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REPORT ON DATA QUALITY ISSUES REGARDING THE PRODUCTION OF INFORMATION ON FINANCIAL DERIVATIVES

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Report on data quality issues regarding the production of information on financial derivatives

Financial derivative instruments : definitions, structures and evaluation.

The present document is directed at facing some accounting issues regarding the financial instruments reported under the category of derivatives in the financial accounts. The debate on the accounting procedure will ultimately bring about higher quality in the production of information exchanged between institutions regarding these financial instruments. The Agency in charge of the financial account compilation very likely differs from the one in charge of financial management for the institutional units. That circumstance necessarily requires data exchange between the two units, the agreement on the nature of the financial item transacted and/or evaluated, besides the usage of a common jargon, whose significance is completely shared by both in order to properly record those particular transactions in national accounts.

Different kinds of derivatives are classified in the accounting Manuals as well as in academic theory. Clear guidelines can be found about the accounting treatment of the option-type contracts, both at inception and during the life of the contract. Within the sub category of the forward-type contracts the interest rate swaps seem to find precise guidelines as well. Some slight differences among accounting sources might be observed in the case of other forward-type contracts, precisely for the cross currency interest rate swaps.

When discounting future cash flows to mark the contract to market values considerable attention should be devoted to the fact that any financial derivative can end up standing either in the asset or in the liability position, regardless of the initial value at which it was transacted. Indeed, financial derivatives are clearly defined as instruments for which there is no nominal value as instead is the case for the debt instruments usually included in the various debt reports. In principle, an integrated set of accounts would represent the adequate tool in order to have a comprehensive overview of the financial instruments portfolio. We will see that derivatives present their own features and purposes, which still allows considerable value to be retained by the pure cash basis recording criterion.

The paper provides an overview of derivatives, some hints from the accounting guidelines framework currently enforced and some numerical examples. Throughout the text some focus points are flagged so as to be considered in the future debate and possibly be further investigated.

Overview of derivates

The expression derivative, on a purely academic ground, covers any transaction where there is no movement of principal, and where the price performance is driven by an underlying commodity.

To provide a clear definition we can say that *a derivative instrument is one whose performance is based or derived on the behaviour of the price of an underlying asset. The underlying itself doesn't need to be bought or sold. A premium may be due.*

This definition is very complete. Since they don't require movement of principal funds, they can turn into very powerful instruments both to hedge and to take risks. For the same reason they are known as off-balance sheet instruments. Indeed, this latter feature is the basis of the main accounting rule regarding derivatives whereby it is stated that transactions in principals are recorded under the underlying category (possibly to be hedged) while the difference between the agreed upon price and the current one at the time of settlement is the value of the financial derivative. The reasons to resort to derivatives is risk management or speculation, risk mitigation or risk taking. There may be a premium payable for the product or it may be zero cost. Premiums are required only for option-based derivatives. Non-premium based instruments lock the client into a specific insurance rate, which is fixed for the duration of the transaction and where the client is obliged to transact: whatever happens he is unable to walk away from his commitments.

	OTC	Exchange-traded	Premium due
Futures	X	V	NO
Options	V	V	YES
Swaps	V	X	NO

The first category into which derivatives are divided is that of **interest rate derivatives**. The interest rate risk is connected either with increased funding costs for borrowers or with reduced yield for investors.

First of all, **the single settlement interest rate derivatives** have only one settlement/fixing during the life of the contract and are typically used to hedge or trade shorter maturities. This sub category consists of:

Financial futures, **Forward Rate Agreements** (**FRAs**), **Interest Rate Options** (**IROs**).

This definition can be used: *a financial future contract is a legally binding agreement to make or take delivery of a standard quantity of a specific financial instrument, at a future date and at a price agreed between the parties in an organized exchange.*

We can also say that *a forward rate agreement is a legally binding agreement between two parties to determine the rate of interest that will be applied to a notional loan or deposit, of an agreed amount to be drawn or placed, on an agreed future date (the settlement date) for a specific term*.

The buyer of a FRA is the borrower wishing to protect himself, or profit from, a rise in interest rates. The seller of a FRA is the lender wishing to protect himself, or profit from, a fall in interest rates.

An option contract is the only derivative contract which allows the buyer (holder) to walk away from its obligation. This is in contrast with both financial futures and FRAs – regarding interest rates which we have already cited – and forward foreign exchange transactions in the currency markets, that are still to be seen. While these contracts provide the holder with an obligation at a guaranteed rate, option contracts give the holder the best of both worlds: insurance when things go wrong, and when things go right the ability to walk away from the instrument, and the ability to deal at a better rate in the market.

That’s why options do not come free of charge: a premium is due and is usually

paid upfront.

A precise definition is: *an option gives the buyer the right but not the obligation to buy or sell a standard quantity of a specific financial instrument at a specific rate on or before a specific future date. A premium is due*.

The strike price is the exercise price chosen by the parties and it must be compared to the current market level to establish whether the client's rate is better (in the money), worse (out of the money) or the same (at the money).

Among these contracts we can have *an interest rate option (an OTC contract) which gives the buyer the right but not the obligation to fix the rate of interest on a notional loan or deposit for an agreed amount and for an agreed period on a specific future date. A premium is due*.

We have mentioned that the single settlement interest rate derivatives provide protection for the shorter tenors while banks nowadays provide service in longer-dated derivatives that are built from shorter-dated products and linked together to provide a guaranteed level at the same rate, throughout the insured period. These are the **multi-settlement interest rate derivatives**, the most famous one being **the interest rate swap**[i].

Swaps are probably the most flexible risk management tool around. They can cover exposures from six months to over 30 years, are often combined with bond issues to achieve favourable funding costs and they can assist a borrower to find a fixed rate funding if he is unable to access other lending markets. They are not a method of raising finance, rather they are a way of managing an interest rate risk and possibly transforming it from fixed into floating or vice versa. All swaps have one common feature: one party is exchanging a benefit it has in one financial market for a corresponding benefit available to another party in another market. This is known as the comparative advantage. Four basic types of swap can be singled out:

single currency interest rate swap, **single currency basis swap**, **currency swap**, **cross currency interest rate swap**.

The following definition can be used : *an interest rate swap is an agreement to exchange interest-related payment in the same currency from fixed rate into floating rate (or vice versa), or from one type of floating rate to another*[ii].

In these swaps, in the first case mentioned, an absolute rate of interest will be guaranteed. One party will agree to pay the fixed rate, the other to receive this fixing rate and to pay the floating rate, usually LIBOR[iii]. This is the simplest type of swap

available named after the simplest type of ice-cream: vanilla swap. Another common word used to name these swaps is coupon swaps to highlight the fact that they are linked to an underlying bond issue where the interest coupon is being swapped.

In the case of a single currency basis swap both the receipt and the payment are based on a floating rate but there is a mismatch to be dealt with. Indeed, with a basis swap both parties will be paying a floating interest rate, one of which is often LIBOR, and sometimes both are. For example one party may wish to pay LIBOR and the other a commercial paper rate; alternatively, both parties may wish to pay LIBOR: 3 month LIBOR one, 6 month LIBOR the other.

Continuing our discussion on swaps we now leave behind interest rate swaps to investigate currency derivatives. The exposure in currency is now the key issue, the final target being that the actual outturn of the foreign currency transaction needs to be known in advance. We can agree that the currency risk to a hedger is either to receive a smaller amount of the base currency than expected, or to pay out more of the base currency to purchase the required amount of the foreign currency. The actor in the market can be a hedger who wants to remove or manage his currency risk, or a trader who wants to take a currency risk in the hope of making a profit.

One of the most common currency derivatives is the currency swap[iv].

This definition is given: *a currency swap is an agreement between two parties to exchange interest obligations/receipts, for an agreed period, between two different currencies and at the end of the period to re-exchange the corresponding principal amounts, at an exchanged rate agreed at the beginning of the transaction*.

Currency swaps differ from interest rate swaps in that they involve an exchange of interest in two currencies and also involve an exchange of principal amounts. There are three types of currency swap: fixed/fixed, fixed/floating, floating/floating.

A *traditional currency swap* would keep the fixed interest rates constant and simply swap into a different currency (fixed US$ to fixed EUR).

A *cross currency swap* will swap fixed for floating as well as crossing the currency (fixed US$ versus floating Sterling).

A *cross currency basis swap* will swap two different floating rates in two different currencies (floating Sterling versus floating US$).

Principal amounts can be exchanged at the start of a currency swap. This is normally when the swap is associated with a new borrowing or where one of the counterparties needs the principal amount of one of the currencies being swapped. At

maturity there will be a re-exchange of currencies at the original exchange rate.

The difference between a currency swap and a forward foreign exchange transaction is worth highlighting.

The swap involves the exchange of interest and principal and the exchange of principal takes place at a rate agreed at the start of the swap, usually the spot rate. With a forward deal no interest amounts are exchanged, only principals, and that exchange takes place at maturity but at a rate different from the spot rate because the interest differential is accounted for in the FX rate.

The accounting guidelines framework

One of the main Manual revisions lately approved was related to the treatment of financial derivatives. The debate on this issue ended by the beginning of the current century and confirmed that financial derivatives should be treated as financial assets. Transactions in financial derivatives should be reported separately from the underlying items whose hedge is supposed to be the derivative contracts. Swap arrangements and forward rate agreements were openly recognized as financial instruments and the ongoing net cash flows called for during the life of the contract as well as the final settlement were no longer classified under interest flows (income property)[v].

In that occasion a useful addendum was provided to the fifth edition (1993) of the Balance of Payments Manual dealing with the subject[vi] (2000 Supplement).

In substance, all the internationally accepted accounting sources of regulations provide mainly the same views about derivatives with some differences in nuances which might give rise to possibly different conceptual interpretations.

The 2000 Supplement, in line with SNA93, with the IMF Government Finance Statistics Manual 2001 (GFS Manual 2001), and with the External Debt Guide, defines two broad categories of financial derivatives: the forward contracts and the option contracts assessing that "…In a ***forward contract***, which is unconditional, *two counterparties agree to exchange a specified quantity of an underlying item (real or financial) at an agreed-upon price (the strike price) on a specified date*. In an ***option contract***, *the purchaser acquires from the seller a right to buy or sell, (depending on whether the option is a call or a put) a specified underlying item at a strike price on or before a specified date"* (2000 Supplement, FD3).

The first type of contract includes financial futures, forward rate agreements, forward foreign exchange contracts, foreign exchange swaps, interest rate swaps,

currency swaps (including the traditional type, the cross currency basis swap and the cross currency interest rate swaps). The other category deals with options[vii].

Finally, warrants are defined as a "*form of options that are treated in the financial account in the same way as other options*" (SNA93, par. 11.41), and credit derivatives which "*…are used primarily to trade credit risk… are designed for trading in loan and security default risk, can be either forward or option contracts*" (2000 Supplement, FD30).

ESA 95 seems to follow the same type of splitting of derivative categories in a slightly less defined way. Indeed, in par. 5.67 from (a) to (e), it numerates all the items that the sub-category AF.34 should include in the following manner: options, warrants, futures, swaps, FRAs.

The importance of having marked this division (forward versus option-type) is worth underlining, because it directly affects the accounting of derivatives as far as the payments at inception are concerned. In an option contract a premium is due which is recorded as the acquisition of a financial asset for the buyer/holder and as the incurrence of a liability in derivatives for the seller/writer. On the other hand "*The creation of a forward contract doesn't normally require the recording of a transaction in a financial derivative because risk exposures of equal value are usually being exchanged. That is there is zero exposure and zero value for both sides*" (2000 Supplement, FD18). The other Manuals seem to adopt the same view: on one hand it is clearly assessed that the commitment of the option writer is treated at inception as a liability (against a claim registered for the buyer); on the other hand, though, some less precise descriptions are provided for the forward contract type. ESA95 in par. 5.139 (b) says that "[in the case of] *Financial derivatives other than options … there may also be the need to record transactions associated with the establishment of derivative contracts. However, in many cases, the two parties will enter into a derivative contract without any payment by one party to the other; in these cases the value of the transaction establishing the contract is nil and no entry is actually required in the financial account*."

GFS Manual 2001 and SNA93 seem to have endorsed a more decisive view on this issue basically assessing that at inception a forward-type contract has zero value and no transaction is recorded (GFS Manual 2001, par. 9.44; SNA 93, par. 11.37).

It can be coherently observed that giving scope to the possibility of incurring into a forward contract with positive value at inception would be not fully in line, in

some way, with the initial definition of derivatives provided by the Manuals. It is clearly said, indeed, that unlike debt instruments there is no advancing of nominal amount to be reimbursed. On the other hand, it is certain that, as in the case of options, a derivative contract with no nil value at inception does not coincide with a nominal amount advanced to be repaid and that a general definition in the Manuals for economic events doesn't prevent the same phenomenon from assuming, in practice, peculiar features partially diverging from the general definition.

A specific provision regarding cross-currency interest rate swaps provided by both SNA93 and by 2000 Supplement would seem to back up these statements. According to 2000 Supplement, FD28 a "***cross currency interest-rate swap*** *contract (also known as a* ***currency swap****) consists of an exchange of cash flows related to interest payments and, at the end of the contract, an exchange of principal amounts in specified currencies at a specified exchange rate. There may also be an exchange of principal at the beginning of the contract. In that case, subsequent repayments that comprise both interest and amortization of principal may be made over time and according to pre-arranged terms.*"

In the same vein, SNA93, par. 11.38 assesses that "*Cross-currency interest rate swaps, sometimes known as currency swaps, involve an exchange of cash flows related to interest payments and an exchange of principal amounts at an agreed exchange rate at the end of the contract. There might also be an exchange of principal at the beginning of the contract, and, in these circumstances, there may be subsequent repayments, which include both interest and principal, over time according to the predetermined rules.*"

As we have gathered before, in a currency swap (in all of the three-fold declination that we have mentioned) principal amounts can be exchanged at the start of the contract. This is normally when the swap is associated with a new borrowing. The two currencies will usually be exchanged according to the spot rate level, though the exchange rate doesn't need to be exactly the spot rate. What has to be taken for certain in a currency swap structure is that at maturity there will be a re-exchange of currencies at the original exchange rate.

The two Manuals quoted above may not be fully clear when they might seem to suggest that in case a currency swap provides also for an exchange of nominal amount at inception there may be an amortization component included in the subsequent cash flows to be paid/received, which would seem to contradict the clause

stating that an exchange of the same nominal amounts at termination is required.

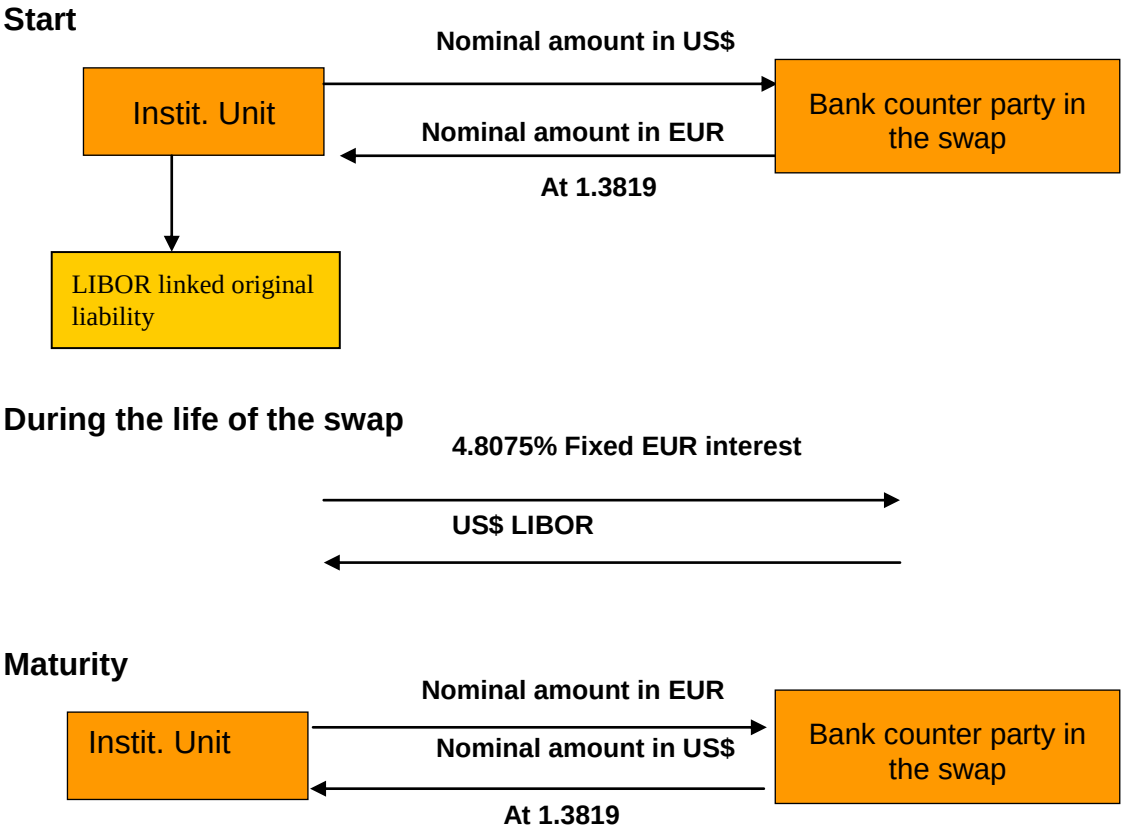
A numerical example for a cross currency interest rate swap is now sketched to illustrate the very straightforward functioning of this type of forward swap.

By raising new funds in the capital markets in one currency and executing a currency swap into the desired currency, a borrower may reduce the cost of raising funds. Let's assume that one institutional unit has issued a 10 year floating rate note in US dollars for an amount of US$ 500,000,000 and that he wishes to receive floating in the cross currency swap to face the bond obligation.

Looking at the current exchange rate for EUR/USD and at the interest rate swap market in each currency for that tenor we would have the following levels:

Numerical example: cross currency swap

Reference rates		
EUR/USD	US$ 10 yr swap	EUR 10 yr swap
1.3819	**5.642**	**4.789**



The difference between 4.789 and 4.8075 at which the transaction is carried out is due to the cost of basis. Indeed, the 10 year EUR swap rate – 4.789 – has been quoted against Euribor; given that this is a cross currency swap the switch to US$ LIBOR must be taken into account. The basis makes the

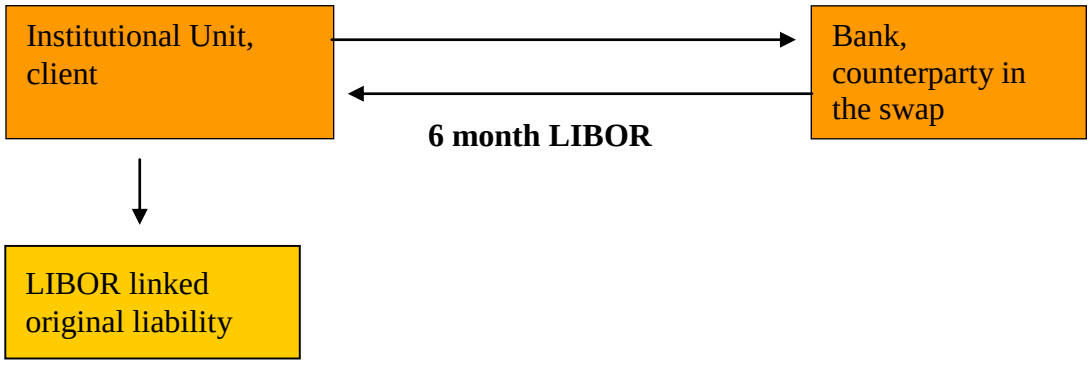
transaction a couple of basis points dearer. The arrows in the diagram refer to interest payment flows.

This is all referred to forward-type contracts where the exchange of nominal amounts is required. Conversely, interest rate swaps (IRS) are clearly defined as contracts involving an exchange of cash flows related to interest payments or receipts, on a notional amount of principal. The agreed amount is called the notional principal because, since it is not a loan or an investment, it is not exchanged initially or repaid at maturity. Switching interest flows from a fixed to a floating basis or the reverse is the simplest way of executing an IRS.

Assume that an institutional unit, for a handful of reasons, has not found the opportunity to raise funds at fixed rate in its domestic market as it wished to do and decides to borrow at a floating rate and swap the proceeds into fixed rate, thus locking in a fixed rate liability, as originally sought.

Assume that the unit raised € 500,000,000 issuing a 10 year floating rate note and that the 10 year swap rate is quoted 4.52% against six month LIBOR as the floating rate of reference, with the client being the payer counter party in the contract. That is, this is the level of the rate the bank is willing to receive for a 10 year contract on a notional of € 500 million. In real life, one should be clear on several details such as whether interest will be calculated on an annual or on a semi-annual basis, whether it will be calculated on a bond basis or on a money market basis and how often payments will occur.

Numerical example: single currency interest rate swap



The arrows in the diagram refer to interest payment flows.

Assume now that the bank manager offers a variant to be built in this type of vanilla structure. According to the new structure, he is willing to receive a fixed rate equal to

4.64% if the client wishes a **lump sum to be extended at inception** of the swap equal to **€ 5,000,000**.

If that is the structure transacted with the IRS contract, the interest rate expenditure related to the nominal amount raised with the original borrowing is over hedged, the additional 5 million in excess possibly resembling an implicit loan.

Indeed, the differential rate of 0.12% to be paid, *rebus sic stantibus*, determines an extra payment which is consistent with a possible annuity capable of amortizing that lump sum in 10 years[viii].

The following remarks and questions may prove useful after having gone through the example.

Focus points

If a loan component is implicit at inception in a single currency interest rate swap contract one may consider that it should be detached in order to constitute a different financial instrument to be separately reported from the rest of the derivative in the financial accounts.

Are financial managers and financial account compilers (likely different institutional units) in different countries coordinated enough in order to trace down the loan component and to end up with the same result in both the derivative and the other financial instrument sector when facing a similar contract-type? Any possible structural failure of coordination would yield a less homogeneous reporting among countries, if possible, more serious than the current one, which would be needy of a more in-depth understanding of derivatives' structures.

What is also important, is that this is a case where it is evident that the reception of a lump sum at inception is not a natural component of the hedging transaction related to the underlying liability. Nevertheless, derivative transactions of a similar structure may be concluded for different purposes where such a component is coherent with the remodeling of the positions that are already present in the portfolio itself so as to further conform it to present market views, a strategy inherent to the activity of risk management which takes place when market views have changed with respect to the moment in which the remodeled item was concluded.

We have seen that derivative instruments can turn into very powerful instruments both to hedge and to take risks. As far as a Government is concerned the activity in derivatives is geared towards managing the risks that derive from debt activity. The goal of such activity doesn't coincide with that of trading, which is speculative and

aimed at making profit, and is not connected to any underlying asset/liability. It is for that reason that the market evaluation of the State's derivative portfolio may have a questionable informative content also considering the extreme volatility of the data.

In order to highlight this latter very intrinsic feature of a derivative instrument we will finally mark to market values a swap contract enforced during a period of high interest rate volatility. We will assume that the institutional unit contracted a 1 billion seven year interest rate swap, traded on 30 June 2003. In that swap, based in US dollars, it receives fixed and pays floating (12 month LIBOR).

Numerical example: single currency interest rate swap

The counterparties had chosen a 3.35 % fixed coupon that, giving a par coupon roughly equal to 3.33% for that structure, determined a contract slightly off the market at inception. The value at inception is obtained by discounting the net payments back to the date of evaluation. The discount factors clearly indicate the interest rates level at that moment (the higher the discount factor, the lower the rate).

Payment dates	Payments (rcv)	Payments (pay)	Net payments	Discount	Net PV
06/30/04	33,500,000	-11,831,458.33	21,668,541.67	0.988051	21,409,624.27
06/30/05	33,500,000	-18,513,776.98	14,986,223.02	0.970091	14,538,000.08
06/30/06	33,500,000	-28,691,833.24	4,808,166.76	0.943033	4,534,259.92
06/30/07	33,406,944.44	-37,107,043.72	- 3,700,099.28	0.909292	- 3,364,470.67
06/30/08	33,593,055.56	-44,157,280.49	-10,564,224.93	0.870838	- 9,199,728.51
06/30/09	33,500,000	-48,276,887.58	-14,776,887.58	0.830733	- 12,275,648.15
06/30/10	33,500,000	-51,638,790.26	-18,138,790.26	0.789941	- 14,328,574.12
					1,313,462.81

Let's now evaluate the same contract one year later, on 30 June 2004. Interest rates have soared up generating the series of discount factors reported below. This means that a liability equal to around US$ 61 million is evidenced for the same counterparty in the derivative section of his financial accounts.

Payment dates	Payments (rcv)	Payments (pay)	Net payments	Discount	Net PV
06/30/05	33,500,000	-24,130,555.56	9,369,444.44	0.975818	9,142,872.53
06/30/06	33,500,000	-37,555,673.19	- 4,055,673.19	0.940497	- 3,814,348.47
06/29/07	33,406,944.44	-47,272,073.30	-13,865,128.86	0.898044	-12,451,495.78
06/30/08	33,593,055.56	-52,804,713.54	-19,211,657.98	0.853002	-16,387,582.68
06/30/09	33,500,000	-56,347,005.35	-22,847,005.35	0.807502	-18,449,002.51
06/30/10	33,500,000	-58,977,246.63	-25,477,246.63	0.762530	-19,427,164.87
					-61,386,721.78

Focus point

If that swap was entered into as an integral part of a borrowing arrangement, in other words if it was a straight hedging transaction which is extremely likely for a

public sector unit, the cash flows between the hedged item and the derivative were made symmetric so that the losses and gains cancel each other out. It might then be seen as inappropriate to recognize gain or loss related to changes in value of the swap given that for the associated liability the prevailing concept is that of the nominal value. That would avoid unnecessarily importing such a high volatility in the unit's financial statement.

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[i] **Interest rate caps**, **floors** and **collars** are the other types within the category, basically deriving their functioning from the same principles (multi-settlements, linking of shorter products).

[ii] This is a broad definition which includes both single currency interest rate swaps and single currency basis swaps.

[iii] LIBOR (London Inter-Bank Offered Rate) is the rate at which major banks exchange funds with other major banks in the London inter-bank market.

[iv] The range of currency derivatives also includes currency futures and currency options.

[v] The European legislation, as far as the fiscal surveillance procedures are regarded, presents its own peculiarity. Indeed, Regulation (EC) No. 2558/2001 amending Council Regulation (EC) No. 2223/1996 has changed the classification of interest flows under swap contracts and Forward Rate Agreements (FRAs) from income property to financial account and has stated at the same time the need for a specific treatment of these flows for the data transmitted under the excessive deficit procedure (EDP). As a consequence, Regulation (EC) No. 351/2002 amended Council Regulation (EC) 3605/1993 in order to still include the streams of cash flows deriving from swaps and FRAs in the balancing item "net borrowing/net lending" of General Government and of each of its sub-sectors (this is the so called EDP exception).

[vi] International Monetary Fund, "FINANCIAL DERIVATIVES, A SUPPLEMENT TO THE FIFTH EDITION (1993) OF THE *BALANCE OF PAYMENTS MANUAL*, 2000.

[vii] We have mentioned different kinds of options: the interest rate option contract and the multi-settlement interest rate ones such as interest rate caps, floors and collars; when dealing with currency risk, we can also include the currency option contract.

[viii] To compare the lump sum extended at inception with an annul extra expense of 0.12% on the notional amount we need to spread the lump sum (i.e. the present value) over the period ("amortizing") and verify if the extra amount paid annually over 10 years is equal to that present value with an appropriate interest rate used in the discount factor. The formula used is

$$PMT = PV \times \frac{i}{1 - (1+i)^{-n}}$$

Where:

PMT = amount that is paid annually, i.e. annuity for the loan
PV = present value or lump sum extended at inception
i = appropriate interest rate as decimal
n = number of years

By determining i one finds the value of the only unknown variable in the equation, which is the interest rate at which the constant depreciation instalments need to be discounted in order to obtain our initial lump sum.