Infrastructure Finance
Prof. A. Thillai Rajan
Department of Management Studies
Indian Institute of Technology, Madras

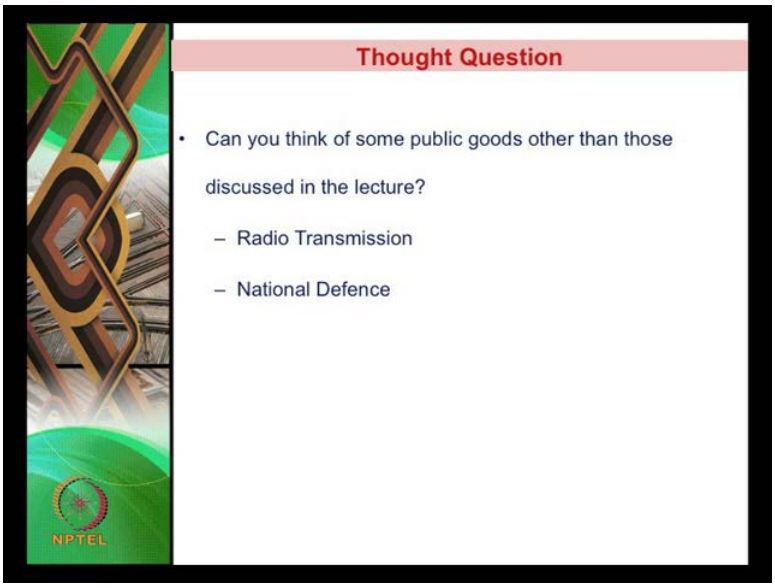
Lecture - 2
Overview on Infrastructure Financing Sources

Hi there, welcome to this second lecture on the course of Infrastructure Finance. In this lecture, we are going to mainly talk about one of the different sources of financing for infrastructure. And when I am going to discusses Infrastructure Financing Sources, I am going to broadly look at it from the prospective of what we actually seen India, but by large, I guessed this trends are going to be, there are going to be lot of commonality in the trends across other countries as well. So, at least the data while, I am going to use what we seen in India? I think that trend is going to be by enlarge not very different, when we look at other countries as well.

(Refer Slide Time: 01:05)

But, before we actually do that, let us go back to the thought questions that we discussed in our lecture 1, what was the 2 thought questions that we look at?

(Refer Slide Time: 01:13)



Question number 1, can you think of some public goods, other than those discussed in the lecture. Now, did you actually have a chance to think through and come out with some of what could be called as public goods. I will give you 2 examples, example number 1 radio transmission, why could be radio transmission a public good, because it is going to be very difficult to exclude somebody from receiving a radio transmissions.

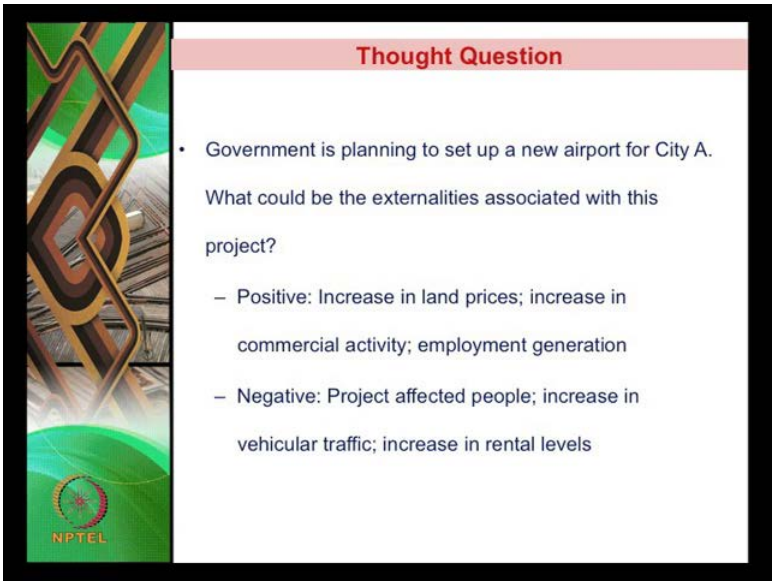
Let us say for example, in a normal fm transmission, anybody who is having a standard radio set, he will be able to receive a fm transmission. So, is going to be very difficult to actually exclude somebody from receiving the radio transmission, so that satisfies one of the criteria of public good. The second criteria is non-rivalry, because one person is receiving the radio signal, through his radio set is not going to affect, another person receiving the same radio signals in any significant way. So, that could be as many people as that can be, who can listen to the radio sat the same time, without significantly affecting the quality of each other reception.

So, it actually satisfies conditions of both non-rivalry and non-exclude ability and therefore, it can be considered as a very good example of public good. Let me also give second example of a public good, which is national defense, why is national defense of public good; it can be called as a public good, because again it has characteristics of non-excludability and non-rivalry. It is very difficult to exclude somebody from being

benefited from national defense. When defense being provided for the whole country, it benefits the entire is population.

It is very difficult to single out somebody has to not to receive the protection of national defense. Similarly just because somebody is being protected by national defense, a does not mean that other are being deprived of it. Everybody is benefiting from the investment in national defense, so it could be called as good example of public goods, any questions.

(Refer Slide Time: 03:48)



Now, let us look at the second thought question that we look at, which is government is planning to set up a new airport in city A, what could be externalities that are associated with the project. Now, we talked about externalities of 2 kinds the first is a positive externality and the second is a negative externality, when we briefly touched upon this example in the class, we have looked at some externalities, now we will try and see if there are many more.

First we start with the positive externality, positive externalities could include the increase in land prices, because the airport is coming up, the prices of land surrounding the airport region can actually increase. Because, people might perceive that airport is going to result in a lot of economic development and therefore, people will willing to pay higher price, for the land around the airport region. On other positive externality could be an increased in commercial activity, because of the increase in people moment that could be a lot more investments happening in the regions surrounding the airport.

The third positive externality could be employment generation, because of the traffic that is coming to the airport, the need to catered to traffic, there is coming to the airport, there could be substantial amount of employment generation. For example, an airport being buildup results in new construction jobs, an airport in operation results in new job in various sectors for example, it could be in catering, it could been a housekeeping and so on and so forth.

So, there all substantial amount of positive externalities that happens in an airport project, but that is just one side of the coin, along with the positive externalities that could be several other negative externalities as well, what could be the negative externalities. Let me give a few example, the first is project affected people for example, the airport is going to come in a land area, which is going to be previously inhabited by let us say agriculture. And when the airport comes up the existing people will need to be displaced to pay way for constructing the airport.

So, that could be people, who are going to be affected by a loss of ((Refer Time: 06:32)), because of their airport project coming up, now that is the negative externality. The second could be increasing in the vehicular traffic, people might experience over a period of time, gradual increase in vehicular traffic, which can result in a lot other effects. For example, that could be more noise pollution, that could be more air pollution and people, who are living in the region surrounding the airport, they could get affected by this increase in the vehicular traffic.

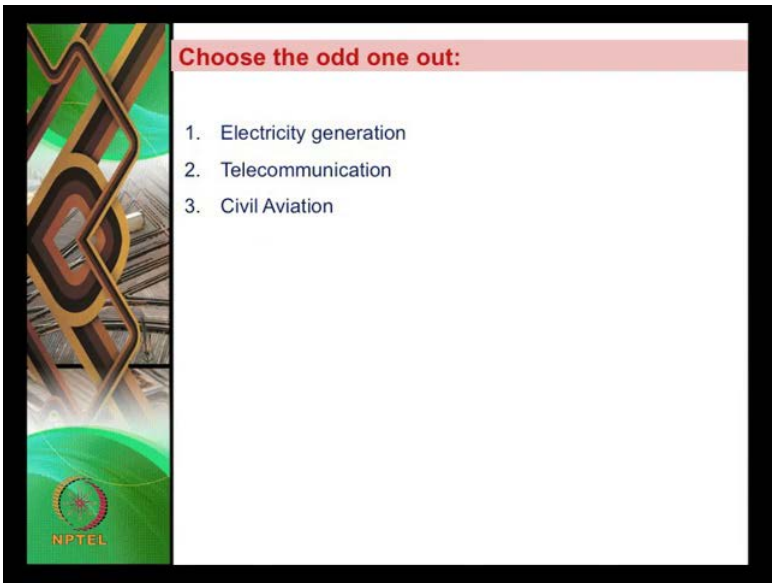
The third negative externality could be, let us say for example, increase in rental levels, because of an additional prospect of better commercial development around the airport region. The rental levels can perceptibly increase and those, who are actually staying in rented property might, therefore get affected, because of this increase in a rental levels, so this is a negative externality at Day-to-day level that could be several negative externalities as well.

So, let me actually is talk about, what I heard in the case of Bangalore airport, than new Bangalore airport is at a distance away from the city. Before the airport were being constructed, the road that the passing through the airport was very narrow and very less traffic and people where able to easily move across the road from one side to the other without any major problem.

But, after the airport has been buildup the road that connects the airport has been substantially avoidance and the vehicular traffic is increase manifold and for the safety of the vehicular traffic, there has been a median that come in between the road. Now, people who are leaving in that region, who are used to crossing the road from one side to the other, because of the median coming up that to experience a lot of difficulty in crossing the road.

They will have to travel some distance and wait for a break in the median where, they could actually cross. So, at a day-to-day level, people could experience certain amount of discount. So, this could be negative externality, so in some if you look at, a infrastructural project can result in several positive as well as negative externalities and it is very important that we recognized those externalities, we should try level best to minimize a the negative externalities, so that the project can proceed without any interruptions or problems. Now let us come back to the topic of this session, which is an overview of financing sources of infrastructure.

(Refer Slide Time: 09:45)



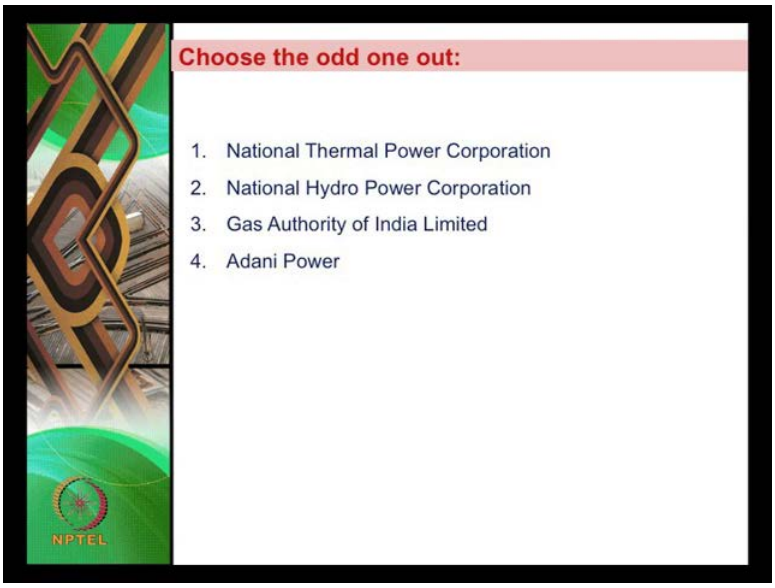
Let me start with this short question, I am going to give you 3 choices and ask you to choose, which is the odd one electricity generation, telecommunication and civil aviation. These all 3 different infrastructure sectors and if you have to choose, 1 sector that is different from 3, which one will that be, I will able to think through. My choice would be to look at electricity generation, why electricity generation, while that could be

several reasons, but the reason why I choose electricity generation as odd 1 out is because of the governance that is actually seen in the electricity generation sector.

Remember, if you really look at the infrastructure benefits across all segments of the society, therefore the regime that actually the ones each and every infrastructure sector is also very different. If you really look at levels of the government can be broadly classified into 3 categories and the higher most level is what is called as a central government or the federal government. So, some sectors of infrastructure come under the purview of the central government and next to that comes a state government, there are some sectors, which you come under the purview of the state government.

And the third level is the local government and there are some sectors, which come under the purview of the local government. Now, I should also mention that there are some sectors, which are governed by both, the central and state and these all called as concurrence subject. Now, if you look at the 3 sectors that I just put off in front of you, telecommunication and civil aviation or under the purview of the central government, in the sense the operation, their regulation is all governed by the ministries are the central governor, but if you look at electricity generation, electricity generation this under the purview of both, central as well as the state government. So, to that extent it is called as the concurrence subject, electricity generation is some extent comes under the state government and it is also under the central government and therefore, among the 3 that makes, it slightly different.

(Refer Slide Time: 12:35)



Now, let us go to the next one between these 4 choices, which 1 would be the odd one national thermal power corporation, national hydro power corporation, gas authority of India limited and Adani power, I will have been able to think through. Out of this 4 different entities remember, these are all 4 different companies that are operating in the infrastructure sector.

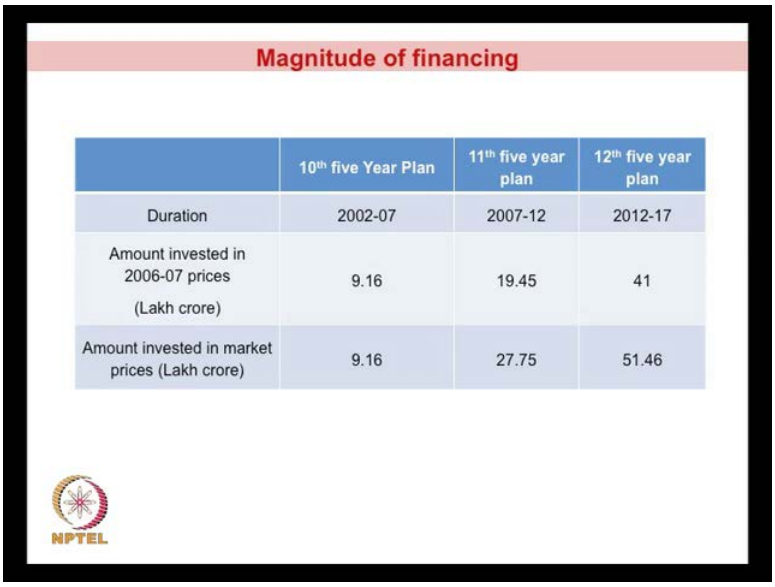
Now some of you might chosen gas authority of India limited as the odd one out, which could be perfectly correct, because out of this 4 companies, 3 of them are power generating companies, whereas gas authority of India limited is gas transportation and supply company. So, to that extent you may feel that, that is the different one, if you look at the sectors, at which company operate, but let us try and look at this companies from that is like a different prospective, let us look at it from, the ownership of this companies.

So, if you look at these 4 choices, accept Adani power, all the other 3 companies are owned by the public sector and is not, these are all government owned companies in the substantial way, Adani power is as a private sector company. So, I would actually considered that as an odd one out, now why I am showing this, the reason I am showing this is to highlight the fact that in the infrastructure sector, we have are both public sector and as well as private sector companies.

And in some of the sectors, we have both public and private let us say for example, as shown in the case of power, it as both private sector and public sector, but there are some

sectors, which are largely, under the purview of the public sector and there are some sectors, which are largely under the purview of the private sector.

(Refer Slide Time: 15:12)



Now let us go back to what we want to start, to look at the different sources of infrastructure financing, I am actually going to show you by investment in infrastructure, in the 3 5 year plans that we have in India. As a were saying in the beginning, I am going to actually base this lecture on date on from India and in India a substantial amounts of planning is done in terms of 5 year plans, infrastructure being very long term projects, they are actually play will major role in the 5 years plans.

So, the 5 year plans identifies the quantum of investment that is expected or need to be made in the infrastructure sector, to support the economic growth of a country. So, has we has speaking today, we are completing the 11th 5 year plan, which is starting from 2007 to 2012 and the government will actually made preparations to finalize the targets for the 12th 5 year plan, it starts from 2012 and hence in 2017. preceding the 11th 5 year plan, we actually on the 10th 5 year plan, which started with 2002 and ended it 2007.

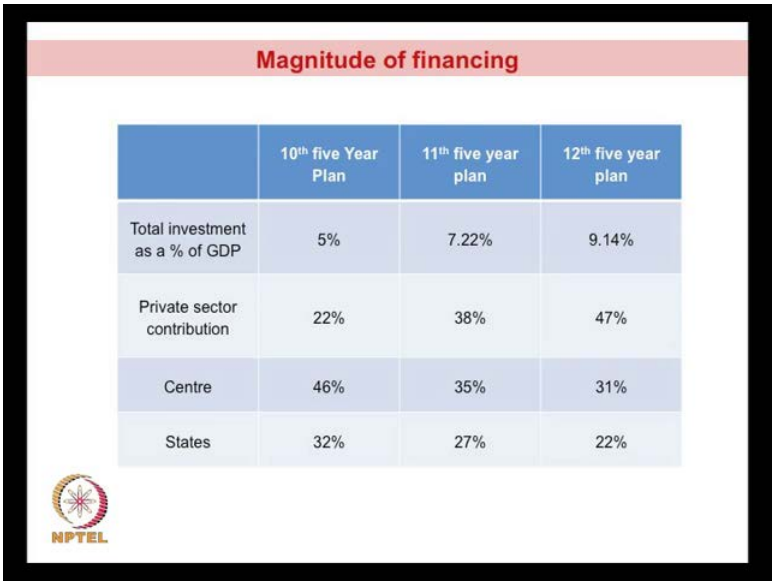
So, we will try and compare the infrastructure investments in each of this 3, 5 year plans and see how does that look like. I am actually going to show you 2 numbers here, the first number indicates the amount to the investor in infrastructure as an 2006 2007 prizes in rupees lakh corores. So, what we see is in 10th 5 year plan, 9.16 lakh croresas has

been invested in infrastructure, but in the 11th 5 year plan the substantially increase to 19.45 and 12 5 year plan is expected to increase to 41 lakh crore.

If you actually considered the amount invested in terms of market prizes, naturally the amount as little bit, I higher in the 10th 5 year plan, it is 9.16, in the 11th 5 year plan it is 27.75 and 12 5 year plan is expected to touch about, 51.46. Now what can you in for this numbers, the first thing, that it should strike you is, the magnitude of financing that involved, we are talking about the investment of 19.45 lakh crores of rupees in the 5 year period ending 2012. So, these are very, very large sums of money that, we are actually investing in infrastructure.

So, point number 1, the quantum of investments that happen in infrastructure are very, very large, point number 2, we see a gradual or not even gradual, I would see remarkable increase in the level of investment that is being made in infrastructure, across the 3 5 years plans. From the 10th to 11th 5 year plan, the investment has increased more than twice and from that 11th and 12th 5 year plan again, if you look at in terms of real prizes the expectation is that investment will be increased more than twice. So, we are seeing a very rapid growth in infrastructure investment in recent years.

(Refer Slide Time: 19:21)



I will give you some other information, let us talk about the total investment of infrastructure as a percentage of GDP. So, in the 10th 5 year plan, it was 5 percent in the 11th 5 year plan, it was 7.22 percent and 12th 5 year plan, it is 9.14 percent. So, what we

are actually seen is between the 10th and the 12th 5 year plan, the total investment as a percentage of GDP, as almost double from 5 percent to close to 10 percent.

So, not only as the proportion increase, because of the fact that GDP is also increasing the actual sums that are been invested infrastructure is also considerably increasing, we can also see some trends in the investment. So, that total investment that, we talked about, 19 lakh crores in the 11th 5-year plan is from all the sources put together that is from the private sector, as well as the public sector. So, this is the total amount of the infrastructure investment in the country that is being made, during the 5 year period.

Let as look at how the pattern of financing has change, over a period of time between public sector and private sector sources of financing, the private sector contribution, which is about 22 percent in the 10th 5 year plan is increased by more than 50 percent to 38 percent in the 11th 5 year plan. And the 12th 5 year plan is expected to increase to close to half of the total investment infrastructure, that is 47 percent is expected contribution by the private sector, during the 12th 5 year plan in infrastructure investor.

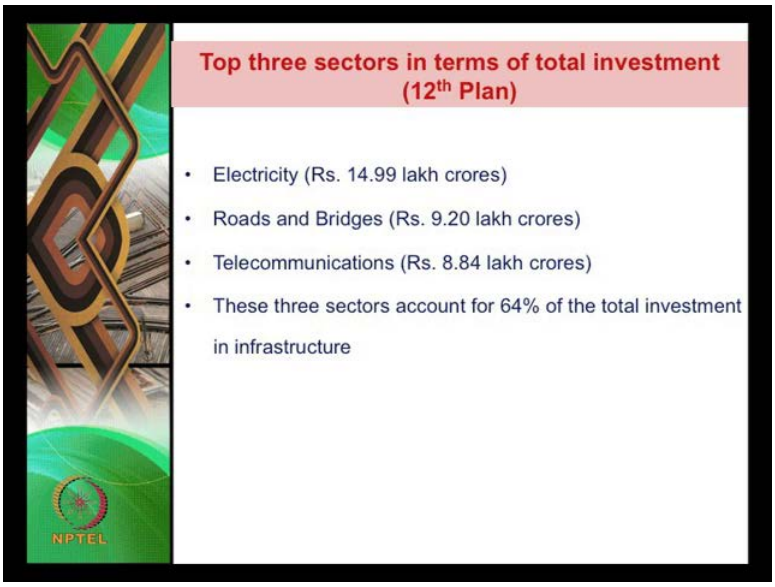
So, the trend is very, very clear, there is a very, very rapid shift in the infrastructure sector from our public sector dominated to a private sector active play, next we look at what we see in the previous pattern between public sector investment. The public sector investment can be further divided into 2 levels, one is the central and the other is state, if you look at the state in the 10th 5 year plan.

It was 32 percent, it is gradually reduced by 5 percentage points, in every consecutive 5 year plans, that is from 32 the state infrastructure investment that is to 27 percent, which further reduce for 22 percent in the 12th 5 year plan. Center similarly as will reducing from 46 percent to 35 percent the 11th 5 year plan and it is expected to be around 31 percent at the end of 12th 5 year plan. So, what can been for, 2 main points Indian has realized that infrastructure investment is critical, to substantial and increase in economic growth.

So, therefore, the total capital get, get investors invested for infrastructure inconsistently increasing in the last 2 5 year plans and expected to increase in the 4th coming 5 year plan. Point number 2 much have the investment in the future is expected to come from a private sector, those the large quantum will still going to be coming from the public sector. The share of the private sector is going to be much higher as compare, to what we

are seen in the past. So, as we go down to more intricate aspects of infrastructure financing, we have too bears this trends in mind.

(Refer Slide Time: 23:48)



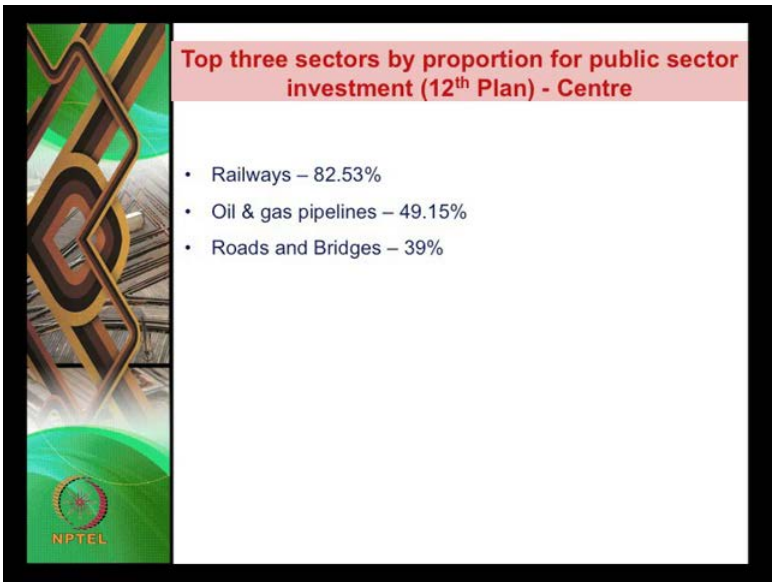
You know, there are several structures, that we looked at in our first lecture, that we qualified really called as infrastructure and in any other sectors of dominate over the other, which of the sectors that attract the most investment. Let us looked that have putdowns here at that top 3 sectors in terms of the total investment, the topmost sector is electricity, which in the 12th 5 year plan is expected to get an investment of about 15 lakh, crore.

So, out of all the infrastructure sector, electricity is expected to get maximum amount of investment, I think this is kind of reflecting the power shortage of that we are seen the country today. There is being many hours of power shortage and this additional investment in electricity generation, can be expected to reduce, the levels of power shortage that we experience in the country today. The next higher sector that going to attract the maximum investment in roads and bridges, so this sector is expect to get a investments about 9.2 lakh, crores in the 12th 5 year plans.

And the third sector that expected to get is telecommunications and this sector expected to get an investment of 8.84 lakh, crores in the 12th 5 year plan. So, put together 3 sectors account for about 64 percentage of total investment in infrastructure. So, substantial amount of investments that we are going to see in infrastructure is going to be

channelized, so this 3 sectors. So, the prospects are very large, the need is large and people who are looking for careers in infrastructure financing.

(Refer Slide Time: 26:11)



These should also give you an indication as to, where though, the most interesting opportunities like, let us also look at whether there are any differences, in the proportion of investment that is being made from different source. Let us look at the proportion of public sector investment and the top 3 sectors that accounts for the highest proportion. First railways 82 percent of railways proportion investment of in the 12th 5 year plan expected to come from the public sector, particularly the central government.

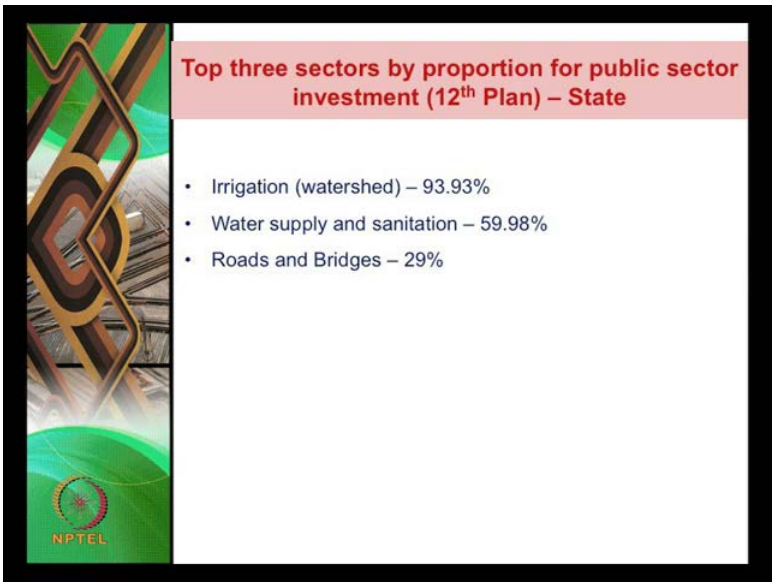
Which is expected, because a railways is still not thrown open for private sector investment in a major way and railways will largely governed by the ministry of a central government. So, much of the investment is railways have to really come from the public sector, at the centre and that is why we are seeing a very high level of public sector investment in railways. Next is your oil and gas pipelines close to 50 percent of the investment the sector is expected to come in the central government, again this are considerably strategically important for the country.

Oil and gas pipelines cut across different stages and therefore, to manage the complexity of such, interstate projects, let it be better for the central government to handle this. And that is the reason why we are seeing, substantial investments in this sector also from the central government, then we talk about roads and bridges. This is the third sector that

gets a highest proportion of public sector investment, from the central government, 49 percent of the investment that expected in the roads and bridges are expected to come from the central government.

Again if you see most of the road projects, particularly the national highway projects the cut across the state boundaries and roads need to be connected across local corner of the country, roads are expected to bring in a lot of economic development. So, many roads need to be constructed in areas that may not be commercially viable, in may have to be constructed areas in that have a very difficult and raff terrain. These are all areas where the private sectors might find it very difficult, to get financial returns and therefore, the government will have to make, the substantial amount of investments.

(Refer Slide Time: 29:15)

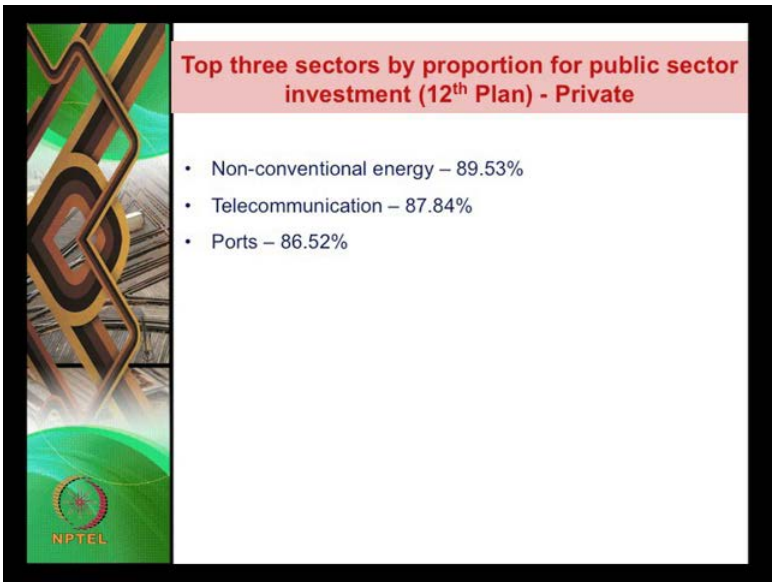


Next lets look at the top 3 sectors, in terms of a state government contribution, so the first is irrigation. So, irrigation is mostly seen as a subject that benefiting the local populace and with a very clear boundaries and irrigation occupies, the top slot in terms of the investment by the various state governments. Next is water supply and sanitation close to 16 percent of total investment in the sector are expected to be made by the state government.

And roads and bridges, which is the common sector that we see, in the investment made by the central government as well. So, display the commonality that we see in the road

sector, we see a lot of differences between, what is priority for the state government and what is priority for the central government level.

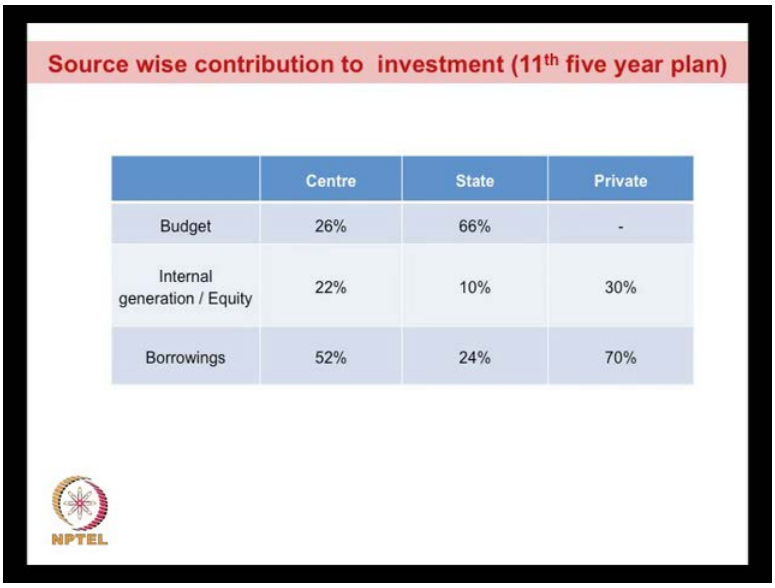
(Refer Slide Time: 30:29)



Now, let as look at the 3rd, which is that top 3 sectors in terms of proportion of contribution by private sector, nonconventional energy occupies the top slot as far as private sector investment is concerned. Out of the total investment to be made in nonconventional energy, 89 percent is expected to come from a private sector, in telecommunication 87 percent of investment is expected to come from private sector, sports 86 percent of expected to come from private sector.

So, wherever there is an element of technology, wherever there is an opportunity to interview is competition, wherever there are commercial viability, we have a strong private sector participation. So, the point I would like you to take away, in this is there are differences within infrastructure sector and the priority for each of the different source of financing happens to the very different.

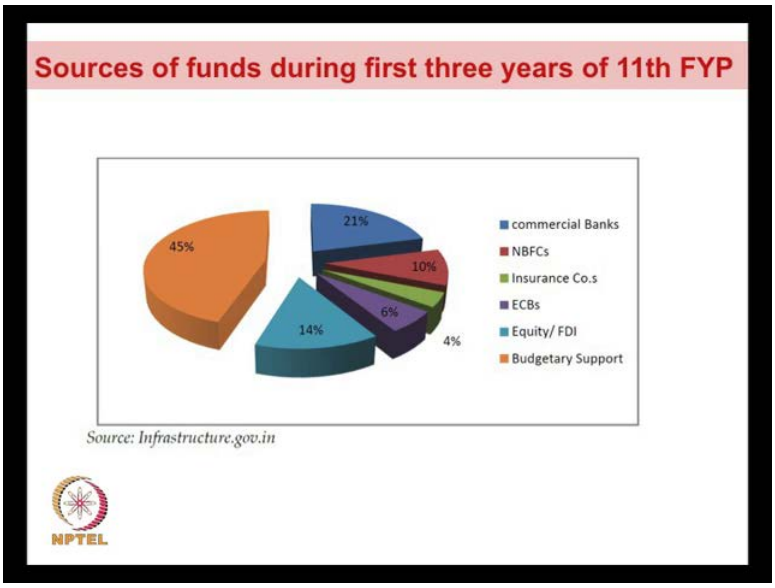
(Refer Slide Time: 31:39)



Let us look at, how are the sources between the centre states and private, if you look at the central government, the sources can be broadly classified into three categories. One is the budget allocation the government gets his own source of revenues and out of revenues that it gets, it is allocates certain amount of foreign investments of infrastructures sectors, so that is your budgetary allocation. Than, we have internal generation are equity, there are several existing companies, which continue to make profits.

And the internal generation refers to this amount, which get reinvested back in the infrastructure sector and 3rd is the borrowings that the government undertakes to finance several infrastructure projects. So, if you really look at it, at the central level 52 percent of the funding is obtained by borrowings and the state-level it is obtained, borrowings account of 24 percent of state-level, but if you look at the private level out of the total investment that happened in the private sector, 70 percent is by way of borrowing. Now borrowing is also known as get finance, so what we generally see is debt financing place a very important role in funding infrastructure projects.

(Refer Slide Time: 33:25)



So, this is an analysis of the sources of funds, during first 3 years of the 11th 5 year plan, so the pie chart indicates, what is being the contribution of the various sources. First we look at the various sources, this includes commercial banks, which include bank like State bank of India, Canara bank for any of the other banks at is functioning in the country today.

The next we have N B F C s, so these are also called as infrastructure financing companies N B F C s means, nonbanking financial corporation's, they all actually financial corporation's, but they do not have banking operation attached to them. So, example of this N B F C s the infrastructure include, power finance corporation to the rural attrification corporation, I D F C and there are other State-level financing corporation in infrastructure sector as well.

The 4 percent of the amount is actually come from insurance companies remember insurance companies obtained a lot of money by way of premium collections and the amount obtained through this premium collections of to be invested. And part of that is actually invested in infrastructure sector, then we have external commercial borrowings, which accounts for 6 percent.

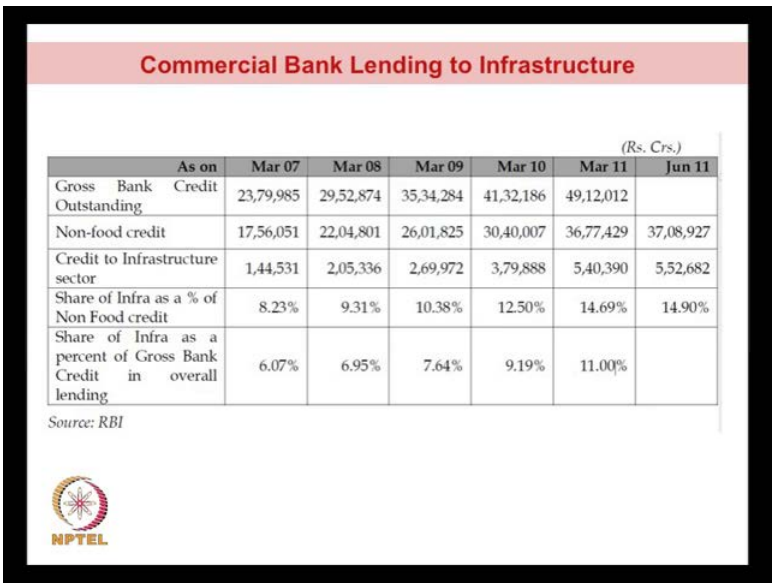
So, this indicates the amount that we are actually borrow from sources outside the country, for example, if actually borrow from us bank for implementing an infrastructure projects in India that it is called as an external commercial borrowings. So, sources

obtained, from outside the country are essentially external commercial borrowings, then we have equity or foreign direct investment, which occupies 14 percent. The 6 percent accounts only for debt funding, with the same is by way of equity funding in a sense, if it is foreign direct investment, it will be club under the equity.

So, that total equity investment than infrastructure projects has been 14 percent and the biggest all has been the budgetary outlay of 45 percent. So, if you actually remove the budgetary outlay of 45 percent, what we actually see is, we see a large portion of for funding is coming from in terms of dead fund's. That is 21 percent of commercial banks, 10 percent from N B F C s 4 percent of external commercial borrowings and 6 percent from you are 4 percent from insurance companies and 6 percent from external commercial borrowing.

So, in a sense about 41 percent of the total funding that is coming to infrastructure is by way of borrowings. Now, if you look at equity, equity is only 14 percent. So, approximately, this is a ratio between equity and borrowings, this is ratio of 1 is to 3. So, this highlights the previous discussion, that we had that debt actually plays a very important role in funding infrastructure projects.

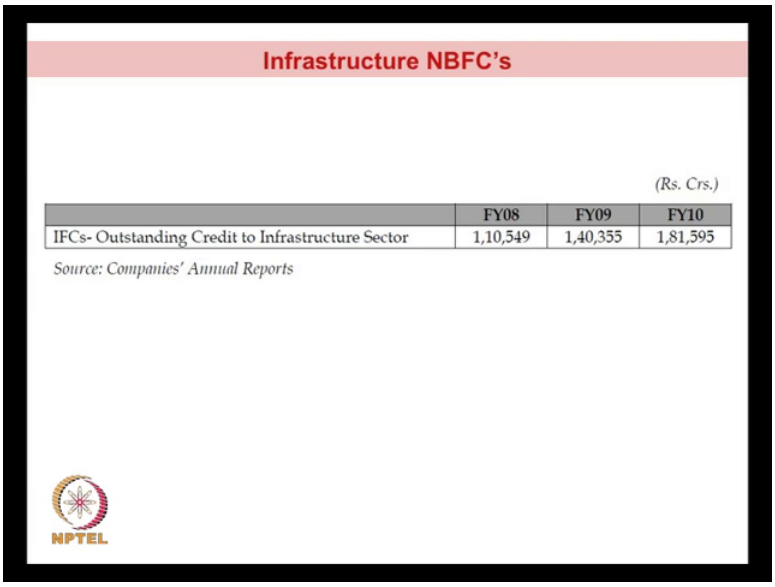
(Refer Slide Time: 36:52)



Now, I am actually going to show you some numbers from various debt sources, first let us look at commercial bank lending to infrastructure projects. So, if you actually look at, the credit to infrastructure, it is gradually increase over period of time, for example, in

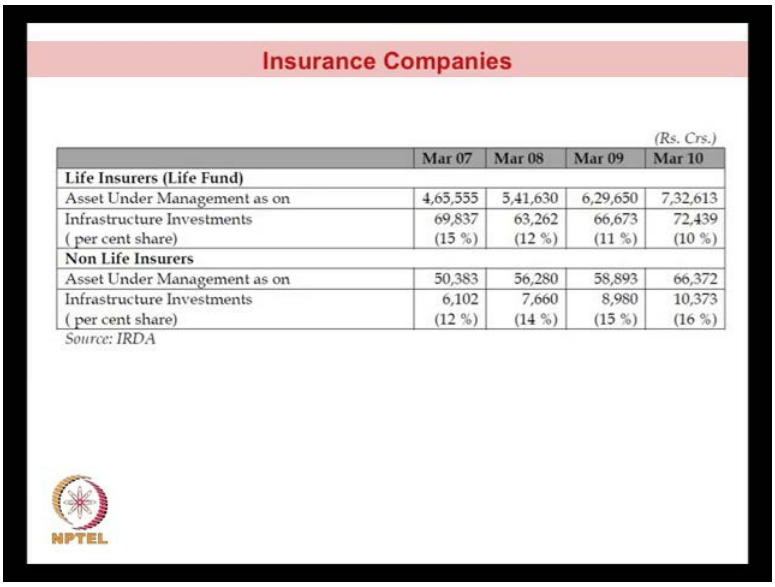
march 2007, it was 1.44 lakh, crores, it has increased to 5.4 lakh, crores in march 2011. So, as a percentage of overall bank credit it is increased from 6.07 percent to 11 percent.

(Refer Slide Time: 37:35)



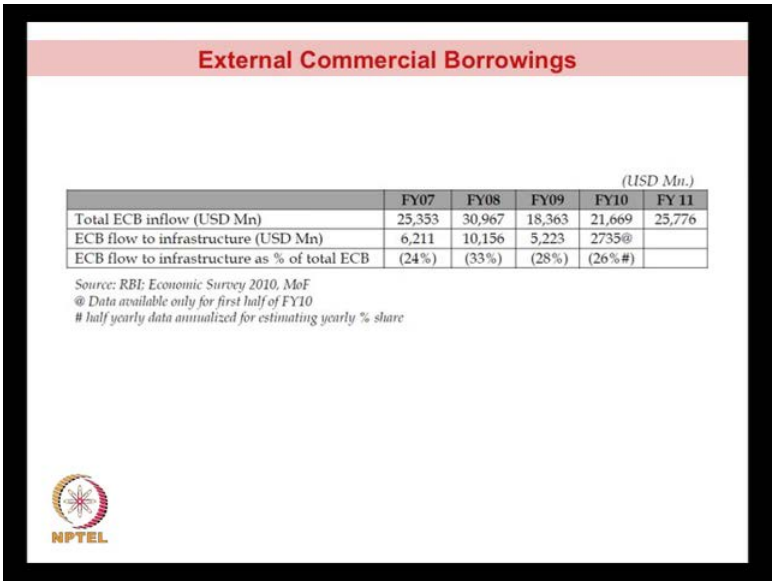
Now, let us look at infrastructures N B F C s, so these are institutions such as power finance corporation rural attrification corporation that we talked about, even in this case. What we see is the allocation to infrastructure projects as gradually increased for a period of time starting from 1.1 lakh crore in 2008 this increased to just 1.81 lakh crore in 2010.

(Refer Slide Time: 38:01)



Insurances companies can be classified into 2 categories life insurance companies and nonlife insurance companies means, in the case of life insurance company life insurance comes from infrastructure investments is actually reduce over a period of time. But, the other hand may look at nonlife insurance companies, the infrastructure investments as a share of their over assets and management has increased from March 2007 to march 2010.

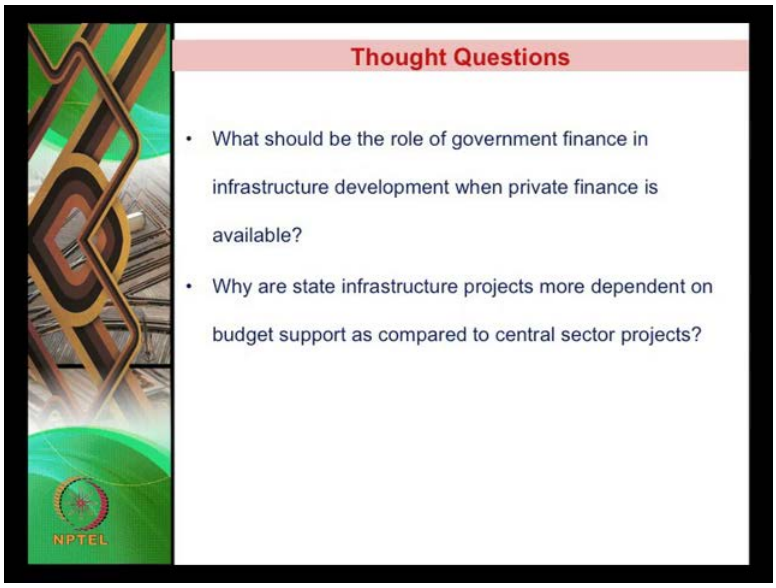
(Refer Slide Time: 38:38)



We look at external commercial borrowings, the number here all in terms of million dollars, the external commercial borrowings, actually shows a fluctuating trend, because the investment from foreign sources into the country depends on, so many factors. it depends on the economic conditions of the country that is actually making the investment as well as the economic conditions of the country that is receiving the investments.

So, in 2007 the ECB inflow was 25353 million dollars, but he's actually reduced to 18363 million dollars in 2009, there was an increase from 2009 to 2010, but did not really touch, the highest level that was experienced into in 2008. So, external commercial borrowing showing a lot of fluctuation, there is not been an uniform increase that we have seemed like case of commercial bank credit.

(Refer Slide Time: 39:50)



Now, let us come back to the thought questions for this session, question number 1, what should be the role of government finance in infrastructure development, when private finance is available. Today we have substantial amount of private finance then what should be the role of public sector finance under this circumstances. Thought number 2, why are state infrastructure projects more dependent on budget support as compact to central sector projects.

We have seen is slide where in the case of state projects a large proportion is coming by way of, but this support, why could be the reason, while you are thinking on this questions, I actually want to show an interesting video, which captures the thoughts of practices. In terms of what is a sense of infrastructure financing, how are companies able to, how are governments able to mobilize large amounts of capital to found big infrastructure programs. We see this video and you will actually get an idea in terms of, how government sources of financing for several projects, before we end.

(Refer Slide Time: 41:26)

I will give you some suggestions for additional reading, should you be interested, the first reading this report prepared by the voting subgroups of infrastructure on the infrastructure funding requirements for the 5 year plan. The second is an interesting report prepared by a high level committee on financing infrastructure, which is being constituted by the planning commission and the interim report produced by the commissioner august 2012, let us meet again in the next lecture.