NYU STERN NSE

NSE-NYU Indian Financial Markets Conference, 2015

Edited Transcript of

Keynote Speech and Panel Discussions

Mumbai, July 28, 2015

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Preface

The world has yet to come out of the shadow of the global financial crisis that began in 2008. This financial crisis interestingly originated in the US, a country whose financial sector is considered to be among the most developed in the world. Further, what was originally a financial sector crisis, soon affected severely the real sector not only of the US but of several other countries as well. India fortunately emerged relatively unscathed and is currently one of the fastest growing economies in the world. Yet, India has important lessons to learn from the crisis: What should be the extent and speed of the expansion of its financial sector? What are the right policies to achieve growth and stability as financial development proceeds? And, how significant is financial sector regulation in all these?

We at NSE recognize the usefulness of the ideas and insights generated through research and deliberations on policy making, particularly on issues relating to the financial markets. As part of its continued efforts to provide such research support to policy makers, NSE had organized in collaboration with NYU Stern School of Business, an international conference 'NSE-NYU Indian Financial Markets Conference' on July 28-29, 2015. This conference was the third in the series and comprised inter alia a keynote address by Dr. Marti G Subrahmanyam (Charles Merrill Professor of Finance and Economics, NYU Stern School of Business) and a panel discussion.

In his keynote address, Dr. Subrahmanyam focused his discussion on a recent study that he had done on the pervasiveness of insider trading in the US. According to his study, a quarter of merger and acquisition deals from 1996 to 2012 in the US involved insider trading; the unusual activity in option trading prior to the announcement of acquisition provides strong evidence for this. Dr. Subrahmanyam pointed out that a similar study would be extremely beneficial for the Indian markets. Regulators can benefit from his research by dedicating more scrutiny to the options market for detecting rogue trading; in this connection, he urged the regulators to invest more in forensic tools.

The panel discussion was on the topic of financial deepening and its impact on economic stability and growth in emerging markets. The panel assessed the quality of financial development in India vis-à-vis other emerging countries. The parameters that were taken into account for comparing financial development across countries included financial depth, accessibility and efficiency. The deliberations in the panel outlined some important policy implications of financial development for the Indian economy.

The panel included Ms. Ratna Sahay (Deputy Director, IMF), Mr. Leo Puri (Managing Director, UTI AMC) and Ms. Roopa Kudva (Partner and India Managing Director, Omidyar Network). I take this opportunity to thank all the panelists and the keynote speaker for their valuable contribution. I am also grateful to Prof. Viral Acharya for playing wonderfully the role of moderator in the panel discussion.

The deliberations of the keynote speech and the panel discussion have been captured in this edited transcript and we believe that the transcript would be useful for industry participants, academics and policy makers.

Nirmal Mohanty

Vice President

National Stock Exchange of India Limited

Welcome Remarks
Ms. Chitra Ramkrishna, MD & CEO, NSE

Respected Whole-Time Members of SEBI, Shri Rajeev Agarwal and Shri Prashant Saran, many eminent members of the academic community who are here today, our distinguish panellists, and my own Board of Directors. Thank you very much for being here this evening. The participants are always a huge source of encouragement for us to build on the conference as we take this forward to the next year.

This is the third conference in this series, and over the years, it has evolved. Last year's conference had many interesting papers on areas of interest to all of us. Typically, very few market participants attend research conferences. However, these are the people who really engage with the outcomes of the research conference. The idea of putting together this kind of a programme with NYU, in the beginning, was to really create a platform for several stakeholders to provide insights into important areas that may have different implications for different stakeholders, such as market participants, policy makers, etc.

So, how do you demystify a lot of the work that goes in through the research programme? How do you convert this into output that different stakeholders can absorb and decide what is relevant for them? That effort has led to us starting with the White Paper Series.

Last year, some of the research work was converted into White Papers, which summed up all the research work done under the initiative. It also had a note on the conclusion and it explicitly stated the implication of the entire research output. In fact, many of the White Papers have been uploaded on the website, some garnering a lot of attention.

One of these papers was on "FII Flows in Indian Equity Markets: Is this a Boon or a Curse?" Another one was on "Stock Market Liquidity: Behavior of Short-Term and Long-Term Traders during Crashes." I know you can identify with these kinds of topics that were of great interest to the stakeholder community at large. This is why the research was converted into White Papers. It also helped in gaining broader interest in the kind of work that was being generated under this programme.

This year, as you can see from the programme for today and tomorrow, the papers deal with very interesting topics and present focused outcomes that many of us can understand and imbibe. It would be interesting to consider what the policy implications of these would be. There is a paper on "Are FIIs Smart Investors around Earnings Announcements?" This revisits some of the popular perceived trading behaviours of FIIs. A second paper is on rating agencies and their interactions with bond issuers. It is well known that the rating agencies have multiple roles to play with the issuers that they engage with: such as they earn rating revenue and revenue from other services from the issuers. So this research work uses some data sets to show whether there is any relationship between the non-rating revenue that is earned from a customer and the kind of ratings they receive. There is also an interesting paper on derivative markets entitled "Do Derivatives Matter?"

I think the point of satisfaction for all of us is that as this programme is evolving, there have been a number of topics on which research has been done and that are of eminent interest to the diverse stakeholder community. Moreover, the programme is attracting the participation of a diverse set of stakeholders, which is coming up through the conference and the research programme that we are engaging in. I was also tremendously encouraged to know that our global call for papers this year received a tremendous response.

As you know from the agenda, the conference is not restricted to research papers. Today, we have a presentation, a panel discussion, and also the keynote address by Prof. Marti Subrahmanyam. These are all ways in which we are trying to significantly add to the content of the research work and topics of interest to the stakeholder community. On behalf of NSE, I welcome all of you to this conference. Thank you very much for your participation, encouragement, and support. We hope to build this forum of engagement in a way in which multiple stakeholders can benefit from this exercise. Thank you.

Financial Deepening[1]

Ms. Ratna Sahay, Deputy Director, IMF

Good evening, everyone. It is really a pleasure for me to be here for the second time. I would like to thank NSE and NYU for organising this programme. On a personal note, I would like to thank Chitra. It was wonderful to converse with her earlier, and with Viral and Nirmal.

What Chitra just said about promoting research and academic debate is really music to my ears. In the 25 years that I have been at the IMF, I have attended many conferences where I would see collaboration with American or other national universities; I would always think about India, and I would wonder, "Why is this not happening in India?" I am so happy to hear that Chitra embraces it, which is just wonderful.

I must admit that this paper has created a lot of controversy in the US. It was covered in top international press—the *Wall Street Journal,* the *Financial Times*, and so on. The main reason for such high coverage for new research is when it is controversial. Part of our job as researchers and policy advisors, as we like to call ourselves at the IMF, is to generate debate. So, I will present my findings and I welcome comments from all of you because, in this way, we would have an opportunity to exchange ideas.

The reason this paper came about was because I was asked to write a paper on financial deepening in emerging markets. We could have written on local bond development, which is important, but I didn't find the topic stimulating. So I said, "Why not look at cross-country comparisons to understand the big picture on global financial deepening, think about the role of finance in these economies, and whether it has evolved in the desired direction?" I was also motivated by the fact that we are still reeling from the 2008 crisis. I wanted to know whether there are any lessons to be learned for emerging markets from the rapid and large financial deepening in advanced economies. Could there really be a trade-off between financial stability and financial development? What happened in 2008? What went wrong? People always talk about foreign banks and their role in the development of a country. So we asked the question: "Do foreign banks really matter to the development or stability of an economy?"

Following the crisis, many regulatory reforms were initiated. Therefore, we wanted to explore the role that regulation/supervision plays. The starting point of our analysis was to figure out how to measure financial development or depth. When we looked at the data, we realised that there are only two measures that most people use: private credit to GDP ratio and stock market capitalisation. But we know that the financial sector is about much more than these two. So, we asked, "Is private credit really a good measure?"

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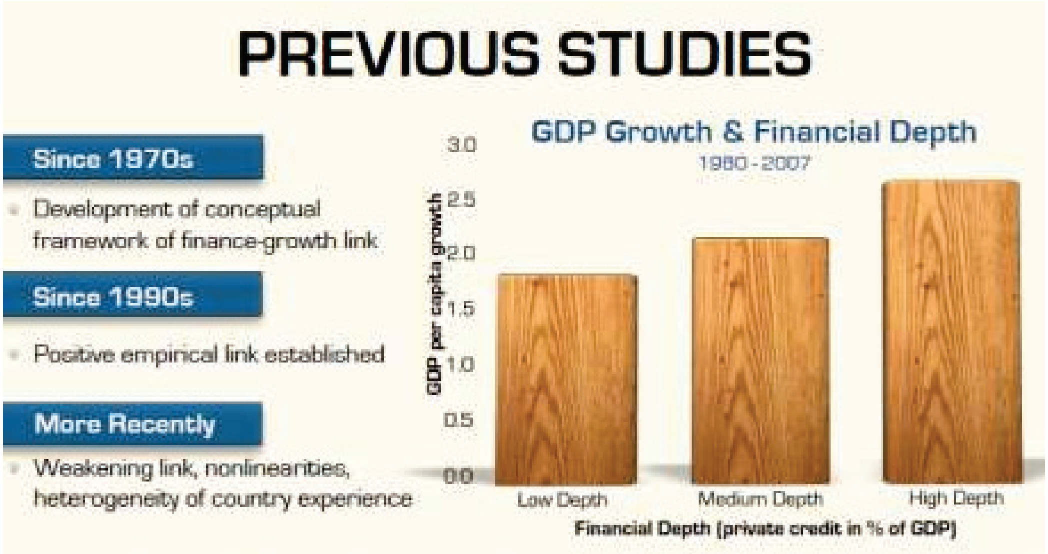
1 Based on IMF Staff Discussion Note, 'Rethinking Financial Deepening: Stability and Growth in Emerging Markets' (2015) by Ratna Sahay et al.

Since the 70s or so, there has been a lot of work on the conceptual framework of "Why is there a link between finance and growth?" Viral mentioned several reasons: to mobilise and pool savings, to allocate resources efficiently, for corporate governance or to monitor investments, to provide information, to facilitate trade and exchange, and so on. But is this empirically true? Until the 90s, there was a lot of empirical research. Most of the work that was done at that time used these two measures and established pretty robustly that finance is good for growth.

Figure 1 presents a summary of prior studies. Figure 1 shows that if you have no depth, your GDP per capita growth is between 1.5 and 2. If the depth is higher, the growth is higher; as the depth increases, your growth is going to be even higher.

Figure 1: Summary of Previous Studies



More recently, evidence began to emerge that this linear relationship between finance and growth has begun to break down, especially after the 2008 crisis. Evidence began to emerge that there was not one unique experience across regions, across countries, and across continents. This evidence raised questions in our mind and motivated our research.

This study has two big contributions. The first is motivated by the fact that the two measures that I'd mentioned earlier (private credit to GDP ratio and stock market capitalisation) are not good enough. We spent several months to construct a broader measure across 180 countries. We feel very proud about this contribution. We have put up the paper and the data on our external IMF website to share the data with anyone who wants to use it.

The second thing that contributed to us starting this research was that we found a non-linearity in the relationship between financial development and long-term economic growth. Given the 2008 crisis, we said that it was not good enough to simply examine the relationship with growth; instead, we should look at financial stability as well, which is what we did. And we found a nonlinear relationship between financial stability and financial development.

We asked the following questions. First, is there a positive contribution of financial development to growth? The short answer is yes, of course there is. Second question that we asked was that what happens if you develop your financial sector to very high levels? I will explain later what I mean by that. Beyond a certain point, while growth will still be positive, it will start declining. This is the concept of "too much finance," which is what was controversial and got the international press very excited.

We asked whether there is a relationship between financial development and stability, which could be financial or economic stability. We found a link: beyond a point of financial development, financial stability starts to get hurt. We witnessed this in 2008. Since we wanted to find lessons for emerging markets, we explored whether there was something special about emerging markets. The answer was no; there is nothing special. Emerging markets are in a different stage of development, and the nonlinear relationship holds for emerging markets as well. Hence, from the IMF's perspective, where we give advice to our 180 plus member countries, do we need to draw new lessons? Our answer is "Yes, we do need to do so."

Let me motivate the importance of creating a new comprehensive measure of financial development by presenting a chart that shows that it is not just banks that matter. In Figure 2, the x Axis is a measure of GDP per capita. On the y Axis, I take the ratio of different measures of capital market development to a measure of the banking system, which is represented by the size of bank deposits. The shaded region shows that anything above the line (crossing x Axis at 1.0) indicates that the particular measure of capital market is much higher than the size of the banking system.

Figure 2: GDP per Capita Growth vis-à-vis Capital Markets

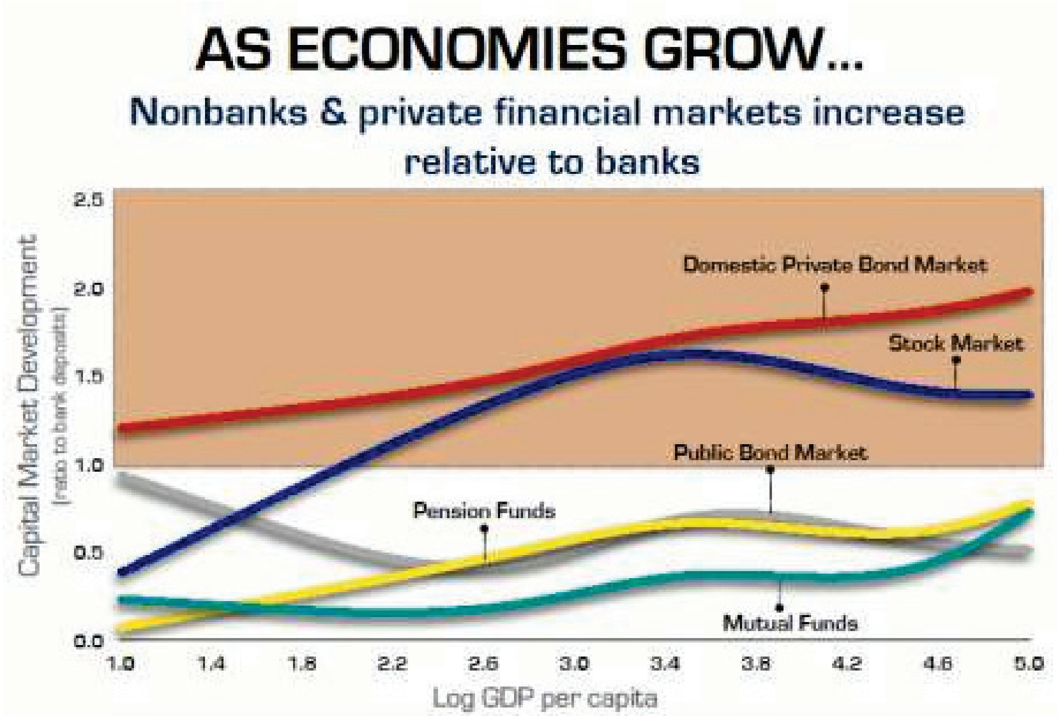
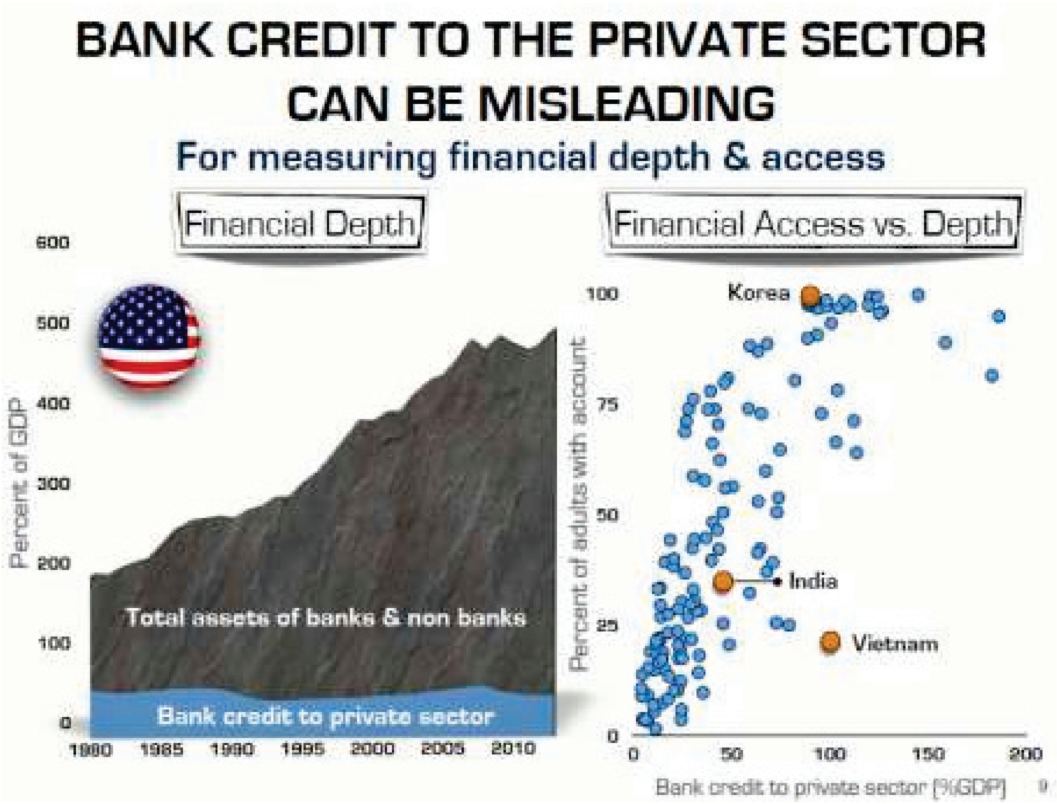


Figure 2 essentially shows that as economies grow, and as they reach higher levels of GDP per capita, this ratio of different measures of capital market to bank deposits—whether it is pension funds, domestic or private bond markets, or stock markets—starts to grow. Some grow faster than others do. At very high levels, stock markets and the private bond markets completely dominate in terms of sheer size. The only one that begins to decline at very high levels of income is the public bond market. The key point that we wanted to highlight using this chart is that it is not sufficient to use bank-related measures to capture financial development, especially as per capita incomes begin to rise.

I will present the index that we came up with, and discuss the benefits and costs of financial development. I will also talk about what is needed to help the financial sector grow in a healthy way, and what the policy implications are for emerging markets, including India.

I will present two charts to motivate why we came up with a new index of financial development. On the left-hand side in Figure 3 is a chart for the US from 1980 to 2010. It measures the ratio of bank credit to the private sector as a percentage of GDP, which is the standard measure that everybody had been using for a very long time. This measure has simply not grown since the 1980s. Had we continued to use this measure, we would have been very wrong in our analysis since we would have ignored the total assets of bank and non-banks, which have grown exponentially, reaching close to 450% of the GDP.

Figure 3: Bank Credit to Private Sector



In the graph on the right-hand side of Figure 3, the financial sector is shown to have other components beyond financial depth. You need to think about financial access also. I was talking to Roopa about financial inclusion earlier, which is where financial access comes into the picture. The x Axis measures financial depth or bank credit to the private sector, while the y Axis shows the proportion of adults who have accounts, which is a measure of financial access.

Consider the case of South Korea and Vietnam. These two countries have the same level of financial depth on the x Axis, but Korea has much higher financial access. Nearly 100% of the people in Korea have access to financial services, whereas in Vietnam, less than 25% of the population has financial access. Since I was coming to India, I thought I would put India in the picture to show you where India stands. In terms of financial access, India stands somewhere between South Korea and Vietnam. This graph was intended to motivate you and show you that there are many dimensions to the measurement of the financial sector.

So what do we do? Our financial development index has two big components, namely, financial institutions and financial markets. Within each, we measure depth, access, and efficiency.

Using this framework, we developed the financial development index for 186 countries. These included 26 advanced economies, 89 emerging markets, and 71 low-income countries. Figure 4 demonstrates that the index for advanced economies is much higher compared to that for emerging markets, which in turn is higher than that for low-income countries. Further, over the period 1980–2013, the financial sector grew over time for all three groups, as your intuition would tell you.

Figure 4: Status of Financial Development across Country Groups

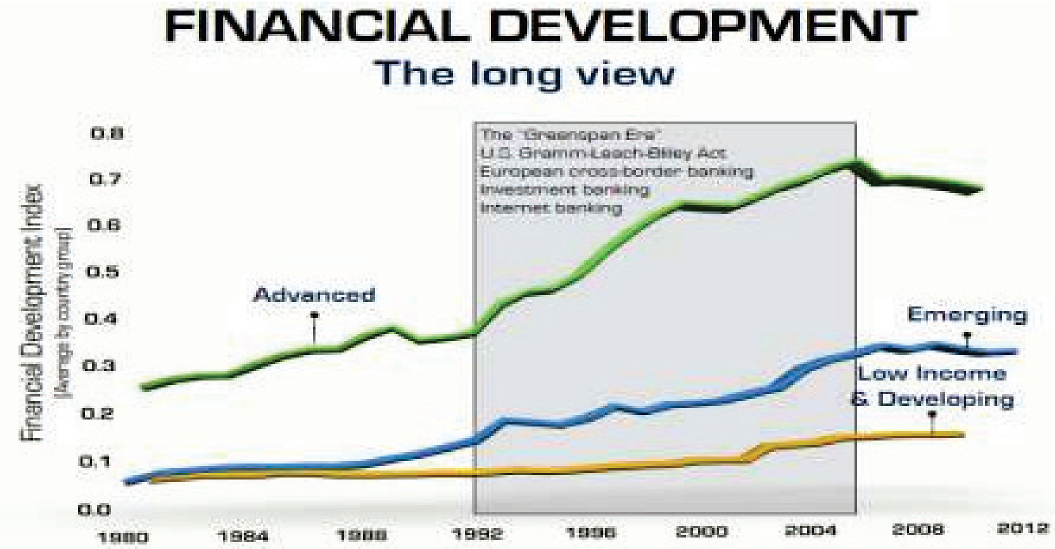
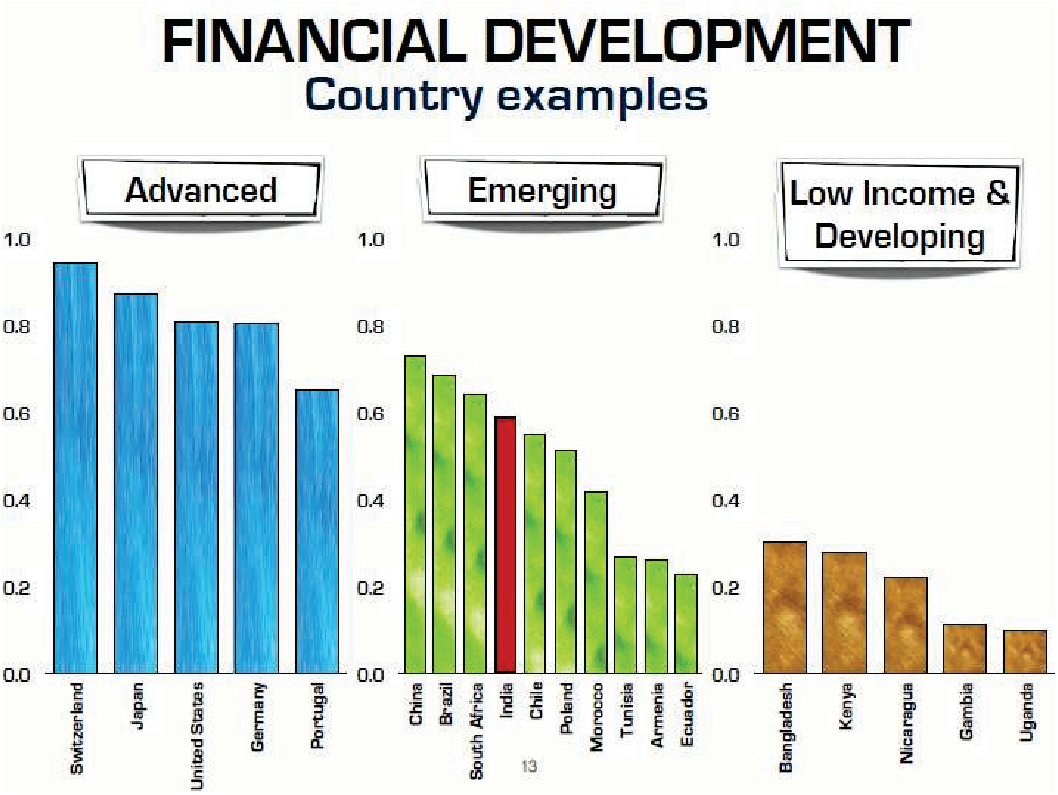


Figure 4 presents an interesting fact that I wanted to show you from the 90s, when there was significant liberalisation in the West, especially in the US during the Greenspan era. Then in Europe, following the creation of the economic union, as well as the euro area, cross border lending increased substantially, with all kinds of products getting exchanged across the borders. Subsequently, Internet banking came up, along with investment banking. Consequently, the financial sector developed much faster, especially in advanced economies (as shown in the shaded region in Figure 4).

I want you to focus mainly on the green line for the year 2008. You will see some decline during the crisis period. That decline was what we call de-leveraging. This happened because there were too many credit excesses, which began to shrink to some extent after the crisis.

Figure 5 shows advanced economies in blue, emerging markets in green, and the low-income countries in brown. There are three key takeaways that I would like to focus on. One is that when you look at financial institutions, the advanced economies are much more developed compared to the others. The case in financial markets is similar; however, the differences are much higher. Advanced economies have much deeper financial markets. However, when you look at the efficiency of financial institutions, the emerging markets and low-income countries are not that far away from the advanced economies. I was a little surprised by this finding. The other thing that really surprised me was that financial access is fairly low for all three country groups. Hence, all countries need to become better at providing greater access and better financial inclusion.

Figure 5: Comparison of Financial Development across Countries

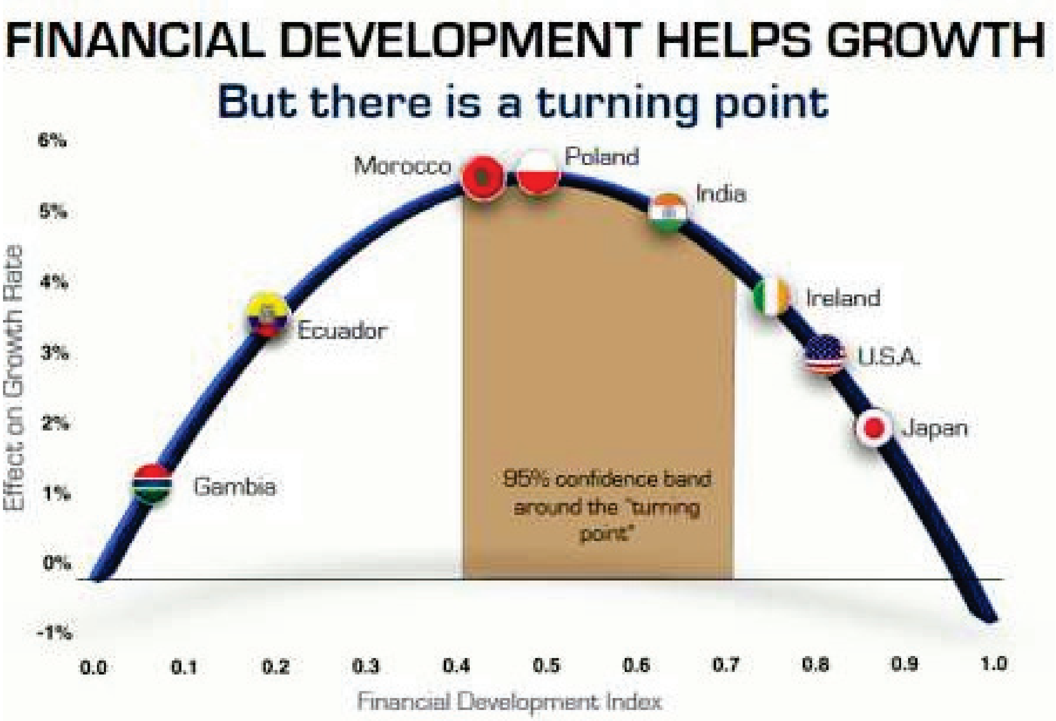


In Figure 5, I will show where India fits into all of this. The blue line represents advanced countries, green is emerging markets, India is shown in red, and low-income and developing countries are in brown. The levels of financial development (which range from 0 to 1) are on the y Axis. As expected, the advanced countries are higher in terms of financial development. Interestingly, in some cases, emerging markets such as China, Brazil, and even South Africa have much bigger financial sectors compared to Portugal. The case of the low-income countries is similar. Bangladesh and Kenya are much bigger than emerging markets such as Tunisia, Romania, or Ecuador. Therefore, we can conclude that just because you are a developing or a low-income country does not mean that your financial sector development is also low. It depends on the country; there is a lot of heterogeneity in this aspect, as shown by our index.

Next, I move to the second part of my presentation: the benefits and costs of financial development. The chart in Figure 6 is the one that all the newspapers published. This is the selling point of this paper that people are focused on, even though I think there is a lot more to the paper. On the x Axis, you have the financial development index, which goes from 0 to 1 because that is how we constructed it. On the y Axis, we have shown the marginal effect on economic growth of increasing the size of the financial sector.

This chart was constructed on the basis of about 126 countries (not 186) because for some of these countries, we couldn't find all aspects of the data that we needed. What we found is that up to a point, the effect on growth is not only beneficial but also increasing. However, after a point, while the impact on growth is still positive, it starts to decline.

Figure 6: Cost Benefit Analysis of Financial Development



I am sure a lot of people in the audience might not be happy when they see India on the falling side. I think you have to interpret this data very carefully because the peak that you see at 0.5 need not necessarily be the turning point for each country. The turning point could be anywhere between 0.4 and 0.7, depending on the country and the circumstances. All we can say is that we are 95%

confident that the turning point is somewhere between 0.4 and 0.7, and India is well within that range. I am not saying that India has reached a turning point. What I wanted to discuss is that there is a turning point. The US is well on the right-hand side, which shows that the financial sector has grown so large that it has a declining impact on growth.

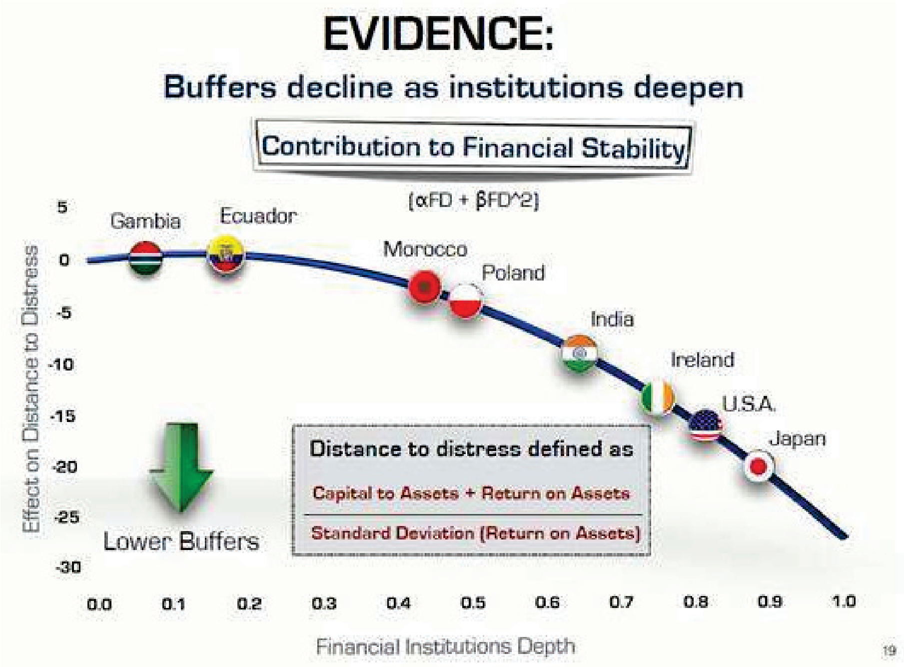
Next, we asked, "What do we mean by growth?" Can we decompose growth in terms of total factor productivity and capital accumulation? What brings about a decline in growth? We found that the total factor productivity starts to decline. Why does it start to decline? According to some studies, this happens because too much finance leads to a lot of misallocation of resources. Another stream of literature claims that people in the financial sector earn too much money, the bonus is too high, and salaries are too fat. Therefore, you take talent away from the real sector into the financial sector, which affects the real side of the economy.

What about the effect on economic stability? According to prior studies, the positive aspect of stability is that it helps to smooth consumption, reduce credit constraints, promote risk sharing, and reduce information deficiencies. The negatives are that too much development leads to excessive risk taking, high leverage, and the amplification of shocks. Dr. Raghuram Rajan has written extensively about this complexity aspect.

What about economic volatility? We find that as the financial sector develops, economic volatility begins to decline, which is good. It is good up to a point. After that, we find that economic volatility increases.

In Figure 7, we consider the depth of financial institutions and the distance to distress, which reflects whether banks have low or high capital buffers. We study the relationship between the two. We find that as the depth of financial institutions increases, there is a tendency for banks to have lower buffers. You can see where India is now relative to the other countries.

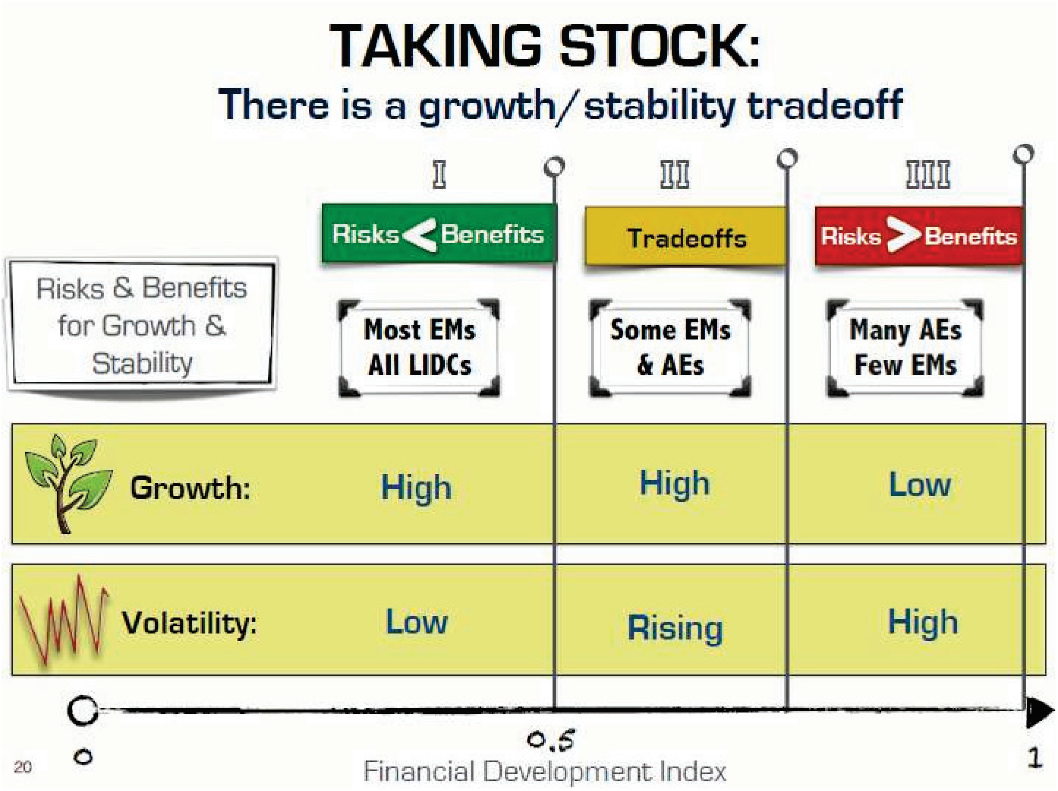
Figure 7: Relationship between Financial Stability and Depth of Financial Institutions



A very important point that I want to make is that this non-linearity or declining trend that we find is not with respect to financial markets. It is only with respect to financial institutions. Thus, the declining returns to growth or contribution to growth are based on the greater depth of financial institutions, not markets.

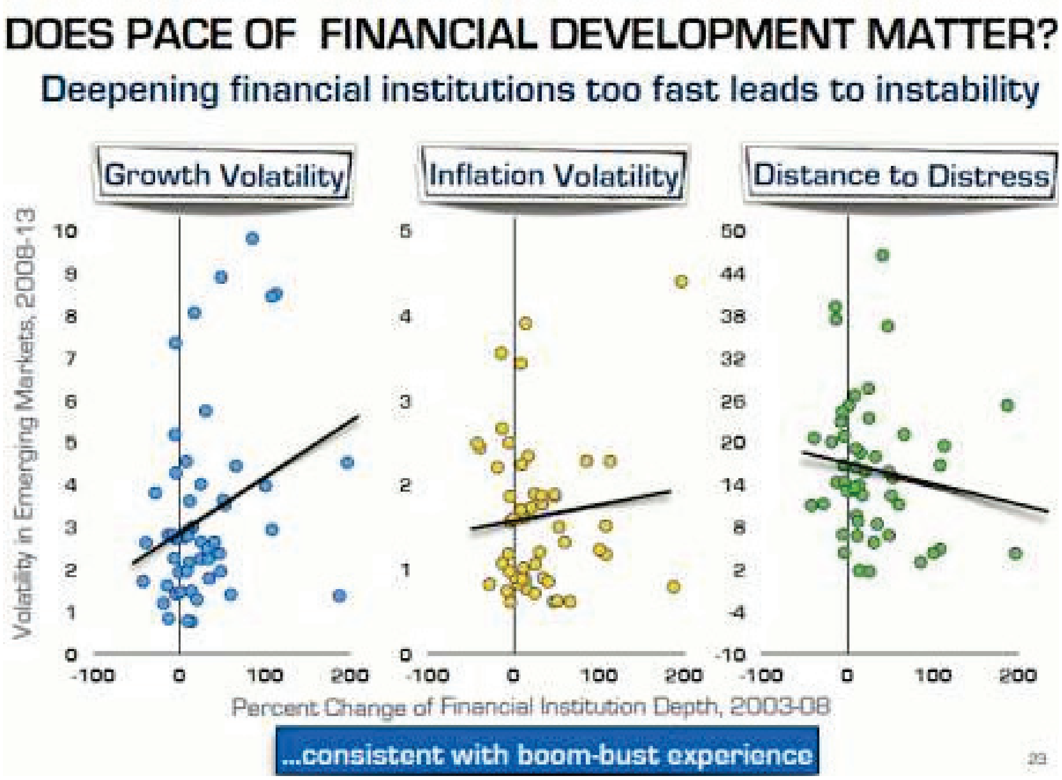
Figure 8 summarises the risks and benefits of financial development. There is one particular region where the risks are always lower compared to the benefits, or the benefits are always higher: this is where the growth is high, and volatility is low. Most of the emerging markets (EMs) are still in this phase, and virtually all the low-income countries are in this phase. Then, there is a second region where growth is still high, but volatility begins to rise. Some of the EMs are entering this region; for example, China and some advanced economies are in this region. There are many advanced economies and a few EMs where growth has already become low, and volatility is very high; we know that the risks are higher in such cases. The question is, how can you push this region so that even at high levels, you can have much higher benefits than risks? This is what I am going to talk about now.

Figure 8: Risks and Benefits of Financial Development



How do you create an enabling environment for financial development? The first question we asked was "Does the pace of financial development matter?" We found that if you grow too fast, it does hurt or lead to instability. In the first chart in Figure 9, we look at the pace of development on the x axis, which is the percentage change of the financial institutions' depth across all three charts. On the y axis, we measure volatility. We find that across the three dimensions of growth, inflation, and financial stability, there is a relationship between greater volatility and faster growth of the financial sector, which is consistent with the extant literature on boom bust cycles.

Figure 9: Creating an Enabling Environment for Financial Development



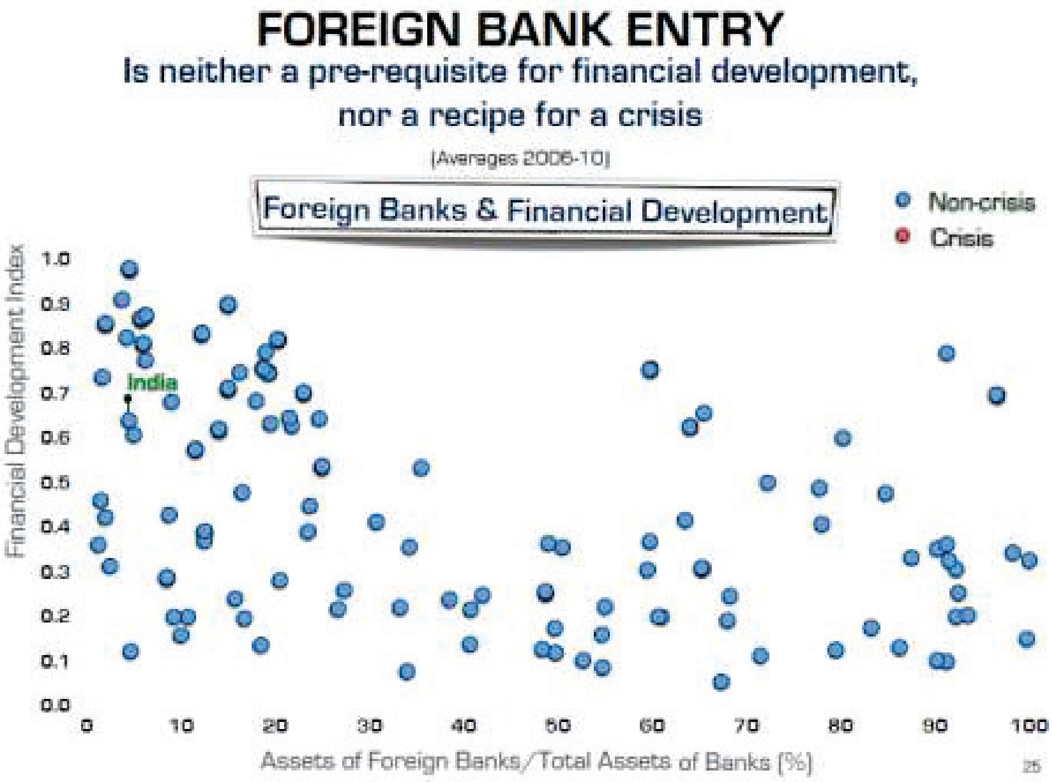
Another interesting question that we examined was, "Can our index say something about sequencing?" We ran many regressions at different levels of GDP per capita, and we examined the contribution to growth at different levels of per capita income vis-à-vis financial institutions and financial market depth separately. What we found—which was quite fascinating for us—was that in the beginning, at very low levels of income, creating financial institutions is much better, as your returns are very high. However, as you develop further, grow more, and become a high-income country, your returns begin to fall. The advanced countries have not learned this yet.

When you look at financial markets on the other hand, in the beginning, the returns to growth start to fall, for which there is a good reason. Initially, when you try to develop the markets, it is a bit unstable. When markets are thin, countries sometimes go through these phases of experimenting and stock market crashes. However, beyond a point, if you look at the return on financial market depth, there is no decreasing return. Thus, even at very high levels of income, there is still a positive return related to developing the financial markets. Thus, the evidence tells us that in the initial stages, it is better to develop banks and to let markets take over subsequently.

What about the entry of foreign banks? Is it good or bad for you? We looked at the relationship between the financial development index and the assets of foreign banks, which is the share of foreign banks in the total assets. Some argue that if you have foreign banks, your development index should be much higher. Our findings show that is not true because there is no relationship involving these data points. That is, despite having a low level of foreign assets, you can still grow on the financial sector side, or despite having foreigners, you can have a low level of index. Hence, foreign capital is not a prerequisite for financial development. Others have argued against allowing foreign bank entry because they are the first to leave during a crisis, thereby worsening the crisis. We find that there is no relationship between crises and the presence of foreign banks.

We also looked at other enabling environments and found that property rights, regulatory quality, and the rule of law are all very important for both the development of the financial institutions as well as that of the markets. The only factor that did not matter as much for the markets as it did for the institutions was creditor rights and information. This makes sense because in the market place, you don't actively search for information about each player in the market. In fact, you don't need to. And then we dug a little bit deeper.

Figure 10: Effect of Foreign Bank Entry on Financial Development



We conducted the Financial Sector Assessment Programs (FSAPs), which we started in 2001, in a number of countries. We have obtained at least 300-odd data points where we have looked at about 93 regulatory principles. We asked the question: Does the quality of financial regulations improve with financial development? We found that the compliance or the regulation improves with financial sector development in the banking, insurance, and securities sectors, which is a good thing.

Then we dug deeper, and questioned whether the regulatory principles that matter are different for financial development compared to those for financial stability, because a lot of people would say, “Look, if you want me to develop deeper, it might hurt financial stability.” And we found that the answer to this question was “No.” The same core set of principles are important for financial stability and for financial development. There is no contradiction, there are no trade-offs here.

So what are the policy implications of this paper? The first one I would like you to remember is that in emerging markets and low-income countries, there is scope for further financial development. But there is a trade-off between stability and growth, which can be addressed through proper regulation. Second, there is no one-size-fits-all solution for the sequencing. However, what we do find is that the returns are much higher in the beginning from developing institutions than from markets. Third, foreign bank entries are not a prerequisite for growth.

To recap, simple measures such as the bank credit to GDP ratio are not sufficient to capture financial sector development. We need to look at a much more comprehensive measure. There can be too much finance, especially if regulation and supervision do not keep pace, as we saw during the 2008 crisis. Finally, of the nearly 100 regulatory principles, the same subsets are critical for both financial stability and financial development. Thank you very much.

Panel Discussion: Financial Deepening and its impact on Economic Stability and Growth

Panelists: Ratna Sahay, Deputy Director, IMF

Leo Puri, Managing Director (MD), UTI AMC

Roopa Kudva, Partner and India MD, Omidyar Network

Moderator: Prof Viral Acharya, NYU Stern School of Business

Viral Acharya: Thank you, Ratna, for discussing this highly stimulating set of results. I had seen only a few of them in the popular media, so I am very glad to see the whole rundown on them. I would like to invite our two panellists who are going to join Ratna for the panel discussion on this topic.

I would like to invite Mr. Leo Puri, who is the Managing Director of UTI Asset Management. He was a partner at McKinsey India for a long time; before that, he was with Warburg Pincus. I also want to invite Ms. Roopa Kudva, who has recently joined as a partner at Omidyar Network and is the Managing Director there. She deals with financial inclusion. Prior to this role, Roopa was the Managing Director at CRISIL and played a very important part in the growth of CRISIL as a leading rating agency in India.

I request the two panellists, starting with Roopa and followed by Leo, to take maybe 5 to 7 minutes each to share their thoughts on financial deepening in the Indian context, or even outside the Indian context; if they have any specific responses to Ratna's presentation, they could bring these up as well. Following their initial set of remarks, we will have Q&A from the audience as well as any rejoinders from Ratna to their responses. Thank you.

Roopa Kudva: At the outset, I would like to thank the National Stock Exchange (NSE) and NYU Stern School of Business for inviting me as a panellist. Ratna, I congratulate you on what was a truly outstanding presentation. I was really struck by how you simplified so much of what you said.

I am going to pick one of the aspects that Ratna talked about, and which was also one of the key factors that she used to construct the index. This is the issue of access to financial services.

I think access to financial services, especially basic financial services, and ultimately linking to markets, plays a key role in financial deepening. When I say access, I am talking about bringing the underserved and un-served sections of the population into the fold of formal financial services. So how do you bring them into the ambit of formal financial services and link them to markets? And how can this contribute to deepening?

The opportunity is immense, mainly because of the huge size of the underserved population. Firstly, about 50% of the world's entire population is outside the ambit of formal financial services. It should be noted that this number can vary depending on the country at which you are looking at. Secondly, the poor are very active financially, as can be inferred from the large number of transactions they carry out daily. Studies have shown that in countries with very high levels of financial exclusion, the poor use anywhere between 10 to 17 different financial instruments, although they are all from the same community. Think about what would happen if you brought them into the formal fold. Thirdly, the importance of bringing the underserved population into the formal financial markets derives from the fact that if you do not do so, the poor and the underserved would not be able to pick up market signals, which means that the broader transmission of monetary policy would become very difficult to achieve. Consequently, about 50% of the entire population would not be touched by policy decisions, thus adversely affecting the ability to achieve change through policy.

Moreover, choosing the right institution to carry out financial deepening is extremely important. At Omidyar Network, we believe that for financial deepening, three sets of institutions are particularly important: the institutions that create the policy, the institutions that create the sector-level infrastructure, and the individual innovators or the companies themselves. Later, I will present some examples that highlight that these institutions are important.

How can financial deepening be made to include the underserved and un-served sections of the population into formal financial services? Our thesis is that three factors are extremely important. (1) Reducing the cost of reaching the underserved population by making your front-end platform completely digital is very important. (2) We also believe that it is very important to be disruptive in bringing down the cost of assessment of the risks related to the un-served by using technology in innovative ways. You have this huge mass of population which has no credit history, for example, or which comprises thin file customers or zero file customers. The challenge lies in using the amazing amount of digital data that each one of them is generating today to help assess whether they are creditworthy or bankable. (3) How do you deliver the entire suite of financial products to this population? By the entire suite, I mean payments, remittances, savings, credit, insurance, and premiums; basically, the entire gamut.

I will give you a few examples for each of these. I stated that having a digital front-end is the key. We believe that the most important entry point into formal financial services for a poor and underserved member of the population is the payment system. Hence, payments are the foundation on which the entire access to the financial services can be provided. In this context, you have companies like Oxigen in India, which has already reached 100 million customers, and Paga in Nigeria, which is a great example of combining mobile phone operators and financial service providers to access the underserved population. Payment banks are going to come up in India, which I think is a significantly positive move.

The second point I discussed was about disrupting the cost of credit assessment by using huge levels of innovations. Today, regardless of our level of wealth (whether we are very rich, rich, poor, or very poor) all of us are leaving behind a huge digital footprint in terms of our phone records, the data that phones generate, and the footprint that we create on social media. One can use that to reduce the cost of assessments and risk assessments. There are some very interesting examples where this has been achieved. Lenddo, a company in the Philippines, uses social media data to assess the risk of an individual. Cignifi uses telephone data to assess how creditworthy or trustworthy you are. The hypothesis is that if X receives calls from 50 very important people who are trustworthy, then X himself must be trustworthy. Some companies are building tools and analytics along these lines and dramatically bringing down the cost of assessment of thin file customers.

Finally, it is also about providing the entire range of financial services or products to the underserved population. Today, in India, thanks to microfinance and microcredit, we have made some progress on the credit side, but I think we have a long way to go as far as savings and payments are concerned. Hopefully, the situation will change. However, we have a very long way to go as far as insurance and pensions are concerned. I think the solution lies in having clever combinations involving players such as mobile phone operators and financial product and service providers to create scalable offerings, thereby creating a huge impact. We have begun to see examples of things like this in India. Vistar, which has found a niche in serving rural businesses that are just above the level of microfinance but below the level that banks will fund, is one example. Vartana is another very interesting company, which lends or provides finance only to affordable private schools; they started operations about a year ago and have already reached 700 schools. In a few years from now, they hope to reach about 7,000 schools. It is here that I think finding niches where the markets or existing financial services are not reaching is important. This would help to really bring in these sections into the fold of formal financial services.

To conclude, I believe the way forward is to have a technology-enabled digital frontend, introduce disruptive services to bring down the cost of risk assessment significantly, and come up with creative partnerships to offer a range of financial products to the underserved.

Leo Puri: Roopa has taken a sharply focused look at one aspect of Ratna's framework. I might just turn the telescope around to take a broad view and use Ratna's framework to share some impressions that I have gathered over the last 20 years of financial sector development in India. I think what Ratna provided is a useful skeleton; ultimately, you have to look at the characters. I would like to comment on three aspects. One is what I would essentially call the quality of development, the second is institution building and where we stand, and the third point is about regulation.

On the whole issue of the quality of development, there are two metrics that I have always used, which are (1) How efficient is a system at allocating capital? And (2) How efficient is a system at institutionalising governance? This applies to both markets and institutions. When you look at where we stand on these two dimensions, the fact is that despite having developed a reasonable amount of depth in the markets, we have a history of monumental misallocation of capital, particularly through the banking system. I remember looking at this analysis in the last credit cycle (and I suspect it has not changed a lot) where close to 80% of bank lending had essentially gone to value-destroying sectors such as cement, refining, and so on. We have just been through another cycle where we have once again successfully, massively misallocated capital through the banking system. I think the implications of that are obviously staring at us, despite having relatively high financial development.

These comments do not pertain to any specific institution. However, it is important to make these counterpoints because I feel that Ratna's analysis—which I think is important and is based on econometric regression and data—fails to capture very important elements of quality in terms of how you think about financial services development. This is not to say that there is a deficiency in the analysis per se; rather, these comments are necessary but obviously not sufficient when you think about properly assessing where a financial system stands, or what policy interventions might actually be needed.

If you look at governance or the ability to apply governance, and if you look at ownership of companies and equity ownership, there really is only one large equity owner in India that is the Life Insurance Corporation of India (LIC). LIC has been at times passive in the corporate governance of its invested companies. The banks—weakened by a lack of creditor rights, let alone any other form of rights—are only now being encouraged (and I am glad to see that they are being encouraged) to step up and assert themselves; however, they are facing significant pushback. The RBI Governor is facing significant pushback as he tries to remind us that one of the roles that you need to play as a financial institution is to institutionalise governance.

The interplay between the ability to efficiently allocate capital and the ability to institutionalise governance is very obvious, and it has played out in many economies. Nowhere is it perfect; however, I think we have to really ask ourselves whether we have progressed on these dimensions at all in the last 20 years. We appear to have moved up rapidly in the financial development index, because we have had financial deepening, we have seen a massive push towards financial inclusion, and our markets have developed really well compared to other emerging markets; however, there are concerns regarding the quality of that progress.

The second is the question of institutions versus markets. I think it was interesting that Ratna pointed out that at a certain phase, building institutions probably would give you more value compared to markets. In India, we had the golden days of institution-building probably about 30 years or 40 years ago, and I think we actually did a remarkably good job. It is one of the strengths of the system that we produced, and I think they served us remarkably well. In the meanwhile, Indian markets have developed much ahead of many other emerging markets, but if you look where we stand today, I think we have a few problems around institutions. One is that we have sanctified institutions, or they have ossified in a way. There is a dangerous and slippery slope between the notions of a national champion and what I would call state cronyism, where you essentially favour your own. We oppose crony capitalism, but there is also a formal public sector cronyism institutional framework that can develop when you fall in love with the institutions you have created, even though they can act as a deterrent to the further development of the institutional ground. This is what I was referring to as a grey area. Today, if you look at our financial system, across banks, insurers, and non-banks, we have created only two significant institutions in that field, which are the State Bank of India and LIC; arguably, three others of any consequence are HDFC Bank, ICICI

Bank, and Axis Bank. Other than these, you have a remarkable array of very anaemic institutions. There is not a single asset management institution, for example, which carries any relevance to the system whatsoever, because we remain a very bank-dominated system. About 70% of the system is government-owned, and the link between attempts to change capital allocation and governance is very tightly tied to ownership.

I think the notion that you can improve governance without fundamentally questioning the ownership in a system such as ours is an extremely delusional view. We seem to be experimenting, and I cannot understand why the issue is being approached so gingerly despite its importance for financial development. Although institutions have made great contributions to get us to this point, it does not mean that they have earned a permanent entitlement to essentially dominate, crowd out, and prevent the further development of markets. I think we must have a much more rigorous, less timid debate, and challenge this hypothesis much more rigorously. Further, it would be good to see further analysis and research being done as to how we can actually push the thinking around that.

My last point is about the discussion on regulation. I am delighted that Ratna highlighted this issue in an important and appropriate manner, because I think we have had very good regulation in India. I think one of our achievements has been that we had regulations ahead of the development of institutions. In my view, this has been true to both the RBI and SEBI. However, one issue that we may still take on is that of too much regulation. We are masters at micro-regulating, and we are not yet able to use the simple principle that regulation is about intervening where there is a market failure, as opposed to a desire to be present in every segment of the regulated entity. I think it would be very helpful if Ratna could provide more precise guidance as to what those areas are where we are over-regulating, and how we could pull back and use the tremendous strength we have built in regulation in order to refocus on only the necessary aspects.

Viral Acharya: Thank you, Leo. Ratna, I will give you one more question to think about before you respond, and then we can open the discussion to the audience for questions. One thing that struck me was that I did not see the word "politics" in your presentation. Consider two of your graphs: the one where institutions are first generating value and then they seem to go too far, and the other where markets are initially maybe not doing much but then they really take off. My sense about a lot of boom burst cycles is that the institutions start getting dis-intermediated to markets. What I mean is that when firms are small, you need institutions, banks, and investments, but when they grow, there is a lot of disclosure about them, and they can start having access to the market.

Then, two things happen. One, the institutions' capacity to generate rents declines because they have a big competitor, which is the market. However, my sense is that this should still most likely get taken care of, as there will be a crisis, the banks would fail, and be washed out. I think the problem that happens is that over time, banks—and I am thinking of them as the primary institution that develops in the early stage of development—become the vehicles through which governments want to control credit allocation. Therefore, the creative destruction that we see with markets and market institutions, we simply do not see that with banks.

Leo said that we first sanctify banks, and then they essentially become useless after a point, at least they are seriously repressive of growth for a while. So the question I have is: How would you integrate in your analysis the risk of the handover of institutions to the market at the point when they are not creating value for the economy? I think the graceful handover of institutions to markets does not take place because politics comes into play. This is because through banks, I can control the sector to which they lend as I am writing all the laws which govern them, which I cannot for market institutions.

Ratna Sahay: I will be brief in my responses. Let me start with Roopa. I am really glad that Roopa focused on the financial access aspect, as it is one area where there is great value to be added, especially in low-income counties and emerging markets. The next study that I will be leading is on financial inclusion from a macro perspective. It is the first time that IMF is trying its hand at financial inclusion. It is important because there are about 60 countries that have financial inclusion as part of their goal very formally, and an increasing number of countries are focusing on it. But there a lot of trade-offs there, because we need to be thinking about what we mean by financial inclusion. Is it a payment system, credit, or is it something else? This matters, as our study clearly shows. It matters because in some cases it is great to extend payment systems, but not necessarily to expand credit to too many borrowers, and so on.

Leo, I want to make two points in response to your comments. The first point is about institution building and state cronyism. This issue is interesting because of my involvement in the Asia Finance Project. There is a whole group of countries in Asia where the state dominates; and it is only in Asia that you see so much state dominance. This phenomenon is related to the fact that the state began by dominating and just cannot let go. I do not see much difference between crony capitalism, as it is in the US, and any other state cronyism. Cronyism by any other name is still cronyism. It is a significant problem in countries where the banks are controlled by the state.

In India, regulation is in the hands of the state. This is an issue that needs to be addressed. I think the good news is that in India, it is being addressed. I do see changes in terms of what the RBI is doing and what the government is doing. Looking at the global perspective, I am very positive about this. Though the changes are moving at a very slow pace, they are moving forward nevertheless. As you said, over the last two decades, the progress was very discouraging. While I do agree with your point, I am more positive about where we are heading.

On the issue of governance and private ownership, it is fascinating how this whole debate has changed since the 80s and 90s. Institutions like the World Bank, the IMF, and others first said "Privatise, privatise, privatise," and we did that for a very long time. Moreover, when the Soviet Union broke down, and 25 countries were being formed, the advice was to go ahead and privatise. And then we saw the costs. The countries privatised, but a lot of the capital was captured by a very few people who were close to the government. So we have to be very careful. Maybe there is a way for you to grow even with the state ownership. China is a fascinating example where growth happened through state-owned enterprises (SOEs). There is something to be learned from that.

Leo Puri: If I may present contradictory views to what you just said, the Russian example has very little relevance for India. We are not that kind of state, and we are not about to see the capture of our private assets. We have rules about banks being widely held, for example. To be very specific, the notion that if you were to actually develop and liberalise the ownership of banks, you would end up with a situation of oligarchs and so on is a farfetched idea. I understand that it is an academically correct view, but its relevance to our situation is so limited that I have to kind of quickly draw the line there, because these are precisely the kinds of arguments that are used to justify the complete lack of momentum even when they are very obvious situations you can deal with.

We have created strong institutions like L&T, ITC, ICICI, HDFC, and IDFC in the past. The government itself has created some institutions. UTI bank, which became Axis Bank, is a creation of the Government of India. So we have a very strong track record, unlike in the erstwhile USSR. That bogey is a really a dangerous one because it is precisely what people will use to say that we cannot change. It was also the argument Indira Gandhi used to nationalise our system in the first place. We have to be very careful, because we, as a country and as a bureaucracy, have always worried about the downside of making the first step towards reform. What would go wrong if you were to liberalise? How can you liberalise the markets when you know that round-tripping would occur?

These are the sort of arguments that we use in India, and frankly, these account for much of the regulatory complexity that you see in the capital markets as well as why much of the exports of our markets go to other centres around the world. It is entirely centred on the phobia about round-tripping. We need a more helpful contribution to the debate on financial sector reforms in India.

Ratna Sahay: But I was not talking about that, because this is still an academic vision.

Leo Puri: What do you feel about India?

Ratna Sahay: We have been very clear about India. Every year, we produce a report on India. We do say that this country is overregulated, not just in the financial sectors, but also in land, labour laws, and just about everything. There was some liberalisation that happened in the 90s, which came about because of the crisis. There was also an IMF aid, however unpopular, which basically was conditional on the liberalisation of the country. After that, we saw growth pick up; thus, there were returns that came through. So we cannot generalise this as being country-specific. In this case, we agree that we do not need to overregulate India; we need to bring in regulation only when there is a clear market failure.

Viral Acharya: We are running out of time. I suggest we switch to a few questions from the audience.

Ajit Ranade: I will quickly react to the discussion. I thought Leo was highly provoked by two things that Ratna spoke about. One was Russia, and the other was China. I would like to know what Ratna thinks about China, because you need to complete that debate. We cannot say that China is an exception. It is a very large country, and it has a 30-year track record. You need to say something of the fact that in China, you do not have ownership, you do not have market transitions, but still you had very good growth, and you continue to have growth there. So where does that fit in, forgetting about Russia for the time being)?

Ratna Sahay: This is actually a question for Leo and not for me, because I said we can have different models. One such model can be like China's, where you can have high growth with state ownership along with the right incentives.

Ajit Ranade: My point was that China is not just a small example or an outlier. This is a very large country and has a very long track record of growth, so it is going to be in the middle of the road.

Viral Acharya: I agree that China has succeeded very well in allocating credit through banks; this was the only way that they grew in the past. Allocating capital through state-owned banks has been their model. I think it is not working now; there has been a huge misallocation of credit through banks, and I think they cannot let go. I am a little bearish on China because I do not think they are ready to actually privatise the banking system. In a way, I think Leo was pointing out that we have this problem in India as well.

What would it take to sell a few branches of a public bank to a private sector bank in India? It is not clear whether it is possible right now. I think China does not even have large private commercial banks. There are just the top four or five state-owned banks. So, I do not see how they are going to make the transition, and I think they are going to keep misallocating credit through the state-run banks. Once you set a target of 8% or 9% GDP growth rate, and if you cannot deliver it for a few years, it is not acceptable in the political circle. You may accept it as an economy, but I do not think it will be accepted in the party. I agree that it is a big data point, but I think it fits in with the theme: unless they find a way of moving from institutions to markets, they might have a slowdown in growth. The US is a good example of a country that managed the successful transition of the banking system from the public to the private sector, except in the mortgage sector.

Leo Puri: I think it is a matter of time, actually. I do not think that the China model is successful as such. Many years ago, I observed a situation where a Chinese bank was undergoing privatisation. Interestingly, the fundamental view in China is one with which Mahalanobis would agree immediately, which is that the fundamental purpose of a bank is as a utility through which you channel state-directed credit. It does not exist for any other purpose. It is essentially a pass-through.

The Chinese Communist Party actually believed it had that ability. This country was in effect run for the benefit of the state by people who are Mandarin and technocrats. These people believed they had the answers, and that they could socially engineer outcomes. Moreover, it did not matter that they went bankrupt from time to time because you essentially had a system that was strong enough to put economic development first and financial development later. This essentially meant that the development of industry and all the ancillaries through it happened well ahead of the development of banks. So, there was no real interest in the health and well-being of banks, other than as this mechanism from which you could actually raise the money and push it through. Of course, they were going to go belly up from time to time, if they got a few calls wrong. In such cases, you could recapitalise them, which is exactly what China has done.

However, despite its tremendous macroeconomic and fiscal strength, it is now beginning to feel the strain because at this scale, it can no longer go down the path of recapitalising. With each cycle of recapitalising, the bill gets increasingly bigger. I think they now face a fascinating challenge. We will see a period when they will test this notion of capitalism. I do not think the issue of slowdown in China's growth will be resolved in a month or two, despite the drama in the markets. I believe we are going to see a very interesting test between this Chinese model and the principles that at least I intuitively believe will be the prevailing principles over the long run. The jury is still out, to be fair. You cannot say that the Chinese model has failed or indeed succeeded yet, but I think we are about to find out pretty soon.

Ratna Sahay: I would like to mention one last thing. I think it is very difficult to argue that the China model has not succeeded. It has grown tremendously in the past, and currently, it is the biggest economy in the world. It has pulled people out of poverty all over the country. Many of the points that you raised about how they should manage growth are valid. However, if the main goal of a financial system was indeed to develop, what is wrong with that? And they have managed it.

Leo Puri: There is no point debating that. I mean you know it is about the means and the end. And of course, China has succeeded in bringing a lot of people out of poverty, but Japan for a while succeeded in becoming the second largest economy in the world before becoming stagnant. Now was that a good thing? China is better off than Japan was. But are they actually going to be a winner in the 21st century? Probably not. Is China going to end up the same way as Japan? The Chinese will tell you that these debates cannot be settled in 10 or 20 years; they are settled over a century or so. Therefore, the jury is still out on this.

Participant: My question is to Ratna. You explained with the collation of data what the parameters of financial growth and financial stability would be. However, I have a hypothetical question. Can economies chart out their exposures to the financial sector, or would they go with the flow, or ape the developed countries? Would economists be able to chart out their exposures to financial institutions or the financial markets, or would they just go with the flow, as in, go where the development is seen? Also, who would decide the transition, the turning point, the curve, and the psychology behind the economic cycle?

Ratna Sahay: This is not an easy question to answer. The scope of this paper was much more modest than trying to answer your question. The point we wanted to make in the paper was that we should not assume that the presence of financial development implies that it is going to be good. Do not assume that; of course, it is not just about any financial development. As Leo pointed out, it depends on what are we talking about when we say "financial development": is it institutions, markets, access, or depth? Our study indicates that these decreasing returns came from the depth of institutions and not of markets. So, we just wanted policymakers across the world to be thinking hard before they allow banks to expand.

The second point was that you can still talk in terms of the financial sector, but we need to be thinking about what the pace and quality of regulation should be. India remains, as Leo rightly pointed out, a country where there is a lot of regulation. The question is, "Is this the right kind of regulation?"

Viral Acharya: Thank you very much, Ratna. Thank you, Leo and Roopa. It was a great panel discussion, and I am sure we will continue this discussion over dinner.

Informed Options Trading Prior to Corporate Announcements: Insider Trading?

Prof Marti G. Subrahmanyam

I would first of all like to thank the National Stock Exchange, and Nirmal Mohanty, in particular, and Viral, for organizing this conference successfully for the past three years, and for inviting me this year. I myself made some feeble attempts over the last 40 or so years to organize the kind of exchange of ideas that they have managed to pull off. I must say that I did not enjoy a modicum of success in that regard and I am deeply impressed by what they have managed to do in three years. I hope they will continue to enjoy similar success in their future conferences too.

As an academic, one of the issues that I feel strongly about is that policy making ought to be grounded in a research foundation, which is unfortunately lacking in many areas in our country. Finance, as we have heard for the last couple of hours, is such an important part of economic development; we definitely need to see more research on financial economics by Indian academic and policy-making institutions.

When Viral and Nirmal asked me to speak, I was a little bit in a quandary because I do not have any current research on India. I was trying to think about which of my current research projects would be of some relevance to an audience like this, and I chose this topic of informed trading in options. Although I admit my own research is based on US data, I do think there are lessons here for other countries as well. I also think that this is a theme that is universal across financial markets, and one that I think you will all hopefully get something out of.

There are three papers that I have worked on in the last couple of years on this broad topic and this set of papers got started based on a casual conversation I had with one of my colleague at NYU about the preponderance of reports on illegal activity in United States involving options trades. I mean this was happening constantly, but nobody saw the established pattern here that needed to be investigated rigorously. In my presentation, I have couple of examples that some of you may have come across. The first one is a much publicized acquisition by Warren Buffett of Berkshire Hathaway jointly with a Brazilian hedge fund called 3G (which really was and is a major player in Brazil, as well in many other parts of the world), of Heinz, a well-known consumer brand in the US, and around the world. Here are some salient facts that came to light pretty soon after the announcement of the deal occurred.

Heinz was trading at around $60.48 on the 13th of February, and there was an unusually large trade in June 65 call options. As this is an audience of market professionals, you are all aware that the $65 strike for June was quite out-of-the-money, and it would be unusual to have a fairly large number of contracts traded a few months prior to expiration. As luck would have it, the very next day following the announcement, the price of Heinz jumped to $72.50, a substantial rise. Of course these trades netted the buyers a substantial profit, and the sellers a substantial loss. Now this would have been happenstance, i.e., it could have been dismissed by saying that someone was just plain lucky. But then again, this is not a unique example. Another instance is the acquisition of Bank One by JP

Morgan back in 2004, which was an important transaction at that time. This was, of course, more than 10 years ago, and again, the story was somewhat similar. In this case, the purchase of options occurred one hour before the announcement, involving substantially out-of-the-money options that were near expiration. So this is another similar, but even more striking, anecdote. The question to ask here is whether these are unique, or if there is a pattern to these trades?

Hence, the question really we were after is, are these isolated cases or is there something more systematic going on here? Some of you who have followed the news in the US would have noticed that there has been a plethora of examples of prosecutions by both the SEC, the regulator in the US, and the very active US Attorney for the Southern District of New York. This prosecutor, Preet Bharara, has been unusually active in the last few years. Just to give you another sort of fairly vivid example of this kind of activity, this is about a similar transaction by China National Offshore Oil Corporation (CNOOC) which is a major Chinese offshore oil explorer. It was in conversation a few months ago regarding a bid for a Canadian oil company Nexen, which is also involved in oil exploration in many parts of the world. Again, a similar pattern was observed. There was unusual activity almost a week prior to the announcement, with almost nothing going on for a long time and then suddenly there was a price spike a few days before the announcement, after which there was a little bit of activity that died off pretty soon. This is a pattern that we have actually seen and, in fact, it convinces you that it is actually a quite common pattern, much more common than what we would expect by pure chance.

Of late, the SEC has been very active in its prosecutions of insider trading. Based on all the SEC prosecutions in the last few years, this is a sort of time series graph for the last 10 years for cases related to insider trading. As you can see, there are a substantial number of cases each year, and the ones involving options trading and mergers and acquisitions in some fashion, are a fair proportion of those, considering this is a very specialized kind of insider trading prosecution.

I should emphasize one point that SEC prosecution is a matter of civil jurisdiction. There is a parallel system in the US for criminal prosecutions under the US Department of Justice; as I mentioned earlier, the Southern District of New York is part of the Department of Justice of United States. Hence, the SEC is really the civil side, so to speak, and there is a parallel criminal side, which we have also looked at.

Now, I am going to talk a little bit about two of my papers. Our focus is on the M&A activities and announcements, and what happens in the options market prior to these M&A announcements. The question one may ask is that why did we choose M&A activities. The answer is quite simple. For all the corporate announcements one can think of, the one that is associated with a substantial jump in the price of the target company, is the announcement of a merger or a takeover. In fact the jump in share prices is substantial. We found in our study that on an average, the jump in share prices is about 30%, which is a significant amount. If someone were privy to that information, and takes advantage of it by “front running” the announcement, one could make a lot of money. Another aspect of this is that for someone who has such information but is capital constrained, then options are the only place that he will be participating in. So that is basically the general idea of how we chose this particular set up to analyze informed trading activities in US.

Most M&A announcements are unexpected, even if there is some hint that something might be in the offing, the precise timing is rarely known to outsiders. Therefore, if someone stumbled upon such information, it would really be a chance event, because there are so many companies, there are so many possible transactions and the fact that a particular one was announced, and maybe later on consummated, is really something that one could not detect through some technique based only on publicly available information. Hence, private information here is very clear, beside the fact that there is also the substantial rise in the target's price.

For the acquirer, however, the evidence is more mixed. We found out that on an average, it is not clear whether the acquirer's stock price goes up or down. Let us assume that the acquirer's price goes down, although that is not a clear cut pattern, especially not as clear-cut as the movement in the target's price. So, we actually used mergers and acquisitions, as what social scientists call a "natural experiment" to find out if this can be used to detect such unusual activity.

We focused on three aspects of this unusual activity. One, we looked at options volume. Now, I should point out we do not obviously have information on the trading strategies of all agents in the market. We only have relatively aggregated data on options trading volume, and we also have data on the prices and the bid-ask spreads. These are the data we have available. To actually drill down and get more detailed data is fairly difficult. That said, I am presently working on a project with the Southern District Court of New York, who are the prosecutors, to drill down more deeply in a few instances, but that is work in progress.

In a related project for the Southern District Court of New York, we have actually done a very interesting examination of the evidence. For those of you who have a research background, you must know that one of the things that has become a big tool for research is text processing. It refers to looking for particular strings of words to identify in a document. So, rather than looking at numbers as data, you look at text as data. This was a completely new experience for me, in which I have learnt how to handle text as data. It is a very exciting field, and I think you will see its application in a lot of areas in future. What we actually did was that we used this text based processing to analyze essentially millions of pages of Department of Justice and SEC files to look at the litigation activity involving illegal options trading. Now, I should qualify one thing beforehand that we are not lawyers, and are therefore not competent to judge the legality or illegality of any activity. All we can say is we are looking for unusual patterns, thereupon the lawyers or the regulators might actually take further action. So, we are actually only looking at unusual patterns and trying to quantify how likely or unlikely those patterns could be.

We looked at the target firms in mergers and acquisition transactions for finding abnormal trading volume. In a few minutes, I will define what abnormal trading volume is, but essentially it refers to trading that is not predictable based on any previous patterns. We see a spike of some sort along the lines of what I showed in my earlier slide. Based upon a simple intuitive argument, out-of-the-money call options are the most likely vehicle for implementing such trading simply because of the leverage potential in it. They would consequently be more likely to be used by someone who wants to profit from such information. These are all call options, because remember the price of the target as I mentioned goes up by a substantial magnitude. One could think of strategies involving put options but they are obviously not as effective. For instance, one would think of some strategy involving selling in-the-money puts, but that is not likely to be, given a capital constraint, as profitable per unit of capital invested as the out of the money call option. Moreover, since this announcement is imminent, and is going to happen within a few days, presumably information is going to leak a few days before the announcement. The activity should be more manifested in the front-dated short maturity, out-of-the-money options.

We also look at the pricing of the options. I will not dwell too much on what we mean by option "price," which essentially is the option's implied volatility, which, I think, many market participants deal with on a regular basis. It is a standardized price of the option. We looked at the impact of the announcement on the price of the option. Essentially it is a kind of a metric of the option price, and we also look at the impact on market liquidity, essentially the bid-ask spread. Presumably, if you are a market maker in any market, and you see a huge set of orders on one side of the market, the obvious thing you would do is to widen the bid-ask spread. So you would expect market makers, who are trying to make sure that they do not get hit by an informed trader, to widen the spread. By the way, there is a vast academic literature that quantifies and in fact gives a motivation for why there is a spread in the first place. As per empirical research, a large part of the spread is due to the possibility that the uninformed market maker, who is uninformed about the true fundamentals, is going to be hit or lifted by an informed agent. We expect to have a sharper effect on the front month options as compared to later months.

We also have some hypothesis on the acquirers, but not as strong as on the targets. We have seen that when there is a likelihood of a takeover by acquirer, it is not clear whether the price of the stock will go up or down in terms of prior evidence, but there is a lot of volatility associated with it. So, just to use that technical expression, someone who gets wind of this and is willing to take advantage of it by trading may be tempted to profit from a jump, based on a so-called long gamma strategy, essentially "buying" volatility, and this would be something that you would expect to find.

So we conducted this analysis. I do not want to get too much in to the technical details of this type of analysis. This is a standard tool that we use in financial markets to look at when information is incorporated in the market prices; it is a so called event study. Essentially the technique involves looking at trading activity prior to some corporate event announcement and looking if there is any unusual pattern relative to the normal, in terms of returns. In this case, we use a similar technique involving options volume. Our main conclusion from the study is that essentially about one quarter of the deals, that is over 450 out of 1,859 transactions over a period of 16 years have abnormal volume in call options, which is a startling number.

Whenever I present this paper, I get two kinds of reactions. Sometimes, people say, how come it is only 26%, it should be much higher, while some other people are more skeptical about the size of this number. This is really what we find and it has been subject to a lot of other tests of robustness. We also have similar numbers, though less striking, for puts. The main sort of really punchy part of the results is in out-of-the-money calls, much as we suspected from an intuitive perspective. The effect is much stronger in cash deals, where the acquisition is made for cash, and where essentially the price is more certain than for stock-based transactions, because the acquirer's stock price might actually fall, and so you are not sure how much you are going to get.

This is what we find in this analysis, and you can see that just prior to the announcement, there is a sharp increase in abnormal trading as the graph indicates. By the way, this is basically abnormal activity in the last few days just prior to the announcement, and so this could not be expected to happen by chance. This is over a large sample, and is not just one instance of the type that I pointed to in the first couple of slides in my presentation, and so this is something that we see in many, many cases.

Now, we actually have some work on what kinds of deals are more likely to show such unusual activity, but I will skip that, and move on to the pricing. So, we essentially do a similar sort of study on the option price, or the scaled "option price," which is essentially the implied volatility of the option. We find that there is excess implied volatility, i.e., there is a buildup of the price in the few days leading up to the announcement date. So, essentially what happens is that there is a huge run-up in the pricing of the option, and that is also true in terms of the so-called front month versus the later month contracts for the implied volatility. Essentially, there is a strong effect on the pricing of out-of-the-money calls, and especially the out-of-the-money calls that are near-dated - so this is basically the conclusion of these graphs.

Now, the third part of the whole story is actually in terms of the bid-ask spread, which is a very simple metric of market liquidity. The intuition is what I suggested earlier that when there is a takeover announcement, the market maker, who may be uninformed, will take action to push up the spread. When I say market maker, I do not mean a single agent; it could be a whole group of people on either side of the market. So that is basically what we find that there is a kind of a sharp rise, again very similar on the date of the announcement, that is very-very visible in terms of the effect on the liquidity.

I did not emphasize this earlier, but every time we conduct these studies, just to make sure that this is not by chance, we compare the results for whatever our sample is, against a random sample. Hence, this sort of test finds out as to whether or not these are really occurring out of pure chance. By doing so, we confirm that we do not find these effects in the random sample; but, in our sample it is very, very clear cut, that it does not occur by chance, since the odds against it are of the order of millions or even billions to one.

If you look at put and call options at different strike prices, the most striking ones, of course, are the deep out-of-the money options, where we find a strong liquidity factor. Essentially, the point that I am making and that has also caught the eye of a lot of people in the markets, is the chances that the results occurred by pure happenstance was three in a trillion, so this is a really very, very strong result that there is something unusual in this action. So, that is the reason why the regulators and the prosecutors are interested in this research.

We have performed a range of robustness checks. I will skip all the details, but mention the essentials. We looked at whether people had already predicted this takeover, because of which they bought the options. So we ruled that out, and then we checked whether there was a sort of speculation in the market because people could have done it by pure chance. We can actually see that, since a control group was constructed which experienced a similar kind of a pattern. We also adjusted for news and rumours. In order to do this, we followed a technique, which I only learnt in the context of this study, that involved going through all the available news data to see if there is any rumour in the news about each one of these 1,800 companies in the six month period before the merger. We also looked at whether some of this activity maybe legal insider trading, that is to say trading by insiders that is being disclosed to the SEC, and that also we did not really find any way of explaining the data based on that. We also looked at leakage in the spot market, but this again did not explain the trades.

So, where does this leave us in terms of the broad conclusions of our research? Well, we basically ruled out that this is done by legal outsiders, and argued that this was not possible, given all the things that we checked. We also checked the legal insiders, and that is also something that we have been able to answer fairly clearly. Now, there are two other possibilities, which are illegal insiders that are basically people who are inside the firm, and who may be actually tipping off others about the information. By the way, especially for the benefit of the regulators in this audience, there is a fascinating paper on insider trading networks, which is done from a practical point of view. It looks at how insider trading networks function, how these networks are built, and how the information travels within these networks, and it is illuminating for any regulator to have a look at that paper.

Another possibility is of illegal outsiders who have somehow gotten wind of some important information. It could be someone who is associated with a law firm or an investment bank or somebody who is not technically an insider, and has traded on it. By the way, I should point out that test for insider trading in United States has recently changed substantially. A few months ago there was an Appellate Court in the US (the Court of Appeals for the Second Circuit), which has actually raised the bar on what constitutes insider trading. It basically says that that that the tipper (the person who is providing information) should be demonstrated to have received a pecuniary benefit from passing on the information, and the tippee should be aware of this, which is a very high bar. There are other aspects to it, but these requirements are actually a significant part of it. So what is illegal and what is legal is not so clear, especially in view of the latest ruling. In fact there is some talk that some of the previous convictions cases may actually be opened up as a consequence, because the legal opinions are divided on that.

Clearly, this is really a situation where there is a lot of ambiguity, and even confusion. I actually have not even dwelt on an issue which is probably even more fundamental. The issue is that why should insider trading be illegal? There are some economists, such as Henry Manne, who have argued that insider trading ought not to be illegal. However, I am not in that camp. Their argument simply puts it as not a fairness issue, rather a matter of efficiency, i.e., what makes the markets reflect all information more speedily. Henry Manne, who is principally associated with this position, argued vociferously for many years, and actually was very persistent with his argument that the insider trading ought not to be prohibited or prosecuted, which is one extreme camp. Of course, there are a lot of people who have shades between that extreme position, and the other end, where somewhat innocuous kind of activity, such as a technical violation, is also deemed to be insider trading. I think you all heard about some of our compatriots getting caught up in this whole thing, I won't take names; but I think you all know whom I am speaking of. I think some of the regulators in India are also mulling over the same sort of practice.

We have got some evidence on the acquirer but I will skip that for now. Next, I turn to what we believe to be a new and very interesting piece of analysis, the evidence on the SEC prosecutions. Our analysis shows that although there are quite a few prosecutions, they fall short of the figure of 26%, i.e., about a quarter of all transactions involved exhibiting some sort of unusual pattern. The prosecutions cover about one-fifth of those, that is for about 5% of the entire sample actually, there has been litigation of some sort. In other words, of the 26%, only 5% have been caught by the regulators and prosecutors, based on publicly available data. So, that still leaves the balance, in some sense, in a grey area. Now, some of them maybe perfectly innocent; so, I am not claiming all of them are, but certainly, the fact that the prosecutors have asked us to look into our data in much more detail, suggests that there is more to study here. So I have actually never had this experience before in any of my previous research that my research is directly of great interest to regulators and prosecutors. So, it is a first time experience for me, and let me see how this plays out.

I just wanted to give you a flavor of how this played out by showing you this video…

Transcript of the video

Narrator: I think it has damning results that may surprise even the most cynical of investors. The study conducted by New York University and McGill University found that a quarter of merger and acquisition deals from 1996 to 2012 involve some insider trading. Average profit from those deals was more than $1.6 million.

And while the SEC and Department of Justice have said they want prosecuting insider trading to be a priority, the study also found that the Securities and Exchange Commission litigated less than 5% of the 1859 mergers and acquisition deals to study sampled. It also took them more than two years to do so on average. They spent their time looking at the biggest transactions and the biggest players and to some degree you would argue looking forward to biggest headlines to the extent that they can deter this activity. But even when the SEC wheels in a big fish, there have not have any corporate take down like this since the 1980s like billionaire Steven Coven in SIC Capital which pleaded guilty to insider trading last November, some argue that is not nearly enough to stop the practice. It is hard to see how these trophy targets would do much to stem the flow of suspect information to those lucky enough to be an ear shot of the tips. Researchers did not rule out the possibility of traders simply getting lucky but the numbers did. According to the study, trades found to be suspicious were so well timed that the probability of the unusable volume in the sample arising out of chance is about three in a trillion.

Okay. That is just a little bit of a clip from one of the various reports that have mentioned our research. I have never received for any of my previous work the kind of publicity that I received for this research, since people usually do not bother that much about academic research. Actually, it was somewhat of a shock to me. So, we did another sort of follow-up study on an area which is less obvious, since M&A is an important announcement, and the SEC in the US is clearly focused on it. Another area, which is sort of similar conceptually, but has not received the same kind of attention, is the corporate spinoff. Spinoff activity has picked up around the world in the past few years, due to consolidation and reorganization, which you see today in many countries. Even in India, I can think of cases in the recent past. That is also an interesting example, and why it is interesting is because, although the numbers are not as striking as mergers and acquisitions, it is a fact that almost always when there is a corporate spinoff, there is a pop in the price of the parent company.

The most famous example in recent times is General Electric (GE) announcing the spinoff of GE Capital over many years that lead to a pop in the price of General Electric of about 11%, which is a huge amount. And, in fact, what is also curious is that there was not only an effect on the stock price, but there was also an effect on the bond prices in the opposite direction. Why was there an effect on the bond price in the opposite direction? This is because there is less collateral backing the debt, and also there is greater risk for the bondholders because GE will actually get rid of some of the assets and diversification. Hence, we looked at spinoffs using a very similar kind of methodology. We have some other new tests because we also looked at stocks, options, bonds and credit default swaps, there is a lot of other stuff that we could look at here. We also looked at what we call informed capital structure arbitrage, that is to say looking at the relationship between debt and equity of a firm, to see if that goes out of gear. I will skip all that details and go straight to the results.

We actually find that while there is evidence, the evidence is not quite as strong as in the case of M&A, but here too, we have 9% of all deals displaying some sort of suspicious activity, which is certainly worth a probe. The interesting thing here is that, unlike in the case of mergers and acquisitions, neither the SEC nor the Department of Justice has been active in prosecuting cases of spinoffs. Our study really suggests that although the numbers here are not as large in terms of potential profit, spinoffs are also prone to similar unusual activity and are worth looking into in more detail.

Here is one example, just to give you an instance of the kind of activity. You have really the announcement here and the unusual activity. It is very much like there is no activity and suddenly, a spike here in terms of option volume is seen ahead of the announcement. You do not see it in the stock, there is a little bit here, but basically it is coincident with the announcement. With the bonds, it happens a little bit after the announcement. So they are basically trading ahead of the announcement, which seems to be more observable in these options. We have looked at the evidence and asked ourselves the question, why is it that we see more volume in options than in other securities? This is due to transaction costs; options are less expensive in terms of transaction cost per unit of action, so to speak, and that includes both the impact cost and the direct brokerage costs.

So what are the takeaways from our research? We document pervasive statistical anomalies in trading ahead of corporate announcements. Again, we are not lawyers, we cannot prove any illegal activity that has to come from legal evidence, which we do not have. But the evidence is too strong to be dismissed as pure, speculative noise. Now, there are lessons for the market players, the regulators who can benefit from dedicating more scrutiny to the options market for detecting rogue trading; in fact there is scope for more forensic tools to help regulators. Regulation is a tough job. I know there were a couple of regulators here, but I do not know if they have these tools, which are really statistical tools, where instead of looking for the needle in a haystack, you at least know which part of the haystack you should look at. I would actually urge that the SEBI should invest in such statistical tools because it will make their job a lot easier just in terms of knowing where to look. By the way, the same is true for the SEC. The SEC in the US is populated mainly by lawyers, and there are few economists who have actually been in the SEC. I do not think even these economists have the same clout as the lawyers; I do not know if that is true in India, but that is certainly true in United States.

The other problem, of course, is the corporate governance problem of leaking information. In a couple of companies where I was in the board, I remember in one of the companies we were locked up in the room till the market got the information. I think that is really the best way to do it; actually, I was very happy they locked us up, because otherwise you never know. The company was a bellwether stock at that time, and if you had a casual conversation with someone, from the tone of your voice, maybe someone will get to perceive whether it is good news or bad news, so it is a good thing they did that.

I know this is really a micro aspect of the discussion that took place before I came on, but actually one of the questions I have is as follows. When someone who has a large amount of money says 'you know what, I will buy stock,' I think the general feeling is it is a rigged game, and that these big guys in Bombay actually have an unfair advantage. I think the man on the street feels that way. That is my casual inference, although I have not done a study of it. I really think that the underpinning of this whole thing is that people need to have confidence in markets, to be persuaded to invest in them.

Now once you go to markets, unless you are able to assure the average citizen that the markets are fair, I think you will have a problem. I think that might be a very significant factor. I was actually startled by this when I first started to go to Germany way back in the mid-80s. Germany, one of the largest economies even back then, had no SEC, in 1987. In fact most countries in the world did not have an SEC or SEBI equivalent 30 years ago. It is amazing actually, I mean think of it today it is obvious that there is a securities regulator but in countries like Japan, Germany, and other large successful economies there was no securities market regulator.

Actually I think it was Leo who said this, but among the things that I say to people who are not from India, is that India has I think some of the strongest regulatory institutions. We know their weaknesses, but I think the fact that we have a regulatory framework that even those countries that are far richer than us do not, is I think a matter for us to be really proud about. Now, of course, these regulators sometimes do things that I think they really should not be doing, that is absolutely true, but the fact that we have the regulatory framework, and the fact is in India we have this framework that you have a regulator and then we have an appellate body, the whole apparatus of regulation is very well developed in India. I think in many countries around the world, it is not clear who the appellate body is. If you take Japan for example, I do not know if you have a problem with FSA, which is their regulator, I don't even know what you would do, you are just stuck. I think you have got a lot of strong institutions in India, and as the debate the panel was having highlighted, they should we strengthened. But I think there is a lot already in place.

Let me end by saying that although I have inflicted my research on US markets on you, I hope there are some insights for India, because I think the issue of fair markets is actually of general interest to everybody. If the markets are not fair, then investor participation will decline, because they will lose faith, with adverse consequences for the overall economy. Thank you very much.

May prosperity always bloom

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