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A NEWSLETTER OF THE FINANCE LAB

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Indian Institute of Management Calcutta

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Editorial

In the first article, the author discusses the controversial angel tax which has troubled many startups for the past one year and concluded that angel investors in India require tax credit for investments made. The second piece looks into one specific aspect of the recently released Financial Stability Report (December 2018) of the RBI, namely, credit growth of the Indian commercial banking sector. In the third article, the author tries to explore the radical and disruptive technology “blockchain” in the field of accounting and auditing. He concludes that the blockchain technology will undoubtedly emerge as a new frontier of modern accounting. In the fourth article, the author discusses the “citizens of utopia” (an ideal world where everything is perfect) be permitted to dabble in financial markets to break their otherwise monotonous existence. In the fifth article, the author discuss three segments – Farmers, MSME and NBFC and try to identify if bailouts/exemptions/waivers will structurally help the situation so that the crisis can be stalled or averted in the near future. In the last piece, the author discuss the no-trade theorem in the Grossman-Stiglitz papers in the 1970s and 80s and conclude that this theorem have a profoundness that we are only slowly beginning to appreciate and exploit.

You may send your comments and feedback on this issue to ashok@iimcal.ac.in

Happy reading!

Ashok Banerjee

Spotlight on Angel Tax

Ashok Banerjee



Ashok Banerjee, Ph.D., is Professor, Finance and Control, Indian Institute of Management Calcutta (IIM-C). He is also the faculty in-charge of the Financial Research and Trading Lab at IIM-C. His primary research interests are in areas of Financial Time Series, News Analytics and Mergers & Acquisitions.

Suppose you are a high net worth individual willing to financially support a young entrepreneur with a bright idea and incidentally you and the entrepreneur live in Singapore, you will get tax incentive in supporting her. You will be allowed to deduct the amount of investment that you make in the startup from your income and save tax. The investee company (i.e., the startup) will not be harassed by the tax authority for the price tag at which the angel fund is raised. Alternatively, suppose the same Singapore investor invests in an early stage startup in India. Still this source of funding would not attract the attention of Indian tax authorities. Now suppose, the Indian startup gets angel funding from an Indian resident. This act may bring trouble to both the investor and the beneficiary- thanks to the so called ‘angel tax’ in India. In India the angel investor does not get any tax credit and the startup may get a tax notice whenever it raises any subsequent round at a valuation lower than the angel round. A provision in the Income Tax Act [section 56(2)(viib)] provides that any excess consideration received by a company will be treated as ‘income’ in the hands of the company if it issues shares to a resident individual (and not to any entity) at a price above its fair value. Thus, if the investor is a venture capital firm, the provision will not apply and similarly it will not apply to non-resident investors. Surprised? You are not alone- the controversial angel tax has troubled many startups for the past one year. Several government agencies (e.g., the Department of Industrial Policy & Promotion, Niti Aayog), which support startup initiatives, came out openly against this activism of tax authorities. The investors and the entire startup community have urged the ministry of finance to intervene and stop this draconian ‘angel tax’.

The angel tax was introduced in 2012 with a different objective- to trap shell companies for money laundering. For example, one creates a startup for software development and the startup ‘sells’ software to an overseas entity, controlled by the same person(s), at a low price (as it is difficult to value any intellectual property). In some cases, the domestic entity may even pass a blank CD as software. The overseas entity, in returning the favour, not only pays for the software but also invests in the equity of the startup at a hefty premium. The domestic startup thereby avoids paying tax on sale of software and this could be a fit case of money laundering. Such rogues should be

nabbed and necessary actions should be taken against them. Back in 2012, it was difficult for the tax authorities to identify shell companies as they were not equipped with data analytics and hence were in the look out of external triggers to nab the wrongdoers.

The situation is completely different now- the surveillance systems of the tax authorities (e.g. CBDT) and the Ministry of Corporate Affairs (MCA) are now robust and in sync to identify money trail dynamically. Hence, one does not need angel tax to nab the money launderers.

Measurement of Angel Tax

Angel tax, as per the extant Indian Income Tax provisions, is levied when startups receive angel funding (i.e., from a wealthy individual) at a valuation higher than its ‘fair market value’. The ‘excess amount’ (proceeds minus the fair value) is taxed as income at the marginal rate. Finding fair market value of a startup is a challenge and sometimes depends on several qualitative parameters and not on objective measure like cash flows. The income tax authorities have used a roundabout way to find out the ‘excess’ by comparing value at which the subsequent round of funding is raised. For example, if a startup raises money at a valuation of Rs. 100 per share in a particular round and thereafter raises equity at a price of Rs.90 per share in the subsequent round, the income tax authority will claim that the startup had raised the earlier round at a price which was higher than the market value by Rs. 10 per share. This is absolutely ridiculous. The lower valuation in subsequent round may happen due to many factors like, market downturn, lower-than-expected growth of the startup. It is a well-established fact that valuation is time-dependent. Immediately before the global economic recession, commodity prices were trading at hefty premium and commodity-companies were priced at higher multiples. The commodity prices plummeted after recession and those companies lost significant market value. For example, the Australian metal giant, BHP Billiton suffered a 65% decline in the profit in 2009 after metal prices and demand plunged during recession. Therefore, if one does a valuation of BHP Billiton at two time points (e.g., in 2006 and 2009), its value would be significantly lower in 2009. This does not imply that valuation in 2006 was not justified on the basis of fair market value- no one could visualise global recession in 2006 and hence the company’s valuation at that time was purely based on available information.

Table 1: Startup Valuation

Business	Valuation (per share)	Valuation (per share)
Zomato	Rs. 1,36,396 (Sept 2015)	Rs. 1,13,739 (Feb 2018)
Swiggy	Rs. 24,839 (Dec 2015)	Rs. 79,834 (Feb 2018)
Bigbasket	Rs. 4380 (Oct 2015)	Rs. 6377 (Jan 2018)

Source: Private Circle Database. The figures are issue price of preference shares.

Had Zomato raised the funds in February 2018 round from angels (this was not the case as the funds were raised from institutions), they would be imposed angel tax (Table 1) for the funds raised in September 2015 on an assumed income of around Rs. 23,000 per share. However, the fact of the matter is where Swiggy was consistently growing and raising funds almost every year, Zomato fell off the radar of investors in 2016 and 2017 as it was struggling with its business model. Zomato raised money in February 2018 after a gap of almost two and half years. The lower valuation of Zomato was mainly due to investor's scepticism. The same company had later raised money in November 2018 at a valuation of over Rs. 2,18,000 per share. Therefore, the valuation of any business depends on available information at the time of the exercise and has nothing to do with what happened in the past.

Large companies take the opportunity of a buoyant stock market while deciding on the timing of initial public offers (IPOs). A private company generally floats an IPO when the market trades at higher valuations. Many of the IPOs experience significant decline in the market price post issue (Table 2). The IPOs listed in Table 2 were issued in 2018 and in a few months have witnessed non-trivial erosion in value. Wherever the decline is more than the fall in general equity market (e.g., index) that could be attributed to either overpricing at the IPO stage or poor performance of the issuer. Therefore, erosion in the market value of equity is a common phenomena and estimating overpricing of an earlier issue based on subsequent decline in price is not a justifiable measure.

Table 2: IPO Premium

Company	IPO Price per share (Rs.)	Current Market Price* (Rs.)
Ircon International	475	410
ICICI Securities	520	228.70
Bharat Dynamics	428	284.35
Garden Reach Shipbuilders	118	93.45
Indostar Capital	572	347

* As on 18 January 2019

Whenever a startup had contested the above-mentioned method for arriving at the angel tax and furnished fair valuation done by certified valuers, tax authorities did not always accept the valuation certificates of professional

firms. The section 11UA (2)(b) of the Income Tax Act provides that the tax department should accept valuation done by a registered merchant bank as evidence of fair market value. Therefore, there should be no scope for confusion. One may note here that Companies Act requires that whenever a firm raises equity, its fair value should be based on a value certified by an independent person. This is to ensure that startups get to raise their funds at fair value and the investors do not force any startup, looking for fund, to accept a lower valuation. If one accepts this logic, there is no question of any angel tax as funds are raised always at fair value prevailing at that time.

The whole purpose of angel funding is to support innovation and provide necessary funding at a stage of a business when established channels of funding (including venture capital) are not available. Angels take very high risk (next only to the promoters) while funding any early stage startup and thus believe in the idea or product of the investor. Angel funding happens when the business entity is in the pre-revenue or early-revenue stage. The firm will have no cash flows or profits at this stage. In such a situation, established methods of valuation (e.g., discounted cash flows, implied price-to-sales) may not be able to capture the fair value of such a startup. One uses several other methods (e.g., scorecard, cost method, opportunity cost of efforts) and there is high degree of subjectivity in those valuations. If one smells foul in these methods and attaches motive of money laundering, that is quite unfair. Many angel funding is made through established angel networks after sincere evaluation of the prospect of the startup and all the payments happen fairly through bank with proper credit validation. Hence, chances of avoiding tax by high net worth individuals through this route are limited.

Incentivise the Investors

Rather than imposing angel tax on fledgling startups, the tax laws should incentivise the angel investors so that great ideas get essential financial support at a very stage. It will not be an exaggeration to mention that many startups would not have reached growth phase had they not got angel funding. The reputation of angels at times provides comfort to venture capital funds when the latter make investment decisions. Countries, which promote innovation, offer tax credit to angel investors (Table 3). Such tax relief provide huge incentive to the investors and thereby attract investments in early stage ventures. In order to get tax benefits, the investors should be resident individuals of the respective nations and the startups should be the 'qualifying' ones. While in Singapore, the tax benefit is in terms of setoff facility from regular income, the benefit in the United Kingdom is even better. Rules provide income tax as well as capital gain relief. Tax on income in the USA is a state subject and hence angel investor tax credit programmes vary from one state to another. States, known for startup culture, have generous tax incentive programmes.

Table 3: Tax Credit to Angel Investors

Country	Tax Benefit
Singapore	Angel Investors Tax Deduction (AITD) Scheme is available to angel investors till 2020. An approved angel investor who invests a minimum of S\$100,000 in qualifying startups is eligible to claim tax deductions for the 50% of investments made for each assessment year up to a period of two years with a maximum cap of S\$500,000. The amount may be deducted from the individual's total taxable income. The angel investor must hold the investments for a continuous period of two years to claim tax credit.
United Kingdom	Under the Enterprise Investment Scheme (EIS), angel investment in the equity of a qualified startup can get income tax relief of up to £ 300,000 per year. Plus, the angel may also get capital gain tax relief on disposal of EIS shares after three years of holding period. If EIS shares are disposed at a loss at any time (after the mandatory three year holding period), the loss can be offset against income (and not capital gains) of the investor in the year of loss. EIS is for early growth stage startups. There is a separate tax incentive scheme for early stage startup, called the Seed Enterprise Investment Scheme (SEIS). Under SEIS, angel investors get tax relief of up to 50% of investment value, subject to a maximum relief of £100,000 per year. Further, investors can also benefit from up to 50% Capital Gains Tax relief (up to a maximum of £50,000) on gains, which are reinvested in EIS eligible shares.
Massachusetts (United States)	Effective from 2017, angel investors get tax credit for investments in qualified business (based in Massachusetts) up to 20% of investment value, subject to a total tax credit of \$50,000 per year.

Conclusions

In May 2018, the income tax department has clarified, through a notification, that section 56(2) (viib) will not apply to certain sections of the startups. The income tax authorities claim that startups registered with the DIPP will enjoy such exemption. However, recent newspaper reports suggest that even DIPP-approved startups were not spared from the angel tax threat. Following the global practices, it is required that startups are not harassed with the angel tax and the exemption from angel tax should be extended to all startups, approved or not. Only

criteria could be that the startup should be a registered unlisted company with some size restrictions. Further, in order to attract more angel funds, angel investments should be eligible for tax credits. In order to ensure that such tax concessions are not misused, eligibility criteria may be laid down for both the investors and the investee. The May 2018 notification of the Central Board of Direct Taxes (CBDT) providing angel investors a tax status at par with the Venture capital funds is not enough. What is required for angel investors is not equal status with venture capital funds, but tax credit for investments made. There is a high expectation from the Hon'ble Finance Minister on 1 February when he presents the budget. Hopefully, the controversy with the angel tax will be put to rest for good.

Credit Growth in Indian Banking System: Green-shoots or Early Blips?

Partha Ray

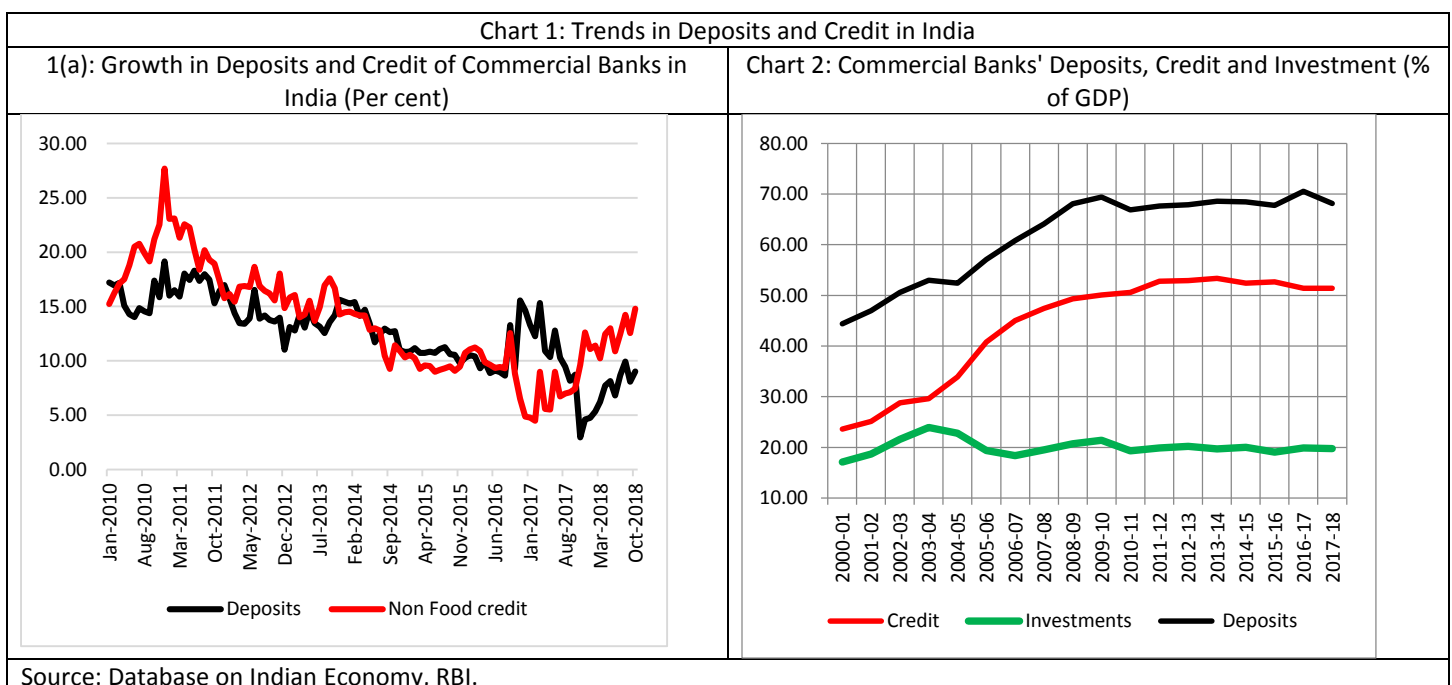


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In an environment dominated by headlines on RBI-government difference of opinion and resignation of the erstwhile RBI Governor Urjit Patel, the recently released Financial Stability Report (December 2018) of the RBI seemed to have attracted less attention. But the report (RBI, 2018) offers a wealth of information and analytics on the Indian financial system at the time when the environment was marked by complaints on accumulation of non-performing assets, regulatory activism and credit shortage after the IL&FS crisis. This note looks into one specific aspect of the report, namely, credit growth of the Indian commercial banking sector.

Trends in Credit Growth

To put the matter in perspective, credit growth in Indian banking system has been rather low in recent times (Chart 1a). Of course, since early 2012 there has been a secular decline in growth of both non-food credit and deposit till end 2016. Because of the deposits inflow arising out of demonetization, during 2017 and 2018, there could have been a disconnect between deposits growth and credit with deposit growth experiencing a spurt during the first half of 2017 and a sharp fall thereafter. In general credit growth continued to fall till about February 2017; it headed for a recovery since then but yet to cross the 15 per cent mark.



The situation is more stark if one considers the major banking aggregates as a percentage of GDP (Chart 1b). Since 2011-12 three major banking aggregates, viz., deposits, credit, and investment have remained almost constant as a percentage of GDP. In particular, bank credit as a percentage of GDP typically hovered around 50 per cent in recent times. In terms of cross-country data from World Bank, India's domestic credit to private sector appears to be quite low among most of the G-20 countries (Table 1).

Table 1: Domestic credit to private sector in 2016 (As % of GDP)

Country Name	Broad Credit-GDP Ratio (%)
United States	192.2
Japan	161.7
China	156.8
South Korea	143.0
Australia	142.5
United Kingdom	134.3
France	97.6
Italy	85.7
Brazil	62.3
Russian Federation	53.4
India	49.5
Indonesia	39.4
Argentina	13.7

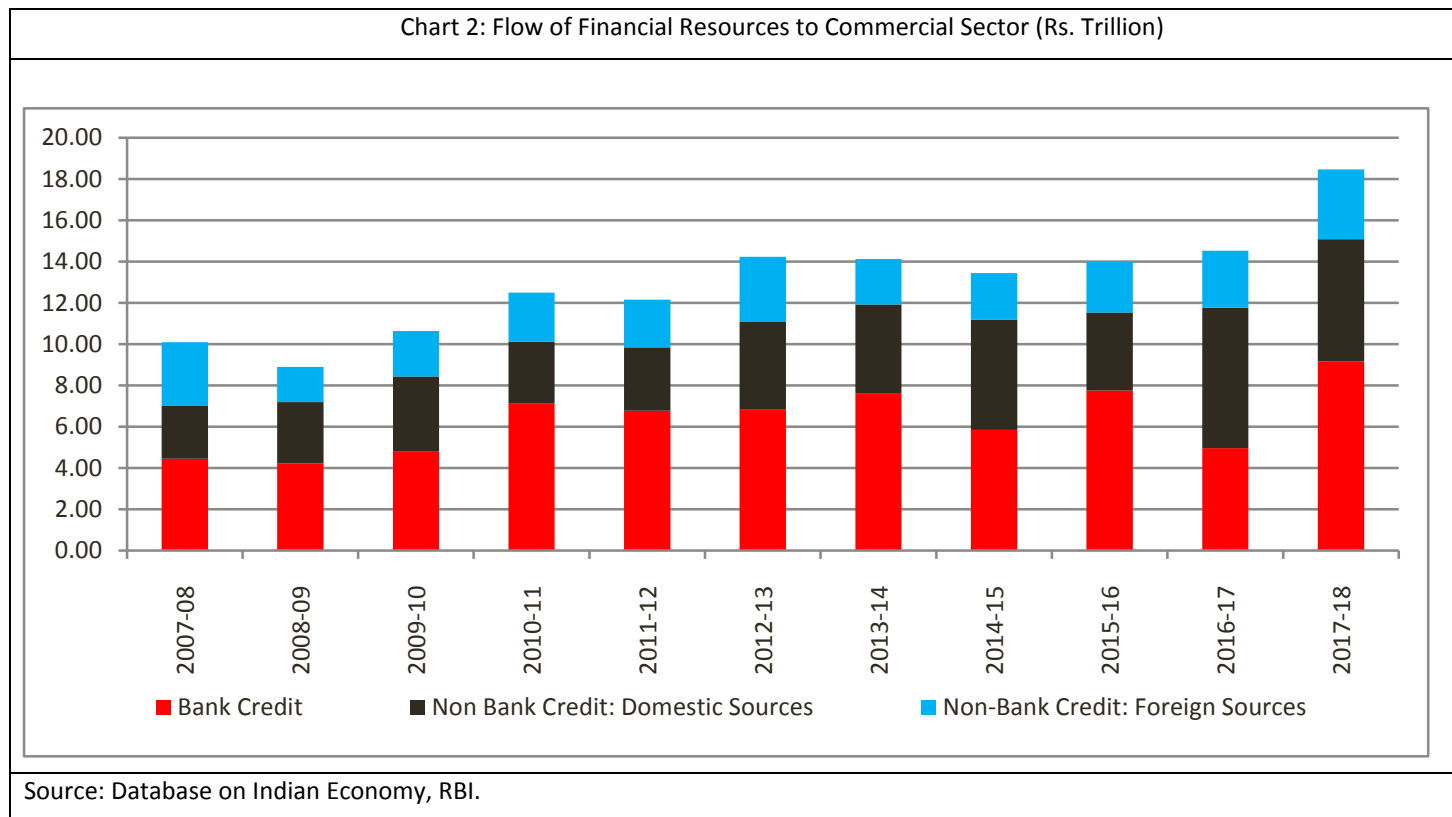
Note: Domestic refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment.
Source: World Bank

Non-Bank Sources of Financing

Considering the fact that India's economy grew at 6 per cent plus since 2011-12, does this lack of credit pose a riddle? How was the growth financed? Interestingly, contrary to the popular belief that the Indian financial system is bank-based, in recent times non-bank sources tended to dominate flow of financial resources to Indian non-financial sector. In fact, faced with a shortage of credit by banks, it seems that a large chunk of credit needs by select sectors were met from non-banking sources of finance - both domestic and foreign sources (Chart 2).

While FDI is the primary sources of foreign flow of resources, What are the domestic non-bank sources of credit? Prominent among these are: i) public issues by non-financial entities; ii) gross private placements by non-financial entities; iii) net issuance of CPs subscribed to by non-banks; iv) net Credit by housing finance

companies; v) total gross accommodation by 4 RBI regulated AIFs (NABARD, NHB, SIDBI & EXIM Bank); vi) systematically important non-deposit taking NBFCs (net of bank credit); and vii) LIC's net investment in corporate debt, infrastructure and Social Sector. In particular, both gross private placements by non-financial entities and net issuance of commercial papers (CPs) subscribed by non-banks have, in recent times, emerged as major sources of finance.



Did this non-bank sources of financial resources get dried up following the IL&FS (Infrastructure Leasing & Financial Services) crisis, when the IL&FS defaulted on a few payments and failed to service its commercial papers (CP) on due date in September 2018.¹ Two major trends are noticeable in this regard.

First, insofar as the flow of resources from domestic non-bank sources is concerned, the share of net credit by housing finance companies (HFCs) in the total flow of credit (from domestic sources) nearly doubled from 6.2 per cent in 2013-14 to 11.7 per cent in 2017-18 (RBI, 2018).

Second, mutual funds (MF) have played a catalytic role in the reshaping of the non-bank financial intermediation. In fact, the RBI report noted:

"The recent episode in the wake of IL&FS default however underlined certain issues in this market intermediated credit provisioning structure, the narrative on which can be broadly divided into: a) nature

¹ According to a Reuters report, by the middle of September, IL&FS and IL&FS Financial Services had a combined Rs 270 billion of debt rated as junk by CARE Ratings and a further six group companies had suffered downgrades with a negative outlook on another Rs 120 billion of borrowings.

of credit intermediation of MFs and the IL&FS incident induced dislocation; b) price impact of MF dislocation with specific focus on money market rates; c) fair value of corporate issuances in banks and MFs; and d) credit concentration in MF portfolios and possible behavioural implications" (RBI, 2018; p. 14).

Recent Trends

Considering the fact that the rise in non-performing assets of the banking sector could have had a significant role in subdued credit growth, the RBI report indicated certain positive pointers. The following are important in particular:

- The asset quality of scheduled commercial banks has showed signs of improvement with gross NPA ratio declining from 11.5 per cent in March 2018 to 10.8 per cent in September 2018.
- The annualised slippage ratio (i.e., fresh accretion of NPAs during the year as a percentage of total standard assets at the beginning of the year) came down from 7.6 per cent to 4.1 per cent in the same period.
- While the stressed assets to advances ratio has started converging to the gross NPA ratio following the withdrawal of various restructuring schemes, sector-wise analysis showed higher stress in mining, food processing and construction sectors.

Furthermore, the RBI report projected that the gross NPA ratio (under the baseline scenario) might decline from 10.8 per cent in September 2018 to 10.3 per cent in March 2019. Concerns however remained as sensitivity analysis indicated that 18 scheduled commercial banks (including all public sector banks under Prompt Corrective Action) may fail to maintain the required CRAR under a 2 standard deviation shock to the gross NPA ratio.

In recent times Indian banking has been occupying headlines mostly due to wrong reasons. Thus, some of these indicators seem to be good news in an otherwise not-so-bright scenario of Indian banking sector. It, however, remains to be seen whether these indicators are genuine green shoots or blips.

Chaining the Blocks: A new frontier in modern accounting

Samit Paul



Samit Paul is Assistant Professor, Finance and Control. Indian Institute of Management Calcutta (IIM-C). He has completed his fellowship from IIM, Lucknow in the area of Finance and Accounting. His primary research interests lie in the area of market risk management, volatility modelling and portfolio management.

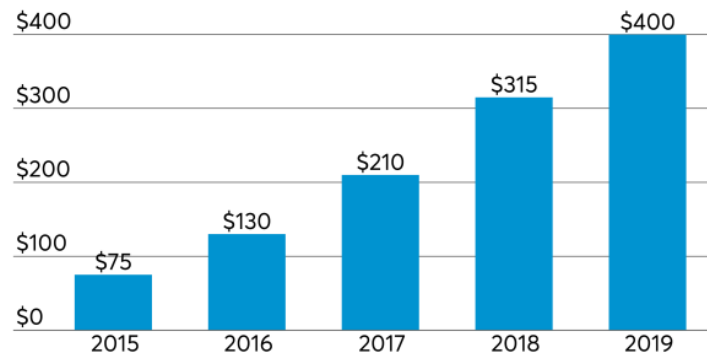
In the world of finance and control, the word “Blockchain” has probably been heard for the first time in the context of Bitcoin. In October 2009, the New liberty standard established the first online service to buy and sell bitcoins at an initial price of eight hundredths of a cent per bitcoin. By December 17, 2017, the price of bitcoin reached \$19,500 and it became the fifth largest currency in the world in terms of total amount in circulation. Despite growing evidence that suggests that the Bitcoin and other major cryptocurrencies are exhibiting signs of a speculative bubble, cryptocurrencies continue to enjoy enormous investor interest. Subsequently, the blockchain technology has become an interesting area to explore for researchers and practitioners. Although the explosion of cryptocurrency in past few years has brought blockchain into the mainstream, “blockchain” is the new buzzword in every industry – investing, banking, education, healthcare, insurance, real estate etc. In the field of accounting and auditing, this radical and disruptive technology has greater pertinence which is worth exploring.

Blockchain can be considered as a database which goes on building up incrementally by a network of participants who run the same software following the same set of constraints and rules. A “Blockchain”, as the name suggests, gets constructed by blocks of data that are gradually “chained” together. One can imagine it as a spreadsheet which is built up gradually by new cells being chained on. A blockchain database continues to be built and maintained as long as the software continues running. Therefore, unlike a single centralized entity, the chain continues to remain “alive” even if individual participants within the chain are pulled out (e.g. - bankrupted). Therefore, the “Blockchain” builds an indelible record that is completely resistant to any sort of tampering by any individual party.

Thus, it is quite likely that such robust and transparent technology would attract more companies to join in crypto economy. As soon as such economy gets larger in size, the accounting firms will be forced to account for cryptocurrency transactions in their accounting process. In the following figure, estimated capital market spending on blockchain over the years has been shown.

Blockchain on the rise

Estimated capital market spending on blockchain, in \$mns



Source: Aite Group

It is clearly understandable that the accuracy of transactions through blockchain technology should not be a matter of concern for the companies. However, they need to plan for how the transactions should be recorded and presented in financial statements. Even the process of valuations based on accounting records also needs to be decided. It is expected that in long term more and more accounting records will be moved to blockchains and that will facilitate the auditing and control of transactions on real time basis.

Impact on Accounting and Auditing:

“Digitalization” or integration of digital technologies in day-to-day life is one of the recent developments across the industries. However, its impact on the accounting system is still at preliminary stage. The most possible reason may be the extremely high regulatory requirements in this domain. In order to keep intact the validity and integrity of the entire accounting system, mutual control mechanisms have been built using multiple checks and balances. This in turn demands for extensive documentations, duplication of efforts and periodical controls. These are majorly manual and labour intensive tasks with larger impact on cost and efficiency. However, the recently emerged blockchain technology carries huge promises in this context. While using this technology, companies can enter their transactions in joint register directly and create an interlocking system of long-lasting accounting records. This replaces the need of keeping separate records of all transaction receipts. Moreover, since these entries are cryptographically sealed and distributed, there is practically no possibility of destroying or manipulating them. Hence, the time and cost required to perform an audit would decline significantly. In effect, more complex transactions or sophisticated internal control mechanisms those need more attention from auditors will be rigorously verified resulting better outcome of audit process.

Although the blockchain technology can radically change the entire accounting system, companies do not need to start with a joint register for all the accounting entries. Rather, it can be slowly integrated with conventional

accounting procedures. It may start with ensuring integrity of accounting records and gradually form fully traceable audit trails. One of the factors that creates a barrier in the process of moving from paper receipts to electronic archiving is the perceived risk of unwanted modification. For physical instruments, especially for immutable records, chance of unnoticed modification is much lower than that of electronic files. This may be a potential reason why companies are not enough enthusiastic about digitalizing paper records. In this context Blockchain can be extremely helpful as a source of trust. By generating a hash string of a file, it may preserve the integrity of such electronic file. The hash string necessarily denotes the digital fingerprint of that file. The same fingerprint can be immutably time-stamped by scripting it in form of a transaction into the Blockchain. Subsequently, one can easily prove the integrity of the same file by matching newly generated fingerprint with the earlier fingerprint stored in the Blockchain. In case these two are identical, the document can be considered as unaltered since the time of first scripting the hash in the Blockchain.

“Thanks to blockchain, recording and timestamping of documents will render all accountancy events permanently memorialized and immutable,” Ricky Ng, founder and chairman of i-House.com commented *“Documents cannot be modified over their life cycles. Business processes that span multiple departments or even companies are recorded and fully traceable.”*

Although this new technology is expected to disrupt the entire accounting industry, the fear of replacement of human accounting professionals with much sophisticated “Blockchain” technology should not be a matter of concern. Rather, it offers a new opportunity for the accountants and CPA firms. They can now ensure the accuracy and truthfulness of the records to their employers and clients who are always worried about the safety and security of such records. Moreover, it’s also an opportunity for them to streamline the accounting and auditing processes and position themselves as innovative and forward thinking service provider.

Erik Asgeirsson, the President and CEO of CPA.com, believes that the “Blockchain” is the very next item which will transform the accounting world. *“Through every phase,”* he said in an article *“what’s really happened is the accountant’s and auditor’s role has just evolved.”*

Therefore, the role of an accountant in this new accounting world will be changed but will certainly be not eliminated. This new technology aligns seamlessly with accounting profession. “Blockchain” basically deals with a new type of accounting ledger which can only be updated and verified continuously without any risk of being corrupted or altered. With the evolution, the accounting professionals need to learn this new technology and offer some valuable differentiated service to their clients. More quickly they adopt, more beneficial it would be for them before the technology becomes standard and part of our daily jobs.

What do the “Big Four” think?

The current practice of auditing can be made far more automated even without pouring through the paper trails. “Blockchain” technology facilitate such auditing process by verifying key data underpinning company’s financial statements. For example, smart contracts that are automatically executed can be readily verified using codes. However, the auditors need to be familiar about the finer nuances of this new technology. In this regard, it is imperative to track how the world’s biggest four auditing firms - Deloitte, Ernst & Young (E&Y), KPMG and PricewaterhouseCoopers (PwC), better known as “Big Four”, are planning to deal with this major development.

E&Y is the first which has started accepting Bitcoin as a payment method. In April 2018, it has launched “Blockchain Analyzer” which will facilitate the review and analysis performed by E&Y audit teams on blockchain transactions. The pilot project aims to build the mechanism behind automated audit tests on assets, liabilities, equities and smart contracts that are recorded in blockchain. KPMG, a member of the Wall Street Blockchain Alliance”, has partnered with Microsoft to launch “Blockchain Nodes” initiative to identify and use new applications of blockchain technology. Besides, KPMG has started a “Digital Ledger Services” program back in 2016 to assist financial services companies in identifying blockchain applications. Similar to E&Y, **PwC has also** started accepting Bitcoin as a mode of payment from December 2017 at its Hong Kong office. Deloitte has launched Rubix, a “one-stop blockchain software platform”, way back in 2014. Using this platform, Deloitte started exploring initial coin offerings (ICOs) as an instrument to diversify their offerings.

It is clear from the above discussion that although the “Big Four” have not yet started their auditing services directly using “Blockchain” technology, but they are very much into the development phase. For example, In April 2018, PwC has announced its first ever blockchain auditing services which aims to ensure whether the already signed up crypto businesses are using this technology properly and effectively. Recently, the “Big Four” have joined a consortium of 20 Taiwanese banks to trial an auditing run on interim financial reports of public companies using blockchain service.

The Challenges

Although it is true that “Blockchain” technology provides a lot of promises especially in the domain of accounting and auditing, one can foresee a number of challenges lying ahead. Firstly, the audit tools developed by both E&Y and PwC most probably support private blockchains. In that case, the businesses that operate on public blockchains will be left out. Secondly, enterprise-ready blockchain solutions are yet to be available for the accounting industry. Thirdly, the widely used accounting softwares are not compatible with sophisticated “blockchain” technology as

of now. Finally and more unexpectedly, in spite of remarkable interest among conglomerates and start-ups to explore this new technology, regulatory hurdles are pushing companies backward. PwC blockchain head, Steve Davies, has commented:

“Businesses tell us that they don’t want to be left behind by blockchain, even if at this early stage of its development, concerns on trust and regulation remain. Blockchain by its very definition should engender trust. But in reality, companies confront trust issues at nearly every turn.”

Conclusion

Blockchain can be considered as a source of trust which has the potential to bring a radical change in history of accounting. It safely records all transactions, reconciles and stores them permanently in the chain. In a way it provides speed, efficiency, accuracy and truthfulness. This, itself, is a major development over traditional accounting system which is fraught with errors and fraud. Although there lies a number of challenges, it can be easily combatted if accounting industry, its leaders, regulators and technology providers work together to achieve a win-win situation for all the parties. Once such challenges will be overcome, blockchain technology will undoubtedly emerge as a new frontier of modern accounting.

ALUMNI CORNER**Financial Markets, An Antidote For Utopia****Balachandran R**

Balachandran R is an alumnus of IIM Calcutta (1987-89) with extensive experience in corporate banking, investment banking and product management.

Utopia, a word coined by Sir Thomas More as the title for his sixteenth century book, is an ideal world where everything is perfect, citizens live in bliss and there is no room for conflict. While the world we live in today is far removed from such idealistic conditions, an all perfect place can have unintended consequences for its inhabitants: ennui or boredom. Imagine if every day was like the previous day, and the future is expected to be a repeat of the past. Perhaps, if financial markets were permitted in utopia, the markets can break its monotony, and give its denizens the much needed spice in their otherwise humdrum existence.

THE RETURN OF VOLATILITY TO FINANCIAL MARKETS

The financial markets would not have lived up to such expectations in the year 2017, with its lack of volatility. To its credit, the markets more than made up for this in 2018, with volatility back with a bang. The Dow Jones Index, cheered on by President Trump and windfall corporate profits from the Tax Cuts and Jobs Act, reached a peak of 26951. Solid growth figures, benign inflation and falling unemployment underpinned the performance of the equity markets. But then, to use a cliché from the financial markets, the Fed stepped in to “take away the punch bowl”, before the party turned too boisterous. The Fed’s rate hikes, and more significantly its phased unwinding of its USD 4.5 trillion balance sheet built to counter the Great Recession, along with the self-confessed “tariff man” Trump’s trade war against China, pulled the Dow down all the way to 21,712. The R word (for recession) was mentioned frequently by the market pundits as higher interest rates could be a dampener for growth in the economy. The flattening yield curve, on the verge of inversion, was another ominous sign for the economy and equities.

Trump, who had tied his fortunes to the stock market, and having taken credit for the upside since his election, was furious with the Fed, blaming it for the fall in the markets and for a potential recession. Talk of neighbour’s envy or in this case a successor’s gloom: in one of his tweets, Trump bitterly pointed out how Obama benefited

from “zero interest rates”, and that despite the Fed’s rate increases, the US economy was still doing well under Trump’s administration. There was incessant pressure from Trump on the Fed, to reduce rates.

WHEN THE FED CAPITULATED

At first, Jerome Powell, the Fed’s Chairman and a Trump appointee, did not budge, maintaining that the Fed’s decisions were not influenced by political considerations. Rumours of Powell being fired made the rounds. Market pundits also chipped in, that the Fed needs to “listen to the markets”. Trump’s relentless tirade against the Fed on twitter and its Chairman Powell, accompanied by a collapse in the Dow Jones Index in a howl of protest against a tight monetary policy, ultimately broke the back of the Fed. In a move reminiscent of the “Greenspan put”, Powell abjectly surrendered, walking back from the talk of continued tightening, by agreeing to “be patient and flexible, and be sensitive to downside risks in the markets”. More significantly, he indicated flexibility on the Fed’s plans to wind down quantitative easing (QE). The equity markets rejoiced with the Dow immediately up by about 1000 points. As always, it was the Fed talk that moved the markets and not any actual announcement of monetary policy by the FOMC.

OIL, ON A WILD RIDE

The most watched commodity in the financial markets, oil, was also on a roller coaster ride along with equities. Starting the year at USD 66.6, Brent prices went up all the way to USD 86 on talks of sanctions on Iran, an oil exporter. The OPEC oil cartel apart, the three influential personalities behind oil price swings, Donald Trump of the US, Vladimir Putin of Russia and Crown Prince MBS of Saudi Arabia, had different agendas. Putin’s Russia, a non OPEC member, having learnt from the lessons from the past, on the risk of excessive dependence on oil and its wild price gyrations, continued to pump oil at its own pace. Saudi Arabia was caught between its economy’s dependence on high oil prices and its hesitation to offend Trump, a vocal advocate of low oil prices. The Khashoggi affair had also put MBS on the defensive.

Sanctions on Iran were supposed to take out a significant chunk of oil supplies off the markets. Hence Saudi Arabia, urged on by Trump, stepped up production to make up for the impending shortfall. Then, in a surprise move, Trump exempted several large oil importing countries like India, from the sanctions, for 180 days, bringing Iranian oil back into the markets. By then, Saudi crude supplies had already been ramped up, to make up for the “Iran sanctions”, leading to significant over supply. Trump, with this apparent sleight of hand, played a decisive role in pulling down oil prices, with a near collapse of about 40 % from its peak in 2018. Perennially current account deficit economies like India, with huge oil imports, have much to thank for, in Trump.

US shale oil production, has made the country the largest oil producer in the world, with inventory levels at the massive oil storage hub in Cushing, Oklahoma a key metric watched by financial markets. US monetary policy also impacts commodity prices, with an accommodative stance being a positive factor. Oil price movements and US stock indices in late 2018/early 2019, now closely track the progress of the US China trade negotiations.

CURRENCY MARKETS AND CORRELATION

The currency market with about USD 5 trillion a day in volumes, is the largest segment of the financial markets. 2018 was an interesting year for this market too. The Pound Sterling, fell sharply against major currencies, when the Brexit withdrawal agreement was voted down by the UK lawmakers. The Sterling's fortunes are now closely tied to progress on reaching a consensus for an orderly exit of UK, from the European Union.

The US Dollar index DXY was up by 4.6% in 2018 helped by a tight monetary policy and strong growth in the US economy. Market watchers have observed a negative correlation between the Dollar index and US equities. One reason is that, a strong dollar makes exports uncompetitive for US multinational companies, dimming their earnings outlook and stock prices. The DXY index measures the Dollar against 6 currencies, Euro (highest 57.6% weight), Pound, Yen, Canadian Dollar, Swiss Franc and Swedish Krona.

The Japanese Yen (JPY) and the Aussie Dollar (AUD) exhibited interesting divergence. The Yen considered a safe haven currency, appreciates against USD when the global equity markets are in a turmoil, Japan being the world's largest creditor to other countries. The US dollar too, as measured by the DXY index, appreciates in the face of risk off scenarios in the financial markets, against the Euro and Sterling, while weakening against JPY. When the markets are back to a "risk on" mode, the Aussie and Canadian Dollar (CAD) benefit. The Australian economy with its dependence on commodity exports saw its currency move in tandem with US equity markets. CAD too is considered a commodity dependent currency.

In addition, Powell's recent dovish comments on interest rates benefited the Aussie Dollar and other "risky" assets. Any pause by the Fed, is a negative for the US Dollar, while emerging market currencies benefit from a dovish signal on interest rates by the US Fed.

Central bank easing on interest rates, is a negative for the domestic currency in emerging markets. On the other hand, economies like Indonesia and Argentina, in the face of fast depreciating currencies in 2018, resorted to monetary policy tightening with the objective of shoring up their currencies.

In Europe, the Swiss Franc (CHF) is considered a safe haven, with uncertainty in the continent, as for example in Italy, resulting in CHF appreciation.

MORE ON CORRELATION IN FINANCIAL MARKETS

Gold is another important commodity in the financial markets. Being priced in US Dollars, the price of gold moves inversely with that of the Dollar as measured by the Dollar index DXY. Dollar strength as witnessed in 2018, is usually accompanied by a fall in gold prices. Interest rates too have their impact, with Fed talk of easing rates, considered inflationary and therefore a positive for gold price; gold is considered a hedge against inflation. The early 2010's, a period of quantitative easing, saw a rush into gold. Lower interest rates also help in reducing the holding cost of gold, making it more attractive to own. Gold is also considered a safe haven asset, with prices moving up in times of turbulence in the financial markets/weak equity prices. US treasuries too are considered a safe haven asset, benefiting in such a scenario, along with JPY.

Oil prices tend to move in tandem with equity markets, with turmoil in equity markets, instantly reflecting on oil prices, though no inferences on long term correlation can be drawn.

Emerging market currencies like the Rupee, witnessed a sharp depreciation in 2018, thanks to a surge in oil prices, which have an outsized impact on current account deficit and unwinding of QE/higher interest rates by the Fed. Though the Dollar index DXY was up by 4.3% only in 2018, the Rupee fell 9% bringing back memories of the 2013 Ben Bernanke induced taper tantrum. The off shore non deliverable forward markets for emerging market currencies were again spoken of with awe in the financial markets, for their ability to influence prices in the onshore spot markets. Rupee movements of 0.5 to 1% in a day which was unusual earlier, have become a common occurrence.

10 year India benchmark government bond yields beginning the year at 7.33% went up all the way to 8.15%, with RBI's intervention in the FX markets to curb rupee depreciation impacting system liquidity. The central bank brought back liquidity by massive open market operations resulting in bond yields falling to 7.2%, though they have since risen.

WHEN THE CORRELATION IN THE MARKETS BREAKS DOWN

Earlier in this column we recommended that "citizens of utopia" be permitted to dabble in financial markets to break their otherwise monotonous existence. If the stock, money, bond, currency and commodity segments of the markets exhibit a standard pattern of correlation, such behaviour takes away some of the charm of the markets, despite their volatility. It is a generally accepted fact that prices in the equity and bond markets move in opposite directions, with euphoric equity investors moving money out of treasuries, driving down their prices. And when stock prices are down, treasuries outperform. However, in October 2018, there were times when both stocks and

bonds moved down together, breaking the past patterns. The other correlations in the various segments of the financial markets, discussed in earlier paragraphs are generic patterns, based on historical trends, which may not necessarily hold true in all future market conditions.

CENTRAL BANKS VERSUS THE GOVERNMENT

Central banks continued to have an outsized influence on the financial markets, through monetary policy, open market operations, day to day liquidity management, and intervention in the foreign exchange markets. 2018 saw tremendous pressure on the central banks on various fronts to cede some of that power to the Governments. India witnessed an outburst from the Deputy Governor warning of the wrath of the markets and “the igniting of economic fire” if the independence of the central bank is compromised. This appeared to work differently in the US, where financial markets set the trend and the central bank followed. A massive sell off in the equity markets caused the Fed to flinch on increasing interest rates, though Trump too contributed by his relentless pressure on the Fed to pause on its plans to hike rates. In all the current tug of war between the governments and the central banks, it is noteworthy that the heads of the central banks are government appointees, who however become inflation hawks the minute they stepped into their new role, ignoring the pleas or tirades from their erstwhile masters. One is reminded of Julius Caesar’s last words to Brutus: “Et tu, Brute?” (You too, Brutus!).

While Powell meekly gave in to political pressure by reinstating the “Greenspan put”, the Governor quietly resigned in India. Subsequently, the central bank tweaked the NPA norms for the MSME segment, while appointing a committee to arrive at the “economic capital” requirement of the RBI. While these moves appear rational, the independence of the central banks is under threat globally. They no longer have the sole monopoly to move markets or set policy. The political class, which has “direct accountability to the people”, now has a very big say on aspects hitherto under the exclusive domain of the central banks.

A final note on who moves the financial markets. Some market watchers attribute the violent December sell off in US stocks to computer driven algorithmic trading. As technology takes over our daily lives, it may also have the last laugh in the central bank versus government tussle.

*GUEST COLUMN***Waivers, Exemptions and Bailouts: Time for a policy framework****Deep N Mukherjee**

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Of late, for better or for worse, three quite divergent segments have either been seeking or were proactively provided with some lifeline or elbowroom to reduce their financial stress. These three segments are Farmers (not all though), MSME (Micro-Small-Medium-Enterprises) and NBFC (Non Banking Financial Companies). The tools for relief in each of these cases were different and if one may say somewhat tactical and hence without regulatory follow-up /government action it is unlikely that such relief would improve a lot of the beneficiaries in the long term. That is not to say whether such waivers/bailouts were at all required or not. Most interesting of course is the case of NBFC, where due to somewhat limited understanding of a viewpoint, it is a liquidity bailout in some shape and form.

At the outset, let us make it clear that this note is not about the economic validity/usefulness of such enabling dispensations. If there is an extreme situation where the livelihoods of people or the stability of the economic system is in jeopardy, the government should come up promptly with relief measures. However, they should also at the same instance assess and take suitable measures to ensure that such bailouts remain a one-time feature and do not become a regular periodic event. Secondly, the bailout should not perpetuate moral hazard problem.

We discuss each of the segments and try to identify if bailouts/exemptions/waivers will structurally help the situation so that the crisis can be stalled or averted in the near future. Additionally, what, if any, follow-up actions may be required to reduce instances or crises or demands of governmental dispensations.

Farmers- Helpless & Ignorant “Put Option Sellers”

Every government, irrespective of political orientation and for allegedly short-term political popularity, have (a) tried to tweak with Minimum Support Price(MSP), and (b) pushed for directed lending to farmers and related

agri-based industries. More recent steps taken by certain state governments include providing direct access to markets without mandatorily going through APMC(Agriculture Produce Market Committee). Such steps have attempted to address certain regulatory shortcomings.

Talking of Indian farmers, the narrative of what ails them has not changed for decades now. Even the latest OECD report on India's agro food sector, published in July 2018, while acknowledging the improvements over the years, highlights "declining but still persistent food insecurity and nutrition deficiencies, large numbers of small and resource poor farms, increasing water scarcity, low productivity growth and the uncertain impacts of climate change". Add to that the problem of small/fragmented land-holdings, limited proactive lending from institutional lenders and one would feel that at least all the malaises of Indian agriculture has been well studied. However most think tanks as well as government bodies, not just in India but elsewhere as well, miss out on a critical economic aspects of farm produce's pricing. The upside of the farmers, when the market value of their produce increases, is somewhat limited. The entities, which are closest to end consumers of the produce, tend to get higher benefit. However, in the event of a bad crop or weather disturbance most of the downside is borne by the farmers. It is almost like the farmers have written (or sold) a put-option to the rest of the agri-supply chain and the entire society. Not that the farmers have too much of a choice in these situations.

Think of a product or service whose demand is relatively inelastic but the supply may vary wildly given the weather conditions. It is most likely that the producer (in this case the farmer) would have built the supply volatility risk into the price. If farmers start building the risk of the production into agri-price, it would potentially increase the cost of the agri-products.

To maintain low levels of core inflation, of which food prices are an important component, food prices are ideally expected to remain in check. But then how will the farmer be paid for the risk he or she is bearing on behalf of the society. Among all the segments this is possibly one segment where it feels that waiver is a backhanded payment for the risk that is being borne.

Given this argument, the government or society needs to bear the risk or make payments for the risk borne by the farmers. Dispensations such as loan waiver or MSP appears like political largesse, but underplays the risks that farmers bear for society. Can financing structures be created along with insurance which will allow farmers to dispose of the risk of selling a put-option to government, who in turn may finance it by issuing tax-efficient bonds on the lines of CAT(catastrophic) Bonds?

MSME: Innovate to remain relevant

MSME are the lifeblood of any nation and India is no different. Indian MSME contribute ~one-third of India's Industrial output GDP and account for ~120 million job. Clearly if this sector is struggling, its impact will overflow to job market, livelihood generation and general sentiment. However, a lot like the farmers, this segment, of late, has been subject to forces beyond its control. Clearly there are lot of MSME which are part of large globally integrated supply chain of MNCs, Indian corporate houses and now successful online sellers in various e-commerce platforms. There are again MSME which are into consumer segment and innovate constantly to tap into ever-changing customer preferences.

These will face the usual business cycle just like their larger peers, however this is not the weak link in the MSME story.

While it may be difficult to put an exact number but there are quite a few MSME which face the following challenges: a) Limited Value b) Lack of scale and limited resources to upgrade offerings c) Dependence on regulatory/tax arbitrage for profit. To the extent some of them may have been intermediaries of a value chain with limited value add, technology driven integration of supply chain usually tends to put a question mark on the sustainability of such firms.

While the recent regulatory forbearance with respect to delayed recognition of MSME defaults will provide some relief to a segment of MSME, for others it may just delay the inevitable. MSME owners need much more than low cost funds. They need exposure to managerial and strategic skills along with enhanced understanding of technology. Without the change in perspective, if MSMEs are provided with technology upgradation funds, full potential improvement may not be achieved.

Quite a few of them are already struggling with profit margins of 2%-5% and may tend to focus on interesting tax optimization techniques. Clearly, their focus should be elsewhere. GST is an appropriate framework to get improved tax compliance and is possibly one of those changes whose positive impact would play out over 5-10 year period. However, increasing the revenue threshold of companies for mandatory GST compliance would benefit those MSME, whose viability may be in question, only to a limited extent. Problems of MSME are not just limited to access of credit or cost of credit. Important as they are and there has been some positive development on those fronts, focus must also be given on improving the managerial quality, ability to leverage technology for business management and user-friendly infrastructure for tax compliance.

NBFC: Potential Lapse in Liquidity Risk Management

While the banking industry has given more adverse shocks than positive surprises to its shareholders in the last 5 years, NBFCs, (and HFC) particularly those focused on retail and to an extent MSME lending, emerged as market darlings. Few of the better established ones provided high quality growth while balancing risks reasonably well. Needless to say they continue to remain much sought-after even after the recent NBFC liquidity scare. As such, the balance sheet delinquency levels of most NBFCs are much lower than their banking big brothers, though the NPA levels have been gradually creeping up. Additionally, most NBFCs are adequately capitalized. Where a lot of them have faced trouble and continue to do so, albeit to a lesser degree, a few have been on the liquidity front. It may be argued that quite a few of the NBFCs have been building the vulnerabilities on the liquidity risk front for last two-three years. Let us see how.

On the backdrop of high growth, NIIs (Net Interest Income) were flattening out and in some cases dropping given the gradual risk in delinquency. As it appeared to some experts, the ‘obvious solution’ for the problem of moderating NII, was to reduce the cost of funds particularly the weighted average cost of debt. Some NBFCs, which experienced an improvement in their credit rating, saw a relative lowering of cost of debt. However, the more aggressive ones played with the mix-of short term and long-term debt. They started increasing the proportion of short-term debt. This playing on the yield curve reduced their cost of funds for sure, but increased the refinancing risk since the maturity of their loans (assets) did not decrease. In fact in some cases it increased given the increasing tenure of their loan products. Then as if this was not enough, some NBFCs have also started reducing the cash portion of their assets. Cash & cash equivalents have much lower yields than loans & advances. This move boosted the overall yield from assets. However, the combination of enhanced refinancing risk and low balance-sheet liquidity made these NBFCs exceedingly susceptible to tightened liquidity conditions. When a highly rated NBFC defaulted, the market sentiments with respect to NBFCs have changed adversely, thereby increasing the vulnerability.

The higher NII benefitted the shareholders/promoters, some of whom failed to realise that liquidity risk is not fully mitigated by just having adequate equity. As such there is a clamour for liquidity for NBFCs. How is this bailout? Lowering the interest rate (ie; cost of liquidity) will underprice the risk of those select NBFCs who arguably have thrown caution to the wind. The lower rate may adversely impact the overnight rate, reduce real interest rate and expose the INR to risk of depreciation. Even for the sake of argument, if one assumes that NBFCs liquidity bailout is required else the credit supply gets affected (there is some merit in this argument) still what is not widely discussed in framework for improving the risk management of NBFCs, is that one should not only think about just credit risk but also interest and liquidity risk.

Conclusions:

The choice of bailing out often requires the government owned banks to foot the bill, initially, with the government reimbursing for the loan waiver or equity shortfall. In liquidity bailout the larger system gets exposed to risks associated with artificially lowered interest rate. However, while the debate goes on about the need, sufficiency and economic rationale of such dispensations; one cannot doubt the need to address core issues associated with each of these segments. Farming sector is possibly the most difficult issue to resolve because the problem highlighted in this article is rarely discussed, if at all appreciated. Even if farm productivity improves and farmers get direct, logistically efficient access to market, their inability to build in the risk associated with their products will remain.

MSME issues require a more holistic focus than on improving the quality of MSME management, which while done in bits and pieces clearly has no scale involved with it. NBFC is the trickiest of the lot, but the one where the issues on risk management may be more easily addressed.

*VOICE OF AMERICA***Trading the No-Trade Theorems****Ayan Bhattacharya**

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Most economic historians trace the rise of finance – as a serious academic discipline – to three waves of conceptual breakthroughs beginning the 1950s: the Modigliani-Miller papers in the 1950s and 60s, the Sharpe-Ross papers in the 1960s and 70s, and the Grossman-Stiglitz papers in the 1970s and 80s. Prior to the 1950s, finance was little more than debit/credit accounting and a bag of tricks about trading. By the mid-1990s though, finance was being hailed as one of the most successful and technically rewarding branches of economic theory. This sea-change in sophistication is widely attributed to the three waves of breakthroughs. While the Modigliani-Miller theory and the Sharpe-Ross theory are nowadays reasonably understood even outside of wonkish academia, appreciation of the no-trade theorems (the Grossman-Stiglitz papers are an application) is still scarce. These theorems, however, lie at the foundation of almost all modern understanding of trading.

1. Birth from Paradoxes

A curious fact about finance is that almost all of its seminal developments can be traced to paradoxes. The Modigliani-Miller papers were about the paradox of financing. In a frictionless world, the mode of financing should not matter, the papers proved. Yet, in the real world, corporate finance managers spend most of their time obsessing over financing decisions. Thus the real world had to have frictions, and the agenda of corporate finance theory, ever since, has been to uncover the right frictions to break the Modigliani-Miller results. Similarly, Steve Ross' fundamental papers were about the paradox of arbitrage. In an ideal world, there must be no arbitrage opportunities. Yet the real world is full of trading opportunities. The agenda of asset pricing theories, ever since, has been to reconcile the abundance of trading opportunities with the idea of no-arbitrage. Like the other conceptual breakthroughs, no-trade theorems, too, are essentially statements of paradox.

While laying the foundations of Game Theory in the 1970s, the young Israeli mathematician Robert Aumann proved a curious fact. Even when people had different information about an uncertain incident, they could not agree to disagree about the outcome if they were rational [1]. Aumann’s 1976 paper is just three pages in length, and the essential argument is only a couple of lines. Yet the paper heralded a revolution that shook the foundations of many areas in economics, and Aumann himself went on to win the Nobel memorial prize. The No-trade theorems of finance are basically a clever adaptation of Aumann’s results to the arena of finance.

Though couched in mathematical language, Aumann’s main argument was extremely intuitive. Suppose Ram and Hari are trying to guess the outcome of an uncertain incident, say a coin toss. The coin is biased and Ram and Hari don’t know the extent of the bias. Ram and Hari’s guesses depend on their beliefs about the bias, and this belief is based on the private information they have about the coin. Ram’s source tells him that heads and tails are equally likely, while Hari’s source tells him that the likelihood of heads is 70%. Can Ram and Hari disagree in their final guess about the outcome of the toss? Aumann argued “No”, as long as all guesses were common knowledge. The key insight was that any rational human being would infer the “hidden” from the “visible”. When Hari saw Ram’s guess, he would infer what Ram’s source told him. Hari would then merge the information from his own source and Ram’s source, and his final belief would be based on the composite information. Ram, too, would do the same thing. In the end, both Ram and Shyam’s guesses would be based on composite information that merged the two private sources. Therefore, they could not disagree!

2. From Disagreement to No-trade

Researchers in finance quickly realized the importance of the disagreement result for markets, and a number of influential papers were written in the late 1970s and early 1980s that interpreted the result for trading. This body of research is now called the No-trade theorems – the most cited work being the Milgrom and Stokey theorem [3]. In their influential paper, Paul Milgrom and Nancy Stokey, both professors at Northwestern University at the time, showed that Aumann’s result meant that there should be no trade in an idealized financial market. The basic idea was again very simple. Any trade must be preceded by a revelation of the intention to trade. But disclosing even the intention to trade reveals some information. It is this information that makes trading impossible in idealized markets. Say, for example, Ram had more information than all counterparties in the market about the price of Reliance’s stock, and wanted to make money off that extra information. To trade, Ram would need to request some counterparty to take the opposite side of the trade. However, no rational counterparty would agree,

because the request from Ram would immediately signal that Ram had more information – thus any counterparty was bound to lose money on a trade with Ram. Therefore, no rational trader would agree to trade with Ram. Hence the name no-trade theorem, because the result meant that information asymmetry could never lead to trade.

The influential Grossman and Stiglitz result [2] took the no-trade idea even further. A financial market can be said to function well, Grossman and Stiglitz contended, when the price at which a trade happens reflects the fundamental value of the asset being traded. The process by which a market comes up with this price of trade is called “price discovery”. For a price to be discovered, however, some market participants needed to “actively” gather information about the asset. Only through the participation of such informed traders in the market, Grossman and Stiglitz argued, could price be truly discovered. But what could be the incentive of such informed traders, they asked? The incentive had to be the money they expected to make from trading on the extra information. That could compensate them for the effort expended in gathering the information. And herein lied the catch. The no-trade theorems implied that no counterparty would agree to trade with such an informed trader. In effect, an informed trader would have no way to monetize his information. Which would mean that no market participant would have an incentive to gather information in the first place. In other words, market prices would never reflect the information of its participants; thus markets would be condemned to perennial informational inefficiency!

3. Bypassing the Paradox

Almost all of modern trading theory – and practice —is an attempt to bypass the no-trading theorem. For example, all behavioral trading strategies are founded on the idea that human beings cannot perfectly infer or act on the basis of information in trades. Thus trading happens despite the no-trade theorem because humans are not perfectly rational. Billions of dollars ride on the markets based on this approach. Another influential school of thought suggests that for markets to function, there must be some market participants who trade for non-informational liquidity reasons. Such participants are called noise traders, and noise trading is a subject of intense interest in both academia and industry. Noise traders can act as a sort of money pump in financial markets because their trading motives are orthogonal to a rational trader’s, allowing the bypass of the no-trade theorems.

The rapid evolution of financial markets in the last 2 decades has suggested newer ways to bypass the paradox. For example, the rise of algorithm intermediated markets and high frequency trade has meant that computational issues are now at the forefront of trade. An active area of research at the frontier of finance exploits this fact and

studies how algorithmic trading can render certain strategies computationally infeasible. Thus even when information is available with traders, they can't take advantage of it, providing another avenue to bypass the no-trade theorems.

For many connoisseurs of finance theory, paradoxes such as the no-trade theorem represent the acme of the field. In many ways, they are the Zen koans of finance. In Zen Buddhism, koans are paradoxical riddles that agitate the mind and provoke enlightenment. The no-trade koans of finance have already provoked a lot of enlightenment (and profits!). However, any serious student of finance would readily affirm that this is just the start: the no-trade theorems have a profoundness that we are only slowly beginning to appreciate and exploit.

References

1. Aumann, Robert J. (1976). "Agreeing to Disagree" (PDF). *The Annals of Statistics*. 4 (6): 1236–1239.
2. Grossman and Stiglitz (1980). "On the Impossibility of Informationally Efficient Markets". *American Economic Review* (70): 393–408.
3. Milgrom, Paul; Stokey, Nancy (February 1982). "Information, trade and common knowledge". *Journal of Economic Theory*. 26 (1): 17–27.
