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A NEWSLETTER OF THE FINANCE LAB

November 2017, Volume 4, Issue 2



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Indian Institute of Management Calcutta

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Editorial

November amendments in GST rates and filing of returns have brought relief to manufacturers and traders. However, marketplace operators are still not happy. Finance Ministry believes that reduction of GST rates would not result in shortfall in target indirect tax collection. The Ministry expects strong corporate results in third and fourth quarters of the current fiscal and hopes that buoyancy in the economy will improve the overall tax collection. One has to wait till March 2018 to see the impact of recent changes in GST on the exchequer. India has also completed this month the first anniversary of demonetisation. Researchers and policy makers would now analyse the data to comment on the effect of such a large natural experiment. We expect to see some serious study on impact of demonetisation soon.

The first article deals with the recent lowering of GST rates where the author explains why our government should use lessons from corporate finance to set the initial GST rates. The second article looks at the external commercial borrowing by Indian firms in detail and tries to find out some of the implications of this surge in external debt in India. The third article explains RBI's Monetary Policy after Dr. Urjit Patel takes over as the new RBI Governor. In the fourth article, the author discuss about current research in algorithmic trading which has been growing fast in India, but Indian market regulators need to be wary of prescriptions derived from complicated market trading models as they are still works in progress.

The last piece is a conference report of India Research Conference held on 27 October 2017 at New York University (NYU) Stern Business School.

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

Happy reading!

Ashok Banerjee

GST and Corporate Finance- A note

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

The Goods and Services Tax (GST) is the most important indirect tax reform in India. It was debated enough over the past sixteen years and yet when it was launched in India, a common criticism was that the present government hurried its implementation. Experts complained that the IT infrastructure was not robust to handle such large volume of data that would get generated in the GST portal. Better beta testing would have avoided initial technical glitches. Perhaps due to pressure from business community and opposition (some claim that impending election in Gujarat did the trick), the government had to recently announce some major changes in the GST rates and also simplified compliance requirements. The major changes include reduction of GST rate for more than 178 items, composite scheme limit increased to INR 15 million, exemption from GST registration for all service providers with turnover up to INR 2 million, pruned by nearly three-fourths the number of items under highest GST rate, halved the composition tax of 1% on turnover of taxable goods, and provided relief to the e-commerce sellers if total turnover is less than INR 2 million. However, marketplace operators and sellers are still not happy with the recent changes in GST rules. One may note the recent announcement by the GST Council would cost the exchequer.

France was the first country to introduce VAT (somewhat equivalent to GST) in 1954 and now more than 160 countries implemented GST or its equivalent. Brazil has higher peak GST rate (35%) than India (28%). There is a difference between GST and VAT as the former is a destination-based tax. USA does not have single GST as taxation decision lies mostly with the states. Closer home in Singapore, GST was implemented in 1994 with a single rate of 3%. What is interesting is the Singapore government assured the business community at time of GST implementation that the rate would not be raised for first five years. In practice, GST rate was increased to 4% in 2003- after a gap of 9 years. Later the rate further rose to 7% in 2007. Such a clear and categorical signal did help business community migrate to GST regime without much difficulty. Another smart decision of the Singapore government was lowering of direct tax to reduce the burden of GST on business and common citizen. It showed great sincerity on the part of the government to care for its citizens. China also implemented GST in 1994. Initially it had many GST rates. And realising the administrative difficulty in maintaining several rates, China has now (July 2017) moved into three-rate band – 17%, 11% and 6%.

It is said that India had followed the Canada model of GST- the dual tax (state GST and central GST). Let us not forget that introduction of GST in Canada in 1991 was very controversial. The manufacturers had complained that GST had rendered them less competitive in international trade. Canada also did not change the GST rate for initial one and half decade. Unlike Singapore, Canada had lowered GST rate over the years- from 7% (1991) to 6% (2006) and further to 5% (2008). Canada has recently raised the GST rates though and it now ranges between 13% and 15%.

Lessons from Corporate Finance

While framing GST rates, the focus was on ‘revenue neutrality’- rates that would not decrease pre-GST revenue of central and state governments. Hence, we end up with four GST rates (excluding the zero rate). It may be mentioned that it is possible to have a single revenue neutral rate (RNR). However, the central government has chosen, and rightly so, to have more than one rate in order not to tax at a higher rate a basket of goods and services which were attracting lower tax in earlier regime. Even after such careful consideration by the GST Council, there was large number of items under the peak rate resulting in protest by traders, and political opponents. The idea of introducing GST with the ‘principle of equivalence’ was perhaps a mistake. One could use lessons from corporate finance to set the initial GST rates.

Corporate finance literature mentions that when a company wants to raise money through public offer for the first time, it ‘underprices’ its shares. It is a worldwide phenomenon. A recent example would be IPO (initial public offer) of LinkedIn, which is stated to be underpriced by 100%. Why do companies underprice IPO? One explanation is ‘information asymmetry’. When an unlisted company comes to the market for the first time, no analyst would be tracking that stock and hence investors would demand ‘premium’ for the fear of unknown. Underpricing is generally lower when information about the issuer is more freely available. The GST Council could have drawn from the IPO underpricing literature and introduced lower GST rates initially taking a hit in the indirect tax revenue for the first few years. Actually government had to do it anyway- an estimate shows that recent pruning the list of items under 28% slab would cost the government around INR 200 billion. There were lots of uncertainty and apprehensions surrounding the GST rates and the possible adverse impact that one-nation-one-tax policy would have on the business sentiment. What was required was to ‘assuage’ the initial ‘fear of unknown’ through lower GST rates and simple compliance (reporting) requirements. That would have ‘earned’ the government confidence of business and thus initial technical glitches would be ignored as something common

with any large implementation. Anti-profiteering provisions and market competition would ensure that business community pass on benefits of lower tax to end consumers.

The recent changes in GST rates within four months of GST launch further show tentativeness of the Council. Rates were reduced for 178 items from 28% to 18% and for restaurants (with exceptions) from 18% to 5%. One may recall that dining in a restaurant would attract 15% service tax in earlier regime. It was initially revised upwards to 18% in GST and now within a few months lowered significantly to 5%. Let us turn to corporate finance again. Lintner¹, while describing how managers determine dividend payout, observed that managers tend not to make dividend decisions that might have to be reversed in near future. Markets react more negatively to dividend reversal than dividend increase. Hence, knowledge of corporate dividend literature would have helped the GST Council in setting initial GST rates in a way that change in such a short time could be avoided. Examples of Canada and Singapore showed that a stable GST rates for a longer duration send a signal of confidence on the part of the government. This would help the business community concentrate more on implementation and compliance issues rather than wasting time in lobbying for reduction of GST rates. The GST Council also, in that case, could have spent more time and energy in fixing the IT glitches and handles issues relating to frequency of return filings. A longer-term GST rates could only be fixed if the rates were lower with fewer slabs in the initial five years, at least. The central and state exchequer would have definitely lost some revenue in such a situation. But smooth transition to the huge transformation is more important than loss of revenue in initial years. There are ways to make good any possible loss. One possibility is that lower GST rates would create favourable buoyancy in the business and hence would offset any shortfall in indirect tax revenue.

Lowering of tax rates has other implications. Corporate finance literature again shows that firms did not use savings due to tax incentives for growth. Rather such savings were passed on to shareholders by way of higher dividend and at times were usurped by managers as costly perquisites. The objective of providing any kind of tax incentive is to help business in early years to grow and face competition. However, literature on 'agency theory' amply shows that tax benefits were squandered away. Therefore, benefits of recent downward revision in GST rates for several commodities may not translate to lower invoice value. The administrative machinery has to be very watchful to ensure that ultimate consumers benefit.

¹ Lintner, J. (1956) Distribution of Incomes of Corporations among Dividends, Retained Earnings and Taxes, American Economic Review, 2, pp 97-113

Major relaxation is now offered with regard to filing of various GST returns. This would provide comfort to small businesses and release pressure on the GST portal for the time being. Developer of the GST portal will get time to fix the bugs that still remain in the system. It is hoped that GST Council will stay put with the rates for some years and observe the impact of the new law on business. One may justify the decision of lowering GST rates and relaxing compliance as something that quickly address the concerns of the business. This would portray the lawmakers as more proactive. However, the danger is that it may also send signal that such pressure tactics would work in future as well. International investors do not generally like frequent policy changes and hence favour a destination that has stable economic and fiscal policies. India has been making right noises on economic front for the past few years and the global community is watching us with delight. Let us embolden their faith with steady GST policy.

A note on External Commercial Borrowings in India: Rapid growth amidst some vulnerabilities

Parthapratim Pal, Ahana Bose*



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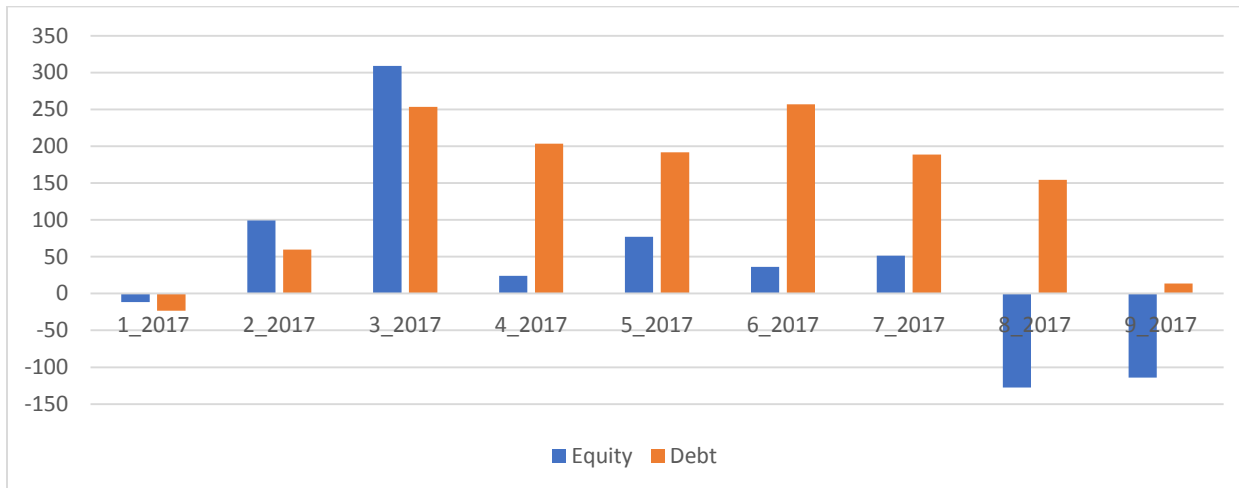
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I. Introduction

External debt flows to developing and developed countries have increased rapidly over the last few years. A study prepared by the Institute of International Finance (IIF) and reported by Reuters indicate that global debt has risen to record US\$ 226 trillion, which is more than three times global economic output. The developing world is estimated to have external debt amounting to US\$ 59 trillion. This increase in debt to developing countries is largely driven by China, which presently has a debt burden of US\$ 35 trillion².

India is also receiving increased debt flows. Since 2007-08, India's external debt stock increased from around US\$ 200 billion to hit about US \$ 485 billion in end-March 2016 before climbing down to US \$ 472 billion in end-March 2017. This has been largely driven by a rapid rise in External Commercial borrowings (ECBs) by Indian firms. Also, in the last one-year, monthly data show that portfolio flows to Indian capital market has been strongly dominated by debt flows. Apart from a few months, net debt inflows have been much higher than equity inflows in the present calendar year (Figure 1).

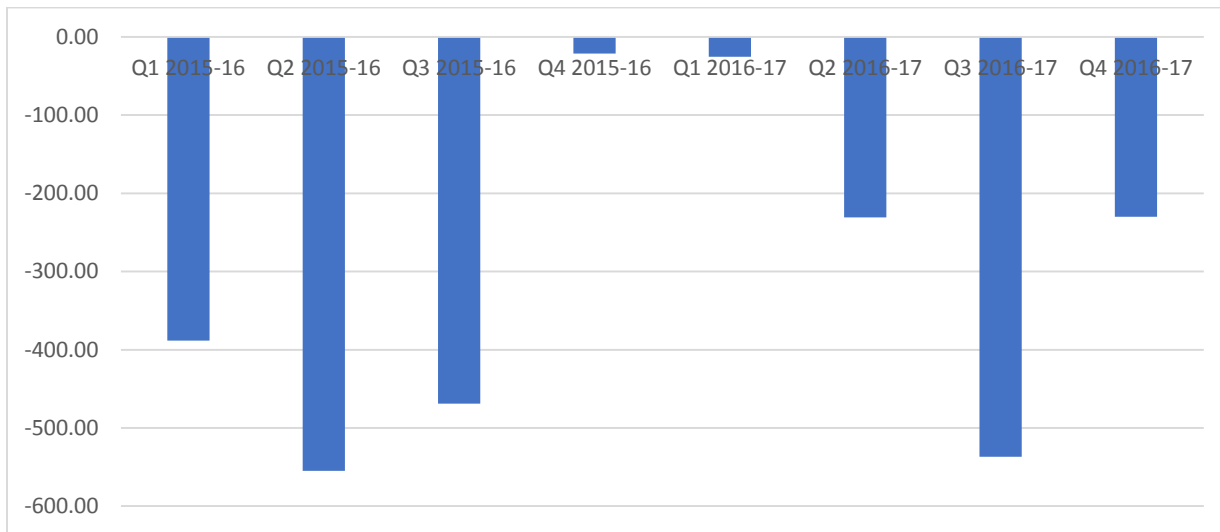
² <http://in.reuters.com/article/us-global-debt-iif/worldwide-debt-more-than-triple-economic-output-as-central-bank-shift-looms-idINKBN1CU1V9>

Figure 1. Foreign Portfolio flows in Debt and Equity in India, (in Rs. billions)

Source: Monthly FPI/FII Net Investments; <https://www.fpi.nsdl.co.in>

It is notable here that since November 2016, Indian currency has appreciated vis-à-vis US dollar and this has happened despite a widening current account deficit (Figure 2) and weak and intermittent inflows of foreign portfolio capital in the Indian equity markets. Though it is possible that the rupee appreciation has happened due to global weakness of dollar, it can also be hypothesized that increased capital flows to India has contributed to the appreciation of rupee during this period. A validation of this conjecture comes from data on foreign exchange reserves released by the Reserve Bank of India which that India's foreign exchange reserve rose from US\$ 288 billion in end-March 2016 to US\$ 398 billion in end-October 2017³. As it is evident from figure 1, private capital flows in the equity market has been subdued during this period, and current account balance has been consistently negative (Figure 2). Therefore, it is foreign direct investment or increased inflow in the debt market which are helping in pushing the rupee up.

³ Weekly Statistical Supplement, Reserve Bank of India, dated November 03 2017, available at: https://rbidocs.rbi.org.in/rdocs/Wss/PDFs/2T_03111706F9ED53B3EA43E78AE8A5A64287FD27.PDF

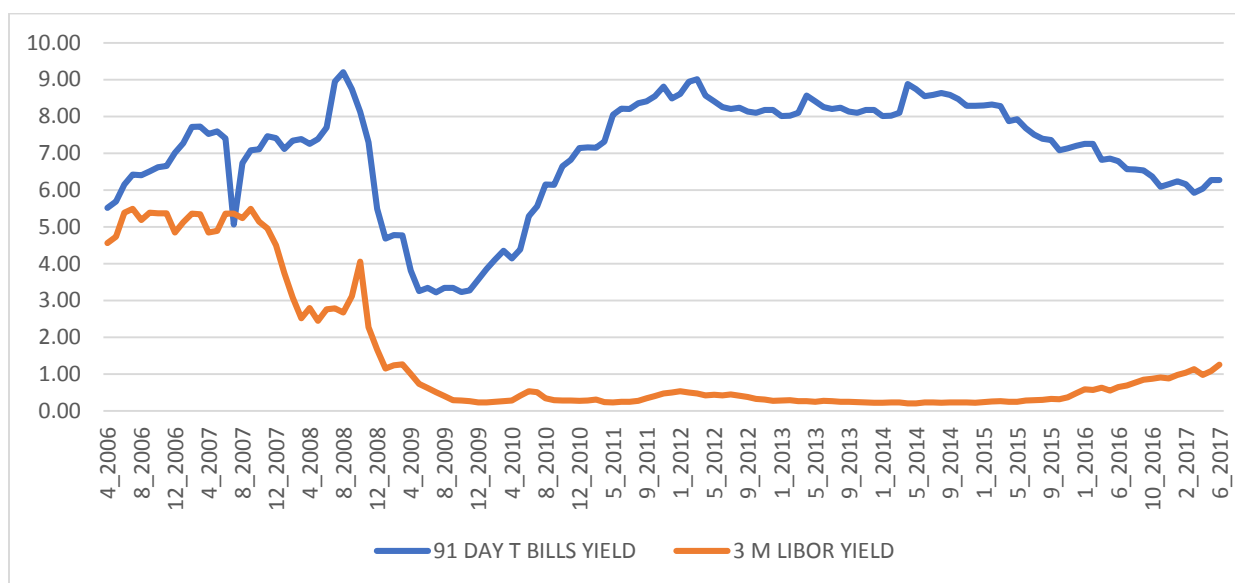
Figure 2. India's Current Account Deficit

Source: Reserve Bank of India (RBI)

Against this backdrop, this article looks at the external commercial borrowing by Indian firms in more detail and tries to find out some of the implications of this surge in external debt in this India. It is important to look at this issue because mounting debt in developing countries has become a major concern for the stability of the global financial system. International Monetary Fund (IMF) has repeatedly pointed out that growing global debt poses the greatest risk to global financial markets in medium term.

II. Debt flows to Developing Countries after the Financial Crisis

This general rise in debt flows to developing countries can be attributed to the post financial-crisis global economic scenario. One of the policy response to the financial crisis of 2008 has been a slew of accommodative and unconventional monetary policy regimes, including policies like Quantitative Easing (QE) or “large-scale asset purchases” by central banks. These policies increased liquidity in the system and pushed interest rates down to historically low levels in these countries (Figure 3). Domestic policy targets of these monetary policies were largely effective, and they managed to impose some control in the developed markets on the financial turmoil associated with the crisis. However, their global fallout has been quite significant. Increased liquidity and low interest rates in developed countries resulted in excess liquidity which is now crisscrossing national borders chasing higher returns in many countries.

Figure 3. Yield of 91 days Treasury Bond (India) and 3-month LIBOR (in percent)

Source: RBI and Federal Reserve Bank of St. Louis

Relatively higher nominal interest rates and better growth performance of developing countries attracted increased capital flows since 2010. This has pushed up asset prices in many countries of these regions. Easy global liquidity has led to massive commercial and household credit growth in developing countries (IMF 2017)⁴. It is also being argued that post-financial crisis, there has been an increase in propensity to save among developed country consumers. Along with influx of more thrifty Asians in the global economic system, this increased propensity to save in many developed countries is also adding to the pool of global liquidity. As mentioned before, a major share of this increase in commercial debt has gone to China. Bloomberg Intelligence estimates that in China total borrowing climbed to about 260 percent of the economy's size by the end of 2016, up from 162 percent in 2008. It is estimated that borrowing in China will hit close to 320 percent of GDP by 2021⁵. This rapid rise in debt levels have prompted the People's Bank of China Governor Zhou Xiaochuan to warn about the emergence of possible 'Minsky moments' in global financial architecture⁶. Famous US economist Hyman Minsky warned that too much optimism and favourable conditions in financial markets may lead to excessive risk taking by economic agents which may eventually lead to a financial crisis. A 'Minsky moment' in China may trigger a significant wave of financial panic across the world. Other economists have also warned about possible repayment problems once central banks in developed countries start shifting towards tighter monetary policy which may lead to higher interest rates in these countries and stronger currencies.

⁴Global Financial Stability Report October 2017: Is Growth at Risk? October 2017, IMF.

⁵'Global economy health at stake as China tries to hold sneeze', Economic Times, October 30, 2017, available at: <https://economictimes.indiatimes.com/news/international/world-news/global-economy-health-at-stake-as-china-tries-to-hold-sneeze/articleshow/61333440.cms>

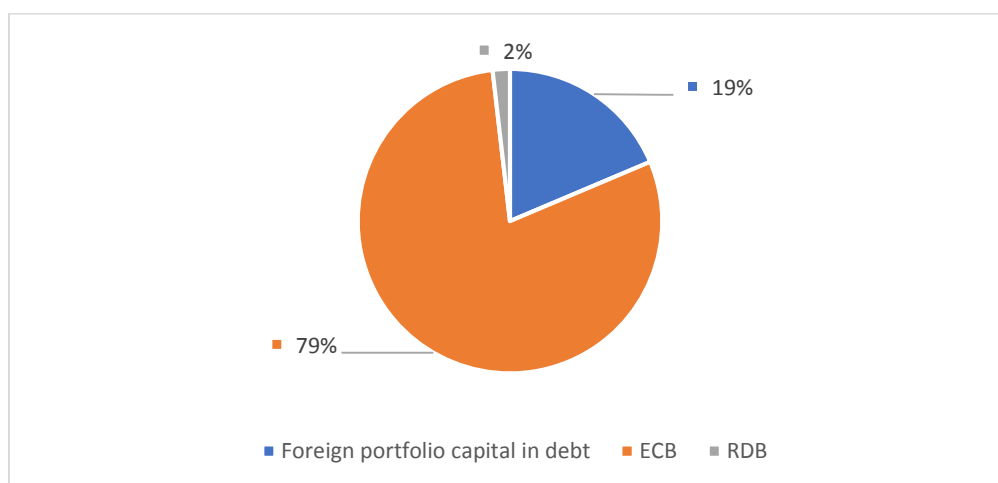
⁶Zhou Warns China Should Defend Against Threat of 'Minsky Moment' Bloomberg News, October 19, 2017, available at: <https://www.bloomberg.com/news/articles/2017-10-19/zhou-warns-china-should-defend-against-threat-of-minsky-moment>

III. India and External Commercial Borrowing

India is experiencing debt flows through three major channels. As mentioned before, foreign portfolio investors are investing heavily in Indian debt markets. Indian corporates are raising money from international capital markets through external commercial borrowings (ECBs) and the newly introduced rupee-denominated bonds (the so-called ‘masala bonds’) are bringing in more debt flows to the country. Among these different routes through which external debt is being accumulated, the most important has been the External Commercial Borrowings. ECBs has seen a sharp rise during the post-crisis period. At end March 2006, India’s ECB stock was US\$ 26.45 billion, it reached US\$ 62 billion at the end of the fiscal year 2008 and by March 2015 the ECB stock crossed US\$ 180 billion. Since then it has declined to about US\$ 173 billion at the end of the fiscal year 2017 (End-March). According to latest available data (end March 2017), ECBs account for about 36.7 percent of India’s total external debt. Since 2015, India has also allowed issuance of rupee denominated bonds (RDBs) by the corporate sector. The major advantage of RDBs is that the issuer does not bear any currency risk and it is borne completely by the subscriber of the bond. RBI data show that so far 44 Indian firms have raised close to US\$ 5.5 billion through RDBs⁷. Taking a cue from Japanese ‘Sushi bonds’, which are fundamentally similar in nature, RDBs are also popularly known as the ‘Masala Bonds’. Recently RBI has imposed some additional guidelines on RDBs. In a June 2017 guideline, RBI has imposed rules capping the maturity limit of bonds less than USD 50 million to three years and bonds above USD 50 million for five years. There is an apprehension that this new rule may restrict the growth of the Masala bond market to a large extent.

On comparing the foreign inflow of funds generated through debt oriented foreign portfolio flows vis-à-vis commercial borrowings, Figure 4 shows that ECBs have become the most dominant avenue of inflow of foreign debt to India.

Figure 4. Composition of inflow of debt to India from January 2007 to July 2017



⁷ Author’s calculations , compiled based on monthly data available on External Commercial Borrowings on RBI website

Source: Reserve Bank of India and NSDL website

This rapid growth of ECBs has happened in a period when domestic credit growth from banks has been slowing down. In fact, in 2016-17, domestic bank credit growth has touched 5.08 percent, which is the lowest growth rate achieved in the last 60 years⁸. It can be argued that development of alternative sources of finance like the bond market and external commercial borrowings has reduced dependence of the Indian corporate sector on banks for raising money, it must be kept in mind that ECBs come with higher level of risk compared to domestic borrowing. ECBs are denominated in foreign exchange and the borrowers bear the dual risk arising out of movements in foreign exchanges and interest rates. Any shock administered through an external economic event like a hike in the Fed rates, can create a dual impact on the borrowing firms through interest rate and exchange rate effect. As long as international interest rates are low, servicing of ECBs may not pose much challenge for Indian firms. However, there seems to be some early signs of hardening of monetary policy in developed countries. If international interest rates go up, it will increase the debt burden in rupee terms. Also, a hardening of monetary policy by the central banks of developed countries may lead to a depreciation of the Indian currency. This may put additional pressure on servicing of external commercial borrowing. For companies involved in exports, net export earnings in foreign currency can act as a natural hedge against exchange rate movements. But India's performance on that front also has not been remarkable in the recent past. Earnings and profitability numbers of the Indian corporate sector are not looking up⁹. Increased competition in some of the sectors have reported to have created payment problems on some international borrowings¹⁰.

Reserve Bank of India publishes monthly company level data on ECBs. These data show how stated purpose of ECBs has changed over the years. On examining the end use of ECBs it is found that over the years it has undergone a significant transformation. Traditionally ECBs were taken for funding projects goods, capital expenditures in foreign currencies and some refinancing. In addition, companies used to borrow abroad for meeting miscellaneous needs such as buybacks of foreign currency Convertible bonds (FCCBs), budget financing, leasing and hiring, operating expense, leasing and hiring purchase as well as financial lease. However, of late (2017) refinancing of loans has turned out to be the most popular reasons for taking ECBs by firms. After refinancing, on-lending is the next most popular reason for firms to opt for ECBs (Figure 5). This trend of using

⁸ 'Credit growth plunges to over 60-year low of 5.1% in FY17' April 16, 2017, Hindu Business line, available at <http://www.thehindubusinessline.com/money-and-banking/credit-growth-plunges-to-over-60year-low-of-5-in-fy17/article9642151.ece>

⁹ Financial Express says: 'The July-September earnings of India Inc. continue to be disappointing with the net profit of a sample of 1,296 companies (excluding banks, financials and oil marketing companies) declining by 1.41% compared with the same period last year. A sharp rise in expenditure at 8.28% squeezed operating margins, which also declined 13.38 basis points. Weak order inflows saw domestic revenues of industrial and infrastructure companies decline sharply during the period, which reflects a slowdown in execution, which in turn reflects working capital challenges in the entire value chain due to disruption from the goods and services tax (GST) roll-out.' See <http://www.financialexpress.com/industry/india-inc-quarterly-returns-festive-season-cheer-bypasses-corporates-as-costs-jump-margins-get-squeezed-auto-sector-bucks-trend/934731/>

¹⁰ 'Anil Ambani group stocks plunge by up to 12%' November 16, 2017, The Indian Express, available at: <http://indianexpress.com/article/business/market/anil-ambani-group-stocks-plunge-by-up-to-12-4939272/>

less ECBs for Capital Expenditure and Project financing is visible for the last few years. The focus of ECBs seems to have shifted towards refinancing and on-lending in the last few years.

Table 1. Changing purpose of ECBs as stated by borrowing companies

Purpose	2010	2017
REFINANCING	8.27	35.27
ON-LENDING	3.06	28.86
CAPEX	60.28	16.23
OTHER*	6.42	9.24
PROJECT	21.95	8.51
WORKING CAPITAL	0.02	1.88

Source: Compiled from Reserve Bank of India

*Notes: * 'Other' include: general corporate purpose, microfinance, port, road, telecommunication, urban infrastructure, infrastructure development, rupee expenditure, power, development, construction, cold storage and cold room facility*

This changing utilization pattern has raised a few questions. Table 1 clearly shows that in ECBs are not used primarily for capacity creation in the Indian economy. This is not surprising as capital utilization in the Indian economy is down to around 72 percent and private sector investment has been low¹¹. Easy availability of foreign debt coupled with lack of avenues of productive domestic investment may have prompted firms to use these resources for financialization and arbitrage. It is possible that the difference in nominal interest rate between India and the developed world is triggering inflows of ECBs in India. This inflow, thereby, is gradually approximating the pattern of carry trade. A paper by Acharya and Vij (2017) has investigated this matter and has concluded that 'carry-trade' explain the rise in foreign currency borrowing by Indian firms more that firm-level characteristics. If this is indeed the case, then any movements of domestic and foreign interest rates may trigger changes in this flow. Possible triggers may include a much-demanded interest rate cut in India or a tightening of interest rates in developed countries.

¹¹ See 'India's market rally running on empty' by Henny Sender, Financial Times, November 16 2017, available at: <https://www.ft.com/content/5ef9775a-ca9a-11e7-aa33-c63fdc9b8c6c>

IV. Concluding Observations

A prolonged period of low interest rates has created a massive global burden of debt. According a CNBC report quoting the Bank for International Settlements, global corporate and household debt reached 138 percent as a share of GDP in 2016, compared to 115 percent in 2007, before the start of the economic downturn. The 2016 figure for advanced economies was 195 percent. Many developing countries like China and India have also taken advantage of this prolonged period of easy money to amass significant amount of external debt. The level of debt in China has reached alarming proportions and given the importance of China in the global financial system, any major problem with debt servicing in that country is likely to have a global fallout. On the other hand, the external debt-GDP burden has been far more modest for India. In case of India, the external debt to GDP ratio has stayed below the 25 percent mark. This level of external debt is manageable and is unlikely to create any major macroeconomic panic in the system. But as monetary tightening is gradually being introduced in developed markets, rising indebtedness and increase in market risk do pose some threat for India. This threat is likely to be more firm-specific. The problem may have its roots in the way ECBs are being used by the Indian corporate sector. Changing usage pattern shows that ECBs are used for financialization rather than real capacity creation. Moreover, performance indicators of the corporate sector have not been very encouraging in the recent past. Earning and profitability numbers have been modest, exports have not shown any major improvement over the past few years, and some of the key sectors like real estate, Information and Communication Technology (ICT) and Pharmaceuticals are going through difficult times. Many of these sectors have fairly high external borrowings. If a shock arises, some firms in these sectors may face problems in managing the dual burden of interest rate and exchange adjustments. While on a macro level, India does not seem to be facing a real 'Minsky moment' in near future, some firms in the more difficult sectors may face challenges in financing and repaying their external debt.

ALUMNI CORNER

Monetary Policy, a vindication, but not a time to rejoice

Balachandran R



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

When the soft spoken Urjit Patel took over as the Governor from Raghuram Rajan, his predecessor with rock star status in the world of finance, there were those who wondered if the fiercely independent Reserve Bank of India, will continue its impeccable track record in setting monetary policy.

Growth versus inflation

India has seen a perennial tussle between the growth lobby from industry seeking a low interest rate regime, whose stance is often echoed by the Finance Ministry, and the inflation hawks from the central bank who seek low and stable inflation through higher policy rates, often at the expense of growth. Many would recall the famous quip from the then Finance Minister P Chidambaram that the government will walk alone in promoting growth, when the pleas from the Ministry to RBI to cut interest rates were ignored by Governor Subba Rao.

Dr Raghuram Rajan at the helm of RBI

Under Rajan, the central bank continued its stellar track record on many fronts. His Asset Quality Reviews at banks brought out many a hidden skeleton into the open. Stressed loans which were being ever greened to postpone the non performing tag and consequent provisioning, were identified and provided for. Rajan made sure that neither the ministry nor the industry even remotely influenced monetary policy, with many of the policy rate announcements taking everyone by surprise.

A lasting legacy of Rajan was the Monetary Policy Framework Agreement signed between the Government and the RBI on 20th February 2015. The objective of the framework is to primarily maintain price stability, while keeping in mind the objective of growth. As per the agreement, a six member Monetary Policy Committee (MPC) would be entrusted with the task of fixing the benchmark policy rate (repo rate) required to contain inflation within the specified target level, as below.

Inflation Target: Four per cent.

- Upper tolerance level: Six per cent.

- Lower tolerance level: Two per cent.

Out of the six Members of MPC, three Members would be from the Reserve Bank of India (RBI), including the Governor, who will be the ex-officio Chairperson, the Deputy Governor, and one officer of RBI. The other three Members of MPC would be experts in the field of economics/banking/finance/ monetary policy. The meetings of the MPC would be held at least 4 times a year and it would publicise its decisions after each such meeting.

Dr Urjit Patel takes over

Right from his early days at the helm, the new Governor Urjit Patel, continued the tradition of the central bank's independence. In the December 2016 monetary policy review, status quo was maintained on rates while the market had taken a 25 bps cut for granted. The next review shocked the markets with a change in policy stance from accommodative to neutral.

The next Committee meeting in June 2017 would understandably have been a stormy one. It forecast consumer price inflation (CPI) of 2-3.5 % for the first half of 2017-18 and 3.5-4.5 % for the second half, much lower than the 4.5 % and 5 % respectively, projected in the previous meeting. There was tremendous clamour from the industry to cut rates to revive growth in the economy. But the Monetary Policy Committee stood its ground, stating that premature action risks disruptive policy reversals later and the loss of credibility. Accordingly, the MPC decided to keep the policy rate unchanged with a neutral stance and to remain watchful of incoming data. One member of the MPC dissented.

With the actual CPI reading for June plummeting to 1.54 % even lower than the revised forecasts, the MPC relented and reduced the policy repo rate by 0.25 pct. in the August 2017 meeting. The MPC stated that it will continue monitoring movements in inflation to ascertain if the recent soft readings were transient or if a more durable disinflation is underway.

Oil prices and inflation

Oil prices play an outsized role in the trajectory of inflation in India, with bulk of petroleum requirements being imported. Oil price impacts current account balance, fiscal deficit and the exchange rate of Rupee in the FX markets. International prices move based on a complex inter play of factors that include the classic demand supply equation, strength of the US Dollar in which it is denominated, geo political scenario in the Middle East which is a perennially volatile region, shale oil production in the US which is a recent development, etc. A very important factor is the ability of the oil cartel, the Organization of Petroleum Exporting Countries (OPEC) in reaching agreement among its members to control production and enforcement of the agreement.

WTI crude oil futures which fell to a low of USD 43 a barrel in the first half of 2017, have shot up to USD 57 dollars, an increase of 33 pct. One can do the math on the impact of this increase, with India's annual oil import

bill of about USD 80 billion. Consumer price inflation, just beginning to factor this in, is already on the upswing at 3.28 pct. in September and 3.58 pct. in October 2017, up from 1.54% in June.

MPC's stance is vindicated

The defensive tone of the Monetary Policy Committee as observed from its previous policy statements, turned remarkably confident in its latest statement from the October 2017 meeting. Gone was the wariness to stick its neck out in stating that current deflationary trends were purely transient. The October Monetary Policy Report stated that the softness in headline inflation observed during April-June 2017 is expected to reverse in the coming months with CPI inflation projected to pick up from 3.4 per cent during August 2017 to 4.2 per cent in Q3:2017-18 and 4.6 per cent in Q4.

The erstwhile Governor Rajan called inflation a hidden tax on the poor and the middle class. No one would rejoice about the prescience of Urjit Patel and the Monetary Policy Committee on the inflation scenario. But in standing firm on the mandate to contain inflation by appropriate calibration of the policy rate, Dr Patel is vindicated and takes his rightful place in the pantheon of Governors of the august institution, the Reserve Bank of India.

VOICE OF AMERICA

What Do Trading Algorithms Know?

Ayan Bhattacharya



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Let us start with an intriguing puzzle at the heart of Epistemic Game Theory: Is it possible to have a configuration of beliefs such that,

“Ram believes that Kali assumes that Ram believes that Kali’s assumption is wrong”

(Brandenburger & Keisler, 2006)?^[1] If Ram believes that Kali’s assumption is correct, then he believes that the italicized second half of the sentence – Ram believes that Kali’s assumption is wrong – holds. But that immediately leads to a paradox: we started with Ram believing that Kali’s assumption was correct! That we are able to conjure up such puzzles at will suggests that paradoxes like these are part and parcel of our thinking – tucked away deep in our minds and manifested in the many contradictory decisions that we seem to take in ordinary life. How troublesome are such impossible beliefs when we trade? Do trading algorithms, too, grapple with such paradoxical beliefs? Algorithmic trading, especially in advanced markets such as the US, is the first instance of large-scale, real-time, interactive, automated decision-making in an ecosystem outside of computer science. And the many fascinating questions the area has been throwing up, especially as algorithms mature, has left all parties – researchers, practitioners and market regulators alike – scratching their heads.

[1] Adam Brandenburger and H. Jerome Keisler (2006). “An impossibility theorem on beliefs in games.” *Studia Logica*, 84(2), 211–240. Protagonist names changed.

[2] Evelyn Chang. “Just 10% of trading is regular stock picking, JPMorgan estimates.” *Cnbc.com*, June 13, 2017. Accessed: November 03, 2017.

[3] Robin Wigglesworth, “The quickening evolution of trading — in charts” *Ft.com*, April 11, 2017. Accessed: November 03, 2017.

[4] David Easley, Marcos Lopez De Prado and Maureen O’Hara (2013). *High Frequency Trading*. Risk Books, London.

1. Explosion in Algorithmic Trades

Algorithmic trades account for a majority of the trades in the US markets today.[2] Not just US, after a brief lull following the financial crisis, algorithmic high frequency funds are on the ascendant in almost all global trading venues.[3] This is partly because legislations in Western markets, like Regulation National Market System (RegNMS) in the US, and Markets in Financial Instruments Directive (MiFID) in Europe, make the transition to algorithmic trade an inherently lucrative proposition.[4]

A less noticed but equally important development has been the growing maturity of the algorithms at use. Trading algorithms had their birth in the portfolio insurance movement of the 1970s and 80s. [5] Yet the algorithms of yore were very simple species: elementary sets of instructions to automate repetitive human trading tasks. Over the years, as research in computer science accelerated, so did the sophistication of algorithms used in trade. Many algorithms today virtually learn on their own: fed with vast reams of historical data, they first spot consistently profitable trading opportunities; these are then strenuously tested with more historical and simulated data, and if the discovered pattern stands scrutiny, the algorithms are released into the market. Ask a human overseer of algorithmic trading to define concretely the trading rule that is being implemented, and he will turn a blank. All that the human can tell you, really, is the dataset used in training and the P&L on that dataset. [6]

2. Romancing High-Frequency

From the early days of portfolio insurance, researchers have been interested in understanding the impact of algorithms on markets. In fact, each new algorithmic innovation has meant dozens of new papers in important journals extending older models to account for new facts. The latest in this line of work is the study of high frequency trading. Early algorithms were simply routine automations – their primary advantage was that they did not make “human mistakes” when the same task had to be repeated mechanically, innumerable times. Since the early 2000s, however, an added feature of algorithms has been the fiendish pace at which they work. A number of technological innovations – from the power of the chips that do the calculations to the infrastructure that conveys market signals – have contributed to this jump to high-frequency. The state-of-the-art research in finance, at present, tries to understand the many effects of this fast paced trading environment in markets that still harbor many slow, lumbering legacy traders. Yet, right from the beginning, there have been dissenting murmurs in research circles: maybe algorithms represent a completely new paradigm. [7] Maybe tweaks on older models do not convey the full power of the algorithmic vision. Maybe we are missing the forest for the trees.

[5] Anora M. Gaudio. “Here’s one key factor that amplified the 1987 stock-market crash.” Marketwatch.com, October 19, 2017. Accessed: November 03, 2017.

[6] Bryant Urstadt. “Trading Shares in Milliseconds.” MIT Technology Review, December 21, 2009. Accessed: November 03, 2017.

[7] Herbert A. Simon (1969). *The Sciences of the Artificial*. MIT Press, Cambridge.

2. Some Economic Theory

Most models used to study algorithmic or high-frequency trading work under the aegis of classical non-cooperative game theory or its asymmetric information variant. Given market participants and their strategies, the aim is to uncover the Nash equilibrium or one of its refinements. An equilibrium represents a stable point of the game – no market participant wants to deviate once he finds himself in equilibrium. However, in a series of influential papers beginning in the 1960s, Robert Aumann, John Harsanyi, Reinhard Selten and their many collaborators began to lay bare the many pitfalls of naively adopting the classical approach. Aumann's work, in particular, established epistemology as a legitimate concern of game theoretic reasoning. All these early pioneers, including Nash, went on to win the Nobel memorial prize in Economics. What this line of research contended, broadly, was that any actual game-play needed to be preceded by reasoning about game-play – how a game played out in reality depended crucially on how players reasoned about other players' plays and payoffs. Each player had to build a mental model of the game before she began play, and had to update the model as the game proceeded. In equilibrium, the mental models of the players about each other, and about the game, had to be consistent.

Publicly available information about the game and game-play – called common knowledge in game theoretic parlance – reduces the need for such game related reasoning because a player can directly use the public information. In classical non-cooperative game theory, everything about the game and its players, except for the final equilibrium strategy, is common knowledge. So reasoning in such games is confined to deriving equilibrium strategies. In asymmetric information games on the other hand, some players do not know their own payoffs while other players do; all else, however, is common knowledge. Any reasoning in such games is confined to the asymmetry in information and concomitant equilibrium strategies. For most of the history of financial market research, classical and asymmetric information games have been deemed enough to understand the behavior of market participants. Such models were earlier used to understand markets with exclusive human traders, and now they have been extended for markets with algorithmic trading.

3. Connecting the Dots

If there is a single characteristic of algorithms that is becoming more and more pronounced, as algorithmic trading matures, it is not their speed – which of course is going up – but the way the algorithms uncover trading opportunities. In the early days, this was human dictated: look for arbitrage opportunities that come from speed advantage, or high Sharpe ratio, or positive alpha, or whatever other designated criteria we humans would decide. In fact, this is exactly how human traders would train themselves! For this is what MBA and other advanced finance programs teach. And this teaching represents a lot of common knowledge. Most human market participants have this inbuilt corpus of common knowledge before they begin serious market trading. Most algorithms had this corpus too – at least till recently. When algorithms spot profitable trading opportunities “on

their own”, without human intervention, they no longer share the exact human corpus of common knowledge. And what is more, because humans have no way of deciphering the algorithmic logic – beyond the fact that it makes profits or losses – we can never be sure what common knowledge an algorithm has inferred from data. Common knowledge allows humans to bypass the ordeal of building complicated mental models of trading games. Going back to the example at the beginning of this article, because common knowledge makes belief models unnecessary, we do not have to wrestle with the impact of such impossible beliefs in trading situations. For an algorithm learning on its own, however, the picture is unclear. At the very least, its common knowledge corpus is likely to be different from a human trader. This implies that asymmetric information game models, prevalent in the literature at present, may not be enough to represent the complexity of trading situations involving algorithms.

4. The Challenges

These are still early days for research in algorithmic trading, but one thing seems fairly certain: fruitful progress in the field shall come only through meaningful collaborations between researchers in finance, game theory and computer science. A promising approach seems to be the study of adaptive strategies. Recent work suggests that any market with adaptive algorithms – i.e. algorithms that try to repeat past successes and avoid past mistakes – converges to a correlated equilibrium. [8] Correlated equilibria result when players have access to a shared public signal, in addition to private signals, and they are supersets of Nash equilibria. For Indian financial markets, the message seems to be mixed. Algorithmic trading has been growing fast in India, but Indian market regulators need to be wary of prescriptions derived from complicated market trading models – such models are still very much works in progress. On the other hand, this represents a great opportunity for the Indian finance research community. Given India’s historic strengths in computer science and programming, it is but natural to expect interesting fundamental research on algorithmic trading from Indian academics.

[8] Sergiu Hart, Andreu Mas-Colell (2013). Simple Adaptive Strategies. World Scientific, Singapore

CONFERENCE REPORT

India Research Conference 2017*

The second IIM Calcutta-NYU Stern India Research Conference was held on 27 October 2017 at New York University (NYU) Stern Business School. The conference is supported by the Financial Research and Trading Laboratory, IIM Calcutta and the Centre for Global Economy and Business, NYU Stern. The primary aim of the conference is to showcase issues that bother Indian financial markets and policies. The conference brings together leading academic and industry experts for an in-depth discussion of India's financial markets and implications for the global economy. This year's conference discussed six research papers, held one panel discussion and organised a keynote by Viral Acharya, Deputy Governor, Reserve Bank of India. Presentation of each paper was followed by discussions.

The papers presented in the Conference broadly deliberated upon three major issues- (a) the state of high frequency capital market in India, (b) implications of large experiment on financial inclusion, called PMJDY (Pradhan Mantri Jan Dhan Yojna), and (c) impact of loan waiver programme. There was one more issue discussed- measuring systemic risk using network theory.

The first set of papers discussed issues in high frequency equity and derivatives market in India. The paper ('Informativeness of Orders in Electronic Limit Order Book Markets: A Revealed Preference Framework'¹²) noted that though the existence and behaviour of 'informed traders' plays an important role in finance literature, the empirical identification of informed traders has been challenging to say the least. The paper discusses a new measure of trader informativeness in the context of electronic limit order book trading. The proposed informativeness measure is semi-parametric in nature and tries to impose minimal assumptions on the underlying distribution of private information and the traders' order submission or trading behaviour. The paper goes on to use the measure to test various hypotheses related to trader choice limit, market and hidden orders in normal, turbulent and informative sensitive periods. The second paper ('Algorithmic Trading and Minimum Trading Unit Restriction'¹³) observed that algorithmic traders use their advantage of speed to execute a large number of small-sized trades in a very short time. In the presence of minimum trading unit (MTU) restriction, they are forced to trade at the smallest possible sizes - often restricted by the MTU. Using a dataset of single stock futures market obtained from National Stock Exchange (NSE) of India, the paper shows that MTU restriction acts as a binding constraint for traders while optimizing trade sizes. The paper also inspects the impact of a market-wide upward

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¹² Sudip Gupta [Gabelli School of Business, Fordham University], Vikas Raman [University of Warwick] and Pradeep Yadav [Price College of Business, Oklahoma University]

¹³ Anirban Banerjee [Indian Institute of Management (IIMC), Calcutta] and Ashok Banerjee [Indian Institute of Management (IIMC), Calcutta]

revision in minimum contract size on trading behaviour in the Indian market during 2015. The paper shows that algo traders continue to trade at the minimum possible sizes, but the difference in trade sizes between algo and non-algo trades reduce due to the revision. Overall traded volume seems to be largely unaffected by the contract size revision.

The second set of papers were themed as ‘Banking India’s Unbanked’. Both the papers were focused on the single largest financial inclusion initiative undertaken in India under the ‘Pradhan Mantri Jan Dhan Yojna’ (PMJDY). The initiative had provided banking access to 260 million unbanked Individuals. The first paper under this section (‘Bank Accounts for the Unbanked: Evidence from a Big Bank Experiment’¹⁴) examines the behaviour of the newly opened bank accounts under the PMJDY scheme. The paper finds significant transactions in these accounts over time and convergence to the levels in non-PMJDY accounts of similar vintage, although the newly banked are poor, unfamiliar with banking and have no financial literacy. The paper, therefore, suggests the unbanked have latent demand for formal banking systems. The second paper (‘Banking the Unbanked: What do 255 Million New Bank Accounts Reveal about Financial Access’¹⁵) reports that 77% of the newly opened bank accounts under the scheme maintain positive balance. Although initial account usage is quite infrequent, the paper reports that it gradually converges to those of similar households who had prior access to banking products. The paper also finds increase in lending and defaults in new loans in regions more exposed to the program. The two papers use different dataset which differ in cross-section as well as duration of data availability but surprisingly report similar results.

The third set of papers was on systemic risk of banks and loan waiver programme. The paper (‘On the Interconnectedness of Financial Institutions’ Emerging Market Experience’¹⁶) noted that 2008 financial crisis possibly highlighted the absence of metrics for measuring systemic risks. There also seems to be very little academic interest in financial systems different than the US, especially in the emerging markets. The paper attempts to undertake a large scale empirical examination of systemic risk among major financial institutions in many emerging markets, starting with India. The paper uses network models for measuring, managing and regulating systemic risks in emerging markets and also utilize them to provide insights to the Indian experience. The paper develops a single and easily tractable measure of systemic risk for the financial sector. The beauty of the measure is that it can be disaggregated to identify contribution of individual banks in the overall risk of the sector. The final paper (‘Borrower Distress and Debt Relief: Evidence from a Natural Experiment’¹⁷) studies the

¹⁴ Yakshup Chopra [Indian School of Business (ISB), Hyderabad], Nagpurnanand Prabhala [Robert H. Smith School of Business, University of Maryland] and Prasanna L. Tantri [Indian School of Business (ISB), Hyderabad]

¹⁵ Sumit Agarwal [Georgetown University], Shashwat Alok [Indian School of Business (ISB), Hyderabad], Pulak Ghosh [Indian Institute of Management (IIMB), Bangalore], Soumya Ghosh [State Bank of India], Tomasz Piskorski [Columbia Business School] and Amit Seru [Stanford University]

¹⁶ Sanjiv Das [Santa Clara University], Madhu Kalimipalli [Wilfrid Laurier University] and Subh Nayak [Wilfrid Laurier University]

¹⁷ Saptarshi Mukherjee [Stern School of Business, NYU], Krishnamurthy Subramanian [Indian School of Business (ISB), Hyderabad] and Prasanna Tantri [Indian School of Business (ISB), Hyderabad]

causal effects of debt relief on loan performance of distressed and non-distressed borrowers. The paper utilizes \$14.4 billion debt waiver programme in India during 2008. The paper compares loan waiver beneficiaries with similar non-beneficiaries using a regression discontinuity design. The results suggest that loan performance of non-distressed beneficiaries declined by a least 23.2% while that of distressed beneficiaries improved by at least 23.4%. The paper concluded that targeting debt relief to distressed borrowers can improve its efficacy.

The panel discussion (‘Assessing India’s Social and Environmental Landscape: Opportunities and Challenges’¹⁸) deliberated at length about the socio-political environment of India and the need for stronger USA-India ties for development. The moderator¹⁹ mentioned that the agenda of Indian government seemed to be growth at great speed at one hand and eradication of corruption on the other. Panel members, with experience of international politics and defense strategies, highlighted the challenges that India face in achieving its stated objectives. Members mentioned that there is need for greater deliberations of policies before implementation.

The highlight of the conference was the keynote by Prof. Viral V. Acharya, Deputy Governor of the RBI on ‘Global Spillovers: Managing Capital Flows and Reserves’ where he talked about complimentary relationship between a country’s forex reserve and short-term debt and the importance of these two items together on the health of the balance sheet of a country. Capital controls need to account for the possibility of regulatory arbitrage between foreign investment flows in domestic market and external borrowing market. The Deputy Governor warned that building foreign exchange reserve without putting any control on short-term (private) external borrowing will not provide any cushion to the central bank in case of crisis. Therefore, he argues, one should always look at net foreign currency reserve (total reserves minus short-term external borrowing) as a percentage of GDP as a measure of macro liquidity.

¹⁸ Manpreet Singh Anand [Deputy Assistant Administrator, USAID], Irfan Nooruddin [Georgetown University] and Soundarya Chidambaram [Bucknell University]

¹⁹ Michael Posner [Stern School of Business, NYU]