

*The Financial Innovations That Never Were**

V. K. Sharma

I deem it an honour and privilege to be addressing this very distinguished and august audience. Right at the outset, I would like to impress upon this very learned and discerning audience that responsible Financial Innovation is not an end in itself, but instead, a means to an end of sub-serving the real sector and in that sense it is consistent with, and a natural fit to, public policy purpose of 'financial sector-real sector balance'. As this distinguished audience is aware, there is broad consensus and unanimity now among all the key stakeholders that it was the unsustainable 'financial sector-real sector imbalance' due to certain financial innovations that was the real cause of the last global financial crisis.

2. Generic financial innovation has typically evolved in the form of both on-balance sheet and off-balance sheet derivative instruments. While Collateralised Debt Obligations (CDOs), CDO-squared, CDO-cubed, Credit Linked Notes (CLNs) *etc.*, are the typical examples of on-balance sheet financial innovations, Currency Swaps, Interest Rate Swaps (IRS), Futures, Options, Credit Default Swaps (CDS), *etc.*, are those of off-balance sheet financial innovations. In both the types, the underlying theory and practice has been the so-called law of one price or, what is the same thing as the no-arbitrage argument, involving replication of derivatives cash flows in the cash markets. In other words, a derivative of an underlying cash market asset will be so priced/valued that it is not possible to arbitrage between the cash market and the derivative market, provided the derivative in question is fairly priced/valued. For, if a derivative were priced expensive

relative to the underlying asset, an arbitrageur will engage in riskless arbitrage by selling the expensively priced derivative and buying the asset in the cash market by financing it at the going repo rate. In the opposite case, an arbitrageur will engage in riskless arbitrage by shorting the asset in the cash market, investing the proceeds of short sale at the higher going repo rate and buying the relatively cheap derivative until, in equilibrium, the derivative was fairly priced/valued relative to the asset in the cash market. Another way to posit the above is to say that a derivative's cash flows/pay offs can be exactly replicated in the cash market provided, of course, seamless, and frictionless, arbitrage is allowed. Significantly, and interestingly, such seamless and frictionless arbitrage also applies, just as much, to derivatives themselves! Illustratively, a long position in forward can be replicated by buying a call option and selling a put option with the strike prices for both at the current forward price. If the actual forward price is expensive relative to the 'synthetic' forward (call + put options), an arbitrageur will engage in risk-less arbitrage by selling the expensively priced forward and buying the relatively cheap 'synthetic' forward (call + put options) and vice versa! The reason why I am labouring this point is because this is very central to the key message of my address today.

3. Specifically, I propose to cover in my address today three financial innovations proxied by three derivative instruments, *viz.*, Interest Rate Swap (IRS), Credit Default Swap (CDS) and Interest Rate Futures (IRF) as they evolved, or did not evolve in India.

Interest Rate Swap (IRS) Market

4. The Report of the Committee on Financial Sector Assessment (Chairman: Dr. Rakesh Mohan) noted that the notional principal amount of outstanding IRS of all commercial banks increased from ₹10 trillion *plus* as

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on 31st March 2005 to ₹80 trillion *plus* as of 31st March 2008. However, due to trade compression, involving multilateral early termination, by the Clearing Corporation of India Ltd. (CCIL), the notional principal amount of outstanding IRS of commercial banks declined to ₹50 trillion *plus* as of 30th June 2012. A granular analysis reveals that of all the commercial banks engaging in IRS, public sector banks with about 74 per cent of total bank assets accounted for less than 2 per cent of notional principal amount of outstanding IRS and private sector and foreign banks, with about 19 per cent, and 7 per cent, of total bank assets, accounted for 18 per cent, and 80 per cent, of total notional principal amount of outstanding IRS, respectively. In other words, with combined assets of just ₹6 trillion or so, foreign banks accounted for notional principal amount of outstanding IRS of ₹40 trillion.

5. Significantly, it is disturbing to note that, day in, and day out, the IRS yields trade way below yields of comparable maturity Government securities. Specifically, currently the 5 year IRS yield is trading at a negative spread of 120 basis points to 5 year G-Sec! Besides, while the G-Sec yield curve is almost flat, the IRS yield is steeply inverted to the extent of 120 basis points defying term, credit risk and liquidity risk premia which typically characterise a normal yield curve of risk assets! A typical, but fallacious, and vacuous, rationalisation offered of this counter-intuitive, warped, wierd and preposterous feature is that while IRS yields are influenced by expected path of future interest rates, those of G-Secs are influenced by their supply!! Nothing could be farther from the truth for this rationalisation turns the very logic and reason on their head. For, as I said, being pure time value of money, G-Secs are influenced by, and immediately price in, inflationary expectations arising from higher fiscal deficit which, in turn, is the cause of additional supply of G-Secs and not the other way round. Thus, here we have an IRS market completely up side down and running on its head. This is completely anti-thetical to the law of one price, or the no-arbitrage argument. For, if this law held, given

hugely negative spreads to Govts., fixed rate receivers, who far exceed, and overwhelmingly outnumber, fixed rate payers, would have engaged in a very simple arbitrage, involving buying corresponding maturity G-Sec in the cash market by financing it in the overnight repo market, and paying fixed, and receiving overnight, in the IRS market! This very normal, and logical, arbitrage would have had the effect of benefiting all the three stake-holders, *viz.*, (a) fixed rate receivers receiving much higher yield than they are currently, (b) Government of India borrowing at much lower cost, and (c) business and industry in general, and infrastructure sector, in particular, getting long-term-fixed-rate-low-cost financing solutions. In other words, this would have been a win-win for all key stakeholders but, the fact of the matter is that, if anything, this is just not happening. As to the explanation of this almost a permanent, structural, though quirky and weird, counter-intuitive, perverse, and preposterous feature of the Indian IRS market, the stock, but specious, refrain is that arbitrage, involving receiving fixed on G-Secs and paying fixed in IRS, is not possible because of the so-called 'basis risk'! But this is totally untenable for the simple reason that 'basis risk' applies just as much to 'hedging' as indeed it does to 'arbitrage'! In other words, 'basis risk' is 'arbitrage-hedging' agnostic and, therefore, it inevitably, and incontrovertibly, follows that the IRS market is also not being used even for 'hedging'. If that be so, as indeed it is, the question, especially, but significantly, when one also considers the fact that only 2 per cent of the notional principal amount of the outstanding IRS is accounted for by the real sector, *i.e.*, business customers, it begs is what then is 98 per cent of this ₹50 trillion *plus* IRS market being used for. In other words, in the case of the Indian IRS market, what holds instead is the 'law-of-two-prices-AND-no-arbitrage-argument'! In this background, it would be no exaggeration to say that these hugely negative spreads of IRS to G-Secs are as counter-intuitive, quirky, anomalous, warped and preposterous as a father's negative age spread to his son's is! Indeed, in the analytical framework of my Singapore speech for

identifying systemic financial risks, this situation can be reasonably interpreted, in a disturbing and sit-up-and-take-notice manner of speaking, as a veritable IRS 'Super-Bubble', signifying 'huge huge' under-pricing of interest rate/credit risks. This I say with analytical conviction because a 'bubble', signifying 'huge' under-pricing of risks, is typically diagnosed with spreads of riskier assets to risk-free G-Secs being unusually low, but still positive, whereas, here in the IRS segment, spreads to G-Secs have persistently, and consistently, been negative to the extent of 100 to 150 basis points for 5 year maturity! It thus follows that the situation here in IRS segment is almost getting to the point where the IRS market, instead of being a means to an end of sub serving the real sector is, to all intents and purposes, existing, almost entirely for its own sake to almost complete exclusion of the needs of the real sector, creating a massive 'financial sector-real sector imbalance'. On this touch-stone, and hallmark, the IRS market in India is then a non-derivative, nay, a financial innovation that never was.

Credit Default Swap (CDS)

6. Like Interest Rate Swap, or for that matter any other derivative, Credit Default Swap is no exception to cash market replication principle of derivatives pricing. Without going into mathematical gymnastic proper, price of a CDS, in spread terms, is reasonably approximated by the difference between the spread of a reference bond to corresponding maturity G-Sec yield and the spread of IRS to the same maturity G-Sec yield. Thus, if S_c be corporate bond spread and S_s be IRS spread to risk-free G-Sec yield of corresponding maturity, then the fair/theoretical/model value/price of a CDS is approximately equal to S_c minus S_s . Tautologically, since G-Sec yield is common to both spreads, another way to approximate CDS price is simply to take the difference between the yield of the reference bond and the same maturity IRS yield. As this learned audience is aware, finally when the product was launched on 7th December 2011, it was a stillborn. In fact, its epitaph was written in the warped, anomalous, quirky and preposterous feature of hugely negative IRS yield spreads to corresponding maturity

G-Sec yields itself! For, as this discerning audience will readily see from the above formula, because of hugely negative IRS spread, fair price of a CDS would be so high as to make it both pointless, and useless, to buy a reference bond and also hedge it with a CDS! In other words, one is much better off straightaway buying a corresponding maturity risk-free G-Sec itself!! Significantly, if actual CDS premium/price/spread is higher than the above theoretical/model price, then an arbitrageur will sell a CDS (which is equivalent to going long the reference corporate bond) and receive this actual spread and short the reference bond and invest the proceeds of short sale at the going corporate bond repo rate and receive fixed, and pay overnight, in an IRS, and do the opposite arbitrage if the actual CDS spread is lower than the theoretical/model spread/price until the arbitrage opportunity disappears and theoretical/model and actual market prices align again. But sadly, like in a classical catch-22, this arbitrage is just not possible simply because of its complete absence, as I said before, in the IRS market and, therefore, alas, much as we would all wish, a happening corporate bond market cannot happen, *inter alia*, to supplement huge infrastructure funding needs of the Indian economy.

Interest Rate Futures (IRFs)

7. If the CDS was a stillborn, IRF too suffered mortality in its infancy the second time round after its 2003 version which itself was almost a stillborn. For, after their second launch in August 2009, Interest Rate Futures on 10-year notional government bond had seen two settlements, *viz.*, the December 2009 contract and March 2010 contract. Significantly, both traded volumes and Open Interest (OI), witnessed decline over the two settlements, eventually decaying very quickly to zero permanently. In particular, the December 2009 contract, which had a peak Open Interest of ₹980 million declined to a pre-settlement Open Interest of ₹610 million and settled 'entirely' by physical delivery, representing physical settlement of 62 per cent of the peak Open Interest. In contrast, the March 2010 contract, which witnessed a peak Open Interest of ₹570 million declined to a pre-settlement Open Interest of

₹420 million and also settled entirely by physical delivery, representing physical settlement of 72 per cent! Both these settlements were a far cry from the hall-mark and touch-stone of an efficient, frictionless, seamlessly coupled, and organically connected, physically-settled futures market even where physical delivery typically does not exceed 1 per cent to 3 per cent of the peak Open Interest! This happened because of the inefficient 'disconnect' and 'friction' in the IRF market due to only one way arbitrage *viz.*, buying the cheapest-to-deliver (CTD), with the highest implied repo rate (IRR), by financing the same at the actual repo rate and simultaneously selling futures. In fact, as ascertained from one market participant, who accounted for almost the entire ₹600 million worth of physical delivery into the December 2009 contract, the implied repo rate of the CTD was 6.75 per cent as against the actual repo rate of 3.4 per cent, representing a risk-free arbitrage profit of 3.35 per cent!! Unlike this, on the other side, for the so-called benchmark, and most expensive-to-deliver, Government security, the IRR was almost zero to negative, suggesting an arbitrage opportunity of short-selling this bond and investing the proceeds of short sale at much higher actual repo rate and buying the futures contract! But this arbitrage could not be engaged in for want of short selling for a period co-terminus with that of the futures contract. It is the possibility of this two-way arbitrage, working in the opposite directions, that, like a 'good conductor' of 'heat' and 'electricity' in physics, will seamlessly conduct/transmit liquidity from the relatively more liquid (the most-expensive-to-deliver) benchmark government bonds to the so-called illiquid (the cheapest-to-deliver) bonds in the deliverable basket! Here, I hasten to caution that the totally misplaced temptation, and impatience, to introduce/launch 'cash-settled' IRF, any how, some how, and at any cost, must be firmly and decisively, resisted for such medicine will be worse than the disease! The reason is that unlike assets such as equity, foreign currencies, commodities which are 'homogeneous', government bonds, except, of course, for their same credit risk, are given their differing coupons and maturities, 'heterogeneous' and,

therefore, for the cogent arguments adduced above, 'physically-settled' contracts will make for seamless transmission/conduction of liquidity from the most liquid benchmark bonds to the relatively less liquid bonds in the deliverable basket and thus impart, and permeate, 'much-needed' homogeneity in the entire deliverable basket of government bonds! But I again hasten to add that I am not even remotely suggesting that it is perfectly legitimate to have 'cash-settled' derivatives contracts in the case of 'homogeneous' assets like equity, currencies and commodities!! For any 'cash-settled' derivative, where physical settlement is possible, tends to become a 'non-derivative', violating the cardinal principle of arbitrage-free pricing/valuation and, therefore, as I said before, comes to exist almost entirely for its own sake and to almost complete exclusion of the larger public policy purpose of subserving the hedging needs of the real sector, creating a massive 'financial sector-real sector imbalance' and, thus, in turn, become the very antithesis of responsible financial innovation.

Market Segmentation

8. Continuing market segmentation in India is the biggest undoing of an efficient, deep, liquid, organically connected and seamlessly integrated financial market which is also a 'sine qua non' for effective, efficient and instantaneous monetary transmission. Market fragmentation/segmentation contributes to price distortion and inefficiency. The most tangible and manifest evidence of market segmentation in India is the 'dis-connect' between IRS, IRF and government securities markets as reflected in the IRS (bank credit risk) yields being 100 to 125 basis points below G-Sec yields and IRF yields (when last traded) being about 70 basis points higher than their fair value, signifying almost complete absence of arbitrage and thus a pernicious violation of the 'no-arbitrage', or what is the something as, the 'law-of-one-price, argument' which, as the discerning audience is by now well aware, is the most fundamental basis of 'fair value derivatives pricing'. Such manifest 'dis-connect' militates against the development of a seamlessly integrated financial market with coupling and organic connect between all

the three! However, this market segmentation can be credibly, effectively and decisively addressed if the nuts-and-bolts reforms propositioned below, which are, if you will, equally also the necessary, and sufficient, conditions, are synchronously orchestrated in all-at-the-same-time-no-piecemeal- and-no-half-way-house manner :

- i. For the cogent reasons elucidated in the paragraph 7 above, the totally misplaced temptation, and impatience, to introduce/launch cash settled IRF must be firmly, and decisively, resisted. For else, this will, to quote Jamie Dimon, Chairman of JP Morgan Chase, tantamount to 'doing the 'easy' and not the 'right' thing' and, in the process, replicating an IRS genie in the IRF/CDS markets which then grows so fast so much that it becomes difficult to put it back into the regulatory bottle.
- ii. What must certainly not be done is even to contemplate, much less permit, the most-liquid-single-bond IRF for the very simple reason that this benchmark security represents less than 10 per cent of the current 10-year IRF deliverable basket and would, therefore, at a time, when we are talking about 'inclusion', this will amount to veritable 'exclusion' of 90 per cent of the 10-year Government securities from the benefit of hedging which arguably runs counter to the public policy purpose of IRF providing hedging to as wide a universe of government securities as possible.
- iii. What also must certainly not be done is even to contemplate, much less allow, selling/repoing of securities acquired under market repo, another name for 'rehypothecation', if the IMF finding in the wake of the 2007-Global Financial Crisis is anything to go by! The IMF noted that pre-2007, thanks to re-hypothecation, the shadow-banking system in the USA generated funding/liquidity of US\$ 4 trillion with the underlying 'original collateral' of just US\$ 1 trillion, implying astronomical and whopping margins/haircuts of 'minus' US\$ 3 trillion!
- iv. What also must certainly not be done is allocate specific government securities to different Primary Dealers for market making as this will be a 'triple whammy' in that this will straight away fragment/segment market, lead to concentration of risk and militate against portfolio diversification.
- v. Symmetrical and uniform accounting treatment of both cash and derivatives (IRF/IRS/CDS) markets.
- vi. Removal of the 'hedge effectiveness' criterion of 80 per cent to 125 per cent which militates against use of derivatives for hedging purposes for it is better to have 'ineffective' hedge than to have no hedge at all!
- vii. Roll-back of the Held to Maturity (HTM) protection *i.e.*, substituting the current 'accounting hedge' with 'derivative hedge'. This is because with HTM, there is no incentive/compulsion whatsoever for use of market-based solutions like IRS/IRF which also require constant monitoring, infrastructure, transaction costs like brokerage and margins *etc.* Indeed, fears that such roll-back may be disruptive, and disorderly, are totally unfounded if one considers the fact that there is 'overwhelming net fixed rate receiving' appetite/interest in the ₹50 trillion *plus* IRS market which will be even more so with the introduction of IRF, what with the total outstanding amount of dated Government securities at ₹30 trillion being much less than the outstanding amount of IRS of ₹50 trillion!!
- viii. Delivery-based short-selling in the cash market for a term co-terminus with that of the futures contract and introduction of term repo, and reverse repo, markets, co-terminus again with the tenure of futures contract for borrowing and lending of cash and G-Secs.
- ix. Both for IRS and IRF, actual notional/nominal amount of IRS/IRF must be allowed on duration-weighted basis unlike the current regulation which restricts the maximum notional/nominal amount of hedging instrument to no more than the

notional/principal amount of the exposure being hedged resulting in under-hedging of risk.

9. While lavishing praise on a speech, of course, in his characteristically inimitable style, the illustrious and very distinguished Governor of the Reserve Bank of India, Dr. D. Subbarao, famously remarked and I quote 'The speech is significant not because of the answers it provides but because of the questions it raises'! With the very fond hope that my today's speech

measures upto, and passes muster on, Governor's touch-stone and hall-mark, I wish all stakeholders God speed so that at the next edition of this event, some Keynote Speaker delivers a speech titled 'The Financial Innovations That Are Since There'!

10. Finally, I wish Finnoviti 2012 all the success that it so very much deserves!

11. Thank you all so very much indeed!