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# The Next India

Industrials – The Return of the Transportation Behemoth



|                                |                     |                                    |
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## Preface

*Our view is that India is facing a decade of opportunity. If executed well, economic growth and hence market returns can be significant. In 'The Next India' series, we are attempting to study and articulate the size of the opportunity – from a macro perspective as well as looking at individual sectors. In the first of the series, "Cyclical Downturn to Structural Upturn", published on May 12, 2014, the Morgan Stanley macro team discussed the long-term growth potential in India, concluding that 6.75% pa was achievable over the next 10 years, which would translate to a US\$5 trillion economy by 2025. One of the components integral to the unfolding of this story is the build-out of infrastructure.*

*In our opinion, the most critical element in infrastructure, from a productivity addition perspective, and hence an enabler to the story, is transportation infrastructure. The World Bank estimates that India's logistics costs are 2-3x the best practice benchmark costs, hurting India's manufacturing competitiveness. We believe that the key reason for this is the underinvestment in Indian Railways – with budget allocation vs. roads significantly lower than global standards. Rail is a significantly cheaper mode of transport than roads, yet the share of roads in Indian freight movement is >1.5x that of the railways, owing to the congestion on the rail network and poor policies. The current Railway Minister, Dr. Suresh Prabhu, is in the process of bringing change to a relatively moribund ministry. He has promised to spend US\$132bn on the railways over F2015-19e, a 285% step-up over the US\$34bn spent over F2009-14.*

*Akshay Soni, our Industrials analyst, who has authored this report, believes that the historical lack of delivery in the railways creates skepticism, but this time could be different. This opinion is driven by the minister's reformist credentials as Power minister, our opinion that he has identified the largest problem (overcapacity and speed) and his innovative approach to funding. Akshay estimates that India will spend US\$95bn on the Indian Railways over the next 5 years, which along with the railways multiplier will result in 12% of the growth in GDP between F2015-19e being driven just by the investment. Of course, the ensuing productivity gains will improve India's manufacturing competitiveness and the lower CO2 emissions on freight would help India meet its C2030 emission targets. On top of that, there would be inventory cost gains for corporate India from the speed increase planned for the railways. In this note, Akshay explores this opportunity in detail, including the risk to his views.*

*We hope you will continue to enjoy this series as we explore India's opportunities and challenges.*

*William Greene Jr  
Director of Asia Research*

*Ridham Desai  
Head of India Research/  
India Equity Strategist*

## A Summary of the Plan & Implications

### THE PLAN

- Raise Railways Investment 3.85x to counter 60 years of neglect
- 80-90% Capacity Expansion in 5 years
- Improve customer experience = Making Fare Increase Possible
- Make rail a safer means of travel
- Achieve self-sustainability removing dependence on govt grants

### POTENTIAL GAINS

- Create 20% of Incremental GDP over F15-19e
- 10% Reduction in India's logistics cost
- 120 bps of savings on GDP = 15% Increase in Corporate India's Profits
- 5% increase in Trade + 100% increase in range of product exports
- Demand creation for commodity sectors such as Steel & Cement
- Development of Tourism Opportunity

### TAILWINDS

- Strong political mandate, Infra Focus Already Visible
- PPP Effort to gain from learnings in other sectors
- Finally Focusing on the Right Problem (Speed not rolling stock)
- Innovative Funding Options in Play (LIC, Bilateral, Multilateral)
- Reformer with Strong Track Record in Charge

### KEY RISKS

- MOEF and Land Acquisition - 28% of Capex Stuck for Clearances
- PPP (15% of Funding Plan) - Past Failures could Weigh
- Wages (55% of revenues) will Strain Internal Generation of Funds
- Key Man Risk is High

## A Story of Underinvestment and Low-Hanging Fruit

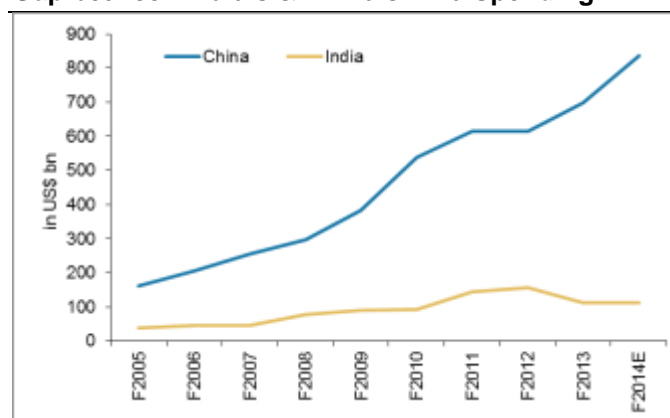
In the first report in the “Next India” series (see [The Next India: From a Cyclical Downturn to a Structural Upturn](#)) Morgan Stanley’s macro team outlined the case for India’s GDP to rise to ~US\$3trn by 2020 and ~US\$5trn by 2025. One of the components on which both our economist and our strategist have focused as integral to the unfolding of this story is the build-out of infrastructure.

### Underwhelming Stock Means Indian Infrastructure Worse off than it looks:

Though always talked about in the Indian context, we believe that the infrastructure story remains one of the most underappreciated in terms of its importance in India. The market usually focuses on the gap between India’s annual infra expenditure vs. spending in other countries, most often China. This does serve as an indicator of India’s underinvestment – but it ignores the major gap that has opened up because of this systematic underinvestment over the years. In other words, in focusing on the flow (the annual spending), the market loses sight of the underwhelming stock of infrastructure in the country. Hence, not only does India need to up spending to stay in place (on a competitiveness scale) with the other economies – it needs to outspend them to catch up.

Exhibit 1

### Gap between India’s & China’s Infra Spending



Source: CEIC, Planning Commission, Morgan Stanley Research

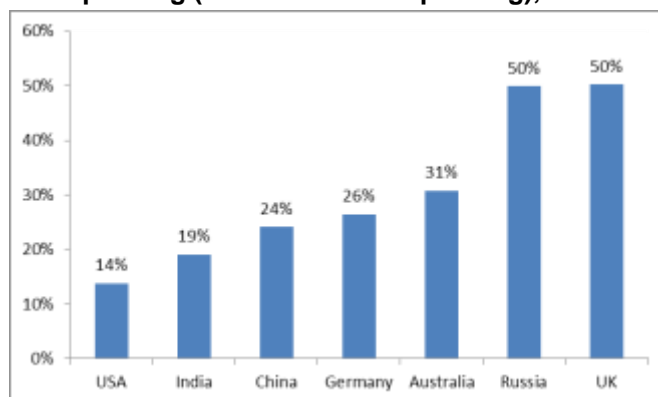
### Rail the Key to Fixing India’s Transportation Infra

**Challenge:** In this report, we take a look at what is in our opinion the most critical element in infrastructure, from a productivity addition perspective: transportation infrastructure.

The World Bank estimates that India’s logistics costs (at around 10-14% of sales) are 2-3x the best practice benchmark costs, hurting India’s manufacturing competitiveness. We believe that the key reason for this is the underinvestment in Indian Railways – with budget allocation vs. roads, significantly lower than global standards (Exhibit 2). Rail is a cheaper mode of transport than roads (by 20%), yet the share of roads (at 57%) in Indian freight movement is >1.5x that of the railways, owing to the congestion on the rail network and poor policies.

Exhibit 2

### Rail Spending (% of rail & road spending), C2013



Source: OECD, CEIC, Economic Survey

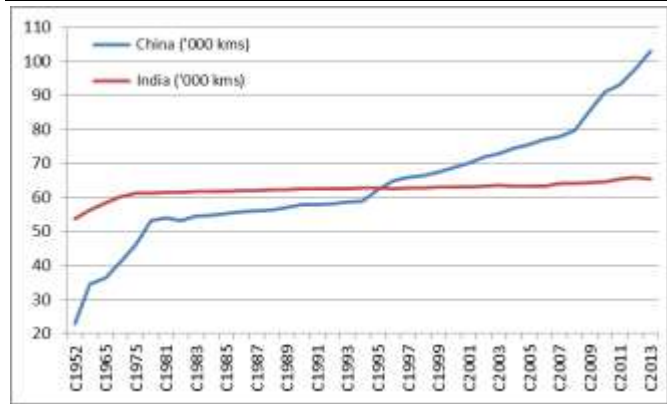
We believe that the correction of the sub-optimal mix in the mode of transport, especially for freight, could give a sustainable boost to productivity, driving jobs and GDP growth, becoming a true enabler.

### Indian Railways Exiting the Time Warp to Yield Outside

**Benefits to India:** A historical perspective will help understand the size of the underinvestment better. In 1951 just after the British left India, its rail network was 53,596kms – yet 63 years later, today, it has only grown 21% overall, to 65,436kms. In 1951 India’s rail network was 2.3x China’s; today China’s is 1.6x India’s. We believe that a rightsizing between roads and rail could result in a 10% decline in logistics costs, in turn leading to a savings of 120-150 bps of GDP, a potential 5-6% increase in trade, and a 100-120% increase in the range of products exported.

Exhibit 3

### Route Length ('000 kms): Indian Railways – Stuck in a Time Warp?



Source: Planning Commission, National Statistical Yearbook, China

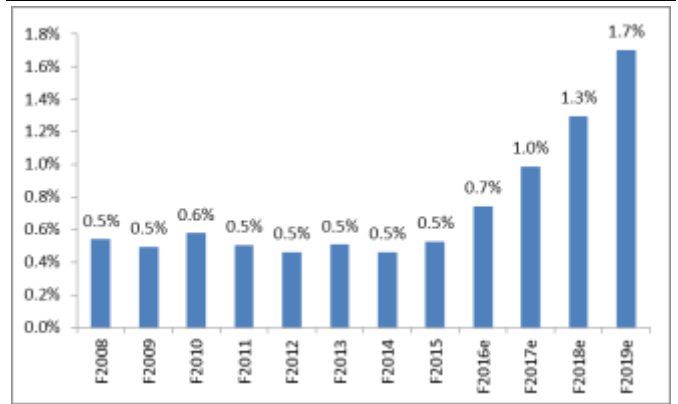
**The Driver of Change is the Man at the Top:** The current Railway Minister, Dr Suresh Prabhu, assumed office on November 9, 2014. He has promised to spend US\$132bn on the railways over F2015-19e, a 285% step-up over the US\$34bn spent over F2009-14. Though the historical lack of delivery in the railways creates initial skepticism, we believe that this time could be different:

- The new minister has strong reformist credentials from his earlier stint in the Power Ministry.
- He is focusing on increasing speed (of trains) rather than burdening an already creaking network.
- He is taking an innovative approach to funding (\$25bn already raised from LIC).

Given the fresh thought process and tailwinds (see the section on "Is Ambition Likely to Lead to Disappointment Again" for details), we use the pickup in rail spending (as a percentage of GDP) in China over C2003-08 (before the boom in C2009-10) as a benchmark for delivery in India.

Exhibit 4

### Indian Railway Funding as a Percentage of GDP – Ambitious Ramp-up Planned

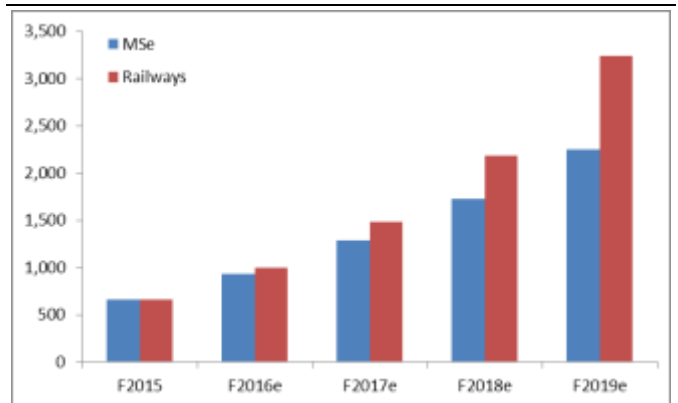


Source: Indian Railways, Morgan Stanley Research

**We Estimate a 75% Strike Rate on the Plan:** Given the step up and India's GDP growth outlook over the period, we end up with estimated spending of US\$95bn. Excluding the money already spent in F2015 implies a 75% strike rate (over F2016-19e) on the railways' stated target. Our lower numbers still mean that the railways multiplier (5x+) will result in 12% of the growth in GDP between F2015-19e being driven just by the investment. Of course, the ensuing productivity gains will improve India's manufacturing competitiveness and the lower CO2 emissions on freight (20% lower per ton / km vs. roads) would help India meet its C2030 targets. On top of that, there would be inventory cost gains from the speed increase planned for the railways.

Exhibit 5

### Railways Spending in Rs bn, F16-19e



Source: Ministry of Railways, Morgan Stanley Research (e) Estimates

**Opportunities in the Railway Eco-System:** Given the comparative success in the infrastructure segments in which the private sector has taken the lead (Exhibit 6) and the recent moves by the government to encourage PPP (Public Private Partnerships), one would expect this spending to be led by the private sector.

However, we expect government spending to be the key in the medium term, given the low private sector participation in the railways currently and the time it takes to create viable PPP models.

Even so, the aggressive capex plan will create opportunities for a broad array of companies, with beneficiaries across the Industrials.

However, given the change in the focus, from throwing more trains at the already constrained network to creating capacity to an increase in speed, we believe that the upside for the traditional gainers will be smaller, with the benefits spread out

to newer segments. The need for speed is likely to drive spending towards more technologically complex areas.

Exhibit 6

### Sectoral Infra Spending as % of GDP

| F2014E/2014   | India    |      | China    |
|---------------|----------|------|----------|
|               | % of GDP | Pvt% | % of GDP |
| Electricity   | 2.8%     | 51%  | 2.8%     |
| Railways      | 0.8%     | 14%  | 1.2%     |
| Communication | 1.2%     | 89%  | 0.7%     |
| Roads         | 1.4%     | 30%  | 3.9%     |
| Others        | 1.1%     | 25%  | 1.1%     |
| Total         | 7.3%     | 42%  | 9.6%     |

Source: Planning Commission, CEIC

Exhibit 7

### The Railways Ecosystem

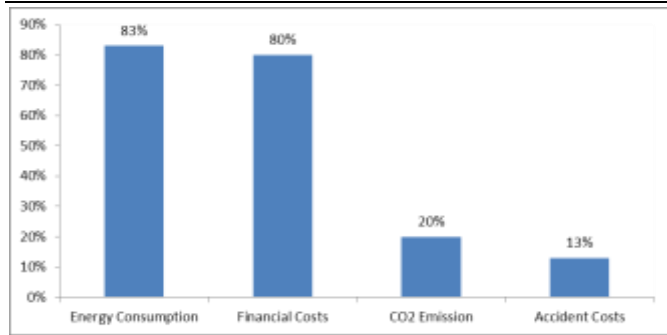
|                         | Non Covered   | Covered                         |
|-------------------------|---|---------------------------------|
| Rolling Stock Companies | Titagarh Wagons, Texmaco Rail, Cimco                | BHEL (UW), GE (EW), Alstom (NA) |
| Logistics Companies     | Concor  | -                               |
| EPC Companies           | -   | L&T (OW)                        |
| Systems Providers       | Medha Servo, Kernex Microsystems, HBL Power Systems | Siemens (UW)                    |
| Cement & Steel          | JSW Steel, SAIL                                     | Ultratech (OW), JK Lakshmi (OW) |

Source: Indian Railways, Morgan Stanley Research



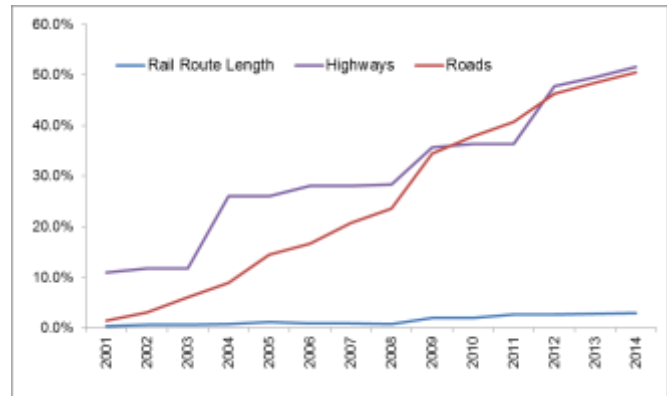
## Key Charts

**Exhibit 8**  
**In India, Rail Remains the Best Mode of Transport (Rail as a Percentage of Road Cost)**



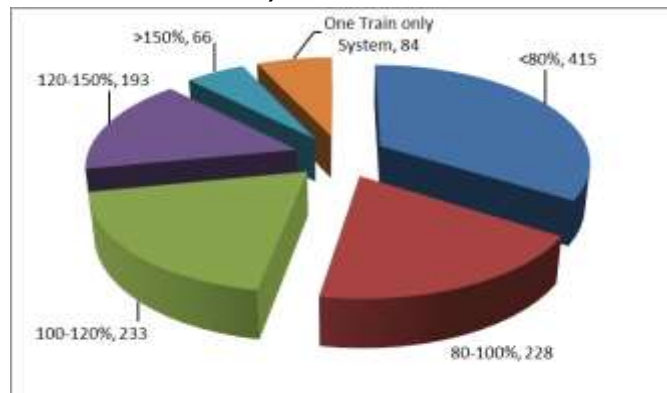
Source: Ministry of Railways, NTDPC Report, AITD Report, TCI

**Exhibit 9**  
**But There Has Been Consistent Underinvestment in Capacity (Rail vs. Road- Cumulative Increase %)**



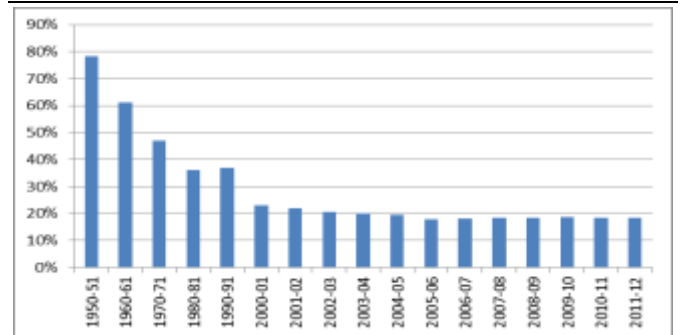
Source: Euromonitor, Planning Commission

**Exhibit 10**  
**The result – a Clogged Network (Capacity Utilization on a Sectional Basis)...**



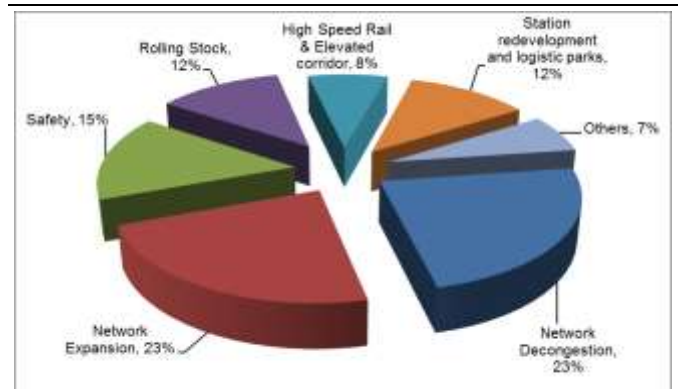
Source: Ministry of Railways, Morgan Stanley Research

**Exhibit 11**  
**...Which Has Led to a Consistently Falling Share in Transport (Rail Share % in Freight & Passenger km)**



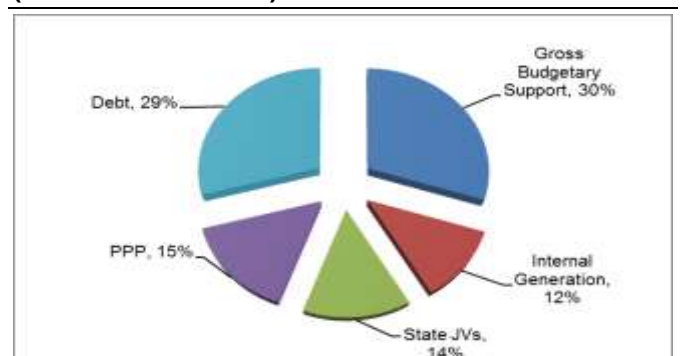
Source: MORTH

**Exhibit 12**  
**Plan to Bump Up Investment in F15-19e to 3.85x the Investment in the Last Five Years Could Change Things Around (Spending Breakup)**



Source: Ministry Of Railways

**Exhibit 13**  
**However, Funding for the Step Up Will Be the Key (Sources of funds %)**



Source: Ministry of Railways

## Indian Railways – The Case for Change

*Indian railways look impressive in absolute achievements – in C14, India ranked in the top 4 globally on freight carried, size of network, etc. – even as high as No 1 on passenger km.*

*In terms of passenger km traveled, the Indian railways did a round trip to Jupiter in C2014.*

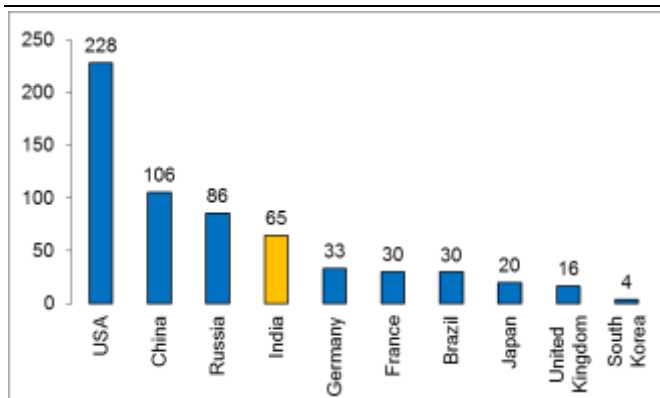
*Yet even though the railways are the cheapest and least polluting way to transport, their share of the combined passenger and freight movement (traffic on rail and road) in India fell from 78% in F1951 to 18% in F2012.*

Taking a look at the Indian railways, we find that both on an absolute perspective and relative to its largest peers across the world, India compares extremely well (ranking 1st to 4th across various parameters). However, when we adjust it for India's scale, we realize the inadequacy of the network, which has continually worsened (over the last 60+ years) owing to a combination of underinvestment, poor utilization of available funding, and the burden of cross-subsidization (passenger vs. freight) which has been put on the railways. The railways' comparatively lower share in transportation (36% in freight and 14% in passenger movement) might have made it tempting for policy makers to ignore the issues, but it is leading to an inefficient system of transport, where the mode of transport that is the cheapest, most reliable, and has the least emissions is losing market share constantly, hurting India's productivity and global competitiveness (especially on the manufacturing front).

### Impressive on Scale

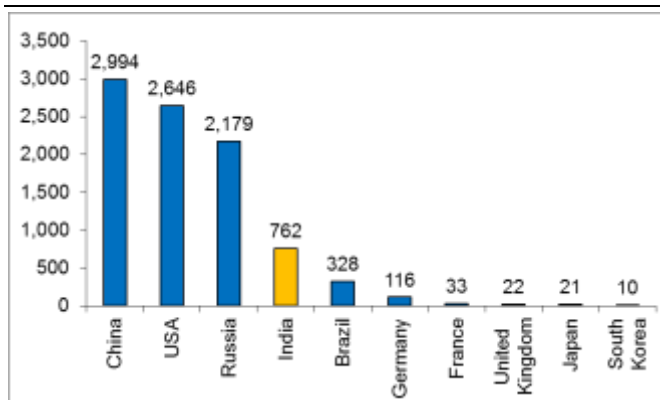
The Indian rail network is spread over a wide area, with ~66,000 route km (~90,000 running track km) and about 7,100 stations. After the US, Russian, and Chinese railways, India's is the fourth-largest railway system in the world. In C2014, the Indian railways carried 1.1bn tons of total freight and 9.3 billion passengers. In terms of the distance freight was carried over too, with 762bn ton / km registered in C2014, India's railways were the fourth largest in the world. Also, the railways run around 13,000 passenger trains which carry more than 25 million passengers per day. With 1.2 trillion km of passenger km for C2014, Indian railways actually score better than on the freight side, ranking first in the world. The growth on both carrying counts has been impressive too, with the railways registering 160% growth over the last 15 years in freight carried and 200% in passengers.

Exhibit 14  
Railway Network ('000 kms, C2014)



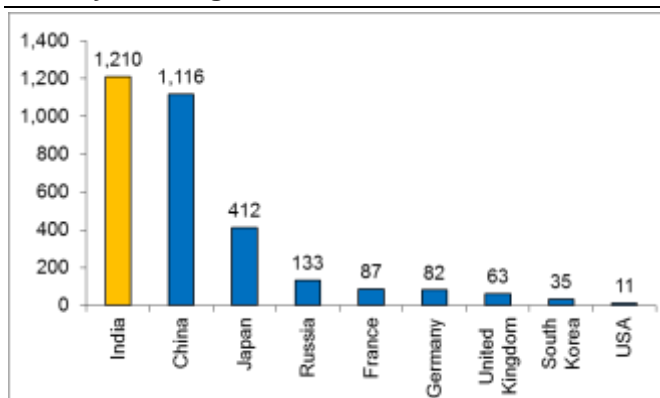
Source: Euromonitor, Ministry of Railways, Morgan Stanley Research

Exhibit 15  
Railway Freight Traffic



Source: Euromonitor, Ministry of Railways, Morgan Stanley Research

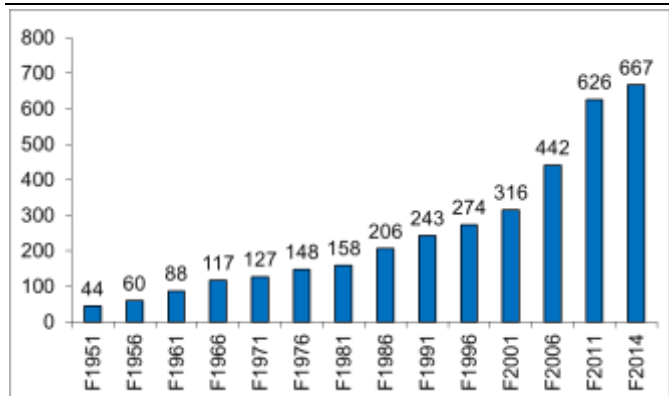
Exhibit 16  
Railway Passenger Traffic



Source: Euromonitor, Ministry of Railways, Morgan Stanley Research

Exhibit 17

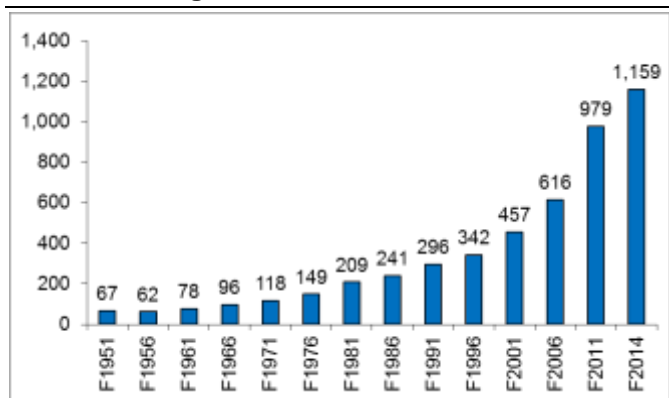
## Indian Freight Traffic



Source: Euromonitor, Ministry of Railways, Morgan Stanley Research

Exhibit 18

## Indian Passenger Traffic



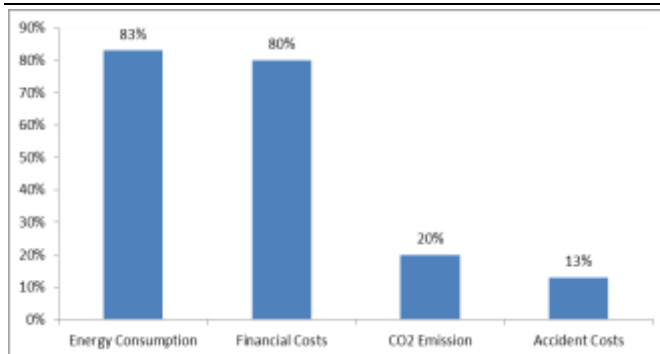
Source: Euromonitor, Ministry of Railways, Morgan Stanley Research

## However, Still Inadequate and Getting Worse

The headlines on size and growth look great, but the former is a function of history (the strong network in place upon gaining independence from British rule in 1947) and the latter a function of India's growth. The railways' share of passenger traffic (measured in bn passenger km) has fallen from 74% in 1951 to 14% in 2012, and their share in freight traffic (measured in bn ton km) has fallen from 86% to 36% over the same period. This is even though rail remains not just the cheapest (Exhibit 19) way to move freight cargo, but also creates 60-80% lower emissions than roads (for freight and passenger transport respectively), which has picked up the lion's share in transport (of both freight and passengers) over the last 60 years.

Exhibit 19

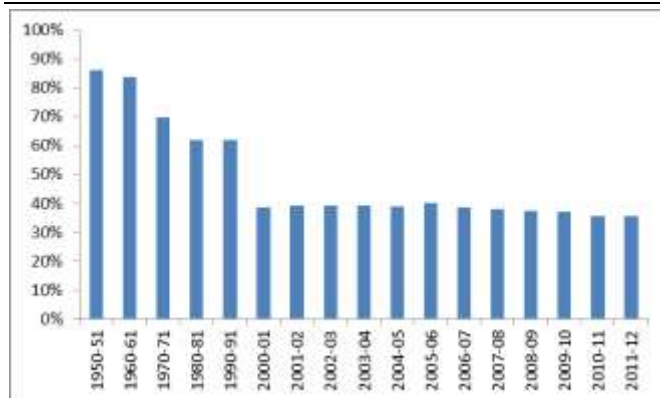
## Cost of Rail Freight as a Percentage of Road Costs



Source: Ministry of Railways, NTDP Report, AITD Report, TCI

Exhibit 20

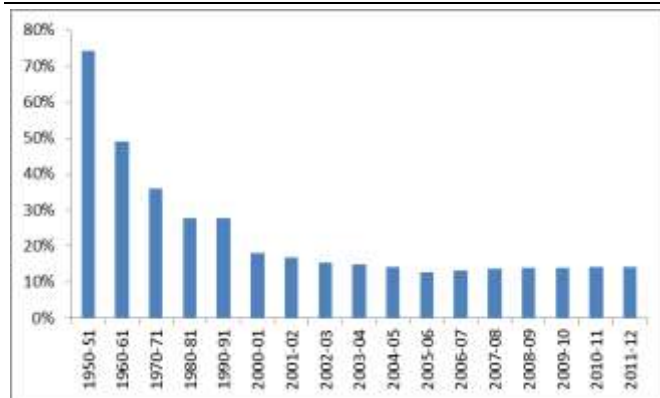
## Decline in Share of Rail on Freight Cargo In India, (in bn ton km)



Source: Planning Commission, MORTH, Indian Railways

Exhibit 21

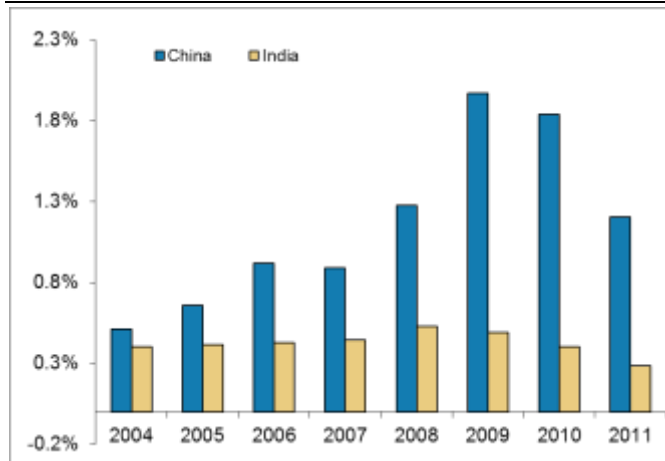
## Decline in Share of Rail on Passenger Cargo In India (in bn passenger km)



Source: Planning Commission, MORTH, Indian Railways

Exhibit 22

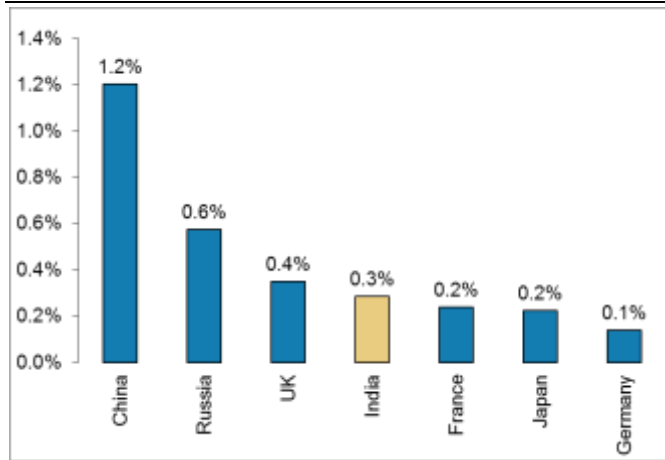
### India vs. China: Rail Spending as a Percentage of GDP



Source: Euromonitor, Morgan Stanley Research

Exhibit 23

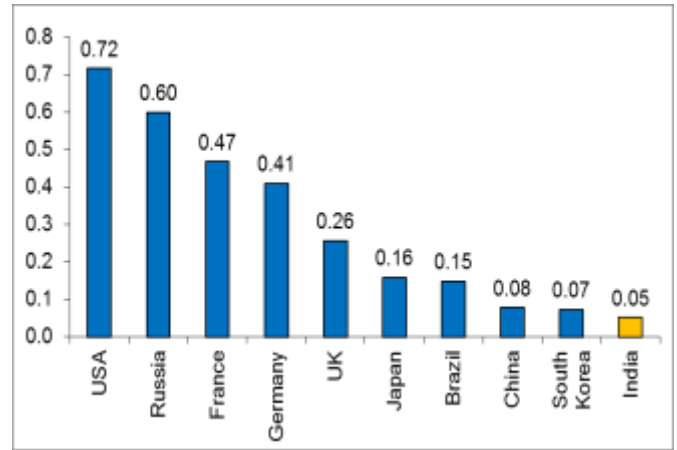
### Global Rail Spending as a Percentage of GDP



Source: Euromonitor, Morgan Stanley Research

Exhibit 24

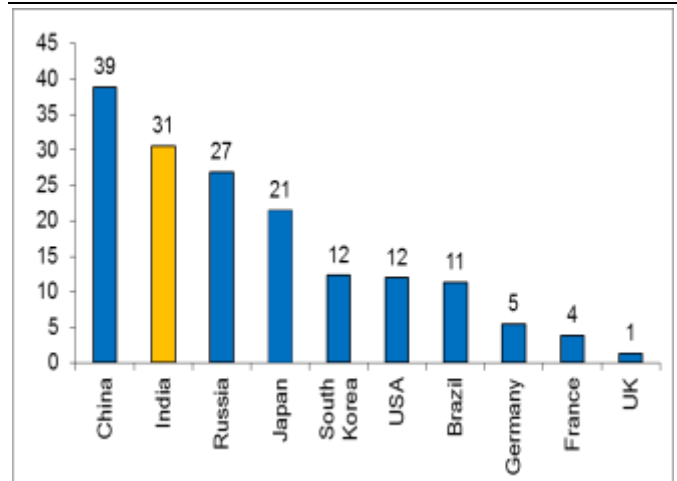
### Rail Network per Capita (in Km) 2014



Source: Euromonitor, Morgan Stanley Research

Exhibit 25

### Movement (in km) per Km of Line in 2014 – India Is Second Most Crowded in the World



Source: Euromonitor, Morgan Stanley Research

## The Decline of the Railways – Understanding the Reasons

We believe that there are three key reasons for the massive decline in the share of the railways in transporting Indian freight and to some extent passengers:

- 1) **Underinvestment:** Budget allocation in rail, at just 20% of roads, is significantly lower than global standards.
- 2) **Poor utilization of funds:** With 60%+ of funds being allocated to projects with negative rate of return, the railways choked off internal funding too.
- 3) **Cross-subsidization:** Passenger fares have moved up just 28% over the last decade vs. a 91% increase in freight rates, with passenger losses being compensated by squeezing the freight customers. This has caused both freight to move over to road and choking of internal generation of funds.

### 1) Underinvestment in Rail vs. Roads

The railways have been suffering from chronic underinvestment over the last 60+ years. This is probably a combination of the strong rail network India had at the time of independence, vs. the weak road network and the state + central nature of roads investments, vs. the railways, which rely only on funding from the latter. Taking the rail network for granted, Indian administrations have allocated (in budgets) nearly 5x the amount spent on rail on roads over the last 15 years (Exhibit 26).

In fact, the dividend paid out by the railways to the government (the budget allocation is accounted for as perpetual debt, and interest paid out on it) has been 30-50% of the allocation over the last 15 years, meaning that the net contribution to the railways from government funding has been even smaller. This has meant that while the physical road network has grown 12.5x (national highways have grown 3.6x) over the last 64 years (Exhibit 27), the rail network (in route km) has grown just 21%.

Exhibit 26

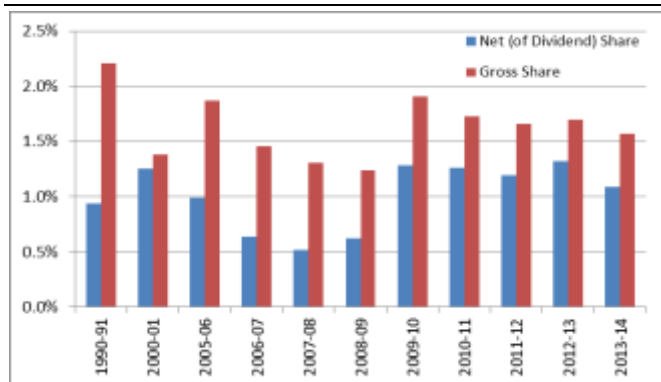
#### Share of Rail & Roads in Total Development Expenditure



Source: Ministry of Finance

Exhibit 27

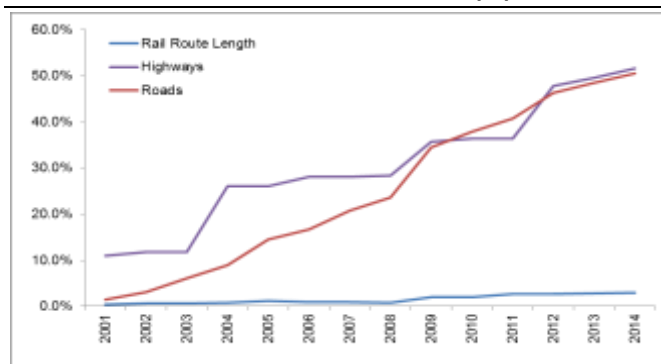
#### Share of Rail Funding (Gross & Net of Dividends) Developmental Expenditure



Source: Ministry of Railways

Exhibit 28

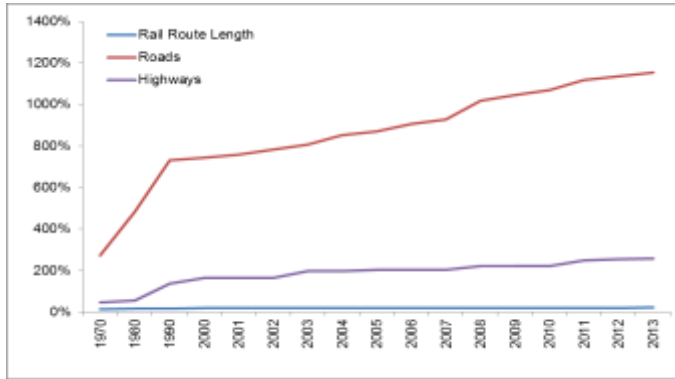
#### Rail vs. Road – Cumulative Increase (%) C2001-2014



Source: Euromonitor, Planning Commission

Exhibit 29

### Rail vs. Road – Cumulative Increase (%), C1950-2014

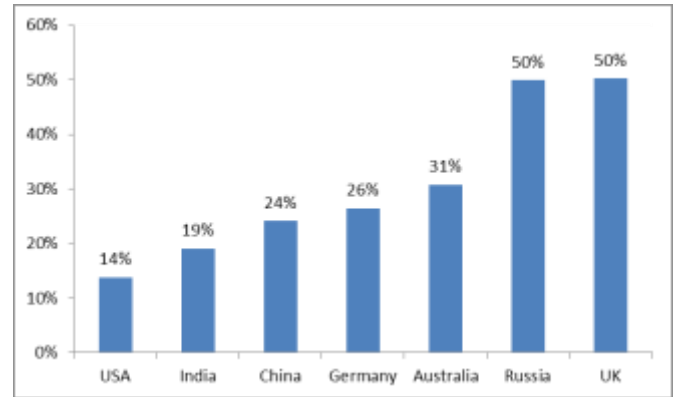


Source: Euromonitor, Planning Commission

Of course, while the underinvestment vs. roads is fairly clear, it is also important to have a global context for the size of the underinvestment. Overall, if the trend across the globe on rail vs. roads spending is similar, then this argument might lose most of its strength even in the Indian context. However, on a global comparison, we can clearly see that not only is India one of the worst economies on this front (Exhibit 30), but that the last decade has also been characterized by an increasing share of rail spending (within rail and road spending) across the globe (Exhibit 31).

Exhibit 30

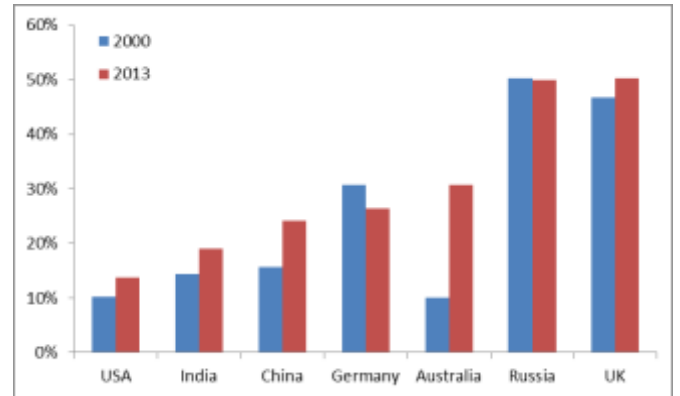
### Rail Spending (% of Rail & Road Spending), C2013



Source: OECD, CEIC, Economic Survey

Exhibit 31

### Rail Spending (% of Rail & Road Spending)



Source: OECD, CEIC, Economic Survey

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## 2) Poor Utilization of the Available Rail Funding Too

Though railways haven't got their fair share of funds from the government, it is important to remember that unlike in the case of roads, internal funding was actually more important for railways, contributing as much as 65-70% in the first Five-Year Plan, even as recently as 20 years back (Exhibit 32).

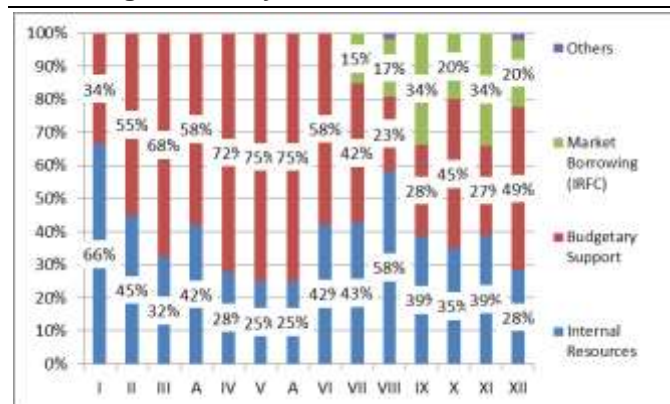
However, we believe that there has been a constant misallocation of resources, led by politics and the social service obligations of the railways, leading to constant announcement of newer projects (lines, stations, trains, etc.) The railways have been used as a source for dispensing political largesse (traditionally factories, trains, jobs and stations) in the key constituencies for every administration, without any regard for profitability of such capex.

In 2013, the Planning Commission looked at the profitability of ongoing projects in the railways (as of April 1, 2011). It found that even though projects for new lines were the worst avenue for investment, with only 8% of the projects meeting the railways' target rate of return (14%), they still received the lion's share of the investment (Exhibit 34). Given the significant investments in projects which actually have a negative rate of return (62% of total), internal generation has been getting choked.

Even worse, personnel expenses have constantly risen (especially after the Sixth Pay Commission), which has brought internal generation down to just 28% in F2014. We expect the Seventh Pay Commission to hit internal generation further; media articles (e.g., *Financial Express*, November 20, 2015) indicate that the railways would have to bear ~25% of the total burden imposed on the government.

Exhibit 32

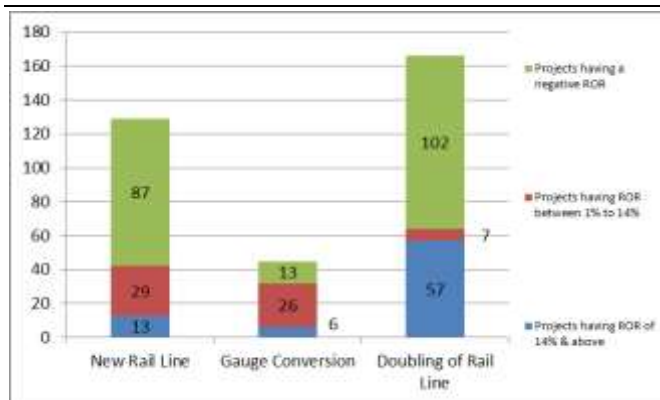
### Financing of Railway Plans



Source: Ministry of Railways, Budget Document, Morgan Stanley Research

Exhibit 33

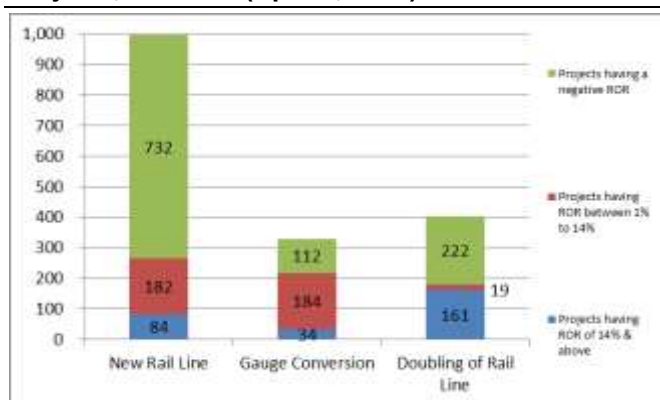
### Rate of Return – Number of Ongoing Rail Projects (April 1, 2011)



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 34

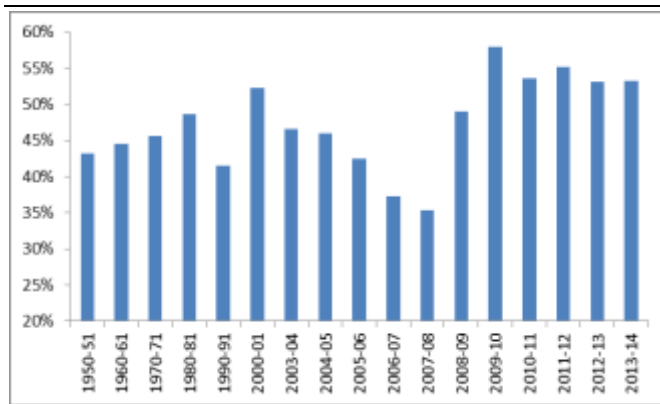
### Rate of Return – Investment in Ongoing Rail Projects, in Rs Bn (April 1, 2011)



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 35

### Indian Railways – Personnel expenses (% of Gross Revenue)



Source: Ministry of Railways, Morgan Stanley Research

### 3) Cross-subsidization: The Dissonance between Rail and Road

Of course, Indian Railways retains its dual role as a public utility (with social service obligations) and a commercial organization. This is also reflected in the tariff policy, which has also been dual over the years, with passenger fares moving up just 28% over the last decade compared to a 91% increase in freight rates (Exhibit 37). Hence, over the years, the railways have increased cross-subsidization in order to offset the losses incurred on passengers through additional revenues (by fare hikes) from freight.

A study by the World Bank of the largest railway systems in the world in 2012 showed that adjusted for PPP, India had both the highest freight costs (Exhibit 40) and the lowest passenger fares (Exhibit 41), thus clearly indicating the burden that the railways are trying to shift onto their freight customers, which is accelerating the shift onto the roads for Indian industry.

The preference for passengers in rail is not just in terms of fares. It also extends to priority, with freight trains moving at around half the speed that passenger trains do (25.9km/hour in F2014 vs. 50.6km/hour for mail / express passenger trains). This has resulted in faster growth in passengers, and crowding out of freight – share of freight as a percentage of movement by rail has been falling consistently for the last 60 years (Exhibit 36). With the share of freight (in passengers + freight) movement down to just 39% in 2014, India has fallen behind not only countries with large land masses (USA, Russia and China) but also even much smaller ones (Exhibit 42).

Of great interest, the same logic of cross-subsidization seems to reverse when applied to the roads sector. Despite the recent catch-up, the tax on diesel has consistently been kept lower than that on petrol (Exhibit 39), ostensibly because higher diesel prices would have a cascading effect on the prices of all goods transported by trucks and railways, and on farm produce.

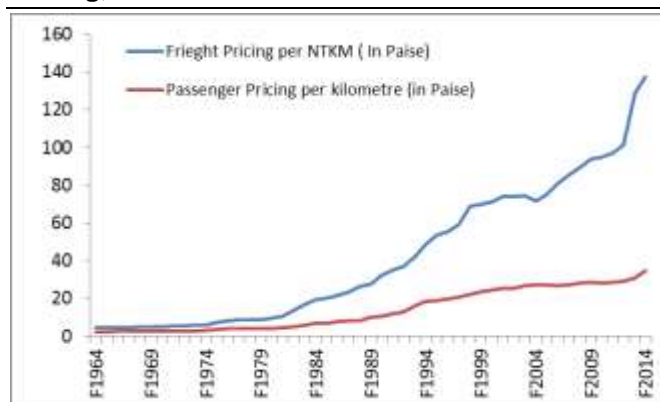
**Hence, in roads, freight is afforded preference over passengers, while it is the opposite in rail.**

Exhibit 36  
**Share of Freight as a Percentage of Traffic on the Rails Fell along with Passenger Pricing vs. Freight**



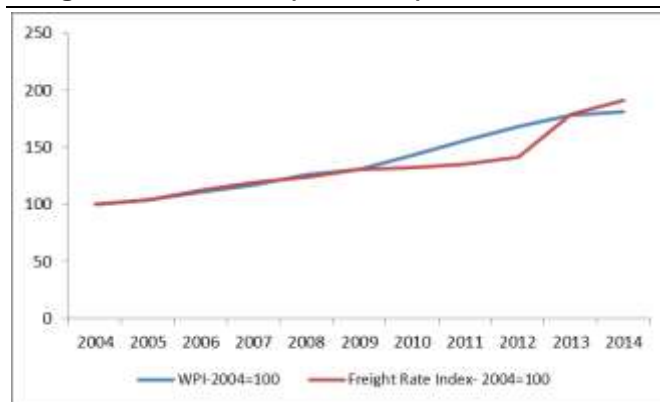
Source: Ministry of Railways, Morgan Stanley Research

Exhibit 37  
**The Widening Gap between Freight vs. Passenger Pricing, F1964-2014**



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 38  
**Freight Index vs. WPI (2004=100)**



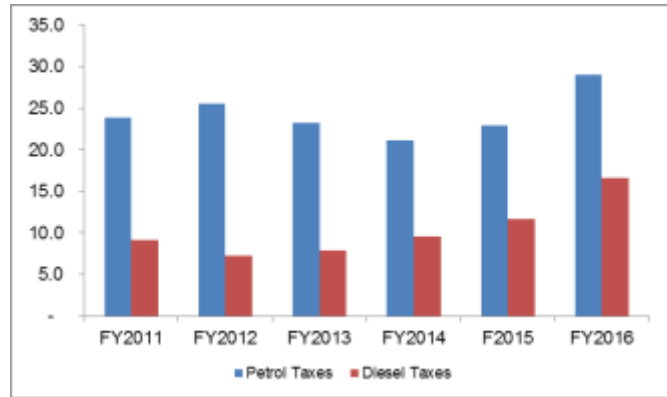
Source: CEIC, Ministry of Railways



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Exhibit 39

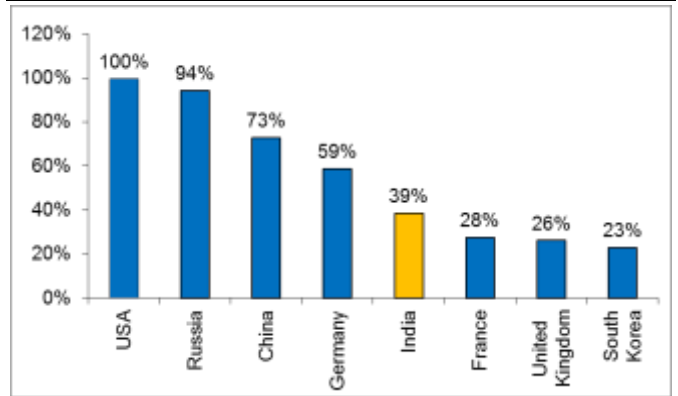
### Petrol vs. Diesel Taxation



Source: PPAC, Company Data, Morgan Stanley Research

Exhibit 42

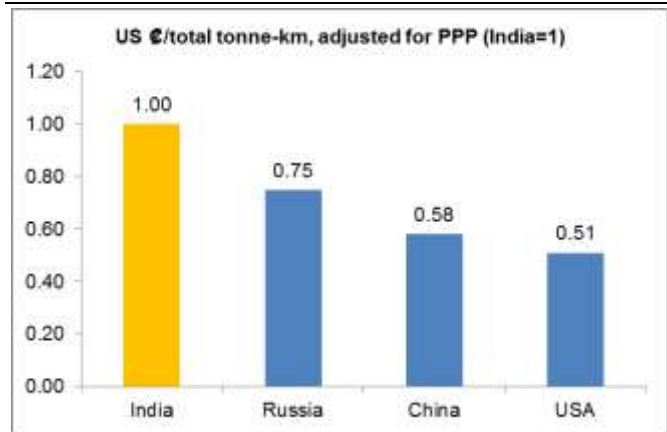
### Share of Freight in Rail Movement (NTKM as % of NTKM + PKM), 2014



Source: Euromonitor, Morgan Stanley Research

Exhibit 40

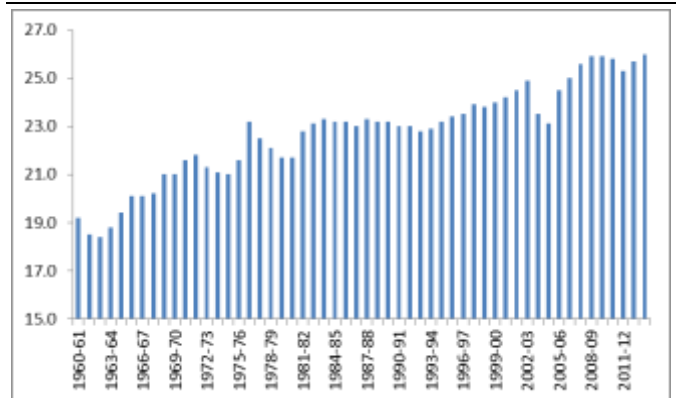
### Rate/Tonne-km, India's Rate Is Highest



Source: World Bank

Exhibit 43

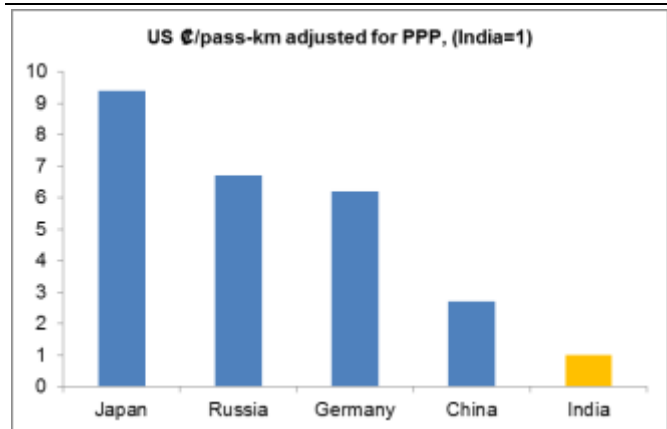
### Speed of Freight Trains in India (in Km/hr), a ~40% Improvement in 50 Years



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 41

### ...and Its Passenger Fares Are the Lowest



Source: World Bank

## Why Does It Matter?

*So the railways are in a decline and inadequate, but why will a fix make them a driver in the next India?*

- 1) **Boost to industry from lower logistics costs:** Based on a World Bank study, we estimate that the gains would be 1% of net sales for the entire corporate sector – or, if passed on, lead to a 5% increase in Trade + a 100% increase in the range of products exported.
- 2) **A 5x+ rail multiplier in operation:** The multiplier means that if the railways can successfully achieve the plan to spend Rs8.56 trillion over F15-19e, 20% of all incremental growth forecast by our economist, Chetan Ahya over F2015-19e would come only from the railway-led investment

This section focuses on the criticality of logistics costs and some quantification of the gains that fixing the modal mix (by boosting the railways) would create for India.

### Transportation Costs Gains – 1% of net sales or 5% increase in Trade + 100% increase in range of products exported

In October 2014, in its development update on India, the World Bank highlighted that *long transit times and high variability and unpredictability in shipments add to total logistics costs in the form of higher than optimal buffer stocks and lost sales, pushing logistics costs in India to two-three times international benchmarks*. This places Indian manufacturing firms in a position of major competitive disadvantage versus Indian companies in the service sector and competitors abroad, where the best practice benchmarks for logistics costs are around 3% of net sales for auto components and around 4% for consumer durables vs. Indian costs of over 10% of net sales for auto components to over 14% for electronics (Exhibit 46).

- According to World Bank estimates, saving 20-30% in logistics costs would be tantamount to a gain in competitiveness of some 2-3% of net sales for key manufacturing sectors, helping India return to a path of high growth and enabling large-scale job creation.
- In addition, a 2007 panel study by the World Bank noted that a 0.5% decrease in logistics costs (relative to GDP) leads to a 2% increase in trade and a 40% increase in the range of products that are exported out

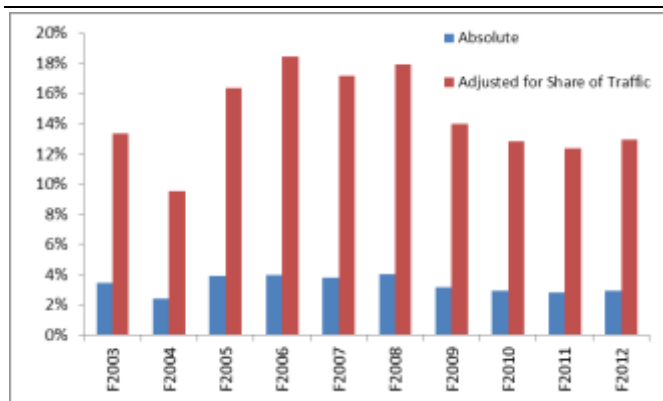
of a country. Of course, this assumes that the gains get passed onto the consumer, through a decline in the price of the product.

In 2008, RITES estimated that a rightsizing of the modal mix between road and rail would lead to nearly a 20% decline in logistics costs for India as a whole. Of course, given the advantages of rail transport in financial, environmental and accident costs (Exhibit 19), RITES assumed a massive shift (Exhibit 45) in throughput terms (taking rail back to 88% share) – which, though possible in theory, is impractical. Since then various bodies led by the Planning Commission have agreed that a 50:50 breakup (from a freight perspective) between the two modes is the target to aim for. Logistics costs for India have moved up since then (India has slipped from 39th in 2007 on the World Bank Logistics Index to 54th position in 2014), but even assuming the smaller shift, we end up with a potential 10% decline in logistics costs.

From the perspective of the economy, Indian logistics (according to the planning commission) are 12-15% of GDP, which looks reasonable vs. other countries (Exhibit 47), till one remembers the poor share of manufacturing in India (Exhibit 49). The 10% saving on the modal mix would lead to a 120-150 bps of savings of GDP and hence a potential 5-6% increase in trade and a 100-120% increase in the range of products exported.

Exhibit 44

### Accidents: Even Adjusted for Share of Traffic, Rail Fatalities Are Less than 15% of Road

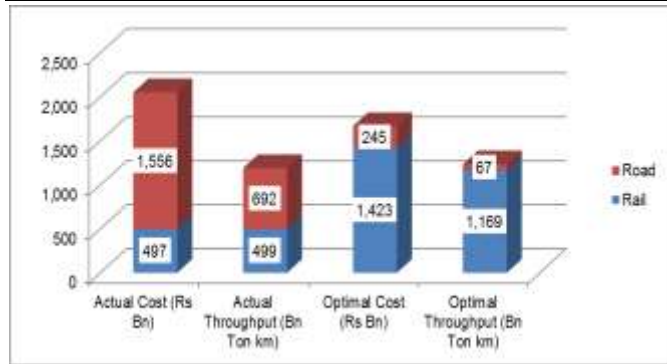


Source: MORTH, Ministry of Railways, Morgan Stanley Research

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Exhibit 45

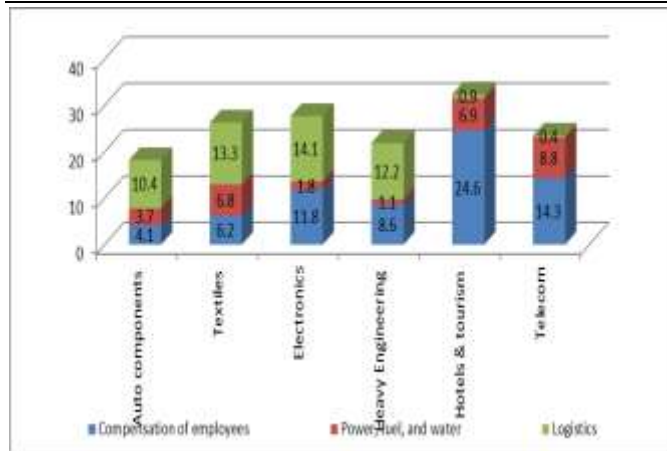
### Gains from Moving to an Optimal Modal Mix on Transport (2008)



Source: RITES, Planning Commission, Morgan Stanley Research

Exhibit 46

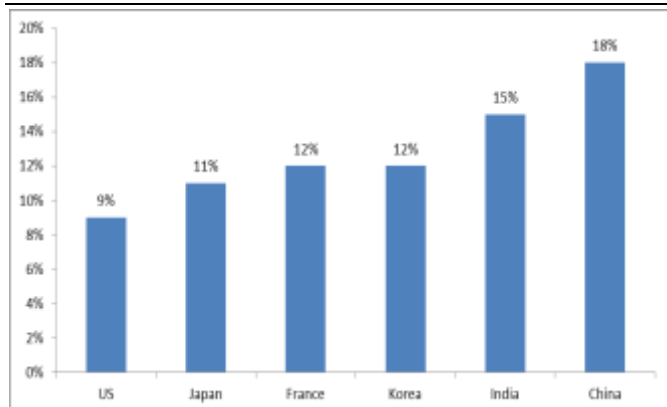
### High Logistics Costs (as a Percentage of Sales) Put Manufacturing Firms at a Disadvantage



Source: Prowess, World Bank, Morgan Stanley Research

Exhibit 47

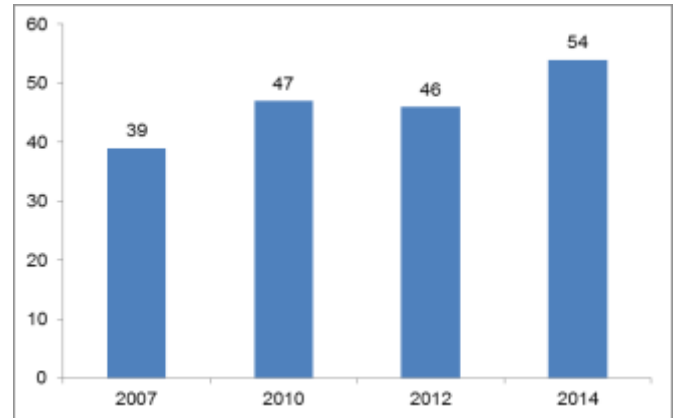
### Logistics Costs (Percentage of GDP) across Countries, 2012



Source: International Transport Forum, Planning Commission

Exhibit 48

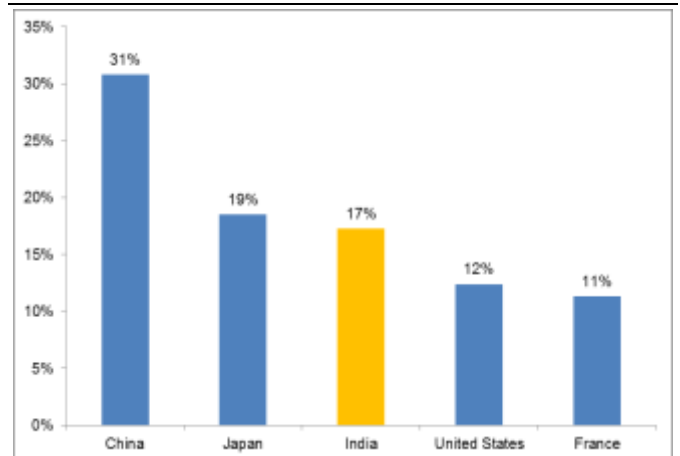
### Dip in India's Rank in World Bank Logistics Index



Source: World Bank

Exhibit 49

### Manufacturing, Value Added (as % of GDP), C2013



Source: World Bank

## Investment Gains – 20% of Incremental GDP between F2015-19e

The gains we measured above are the gains from the reduction in logistics cost for the competitiveness of the Indian manufacturing sector. However, the building of the infrastructure to be able to trigger the shift in modal mix will also have a significant impact on the economy.

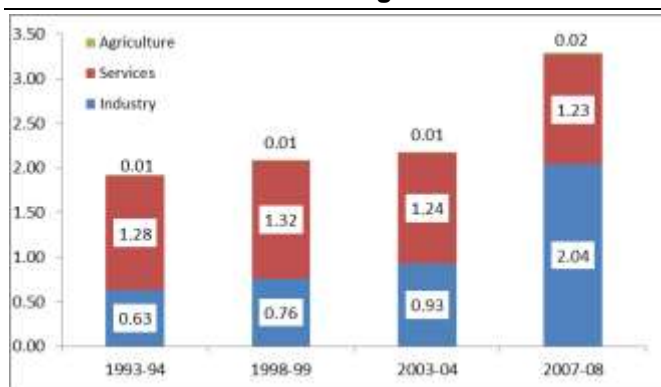
Spending on railways would of course result in significant demand creation, particularly for commodity sectors such as iron and steel (and to a lesser extent, cement) and also for rail linked service sectors (like engineering). Based on 2007-08 data (the latest year for which the input-output tables are available), the economic survey for 2014-15 showed a strong backward linkage (demand pull from other sectors) with both the manufacturing and services sectors, with a Rs1 increase in railway output leading to an increase in output in the economy by Rs3.3. This large multiplier has been increasing over time (Exhibit 50), and the effect is greatest on the manufacturing sector. Investing in railways could provide a significant boost to the “Make in India” policy of the new government.

In addition, we need to consider sectors where railway services are an input to production (i.e., forward linkages). The railways would help in transporting goods and raw materials from different industries which would benefit from them. Some portion of this was covered in the logistics cost gains – but not all of it is. As an example, railways will also help in passenger travel and therefore they would develop services as well as tourism. Though not as strong as the backward linkages, the forward linkages are still fairly high, with a Rs1 push in railways likely to increase the output of other sectors by about Rs2.5. The forward linkages have been declining over time (Exhibit 51), but we view that as a function of the falling share of the railways in both freight and passenger traffic. So a boost in that would lead to a stronger forward linkage too.

Even without assuming a boost, combining the forward and backward linkage effects suggests a very large multiplier (5+) of investments in Railways. If we assume that the railways can successfully deliver on its plan to spend Rs8.56 trillion over F15-19e, then the high multiplier would mean that 20% of all incremental growth forecast by our economist, Chetan Ahya over F2015-19e would come only from the railways led investment.

Exhibit 50

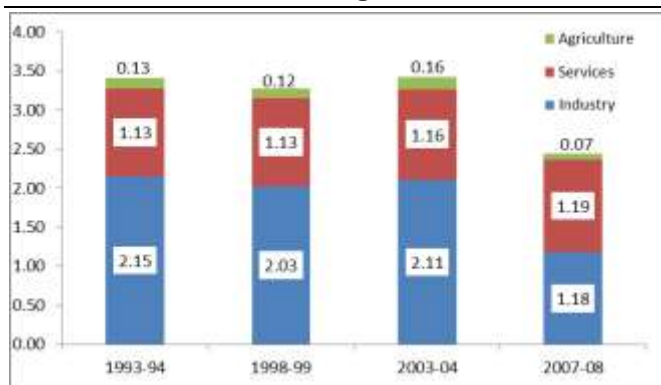
### Indian Rail – Backward Linkages



Source: Economic Survey 2014-15

Exhibit 51

### Indian Rail – Forward Linkages



Source: Economic Survey 2014-15

## The Plan for the Fix

The new Railways Minister, Dr Suresh Prabhu, has formulated a multi-pronged approach to resolve the issues created over the last few decades:

- 1) **Improving customer experience:** We think this is key to increasing passenger fares and reducing the losses.
- 2) **Making rail a safer means of travel**
- 3) **Expanding capacity:** 60% of railway lines and 88% of the high density network run at 80%+ capacity utilization
- 4) **Making Indian Railways financially self-sustainable:** The goal is to enable them to service debt and invest in renewal of assets.

The railways are a massive system riddled with various complaints – so the solution needs to be complex. Apart from envisioning a huge step up in investments over the next five years (at Rs8.56 trillion, 3.9x the size of the investment in the previous five years), the new Railways Minister, Dr Suresh Prabhu, has formulated a multi-pronged approach to resolve the issues created over the last few decades:

### Achieve a sustained and measurable improvement in customer experience

In our opinion, this is important because, though there is lack of political will to raise passenger fares, the reluctance is not shared by passengers. An NCAER survey including both suburban and non-suburban and reserved and unreserved passengers indicated that they are willing to pay more, if they get better services – easier reservations, cleanliness, on-time arrival of trains, food and safety.

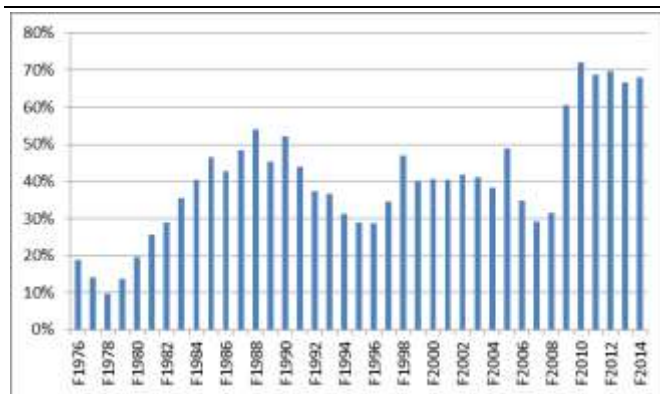
As Exhibit 55 below shows, ~55% of the rail passengers across quintiles (based on household income) were willing to pay for faster train travel, with nearly 100% of those being agreeable to a 1-10% hike for a 10-15% increase in speed (Exhibit 56). Of interest, train travel as a mode of transport is clearly critical; with 50%+ of the passengers seeing an increased cost of 10-20% when train tickets were not available. Probably because of this differential, 40%+ of passengers, across quintiles, were willing to absorb a 10%+ hike for better train services (Exhibit 58). Hence, we believe that the customer resistance to fare increases would be much lower if there were an improvement in speed and services.

We expect that the railways' attempt to improve the customer experience will prefigure successful raising of passenger fares.

A fare increase would reduce the drastic losses on passenger traffic (Exhibit 52), now running at 68% of passenger earnings. Passenger losses (including suburban and non-suburban) have grown from 72% of social obligation cost borne by the railways in F1975 to 95% in F2014 (Exhibit 53), the decline would also have a significant positive impact on railways' finances. It might also enable the railways to stop whittling away their financial cost advantage over roads as a mode of transport, by creating the potential to reduce the over-recoveries on freight (Exhibit 54) to make up for the under-recovery in the passenger segment.

Exhibit 52

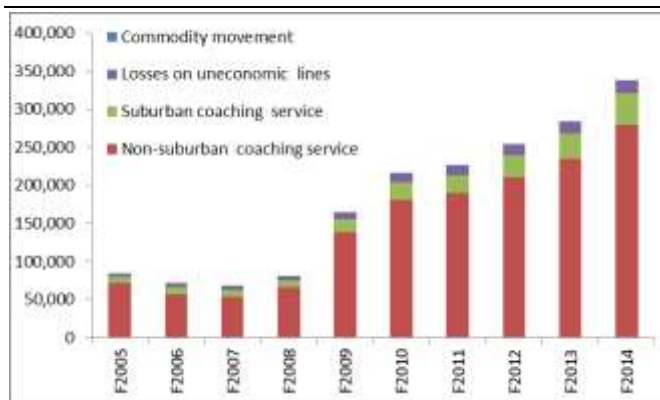
### Passengers – Losses as a Percentage of Earnings, F1976-2014



Source: CMIE, Morgan Stanley Research

Exhibit 53

### Passenger Losses up to 95% of Social Costs, F2005-14



Source: CMIE, Morgan Stanley Research

Exhibit 54

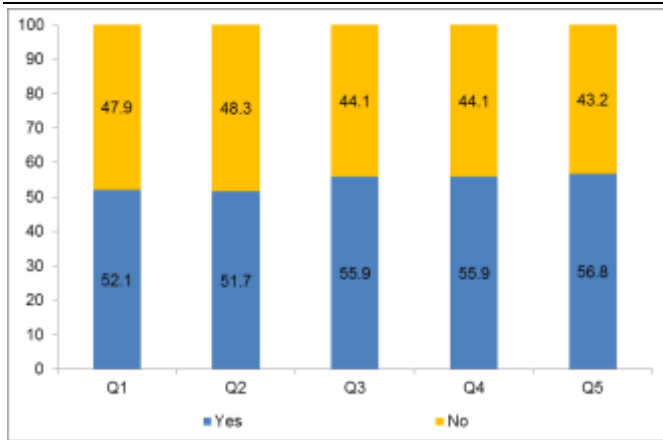
## Reducing Recoveries for Passengers Being Compensated by Higher Over-Recoveries from Freight

|       | Coaching Service |              |       | Freight Service |              |       |
|-------|------------------|--------------|-------|-----------------|--------------|-------|
|       | Cost/PKM         | Earnings/PKM | Ratio | Cost/PKM        | Earnings/PKM | Ratio |
| F2000 | 35.8             | 22.2         | 62%   | 55.9            | 72.3         | 129%  |
| F2009 | 48.9             | 26.1         | 54%   | 63.7            | 96.9         | 152%  |
| F2010 | 52.9             | 26.0         | 49%   | 65.8            | 97.4         | 148%  |
| F2011 | 52.6             | 26.3         | 50%   | 67.6            | 100.4        | 149%  |
| F2012 | 54.4             | 27.0         | 50%   | 69.6            | 104.2        | 150%  |
| F2013 | 57.8             | 28.5         | 49%   | 75.3            | 123.3        | 164%  |

Source: Ministry of Railways, White Paper- February 2015

Exhibit 55

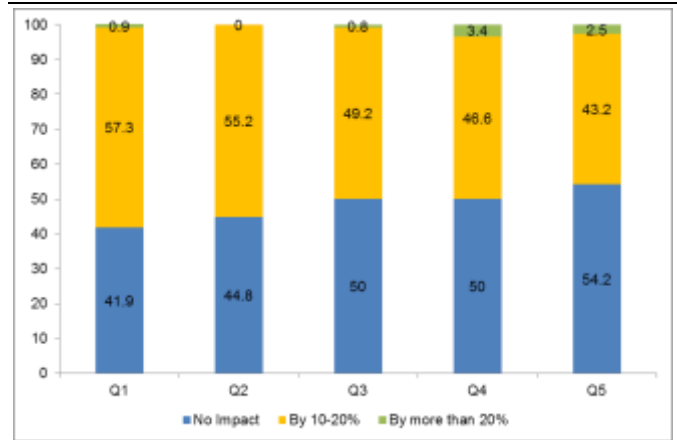
## Respondents' Readiness to Pay More for Faster Train travel



Source: NCAER, Morgan Stanley Research

Exhibit 57

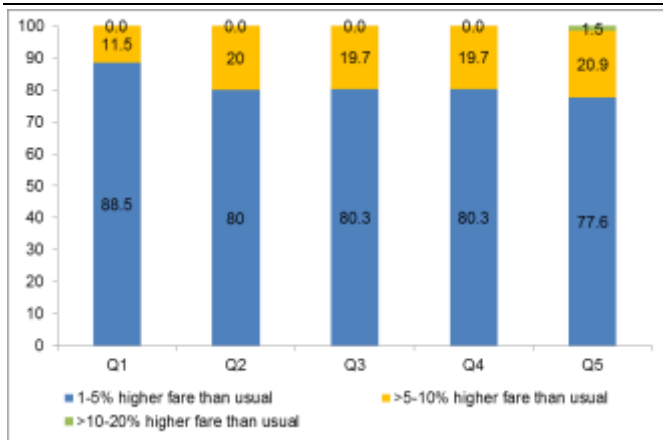
## Impact of Journey Expenditure (in Percentage Terms) when Train Tickets Are Not Available



Source: NCAER, Morgan Stanley Research

Exhibit 56

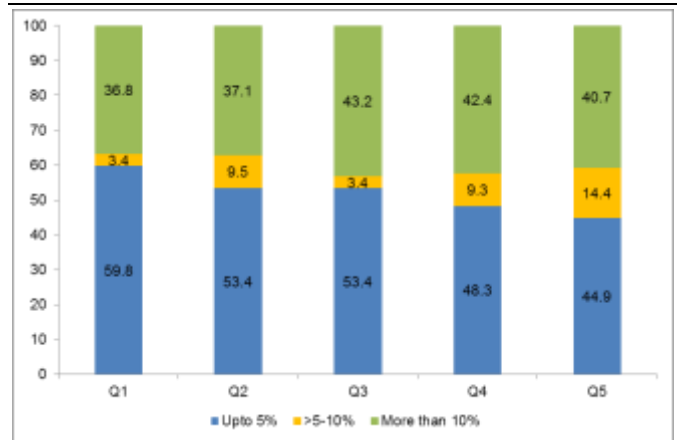
## Respondents' Degree of Willingness to Pay for 10-15% Quicker Train services



Source: NCAER, Morgan Stanley Research

Exhibit 58

## Distribution (%) of Respondents Willing to Pay for Better Train Services by Quintiles



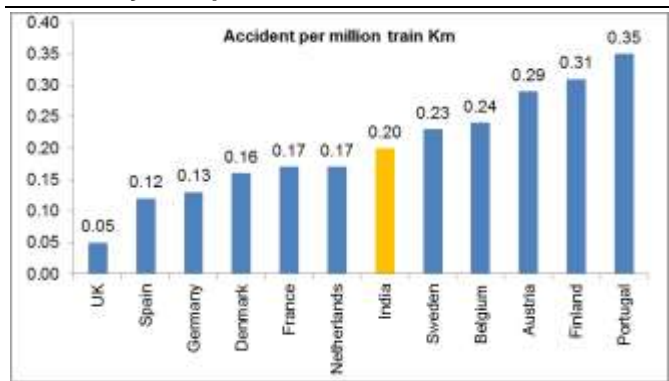
Source: NCAER, Morgan Stanley Research

## To make rail a safer means of travel

By comparison to Indian roads, as shown in the earlier section (Exhibit 44), rail is a much safer mode of transport, both for passengers and freight – but compared to other countries, India's safety record is only middling (Exhibit 59). We believe that this is a function of the 30,000+ level crossings, especially the ~11,500 unmaned ones. In 2012, a presentation made by the railways at the international railways safety conference showed that level crossings caused 41% of all rail accidents and 65% of all fatalities (Exhibits 61-62) between F2008-12. The railways continue to pursue a better safety record through reducing the potential challenge – while manned level crossings have increased 27% over the last 40 years, unmaned ones have come down 57%, taking the share of unmaned level crossings (in the total) down to 38% in F2014 vs. 64% in F1974 (Exhibit 60).

Exhibit 59

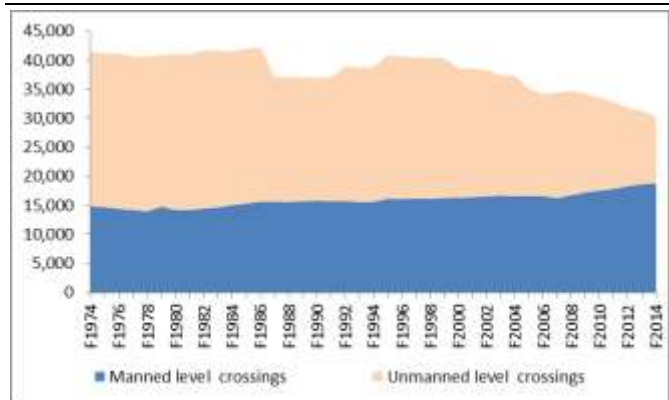
### IR's Safety Comparison with Peers, 2012



Source: Ministry of Railways, European Railways Agency

Exhibit 60

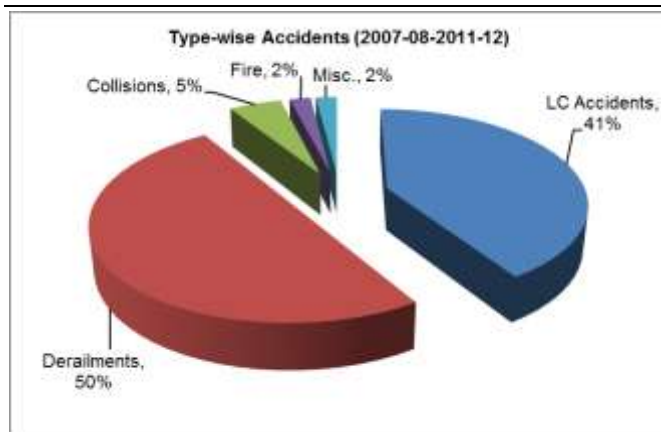
### Number of Level Crossings in IR



Source: CMIE, Ministry of Railways

Exhibit 61

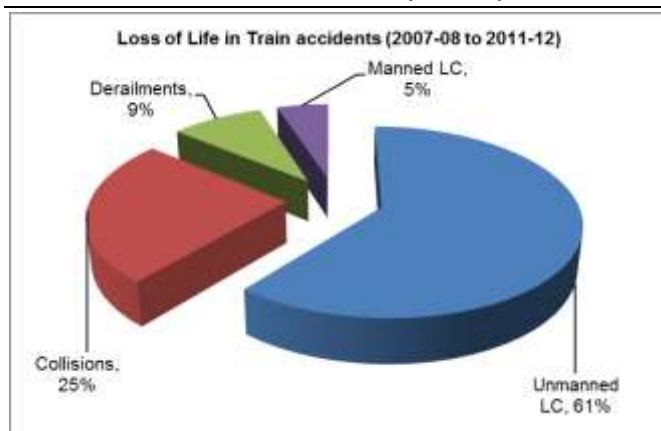
### Accidents by Type in IR (F08-12)



Source: Ministry of Railways

Exhibit 62

### Loss of Life in Train Accidents (F08-12)



Source: Ministry of Railways

## Expand Indian Railways' Capacity Substantially

Of course, this remains key. The reason that the railways have been losing share to roads despite all the advantages they have as a mode of transport is overcrowding. The Committee for Mobilization of Resources led by Mr Bibek Debroy, which submitted its final report in June 2015, highlighted that 60% of Indian Railways' lines were running above a capacity utilization of 80% (which IR defines as the optimum utilization). The situation on the High Density Network was worse. Even though it makes up only 18% of the total IR network, it carries 56% of the traffic, with 88% of the lines above the optimum utilization.

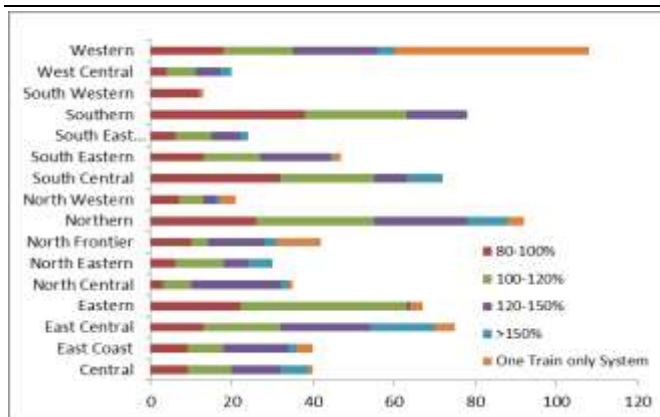
Of course, historically, instead of going into doubling, investments have gone into new lines (Exhibit 66), despite lower returns (Exhibit 34) and rolling stock. However, the plan for the next five years is rather different, with network decongestion finally to get as much investment as network expansion (Exhibit 12) vs. the past 10 years, where investments in doubling were half the investments in new lines (Exhibit 66).

The target set by the Rail Ministry over F15-19e is to increase daily passengers carried from 21 million to 30 million and to lift annual freight carried from 1 billion to 1.5 billion tonnes. Our discussion with the Ministry indicates that it also plans to bring capacity utilization down from around 100% at the moment to below 80% (which it defines as optimal). Hence the capacity expansion in play is more like 80-90%, rather than the 40-50% implied by the passenger and freight targets. Part of this would be through the promised 20% increase in track length (from 114,000km to 138,000km) over the same time frame.

In addition, the railways have announced plans (in the rail budget) to:

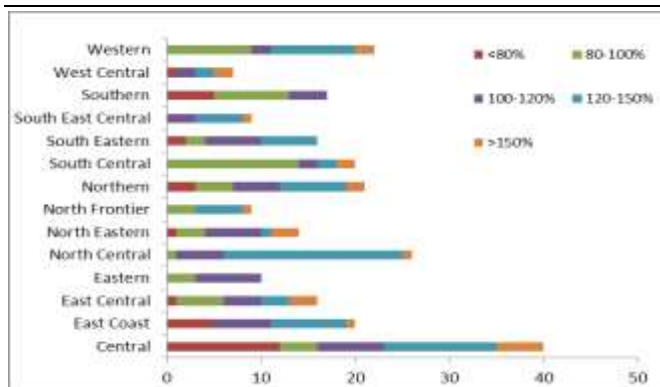
- Fast-track 7,000kms of double/third/fourth lines with 1200km out of that being commissioned in F2016 itself (investment of Rs87bn)
- Start 77 new projects for doubling/tripling/quadrupling another 9,400km along with their electrification (investment of Rs962bn)
- Prioritize construction of longer loops, creating smaller block sections, building bypass lines, making crossing stations, augmenting terminals – all with the aim of decongestion.

Exhibit 63  
**60% of Indian Railways' Lines Are Running above Optimal (80%) Capacity Utilization**



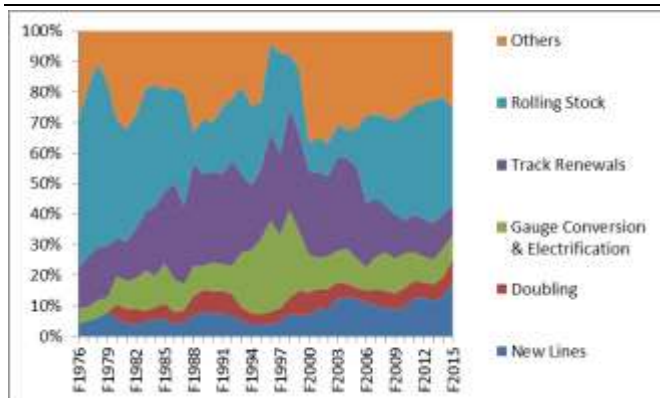
Source: Ministry of Railways, Morgan Stanley Research

Exhibit 64  
**88% of Lines in High Density Network Running above Optimal (80%) Capacity Utilization**



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 65  
**Breakup of Rail Investments (F1976-2015): Rolling Stock Has Been the Big Ticket**

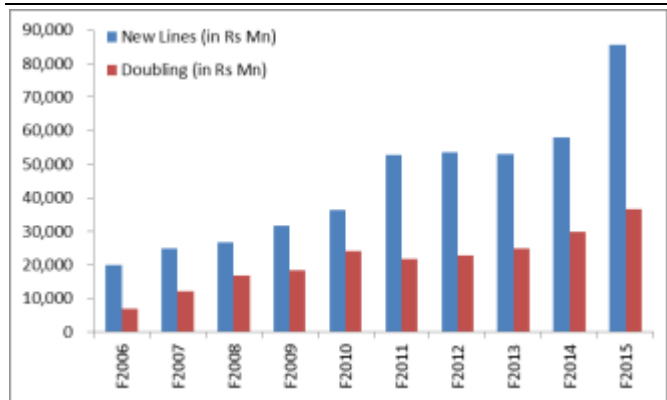


Source: CMIE, Morgan Stanley Research



Exhibit 66

## Investments in New Lines 2x Investments in Doubling, (F2006-15)



Source: CMIE, Morgan Stanley Research

## Dedicated Freight Corridors (DFC) – A Slow Beginning, but Key to Growth

Of course the DFC (Exhibits 67-68) will be a significant part of this ramp up, with projections by the Ministry of Railways indicating that it will carry 305mn tons (including both the eastern and western corridors) of cargo by F2022. This is a 2,788km (excluding the 534km Dankuni-Sonnagar section to be built through PPP funding) dedicated freight corridor (no passenger trains) that the Railways are constructing with funding support (67-80% of projects capex) from Japan International Co-operation Agency (Rs387bn on Western corridor) and the World Bank (US\$2.73bn on Eastern Corridor) at a cost of ~Rs815bn (Exhibit 67).

Around 85% of the land required for the Eastern and Western DFC has been acquired already, though our discussions with the Rail Ministry indicate that 100% of the land is now in possession of the railways, clearing the DFC's biggest potential stumbling block. Though only 65% of the DFC (in track length) has been awarded as of now, the awards process has picked up in C2015 (between January to August 2015, the DFC awarded contracts worth Rs170bn vs. Rs130bn in the 10 years prior to that). Our discussions with the Rail Ministry indicate that the award process will be completed by June 30, 2016, setting the stage for both corridors to be fully operational by December 2020 (4.5 years required for construction), though part of the Eastern DFC (a 55km section between Durgawati-Sasaram) will become operational in F16e.

The railways also plan to follow this up with another four dedicated freight corridors. They have already asked DFCCIL (Dedicated Freight Corridor Corporation of India), the

implementing body for the current corridors, to do traffic surveys for them:

- East-West Corridor (Kolkata-Mumbai) - ~2330km
- North-South Corridor (Delhi-Chennai) - ~2343km
- East Coast Corridor (Kharagpur-Vijaywada) - ~1100km
- Southern Corridor (Chennai-Goa) - ~899kms

Of course, if the new corridors are to make a difference, they will need to be implemented a lot faster than the Eastern and Western corridors, which – if the current timetable holds – will have taken 15 years between traffic studies (May 2005) and becoming operational (December 2020). According to our latest interaction with the DFCCIL (see our report [Indian Infra Trip – Bulls \(Delhi\) vs. Bears \(Mumbai\)](#) dated November 9, 2015 for details), it has already completed the traffic surveys for three of four new proposed corridors and believes that the returns on at least two of them are higher than for the Eastern and Western corridors. Though the first two corridors have taken longer, management believes that the learning value from those will ensure that the others (once approved) can be completed in 7-10 years.

Exhibit 67

## Western & Eastern DFCs – A Snapshot

|                   | Western Dedicated Freight Corridor                            | Eastern Dedicated Freight Corridor                        |
|-------------------|---|---|
| Route Description | JNPT-Ahmedabad-Palanpur-Rewari-Tughlakabad/Dadri              | Dankuni-Gomoh-Sonnagar-Mughalsarai-Kanpur-Khurja-Ludhiana |
| Route Kms         | 1483  | 1305*   |
| Traffic Type      | Container Transport   | Coal & Steel Traffic                                      |
| Funding Partner   | Japan International Co-operation Agency – 80% of project cost | World Bank – 67% of project cost                          |

Source: Ministry of Railways

\* excluding the 534km Dankuni-Sonnagar section to be built through PPP funding

Exhibit 68

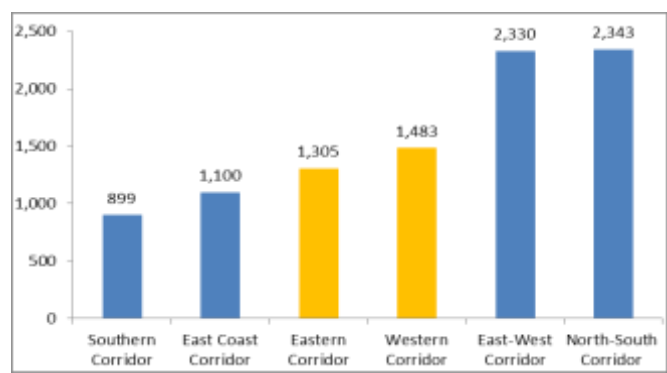
## Advantages of DFCs

|                  | Current            | DFC                  |
|------------------|--------------------|----------------------|
| Height (m)       | 4.265              | 5.1-7.1              |
| Width (mm)       | 3200               | 3600                 |
| Container Stack  | Single             | Double               |
| Train length (m) | 700                | 1500                 |
| Train Load (Ton) | 4000               | 15000                |
| Axle Load (ton)  | 22.9/25            | 32.5/25              |
| Maximum Speed    | 75                 | 100                  |
| Grade            | Up to 1 in 100     | 1 in 200             |
| Traction         | Electrical (25 kv) | Electrical (2X25 kv) |
| Station Spacing  | 7-10km             | 40km                 |

Source: Ministry of Railways

Exhibit 69

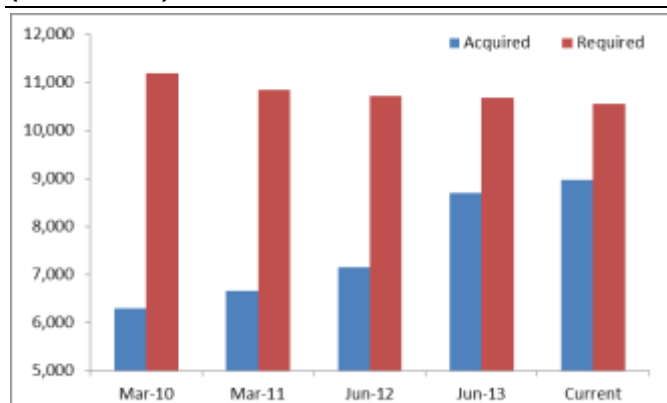
## The Golden Quadrilateral Freight Corridor – The Intended Corridors (in km)



Source: DFCCIL, PIB, Morgan Stanley Research

Exhibit 70

## Land for the Eastern and Western Freight Corridors (in Hectares)



Source: DFCCIL, PIB, Morgan Stanley Research

## Make Indian Railways Financially Self-Sustainable

This is probably the single most challenging objective for the Indian Railways, because it means generating surpluses from operations that are large enough not only to service the debt needed to fund the current capacity expansion (Exhibit 70) but also to invest in renewal of assets. Getting to such a stage will require significant improvement in both the revenue stream of the railways and strong cost control measures. To achieve this objective, the railways have announced several measures:

**Fuel cost (21% of F14 gross receipts):** Given the significant cost advantage electricity has over diesel (Exhibit 73), India has already moved to running 51% of passenger trains and 63% of freight trains on electric traction (Exhibit 74). The railways are adopting a twin approach to lower the energy bill by ~Rs50bn (\$800mn) annually over the next five years.

1. The railways plan to accelerate electrification – In F16e, they have sanctioned electrification of 6,608km vs. the sanction of 462km in F15. To understand the difficulty in reaching this goal, it is important to remember that IR managed to execute only 4,111km on this front in the last decade (Exhibit 71).
2. The move from diesel to electricity will help, but the railways are also trying to lower electricity costs (~35% of total fuel costs), by bidding out for medium-term (three-year) power supply contracts in the open market. The first such agreement for supply of 50 MW was signed with Adani Power (the winner out of seven bidders) in October 2015 ([see release](#)) at Rs3.69 per unit, a 45% discount to the current costs of Rs6.75 a unit paid by the railways to state utilities. Tenders have already been floated for another 585 MW, while media reports (e.g., *Live Mint*, July 13, 2015) indicate a tie-up with NTPC in Maharashtra for another 500 MW (at Rs4.70 a unit). The railways consume around 2.5 GW of power, so bidding it out entirely could mean that savings target of the railways can be met just from this initiative.

**Higher utilization to boost revenues:** To reduce empty flows of wagons, the railways are rolling out (on an all-India basis) an Automatic Freight Rebate Scheme for traffic loaded in empty flow direction which they had launched as a pilot (in October 2014) on the NF Railway and Southern Railways.

**Increased speed to boost revenues:** The railways plan to try to enhance the speeds of freight trains to between 75-100

November 25, 2015

India Industrials

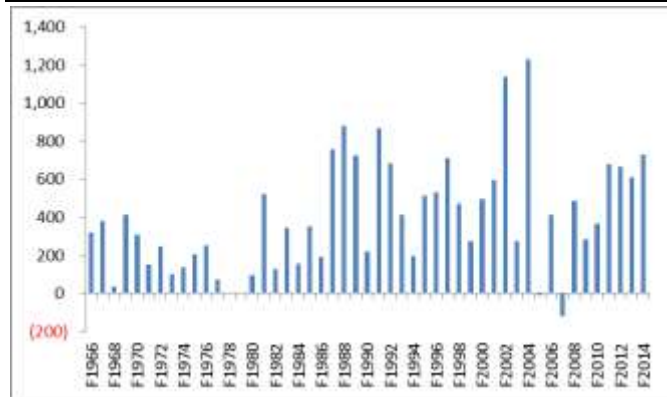
kmph vs. the current 25 kmph (Exhibit 43). This would massively (3-4x) increase revenue potential, though we think that given the clogged networks, it is likely to be feasible only on the DFCs, though technology enhancements should help increase speed to some extent on the main network. As an example, the train sets that the railways plan to introduce will enable a train to stop in 1.5 minutes vs. the 6-7 minutes it takes now.

However, the railways have not announced any plans to deal with its wage expenses, which are the biggest challenge at 56% of the last five years' gross traffic receipts. Of course, even though the railways are the largest employer in India (employing 1.33mn people), since the peak in F1992, the

railways workforce has declined 20% in absolute terms. When combined with the consistent increase in traffic, this has meant that productivity has moved up significantly. In addition, with ~60,000 employees (~ 4.5% of total employee strength) set to retire annually over F16-18e, the trend toward increasing productivity should continue. However, a study by the Planning Commission in F2007 had indicated that employee productivity in India (adding up both passenger and freight) was amongst the worst in the world (Exhibit 77), leaving massive room for improvement.

Exhibit 71

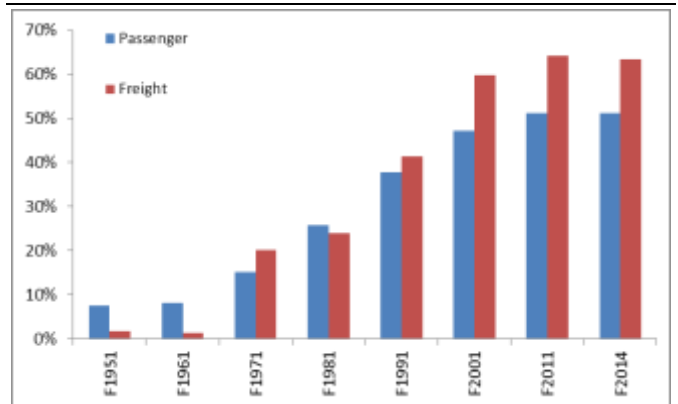
### Electrification of Lines (in Km)



Source: CMIE, Morgan Stanley Research

Exhibit 74

### ...Will Keep Driving the Share of Electric Traction Upwards in the Future Too



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 72

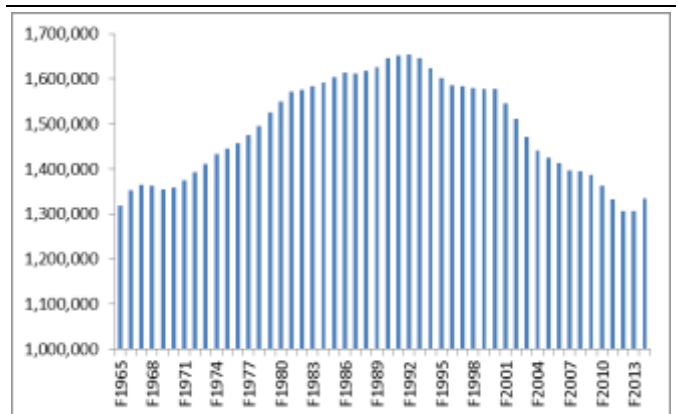
### Key Expenses as a Percentage of Gross Traffic Receipts



Source: CMIE, Morgan Stanley Research

Exhibit 75

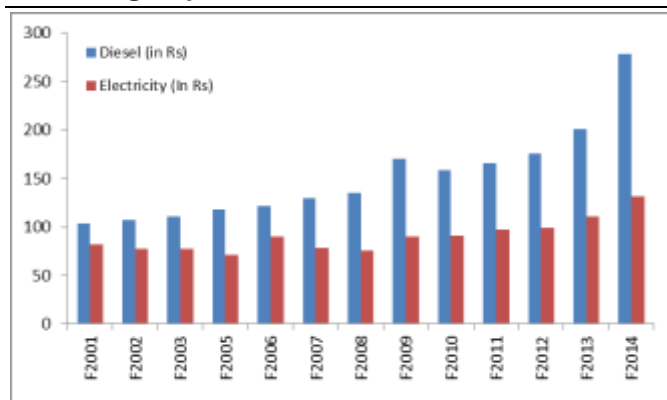
### Number of Railway Employees, FY1965-FY2014



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 73

### Line Haul Cost/ 1000 GTKMs (BG) for Freight – The Increasing Gap in Fuels...



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 76

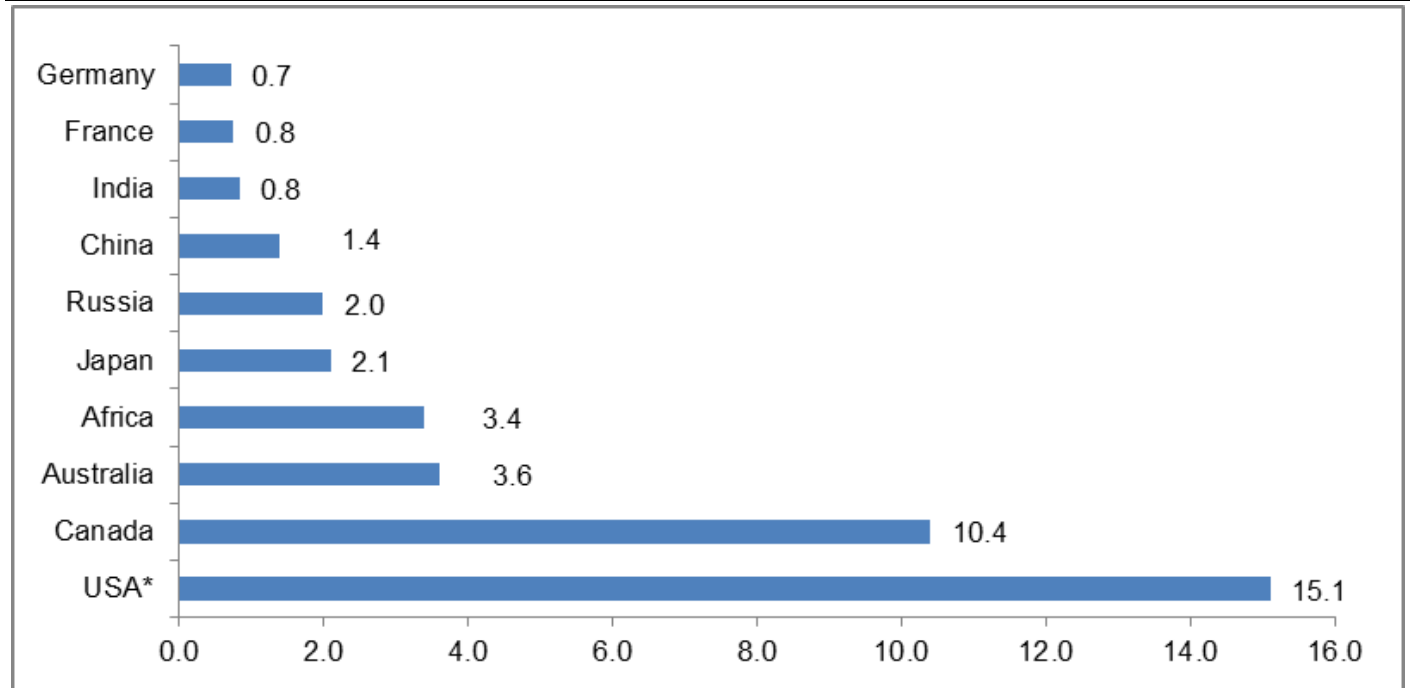
### Likely Number of Retirees in IR



Source: Ministry of Railways, Morgan Stanley Research

Exhibit 77

**Staff Productivity Comparison Using Traffic Units (NTKM + PKM), F2007**



Source: Report of the Working Group on Railways (NTDPC), White Paper on Indian Railways, UIC 2007  
\* US data for AAR Class 1 and Amtrak

Exhibit 78

**Why India's Electrification Story Is So Different from the Diesel Story in the US – Understanding the Differences vs. the Most Successful Freight Market in the World (The US)**

|                              |  |
|------------------------------|--|
| Makeup of Rail               | Similar to the European situation, where electrification was rolled out for high speed passenger trains and freight trains joined the party, since they shared the tracks  |
| Already over the Hump        | Unlike the US, where a shift from diesel would require massive infra spending and capital costs in rolling stock, with 50%+ of the network already electrified India's line haul costs show a wide gap between electric and diesel costs for hauling cargo |
| Who Bears the Cost?          | Unlike the system of fuel surcharges in the US, the predominance of subsidized passenger travel in India means that the railways will need to load an exaggerated cost only onto the freight customer, or bear it themselves                               |
| Energy Security              | Given the high import bill on oil and the availability of coal for power plants, this move boosts India's energy security  |
| The Difference in Fuel Costs | The rate paid by the Indian railways for diesel is 50% <i>higher</i> than the rate paid by US railways, while the rate at which the Indian railways can get electricity is 45% <i>lower</i> than that paid by US transporters                              |

Source: Indian Railways, Morgan Stanley Research

## Is Ambition Likely to Lead to Disappointment Again?

India has traditionally been the land of opportunity as far as infrastructure (including the railways) is concerned – high on promise and low on delivery. However, we expect this time to be different for the following reasons:

- 1) **PPP renegotiation to lead to a more robust model:** Railways are in a position to take advantage of the evolution (through challenges) of the PPP model in India.
- 2) **Strong political mandate, infra focus already visible:** An increased allocation to infrastructure (mainly roads), plus measures to reduce risk for the private sector and ease funding challenges, reflect strong intent.
- 3) **Focusing on the right problem:** The focus on speed rather than the historical solution of throwing more rolling stock on the burdened tracks is a game-changer.
- 4) **Innovative funding options being explored:** With \$25bn of funding already raised from LIC (Life Insurance Corporation of India) and land monetization and bond issuance on the cards, the railways are seeking differential sources of funding. That reduces the challenge posed by India's constrained banking sector.
- 5) **Delivery has already started, though there's a long way to go yet:** We count 132 promises (across 11 broad areas) made by the Railways Minister in the F2015 speech. Our analysis of the Rail Ministry's tracker indicates that delivery has already begun on 72 of those.

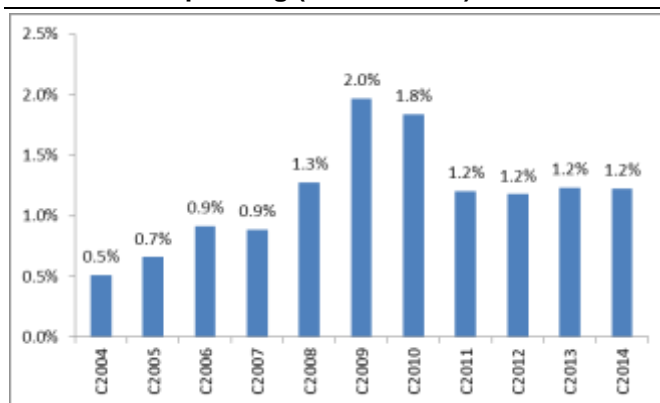
Of course, India has traditionally been the land of opportunity as far as infrastructure (including the railways) is concerned – high on promise and low on delivery. This gives rise to a certain cynicism about the bullishness that the above numbers convey. However, we believe that the next 5-10 years are likely to be very different for the railways, with strong delivery coming through.

Given the fresh thought process and tailwinds (see below), we look towards China as an example of a successful implementation of strong capex in the railways. With 0.5% of GDP being spent on the railways at the moment, India is where China was in C2004. China saw a sustained pickup in spending (as a percentage of GDP) to 1.3% in C2008, before

a spurt in C2009-10 and then a return to around C2008 levels for C2011-14 (Exhibit 79). We use what took place in China over 2004-08 (before the boom in C2009-10) as the benchmark for delivery in India over F2015-19e. The combination of the step up in percentage of GDP and India's GDP growth (Exhibit 80) over the period results in estimated spending of US\$95bn. Excluding the money already spent in F2015 implies a 75% strike rate (over F2016-19e) on the railways' stated target. In the context of past delivery failures across the sector, an assumption of 75% delivery on a very ambitious plan indicates our strong confidence.

Exhibit 79

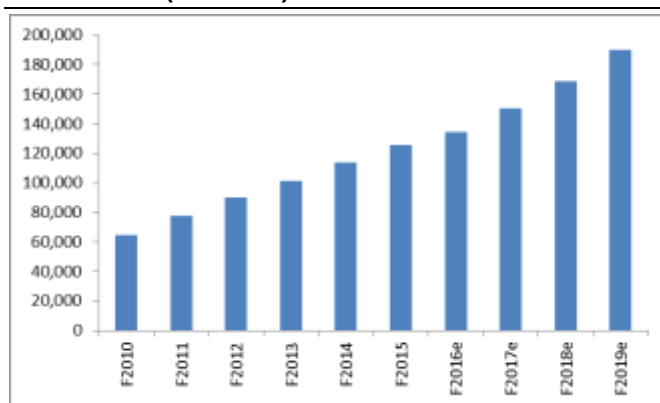
### China's Rail Spending (as % of GDP)



Source: CEIC, Morgan Stanley Research

Exhibit 80

### India's GDP (in Rs Bn)



Source: CMIE, Morgan Stanley Research Estimates

We detail the reasons for our belief that things are set to change and move to a high trajectory on the railway build-out.

## 1) PPP Renegotiation to Lead to a More Robust Model

The private sector's share in infra spending in the country was 33% over F2003-12, so the concept is already proven. It is clear that potentially attractive infrastructure business models do exist (in power, roads, ports, airports, etc.), and that the private sector is willing (for a profit motive) to shoulder the burden of building out the country's infrastructure.

Even better, the PPP model has already faced challenges in several segments (power and roads) and renegotiations are currently under way with the government. Studies by the OECD indicate that in 55% of the PPP projects across the world (over 1980-2000), given the challenges of duration and unforeseen risk, renegotiations are required. The speed bump caused by the first set of renegotiations in the Indian PPP journey is nearly behind now. Surmounting this challenge will lead to a more robust model with room for future renegotiations if required.

Railways, on the other hand, are the most backward infrastructure segment where PPP is concerned – only 4% of the spending over F2003-12 came from the private sector. However, being late to the PPP party means that the railways start their PPP journey with the benefit of the experience across the other segments. Hence they should be able to create more robust contracts upfront, which is in turn likely to lead to a faster acceleration of the PPP participation (vs. the time it took to build up in other segments).

As an example of learning, after seeing the conflict of interest in roads, where NHAI is both a party to the dispute and an adjudicator, the railways are clear about setting up a regulator (promised in the rail budget speech) to encourage PPP. Also, given the challenges faced in toll-based models, the railways want to ease into it, and our discussions with the ministry indicate that they will start off PPP (in building tracks) on an annuity basis, hence ensuring maximum visibility to the private sector and lenders. As a start, the railways have made an indicative list of projects worth ~Rs900bn which they plan to put up for PPP (see Annexure 2 for details on the projects).

Exhibit 81

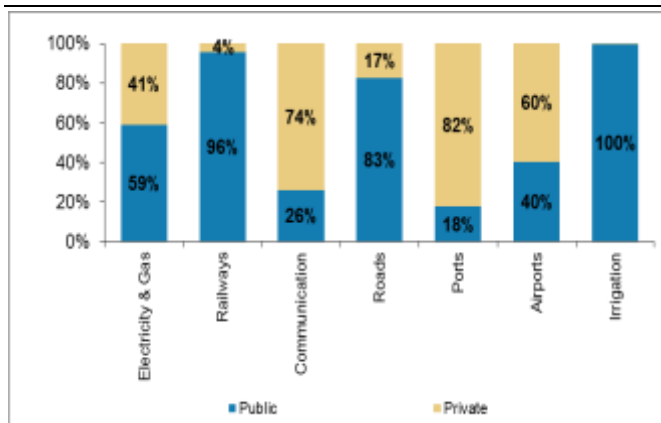
### 55% of PPP in Transport (1980-2000) Were Renegotiated

| Region/Country              | Sector      | % of renegotiated contracts | source                                       |
|-----------------------------|-------------|-----------------------------|--|
| Latin America and Caribbean | Total       | 68%                         | Guasch 2004 (2012)                           |
|                             | Electricity | 41%                         |  |
|                             | Transport   | 78%                         |  |
|                             | Water       | 92%                         |  |
| US                          | Highways    | 40%                         | Engel Fischer & Galetovic 2011               |
| France                      | Highways    | 50%                         | Athias and Saussier 2007<br>Beuve et al 2013 |
|                             | Parking     | 73%                         |  |
| UK                          | All Sectors | 55%                         | NAO 2001                                     |

Source: World Bank/PPIAF Database, Guasch (2014), Morgan Stanley Research

Exhibit 82

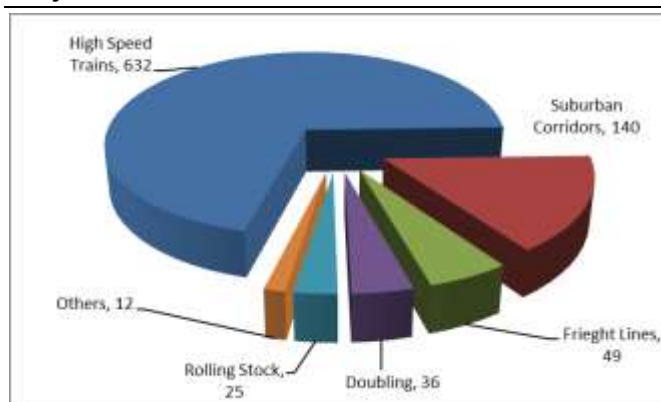
### Share of Segments in Infra – F2003-12



Source: Planning Commission

Exhibit 83

### Projects of ~Rs900bn Listed for PPP



Source: White Paper on Railways 2015

## 2) Strong Political Mandate, Infra Focus Already Visible

The new government has assumed office with the strongest mandate in 30 years. Though this is neither a necessary nor a sufficient condition for an infrastructure buildout, because the gains from infrastructure spending are less immediate, the lower political pressure (from allies) can enable longer-term thinking, over which period the gains are easier to see. Our macro team believes that the new government's policies will be reform- and development-oriented, and we believe that infrastructure will be a key component there.

The budget already gave us a preview of the plan:

**Increased allocation:** The Finance Minister (FM), Mr Jaitley, is increasing the allocation to infrastructure (including CPSEs – Central Public Sector Enterprises) by Rs700bn, mainly driven by the conversion of excise duty on petrol and diesel into a road cess (Rs400bn). Apart from the cess gains, the allocations to roads and rail were increased by Rs140bn and Rs100bn, respectively.

**Easing debt funding:** The government plans to establish a National Investment and Infrastructure Fund (NIIF) and fund it to the tune of Rs200bn annually, which would be levered to invest into infrastructure finance companies, such as the IRFC and NHB, which would further lever it to finance infrastructure projects. Also, tax-free infrastructure bonds for projects in the rail, road and irrigation sectors will be allowed, and the capital gains regime for the sponsors exiting at the time of listing of the units of InvITs has been rationalized.

**Risk transfer to government on PPP:** On PPP, the FM focused on the rebalancing of risk, concluding that the sovereign will have to bear a major part of the risk in Infrastructure. While announcing 5 new Ultra Mega Power Projects (4000 MWs each) on which all clearances and linkages will be in place before awarding, the FM said that the government is considering similar plug-and-play projects in other infrastructure projects such as roads, ports, rail lines and airports. Clearances have been a big stumbling block for infra capex, so such a plug and play policy could be a game-changer, in our opinion.

## 3) Focusing on the Right Problem

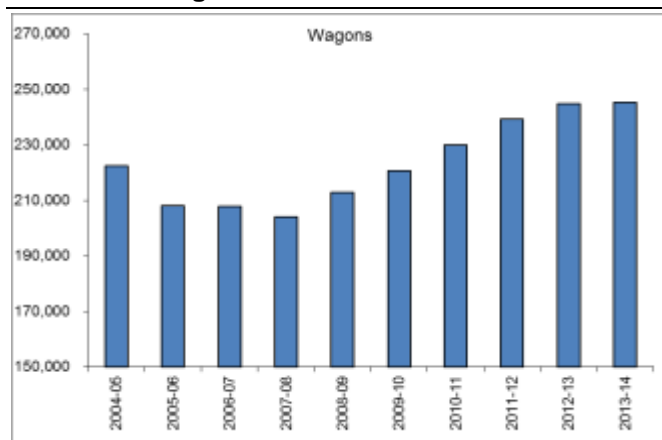
Though the consistent underinvestment in the railways over the last 40 years has resulted in capacity constraints, successive governments have been trying to resolve the wrong problem. A World Bank study of the largest railway systems in the world in 2012 showed that the problem was not one of quantity but quality – i.e., productivity (Exhibits 86-87). Over the last decade, while there was only a 7% increase in running track km (from 83,859km in 2004 to 89,919km in F2014), the numbers of locomotives went up 34%. Instead of trying to increase the speed of the trains, governments have actually been throwing more trains at the network to keep up with new project announcements.

*It's like getting a tummy tuck instead of changing your exercise and eating habits in order to make a lifestyle change. To add insult to injury, you start trying to eat more than you were eating earlier. Not only are you likely to revert to the same (tummy) situation in a while, but you've also put medical risk (surgery-related) on the menu.*

Clearly, both moves have been counterproductive, resulting in further clogging of the network, thus bringing down wagon / train speeds and hence productivity even more. What's different this time is the focus on speed by the current Railways Minister, Dr. Suresh Prabhu. His budget speech in February 2015 focused on achieving higher speed through increased efficiency (e.g., ROBs) and capacity (increase in track length by 14% to 138,000km over five years). We believe that this (identification of the problem) is the first step on the right path and continuation on it over time will lead to the resolution of the railways' main challenge - congestion.

Exhibit 84

### Number of Wagons over the Last 20 Years

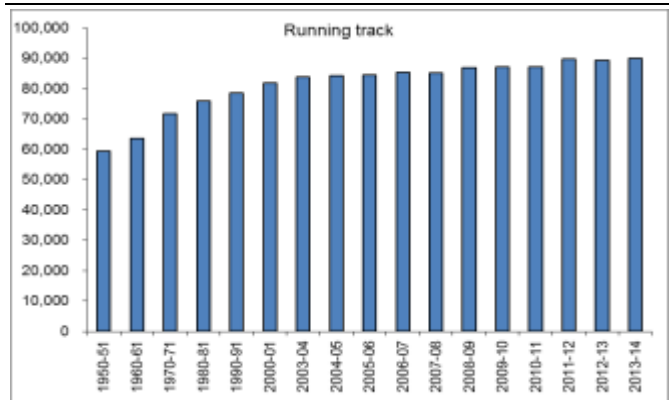


Source: Ministry Of Railways



Exhibit 85

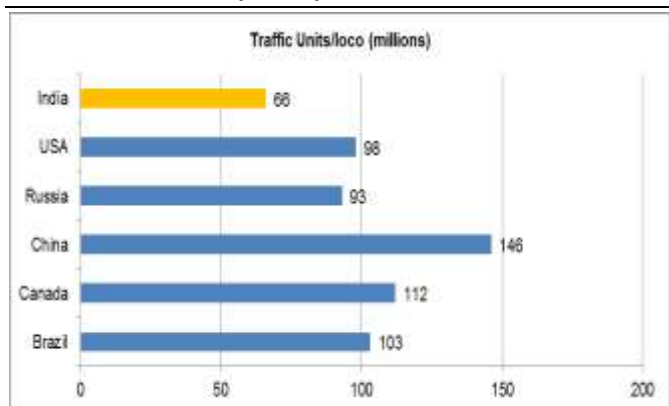
## Running Tracks – kms



Source: Ministry of Railways

Exhibit 86

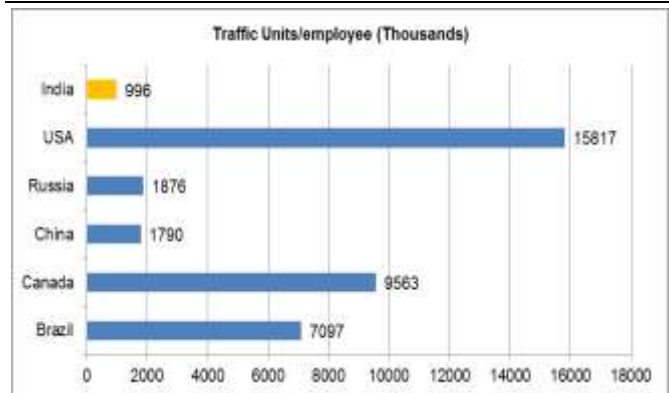
## Traffic Units/loco (in mn)



Source: World Bank

Exhibit 87

## Traffic Units/employee (in Thousands)



Source: World Bank

## 4) Innovative Funding Options Being Explored

Given the hiccups in the PPP projects over the last 3-4 years (mainly in power and roads), banks' funds have been stuck in the sector with little visibility and an increasing risk of NPLs. Our banking team pointed out in their report in "The Next India" series (see [The Next India: Financials – Foundation For The Next India](#)) that the problems faced by the infrastructure sector and the duration mismatch created for banks in infra lending mean that the banks are likely to be averse to funding infrastructure over the next five years.

However, over the last 18 months, we have seen several initiatives from the RBI and the government to nip this issue in the bud.

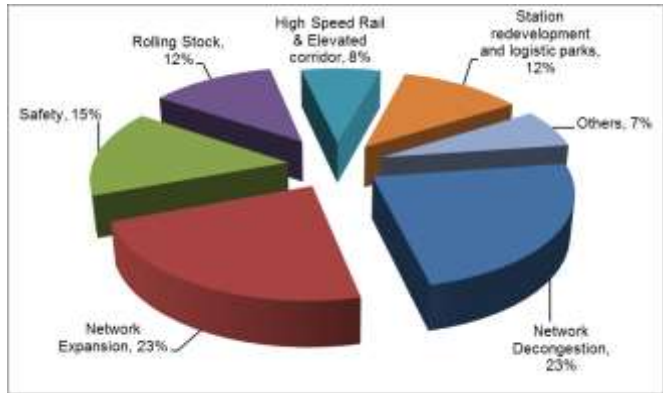
The move to remove the CRR (Cash Reserve Ratio) and SLR (Statutory Liquidity Ratio) requirements for infrastructure lending is likely to make the lending significantly more attractive to banks. Apart from that, given the ALM mismatch, banks have been allowed to raise long-term bonds from the market for financing infrastructure loans. The finance minister's launching of Infrastructure Investment Trusts (InvITs) also opens up another venue for infrastructure funding (especially for the private sector). Projects that are in growth or mature stages can be monetized to finance new projects or the ones currently in investment phase.

We have also seen the railways in particular seek differential sources even for the government part of the funding:

- LIC extended a US\$25bn loan for financing the expansion of 24 congested corridors.
- The dedicated freight corridor is being primarily financed by the World Bank (Eastern Corridor) and the Japan International Cooperation Agency (JICA).
- 8,000+ stations are being put up for development through the PPP route, with land exploitation being chosen as the route for payment.
- New business models (discount on rail fare) being evolved for tapping funding for last-mile connectivity from the customers who benefit.

Exhibit 88

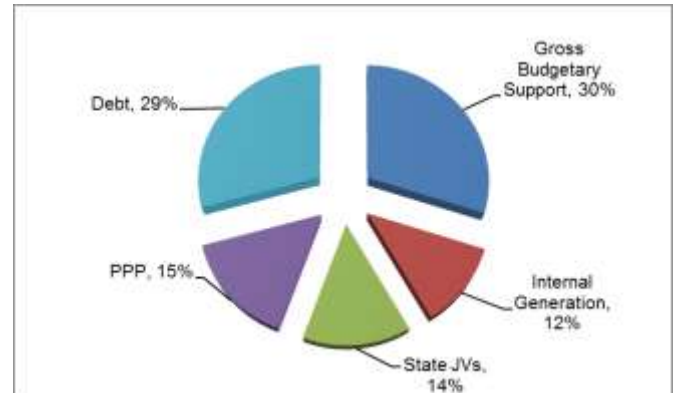
## Spending Plans



Source: Ministry of Railways

Exhibit 89

## Funding Plans



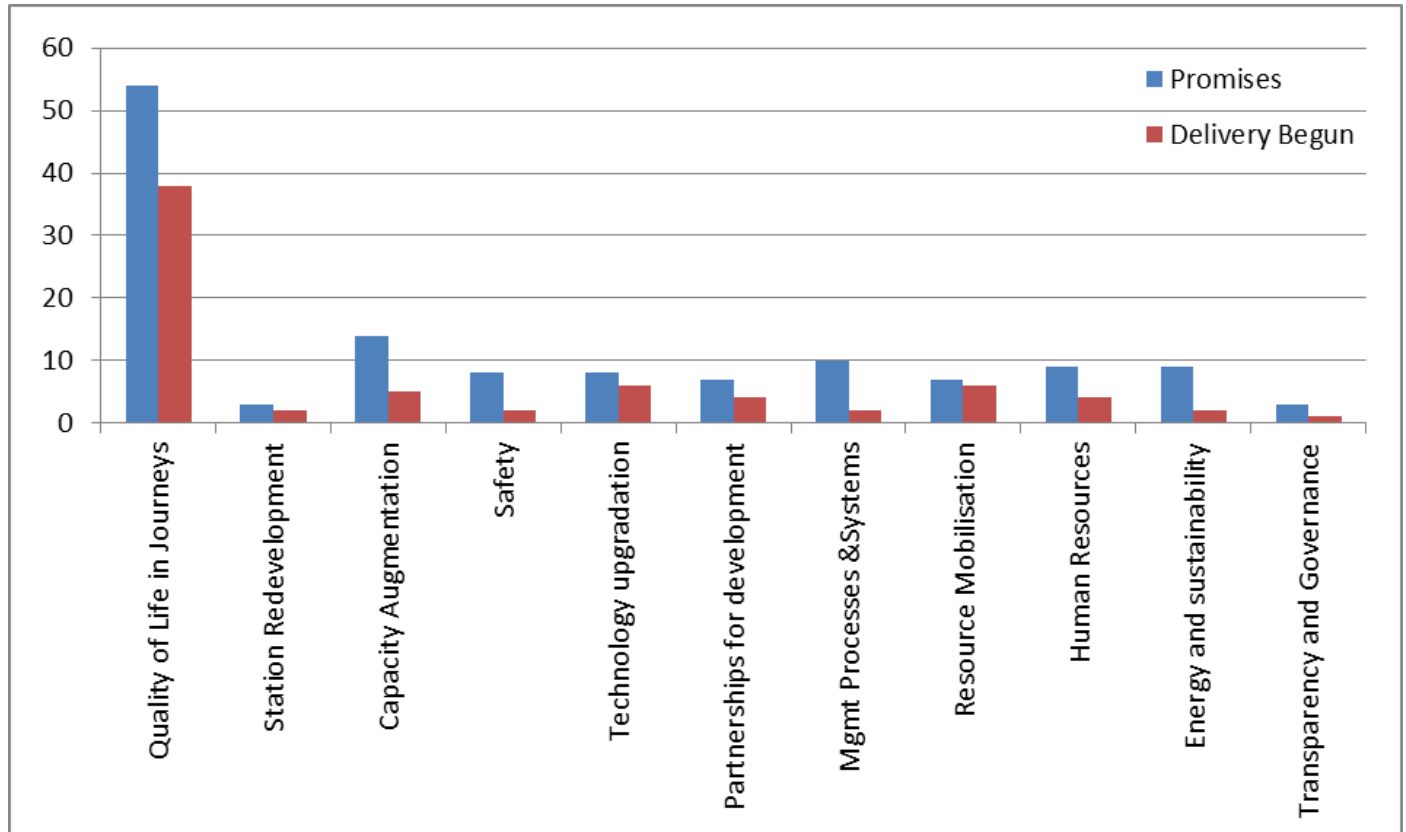
Source: Ministry of Railways

## 5) Delivery Already Started, Though There's a Long Way to Go Yet

What also gives us confidence is the transparency in the objectives of the ministry and the speed with which the ministry is delivering on them. The Rail Ministry has a file up on its website ([see tracker here](#)), which tracks the implementation of the announcements in the railway budget. We count 132 promises (across 11 broad areas) made by the Railways Minister in the speech – and the tracker indicates that delivery has already begun of 72 of those (Exhibit 90).

Exhibit 90

## Tracking Delivery on the Railway Budget's Promises



Source: Ministry Of Railways, Morgan Stanley Research

Exhibit 91

## Some Objectives to Track over the Next 6-9 Months

| Quarter | Delivery – 1   | Delivery – 2  | Delivery – 3   |
|---------|--|---|--|
| F3Q16   | Wi-Fi at all A1 and A category stations                | Feasibility report on High Speed Rail between Mumbai and Ahmadabad                    | Opening of tenders to buy 585 MW of power                            |
| F4Q16   | Tendering of 77 projects for 9400km of lines - Rs961bn | Selection of transaction advisor for awarding stations through Swiss Challenge Method | Award of 100% of the contracts on Western DFC and 85% on Eastern DFC |
| F1Q17   | Award of last 15% of the contracts on Eastern DFC      |   |  |

Source: Ministry Of Railways, Morgan Stanley Research

## The Man behind the Change – Dr Suresh Prabhu

*Various committees studying the railways over the past 30 years have historically highlighted most of the points we have spoken about in this report, but we believe the key change this time is really in the decision maker.*

*Our confidence in Dr Suresh Prabhu's ability to deliver on his ambitious plans stems from the reforms that took place in the power sector when he was Power Minister (1998-2004):*

- 1) **Electricity Act 2003:** A landmark Act for the Indian power sector, which led to the start of the PPP story.
- 2) **Securitization of state dues:** Creating a clean state (and hence breathing space) for SEBs through the removal of the balance sheet pain.
- 3) **APDRP scheme:** Incentivizing states financially to keep SEB balance sheets clean through T&D reform.

While various committees studying the railways over the past 30 years have historically highlighted most of the points we have spoken about in this report. However, we believe the single biggest reason that we're seeing change this time around in the railways is the change at the top - the new Railways Minister, Dr. Suresh Prabhu. In our opinion, he has brought fresh thinking to a relatively moribund railway ministry, which in history has primarily been used to dispense political largesse (factories, new trains and new routes) by previous administrations. What gives us confidence in Dr. Prabhu's ability to execute on his vision is his exceptional record in the utilities sector in the last BJP administration (1998-2004).

As Minister of Power, Dr. Prabhu introduced major reforms in India's power sector, such as enacting the Electricity Act of 2003 and securitization of dues from the states. Acknowledging his key role in the utility build out in India, the NDA government since returning to power in July-14, appointed him as the head "Advisory Group for Integrated Development of Power, Coal and Renewable Energy" – a high-level panel on the revamp of the power sector.

### 1) Electricity Act 2003: This was a landmark Act for the power sector

- The Act mapped the road for reforms and encouraged the entry of the private sector. This sector until then was dominated by government-controlled assets (state and centre). Power generation, except for hydro-electricity, was delicensed.

- The Act facilitated setting up & operation of captive power plants, no approval or license required, group captive plants allowed the right to open access for the purpose of carrying electricity from captive plant to destination of its use, exempted from surcharge, when power is wheeled (transferred through T&D lines from one utility's service area to another's) for own use.
- Open access to transmission was allowed. Also, there was a proposal to allow open, phased access to distribution. However, SEBs' distribution monopoly continues.
- Electricity trading was permitted to improve the industry's efficiency.
- Also, it took into consideration the promotion of competition, the protection of consumer interests and the rationalization of electricity tariffs. Laws relating to generation, transmission, distribution, trading and the use of electricity were consolidated.

### 2) Securitization of State dues – Another Major Step towards reform

The immediate cash burden on SEB (State Electricity Board) balance sheets was lifted by receivables being securitized, enabling SEBs to begin with a clean slate. To force state governments to improve the health of the SEBs or fund losses from state budgets, the central government signed a tripartite agreement with 24 state governments and the RBI to securitize the arrears of SEBs (Rs374bn as of F2002). Various incentives for issuing and honouring the bonds were provided by the central government, including a 60% waiver of interest/surcharges and a moratorium on loan repayment for five years for such bonds.

### 3) APDRP Scheme a Big Incentive to Reform:

The central government is heavily incentivizing SEBs to accelerate the reform process by offering financial assistance under the APDRP (Accelerated Power Development Reform Process) scheme. The objective was to reduce distribution losses and improve the quality and reliability of power. Under the five-year plan (F2002-07), Rs400bn was approved by the government for the APDRP scheme. Of this, Rs200bn was to fund upgrades to sub-transmission and distribution networks, and the remainder was to be given as incentives to SEBs that reduce their cash losses.

Exhibit 92

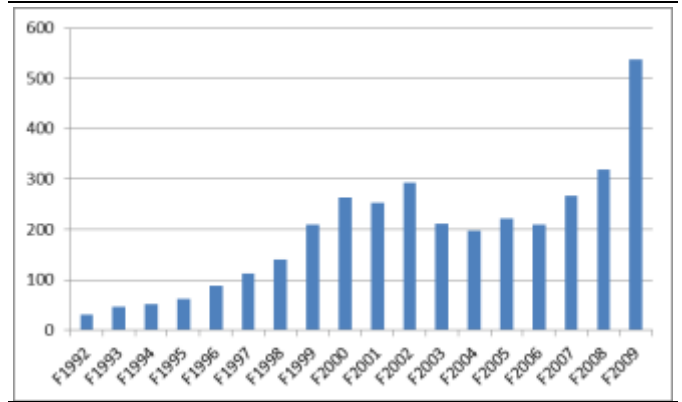
## Private Sector Owned Capacity



Source: Company Data, Morgan Stanley Research

Exhibit 93

## SEB losses pre-subsidy by state government (Rs, bn)



Source: Company Data, Morgan Stanley Research

## Key Risks to Our Bullish View

We have bullishly assumed that Dr Prabhu will be able to deliver on 75% of his ambitious capex plan over F16-19e, but there are several potential stumbling blocks:

- 1) **MOEF and land acquisition challenges**
- 2) **PPP challenges will remain:** The funding plan assumes a 15% contribution from PPP, which, given the railways' past failures, looks challenging.
- 3) **Employee costs will strain internal generation:** With wages at 55% of traffic receipts, internal generation is likely to be constrained.
- 4) **Key man risk:** We believe it is imperative that Dr Prabhu stays in office long enough for his thought process to be institutionalized.

Given statements from the Minister of Environment and Forestry, Mr Prakash Javadekar, on creating an easier and more transparent system for ECs, we believe that this stumbling block will lessen over the next 5-10 years.

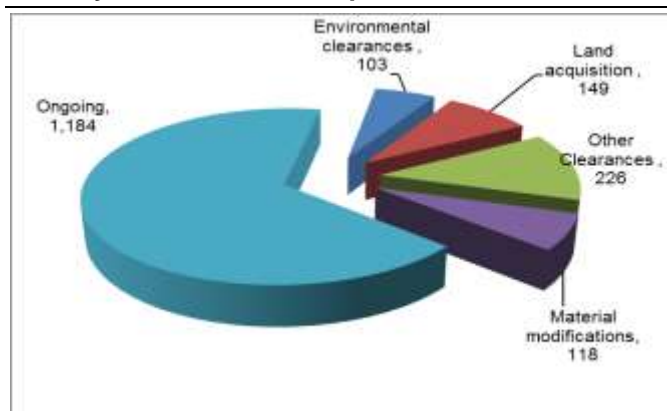
In addition, the LARR Bill (Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act) has worsened the problem on land acquisition for the corporate sector in general and infrastructure projects in particular. It is unlikely to be overturned anytime soon. Even so, we believe that the states will be able to push through legislation on changes (similar to the Rajasthan model). The move by the central government towards exempting infrastructure projects from the bill could have provided a significant boost, but the failure of that exercise in the parliament (in August 2015) clearly showed that land acquisition remains an emotive and political issue. Hence, we expect it to remain challenging.

### MOEF and Land Acquisition Challenges

Over the past 5-6 years, environment clearances from the MOEF and land acquisition have emerged as the two biggest bugbears for capex in general and infrastructure projects in particular. In April 2014, the report of the Committee for Creative Financing for Indian Railways pointed out that 7% of the projects comprising 15% of the capex (hence some of the larger projects) planned by Indian railways were stuck for lack of land and environmental clearances, while another 13% were stuck for other clearances (Exhibit 94).

Exhibit 94

#### Committed liability of Railway projects (in Rs Bn) and key reasons for hold ups



Source: Planning Commission, Morgan Stanley Research

### PPP Challenges Will Remain

While the central government's funding plan assumes a 15% contribution from PPP (the third largest after budget allocation and debt), given the railways' past failures (Exhibit 89) to create momentum in any of its PPP schemes, it's not going to be easy to attract the private sector. While we believe that the sector will be amenable to the annuity projects under consideration (for new tracks and doubling), station development is likely to bring its own challenges. Our discussions with the ministry indicate that they will be leaving the permissions for land development (which will involve municipal and state authorities) as the responsibility of the winning bidders. We already foresee two potential issues assuming that the ministry does not assume this responsibility:

**1) Risk to private parties:** Delays will lead to lower monetization by private parties (akin to the problem created by delays in land acquisition by NHAI in roads) and could even endanger viability of some projects.

**2) Reputational risk to the railways:** If in the longer term corruption involving municipal / state governments in the land monetization approvals comes to light, what will the railways do – work with a tainted organization, or revoke the contract and evict the parties who might have leased the premises in good faith?

Of course, the railways could try to ensure that the fine print of the contract covers these issues, but we use the above as examples of challenges that could emerge. While the roads sector (NHAI) developed a robust contract, we continue to see the need for change even after 15-20 years in the MCA (Model Concession Agreement). Even global examples indicate a mixed record on PPP on railways (Exhibit 95), with

a lower number of countries having tried it and fewer projects coming to fruition (financial closure) which is also probably due to the higher average project size. Interestingly, most of the railway projects listed in Exhibit 95 are greenfield, either by miners in South America or urban transportation (metro) projects.

Exhibit 95

## PPP Projects in Infrastructure Segments, C1990-2014

| Sectors     | No of countries | No of Projects | Total Investment (US\$ bn) | Average Project Size (US\$ mn) | Top 10 (US\$ bn) | Top 10 (%) |
|-------------|-----------------|----------------|----------------------------|--------------------------------|------------------|------------|
| Airports    | 52              | 168            | 64                         | 379                            | 38.4             | 60%        |
| Seaports    | 66              | 426            | 77                         | 180                            | 14.6             | 19%        |
| Rail        | 42              | 128            | 92                         | 716                            | 39.6             | 43%        |
| Roads       | 34              | 915            | 244                        | 267                            | 30.5             | 12%        |
| Electricity | 109             | 2,724          | 752                        | 276                            | 90.6             | 12%        |

Source: World Bank, PPI Database, Morgan Stanley Research

## Employee Costs will Strain Internal Generation

Railways are the single largest employer in India, with a workforce of 1.33mn. Given its social obligations (as a provider of employment), while the Railways have allowed lower recruitment levels and natural attrition to reduce staff numbers, they haven't undertaken any significant measures to reduce employee levels.

Even when the Railways did introduce a Voluntary Retirement Scheme (VRS) in 2010, they promised a job to one child of a staff member if they opted to retire. Hence, while average wages fell, as the new entrant would come in at the bottom of the pay scale, there would be no workforce reduction. With life expectancy going up and wage rises taking place periodically, the position will only worsen leaving little scope for development plans without reform. Post the implementation of the sixth pay commission, wages have moved up from 36% of the gross traffic receipts in F2008 to 55% in F2014. With the seventh pay commission set to become effective from January 2016, we would expect another leg up in employee costs (though smaller than those earlier), further constraining the internal generation in the railways.

## Key Man Risk

Our belief that the story is likely to be different this time vs. the historical trend of overpromise and under-deliver for Indian Infrastructure is to a great extent premised on the new Railways Minister, Dr. Suresh Prabhu. We believe he has brought fresh thinking into a hitherto moribund ministry - a

focus on speed (which we think is a game changer), reluctance to announce new projects (focusing on completion of the massive amount of past capex still unexecuted – Exhibit 96), and the implementation of innovative ideas for funding (including LIC) are indicators of the new approach. We also take comfort from his history as Power Minister. As reform of the railways is a long-term process, we believe it is imperative that Dr Prabhu stays in office long enough for his thought process to become institutionalized.

Exhibit 96

## Unexecuted Projects as of F2015

| Project Type      | No of Projects | Cost (Rs. bn) |
|-------------------|----------------|---------------|
| Rolling Stock     | 1,287          | 1,750         |
| New Lines         | 132            | 1,336         |
| Road Safety Works | 1,739          | 437           |
| Doubling          | 174            | 396           |
| Gauge conversion  | 42             | 245           |
| Metro Projects    | 16             | 217           |
| Track Renewals    | 2,355          | 152           |
| Electrification   | 39             | 67            |
| Others            | 2,084          | 315           |
| Total             | 7,868          | 4,914         |

Source: Final report on Mobilization of Resources for Major Railway Projects

## The Railway Ecosystem

*While this spending will create opportunities for companies across the space, given the change in focus from adding more trains to an already-constrained network to creating capacity through an increase in speed, we believe that the upside for the traditional gainers will be smaller this time, with the benefits spread out to newer segments:*

- 1) **Rolling Stock Companies:** Focus on speed should ensure that the productivity of rolling stock goes up.
- 2) **Logistics Companies:** While the focus on speed will likely reduce the edge of the incumbents (ground infrastructure importance will reduce), the movement from road to rail should create volume growth.
- 3) **EPC Companies:** With the increased emphasis on doubling / tripling and new lines (though to a lower extent than the former), the benefit to these companies in this round of capex is likely to be a lot higher.
- 4) **Systems Providers (Emphasis on Technology):** We see systems companies as big gainers, especially those focused on safety and increasing efficiency.
- 5) **Cement & Steel:** Given the increased spending in new tracks, station redevelopment (upgrade and build out of real estate), we expect cement and steel demand growth to witness a meaningful step up.
- 6) **Banking:** We expect banks, particularly private banks to be averse to lending to infrastructure. State-owned banks are also constrained with capital and have a starting point of weak balance sheets (high bad loans with low coverage) in the current cycle. Their focus, in our view, will be largely towards existing infra projects to help them survive and not become NPLs.

This spending should create opportunities for companies across the space, with beneficiaries in the private sector ranging from infrastructure developers to construction and capital goods. However, while the entire capex ecosystem should benefit, we believe that it is important to understand the impact across a few broad ranges to be able to pick stocks better.

Given the change in focus, from adding more trains to an already constrained network to creating capacity through an increase in speed, we believe that the upside for the traditional gainers will be smaller this time, with the benefits spread out to newer segments. The need for speed is likely to drive spending towards more technologically complex areas.

### Rolling Stock Companies

Traditionally, with railways only growing cargo through the addition of rolling stock addition, key gainers were the wagon / coach companies (the key listed names in India are Titagarh Wagons, Texmaco Rail and Cimco – all not covered by MS), and companies which make locomotives (this is a small business for BHEL, rated UW). While the railways do plan to add significantly to rolling stock (Rs1 trillion – 12% of the Rs8.56 trillion spend over F15-19e), we are less excited about it than the market, despite the government's focus on the Make in India program.

A good portion of this Rs1 trillion spending will be investments into building new factories with foreign partners. On November 9, 2015, the railways awarded contracts to General Electric and Alstom to set up diesel and electric locomotive factories, respectively, in the state of Bihar at a cost of ~ Rs400bn ([see our report](#)), 40% of the spend anticipated on rolling stock.

We also believe that the focus on speed will ensure that the productivity of rolling stock goes up. While we expect a c.50% increase in freight to be carried, if the railways are able to increase freight train speeds by 50% (from the poor 25km/h now currently vs. ~35-45 km/ hour globally), the current rolling stock should be enough to deal with the increased cargo. Of course, the railways are unlikely to just focus on speed and there should also be replacement demand, which means that we will see more rolling stock purchases (but we suspect that it is likely to be more concentrated towards locos, than wagons / coaches).

BHEL announced on its F2Q16 conference call that it is in talks with GE and Alstom for equity participation in both of the announced factories, but given the likelihood of it being a minority stake, as well as the lower importance of this vertical for BHEL we see little upside here for BHEL.



## Logistics Companies

The traditional gainers in this segment have been container carrier and warehousing companies, led by CONCOR, a subsidiary of the Indian railways. Interestingly, the focus on speed will likely reduce the importance of ground infrastructure required in this business, reducing the incumbents' edge. However, the movement of cargo from road to rail should offset these issues, with the gains still overwhelming the problems.

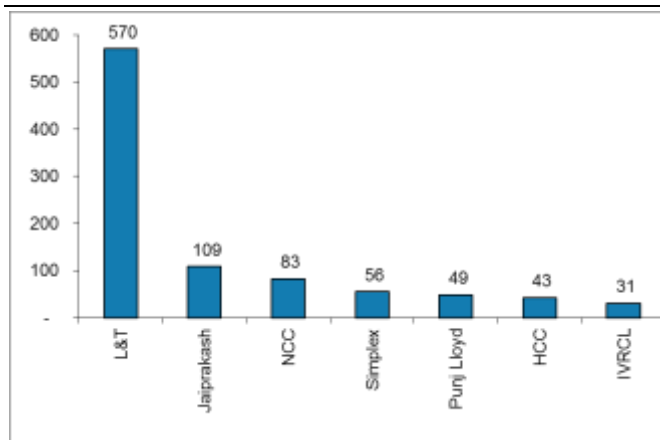
The hub-and-spoke model that is likely to evolve will involve the Railways carrying goods to the hubs, that is, from one station to the other; while the private sector transships the goods from the hub to the spoke, ie, from the railway station to the customers' godown/outlet. The use of this model by the railways would incentivize them to divert goods from pure-road to road-cum-rail. The last mile will become a lot more important in that case given the greater reliability and lower time taken over the longer portion of the travel – rail.

## EPC Companies

While EPC companies, led by L&T (Exhibit 97) have always benefited from railways capex, but with the increased emphasis on doubling / tripling and new lines (though to a lower extent), the benefit to these companies in this round of capex is likely to be a lot higher. As Transportation Infra (including orders from India and abroad) is probably the second largest vertical within L&T now (after real estate) and the increasing size of orders (where L&T's size becomes a natural advantage – Exhibit 98), we believe that the railways' capex spend can, to some extent, be played through L&T (OW). Of course, the bigger beneficiaries (from an impact perspective) will likely be small construction companies, which will pick up smaller orders (like for railway overbridges as the railways try to further reduce unmanned level crossings).

Exhibit 97

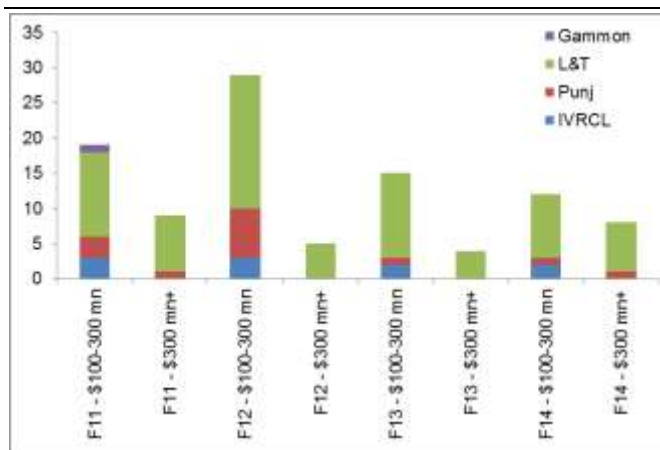
### L&T Revenue Size vs. Indian Peers (F2015)



Source: Company Data, Morgan Stanley Research

Exhibit 98

### Number of US\$100mn+ Wins from External Clients



Source: Company Data, Morgan Stanley Research

## Systems Providers (Emphasis on Technology)

With the increased emphasis on safety, spending on anti-collision technologies will increase. Konkan Railways has developed (along with its technical partner, Kernex Microsystems) an anti-collision device (ACD) which uses a combination of location information from satellites and radio frequency transmissions. After successful trials, the railways developed it further into a more centralized (and cheaper to widely implement) system called Train Collision Avoidance System (TCAS) for the same purpose.

Between June and November 2013 orders for ACD systems were placed by Konkan with three vendors (Medha Servo, Kernex Microsystems and HBL Power Systems). While the

TCAS installations could become a Rs8-12bn market (assuming full roll out), we believe this is an indicator of the growing market for technology-heavy solutions. As an example, the RDSO (Research Design & Standard Organisation) of the Indian railways, which developed TCAS is also working on:

- Train Protection & Warning System (TPWS)
- Failsafe Networked Multiplexer (FNmux)
- Advanced Auxiliary warning system (AAWS)
- Centralised Train Control (CTC)
- Online Insulation Monitoring (OLIM) System

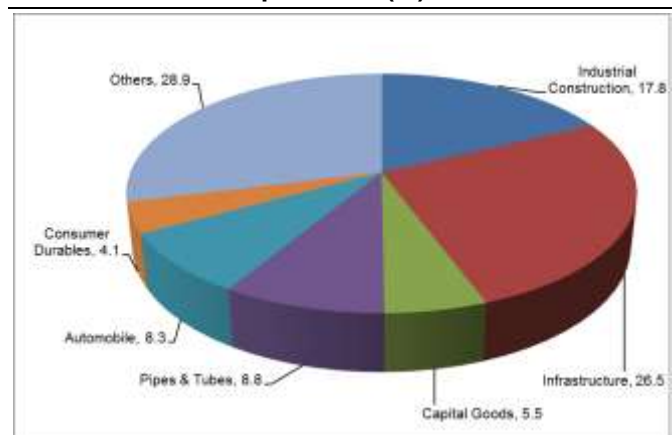
The railways have also issued a global Expression of Interest ([see EOI here](#)) for shortlisting companies for development and supply of Broken Rail Detection System working on principal of propagation of guided ultrasonic waves.

## Cement & Steel

It is also important to remember the significant material requirements for the significant increase in the Railways' capex. While a significant portion of the capex is going to be focused on boosting speed and hence equipment / systems, given the increased spending on new tracks, station redevelopment (upgrade and build out of real estate), we expect cement and steel demand growth to witness a meaningful step up. The companies we prefer in the cement industry are Ultratech (OW) and JK Lakshmi (OW). Two companies in India with significant exposure (primarily with domestic capacity) to steel are SAIL and JSW Steel (both non-covered stocks).

Exhibit 99

### Total Steel Consumption Mix (%)



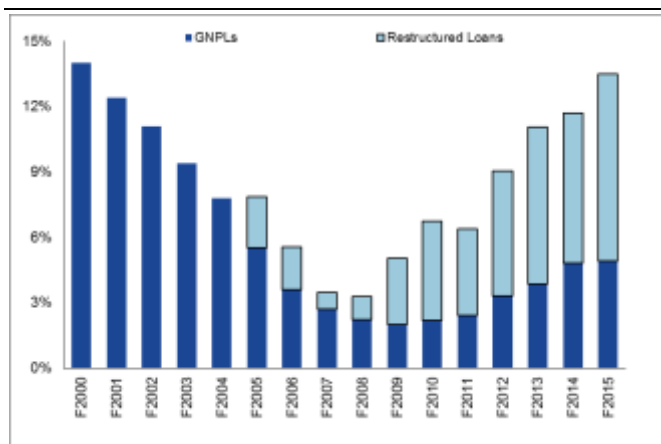
Source: Company Data, Morgan Stanley Research

## Banks

As highlighted in our Next India report titled '[Financials – Foundation for the Next India](#)', we believe infrastructure financing is one of the key challenges facing the railway sector. After the problems faced by banks related to infrastructure loans in the past four years – investors have been concerned about NPLs in the sector - we expect banks, particularly private banks, to be averse to lending to infrastructure. State-owned banks are also constrained with capital, and have weak balance sheets (high bad loans with low coverage) in the current cycle. Their focus, in our view, will be largely towards existing infra projects to help them continue and not turn into NPLs. The ability to fund new infra lending will therefore be limited, in our view. Moreover, banks do not have large amounts of long maturity liabilities, which will likely impede their ability to increase exposure to the infrastructure sector meaningfully.

Exhibit 100

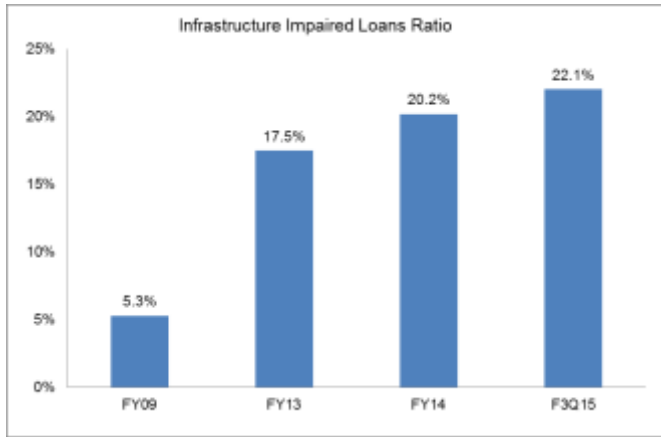
### Sector NPLs vs. Loans



Source: RBI, Company Data, Morgan Stanley Research

Exhibit 101

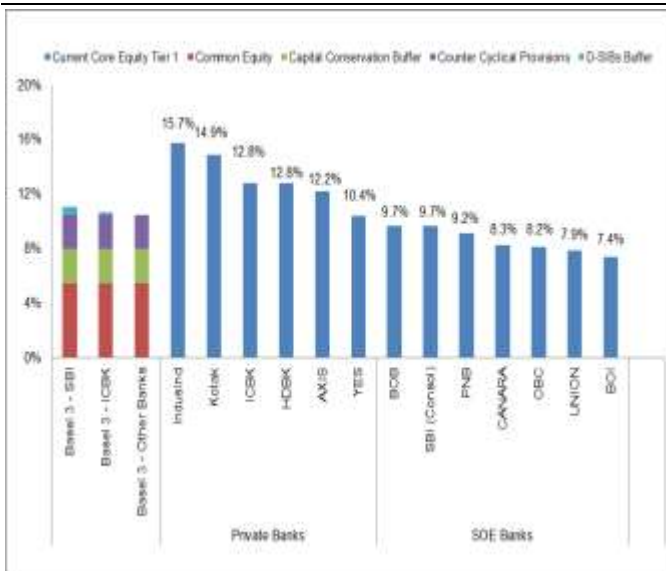
## Infrastructure Impaired Loan Ratio



Source: RBI, Morgan Stanley Research

Exhibit 102

## Private Banks vs. SOE Banks – Core Equity Tier 1



Source: Company Data, Morgan Stanley Research

## Annexures

### Annexure 1

#### Deliveries for the Promises made by Indian Railways

| <b>Improvement in customer experience</b>  |
|--|
| New department created for housekeeping to keep stations & trains clean  |
| Instructions issued to provide disposable bags for garbage collection with OBHS facilities to maintain hygiene   |
| New Non-AC coaches will have dustbins from 1 May 2015  |
| NIFT, Delhi has been engaged for designing bedroll which will improve quality & cleanliness of bed linen   |
| 3 new mechanized laundries have been started and IR has identified 29 more locations   |
| All-India helpline no. 138 became functional to address customer grievances and 182 for security-related complaints  |
| Mobile application to redress Railway-related complaints is launched   |
| Operation Five Minutes launched to reduce the transaction time of travellers by setting up facilities like coin vending machines, modified hot buttons etc                   |
| Instructions issued for differently-abled travelers to purchase concessional E-tickets after one-time registration   |
| Paperless unreserved tickets on mobile phones launched   |
| E-ticketing portal in Hindi launched   |
| E-catering has been introduced in over 1,000 trains for better food experience   |
| Online booking of retiring rooms functional  |
| Policy for water vending machine issued to ensure clean drinking water at a very low cost. IRCTC to provide machines at select stations                                      |
| Centrally managed railway display network technology approved. This will help customers in providing information on train status, reservations, general & emergency messages |
| MOU with NID signed for replacing the present ladders for climbing to upper berths and introducing folding ladders for easy climbing   |
| Pilot project for providing surveillance cameras launched in selected mainline coaches and ladies' compartments for safety   |
| Instructions issued for mobile charging facilities in all new general coaches as well as 3,000 existing coaches.   |
| Quota for lower berths for senior citizens increased from 2% to 4%   |
| E-concierge services started in 22 railway stations for assistance in pick up & drop   |
| Instructions have been issued for reserving middle bay for women & senior citizens   |
| Construction of 100 toilets at 67 stations completed up to June 2015 and further work in progress  |

|   |
|---|
| All new ICF coaches & LHB coaches to be fitted with bio-toilets from 1 July 2015  |
| Destination Alert Service has been introduced on all Rajdhani and Duronto trains on 8th July 2015   |
| Onboard Entertainment implemented on New Delhi-Chandigarh Shatabdi and tendering is in progress for other six trains  |
| 143 Railway stations approved for development as Adarsh Station for upgrading passenger amenities at station  |
| Wi-Fi commissioned at 11 stations. All A1 & A category stations targeted for completion by Dec 2016   |
| New LHB manufacturing unit dedicated to the nation on 6 July 2015. Under this, IR intends to progressively replace all coaches with LHB design coaches  |
| An IT advisory council has been set up, draft likely to be submitted by Aug 2015 with the aim to reduce Customer's time & effort by launching mobile app including station navigation system etc  |
| Parcel management system has been implemented on Delhi-Howrah and Delhi-Mumbai corridors, which includes features like Bar-coding & online tracking of parcels.   |
| Digitized mapping of Land record introduced. Data of 40K land plans out of 52K Land plans, have been entered in TMS<br>Scrap disposal policy reviewed for speedier disposal   |
| <b>Make IR financially Self-Sustainable</b>   |
| Kayakalp Council formed for the purpose of business re-engineering and innovation in Railways   |
| A committee under Shri Ajay Shankar has been constituted for revamping the PPP cell, which will help create more jobs in the economy vis-à-vis augmenting capital for Indian Railways   |
| MOU with LIC has been signed to initiate the mobilization of extra-budgetary resources by seeking advice from experts   |
| Committee has been formed to set up a Regulator for the purpose of orderly development of infrastructure services, determining tariffs & setting performance standards etc  |
| MOU signed for setting up Railway Research Centres to strengthen the RSDO organization of excellence for applied research   |
| Instructions issued to set up Divisional Committee which will serve as an important link between Railways & the people  |
| Review of Private Freight Terminal policy completed. Application & Security fee has been reduced and revenue sharing is discontinued  |
| The Policy Circular on Automatic Freight Rebate for Loading in Traditional Empty Flow Direction has been issued to reduce empty flows of wagons   |
| Implemented order issued on Setting up of Core Team for Technology Mission for Indian Railways on investment sharing model  |
| Project of rail connectivity to Dighi has been sanctioned. MoU between RVNL and Port for Dighi has been signed to mobilize investments  |
| Rail connectivity to Jaigarh Port has been sanctioned. The concession agreement for Jaigarh Port has been signed in the month of June 2015. This will ensure ensures a level playing field, simplification of procedures and consistency of policy. |
| 17 states have given in-principle approval for formation of SPVs. A note for consideration of CCEA has been sent. This will ensure faster completion of work and generate revenues for Railways   |
| Financial Services Cell headed by Adv Finance has already been constituted in Railway Board aimed at seeking advice from experts in this field  |
| Approval to ports of Rewas, Chhara, Nargol & Tuna have been granted. This will ensure rail connectivity to these places and expected to mobilize investments of Rs20bnn   |
| Tender for financial consultant for Kazipet-Vijaywada opened and under finalisation. RITES is exploring implementation through JV.  |
| Instructions issued to arrange training on soft skills for all front line staff by linking up with professional training institutes   |
| Identification & repairing of quarters and RPF barracks is being taken care of and is ahead of target. Holiday Homes are also identified for upgrade for recreational pursuit of IR's staff   |
| Board wide letter advised all Zonal railways to carry out energy audit to conserve energy   |
| 152 locations for a water audit and 32 stations to set up Water Recycling Plants(WRP) have been identified for 2015-16  |
| 23 workshops have been accredited for environment management. Balance are planned to be accredited by Mar 2016  |
| MOU with Ministry of Skill Development and Entrepreneurship signed to make as spare railway infrastructure available for setting up of Skill Training Centres   |
| <b>Rail – a safer means of travel</b>   |
| Recommendations made by High Level Safety Review under Corporate Safety plan have been examined by the Board  |
| Signal design project from IIT Kanpur has been approved for safety of Unmanned Level Crossings  |
|   |
|   |

## IR Capacity Expansion

|   |
|---|
| 05 trains have been identified for augmentation of capacity from 24 to 26 coaches   |
| Target of 1,000 coaches in 460 trains has been set for permanent augmentation... However, 123 coaches in 114 trains have been permanently augmented   |
| Technical specification for EMU train set prepared & RFQ document has been finalised in May 2015 to introduce modern train system. This will ensure higher capacity, greater energy savings & increased throughput. |
| Cabinet approval for station development received   |
| Concerned Zonal Railways have been requested to submit the proposal and scheme for approval for setting up of Satellite stations in major cities  |
| Trial for 25T Track friendly bogie under BOXN wagon completed. Initiated for better fuel efficiency and carrying capacity   |
| National Productivity Council (NPC) team has commenced their study at ICF in order to undertake measures for technological upgrade & enhancing productivity to make it self-sustaining                              |
| Malaviya Chair has been setup at IIT (BHU). MOU signed between MOR & IIT (BHU) which will help in development of new materials to be used in all assets of Railways   |
| MOU signed with Ministry of Coal for Rowghat -Jagdapur Project for expansion of new lines   |
| MOU signed with Ministry of Coal & Govt of Odisha to implement identified Coal Connectivity Projects in Odisha  |
| E & R directorate has circulated a comprehensive document covering the best technology available across the globe in order to carry out the key operating and maintenance activities.                               |
| Model document for EPC system is ready, which aims timely completion of projects  |
| Consultant has been appointed for Bhadrak – Nargundi 3rd line, where Railways proposed to launch Rs25bn projects through BOT/Annuity route  |

**Annexure 2**

**Projects identified for domestic/foreign direct investments in Railways**

| <b>Suburban Corridor projects through PPP</b>  |                               |                     |   |                                    |
|--|-------------------------------|---------------------|---|------------------------------------|
| <b>Project</b>   | <b>Kms</b>                    | <b>Cost( Rs Bn)</b> | <b>Probable Mode of Execution</b>               | <b>Bidding Parameter</b>           |
| CSTM-Panvel  | 49                            | 140                 | DBFOT   | Premium/Viability Gap Funding(VGF) |
| <b>High speed train projects</b>   |                               |                     |   |                                    |
| <b>Project</b>   | <b>Kms</b>                    | <b>Cost( Rs Bn)</b> | <b>Probable Mode of Execution</b>               | <b>Bidding Parameter</b>           |
| Mumbai-Ahmedabad High Speed Corridor   | 534                           | 631.8               | DBFOT/<br>Government to Government cooperation. | Premium/VGF                        |
| Chennai-Bangalore-Mysore   | -                             | -                   | DBFOT/<br>Government to Government cooperation  | Premium/Viability Gap Funding(VGF) |
| <b>Freight Lines</b>   |                               |                     |   |                                    |
| <b>Project</b>   | <b>Kms</b>                    | <b>Cost( Rs Bn)</b> | <b>Probable Mode of Execution</b>               | <b>Bidding Parameter</b>           |
| Dankuni-Gomoh  | 282                           | 45                  | BOT/Annuity                                     | VGF/Annual premium                 |
| Whitefield-Kolar (52.9km)  | 52.9                          | 3.5                 | BOT/Annuity                                     | VGF/Annual premium                 |
| North- South DFC   | -                             | -                   | BOT/Annuity                                     | VGF/Annual premium                 |
| <b>Doubling</b>  |                               |                     |   |                                    |
| Ajmer-Bangurgram (48.43km)   | 48.43                         | 1.4                 | BOT/Annuity                                     | VGF/Annual premium                 |
| Durg-Rajnandgaon 3rd line  | 31                            | 1.5                 | BOT/Annuity                                     | VGF/Annual premium                 |
| Wardha(Sewagram) Nagpur 3rd line (76.3km)  | 76.3                          | 3.0                 | BOT/Annuity                                     | VGF/Annual premium                 |
| Kazipet-Vijaywada 3rd line with electrification (219.64km)   | 219.6                         | 10.5                | BOT/Annuity                                     | VGF/Annual premium                 |
| Bhadrak-Nergundi 3rd line (80km)   | 80                            | 8.4                 | BOT/Annuity                                     | VGF/Annual premium                 |
| Sambalpur-Talcher (174.11km)   | 174.1                         | 6.8                 | BOT/Annuity                                     | VGF/Annual premium                 |
| Manoharpur-Bondamanda 3 <sup>rd</sup> line (30km)  | 30                            | 2.6                 | BOT/Annuity                                     | VGF/Annual premium                 |
| Rajkharwan-Chakradharpur 3 <sup>rd</sup> line (20km)   | 20                            | 1.7                 | BOT/Annuity                                     | VGF/Annual premium                 |
| <b>Rolling stock including train sets and locomotives or coach manufacturing and maintenance facilities</b>  |                               |                     |   |                                    |
| <b>Project</b>   | <b>Quantity</b>               | <b>Cost( Rs Bn)</b> | <b>Probable Mode of Execution</b>               | <b>Bidding Parameter</b>           |
| Rail Coach Factory, for manufacture of modern 3 phase MEMU/EMU coaches equipped with IGBT technology at Kachrapara. (Subject to confirmation of requirement) | 500 EMU/MEMU coaches annually | 12                  | BOT/BOO/JV/Annuity                              | Lowest price per EMU/MEMU          |
| Rail coach factory for manufacturing of Aluminum coaches at Palakkad (Subject to confirmation of requirement)  | 400 coaches per annum         | 5.5                 | BOT/BOO/JV/Annuity                              | Lowest price per coach             |
| Periodic overhauling of wagons at Sonpur   | 180 wagons per annum          | 3                   | BOT/BOO/JV/Annuity                              | Lowest price of POH per wagon      |

|  |  |     |                      |   |
|--|--|-----|----------------------|---|
| Midlife rehabilitation of coaches at Anara | 250 coaches per annum  | 1.9 | BOT/BOO/JV/Annuity   | Lowest price of rehabilitation per coach. |
| Locomotive maintenance depots.             | Barauni (ECR)<br>Daund (CR)<br>Mughalsarai (ECR)<br>Bondamunda (SER) | 3   | BOT/BOO/BOOT/Annuity | Lowest maintenance cost per locomotive    |

**Railway Electrification Projects**

| Project  | Kms | Cost( Rs Bn) | Probable Mode of Execution | Bidding Parameter  |
|--|-----|--------------|----------------------------|--------------------|
| Katwa-Azimganj-Nalhati & Azimganj-Tildanga/New Farakka | 200 | 2.3          | BOT/Annuity                | VGF/Annual premium |

**Signaling System**

| Project  | Kms | Cost( Rs Bn) | Probable Mode of Execution | Bidding Parameter  |
|--|-----|--------------|----------------------------|--------------------|
| Agra-Gwalior, A route: provision of automatic signaling along with train protection system to enhance line capacity      | 118 | 2.5          | BOT/Annuity                | VGF/Annual premium |
| Gwalior – Burhpura A route: Provision of automatic signaling along with train protection system to enhance line capacity | 126 | 2.8          | BOT/Annuity                | VGF/Annual premium |
| Burpura-Bina, A Route: Provision of automatic signaling along with train protection system to enhance line capacity.     | 126 | 2.7          | BOT/Annuity                | VGF/Annual premium |

**Railway Technical Training Institutes**

| Project   | Quantity  | Cost( Rs Bn) | Probable Mode of Execution | Bidding Parameter                   |
|---|---|--------------|----------------------------|-------------------------------------|
| Advanced Training Institute (ATI) for training of Technical staff and Loco Pilots | 6 Training Centers – with Driving Simulators<br>Mughalsarai (ECR)<br>Kurla (CR)<br>Asansol (ER)<br>Vishakapatnam (ECoR)<br>Kanpur (NCR)<br>Avadi (SR) | 1.2          | BOT/BOO/JV/Annuity         | Lowest cost for identified quantity |

**Mechanized Laundry**

| Project   | Quantity            | Cost( Rs Bn) | Probable Mode of Execution | Bidding Parameter                   |
|---|---------------------|--------------|----------------------------|-------------------------------------|
| Mechanized laundries at identified locations of different capacities. | 1T/2T/3T/5T per day | 1            | BOT/BOOT/BOO/JV/Annuity    | Lowest Cost for identified quantity |



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|--------------------------|-------------------|------------|----------------------------------|------------|----------------------|
|                          | Count             | % of Total | Count                            | Total IBC  | % of Rating Category |
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| <b>Equal-weight/Hold</b> | <b>1445</b>       | <b>43%</b> | <b>346</b>                       | <b>44%</b> | <b>24%</b>           |
| <b>Not-Rated/Hold</b>    | <b>91</b>         | <b>3%</b>  | <b>9</b>                         | <b>1%</b>  | <b>10%</b>           |
| <b>Underweight/Sell</b>  | <b>651</b>        | <b>19%</b> | <b>95</b>                        | <b>12%</b> | <b>15%</b>           |
| <b>Total</b>             | <b>3,397</b>      |            | <b>790</b>                       |            |                      |

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