

## **G Padmanabhan: Technology in the financial sector – some issues and a few concerns**

Address by Mr G Padmanabhan, Executive Director of the Reserve Bank of India, to the Bankers' Club, Thrissur, 22 October 2012.

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Mr Joseph, Mr Jayakumar, Mr Hareesh Babu, Mr John, distinguished ladies and gentlemen,

It is a pleasure to be addressing the bankers in this beautiful city of Thrissur, often called the cultural capital of Kerala. From the bankers' perspective it can well be called the banking capital of Kerala, as three banks are head-quartered in Thrissur and a fourth in the adjoining town of Aluva. I am told that the Bankers Club, Thrissur is one of the oldest and the largest in Kerala. As I struggled to decide on what I should talk to an audience like this, I recalled that in the email, Mr Hareesh Babu, President, Bankers' Club, had sent inviting me to this event, he had taken considerable pride in pointing out the fact that as united forum of bankers, you have coined the slogan, "Think Beyond Banking" as your objective. I was quite impressed with this forward looking vision and decided that to an erudite audience like this, I would flag the defining role of technology in the financial sector. The advent of technology and its adoption into the financial sector has enabled bankers to think beyond banking, at the same time, the same technology by facilitating complex financial products has indirectly contributed to the financial crisis that is sweeping the world. Therefore in my address, I intend to make certain observations about financial crisis as well. I shall at the end, raise some technology related issues of immediate concern to Indian banks.

2. The financial sector has undergone both qualitative and quantitative transformation during the last four decades. As Martin Wolf has noted, over the last three decades, the debt of the US financial sector (can be taken as a proxy given its size) grew six times faster than the GDP. At the peak of the pre-crisis boom, the financial sector is reported to have generated about 40% of total US corporate profits<sup>1</sup>. The financial sector in US accounts for about 8.6% of the country's GDP, eclipsing the pre-crisis peak of 2006. Let us look at the markets. Turnover in the global foreign exchange market (which, as you see it today, is only four decades old!) has grown from USD 640 billion a day in 1989 (the earliest year for which comprehensive data is available) to about USD 4 trillion a day in 2010. From a hesitant beginning in 1970's, securitized assets outstanding today are estimated to exceed USD 15 trillion. Interest rate derivatives market, which has a shorter history, had outstanding contracts exceeding USD 500 trillion at end 2011. Whichever metric or statistic you look at, it is abundantly clear that the financial sector has grown phenomenally. That this growth has been propelled by the increase in global trade, commerce, investment is fairly obvious but a difficult question yet remains to be answered. Has the large financial sector made the world a riskier place without commensurate social or economic benefit? I shall come back to this issue a little later. but at this juncture, the limited point that I am making in this context is to recognize the phenomenal growth of the financial sector, which would certainly not have not been possible without advancement in information technology.

3. Before we discuss further some of the qualitative changes in the financial sector that has been made possible by advancement in computing and communication technology, let us look at the development of technology during the last four decades. If we take the introduction of fourth generation computers (LSI and VLSI technology) in the late seventies, the computing capacity has developed manifold, in keeping with the famous Moore's Law. To

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<sup>1</sup> Reportedly, financial sector profits account for about 30% of total corporate profit in US.

give an interesting example, Apple II, perhaps the first successful personal computer, released to public in 1977 by Stephen Wozniak and Steven Jobs cost \$1,195 (without a monitor), had 16k RAM only, and no storage device. A minimal specification personal computer today has about a quarter of a billion times more RAM and comes at one-fourth cost, purchasing power taken in to account. Riding on the back of this advancement, the communication technology has taken quantum leap. We see an explosive transformation in all aspects of our lives – but perhaps nowhere it is as apparent as in the financial sector.

4. The computing and communicating technology today has made financial transactions across space possible instantaneously and provided the wherewithal to record and account for innumerable transactions accurately. It is difficult to believe today that in the 1960's the New York Stock Exchange shortened its trading days because the volume of trades was too high to process manually. Nearer home, few would remember that when the Rupee was devalued in June 1966, the foreign exchange market was closed for two days to enable the banks to rework their positions. The speed and reliability of information technology has supported creation of nationwide financial services, including ATMs (hailed by Paul Volker as the only useful innovation by the financial sector in the last three decades), electronic check and credit card processing, transfer of funds, and so on.

5. The development of the vast array of financial products – from plain vanilla securities based on various kinds of receivables to complex non linear structures – critically depended on advancement in technology to support it. The creation, pricing, valuation and risk management of complex and exotic products would not have been possible without development in technology. I would venture so far as to say that formulation and refinement of the quantitative techniques and models underlying these products were brought about by advancement and secular availability of computing technology.

6. Are there any concerns about development of technology enabled financial sector? First question that arises is: has the financial sector become more efficient? Apparently not. It is stated that the cost of financial intermediation in the US, which perhaps has the most advanced financial system, as measured by the sum of all profits and wages paid to the financial intermediaries, has grown from 5% of GDP in 1980 to 9% in 2010<sup>2</sup>. Similarly, financing cost as represented by the value added share as a proportion of the total output of the financial sector has increased from about 1.4% to 2.3% during the same period. The explosive growth in the risky products – another name for derivatives and structures securities – has led to similar concerns. It has been argued that the financial sector, through these instruments, has ended up taking excessive risk and if the value added is adjusted for the risk, the contribution to GDP may have to be significantly revised downwards. As regards the futility of excessive risk taking, as Andrew Haldane puts it, “If risk-making were a value-adding activity, Russian roulette players would contribute disproportionately to global welfare.”

7. Even post crisis, it is agreed by all that a well developed financial sector plays a critical role in economic development. An efficient financial sector enables the individuals to smoothen their consumption through the life cycle and deal with uncertainties. It also pools resources and directs them to socially productive projects. A poorly developed financial sector on the other hand would greatly reduce welfare. But it certainly does not mean that social and economic welfare is a monotonically increasing function of the financial sector growth. The financial sector after all is supposed to serve the real sector, and when it grows beyond what is warranted by the “economic fundamentals”, problems like financial complexity, poorly understood financial innovation, herding behaviour, and endogenous risk-taking, etc surface, far outweighing the benefit. The crisis has abundantly demonstrated this.

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<sup>2</sup> Philippon, T (2011), “Has the US Finance Industry Become Less Efficient?”, mimeo NYU.

8. Let us look at another aspect of a technology enabled of modern financial system. With the advent of electronic trading in exchanges, high frequency or algorithmic trading has come to dominate the Wall Street and exchanges world over. On any given day, this lightning-quick, computer-driven form of trading accounts for upward of half of all of the business transacted on US stock markets. Starting in the 1980's and apportioned part of the blame for the 1987 Stock market crash, high frequency trading(HFT) has acquired increasing sophistication over the years. On the one hand there are allegations that HFT goes against the interests of ordinary investors and has made the market less fair for them. On the other, it has opened the possibility of nightmare events like flash crash of May 2010, when in 5 minutes the DJIA recorded its biggest intraday fall of about 1000 points (9%), to recover most of the losses 20 minutes later. In August 2012, runaway trading by Knight Capital affected the shares of 148 companies and Knight Capital itself had to take a loss of USD 440 million in what has been attributed to "technology breakdown". A few days back, a freak trade wiped out nearly USD 58 billion of wealth in two minutes when NIFTY fell by nearly 900 points due to a set of faulty orders by a broker.

9. Frauds and deceptions have been the bane of banking and finance down the ages. Advent of computers have not only made novel ways of fraud possible, but also made the consequence of such frauds – the quantum of potential loss astronomical. The banks are susceptible to frauds both from external as well as internal sources. In a white paper title "Dissecting Operation High Roller"<sup>3</sup> McAfee and Guardian Analytics have indicated a cyber fraud with objective to siphon large amounts from high balance accounts. The white paper states that the criminals have attempted at least €60 million (US\$78 million) in fraudulent transfers from accounts at 60 or more financial institutions (FIs). If all of the attempted fraud campaigns were successful as the total attempted fraud could be as high as €2 billion. Similarly, internal frauds have also assumed paramount importance. An article published in ABA Banking journal<sup>4</sup> has indicated various types of internal frauds viz. general ledger frauds, identity theft, account takeover and collusion with outsiders. The article also mentions about a high-level bank employee being indicted for allegedly transferring more than \$4 million from general ledger accounts to her own accounts over a period of eight years and concealing the money in the general ledger.

10. The point that I have been trying to make so far is that advancement in information and communication technology has opened vistas in financial sector that could not be imagined a few decades back. Yet, it cannot perhaps be said that all the ways in which we have harnessed the technology has contributed to social utility or made the financial sector more robust and useful.

11. Now let us turn to some of the beneficial aspects of techno-banking in the Indian context. There are three perspectives to this issue – that of profitability, which concerns the owners, that of service, which concerns the customers and lastly, that of regulatory and statutory compliance, which concerns the regulators. I have discussed this issue in the Indian context at great length recently and I do not want to repeat the same in detail. Briefly, the technology adoption has surely added to the profitability for the banking sector now supports a much larger asset without any increase in manpower. The ease of capture, storage, portability, and retrieval of information has enabled, at least potentially, a much better compliance regime. With expansive ATM network and wide implementation of core banking solution, we seem to have but in place the basic paradigm of techno-banking for the customer. However, you would agree with me that we are yet to achieve an optimal level of efficiency in all three aspects and there is a lot to be done in that regard.

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<sup>3</sup> <http://www.mcafee.com/us/resources/reports/rp-operation-high-roller.pdf>

<sup>4</sup> "4 internal frauds and how to spot them" – the article was posted on the website of ABA Banking Journal on May 26, 2011.

12. One issue that has been accorded high priority in our policy hierarchy in recent times is financial inclusion. We have always been alive to the need for extending the reach of the financial sector to the under-privileged sections of the society. The branch licensing policy of the seventies and the eighties with mandatory extension of branch network to rural areas was pursued with that objective. It has been estimated that a 1 percent increase in the number of rural banked locations, per capita, resulted in distinct decline in poverty, and a 0.34 percent increase in total output. Now, the technological advancement has made it possible for us to think of novel and innovative ways to approach the objective of financial inclusion.

13. Before we discuss application of technology to achieve financial inclusion, let us convince ourselves of the imperative of financial inclusion. The financial sector, amongst others, performs two important functions. It enables inter-temporal transfer of income – you can transfer surplus income of one period to a lean period and you can borrow in a lean period against future income. For whom is this more important than the poor, who have to face the vagaries of employment and income? Access to financial sector also enables the vast multitude of self-employed urban as well as rural poor to engage in productive activities and live with dignity. The plight of these people can be understood from an example cited by Abhijit Banerjee and Esther Dufflo in their excellent book “Poor Economics”. In Chennai, fruit sellers buy INR 1000 worth of fruit on credit from the wholesalers and pay it back at the end of the day with an interest of 4.69% – an annual interest rate exceeding 1700%. Imagine what difference access to organized financial sector can make for these people. This brings me to another point I wish to emphasize: financial inclusion should not be driven by altruistic motives. It is rather to be pursued as a business model. There is vast scope of sustainable and profitable business here as the example clearly suggests.

14. On the subject of innovative application of techno-banking in a broader socio-economic context, I wish to talk about the innovative M-PESA mobile banking system in Kenya. The basic idea of M-PESA is that the 100,000 small retailers in Kenya who already sell mobile-phone airtime, in the form of scratch cards, can also register to be mobile-money agents, taking in and paying out cash. More than 17,600 retailers have signed up as M-PESA agents – far outnumbering Kenya’s 840 bank branches. By March 2012, within five years, over 15 million people of Kenya’s had used it – this means rural villagers haggling over produce, then using their Nokias to make the final deal. It means Masai herdsman bringing their phones to market along with their cattle, ready to stock up on essentials to bring back to their homes. Such a system also requires intermediaries, to get the cash to M-PESA agents, and ensure cash movement keeps up with e-float exchanges. In this way, the system has created new jobs, with some intermediaries and retailers earning \$1000 a month in commission from M-PESA transactions. No wonder, the model has been sought to be replicated in other countries. However, replication of success in Kenya remained elusive in other countries like Tanzania and South Africa. The success of M-PESA can be attributed to several factors viz. the absence of banking facility, presence of a single dominant operator, absence of a cost effective remittance channel and existence of national identity. Needless to say, there is no one-size-fit-all technology for all situations. The innovation will have to adapt itself to the needs and endowments of each society.

15. Let me now turn to the last issue I wish to touch upon today – IT Governance. The business processes in the banks and other financial sector entities are increasingly dependent on information and communication and communication technology. It is therefore imperative to create an appropriate governance framework not only to protect the interests of the bank itself, but also to address the concerns of all stakeholders including regulators and the customers, who are outside the organization and create a conducive atmosphere of confidence in the system. Briefly an IT governance framework should be built around the following considerations:

- a. The strategy for adoption and implementation of IT has to be aligned with the business strategy of the bank. The use of IT resources should be aimed at delivering value to the stakeholders.
- b. There has to be a comprehensive framework for management of risk emanating from use of IT. This is a very broad area and includes a host of issues including
  - i. Redundancies and business continuity
  - ii. Information security
  - iii. Audit of financial transactions in an IT enabled system.

16. Though the scope for use of complex financial products is rather limited in the Indian context, it is to be appreciated that the pricing, valuation and hedging of such positions are based on computer models. In the context of the financial crisis, Richard Doling wrote in The New York Times<sup>5</sup>, "Somehow the genius quants – the best and brightest geeks Wall Street firms could buy – fed \$1 trillion in subprime mortgage debt into their supercomputers, added some derivatives, massaged the arrangements with computer algorithms and – poof! – created \$62 trillion in imaginary wealth." Now this may be an extreme position, but there is a kernel of truth in it. Do we have a framework where the top management, the Board, understands the computer models used for creating risky positions in complex products and their implications? There has to be a policy framework for continuously assessing and auditing the performance of the IT resources, including IT personnel.

## Conclusion

17. Before concluding my thoughts, I wish to raise a few questions hoping that the questions would lead to a greater debate among stakeholders.

### 18. Question 1: How reliable is the BCP/DR mechanism in banks?

The 24x7 electronic banking through alternate channels has put the spotlight on need for continuous, uninterrupted and reliable services which presuppose existence of a robust BCP/DR mechanism in banks. BCP/DR mechanism typically incorporates impact analysis, recovery and governance framework which includes communication and crisis management. Indian banks have strengthened their BCP/DR mechanism through technology implementation. But where do we stand today and how prepared is our industry? Can we exhibit the level of preparedness the banking and financial industry displayed in Japan during the tsunami? In recent times, ATMs of a large bank were out of operation because the BCP/DR mechanism put in place for moving the primary site to the secondary site did not kick in. BCP/DR is still looked at as an IT issue in the organization where as it is actually a business issue. Successful BCP/DR mechanism involves three critical aspects of people, process and technology. Are we giving adequate emphasis on people aspects?

### 19. Question 2: What is the status of adapting CBS to meet the future needs including the banking need of billion plus population?

The coming days will put several demands on the CBS in banks. Indian financial sector is to become the third largest in the world in terms of asset size by 2025 and will warrant commensurate increase in depth and breadth of financial products and instruments as well as high level of service delivery. The initiatives towards inclusive banking would see customer base of banks expanding at a faster pace. The continued emphasis on shifting cash transactions to non-cash modes; and the efforts of the Government to transfer all social

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<sup>5</sup> The Rise of Machines, Richard Doling, The New York Times, October 11, 2008.

benefits electronically to the citizens, the volume of transactions in the electronic payment systems would grow manifold. Further, as the IDC Financial Insights, April 2012 has reported “banks would like to see their core banking systems help them cope with the onslaught of new regulations and the new reporting requirements that come along with the new rules”. Besides, several initiatives listed in the "Payment Systems in India: Vision 2012–15" such as uniform routing code, uniform account code, electronic trade financing etc are going to affect the way the banks are processing transactions today and would require, if implemented, suitable adjustments by banks. Thus, these developments are likely to challenge the scalability and adaptability of CBS in banks not only in terms of transaction handling but also in terms of adding new products, new processes and new applications. Are the banks ready for such future demands?

**20. Question 3: Converting data archives to data warehouse – have we tapped the potential?**

The needs for use of business intelligence, analytical and data warehousing for retaining competitive advantages in a highly competitive industry were never so urgent for banks. Analytics has the power to transform technology and data from supporting tools into strategic weapons for retaining and servicing the existing and potential customers. CBS of bank is generating huge piles of data. But how many of the banks have really leveraged the data goldmine they have to the hilt? Have they sufficiently built skill sets to see pattern in those data bases and increased their understanding of customer behavior? Have the banks realized the potential of analytics and business intelligence in fraud management and regulatory compliance in areas of AML/CFT, suspicious transaction reporting etc?

**21. Question 4: What ails alternate banking channels from achieving a critical mass – customer fear, ignorance or bad business pursuits by many banks?**

It is well known that socio-cultural factors affect the customers' adoption of alternate business channels. But are the banks doing enough to instill the sense of security, reliability and trustworthiness of the alternate channels in customers to help them overcome these barriers? Adoption of alternate banking channels would require moving the customers from being “assisted” initially to becoming “self-reliant” in using the channels. Though, the banks may have strategies for increasing the usages of alternate channels, successful adoption would depend to a large extent on the line managers dealing with customers. Are they motivated enough to promote alternate channels? How do we incentivize the branches that initiate the customers to electronic banking?

**22. Question 5: Outsourcing or abdicating – are banks treading the thin line?**

It is but natural for banks to outsource their some of their activities especially their IT related activities. However outsourcing brings in its wake, several risks and thus it is imperative for any bank outsourcing its activities to ensure effective management of these risks. Do the banks have adequate controls over the outsourced activities and outsourcing entities? I heard of an incident where the administrative password of a critical application server of a bank was with the vendor not with the system administrator of the bank. Delegating is what we ask someone to do on our behalf; while abdicating is what we do as escapism, camouflaging lack of skill sets.

23. One related question is over-dependence on certain IT systems (including operating systems and databases) resulting in concentration of risk in certain components / vendors which are spread across the banking sector. What could be done to redress this?

**24. Question 6: Are banks properly leveraging technology for inclusive banking?**

The challenge in financial inclusion is reducing the gap between demand and supply of financial services. Delivery of banking services is not always feasible in rural areas with cost effective distribution being a challenge. Can the technology help in meeting this distribution gap? Everybody is pinning hope of mobile technology for financial inclusion. Is it an exciting possibility or a meaningless dream? It is definitely an exciting possibility. The mobile banking in India is gradually making in-roads. However, the success of mobile banking would depend on how the banks and the mobile service providers co-operate and collaborate to deliver the financial services to the unbanked. Further, it would depend on banks how they can leverage the technology to improve business, whether it's through mobility, low-cost ATM rollouts, or revenue sharing models and service management.

**25. Question 7: Time for wake up call for banks?**

The World Payments Report 2012<sup>6</sup> puts India as the 13th largest non-cash payments market in the world, with non-cash volumes have been growing about 10% a year. However, the non-cash payments growth in India is behind the more enthusiastic pace of other BRIC nations (China and Russia having growth rate of 30 per cent). The "Payment Systems in India: Vision 2012–15" focuses on inculcating the habit of cash less payments in the citizens of the country for a less-cash society. The execution and achievement of the Vision would be purely driven by the banks and non-bank entities. The World Payment Report 2012 report recognizing the role of banks in non-cash payments states that banks need to innovate even more around customer needs to drive loyalty and retention. But are the banks in India doing enough? Are banks taking the easy way out by being content with the measures initiated by the regulator? To illustrate most of nearly 7 lakh PoS terminals in the country are deployed by three banks. Where most of the banks issue cards, except for a few banks, none of them are in acquiring business. Is this because card issuance is a lot easier than enrolling merchants and putting in place the PoS infrastructure? How should we respond? One way could be to review the extant guidelines on acquiring PoS/ ATM transactions in terms of increased role of non-bank payment system operators by permitting white label PoS. The other could be to mandate the banks to deploy PoS terminals linked/proportion to the number of cards issued by them.

26. Let me now sum up. IT and communication technology has changed banking and financial sector in many fundamental ways. It has created new kinds of risk with far graver potential consequences than in the pre-techno-banking era but at the same time it has opened up new paths to make financial sector broad based and, particularly in the context of economies like ours, to explore innovative ways to achieve financial inclusion. In this pursuit there are several important issues that Indian banks will have to face up and resolve. Finally, exploitation of the benefits of the IT resources have to be within a comprehensive framework of governance that aligns the interests of all stakeholders, addresses the risks arising from technology-enabled business processes, and is in sync with the broader social objectives.

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<sup>6</sup> Capgemini, RBS, EFMA.