5
MC	2.9	2.1	1.8	1.7	2.0	3.4	5.7	8.8
OC	0.9	1.1	1.3	1.0	1.6	1.7	2.6	2.3
TOTAL	99.8	99.4	99.0	99.4	99.4	99.4	99.5	99.8

Share of Total Exports by Destination

Destination								
IC	-	82.0	75.1	69.2	67.3	65.9	62.5	57.6
U.S.A	-	62.7	58.2	57.1	56.2	53.9	50.1	48.0
Other IC	-	19.3	16.9	12.1	11.1	12.0	11.4	9.6
LDC	-	16.9	23.3	28.7	30.3	30.9	36.0	40.2
WH	-	16.1	22.1	25.6	28.2	28.5	32.9	37.4
Other LDC	-	0.8	1.2	3.2	2.1	2.4	3.1	2.8
Total	-	98.9	98.4	97.9	97.6	96.8	98.5	97.8

Notes: See Table 10.
Source: See table 10.