Brazil Infrastructure
Paving the Way

Emerging economies have shown remarkable, resilient growth in recent years. Indeed, Morgan Stanley expects strong secular forces to continue driving outperformance in emerging vs. developed economies for some time to come.

For Brazil, low infrastructure investment could become the bottleneck to growth. Other necessary steps include improving the business environment, rethinking fiscal spending priorities, reforming the tax burden, and improving the current fiscal framework.

Brazil must double its infrastructure investment rate to live up to the expectations for a BRIC member. Overall investment-to-GDP ratio averaged 17% in the past 5 years, vs. China’s 44%, India’s 38%, and Russia’s 24%. To grow at 5% per year in the next decade, infrastructure investment must double from the 2.1% of GDP average in recent years.

We believe Brazil will rise to the occasion and, over time, achieve our base case of infrastructure spending at 4% of GDP. Scheduled projects include: 2014 World Cup, 2016 Olympics, pre-salt oil reserves, and government-backed Growth Acceleration Program.

We highlight two ways for investors to participate in infrastructure investment: 1) our analysts’ top 10 picks (Cosan, Cosan Ltd., OSX, Lupatech, Gerdau, Usiminas, CCR, ALL, Tractebel, CPFL) and 2) a basket of 20 related plays (bbg ticker: <MSBZINFR>).

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Executive Summary

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Infrastructure spending in Brazil has been in a declining trend over the past 40 years, averaging 5.4% of GDP during the 1970s, 3.6% in the 1980s, 2.3% in the 1990s, and 2.1% in the 2000s. Some studies suggest infrastructure investment of 2.0% of GDP is needed simply to sustain the current infrastructure stock in Brazil.

For Brazil to grow at 5% per year over the next decade, we think it must double its current infrastructure investment rate to 4% of GDP. Brazil's overall investment-to-GDP ratio has averaged only 17% over the past 5 years, well below the levels of China (44%), India (38%), and Russia (24%) — the other BRIC economies — during the same period.

- **Brazil must invest 4% of GDP (doubling its current investment) for 20 years to catch up with Chile, the benchmark in Latin America, according to our estimates.**
- **To catch up with South Korea — the benchmark in Asia — Brazil would need to invest 6–8% of GDP per year.**

Our economist, Marcelo Carvalho, believes that Brazil will rise to the occasion and, over time, achieve our base case of infrastructure spending at 4% of GDP. There are four key known drivers of higher infrastructure spending in the near future: the 2014 World Cup, the 2016 Olympics, the development of the pre-salt oil reserves, and the government-sponsored Growth Acceleration Program (PAC).

Our equity analysts have selected the best companies from five industries in Brazil to gain exposure to rising infrastructure investment:

- **Agribusiness:** Cosan (CSAN3.SA) and Cosan Ltd. (CZZ.N)
- **Oil services:** OSX (OSXB3.SA) and Lupatech (LUPA3.SA)
- **Steel:** Gerdau (GGB) and Usiminas (USIM5.SA)
- **Transportation:** CCR (CCRO3.SA) and ALL (ALLL11.SA)
- **Utilities:** Tractebel (TBLE3.SA) and CPFL (CPFE3.SA)

Investors can also gain exposure to the theme through our Brazil Infrastructure basket1 (Bloomberg ticker <MSBZINFR>), see Appendix IV for basket constituents). Finally, a broader list of 42 Brazilian companies with direct or indirect leverage to rising infrastructure investment can be found in Appendix V.

The Brazilian National Development Bank (BNDES) estimates infrastructure investment could be R$274 billion in 2010–13, or 37% higher than the R$199 billion disbursed in 2005–08. The figure is the result of a recent mapping of infrastructure projects by sector planned for the current and the next few years.

- **Electricity (R$92 billion, or 34% of expected spending):** new mega-hydroelectric plants such as Jirau, Santo Antonio, and Belo Monte; upgrades of the Angra III nuclear plant; and more than 70 new wind power projects.
- **Railways and Sanitation (R$69 billion, or 25%):** in railways, the construction of new lines and the expansion of the current network (Transnordestina, Norte-Sul and Ferronorte-Rondonopolis), besides plans to build a high-speed train between Sao Paulo and Rio de Janeiro; in sanitation, completion of the projects included in the PAC.
- **Telecommunication (R$67 billion, or 24%):** network expansion, and increase in capacity, including the introduction of new technologies, should drive investment in the sector. The main area of expansion will be broadband in both mobile and fixed line.
- **Ports, Highways, and Airports (R$47 billion, or 17%):** in ports, the build-up of new facilities and upgrades to existing ones now managed by the private sector; in highways, maintenance of the current network and the grant of new concessions to the private sector; in airports, required upgrades to help ease congested terminals.

In general, we see the biggest opportunities in areas like road, railway and port infrastructure. Investment in ports and railways is already projected to expand an annualized pace of 24.8% and 12.7%, respectively, even though a low starting point means that the resulting volume of planned investments in these sectors would remain relatively limited.

The R$274 billion in infrastructure investments estimated for 2010–13 corresponds to only 2.2% of GDP — in line with the average 2.1% of GDP spent in recent years. Over the past 10 years, the private sector has accounted for almost 90% of total investment in Brazil, while the public sector was responsible for the other 10%. In infrastructure investment, however, the private and public sectors have shared the burden (i.e., 50/50).

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Brazil faces four key challenges to greater infrastructure investment, in our view:

- **Improving the business environment.** Brazil needs a more stable and credible regulatory environment to spur private sector investment. The main issues are: 1) regulatory bottlenecks and political uncertainties, 2) excessive renegotiations of concessions, and 3) the lack of efficiency of regulatory agencies.

- **Rethinking fiscal spending priorities.** The government needs to contain current spending growth and rethink priorities by 1) addressing budget rigidities, 2) reducing mandatory earmarking in the budget, and 3) revisiting structural entitlements (i.e., social security reform).

- **Reforming the tax burden and system.** The government should limit its crowding-out effect and help improve the local business environment. The government intake is close to 40% of GDP, while companies spend on average 2,600 hours per year to prepare, file, and pay their taxes. Both figures are outliers by international standards.

- **Improving the current fiscal framework.** Brazil needs to lay out a clear medium-term fiscal framework to restore transparency to its fiscal accounts and targets — and to address directly the quasi-fiscal transactions among public sector financial entities (i.e., Treasury and BNDES).

The key risk could be complacency. Many hope that oil gains can help finance fiscal needs and fund infrastructure spending in the coming years; if nothing is done to support and supplement that, then an infrastructure boom could peter out.

Finally, from an equity strategy point of view, we highlight the discrepancy in profitability and growth prospects for the many companies leveraged to infrastructure investment in Brazil.

We see interesting results from a simple analysis of return-on-equity and Sharpe ratios (defined here as the average return on equity divided by their standard error over the past 5 years) for the 42 companies that we have identified.

For instance, the most profitable segments have been toll roads (29% average ROE), followed closely by industrials (28%) and oil services companies (25%). However, oil services companies have delivered volatile results (1.2 Sharpe ratio) over the past 5 years. Thus, when we adjust for risk, utilities (with an average 15% ROE and 2.5 Sharpe ratio) look more interesting. Meanwhile, the least profitable segments have been ports (5%), building materials (6%), and energy/logistics (8%) — all with Sharpe ratios below 0.5.
Brazil Infrastructure: Paving the Way

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Brazil needs to double its infrastructure spending, to 4% of GDP, to sustain faster real GDP growth.

We estimate that infrastructure spending can reach 4% of GDP over the next decade. Our bull case scenario is a tripling of current spending, to 6% of GDP; our bear case is 2%, or flat.

Drivers of higher infrastructure spending are not without risk:

- **Known major drivers of infrastructure demand** — the World Cup (2014), Olympics (2016), investment in the pre-salt oil reserves, and PAC — illustrate prospects for increased spending.
- **Less certain is Brazil’s ability to address fiscal challenges** that limit public spending on infrastructure. Also, changes in the business environment could drive private sector infrastructure investment.

Brazil’s infrastructure is poor by international standards, but with large potential for improvement. In a World Economic Forum survey, Brazil ranked 74th among countries in infrastructure. In the same survey, it ranked 10th globally in market size. Most countries with a market size comparable to or larger than Brazil’s have better infrastructure — the notable exception being India. We believe this disconnect between infrastructure and market size illustrates the potential for significant infrastructure growth in the coming years.

Whether Brazil increases infrastructure spending, and by how much, will be an important determinant of GDP growth, we think. The base case scenario we outline here — less a forecast than a target, as it is over a 10-year horizon — assumes real GDP growth of 5% per year, above the 4% pace witnessed in recent years. We would expect Brazil’s ability to grow GDP faster than the current average to be jeopardized if infrastructure investment remained low for long, as the economy could run an increasing risk of serious constraints in logistics areas like ports and transportation.

To sustain faster growth, Brazil needs to double its annual investment in infrastructure, to 4% of GDP, we estimate. To achieve that, the country’s overall investment-to-GDP ratio would need to increase markedly. There is a significant correlation between infrastructure investment and overall investment. Infrastructure investment in Brazil has averaged 2% of GDP in the past decade, while overall investment averaged 17% of GDP. By contrast, when infrastructure investment in Brazil was about 5% of GDP a few decades ago, overall investment was 22% of GDP. If Brazil’s infrastructure investment is to meaningfully increase, then the overall investment-to-GDP ratio would likely exceed 20% of GDP.

**Exhibit 2**

**Brazil Infrastructure Scenarios; Our Bear Case Is No Change from Current Numbers (2011–20 average)**

<table>
<thead>
<tr>
<th>Infrastructure Spending</th>
<th>Real GDP</th>
<th>Public Debt</th>
<th>FX Avg.</th>
<th>Interest Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of GDP</td>
<td>R$bn/yr</td>
<td>%/yr</td>
<td>% of GDP</td>
<td>R$/US$ Avg.</td>
</tr>
<tr>
<td>Bull</td>
<td>6.0</td>
<td>188.6</td>
<td>6.0</td>
<td>62.9</td>
</tr>
<tr>
<td>Base</td>
<td>4.0</td>
<td>125.7</td>
<td>5.0</td>
<td>52.9</td>
</tr>
<tr>
<td>Bear</td>
<td>2.0</td>
<td>62.9</td>
<td>4.0</td>
<td>42.9</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley LatAm Economics

Known major drivers of demand illustrate prospects for increased infrastructure spending in our base case... The World Cup (Brazil is host in 2014), the Olympics (Rio de Janeiro is host in 2016), increased pre-salt oil exploration, and the growth acceleration program (PAC) all raise the prospects for increased investment.

...but infrastructure investment plans fall short without other drivers of investment, we think. Significant infrastructure expansion will likely depend on addressing fiscal challenges. In our view, the administration that assumes power in 2011 will need to address the following: 1) spending priorities and mandatory earmarking, including social security, probably the most important challenge facing Brazil’s fiscal accounts over the long run; 2) the arcane tax system (Brazil is a glaring outlier in international comparisons in the amount of time firms are required to spend to comply with tax rules); and 3) a medium-term fiscal framework that restores transparency to the fiscal accounts and addresses the issue of quasi-fiscal transactions through public sector financial entities.

The task is doable, we think, although the path may prove non-linear, with relatively limited progress in the near term before reforms advance and infrastructure investment picks up.

The key risk could be complacency: Many hope that oil gains can help finance fiscal needs and fund infrastructure spending in the coming years; if nothing is done to support and supplement that, then an infrastructure boom could peter out.
The Main Investment Opportunities in Infrastructure

Infrastructure investment looks likely to represent about 2.2% of GDP per year over the next four years, judging by a mapping of investment plans by BNDES, the national development bank. A recent survey\(^2\) from BNDES indicates that infrastructure investment should increase to R$274 billion in 2010–13, from R$199 billion in 2005–08. That represents a total increase of 37%, or annual growth of 6.5%. From these numbers, we estimate that infrastructure investment in Brazil would amount to about 2.2% of GDP per year over the next four years, compared with about 2.0% on average in 2005–08.

This level of investment is close to the average of recent years, despite the potential for accelerated infrastructure spending associated with the World Cup, the Olympics, and potential future pre-salt oil benefits. Actual investments may disappoint versus potential upside. However, to achieve greater GDP growth, we believe Brazil will have to make greater investments in infrastructure.

We see the biggest opportunities in areas like road, railway and port infrastructure. Investment in ports and railways is already projected to expand an annualized pace of 24.8% and 12.7%, respectively, even though a low starting point means that the resulting volume of planned investments in these sectors would remain relatively limited.

The bulk of total projected infrastructure investment would still concentrate in the electricity sector, which is expected to account for about one-third of total infrastructure investments during the next four years. Telecommunications come second, with a large share of 24.5% of the total, followed by water and sewage with a share of 14.2%. However, growth in infrastructure spending in telecommunications is expected to be fairly modest, as it seems largely related to maintaining structures already in place.

### Exhibit 3

**Brazil: Infrastructure Investment Plans (2010–13)**

<table>
<thead>
<tr>
<th>Sectors</th>
<th>R$ billion</th>
<th>% of total</th>
<th>% of GDP per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>92</td>
<td>33.6</td>
<td>0.7%</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>67</td>
<td>24.5</td>
<td>0.5%</td>
</tr>
<tr>
<td>Sanitation</td>
<td>39</td>
<td>14.2</td>
<td>0.3%</td>
</tr>
<tr>
<td>Railways</td>
<td>29</td>
<td>10.6</td>
<td>0.2%</td>
</tr>
<tr>
<td>Highways</td>
<td>33</td>
<td>12.0</td>
<td>0.3%</td>
</tr>
<tr>
<td>Ports</td>
<td>14</td>
<td>5.1</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td><strong>274</strong></td>
<td><strong>100</strong></td>
<td><strong>2.2%</strong></td>
</tr>
</tbody>
</table>

Source: GT Investimento, APE/BNDES, Morgan Stanley LatAm Economics

Our Report at a Glance

**Infrastructure investment requirements:**
- Brazil’s infrastructure investment has slowed to 2.1% of GDP in recent years, down from 3.6% in the 1980s.
- Brazil would need to invest 6–8% of GDP per year to catch up with South Korea in 20 years…
- …and 4% of GDP per year to catch up with Chile.

**Prospective infrastructure investment by sector:**
- Electricity tops the list in terms of total investment and percentage of GDP.
- Ports, starting low, should see most percentage increase.

**Challenges to increased infrastructure investment:**
- Public sector infrastructure investment has been low, and could grow over time if authorities can create fiscal space.
- Challenges to increasing public sector infrastructure investment: The tax burden is high and most of the budget is earmarked for hard-to-curb expenditures.
- Challenges to increasing private sector investment: the legal and regulatory framework.

**Current situation not good for Brazil’s competitiveness:**
- In a WEF survey of global competitiveness, Brazil ranked in the bottom half globally in infrastructure. Further, its infrastructure score appears to offer the most room for improvement of any category surveyed.
- Brazil’s port and transportation infrastructure looks particularly poor, with implications for agricultural competitiveness and exports generally.
- Infrastructure is likely to pose increasing problems for doing business in Brazil. It can also affect an economy’s ability to attract foreign direct investment. And infrastructure also matters for sovereign ratings.

**Macro implications:**
- **Base case:** Brazil doubles investment in infrastructure, to 4% of GDP; it moves ahead with some reforms; and real GDP growth averages 5%.
- **Bull case:** Investment in infrastructure triples, to 6% of GDP; structural reforms are put in place; and real GDP growth accelerates to 6% on average.
- **Bear case:** Infrastructure spending remains stuck at 2% of GDP, and average real GDP growth remains at 4%.

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\(^2\)“Perspectivas de investimento na Infraestrutura 2010-2013” in Visão do Desenvolvimento, n. 77. BNDES, February 2010 - Gilberto Borça Jr and Pedro Quaresma.
# Equity Investment Implications

<table>
<thead>
<tr>
<th><strong>ANALYST</strong></th>
<th><strong>INDUSTRY CALL</strong></th>
<th><strong>STOCK CALLS</strong></th>
</tr>
</thead>
</table>
| Javier Martinez | Agribusiness      | **Cosan Limited (CZZ, Overweight), Cosan SA (CSAN3, Overweight): new player in sugar logistics via Rumo.**  
Cosan was transformed by its recent joint venture with Shell. Fuel distribution represents 45% of our valuation, logistics 15%. The Rumo rail project, expected to start operating this year, should transport 10 million tons of sugar and elevate 18 million tons in its port terminal (as a reference, Brazil exported 24 million tons last year). We expect Rumo to generate EBITDA of R$400 million from capex of R$1.3 billion, of which a large part is already contracted. |
| Carlos de Alba  | Basic Materials   | **Gerdau (GBR4.SA, Equal-weight): Brazil’s leading supplier of long steel products for civil construction.**  
Gerdau’s exposure to the US is priced in and recent underperformance vs. peers is unlikely to continue, but it is too early to buy. We think US commercial construction will start to recover, following the residential and industrial trend (see *Fundamentals Bottoming, Balanced Risk-Reward After Underperformance, April 22*). Gerdau looks fairly priced after underperforming its Brazilian steel peers by ~19 percentage points YTD. The stock is trading at 6.7x 2011e EBITDA, in line with the forward multiple we view as fair for long steel stocks.  
**Usiminas (USIM5.SA, Equal-weight): the sole producer of heavy plates for the oil & gas industry.**  
Usiminas is also developing new product applications for construction. Its businesses enjoy positive fundamentals that are offset by fair valuation. We like its exposure to the recovery of steel demand in Brazil through a portfolio of high value-added products, and the potential for unlocking value at the iron ore division. Also, Usiminas offers the highest EBITDA growth (86%) in our steel coverage (58%, on average) over the next couple of years. But the stock has rallied 30% in the past three months (USD) vs. 23% for its peers and 8% for the Bovespa, and we see limited upside. |

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Our stock ratings are on a 12- to 18-month view, while our investment recommendations in the context of a Brazil infrastructure play are on a 10-year macro view.
## Equity Investment Implications

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<tbody>
<tr>
<td>Subhojit Daripa</td>
<td>Oil, Gas &amp; Petrochemicals</td>
<td><strong>OSX (OSXB3, Overweight):</strong> offshore platform and rig manufacturer. OSX has a contract to provide and service all of OGX’s production infrastructure; it also leases E&amp;P units to oil and gas companies. OSX is positioned to benefit from spending on the pre-salt. We think it has an advantage over domestic and international peers due to: 1) Brazil’s local content requirement; 2) its potential $30 billion OGX order book; 3) its special relationship with OGX, with guaranteed gross margins and leasing ROE; 4) government-subsidized financing; and 5) a partnership with ship manufacturer Hyundai.</td>
</tr>
<tr>
<td>Javier Martinez</td>
<td>Lupatech (LUPA3, Overweight):</td>
<td>only local vertically integrated equipment manufacturer/service provider with focus on oil &amp; gas. With the equipment and services segment of energy at the bottom of the capital investment cycle, we see opportunities for Lupatech to gain clients, both domestic companies and international oil companies expanding in Brazil. Lupatech’s main competitive advantages are its expertise in the manufacturing of equipment for deep water oil production and its close relationship with Petrobras helping to develop new applications over many years. Also, Lupatech benefits from laws requiring local content in E&amp;P.</td>
</tr>
<tr>
<td>Nicolai Sebrell</td>
<td>Transportation Infrastructure</td>
<td><strong>CCR (CCRO3.SA, Overweight):</strong> significant value from new concessions. CCR is one of LatAm’s largest toll road operators, with 1,571 km of highways and other concessions. It should gain value even with just a few wins among the many upcoming projects. Synergies with its existing network, such as the RodoAnel south tranche in São Paulo, could drive further upside. <strong>America Latina Logistica (ALL11, Equal-weight):</strong> opportunity to grow with greater projects. ALL specializes in rail and logistics, a focus of the government due to lower transport costs over middle to long distances. Part of the R$29 billion p.a. potentially channeled to rail investment builds on projects already ahead of ALL, including: 1) Sugar pipeline. In early 2009, ALL signed an agreement with Rumo (a Cosan subsidiary) to operate a new 400 km rail line (fully financed by Rumo) transporting sugar from Ribeirão Preto to the port of Santos. Over the next four years, ALL expects its transported sugar volumes to grow by a factor of 4 or more. The Rumo line would also drive ALL’s bulk cargo share at Santos, which has nearly doubled in the past three years. 2) Rondonopolis extension. ALL has a project to build a 260 km railway extension from Alto Araguaia to Rondonopolis in Mato Grosso, connecting it to Santa Fe do Sul in São Paulo state. ALL expects to move 500,000 tons on the completed track in 2011.</td>
</tr>
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</table>

Boosted by pre-salt oil prospects, investments in the oil and gas sector are expected to jump to R$295 billion in the next four years, up 88.2% from 2005–08, or annual growth of 13.5%.
**Equity Investment Implications**

Our stock ratings are on a 12- to 18-month view, while our investment recommendations in the context of a Brazil infrastructure play are on a 10-year macro view.

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<th>ANALYST</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Subhojit Daripa</td>
<td>Utilities</td>
<td>Tractebel (TABLE3, Overweight): Long-term winners will be the most efficient generation plays, like Tractebel, in our view (see Poised for Growth, Catalyst Expected; Upgrading to Overweight, April 23). We think generation offers lower risk and higher potential return than distribution. After flat earnings YoY in 2009, we expect Tractebel to resume earnings growth of 13% and EBITDA growth of 8% in 2009–15 (CAGR) due to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Additional capacity.</strong> The transfer of Estreito by GDF Suez (Tractebel's controlling shareholder) to Tractebel should add 435MW of installed capacity by 2011e. The complementary biomass plant Destilaria Andrade should add 33MW of installed capacity in 2010.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <strong>Higher generation prices.</strong> We expect strong volume growth, led by industrials, to shave off part of the excess capacity in the system, driving a recovery in generation prices to industrial customers in the free market.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CPFL Energia (CPFE3, Equal-weight): also worth highlighting.</strong> It is mostly a distribution play, and we prefer generation; however, we believe CPFL is an interesting vehicle to play long-term infrastructure development in Brazil.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Why we are positive on CPFL:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• CPFL combines some of the key drivers of success in consolidation, such as a strong management team, material size (increasing potential bargain power with suppliers), and operational efficiency.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• CPFL has growing exposure to the generation segment. We expect the company to increase installed capacity from 1,737 MW today to 2,765 MW by 2012, based on projects under development. Management’s target aims to reach 4,000 MW of installed capacity in 2014.</td>
</tr>
</tbody>
</table>
Infrastructure Investment Requirements

Brazil’s infrastructure investment has slowed to 2.1% of GDP in recent years, down from 3.6% in the 1980s.

Brazil would need to invest 6–8% of GDP per year to catch up with South Korea in 20 years…

…and 4% of GDP per year to catch up with Chile.

All of Latin America needs greater infrastructure investment:

- LatAm infrastructure investment was about 3.7% of GDP in the early 1980s before slowing to 2.2% in the late 1990s.
- One World Bank study estimates that an annual infrastructure investment of 2.5% of GDP would be enough to meet increasing demand, maintain existing infrastructure, and ensure universal coverage in electricity, water, and sanitation.
- The same study estimates that annual investment of 6–8% of GDP for 20 years would be needed for Latin America as a region to reach levels of infrastructure per worker similar to that of South Korea.

Brazil’s infrastructure needs are especially significant; the bar is higher because the starting point is lower.

- Infrastructure investment in Brazil has slowed to about 2.1% of GDP on average in recent years.
- That is down from 5.4% in the 1970s, 3.6% in the 1980s, and 2.3% in the 1990s. While the investment slowdown is comparable to the one seen in the region, the resulting infrastructure picture is worse in Brazil than elsewhere.
- The World Bank study estimates that Brazil would need infrastructure investment of 6–8% of GDP per year to catch up with South Korea in 20 years. While ambitious, such infrastructure investment levels were achieved by Korea, China, Indonesia, and Malaysia from the late 1970s through the late 1990s.
- Some studies suggest that infrastructure investment of about 2% of GDP per year is needed to simply maintain the current infrastructure stock (offsetting depreciation), and to keep up with a growing population.
- Building on studies by the World Bank and the World Economic Forum, we estimate that to sustain real GDP growth of about 5% and catch up to infrastructure levels in Chile, the Latin American infrastructure leader, Brazil would need to invest 4% of GDP per year on infrastructure over 20 years, or about twice as much as in recent years.

Exhibit 4
Brazil: Infrastructure Investment
(as % of GDP)

Exhibit 5
Investment Needed for Infrastructure Improvement*
Annual investment over 20 years to equal South Korea
(as % of GDP)

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Prospective Infrastructure Investment by Sector

In electricity, prospective investments are led by hydroelectric plants. Total investment in the sector is projected to be R$92 billion in 2010–13, or annualized growth above 6% in this relatively consolidated sector. According to BNDES, the main projects here are hydroelectric plants in the context of the growth acceleration program (PAC). These include Jirau and Santo Antônio along the Madeira River, with a budget above R$23 billion, of which R$20 billion should materialize within the next four years, besides investments of about R$8 billion in the hydroelectric plant of Belo Monte and investments in the nuclear plant of Angra III estimated at R$4 billion. Finally, more than 70 wind power projects should add about R$8 billion over the next three years.

In telecommunications, investments appear to have stabilized after a privatization-related expansion cycle in 1997–2001, as the sector now looks fairly consolidated, with relatively few players. Investment drivers here are twofold, according to BNDES.

- Firms in the sector now appear inclined mainly to maintain minimum investment as required by the regulator.
- Telecom firms seem to compete for market share in specific niches through the introduction of new technologies, such as the third generation of mobile phones and digital TV.

In water and sewerage, investments could grow strongly in 2010–13, although the regulatory framework could still improve further. Besides projects in the growth acceleration program (PAC), drivers here include strong penetration of the private sector in this area, which is expected to account for 30% of new concession over the next 10 years, according to BNDES.

As for railways, infrastructure investments are projected at R$30 billion in 2010–13, or an average growth of 13% per year. Drivers here include expansion of the network, with the construction of new lines and expansion of existing railroads, including the Transnordestina, Norte-Sul and Ferroronorte-Rondonópolis, besides the planned introduction of a high-speed train between the cities of Campinas and Rio de Janeiro, going through São Paulo.

Planned investments in highways would add up to R$33 billion in 2010–13, for an average annual growth of 7.8%. Highlights here would include new concessions in the existing system, like the second stage of the federal program, and the second stage of the program in the state of São Paulo, which have already added 5,000 kilometers to the 15,000 kilometers under concession. Desperately congested now, airports seem to hold the promise for significant future investments, too, depending on how the authorities handle the framework for the sector in the next administration.

Finally, infrastructure investment in ports would triple in 2010–13, with an average annual growth of 25%, from a very low starting point. The main drivers here include the implementation of new ports administered by the private sector, on the back of an improved regulatory environment since late 2008, BNDES notes. While the global crisis and resulting slower trade flows temporarily cooled pressures on port utilization, port improvement and expansion remain a pressing medium-term challenge. For instance, Brazil’s national association of containers (Abratec) estimates that the sector saw a volume decline of 14.3% in 2009 after 12 years of uninterrupted growth, but now looks for a rebound of 18.3% in 2010 as global trade recovers and the Brazilian economy expands.

Exhibit 6
Brazil: Infrastructure Investment Plans
(R$ billion)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>Critical Factors</th>
<th>Investment 2010-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ports and Highways</td>
<td>Regulation - Concession</td>
<td>R$47 billion</td>
</tr>
<tr>
<td>Railways and Sanitation</td>
<td>Federal Budget</td>
<td>R$69 billion</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>Competition</td>
<td>R$67 billion</td>
</tr>
<tr>
<td>Electrical Energy</td>
<td>Licenses</td>
<td>R$92 billion</td>
</tr>
</tbody>
</table>

Source: APE/BNDES

Critical factors and prospects for infrastructure investment across sectors in Brazil: BNDES highlights that consolidation of the new regulatory framework for ports, and increases in road concessions are key to attract investments in these sectors. Stable sources of public and private financing are important too for investment in railways and in large sanitation projects. For telecommunications, competition dynamics amid technological innovations seem a key ingredient for investment prospects in the sector. As for the electricity sector, regulatory and bureaucratic procedures,
including licenses, are important for implementation of large hydroelectric projects in the north region, like Jirau, Santo Antônio, and Belo Monte.

Exhibit 7  
Brazil: Investment Prospects  
(R$ billion, and % change)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>2005-2008</th>
<th>2010-2013</th>
<th>%</th>
<th>% a.r.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>199</td>
<td>274</td>
<td>37.3</td>
<td>6.5</td>
</tr>
<tr>
<td>Electricity</td>
<td>68</td>
<td>92</td>
<td>35.7</td>
<td>6.3</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>66</td>
<td>67</td>
<td>0.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Sanitation</td>
<td>22</td>
<td>39</td>
<td>77.1</td>
<td>12.1</td>
</tr>
<tr>
<td>Railways</td>
<td>16</td>
<td>29</td>
<td>81.7</td>
<td>12.7</td>
</tr>
<tr>
<td>Highways</td>
<td>23</td>
<td>33</td>
<td>45.4</td>
<td>7.8</td>
</tr>
<tr>
<td>Ports</td>
<td>5</td>
<td>14</td>
<td>203.0</td>
<td>24.8</td>
</tr>
<tr>
<td>Industry</td>
<td>311</td>
<td>499</td>
<td>60.2</td>
<td>9.9</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>156</td>
<td>295</td>
<td>88.2</td>
<td>13.5</td>
</tr>
<tr>
<td>Mining</td>
<td>53</td>
<td>52</td>
<td>-2.7</td>
<td>-0.6</td>
</tr>
<tr>
<td>Steel</td>
<td>28</td>
<td>44</td>
<td>58.7</td>
<td>9.7</td>
</tr>
<tr>
<td>Petrochemical</td>
<td>19</td>
<td>36</td>
<td>87.1</td>
<td>13.3</td>
</tr>
<tr>
<td>Automobile</td>
<td>23</td>
<td>32</td>
<td>40.8</td>
<td>7.1</td>
</tr>
<tr>
<td>Electric/Electronics</td>
<td>15</td>
<td>21</td>
<td>42.1</td>
<td>7.3</td>
</tr>
<tr>
<td>Pulp and Paper</td>
<td>17</td>
<td>19</td>
<td>13.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>510</td>
<td>773</td>
<td>51.6</td>
<td>8.7</td>
</tr>
</tbody>
</table>

Source: GT Investimento, APE/BNDES, Morgan Stanley LatAm Economics

Investments in the oil sector: Beyond infrastructure, BNDES also maps investment prospects in other areas, including the oil sector and other industrial segments. The oil sector already represented a large share of 30.6% of total mapped investments in 2005–08, and is expected to jump to 38.2% of the total in 2010–13. Boosted by pre-salt oil prospects, investments in the oil and gas sector are expected to jump to R$295 billion during the next four years, up 88.2% from 2005–08, or annual growth of 13.5%. Spillovers to other sectors can prove relevant — most obviously to the petrochemical sector, where investment is expected to expand an annual rate of 13.3% in coming years. But implications for other industrial sectors and for infrastructure in particular are less clear.

In all, investment in the oil and gas sector would expand at an annual pace of 13.5% per year in 2010–13, according to BNDES, while other industrial areas would grow 5.6%, and infrastructure investment would increase 6.5% during the same period.
Challenges to Increased Infrastructure Investment

Public sector investment in infrastructure has been low, and could grow over time if authorities manage to create enough fiscal space.

Challenges to increasing public sector investment in infrastructure: the tax burden is already high and most of the budget is earmarked for hard-to-curb expenditures like payroll expenses and social security outlays.

Challenges to increasing private sector investment in infrastructure: the legal and regulatory framework.

Total investment in Brazil is not high by international standards, and infrastructure investment in particular is low. Total investment in Brazil has been about 17% of GDP on average over the last decade, according to the national accounts statistics. Investment in infrastructure on average represents about 13% of total investment in Brazil, or about 2% of GDP (Exhibit 9).

Exhibit 9
Brazil: Investment by Sector
Infrastructure represents ~13% of total investments (as % of GDP)

The bulk of total investment in Brazil is conducted by the private sector. According to the national bureau of statistics (IBGE), the private sector accounts for almost 90% of total investment in Brazil, while the public sector accounts for a bit above 10%.

…but in infrastructure, the role of public sector investment is significantly larger. One study estimates that the public sector (essentially the federal government) has accounted for about one-half of total infrastructure investment in Brazil during the last decade.

Within the public sector, federal government investment remains low. Despite Brazil’s rising overall public sector spending over time, along with a steadily rising tax burden, Brazil’s public sector spends relatively little on investment. Investment accounted for just 6% of total federal spending last year, lagging social security expenses (39%) and payrolls (27%). And federal government investment in 2009 was only about 1% of GDP — although it is not clear how much of that goes to infrastructure specifically.

Exhibit 10
Brazil: Federal Government Spending
Federal spending on investment is just 6% of the budget, or about 1% of GDP (% of total, 2009)

State-owned-enterprise (SOE) overall investment has been growing. Overall investment by other public sector entities, such as states and municipalities, has been relatively stable over the years. But investment by federal SOEs has been rising, although there is little clarity if any of that goes into infrastructure. Petrobras, Brazil’s giant oil company, plays an increasing role, investing about 2.1% of GDP in 2009 and outpacing total investment by the federal government (Exhibit 11).

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Brazil: Public Sector Investment

SOEs play growing role in public sector investment, but infrastructure investment concentrated at federal level (as % of GDP)


Challenges to Increased Public Sector Investment

Public sector investment needs to increase, especially on infrastructure, to sustain faster growth. A key challenge facing Brazil is how to create fiscal room for increased public sector investment in infrastructure, given Brazil’s already high tax burden and its rigid budget, where the vast majority of resources are channeled to hard-to-curb current expenditure items like payroll expenses and social security outlays. Structural reforms are needed to address Brazil’s long-term fiscal constraints, open up room for increased public sector investment in infrastructure, and encourage private sector investment.

We think the administration that takes power in 2011 will face three long-term fiscal challenges; see “Brazil: Long-term Fiscal Challenges” in This Week in Latin America, November 30, 2009:

- Contain spending growth and rethink spending priorities. Besides improving efficiency in the public sector in key areas such as basic health and primary education, the fiscal authorities will need to curb overall spending growth if they seek to free resources to invest in infrastructure. That will require addressing budget rigidities and mandatory earmarking, as well as social security reform (probably the most important challenge facing Brazil’s fiscal accounts over the long run).

- Curb the tax burden and simplify the arcane tax system to limit the public sector’s crowding-out effect and improve the local business environment. Brazil’s tax burden is high by international standards, once adjusted for the country’s per capita income. And the tax system is a glaring outlier in international comparisons of the amount of time required of firms to comply with complex tax rules.

- Lay out a clear medium-term fiscal framework, restoring transparency to the fiscal accounts and targets, and addressing more explicitly the issue of quasi-fiscal transactions through public sector financial entities. For instance, let’s say the Treasury allocates resources via BNDES to support the building by the private sector of a high-speed train system between São Paulo and Rio de Janeiro, while the government also assumes the risks involved in the project. While the headline net debt does not change, the little-watched gross debt increases. And the current system does not answer in a transparent way questions about implicit contingent fiscal liabilities that could come back to haunt the fiscal accounts.

Challenges to Increased Private Sector Investment

Within Latin America, Brazil ranks as an attractive market for private sector investment in infrastructure, according to an Infrastructure Private Investment Attractiveness index, constructed by the WEF. The index measures the institutions, factors, and policies that attract private investment in infrastructure projects in a number of Latin American countries. It is composed of eight pillars (for a total of 62 variables), including the macro environment, the legal framework, political risk, ease of access to information, financial market enablers for infrastructure financing, track record of private investment in infrastructure, government and social indicators, and government readiness to facilitate private investment. Among the 12 LatAm countries surveyed, Brazil ranks second according to this attractiveness index, just behind Chile.
The legal and regulatory framework is a key challenge to private sector investment into infrastructure in Brazil. According to the WEF survey, Brazil’s legal framework scores poorly — in fact, the distinction between Brazil and Chile is the largest in this factor (see Exhibit 13). Brazil ranks 9th out of the 12 LatAm countries in the quality of its legal framework, mainly because of inefficiencies in the regulatory framework and poor public ethics. The business community shows little trust in politicians and doubts their impartiality. Diversion of public funds and, to a lesser extent, issues regarding the awarding of public contracts are widespread, according to the WEF survey. In addition, given the importance of the judiciary system in determining investment attractiveness, Brazil’s poor ranking (ahead of only Venezuela in the survey) raises a flag.

Brazil needs a stable, credible regulatory environment to spur private sector infrastructure investment, according to a World Bank study. The report highlights the need to: 1) eliminate regulatory bottlenecks and remaining political uncertainties in certain sectors; 2) plan infrastructure concessions to avoid excessive renegotiations; and 3) improve the functioning of regulatory agencies.

Among factors that attract private sector investment, Brazil does well in terms of investor access to information, scoring close to Chile on the WEF survey. This includes aspects such as the quality of statistical information, transparency, and openness of the dialogue and decision-making process. Elsewhere, there is clear room for improvement, ranging from financial market enablers and government readiness for private sector investments to political risk and the macro environment. In particular, while Brazil gets high marks for the soundness of its financial system, the WEF survey indicates that investors express concern about the poor quality of Brazil’s educational system and the difficulty in hiring skilled labor.

Exhibit 13
Infrastructure Attractiveness Index: Brazil vs. Chile
Brazil lags most in legal and regulatory framework (1-7 scale, the farther from the center the better)


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Current Situation: Not Good for Brazil’s Competitiveness

In a survey of global competitiveness, Brazil ranked in the bottom half globally in infrastructure. Further, its infrastructure score appears to offer the most room for improvement of any category surveyed.

Brazil’s port and transportation infrastructure looks particularly poor, with implications for agricultural competitiveness and exports generally.

Infrastructure is likely to pose increasing problems for doing business in Brazil. It can also affect an economy’s ability to attract foreign direct investment. And infrastructure also matters for sovereign ratings.

Brazil’s infrastructure ranks 74th out of 133 countries, even though its overall economy ranks 56th, according to a World Economic Forum (WEF) survey that asked firms to rank global competitiveness. Among the BRIC economies, Brazil’s infrastructure ranks similar to India’s (76) and Russia’s (71), but it lags China’s (46). Within Latin America, Brazil’s infrastructure ranking is near Mexico’s (69) and is significantly better than Venezuela’s (106), but it is far behind Chile’s (30); see Exhibit 14.

Infrastructure is crucial to strong GDP growth. One study estimates that Brazil could boost real GDP growth to 5–6% if its infrastructure caught up with regional leader Chile. And it could boost real GDP growth to as much as 7% — above even our bull case scenario — if its infrastructure caught up with that seen in East Asian countries like South Korea.

Brazil’s port and transportation infrastructure looks particularly poor, with implications for logistics costs and trade competitiveness. Among 133 countries in the WEF survey, Brazil ranked 127th in the quality of its ports. Only six countries ranked lower in port infrastructure — and two of them are landlocked. Brazil’s international rankings in other infrastructure areas are also generally poor, including quality of overall infrastructure (81), air transport (89), railroads (86), and roads (106); see Exhibit 15. In contrast, Brazil’s electricity supply ranked higher at 55.


Exhibit 16

**Market Size vs. Infrastructure**

Brazil: advantage in market size, lags on infrastructure. (Bottom-left: small markets with poor infrastructure. Top-right: large economies with advanced infrastructure)

![Graph showing market size vs. infrastructure for various countries, with Brazil highlighted.]

Scale is 1-7, with 7 being the best. Source: World Economic Forum, Morgan Stanley LatAm Economics

Exhibit 17

**Brazil: Infrastructure by Sector**

Brazil lags in port facilities but excels in electricity supply (1-7 scale, and ranking among 133 countries)

![Bar chart showing infrastructure scores for Brazil and other countries, with Brazil highlighted.]


**Poor infrastructure is a hindrance to Brazil’s agricultural competitiveness.** For instance, Brazil is a major producer and exporter of soybeans, and the world’s second-largest exporter of soybean oilseed, after the United States. Soybeans represent about 11% of Brazil’s total exports. The state of Mato Grosso alone contributes about 7% of global soybean production. The state has the lowest production costs in Brazil, but its logistics costs are very high. Our LatAm agribusiness team estimates that logistics costs represent 32% of total costs for soybean exports from Mato Grosso, given the long distances along poor roads that trucks have to travel to reach the Santos port (see Exhibit 18). Further, the poor roads are particularly vulnerable to weather conditions. In the latest harvest — a record for Brazil — heavy rains interrupted traffic in the region, causing soybeans to be stuck at the point of origin. Some studies indicate that soybean transport costs in Brazil can be up to 7 times higher than in the US.

Exhibit 18

**Brazil: Farmers’ Cost Structure**

Mato Grosso (MT) contributes 7% of global soybean production, but poor roads result in high logistics costs ($ per ton, and % share)

<table>
<thead>
<tr>
<th></th>
<th>MT</th>
<th>MAPITO</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>601</td>
<td>576</td>
<td>515</td>
</tr>
<tr>
<td>Production cost*</td>
<td>407</td>
<td>487</td>
<td>452</td>
</tr>
<tr>
<td>Logistics cost**</td>
<td>194</td>
<td>89</td>
<td>63</td>
</tr>
</tbody>
</table>

* Includes fertilizers, chemicals, seeds, process, etc. ** Includes transportation and ports

MT=Mato Grosso; MAPITO=Maranhão, Piauí and Tocantins; PR=Paraná. Source: MS LatAm Agribusiness Report, Agrianual, Conab, Morgan Stanley LatAm Economics

Brazil’s freight costs to export to the US are higher than for countries in Europe or the East Asia, including China (Exhibit 19). This is remarkable, given the distances involved. Brazil and Latin America as a whole spend nearly twice as much in freight costs per ton to import goods as does the United States (see “The Age of Productivity” in *Development in the Americas*, Inter-American Development Bank, 2010.)
Infrastructure could pose increasing problems for doing business in Brazil, if left unchanged. A global survey\textsuperscript{13} asked executives of large global companies to rank the factors that pose difficulties for doing business in different countries. Infrastructure was not the top concern for Brazil. (It ranked sixth, after Brazil’s arcane tax system, heavy tax burden, restrictive labor regulations, inefficient bureaucracy, and access to financing.) However, if Brazil grows rapidly amid limited infrastructure investment, we would not be surprised if infrastructure moves up the list in the coming years.

Infrastructure can also affect an economy’s ability to attract foreign direct investment (FDI). A survey\textsuperscript{14} conducted by the United Nations Conference on Trade and Development (UNCTAD) finds that Brazil does well in international comparisons of market size and growth rate, but lags global average in the quality of infrastructure and government effectiveness. Importantly, the object of the survey was to gauge the prospects for FDI in Brazil.

And infrastructure matters for sovereign ratings. When Standard & Poor’s reviews Brazil’s sovereign rating (currently a foreign currency rating of BBB- and stable outlook), it typically identifies the country’s insufficient and inefficient infrastructure as a factor limiting sustainable growth (see “As Brazil Heads for the World Stage, It Looks to Bolster Infrastructure” in Global Credit Portal, Standard & Poor’s, February 24, 2010).

\textsuperscript{13} See the 2009 WEF’s Executive Opinion Survey.

Macroeconomic Implications

Assuming Brazil increases infrastructure investment, what would the economy look like in the next decade?

- **Bull case**: Investment in infrastructure jumps to 6% of GDP, structural reforms are put in place, and real GDP growth accelerates to 6% on average. The currency appreciates further than in our base case, in both nominal and real terms, and interest rates fall even faster.

- **Base case**: Brazil manages to double its investment in infrastructure, to 4% of GDP; it moves ahead with some reforms, and real GDP growth averages 5%.

- **Bear case**: Infrastructure spending remains stuck at a low level of 2% of GDP, and average real GDP growth does not exceed the recent average of 4%.

These scenarios look at simple averages over the next decade; reality will be much more complex and non-linear. Take the base case scenario of success, for instance. Infrastructure investment is unlikely to suddenly double overnight. Instead, it may well remain relatively low in the near term, before it picks up more significantly later on. The outlook in part also depends on the willingness and ability of the administration that takes power in 2011 to move forward with reforms and infrastructure investment. Besides actual infrastructure investment, signposts in coming years to gauge which scenario is playing out include progress on reforms, especially on the fiscal front.

Other macroeconomic variables under a base scenario of success: Brazil’s overall investment-to-GDP ratio would need to increase markedly. After all, there is a significant correlation between infrastructure investment in particular and overall investment. Infrastructure investment in Brazil has averaged about 2% of GDP in the latest decade, while overall investment averaged about 17% of GDP. By contrast, when infrastructure investment in Brazil was about 5% of GDP a few decades ago, overall investment was 22% of GDP (see Exhibit 22). If Brazil’s infrastructure investment is to meaningfully increase, then the overall investment-to-GDP ratio would likely exceed 20% of GDP.

In fact, Brazil’s overall investment-to-GDP ratio is too small. Brazil’s average investment-to-GDP ratio of about 17% stands well below the median ratio of 25% for comparable investment-grade peers which Standard and Poor’s rate as BBB. Brazil’s overall investment ratio also stands below regional investment-grade peers like Mexico (23%) and Peru (24%). And Brazil’s investment ratio lags well behind its peers’ infrastructure investment numbers due to specific areas. Brazil’s ability to grow fast over time might come under question if infrastructure investment remains low for long, as Brazil could run an increasing risk of facing serious constraints in logistics areas like ports and transportation. There is precedent for complacency or inaction: Limited progress on structural reforms during the abundance years since 2003 inspires some caution about proactive policy action.

### Exhibit 21

<table>
<thead>
<tr>
<th>Brazil Infrastructure Scenarios; Our Bear Case Is No Change from Current Numbers (2011–20 average)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure Spending</strong></td>
</tr>
<tr>
<td>% of GDP</td>
</tr>
<tr>
<td>Bull</td>
</tr>
<tr>
<td>Base</td>
</tr>
<tr>
<td>Bear</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley LatAm Economics
behind other BRIC economies, India (38%), Russia (24%), and China (44%); see Exhibit 23.

Prospective oil-related investment helps, but cannot alone save the day. A BNDES mapping of prospective investments in oil and gas suggests that annual investments in this sector could increase from 1.5% of GDP on average in 2005–08 to 2.3% in 2010–13. The resulting investment gain of 0.8% of GDP would be welcome, but insufficient by itself to dramatically change Brazil’s overall macroeconomic investment picture.

Exhibit 22
Brazil: Overall and Infrastructure Investment
Overall and infrastructure investment are co-related (as % of GDP)

Source: BCB, PAC, Morgan Stanley LatAm Economics

Exhibit 23
Gross Domestic Investment
Brazil’s investment-to-GDP ratio is well below peers’ (as % of GDP)

Source: Standard and Poor’s, Morgan Stanley LatAm Economics *E = Estimate, F = Forecast

Increasing infrastructure investment is tied to increasing overall investment in the economy. As the national accounts dictate, total investment must equal total savings. Higher investment requires higher savings. In turn, an increase in total savings comes from higher domestic savings, higher external savings, or a combination of the two.

Higher overall investment would likely require increased external savings, in the form of a wider current account deficit. There is a significant historical correlation between investment and the current account in Brazil; see Exhibit 24. A scenario where infrastructure and overall investment increase significantly amid faster domestic demand growth would likely mean that Brazil’s current account deficit could widen, perhaps to 3–5% of GDP for several years — at least until increased domestic oil production and a better oil export mix eventually boost total exports more significantly. As a reference, Brazil’s current account deficit has been almost 2% of GDP on average since the 1980s, but averaged close to 4% in the 1970s, when the economy was growing much faster.

Most of Brazil’s current account deficit should be covered by foreign direct investment, if all goes well, although portfolio flows will play a role, too. Our previous work has highlighted that Brazil’s market size and growth outlook help attract FDI flows, but its infrastructure and public sector efficiency remain challenging (see “Brazil: What Is the FDI Outlook?” in Latin America This Week, September 21, 2009). Improved infrastructure, if combined with increased public sector efficiency, could go a long way toward supporting FDI inflows. If Brazil were to recover the market share of 3.5% of global FDI flows it enjoyed back in 1980, for instance, annual FDI flows into Brazil could reach 3% of GDP.
Brazil: Investment versus Current Account

If infrastructure and overall investment grow significantly amid faster domestic demand growth, Brazil’s current account deficit could widen, perhaps to 3–5% of GDP (% ∆ y-o-y, and absolute ∆ in US$ y-o-y)

Higher investment could also come in part from increased domestic savings, private and/or public. Boosting private sector investment would likely depend on improving Brazil’s business environment. Brazil ranks poorly on microeconomic indicators, according to an annual survey conducted by the World Bank (“Doing Business”). In the latest edition of this survey on local business conditions (2009), Brazil ranks 129th out of 183 countries under consideration; see Exhibit 25.

To foster private sector investment, we think Brazil will need to contain its tax burden and simplify its tax system. Brazil’s high tax burden and complex tax system are important hurdles to doing business in the country. According to, again, the World Bank survey, Brazil ranks very low in terms of the amount of taxes and mandatory contributions on labor paid by businesses as a percentage of commercial profits; the average corporate tax rate in Brazil is 69%, but only 41% in the median country in the survey. The situation is even worse when it comes to the time it takes to prepare, file, and pay (or withhold) corporate income tax, VAT and social security contributions. Brazil ranks dead last in the survey.
Brazil’s tax burden has been climbing steadily over the years, and is simply too high by international standards, once adjusted by Brazil’s per capita income; see Exhibit 27. The concern is that a high and rising tax burden can be bad for growth, as it crowds out the private sector and can hurt private sector investment.

Exhibit 27
Brazil: Tax Burden Over Time
Brazil’s tax burden has been rising steadily for decades (as % of GDP)

Source: Morgan Stanley LatAm Economics

Another factor to support private sector investment in infrastructure is the development of local capital markets. BNDES has played a crucial role in providing subsidized financing for long-term projects like infrastructure. However, the authorities may need to reassess the role of BNDES over time, for micro and macro reasons.

- **From a microeconomic perspective, local capital markets need to develop to provide diversified sources of long-term financing for private sector investment plans.**

- **From a macroeconomic point of view, subsidized BNDES lending carries fiscal implications as well, if not always explicitly.** For instance, when the Treasury issues debt in order to help fund BNDES subsidized operations — as it did last year — the federal government’s net debt goes up but the net debt does not change immediately, although there is an implicit negative carry over time. While most observers seem to focus on Brazil’s net debt (42.9% of GDP at year-end 2009) as the main benchmark indicator, Brazil’s public sector gross debt is significantly higher (62.9% of GDP at end-2009); see Exhibit 28. A strategy of funding infrastructure investment through Treasury-based BNDES subsidized lending could further widen the gap between gross and net debt statistics, before any considerations about liquidity and asset quality of the BNDES lending portfolio.

Exhibit 28
Brazil: Gross and Net Fiscal Debt
(as % of GDP)

Source: BCB, Morgan Stanley LatAm Economics

As for spurring private sector savings, structural reforms like pension reform could prove important, too. Brazil’s current pay-as-you-go pension system, and its many distortions, provides little incentive for higher long-term household savings. Here, Chile’s experience with pension reform and savings might provide useful lessons.

Commodity wealth can help, but it is no guarantee of increased infrastructure spending. One channel through which the pre-salt oil exploration could indirectly help infrastructure prospects is through the fiscal accounts. In
principle, rising fiscal revenues from the oil sector could enhance the government’s ability to spend more in infrastructure. Payments from Petrobras to the public coffers (mainly royalties, but also taxes and special participation contribution, besides dividends) were 0.9% of GDP last year, or about 6% of federal government revenues.

Two caveats on prospects for oil-related fiscal gains:

- **The timeframe and magnitude of prospective oil gains.** While capacity expansion plans by Brazil’s giant oil company are impressive (above US$ 200 billion in 2010–14), it will take time before new oil output runs at full speed; see Exhibit 29. And only about a third of oil dividends get transferred to the government, given the ownership structure of Brazil’s main oil company. Our sector equity analysts estimate that total oil-related payments to the government would increase to about 1.2% of GDP by 2014, or a gain of about 0.3% of GDP relative to 2009. Numbers would grow over time, as oil production ramps up. Under certain assumptions, annual fiscal earnings from oil could eventually increase by almost 1% of GDP relative to 2009, to reach about 2% of GDP by 2020 - although our sector analysts believe there are upside risks to potential oil reserves.

In other words, it will probably take several years before the authorities can rely on a significant fiscal boost from oil revenues, assuming all goes well. It is worth keeping in mind, too, that international oil prices can prove highly volatile, adding uncertainty to prospective fiscal gains from oil.

Further, there is not even a strong positive correlation between natural resource wealth and economic growth; see “The Natural Resource Curse: A Survey”, NBER working paper, March 2010, by Jeffrey Frankel:

- Commodity prices can decline over time.
- Natural resource sectors can crowd out manufacturing, a concern if the sector offers positive spillovers for growth.
- International commodity prices are notoriously volatile.
- Much abundance can undermine institutions, especially if it fosters rent-seeking.

In addition, natural resource wealth can be a double-edged sword, as swings in commodity prices can entail macro instability, through the real exchange rate and government spending, imposing unnecessary costs. The international literature suggests that oil booms typically entail higher government spending on two main budget items: public sector investment and government wage bill. Infrastructure investment is surely welcome if well designed and implemented within a long-term framework — as opposed to a surge in white elephant projects which later on end up unfinished or strapped for maintenance funds when commodity prices go down. As for increased spending on the public sector wage bill, as has already been the case in Brazil in recent years, a key concern is the asymmetric nature of such spending, which is very hard to cut back when needed.

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Exhibit 29

**Brazil: Oil Production**

Oil output will not provide a major fiscal boost for years (million barrels of oil equivalent per day)

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Source: Company data, Morgan Stanley LatAm Economics
Equity Section
Agribusiness

An Infrastructure Play Via Rumo

We see Cosan as an infrastructure play. Following Cosan’s joint venture with Shell (see sidebar), Cosan is not just a sugar and ethanol play anymore. We estimate that fuel retail business now represents 45% of our price target of R$29, and Rumo (Logistics) and other businesses represent 22% (see Exhibit 30). After the deal is finalized, Cosan is expected to have a market share of 24%, 30% and 39% in gasoline, ethanol, and aviation fuel retailing, respectively, and transport 10 million tons of sugar by railway and 18 million tons through its Port Terminal. As a reference, Brazil exported 24 million tons last year.

Shell JV plays a relevant role in this call. We have never been fans of vertical integration in the sugar and ethanol sector, but believe that the Shell JV will add a lot of value, especially due to potential synergies with Esso assets (acquired by Cosan in 2008).

- First, the JV, in our view, will allow Cosan to gain critical mass, which is the main profitability driver in fuel retailing. We expect NPV of synergies to be R$1.5 billion as we see EBITDA /cubic meter increasing from R$40 today to R$54 in two years, in line with that of Ultrapar, the second player in the market, as Cosan closes the market share (and EBITDA) gap with Ultrapar (covered by Subhojit Daripa).

- Second, we expect the JV will deleverage Cosan, likely: i) allowing it to participate in M&A transactions at a good time (i.e., when sugar is in the middle of a down-cycle), and ii) increasing the viability of the Rumo logistic project. (See our note of April 12, 2010, Buy CZZ and CSAN Despite Sugar Prices; JV Adds Value, for more details).

What is the Cosan/Shell JV?

In 2008 Cosan acquired Exxon Mobil’s fuel retail assets in Brazil. In February 2009 it announced a MOU to form a joint venture with Shell combining its operations with Shell Brasil. There are to be two JVs, one for the sugar & ethanol assets (including cogeneration), and the other for fuel retail assets (combining Esso and Shell distributions in Brazil). Cosan’s Rumo, land, and lubricant business will remain outside the JV. Cosan and Shell are to have shared control of both JVs.

Rumo

Rumo Logistica, owned 93% by Cosan, is a company that specializes in sugar and grain logistics. Cosan originally had a Port Terminal in Santos with partnership with Nova America group. In 2009 Cosan acquired Nova America and become the sole owner of the terminal. Then it began to broaden its logistics business (now Rumo) which included the expansion of the terminal and a partnership with America Latina Logistica (ALL) for sugar railway transportation. Given ALL had the concession, but not the capacity to transport all of Rumo’s expected volume, Rumo will invest ~R$1.3 billion to expand ALL’s rail transport capacity in the sugarcane area of SP state and will hire ALL to provide the transport services up to its Port Terminal. We expect Rumo to generate an EBITDA of R$400 million in 2013.

Shell JV also has positive implications for Rumo. Last year, Cosan was searching for private investors to acquire a stake in Rumo and help finance its capex needs. After the Shell JV, Cosan’s leverage would be significantly reduced. In anticipation of that, the private placement for Rumo was put on hold until the closing of Shell deal. With the lower leverage Cosan should have greater bargaining power in the negotiations, or even the option to finance the project alone.
Exhibit 31
Rumo’s Expected Volumes and Capex

<table>
<thead>
<tr>
<th>Volumes ('000 tonnes)</th>
<th>2010e</th>
<th>2011e</th>
<th>2012e</th>
<th>2013e</th>
<th>2014e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railroad</td>
<td>5,313</td>
<td>6,513</td>
<td>7,717</td>
<td>10,662</td>
<td>10,875</td>
</tr>
<tr>
<td>Port</td>
<td>11,000</td>
<td>12,000</td>
<td>15,000</td>
<td>15,000</td>
<td>18,000</td>
</tr>
<tr>
<td>Capex (R$ mn)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Railcars and Locomotives</td>
<td>290</td>
<td>78</td>
<td>68</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Permanent Way</td>
<td>0</td>
<td>524</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transshipment Warehouses and Port Terminal</td>
<td>121</td>
<td>117</td>
<td>71</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Capex</td>
<td>411</td>
<td>719</td>
<td>139</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Company data, Morgan Stanley Research estimates

We think the stock is attractively valued. We arrive at our price target (R$29.0 for CSAN and US$14.8 for CZZ) using a DCF model in which we include all of Cosan’s businesses (fuel retail, logistics, etc.). Our sum-of-the-parts methodology generates a similar valuation, R$28.6 for CSAN. We use a WACC of 11.95% for CZZ and 12.7% for Cosan SA, based on equity risk premium of 5.5% and a 4% real terminal growth rate in year 2019.

Sugar business is trading at a large discount, and is attractive even in a down cycle. Analyzing the implicit EV/ton multiple for the sugar and ethanol business after the deal with Shell shows us that the stock is cheap in terms of multiples, and is now trading at US$55/ton, which is below historical multiples, below peers (SMTO trades at US$83/ton) and below M&A transactions in the sector, which have recently ranged from US$77–110/ton.

Exhibit 32
Cosan’s Multiples Got Cheap After Shell Deal

Source: Company data, Morgan Stanley Research
Cosan: Play Both Vehicles

Cosan Limited is the holding company that controls Cosan SA. Therefore, our scenario analyses are identical for the two stocks. The difference in upside reflects our view of the holding company discount.

**Cosan SA (CSAN3, R$22.1, Overweight, PT R$29.0)**

- **Bull Case**: R$35.5
  - EV/EBITDA: 3.5x 2011
  - Sugar prices are in US$0.184/lb for 2010/11. FX is at 1.8 for YE10. Shell and Esso deal generates more synergies than expected. Rumo increases further than current guidance.
- **Base Case**: R$29.0
  - EV/EBITDA: 4.0x 2011
  - Sugar prices are in US$0.18/lb for 2010/11. FX is at 1.7 for YE10. Shell and Esso deal generates expected synergies. Rumo delivers its guidance.
- **Bear Case**: R$16.4
  - EV/EBITDA: 5.2x 2011
  - Sugar prices are in US$0.162/lb for 2010/11. FX is at 1.6 for YE10. Shell and Esso deal gets less than expected synergies. Rumo does not deliver full guidance.

**Cosan Ltd (CZZ, US$10.6, Overweight, PT US$14.8)**

- **Bull Case**: US$17.3
  - EV/EBITDA: 3.9x 2011
  - Sugar prices are in US$0.18/lb for 2010/11. FX is at 1.7 for YE10. Shell and Esso deal generates expected synergies. Rumo delivers its guidance.
- **Base Case**: US$14.8
  - EV/EBITDA: 4.3x 2011
  - Sugar prices are in US$0.18/lb for 2010/11. FX is at 1.7 for YE10. Shell and Esso deal generates expected synergies. Rumo delivers its guidance.
- **Bear Case**: US$8.1
  - EV/EBITDA: 5.5x 2011
  - Sugar prices are in US$0.162/lb for 2010/11. FX is at 1.6 for YE10. Shell and Esso deal gets less than expected synergies. Rumo does not deliver full guidance.

**Investment Thesis**

- **After the JV with Shell and the investments in Rumo, Cosan has diversified into businesses that can generate synergies, in our view.** Current share price does not appear to reflect the value of all these businesses.
- **The valuation gap between CZZ and CSAN3 has been reduced significantly in the last months, and is now below the historical average.** We see conditions under which the current CZZ structure could be ended, improving corporate governance and potentially bringing the discount to zero.

**Potential Catalysts**

- **Closing of the Shell/Esso JV.** Official guidance is early August, but we believe the deal could be closed in early June. For CZZ, the main catalyst would be the announcement of an operation to end the CZZ shareholder structure, bringing all minorities to CSAN3 and reducing the gap to zero.

**Risks**

- **Delays in or failure to close the Shell JV.** Failure to deliver on guidance from Rumo. No changes in CZZ current structure. Market concerns during the down part of the commodity cycle.

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**Source:** Morgan Stanley Research estimates
Basic Materials

Steel Is Our Favorite Way to Play Infrastructure in Brazil; Limited Benefits to Mining or Pulp & Paper

The early-cycle nature of steel consumption makes steel our favorite way to play the infrastructure theme in Brazil... Infrastructure investments seem likely to drive stronger GDP growth over the next 5–10 years. Brazil’s hosting of the World Cup (2014) and the Olympics (2016), as well as development of the pre-salt oil reserves, should drive higher steel consumption in just the next couple of years, ahead of many other industrial sectors in the country.

...while paper and mining should see little benefit from investment-led GDP growth, in our view. We view paper demand as the second derivative to an accelerated growth driven by infrastructure, which would generate increased consumption, particularly during the World Cup and Olympics. However, we believe it is too early for this second derivative to be a catalyst for equities. As for mining stocks, they should see limited benefits from higher steel demand as steel mills are highly vertically integrated into iron ore.

Steel production capacity in Brazil is not a concern for accelerated growth from infrastructure. Based on the scenarios outlined by our economics team, we think it is very likely that steel production capacity will be sufficient to support future infrastructure investments in Brazil. Only in the bull case (6.0% GDP growth over the next 10 years) would steel capacity be insufficient to meet long steel demand, and then only in 2019. In that scenario, we would expect either a stronger supply response by incumbent local steelmakers (to avoid new entrants) or an increase in steel imports into Brazil.

We also do not rule out investments necessary to meet specific demand from a pickup in infrastructure expenditures. For instance, Brazil does not produce railway tracks, but if demand from this segment starts to intensify, we believe local steel producers will invest in rail rolling mills to meet future domestic requirements. Investments in steel rolling and finishing capacity are not as capital intensive as those in crude steel expansions. They are also easier to execute, which lessens concerns with steel shortage in the domestic market.

Steel Industry Investment Case

We expect event-driven investments to boost Brazilian steel consumption by 4% in the next seven years. Steel is consumed by a large array of economic segments, from basic utilities (electricity and sanitation) to industrial applications (automotive and oil industries).

Four events should generate 8.0 million tonnes of incremental steel consumption in Brazil (see Exhibit 35). Steel historically has shown a strong correlation with GDP (0.77), with its steel consumption expanding 1.7–2.0x real GDP growth over the past 35 years, depending on product grade. However, we believe that major events in Brazil in the coming years will intensify steel consumption:

- Minha Casa, Minha Vida housing programs
- World Cup
- Olympics
- Oil & gas investments
We see an attractive market for both long and flat steel products. The incremental steel consumption implied by most of the major events we highlight above suggests increasing exposure to long steel producers. Based on technology in use today, the elasticity of long steel demand to GDP growth is ~15% higher than that of flat steel demand. However, steelmakers are developing flat steel solutions for civil construction, including housing and stadiums, which should allow flat products to exhibit a higher correlation to economic activity in the coming years. Furthermore, incremental steel demand arising from oil & gas investments will be concentrated in heavy plates, a type of flat steel product.

**New Applications of Flat Steel in Civil Construction Will Likely Increase Its Elasticity to GDP Growth**

We see an 8.0Mt incremental steel demand in Brazil driven by specific events in the next seven years. This demand is concentrated in heavy plates, a type of flat steel product.

**Fundamentals Bottoming, Balanced Risk-Reward After Underperformance, April 22.** Gerdau looks fairly priced after having underperformed its Brazilian steel peers by ~19 percentage points YTD. It is trading at 6.7x 2011e EBITDA, in line with the forward multiple that we view as fair for long steel stocks.

**Exhibit 37**

Long Steel Is Leveraged to Construction, but Brazil Represented Only 38% of Gerdau’s Volumes in 2009

**Usiminas (Equal-weight):** the sole producer of heavy plates for the oil & gas industry. Usiminas is also developing new product applications for construction. The company’s businesses enjoy positive fundamentals that are offset by a fair valuation. We like its exposure to the recovery of steel demand in Brazil through a portfolio of high value-added products, including heavy plates, and the potential for unlocking value at the iron ore division. Further, Usiminas offers the highest EBITDA growth (86%) in our steel coverage universe (58%, on average) over the next couple of years. However, the stock has rallied 30% in the last three months (USD) vs. 23% for its peers and 8% for the Bovespa, and we see limited upside.

**Exhibit 38**

Usiminas: 25–30% of Mix Exposed to Infrastructure

**Stock Picking: Wait for a Better Entry Point**

Gerdau and Usiminas offer leverage to infrastructure growth, but valuation is not compelling. Steel price increases beyond what we model could make the stocks less expensive, but still not attractive, in our view.

Gerdau (Equal-weight): the leading supplier of long steel products for civil construction in Brazil. Gerdau’s exposure to the US is priced in and recent underperformance relative to its peers is unlikely to continue, but it is too early to buy, we believe. We think US commercial construction will start to recover, following the residential and industrial trend (see
Risks to our ratings, price targets, and earnings estimates include political and macro risks in emerging markets, a sharp slowdown in the global economy driven by China, slower than expected demand for metals, abrupt decline in metal prices, increases in raw material costs, failure to deliver growth plans, long-lasting strikes, changes in mining and environmental regulations in countries where companies operates, other unforeseeable operating disruptions and adverse litigation outcomes.
Gerdau (GGBR4.SA, R$28, Equal-weight, Price Target R$32)

Gerdau Currently Offers a Balanced Risk-Reward Proposition

Source: FactSet (historical chart data), Morgan Stanley Research estimates

Investment Thesis

- We see a more balanced risk-reward on GGBR4 that makes the stock’s YTD underperformance relative to its peers unlikely to continue. Further, EV/EBITDA multiple has contracted 16% YTD.
- We believe commercial construction in the US has bottomed, which eases the main concern behind our previous Underweight rating. We also think that Gerdau’s exposure to this segment is now well understood by the market, and it should no longer be a negative catalyst for the stock.
- In Brazil, although the domestic price premium has closed to 29% from 50% recently, we believe Gerdau will wait to assess the sustainability of these levels before implementing price increases.

Key Value Drivers

- Operating flexibility provided by combination of low-cost electric arc furnace (EAF) facilities and an integrated plant provides strong leverage to steel prices in Brazil.
- Relative low fixed costs in N. Amer. operations results in high sensitivity to operating rates in the region.

Potential Catalysts

- Positive: commercial construction indicators continue to improve.
- Negative: long steel imports continue to rise in Brazil into 2Q10.

Where We Could Be Wrong

- We continue to forecast flat long steel prices in Brazil this year, but our sensitivity analysis shows higher prices in Brazil would bring meaningful upside to our estimates.
- Gerdau succeeds in curbing Brazilian rebar imports by tightening its control over the distribution chain and customer loyalty.
Usiminas (USIM5.SA, R$56, Equal-weight, Price Target R$62.50)

Exposure to Solid Industry Fundamentals, but Entry Point Not Attractive

Investment Thesis

- We like Usiminas’s exposure to the strong rebound expected for the Brazilian economy and local steel consumption.
- Potential to unlock value at its iron ore division will likely drive the stock in coming months; we see a possible 31% upside if the market were to pay peak multiples for iron ore.
- However, USIM5 shares are trading at 6.2x 2011E EBITDA, in line with our fair multiple for the company on our sum-of-the-parts valuation.

Key Value Drivers

- World-class steel operating practices and growing iron ore integration allow the company to achieve a lowest cost structure.
- Efficiency has supported strong EBITDA margins over prior cycles.

Potential Catalysts

- Positive: delivery of higher product mix in the domestic market.
- Positive: capital goods industry growth (steel intensive) catches up to overall IP growth in Brazil.
- Negative: Imports of flat steel continue to grow in absolute terms during the coming months.

Where We Could Be Wrong

- Steel imports in Brazil continue to increase into 2Q10, which could jeopardize mills attempt to increase domestic prices in Brazil.
- Usiminas finds a strategic partner to help it develop its iron ore assets, and the stock continues to rally off a high base.
Oil, Gas & Petrochemicals

Pre-Salt and Local Content
Boosting Local Development

We expect investment in the pre-salt oil reserves to be a major driver of infrastructure demand. Petrobras has impressive plans to expand capacity by spending over US$200 billion in 2010–14. Per BNDES, investment in the oil and gas sector should expand 13.5% p.a. in 2010–13.

Despite focus on the upstream segment, Petrobras also plans to expand its refinery park. In Petrobras’s announced 2010–14 plan, downstream investments represent 38% of total investments, up from 25% in its previous plan (2009–13). In the event of insufficient funding, we think Petrobras would defer downstream investments and prioritize the upstream business. Petrobras’s downstream investments are concentrated today in the development of four refineries: Abreu de Lima, with capacity of 230 Kbdp; Comperj, 150 Kbdp; Premium I, 600 Kbdp; and Premium II, 300 Kbdp.

Also, we expect prospective oil gains to fill government coffers, allowing infrastructure spending elsewhere. Only about one-third of oil dividends are transferred to the government, given the ownership structure of Brazil’s main oil company. Still, we estimate that total oil-related payments to the government will increase to about 1.2% of GDP by 2014, or a gain of about 0.3% of GDP relative to 2009. Numbers would grow over time, as oil production ramps up.

Pre-salt reserve estimates look conservative:

- We think these requirements will delay development of the pre-salt, but not as much as the market expects. ANP (Brazil’s regulatory agency for oil and gas) has been increasing the minimum local content in the exploration and development of Brazilian oil and natural segment. In the development stage, the minimum local content for platforms is ~70%. We expect this to delay development somewhat by limiting the use of global resources; however, it will be a key driver of local industry development. Our conversations with ANP left us convinced that, forced to choose between delaying production or limiting domestic fabrication, it would choose the latter.

Raw text from exhibit 41:

<table>
<thead>
<tr>
<th>Main Prospects Indicate 7.2 bn boe Net for PBR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reserve estimates (Bin. Boe)</strong></td>
</tr>
<tr>
<td>Recoverable factor (%)</td>
</tr>
<tr>
<td><strong>Net Reserves</strong> (Bin Boe @mid point of range)</td>
</tr>
<tr>
<td><strong>Consortium</strong></td>
</tr>
<tr>
<td>Petrobras Working Interest (%)</td>
</tr>
</tbody>
</table>

Source: Company data, Morgan Stanley Research

Raw text from exhibit 42:

<table>
<thead>
<tr>
<th>Assuming Recoverable Factor of 40%, PBR Reserves Could Increase to 16.4 bn boe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adjusted recoverable factor (%)</strong></td>
</tr>
<tr>
<td>Adjusted reserve estimates (BinBoe)</td>
</tr>
<tr>
<td>Petrobras Working Interest (%)</td>
</tr>
<tr>
<td><strong>Net Reserves</strong> (Bin Boe @mid point of range)</td>
</tr>
</tbody>
</table>

Source: Company data, Morgan Stanley Research

Local content requirements:

- We think the estimates may be underestimated by at least 40%. Based on our conversations with managements of Petrobras and Repsol, among others, we are convinced that Petrobras’s estimates of the pre-salt prospects are on the conservative side due to recovery factor and absolute volume.
According to Petrobras, in most areas where the company requires service, the local industry already has a high level of local content. One exception is the maritime space, particularly related to the shipyard for offshore construction.

- **OSX should benefit.** We expect newly formed offshore platform and rig manufacturer OSX to benefit significantly from the local content requirement. As a short-term example, Petrobras announced a tender for the construction of 28 rigs in early May. The rigs (semi-submersible or drillships) will have a combination of owned and chartered rigs to Petrobras and will be built in Brazil. Based on our conversations with industry players, we think Petrobras is likely to award 7+7+1+1 to virtual yards and the remaining 12 rigs to charter players. OSX will likely not take part in the initial batch of owned rigs as its yard had not received the preliminary environmental permit by the time of the invitation letter (now the yard obtained the preliminary permit, but it awaiting the installation permit). However, it is looking to make a JV with an international company to participate.

We recently initiated coverage of OSX with an Overweight rating (see our report dated April 28). OSX, which IPOed in February, is a manufacturer of offshore platforms and rigs (it has a contract to provide and service all of OGX’s production infrastructure requirements); it also leases E&P units to oil and gas companies and services the units. We think the company may emerge as a world leader over the next five years and will be built in Brazil. Based on our conversations with industry players, we think Petrobras is likely to award 7+7+1+1 to virtual yards and the remaining 12 rigs to charter players. OSX will likely not take part in the initial batch of owned rigs as its yard had not received the preliminary environmental permit by the time of the invitation letter (now the yard obtained the preliminary permit, but it is awaiting the installation permit). However, it is looking to make a JV with an international company to participate.

**Five pillars of our OSX investment case:**

- **Local content requirements leads OGX to contract its equipment s in Brazil.** In light of local content rules, OGX has little option but to purchase equipment fabricated in Brazil. In the early years of delivery, we think OSX will be a quasi off-balance sheet company to OGX whereby its margins and profitability will be defined ex-ante.

- **Size: Potential order book of $25 billion from OGX.** OGX is the E&P company of the EBX group, which has 22 offshore blocks spanning across 4 offshore basins. According to DeGolyer & MacNaughton (D&M), OGX has 6.8 billion boe of net prospective resources, which will require 48 units, amounting to a potential backlog of $30 billion. As per the agreement between OGX and OSX, the former will fabricate all but two of the units required by OGX. Should all the 48 units be built, we estimate that OSX will be fully occupied until 2017, at least.

- **Attractive commercial relationship with OGX.** According to the contract between OGX and OSX, an open book approach will guarantee an equivalent of 15% gross margin for the shipyard, a 15% ROE for the leasing unit, and a 5% gross margin for the service unit. We think this relationship is vital for the yard and a key advantage in relation to other yards as potential cost overruns will be passed on to OGX.

- **Attractive financing from government-subsidized funds.** OSX will ask for financing to FMM (Fundo de Marinha Mercante), a naval-type fund to build the shipyard. FMM can provide up to 90% financing at attractive cost of funding (2.0–4.5% in USD). In addition, the shipyard may access funds from FGCN (Fundo Garantidor de Construcao Naval) to tap a potential cash shortfall stemming from cost overruns. The federal government has put R$15 billion in the FMM and R$5 billion in the FGCN and it is a key initiative of the federal government to foster naval construction.

- **Partnership with Hyundai in the shipyard.** OSX has entered into a technology partnership with Hyundai, the world’s largest shipbuilder, to acquire state-of-the-art technology and gain expertise for OSX’s own shipyard. OSX will have access to expertise from Hyundai, which will supply technical advice, staff training, technology and engineering know-how on the shipbuilding industry. Hyundai will have a 10% ownership in the yard.

**Risks to our view:**

- **Execution risks** are evident at this stage of development as producing platforms/rigs require high standards of welding systems and skilled workforce. As the shipyard is slated to become the biggest in the Americas, there are risks related to construction of the plant.

- **Cost overruns could defer the earnings stream.** Although the agreement made with OGX calls for an open book approach, the company could face delays in the delivery of the units, of which in this case its earnings and cash flow stream will be deferred throughout the time of the delay.

- **OGX may not prove up its reserves and OSX may loose its main customer.** At this point, OGX did not finalize all the steps to certify its reserves, remaining under the category of net prospective resources.

- **Environmental risks** could lead to a delay in the start-up of the shipyard, slated to begin operation in 4Q10. So far, the EBX group has secured the land and applied for the environmental permit with IBAMA. The company expects to receive the permit in time to begin operations this year but delays could undermine this schedule, putting at risk the initial start of the operations in 2011.
OSX (OSXB3, R$557, Overweight, Price Target R$960)

Risk-Reward View: Base Case Is Centered on OGX Backlog Only

Investment Thesis

OSX could become a global player in the offshore fabrication market as it gains high-efficiency expertise levered by its relationship with Hyundai and OGX.

Our investment case is based on:
- Protected environment. Commercial relationship with OGX based on an open book approach and local content requirements.
- High earnings visibility. Potential backlog with OGX amounts to an estimated $30 billion and would run through 2019.
- Macro environment. Fabrication market is bottoming out, potentially leading to a tight supply/demand balance in the near future.

Key Value Drivers

- Backlog. Large part of the backlog comes from sister company OGX, with further potential from other players in the Brazilian offshore.
- Fabrication time, delays in construction. Although the agreement made with OGX calls for an open book approach, the company could face delays in the environmental permit and delivery of the units, deferring cash flow.

Potential Catalysts

- Environmental permit is granted to OSX shipyard by the end of the year.
- Winning four drillships from the upcoming PBR tender on May 20.
- Review of the D&M appraisal report, increasing OGX’s net prospective resources to ~9 billion boe from 6.8 billion boe.

Where We Could Be Wrong

- Execution risks
- Cost overruns
- OGX may not prove up its reserves
- Environmental risks

Source: FactSet (historical chart data), Morgan Stanley Research estimates
Lupatech (LUPA3.SA, R$24, Overweight, PT R$34); covered by Javier Martinez

Risk-Reward View: The Opportunity to Play Brazil Oil Services Boom

Why Overweight?
- **Local player**: Only local player with a strong long-standing relationship with Petrobras and with a growing product portfolio that includes both oil and gas E&P, transportation and refining.
- **Expanding client base in Brazil**: As other oil companies expand operations in Brazil, Lupatech could gain new clients.
- **Opportunity to expand internationally**: Deep-water exploration is also growing in other regions of the world and Lupatech could export its Brazilian experience and know-how.
- **Capital investment cycle**: The equipment and services segment is at the bottom of the capital investment cycle.

**Key Value Drivers**
- **Oil macro fundamentals** signal a tightening of supply. New exploration in deep-water should trigger capital investments in the region.
- **E&P capex** increasing in Brazil as PBR accelerates production or as other players start exploration.

**Potential Catalysts**
- **Movement in the backlog** should be the first signal that Lupatech wins new contracts.
- **PBR’s capital increase** could accelerate the capital investment process.
- **New projects outside Brazil** would indicate success in becoming an international player.
- **Joint Ventures** with independent players would allow Lupatech to expand product portfolio.

**Risks**
- **Competition**: PBR’s announced investment over the next decade will bring more competition to Lupatech.
Transportation Infrastructure: Highways and Rail

CCR and ALL Benefit from Accelerating Infrastructure Investment

Government focus on transportation infrastructure is best played through CCR (CCR) and America Latina Logistica (ALL). Strong established operations, scale, geography, established ties with the BNDES, and close relations with the regulatory authorities set CCR and ALL apart from peers.

Creating value in infrastructure investment depends on winning and executing government projects at an acceptable price and a sufficient rate of return for stakeholders. Both CCR and ALL have deep experience in such projects. CCR specializes in toll highway and light rail projects, while ALL focuses on rail and logistics. CCR in particular has shown discipline when bidding for new projects with respect to returns and risk. ALL successfully acquired and rehabilitated first the formerly national-run rail concession in the states south of São Paulo and later acquired and turned around the concession covering São Paulo state and northwest, including Mato Grosso.

Valuations for both are reasonable relative to history and peers, in our view. ALL trades at 10.1x 2010e EBITDA and CCR at 9.2x. These multiples are consistent with an infrastructure investment scenario above the bear case but below the base case in our economist’s forecast, making both potentially interesting investments, in our view.

CCR and ALL have capacity to invest more. CCR has ample balance sheet capacity to fund new projects, about R$6 billion over the near term when taking into account cash on the balance sheet (R$2 billion) and additional debt (raising net debt to EBITDA from 1.5, to 3.0x by year-end 2010) without returning to the market for additional equity. ALL has roughly R$2.5 billion in cash on its balance sheet.

ALL, CCR, and other smaller concession companies have already shown their value in improving Brazil transport infrastructure and operations. Since the start of the decade, volume transported has almost doubled. Railroads’ share of total cargo transported in the country has risen from about 21% in 2001, to 25% by 2007 (latest available data), which shows steady progress. Growth in volume during that period, despite two downturns, has averaged over 10% for ALL.

CCR has experienced similar success with tolled traffic growing over 2.0x GDP for much of the decade, due to capex spent on road improvements and network expansion. This year, CCR should again exhibit healthy growth as high as 12%, or about 2x GDP.

The stark contrast in quality of road conditions between privately administered and state-run highways (shown in Exhibit 51) argues for further concessions to improve Brazil’s highway infrastructure, in our view.

Raising long-term infrastructure investment to 4.0% of GDP would add significant value to the industry. There is a difference between the current concession flow announced by the government and that laid out in this report. At the start of 2010, there was at least R$127 billion worth of work on identifiable transportation infrastructure projects, including airports, railway, waterway, ports, roads, and subways, the majority of which are to be completed over the next three years. That averages about R$40 million per year, or about 1.2% of GDP per year, in between the bear case of 0.8% and base case of 1.6% of GDP spent on transportation infrastructure in this report. Thus, the base case represents upside from the current scenario laid out by the government from a bottoms-up perspective.

The government already has a significant amount of concessions planned for auction. Exhibit 44 shows those concessions and PPPs planned for the next two or so years, with a focus on the kinds of projects that CCR and similar companies would bid on. Excluding the bullet train, investments for these projects total about R$30 billion, indicating more than ample opportunity for all concession operators if auction momentum accelerates.

Exhibit 44
Large Number of New Projects Expected

<table>
<thead>
<tr>
<th>Concessions Coming to Market</th>
<th>Authority</th>
<th>Est Length of Concession, Yrs</th>
<th>Capex Rs Bn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second RodoAnel tranche</td>
<td>São Paulo</td>
<td>30</td>
<td>4.5</td>
</tr>
<tr>
<td>GRU Airport express train</td>
<td>São Paulo</td>
<td>35</td>
<td>1.8</td>
</tr>
<tr>
<td>Third São Paulo state hwy auction</td>
<td>São Paulo</td>
<td>30</td>
<td>3.8</td>
</tr>
<tr>
<td>Minas Gerais state hwy auction</td>
<td>M. Gerais</td>
<td>25</td>
<td>9.0</td>
</tr>
<tr>
<td>Fed stage III Minas hwy auction</td>
<td>Federal</td>
<td>25</td>
<td>8.2</td>
</tr>
<tr>
<td>SP-RJ bullet train</td>
<td>Federal</td>
<td>25</td>
<td>40.0</td>
</tr>
<tr>
<td>Brasilia metro project</td>
<td>Federal</td>
<td>25</td>
<td>0.8</td>
</tr>
<tr>
<td>Belo Horizonte metro project</td>
<td>M. Gerais</td>
<td>25</td>
<td>0.8</td>
</tr>
<tr>
<td>Undisclosed city metro project</td>
<td>State TBD</td>
<td>25</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Source: Company data, Morgan Stanley Research
CCR should capture significant value from new concessions. CCR is among Latin America's largest toll road operators, with a current portfolio of 1,571 km of highways and other concessions and operations. With the large number of upcoming new projects, bolstered by the renewed PAC funding, CCR should gain additional value even if it were to win just a few. Further upside exists should CCR win projects that would lead to synergies with their existing network, such as the RodoAnel south tranche in São Paulo.

ALL’s opportunity to grow extends with greater projects. Though highway transportation is dominant in Brazil, rail logistics are a focus for the government due to lower transport costs over medium to long distances (Exhibit 50). Part of the R$29 bn per year potentially channeled to rail investment builds on the projects that ALL already has ahead of it. Two of the most important are:

- **Sugar pipeline.** In early 2009, ALL signed an agreement with Rumo (a Cosan subsidiary) to operate a new 400 km rail line (fully financed by Rumo) transporting sugar from Ribeirão Preto to the port of Santos. Over the next four years, ALL expects its transported sugar volumes to grow by a factor of 4 or more. This would also increase ALL’s bulk cargo share at Santos, which has nearly doubled over the past three years.

- **Rondónopolis extension.** ALL has a concurrent project estimated at R$400 million to build a 260 km railway extension from Alto Araguaia to Rondónopolis in the state of Mato Grosso, connecting it to Santa Fe du Sul in the state of São Paulo. The company expects to be moving upwards of 500 thousand tons on the completed track in 2011.

Scenario Discussion

Base and bull cases mean more investment opportunity and longer horizon for substantial growth for both CCR and ALL. In our bull case, where the government accelerates infrastructure investment to 6.0% of GDP, ALL’s stock exhibits slightly more upside potential (60% vs. 53% for CCR), although within the accuracy of this exercise the difference is not material, in our view. The slightly greater upside potential for ALL comes from the greater importance of increasing traffic growth through the end of the current concessions and then extending their time horizon, which is in line with the government’s goal to increase rail’s utilization and share of cargo transit. CCR is a larger company and we do not expect traffic on its roads to grow faster due to greater infrastructure spending. After all, the point of greater road investment is to reduce congestion. Instead, CCR benefits from new projects to bid on which further add scale and value to the business.

We value CCR as a package of current road and metro concessions. To adjust for the change in potential project flow in each scenario, we adjust the value of future projects that the company has not yet won. In our bull case, the company’s upside potential becomes limited by execution and financing capacity. In general, we believe the capex intensity of the industry would make it difficult for management to grow CCR significantly above 15-20% on a sustained basis in terms of new project flow. This does not include traffic growth in current projects, which require little incremental operational attention.

For ALL, we take a slightly different approach. With additional investment in new projects fostered by the government, the company’s growth profile should extend beyond the current three to four years. As well, additional value should be added through new projects as yet unidentified. We model this by extending the DCF to beyond the current concession termination date.

The bull, base, and bear cases for both ALL and CCR are detailed in their respective risk-reward pages.

Price Target Discussion

Our R$47 mid-year 2011 price target for CCR is based on a DCF that values the company’s concessions as finite projects. There is a small terminal value due to businesses such as STP that are ongoing concerns. In our view the finite project assumption is potentially conservative as the company has shown in the past that granting authorities will often extend concession maturities in exchange for additional capex or operating changes. In exchange for the additional capex or costs, the granting authority extends the life of the concession to preserve the original contract return. We use a BRL-equivalent WACC of 11% (cost of equity of 14%). Past 2015, highway traffic is assumed to grow at 4%, or about 1.1x GDP until the maturity of each concession. This valuation is equivalent to a forward EV/EBITDA multiple of 8.7x, in line with the long-term average.
America Latina Logística (ALLL11.SA, R$16, Equal-weight)

14% Upside in Base Case Infrastructure Investment Scenario: 4% of GDP

Investment Thesis
- After a difficult year in 2009, we see accelerating growth in 2010, with upside risk to our estimates.
- ALL’s EV/EBITDA multiple looks reasonable on a forward basis relative to peers, despite higher sustained growth of low double-digits.

Drivers
- Agricultural exports should grow in excess of 20%.
- Brazilian industrial production should grow in excess of 10%, after contracting in 2010.
- Rondónopolis and Rumo projects add visibility to growth outlook.
- Corumbá mine and similar long-dated opportunities add potential upside to long-term outlook.

Risks/Concerns
- Valuation looks expensive compared to the market and peers on a P/E basis.
- Company has not yet reached positive cash flow; break-even expected some time next year.
- Market saturation on the agriculture side could occur within the next three years unless operational region expands (possible through new government concessions or projects such as the Rondónopolis extension).

Note: These scenarios are based on the infrastructure outlook scenarios of this report; Base Case is based on DCF fair value estimate.

LatAm Infrastructure Comparables – Best Value to Growth Relationship

<table>
<thead>
<tr>
<th>20-Apr-10</th>
<th>Company</th>
<th>Ticker</th>
<th>Rating</th>
<th>Price</th>
<th>Mkt Cap</th>
<th>Daily Vol</th>
<th>P/E</th>
<th>EV/EBITDA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ALL</td>
<td>ALLL11.SA</td>
<td>E</td>
<td>15.82</td>
<td>6,467</td>
<td>22.8</td>
<td>7.4</td>
<td>7.5</td>
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<tr>
<td></td>
<td>CCR</td>
<td>COR03.SA</td>
<td>O</td>
<td>40.94</td>
<td>10,287</td>
<td>22.9</td>
<td>9.9</td>
<td>9.9</td>
</tr>
<tr>
<td></td>
<td>OHL Brasil</td>
<td>OHLB3.SA</td>
<td>E</td>
<td>40.99</td>
<td>1,832</td>
<td>2.9</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>IDEAL</td>
<td>IDEALB1.MX</td>
<td>U</td>
<td>15.53</td>
<td>3,804</td>
<td>0.8</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td>Zhejiang Exway</td>
<td>0576.HK</td>
<td></td>
<td>U</td>
<td>7.35</td>
<td>4,112</td>
<td>7.3</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Union Pacific</td>
<td>UNP.N</td>
<td></td>
<td>O</td>
<td>75.60</td>
<td>38,286</td>
<td>274.1</td>
<td>11.6</td>
<td>11.6</td>
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<tr>
<td>CSX</td>
<td>CSX.N</td>
<td></td>
<td>O</td>
<td>56.05</td>
<td>22,224</td>
<td>194.6</td>
<td>18.6</td>
<td>18.6</td>
</tr>
<tr>
<td>Guangshen RR</td>
<td>0525.HK</td>
<td></td>
<td>O</td>
<td>3.05</td>
<td>2,783</td>
<td>2.2</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Median</td>
<td></td>
<td></td>
<td></td>
<td>16.3x</td>
<td>14.7x</td>
<td>13.9x</td>
<td>8.7</td>
<td>7.5</td>
</tr>
</tbody>
</table>

0576.HK and 0525.HK covered by Andy Meng; CSX.N and UNP.N covered by William Greene

Source: Morgan Stanley, FactSet

P / E EV / EBITDA
Brazil Infrastructure

CCR (CCRO3.SA, R$40, Overweight, Price Target R$47)

17% Upside in the Base Case Infrastructure Investment Scenario: 4% of GDP

Investment Thesis

- Traffic growth, new businesses, a large potential auction win, inflation protected tariffs, and a reasonable valuation support our Overweight rating.

Drivers

- Double digit top-line growth driven by strong traffic growth, tariff increases, and new businesses
- Robust project pipeline should generate important business opportunities further down the road
- Rodoanel auction expected in June is a potential catalyst.
- Secondary market opportunities for existing concessions could add value, e.g., CCR’s Renovias purchase, in keeping with company’s stated strategy on uses of cash

Risks/Concerns

- Timing of Rodoanel South and East auction(s) could slip; financing of the Rodoanel project will require multiple solutions (e.g., BNDES combined with Brazilian banks and potentially foreign investors)
- Ayrton Senna impact on Nova Dutra looks to be negligible so far, but could increase
- Elections could shift focus away from infrastructure progress as year end approaches

Price Target $47

Bull Case R$56

- 10x
- 2011e EBITDA of R$2,900

Better than expected 2010 carries over to 2011; Rodoanel auction win. CCR wins the Rodoanel auction as part of a consortium. Traffic grows at 12% and 10% in 2011. Multiple expands on expectations for more auctions in 2011 and 2012.

Base Case R$47

- 9x
- 2011e EBITDA of R$2,723

Double-digit traffic growth. Low double digit growth in traffic in 2010, partially offset by competition in Nova Dutra. Rodoanel West continues strong growth as South stretch opens. Controlar and Linha 4 also add revenue growth.

Bear Case R$35

- 8x
- 2011e EBITDA of R$2,450

No auction wins and weak traffic. Traffic grows in mid-single digits, driven by cannibalization in Nova Dutra and little positive effect from Rodoanel South. No auctions won during the year, and a change in strategic direction that makes future auctions unlikely.

Note: These scenarios are based on the infrastructure outlook scenarios of this report; Base Case is based on DCF fair value estimate.

Progression from Bear Case to Bull Case

- Price target: R$47
  - 35
  - 4.50
  - 6.00
  - 1.50
  - 47
  - 3.50
  - 4.00
  - 1.50
  - 56

* Base case traffic grows 15% 2010, 8% 2011; Bear 10% and 4%; Bull 17% and 2%; Source: Morgan Stanley Research estimates
Utilities/Electric and Water: In Support of Economic Growth

**We do not expect electricity to be a bottleneck to economic growth.** Brazil combines large generation potential with what we view as a robust regulatory framework in the sector that offers adequate incentives to guarantee the required investments in all segments (generation, transmission, and distribution).

**Industry can make investments needed to meet expected GDP growth.** Brazil needs to increase installed capacity by 5.0 GW per year, on average, to meet expected annual GDP growth of 5.0% (base case). This will require annual investment of R$17.0 billion in generation through 2016, and of R$5.0 billion in transmission and distribution segments. We think this is achievable.

**The auction model encourages private sector participation.** For many years, generation companies had their prices set at artificially low levels, which caused them to earn below required rates of return. As a result, investment in the industry declined significantly in the past two decades, increasing the risk of rationing, which finally took place in 2001. Since then, the Lula administration has implemented a new electricity model aimed at increasing capacity in the system.

The model fosters private player participation through electricity auctions. These were somewhat disappointing when they began in 2005: Generation prices were set at lower-than-expected levels, and there was significant participation by state-owned companies, particularly Eletrobras, which pushed prices down further. However, prices have been trending up since then due to a tighter supply-demand balance and less interference from state-owned companies.

**Public (non-state-owned) operators see attractive returns,** we believe. Several public companies are exploring generation opportunities in Brazil, including Tractebel (GDF SUEZ group), Energias do Brasil (EDP group), AES Tiete (AES group), MPX (EBX group), and CPFL (Camargo Correa group). This supports the view that these operators are still finding attractive return rates in the Brazilian market. We believe that generation companies will increasingly enhance their returns as current contracts are renewed at expected higher generation prices.

**Brazil’s current electricity oversupply should become tighter in the coming years, but this is not a risk to supply,** in our view. Assuming electricity demand sensitivity to GDP growth of 1.2x, we estimate that additional capacity can meet our economists’ bull, base, or bear case growth scenarios. (Note that we are assuming that the plants facing no or low restrictions come on stream; we are not considering plants with serious restrictions, according to ANEEL criteria.)

**Exhibit 45**

Electricity Oversupply Should Become Tighter in the Coming Years, but This Is Not a Risk to Supply

<table>
<thead>
<tr>
<th>Year</th>
<th>Average MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>35</td>
</tr>
<tr>
<td>2005</td>
<td>45</td>
</tr>
<tr>
<td>2007</td>
<td>55</td>
</tr>
<tr>
<td>2009E</td>
<td>65</td>
</tr>
<tr>
<td>2011E</td>
<td>75</td>
</tr>
<tr>
<td>2013E</td>
<td>85</td>
</tr>
<tr>
<td>2015E</td>
<td>95</td>
</tr>
</tbody>
</table>

Source: Morgan Stanley Research estimates

Brazil’s generation potential is very large, combining hydro, thermal, wind, biomass, and nuclear. PAC II (the government’s economic growth acceleration program)

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15 Generation requirements based on our supply-demand model
16 Investments in the transmission and distribution segments based on “Plano Decenal de Energia 2008-2017” (EPE / Ministerio de Minas e Energia)
identified 48 GW of additional capacity (hydropower only) to be installed over the next years. The whole program expects to invest R$113 billion in generation and R$27 billion in transmission through 2014. However, given the disappointment with the previous program (PAC I), we are not counting on the full implementation of this program.

We do not see water and sewerage investments as a bottleneck to economic growth, as such investments are more a matter of social policy than are electricity investments.

The largest portion of investment in water and sewerage still comes from government funds (FGTS). Furthermore, water and sewerage compete with electricity projects for government funds. However, we believe electricity projects will be prioritized because they are critical to economic growth.

Return on investment remains an uncertainty in water and sewerage. The regulatory framework in the space is improving toward a more robust framework, as in the electric distribution industry; however, challenges remain. Both in Sao Paulo and Minas Gerais, regulators are working on the development of a ROA-based rate review methodology.

We prefer to maintain our Equal-weight rating in both Copasa and Sabesp until we have more visibility on the methodology of the new rate review to be adopted in these regions, and on its implementation. The critical value driver is whether the upcoming investments will be remunerated properly or not.

Likely Beneficiaries from Long-Term Outlook

Two key drivers of the generation segment that we think make it compelling to investors:

- **Growth through the expected increase in generation prices and addition of capacity and**
- **Fewer uncertainties on the regulatory front.**

In our view, the long-term winners will be the most efficient generation plays, like Tractebel (Overweight). We believe the generation segment offers both lower risk and higher potential return than the distribution segment. (See our note Poised for Growth; Catalyst Expected; Upgrading to Overweight, April 23.)

After flat earnings year-over-year in 2009, we expect Tractebel to resume earnings growth of 13% and EBITDA growth of 8% in 2009–15 (CAGR) due to:

- **Additional capacity.** The transfer of Estreito by GDF Suez (Tractebel’s controlling shareholder) to Tractebel should add 435MW of installed capacity by 2011.e. The complementary biomass plant Destilaria Andrade should add 33MW of installed capacity in 2010.
- **Higher generation prices.** We expect strong volume growth, led by industrials, to shave off part of the excess capacity in the system, prompting a recovery in generation prices to industrial customers in the free market.

Risks to our Tractebel investment thesis:

- **Lower-than-expected long-term generation prices.**
- **New projects with lower than required return on equity.**
- **Transfer of assets to Tractebel.** As Jirau was won by Suez and is likely to be transferred to Tractebel, investors want to know when and at what price the transfer of assets will be made.
- **Exposure to spot electricity prices.** Tractebel’s ability to forecast spot prices during the year is critical to reduce the impact of its 375MW exposure to the spot market.

We also highlight CPFL (Equal-weight). Although it is mostly a distribution play (and we believe the winners are in the generation side), we believe CPFL is an interesting vehicle to play long-term infrastructure development in Brazil.

We are positive on CPFL as a consolidator in distribution and due to growing exposure to generation:

- **We remain positive on value creation opportunities through consolidation,** with CPFL as one of the best positioned to benefit from it. The company combines some of the key drivers of success in consolidation, such as a strong management team, material size (increasing potential bargain power with suppliers), and operational efficiency.
- **We have a positive view on CPFL’s increasing exposure to the generation segment.** We expect the company to increase its installed capacity from 1,737 MW today to 2,765 MW in 2012, based on projects under development. Management targets 4,000 MW of installed capacity in 2014.
Our Equal-weight rating is based on a 12-month view, on the back of a rich valuation. The stock’s trading multiples are in line with historical levels, and we see companies with more compelling upside in our coverage universe.

Risks to our investment thesis and price target:

- **Increase in generation capacity.** We are assuming a growth in assured energy of 40% year-end 2010 to year-end 2009, based on two new projects (Foz do Chapeco HPP and EPASA TPPs) expected to enter on stream at 3Q10. If one or both of these projects is delayed, it could reduce the generation segment revenue.

- **Dividend policy.** The company’s policy defines a minimum payout of 50%, although the company has historically distributed its dividends at 94%. If CPFL reduces its payout, it might reduce its premium to the peer group.

- **Next rate cycle.** Should regulatory WACC for the distribution companies turn out to be lower than our estimate of 8.9%, we might review our valuation.

- **Share overhang.** If Bradespar confirms its intention to sell its shares, or even maintain signals in this direction, stock overhang could prevail.
Tractebel (TABLE3, R$22, Overweight, Price Target R$28)

**Risk-Reward View: Limited Downside and Generation Repricing**

- **Price Target R$28**
- **Bull Case**
  - R$30
  - 14x
  - 2011e EPS
  - Pricing Power. Tractebel’s uncontracted generation capacity is renewed at R$145/MWh in the free market. We assume spot prices at R$16/MWh. We do not include additional capacity from Jirau.
- **Base Case**
  - R$28
  - 13x
  - 2011e EPS
  - Higher generation prices. Bilateral contracts are maintained under current generation prices (over 83% of average MW until 2013) and the remaining amount is renewed at R$130 per MWh (real terms). We do not include additional capacity from Jirau. Assume spot prices at R$50/MWh
- **Bear Case**
  - R$20
  - 9x
  - 2011e EPS
  - Late recovery / Oversupply. Tractebel reprices generation contracts to R$90/MWh. Exposure to the spot market of 375MW and spot prices at R$115, closer to the levels at which the most efficient plants would be dispatched. We do not include additional capacity from Jirau, but a negative impact from its transfer to Tractebel of R$750 million.

**Investment Thesis**
- Tractebel should be seen as a stock with low volatility, as its cash flows are secured by long-term contracts. We view management as high quality, and shareholder returns are the key focus of the company.
- The long-term winners in the electric utilities sector will be the most efficient generation players, like Tractebel. The generation segment offers both lower risk and higher potential return than the distribution segment. We expect Tractebel to resume earnings growth of 10% and EBITDA growth of 6% in 2009–15 (CAGR) due to additional capacity and higher generation prices.

**Key Value Drivers**
- Generation prices: Every R$10/MWh move in generation prices moves our PT by R$1.
- Spot prices: Tractebel has a 375MW exposure to spot prices. Every R$30 move in spot prices reduces our target price by R$1.00/share

**Potential Catalysts**
- Jirau’s transfer price: GDF Suez’s stake in Jirau may be transferred to Tractebel at a price to be defined during 2011. Even considering a less favorable goodwill scenario, the impact on share price is marginal. For each 15% of goodwill (as percentage of total capex), our fair value decreases by R$1.00/share.
- Generation prices: We expect the company to disclose higher implied free market generation prices during the next quarters.

Source: Morgan Stanley Research
**Investment Thesis**

- We believe CPFL is an interesting long-term play to benefit from investment in infrastructure in Brazil; however, we do not see the stock outperforming the index in the next 12 months. It is trading in line with historical multiples levels and maintains a premium over its peers.
- Professional management: We think CPFL trades at a premium due to its management — one of the best in the industry, in our view, with solid expertise and comprehension of investors’ needs.
- Increasingly exposure to the generation segment: The company should increase its generation capacity by 60% until 2012 and plans to more than double its current capacity by 2014.
- The company is leveraged to volume growth and should benefit from industrial volume recovery in 2010.
- We remain positive on value creation opportunities through industry consolidation, with CPFL as one of the best positioned to benefit.

**Key Value Drivers**

- Rate review: The conditions for the 3rd rate review cycle to be defined. Every 100 bps reduction in regulatory WACC reduces our fair value by R$1.0/share.
- Return on investments: Rate of return from additional projects. Every 100 bps of value creation / destruction = R$1.0 / share.

**Potential Catalysts**

- Growth plan: We see CPFL as a consolidator in the sector with a good track record of acquisitions. A new acquisition could be a trigger.
- Rate review: announcement on conditions of 3rd cycle rate review.
- Overhang: Bradespar could decide to sell its shares.
Appendix I: Infrastructure Across Sectors in Brazil

Transportation Sector

Strong growth in Brazil’s economy and exports since 2003 is endangered by high logistics costs. These costs are estimated to be about 20 percent of gross domestic product, or about twice as high as in OECD countries. The global trend toward integrated logistics solutions in contract logistics can also be seen in Brazil. For instance, just-in-time solutions are frequently sought by the automotive industry, prompting many service providers to offer them. But the efficient and cost-effective implementation of these solutions is often hindered by bureaucratic hurdles. The transport sector was once strongly fragmented, although it has become more consolidated since the late 1990s.

The highway network plays a leading role in Brazil. Highways are cheaper to build initially, but much more expensive to maintain over time. Despite a slight decline in its share in recent years, highways are still used for around 60% of Brazil’s total freight transportation, a much higher ratio than in other countries, especially those with a territorial size equivalent to Brazil’s. Indeed, countries that rely significantly on highways typically have a smaller territory, like France or Germany, for instance. Countries as large as Brazil, like the United States or Russia, rely relatively more on railways and less on highways than Brazil does.

Brazil’s transport infrastructure is characterized by sharp regional differences. Several well-built highways are available in the economically developed Southwest and South. But the picture is completely different in the Amazon region in the North, where opportunities are very limited — both in terms of much thinner population density and in terms of the availability of various means of transport. As a result of the difficult terrain, transport infrastructure in the rain-forest region of the north is poorly developed. Rain forests in the lowlands of the Amazon in the north, plateaus and mountains in the south, and the Andes toward the west shape Brazil’s geography.

Brazil’s transport system is heavily dependent on the highway network. This applies especially to economically advanced regions, even though other means of transport are available there — particularly in the state of São Paulo. One major challenge is the long-term shift away from relying so heavily on road traffic. This would become possible after a sufficient number of inter-modular distribution centers have been set up.
In railway transportation, Brazil lags behind by American or European standards in terms of quality and density. Brazil’s 29,000 kilometer long rail network is poorly developed, and parts of it are in bad condition. It is primarily based in the states of São Paulo, Minas Gerais, Rio de Janeiro and Rio Grande do Sul. Another problem is the different track widths used in parts of Brazil.

As for ports, fees charged by Brazil’s harbors are high by international standards. Many ports have tremendous problems as well. Some lack handling capacities, ships face restrictions because of low navigational channel depths, while highway and rail connections are inadequate. In addition, personnel is often poorly trained and a there is a shortage of parking for trucks.

Highway Transportation

Brazil’s paved highway system extends over 212,442 km and is distributed very unevenly among regions. The South and Southeast regions contain more than 50% of Brazil’s highways, even though they represent only 18% of the national territory. Opting to build highways was largely due to the lower initial implementation cost compared to railroad transportation. It also served as an incentive for the development of the Brazilian automobile industry. Despite the lower cost of implementation, the operational cost of highway transportation is about six times higher than for railroad transportation, which contributes to the high average costs for transportation in Brazil.

The main problem affecting freight transportation in Brazil is the structural distortion in its composition. While countries of great territorial dimensions, as the US, Canada, China and Russia use primarily railroad and waterway systems, in Brazil the exact opposite occurs, with an absolute dominance of the highway system. In Brazil about 60% of freight transportation is based on the highway system, while in the Unite States this proportion stands at 26%, in Australia at 24%, and in China 8%. Observers say that the lack of appropriate regulation for the entrance of new companies in the highway system in Brazil creates competition distortions with other modes of transportation, inhibiting investment in the modes which involve higher fixed costs, as the railroad system. The reduced scale of other modes makes it difficult to dilute fixed costs.

Another significant problem is serious deterioration because of weather conditions and heavy usage. The government's investment in highway maintenance often falls short of the necessary amounts, resulting in the lack of maintenance of thousands of kilometers of federal highways, especially the minor ones. Transportation infrastructure investment in Brazil is in the early stages, and significant additional spending is required for the country to remain competitive. The so-called growth acceleration program (PAC) is expected to invest R$ 58.3 billion in the logistics and transportation sector by the end of 2010. However, experts suggest that investment needed in the sector would be at least twice this amount.

Maintenance costs are also high and, given the large portion of highways under public sector management, this also results in poor conservation, which further raises the operational cost of highway transportation versus other means of transportation.

The public sector is responsible for managing around 93% of Brazil’s paved highway system, especially the federal and local state governments. The sections under private-sector concession total around 14,328 km, close to 7% of the total system. Most of the highways under concession are located in the Southeast and South regions, especially in São Paulo, Rio Grande do Sul and Paraná. Over the next few years, observers expect a significant rise in the percentage of the highway system under concession. For 2010, more than 2055 km of federal highways are scheduled to go under concession.
Despite the generally poor conservation of Brazilian highways, there is a major difference between the highways managed by the public and private sectors. A 2009 survey by the National Transportation Confederation (CNT) showed that more than 30% of Brazil’s paved highways are in bad or very bad condition. However, within the highways under concession, 76.5% are in a good or very good state of conservation, a percentage that drops to 22.4% for the highways run by the public sector. Of the 30 best highway sections, 24 are managed by the private sector.

Railway Transportation

The railroad system accounts for 21% of all freight transportation in Brazil (around 426.5 million tons) and consists of 29,426 Km of track, which is quite limited in comparison to other countries, especially considering Brazil’s vast territory. For instance, railways account for 38% of the transportation system in the United States.

Exhibit 52
Transportation Structure: Brazil versus US (% of total, and relative prices)

<table>
<thead>
<tr>
<th>Participation (% of total)</th>
<th>Brazil</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway</td>
<td>36%</td>
<td>114%</td>
</tr>
<tr>
<td>Railroad</td>
<td>180%</td>
<td>111%</td>
</tr>
<tr>
<td>Waterway</td>
<td>111%</td>
<td>141%</td>
</tr>
</tbody>
</table>

Prices in Brazil as % of US prices (per 1,000 ton km)

In the past, insufficient funds have been the main hurdle to improving road and rail networks. To an extent, this remains a problem. But some observers argue this hurdle could be greatly reduced by leveraging the private sector for much of the needed investment.

Waterway System and Ports

Waterways account for only a small share — around 14% — of total freight transportation in Brazil. According to the National Agency for Waterway Transportation, the total freight volume carried in 2000 was 25.2 million tons, of which 58% is concentrated in the Amazonas region. Brazil has approximately 8,500 Km of ocean coast and approximately 42,000 km of navigable inland waterways, of which only 10,000 km are actually used for freight transportation. This is considered to be the most underdeveloped sector in Brazil’s transportation system. Besides environmental constraints that complicate the completion of a number of projects, most of and two state-owned corporations. Railroad concessions have successfully preserved existing assets, but not all concessions have kept pace with modernization. Since then, companies have invested around R$18.8 billion in the transportation system, and another R$2.4 billion was expected for 2009. From 2007 to 2010, the growth acceleration program (PAC) is expected to invest R$7.9 billion in 14 new tracks, totaling 2,500 km. In October 2009, the government had concluded 356 km and invested R$1.2 billion.

The total volume of transported freight increased 95% in the first 11 years of concession, since the 1990s. However, the railroad track extension stagnated at the 29,426 km mark. According to the ANFT (National Association for Railroad Transport), the ideal would be around 52,000 km. The government estimates that railroads have reached their transportation limit, and more investment has to be made in order to increase capacity. According to the National Plan for Logistics and Transportation, an investment of R$245 billion is needed by 2023, in order to support railroad competitiveness.

Exhibit 53
Brazil: Railroads

<table>
<thead>
<tr>
<th>Land Area (km²)</th>
<th>Rail Length (Km)</th>
<th>Rail per area (km/1000km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>8,456,510</td>
<td>29,295</td>
</tr>
<tr>
<td>Chile</td>
<td>748,800</td>
<td>6,585</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,923,040</td>
<td>17,665</td>
</tr>
<tr>
<td>Argentina</td>
<td>2,736,690</td>
<td>31,902</td>
</tr>
<tr>
<td>India</td>
<td>2,973,190</td>
<td>63,221</td>
</tr>
<tr>
<td>U.S.</td>
<td>9,161,923</td>
<td>226,612</td>
</tr>
<tr>
<td>U.K.</td>
<td>241,590</td>
<td>16,567</td>
</tr>
<tr>
<td>Belgium</td>
<td>30,278</td>
<td>3,536</td>
</tr>
</tbody>
</table>

Source: Coppead (2001), Morgan Stanley LatAm Economics
these also suffer with the scarcity of resources, since waterways are rarely in the priority list of investment plans. Of the R$400 billion amount suggested by the National Plan for Logistics and Transportation for the improvement of infrastructure in Brazil until 2023, only 4% are allocated to waterways (R$17 billion). Until 2011, R$6 billion should be invested. However, in 2007 alone, the Transport Ministry spent only R$354 million in the waterway system (including ports), which represent less than half of the revenues for the sector.

The Brazilian port system is composed by 40 ports, 37 of which are run by the public sector. There are also 125 port terminals, divided between privately-owned terminals and mixed-use terminals. In privately-owned terminals, the owner is authorized by the government to install and operate a port terminal only for movement of self-owned cargo. In mixed-use terminals, the concession holder can deal with third-party cargos, besides moving its own cargo.

Furthermore, the private sector also participates in the operations of some government-owned ports. Public-sector entities can transfer the operation of the public ports to private companies, through a concession involving a public bidding process. In this case, the successful bidder is responsible for equipping the terminal and for loading and unloading operations at the port.

Public-sector entities are in charge of inspecting and maintaining the port infrastructure, including roadways connecting the port to the highway and the dredging of the access canals to the terminals.

The Special Secretariat for Ports has earmarked investments of $2.7 billion from the federal government's Growth Acceleration Program (PAC) specifically aimed at infrastructure work in ports, from 2007 to 2010. The National Plan for Logistics and Transportation estimates that at least R$40.6 billion are needed in the sector by 2023.

The waterway transportation system can be divided into three main types:

- **Long-distance transportation.** International trade of goods. Long-haul transportation accounts for around 90% of Brazil’s foreign trade flows.

- **Coastal:** Transportation of goods along Brazil’s coast and the Amazon River, considered an extension of maritime shipping since it can handle big vessels. This segment is dominated by private shippers and ferries between São Paulo and Manaus. Most cargo, however, consists of coal/charcoal, wheat, corn, fertilizers, salt and iron ore.

- **Inland marine transportation:** Transport via rivers or lakes using low-tonnage vessels. Despite the vast length of navigable waterways in Brazil, only some 23.8% of its total potential is actually used for navigation.

The system is used mostly for international trade; inland marine and cabotage shipping represent only 26% of total waterways' freight transportation. Cargo movement through Brazil’s main ports is divided in bulk solids (59.5% in terms of volume), bulk liquids (25.5%), and general cargo (15.0%).

As with railroads, the main limitation to waterway system expansion is the high cost of infrastructure building, especially for inland marine transportation. On the other hand, operational costs are nearly four times lower than those of road transportation. The cost of freight movement through Brazilian ports is very high, significantly higher than in many developed countries or emerging markets. Sector development has been hindered by the dreadful state of the ports, whose services and storage facilities are generally much more expensive — and considerably less efficient — than those of their international counterparts. According to a World Bank survey, out of 183 countries, Brazil ranks poorly at 100th when it comes to the logistics of trading across the borders.

**Air Transportation**

The Brazilian airport system has 34 international airports and 31 domestic airports. There are other 2,498 smaller airports, whose capacity cannot accommodate larger aircraft. The administration and operation of the 65 main airports in Brazil are under the responsibility of Infraero, a state-run company controlled by the federal government. The airport system is used mainly for passenger transportation. In 2008, airports operated by Infraero served 113.2 million passengers (arrivals and departures), 54% of them at Brazil’s five largest airports — São Paulo (GRU); São Paulo (CGH); Rio de Janeiro (GIG); Brasilia; and Salvador.

Only 0.4% of all freight transportation is made by air in Brazil. Total air freight in 2008 was 1.27 million tons at the five main freight shipping airports, São Paulo (GRU); Campinas; Manaus; Rio de Janeiro (GIG) and Recife, representing around 73% of the total. If it were not for its relatively high cost, perhaps more freight would be sent by air. The cost of air transportation in Brazil is around 38 times higher than that of railroad transportation and about six times the cost of highway transportation. Although Brazil’s airport
infrastructure is managed by the state, there is no state-owned airline in operation. Currently, 17 Brazilian airlines run regular domestic flights and six operate international routes.

The Brazilian air traffic has climbed at an average pace of 9% y-o-y, and some market estimates expect air transportation to increase three times above GDP growth in the next 15 to 20 years. The growth acceleration program (PAC) investment in airports expansion and modernization was expected to reach around R$3 billion by 2010. However, by August 2009, the government invested R$ 221 million in five airports.

Electricity

Organization of Energy Sector and Current Situation

Until the first half of the 1990s, most activities in the energy sector in Brazil were controlled by government-owned (federal and state) corporations, which handled generation, transmission and distribution. In the late 1990s, the energy sector went through a series of privatizations and deregulations, with the creation of a new sector regulatory framework and various agencies to regulate and supervise the industry, including the National Electric Energy Agency (Aneel). The seven main bodies of the Brazilian electricity sector are: National Council of Energy Policy; Ministry of Mines and Energy; Electricity Sector Monitoring Committee; Energy Research Company; Electric Power Commercialization Chamber; Electric System National Operator; and the Brazilian Electricity Regulatory Agency.

Despite the privatizations, the participation of government-controlled companies in the energy sector remains significant, especially for energy generation and transmission.

The good news is that, currently, almost half of Brazilian energy, 44%, comes from renewable sources. Such figure is much higher than the world average of 14%. While deep water offshore exploration of petroleum and gas advances, Brazil also has also seen investments in the construction of hydroelectric plants and in the production of bio-fuels, with emphasis on sugar cane biomass for the generation of electricity.

In terms of electricity, ~90% of the energy generated comes from non-fossil sources, primarily hydroelectric. There are many opportunities. Although hydroelectric plants are responsible for 80% of the country’s energy generation, only 27% of Brazil’s hydroelectric potential has been explored.

The electricity sector is important not only because there exists many challenges in the sector’s policy development, but also because electricity shortages may imply consumption restriction programs (e.g., as the one introduced in Brazil in 2001), which would be an obstacle for economic growth.

Despite its numerous negative effects, the 2008/2009 financial crisis did have its positive side, especially for the electric sector in Brazil. Indeed, from January through September 2009, average energy consumption in Brazil fell by 2.3% compared to the previous year. The drop was mainly due to the slowdown in the industrial sector, whose average consumption declined 9.9% in the same comparison. This environment allowed energy supply and demand to invert the dangerous disequilibrium trend seen since the first half of 2008.

Exhibit 54
Brazil: Energy Sector (% of total)

<table>
<thead>
<tr>
<th>Type</th>
<th>State-owned</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Generation</td>
<td>72</td>
<td>28</td>
</tr>
<tr>
<td>Electricity Transmission</td>
<td>84</td>
<td>16</td>
</tr>
<tr>
<td>Energy Distribution</td>
<td>34</td>
<td>66</td>
</tr>
</tbody>
</table>


Generation

After the license auction of the hydroelectric plants of Santo Antônio (with an estimated capacity of 3,150MW ) and Jirau (generation capacity of 3,300 MW), as well as the Belo Monte’s contract — which is expected to take place in the first half of 2010 — the Amazon River basin region should continue to account for the largest part of Brazil’s new generation capacity. The Energy Research Company (EPE) estimates that, in coming quarters, a number of projects should be concluded and together would generate 32,950 megawatts, distributed in 10 different plants. Such increase would represent almost 30% of Brazil’s current energy generation capacity.

However, difficulties in obtaining environmental permits usually delay the construction schedule. Indeed, there are 10 plants whose licenses were auctioned before 2002, and whose constructions have not started yet.

Although the 2008/2009 financial crisis did affect investments, investors have shown interest in the country’s new projects. Besides, even if the private sector resources are scarce, the National Development Bank (BNDES) seems willing to cover a large part of the R$14.2 billion investment amount which is expected for the next few years.
In 2009, according to the National Agency for Electrical Energy, the country’s installed generating capacity stood at 113,360 MW. Total consumption amounted to 392,900 GWh (in 2007), of which 24.1% is residential, 45.8% industrial, 15.8% commercial and 14.3% for other purposes.

In November 2008, there were 1,768 energy generation companies operating in Brazil, with an aggregate installed capacity of 104.8 GWh. Among them, 159 units were medium- and large scale hydroelectric plants, 320 were small hydroelectric plants and 1,042 were thermoelectric plants fired by various energy sources (natural gas, diesel oil, fuel oil and biomass). Brazil has the largest hydro power potential in the world - a total of 260GW. Of this amount, only about 30% (77GW) is being exploited by existing plants. The hydro power potential yet to be exploited totals some 126GW, of which 70% lies in the basins of the Amazon and Tocantins/Araguaia regions.

Most of Brazil’s existing large hydro power plants are located in the basins of the Paraná and São Francisco rivers, in the South, Southeast and Northeast regions, despite the existence of important energy plants in the North region. Nearly 100% of the hydro power capacity in the South, Southeast and Northeast regions is being exploited (or subject to environmental restrictions). Efforts to expand Brazil’s hydro power capacity would therefore need to focus on the country’s North region.

Since the largest hydro power potential is located far from the main centers of consumption, Brazil’s energy grid is highly interconnected in a vast transmission network. Small isolated systems represent only 3.4% of Brazil’s total hydro power generation.
Distribution and Consumption

This segment has been working without major difficulties over the past years. As of today, the distribution companies already have contracts to sell all the energy which is necessary for its markets until 2012. Due to the decline in energy consumption during the 2008/2009 financial crisis, revenues of distribution companies fell temporarily but the situation has normalized since then.

Exhibit 57
Brazil: Service Disruptions
(hours per year, and times per year)

Source: ONS (2009), Morgan Stanley LatAm Economics

Brazil has over 64 million consumer points of electricity connection, covering 98.6% of Brazilian households. Of this total, 85% are residential consumers and 15% are industrial, commercial and/or rural users.

Of the total electricity consumed in Brazil, 88% is produced domestically and 12% is imported, mainly from the Itaipu hydroelectric plant, which is a bi-national venture between Brazil and Paraguay. The Itaipu power plant in the Paraná River on the Brazil-Paraguay border currently is the second largest hydroelectricity producer in the world. With 20 generator units and 14,000 MW of installed capacity, in 2008 the Itaipu power plant reached a new record for electricity production by generating 94.68 terawatt-hours (340,800 TJ).

Domestic consumption totaled 412.2 GWh in 2007, of which 80% comes from hydro power. After Brazil’s energy rationing in 2001, the government granted incentives to boost energy generation capacity using thermoelectric energy plants. These plants aimed to turn Brazil less vulnerable to rainfall conditions. Indeed, Brazil is unique in its dependence on hydro power, hydro energy consumption as a percentage of total energy consumption in Brazil is the second highest in the world, only trailing Norway (98%). In the rest of the world, only 16% of domestic consumption, on average, is generated by hydro power.

Exhibit 58
Brazil: Electric Power Sources
(As % of total, 2008)

Source: Empresa de Politicas Energéticas (EPE), Morgan Stanley LatAm Economics

The 10-year Energy Extension Plan, by the Ministry of Mines in Energy for 2008 to 2017, expects an increase in electricity demand at an annual pace of 5.4% over the next 10 years, and the addition of around 54,000 MW of installed capacity in Brazil.

The cost of energy production at hydro power plants is around four times lower than the cost of production at thermo plants fueled by diesel oil, and three times lower than the cost of plants fueled by fuel oil. However, the final average energy price in Brazil is one of the highest in the world, for both industrial and residential users. Higher costs of transmission (6% of total cost), distribution (29%), and especially taxes (around 33%) raise the price of energy for final consumers.
Petrobras plans to raise production from 2.5 million barrels of petroleum (boe) a day to 2.7 million by 2013 (in Brazil and abroad), and ultimately reach 3.9 million by 2020. The pilot system for the Tupi field starts production in 2010, followed by other fields, such as the Guará and Iara fields. Projections for output from the pre-salt layer look for a gradual increase in the production of oil over the years.

Brazil is at the technological vanguard of deep-water production and exploration of petroleum and natural gas reserves. 2008 was marked by large deposits discoveries, known as pre-salt and located in sedimentary basins, around 6,000 meters beneath the surface of the ocean. Some estimates suggest the volume of reserves in the deep sea pre-salt layer to be around at least 50 billion barrels, four times the number of current reserves. Such volume would place Brazilian reserves among the ten largest in the world. Investment plans in the sector are substantial, north of $200 billion over the next five years, focusing on exploration and production.

Brazil is the largest exporter of ethanol in the world, and produces fuel from sugarcane. The largest portion of sugarcane cultivation is concentrated in the southeast region of Brazil, far away from the Amazon region. In all, 90% of the sugarcane production for ethanol is located in the Southeast, Central and South regions of Brazil.

Production of Brazilian ethanol reached 27 billion liters in 2008, a 17.9% increase over the previous year, and the Brazilian Ministry of Agriculture calculates that this could rise to 37 billion liters in 2015, without a significant increase in the sugarcane planted area. There is large demand for bio-fuel in the domestic market, due to the development of “flex fuel” technology, launched in 2003, which allows cars to run on gas and ethanol in any proportion.

The productivity of ethanol per hectare is 6,800 liters for sugarcane, 5,400 liters for beets and 3,100 liters for corn. Brazil is the third largest producer and consumer of biodiesel in the world. The National Program for the Production and Use of Biodiesel (PNPB), established in 2004, provides a mandatory and gradual addition of alternative fuels to diesel.
Appendix II: The Growth Acceleration Program (PAC)

The Context

Brazilian industrial activities are highly concentrated in a few urban settlements, and living standards vary significantly between these metropolitan areas and the vast rural regions. In this context, the authorities have identified the need to promote an efficient and extensive infrastructure network, to assure that all Brazilian regions have the opportunity to participate in the country’s development. As a result, in early 2007, the federal government launched the “Growth Acceleration Program” (PAC in the Portuguese acronym), which organized and defined guidelines for investment in logistics, energy, social and urban infrastructure projects.

The initial plan estimated investments of R$504 billion (US$ 220 billion) in 2007–10. More than half of that total (R$275 billion) was earmarked for energy projects, R$171 billion for housing and sanitation, and R$58 billion for logistics. State-owned firms, including the giant oil company, would be responsible for a large share of the total investment, while the federal budget should contribute directly with only R$70 billion.

Exhibit 60
Brazil: PAC Investments
(R$ billion)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Logistics</td>
<td>58.3</td>
<td>96.0</td>
<td>36.2</td>
<td>132.2</td>
</tr>
<tr>
<td>Energy</td>
<td>274.8</td>
<td>295.0</td>
<td>464.0</td>
<td>759.0</td>
</tr>
<tr>
<td>Social and Urban</td>
<td>170.8</td>
<td>255.0</td>
<td>2.0</td>
<td>257.0</td>
</tr>
<tr>
<td>Total</td>
<td>503.9</td>
<td>646.0</td>
<td>502.2</td>
<td>1148.2</td>
</tr>
</tbody>
</table>

Source: PAC, Morgan Stanley LatAm Economics

In February 2009, the federal government increased the total planned amount by 26%, to R$646 billion (US$ 301 billion), to be used by 2010 as an additional tool for supporting the economy and countering the negative effects of the international financial crisis.

Besides infrastructure investments, the overall program also includes other measures, such as tax breaks and incentives (particularly for construction, and for technological development), regulatory changes, special transactions with the national development bank (BNDES), new regulation on small and medium-sized enterprises, minimum wages increases, and the creation of a new R$ 5 billion Infrastructure Fund — using part of workers’ compulsory savings (Fundo de Garantia por Tempo de Serviço, or FGTS).

Exhibit 61
Brazil: Investment*
(As % of GDP)

Investments under the PAC are divided into three categories: logistical infrastructure, which includes the construction and expansion of highways, railways, ports, airports and waterways; energy infrastructure, which includes generation and transmission of electricity, as well as the production, exploration and shipping of petroleum, natural gas and renewable fuels; and social and urban infrastructure, which covers sanitation, housing, subways and urban trains.

Furthermore, the stated investment plan goal is to construct, modify, duplicate and recuperate 45,000 kilometers of highways in four years, and 2,518 kilometers of railways; expand and improve 12 ports and 20 airports; generate more than 12,386 MW of electricity; construct 13,826 kilometers of transmission lines; install four new refinery or petrochemical units; construct 4,526 kilometers of gas pipelines and install 46 new biodiesel plants and 77 ethanol plants.

Exhibit 60
Brazil: PAC Investments
(R$ billion)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
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<td>58.3</td>
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<td>1148.2</td>
</tr>
</tbody>
</table>

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The PAC also includes investments by the giant oil company, which is expected to invest more than US$ 200 billion through 2013 in the oil and gas exploration, and in the construction of new refineries, among other projects.

In all, PAC investments stated aim is “to boost technological modernization, accelerate growth in already developed areas, and to foster growth in depressed areas, increasing competitiveness and integrating Brazil with neighboring countries and with the world.”
PAC: An Overview

Between the 1990s and 2006, federal government investment in Brazil represented less than 0.5% of GDP, on average. With complex infrastructure projects, the PAC package was conceived as a new model for planning and managing public investment. It is focused on articulating infrastructure projects to accelerate growth, together with providing better social and urban conditions, mainly within the most important Brazilian metropolitan areas. PAC does not, however, consist only of new projects. Indeed, most of the included projects had been studied and designed since the 1980s.

Exhibit 62
Brazil: PAC Investment by Sector (% of total)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>2007/2010</th>
<th>After 2010</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logistics</td>
<td>14.9</td>
<td>7.2</td>
<td>11.5</td>
</tr>
<tr>
<td>Energy</td>
<td>45.7</td>
<td>92.4</td>
<td>66.1</td>
</tr>
<tr>
<td>Social and Urban</td>
<td>39.5</td>
<td>0.4</td>
<td>22.4</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: PAC, Morgan Stanley LatAm Economics

Energy Generation

The PAC projects place strong emphasis in the energy sector. In fact, despite impressive growth in bio-fuel production, Brazil remains dependent on foreign oil and gas supplies, and exposed to potential electricity shortfall.

The PAC stated energy goals include:

- Assuring Brazil's long-term self-sufficiency in oil, with production at least 20% above Brazil's internal consumption, a minimum 15-year reserve/production ratio, and larger production of light oil;
- Boosting and modernizing oil refining, increasing Brazilian participation in the processing chain, and improving quality of byproducts;
- Increasing domestic supply of natural gas;
- Assuring Brazilian leadership in bio-fuels.

Exhibit 63
Brazil: PAC Investment in the Energy Sector (% share)

<table>
<thead>
<tr>
<th>Sector</th>
<th>2007/2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
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<tr>
<td>Oil and Gas</td>
<td>65.1</td>
</tr>
<tr>
<td>Other</td>
<td>34.9</td>
</tr>
</tbody>
</table>

Source: PAC, Morgan Stanley LatAm Economics

Energy Distribution

Some studies indicate that Brazil would need another 34,072 kilometers of energy distribution lines (in addition to the current 86,229 kilometers). The new lines would cost approximately US$10 billion, according to the authorities. Expansion under PAC projects would add 7,120 kilometers, which are not enough to fully meet growing demand, although the private sector has also expanded projects in energy distribution lines.

The Oil Factor

About 65% of energy infrastructure projects under the PAC involve oil and gas. Most of this investment would be concentrated in the Southeast and include the following:

- The Rio de Janeiro State Petrochemical Complex (Comperj), a R$21 billion project, which, once concluded, is expected to process 150,000 bbl/d of heavy oil to produce diesel and several other petrochemical materials.
- The Abreu e Lima Refinery in the state of Pernambuco, a R$10 billion project that once finished in 2012 should process 200,000 bbl/d of heavy oil and produce diesel, coke, naphtha, and gas;

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• Two bio-fuel export pipelines - one just for ethanol from Goiás state to the São Sebastião port in São Paulo; the other for both ethanol and biodiesel, to run from Cuiaba (in Mato Grosso) to Paranagua (in Paraná);
• The Gas Production Anticipation Plan (Plangás), a R$25 billion investment to increase natural gas production to 55 million cubic meters by end-2010.
• In addition to Plangás, the PAC envisions to build about 4,526 kilometers of new gas pipelines.

Bio-fuels

As for bio-fuels, the PAC envisaged some 120 new projects for 2007–10, to raise the country's ethanol output to 23.3 billion liters by 2010 and biodiesel production to 3.3 billion liters. The projects included:

• Ethanol: 77 new plants producing about 40% more ethanol;
• Biodiesel: 46 new plants to quadruple production by 2010;
• H-bio: the state oil company would invest some R$150 million (about US$71 million) in four refineries in Minas Gerais, São Paulo, Paraná and Rio Grande do Sul to produce "H-bio", a blend of vegetable oil and diesel.

Hydroelectric Dams

As for hydroelectric dams, the PAC envisions across the main regions of Brazil:

• North: 10 regular hydroelectric plants
• Northeast: seven foreseen sometime after 2010;
• Southeast: 12 plants — five under development, four foreseen after 2010;
• South: 8 plants under development, seven envisioned after 2010;
• Center-West: 10 under development, 10 more foreseen after 2010.

All these projects must undergo environmental impact assessment, public hearings and licensing.

Power Lines

The PAC estimated an investment of R$12.5 billion in building 13,826 kilometers of high-tension power lines (and substations) across the Brazilian territory. The regional breakdown is as follows: North, 4,721 km; Northeast, 2,276 km; Southeast, 2,900 km; South, 2,078 km; Center-West, 1,851 km.

Transport

The authorities recognize that the current deteriorated transport system is responsible for large economic losses and high statistics on road accidents, also hurting competitiveness. The PAC has in its budget a total of US$ 20 billion earmarked for transport projects.

Highways. Given Brazil’s high dependence on highway transportation, 70 percent of the PAC total transport budget is dedicated to highway improvements. According to the National Association for Cargo Transport Users (ANUT), the increasing deterioration of the highway system is a particular area of concern. Back in 2004, ANUT estimated that approximately US$ 5 billion would be needed to restore the highway system. The PAC has estimated approximately US$ 14 billion for investment in highways. However, according to some sector experts, the country would need to invest more than US$25 billion in the sector.

Ports. After highways, ports are the second priority in the PAC for reducing main logistics bottlenecks and reducing operational transport costs in Brazil. Brazil’s current port structure shows several critical weaknesses, including equipment obsolescence, inefficiencies in labor organization and allocation, lack of capacity in harbors, and inadequacies in port administration.

In Brazil, only seven ports are able to handle large, capesize ships, which required ports with minimum water depth of 16 to 18 meters. The port system is one of the most important logistical bottlenecks in Brazil, given its impact on international and national logistics efficiency. The Port Modernization Enactment of 1993 opened port operations to private companies that took responsibility for the operations of 6 out of the 10 major ports in the country. However, in 2005, the National Agency for Waterway Transport (ANTAQ) enacted two controversial resolutions (resolutions 55 and 517) that changed the rules of port operations and private terminal capacity improvements, analysts argue. Concession periods, for example, were reduced from a 25-year-period to a precarious one-year authorization that could be revoked at any moment. These resolutions discouraged private investment from taking place on a larger scale. A new regulatory framework seeks to address these issues. The PAC port projects include a total of US$5 billion, including ship construction.

Other modes of transport. One recurring issue in logistics discussions in Brazil has to do with the lack of balance in the Brazilian transport matrix, which is heavily biased towards highways. Incentives to use transport modes other than
highways should be a trend already consolidated in the country, experts note.

Approximately US$12 billion of the PAC budget is earmarked for investment in railroads, inland waterways, and air transport. Some sector experts believe that the country needs investments about twice as large (or a total of US$25 billion) to balance its transport structure.

### Brazil: Main Infrastructure Investment Projects (R$ billion)

<table>
<thead>
<tr>
<th>Projects</th>
<th>Investment</th>
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</thead>
<tbody>
<tr>
<td>High-speed train, between SP and RJ</td>
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<tr>
<td>Belo Monte Hydroelectric Plant</td>
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<tr>
<td>Santo Antonio Hydroelectric Plant</td>
<td>13.5</td>
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<tr>
<td>Jirau Hydroelectric Plant</td>
<td>9.3</td>
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<td>Angra 3 Nuclear Plant</td>
<td>8.6</td>
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<tr>
<td>P-57 Platform</td>
<td>5.1</td>
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<td>North-South Railway, South Section</td>
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<td>Energy Connection Line Madeira-Araraquara</td>
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<tr>
<td>Highway Arch - Rio de Janeiro</td>
<td>1.1</td>
</tr>
<tr>
<td>Guarulhos Airport Lane</td>
<td>0.3</td>
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</table>

Source: Anuário de Infraestrutura 2009 Revista Exame, Morgan Stanley LatAm Economics
Appendix III: The 2014 World Cup and 2016 Olympic Games

As an IMF study argues, hosting a large sporting event can offer both direct and indirect economic benefits. While direct benefits include capital and infrastructure construction related to the event, long term benefits include lower transportation costs thanks to an improved road or rail network, and spending by tourists who travel from out of town to attend the games. Indirect benefits may include advertising effects that showcase the host city or country as a potential tourist destination or business location in the future and an increase in civic pride, local sense of community, and the perceived stature of the host city or country. But there is also a potential downside, resulting from possible cost overruns, poor land use, inadequate planning, and underutilized facilities.

**Potential Benefits and Costs**

Economists tend to be skeptical about the economic benefits of hosting “mega-events” such as the Olympic Games or the World Cup, since such activities have considerable cost and seem to yield few tangible benefits. The academic literature on the impact of hosting sports mega-events on economic growth is scarce. However, some evidence suggests that these events can have a positive impact on growth over time. According to one study, the Olympic Games are able to raise growth on the impact of hosting sports mega-events on economic growth. However, some evidence suggests that these events can have a positive impact on growth over time. According to one study, the Olympic Games are able to raise growth on the impact of hosting sports mega-events on economic growth. However, some evidence suggests that these events can have a positive impact on growth over time.

Hosting a mega event like the Olympic Games often requires increased infrastructure to move the participants, officials, and fans to and from the venues. In previous episodes, most transportation infrastructure construction has been on roads. But host cities and regions have also spent considerable sums on airport construction as well as on the renovation and construction of public transportation systems. In less-developed cities, building modern telecommunications infrastructure can provide a significant boost to the local and regional economy. Beyond the construction period, sports-event-generated infrastructure can provide the host metropolitan area or region with a continuing stream of economic benefits. The venues built for these events can be used for years or decades afterward. More important, upgrades to the transportation infrastructure can provide a significant boost to the local and regional economy.

**Critics argue that while some expenditures improve infrastructure, some spending is on white elephants.** That is the case when facilities built especially for the games go underutilized after the few weeks of the competition itself, require large sums to maintain, and occupy increasingly scarce real estate.

Within the direct economic benefits generated by mega sporting events, tourist spending is probably the most highly publicized. On average, 5.1 million tickets were sold for the past six Summer Olympic Games, and an average of 1.3 million tickets for the past five Winter Olympics. A sporting event of this size and scope has the potential to attract a significant number of visitors from outside the host city. These visitors may spend considerable time in the host area, generating substantial spending in the lodging and food and beverage sectors.

However, additional visitors for the games are likely to be at least partially offset by fewer visitors for other purposes (tourism or business), as the latter seek to avoid the higher prices and congestion associated with the Olympics. Further, even if hotel occupancy rates and room prices rise during the games, the extra revenue often leaves the local economy as hotel profits are transferred to the company’s home office. Since the benefits accrue to non-local capital owners leading to higher than normal leakages of income, the money generated from these events is unlikely to re-circulate through the economy, and any multipliers applied are therefore probably inflated.

**Another positive impact can be found on trade numbers.** Indeed, using a variety of trade models, one study shows that construction of such infrastructure generates appreciable economic activity in the local host community. Many construction workers must be hired and large quantities of construction materials must be purchased and transported. Beyond the construction period, sports-event-generated infrastructure can provide the host metropolitan area or region with a continuing stream of economic benefits. The venues built for these events can be used for years or decades afterward. More important, upgrades to the transportation infrastructure can provide a significant boost to the local and regional economy.

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1 This appendix draws heavily from an IMF survey - “Is it Worth It?”, by Andrew Zimbalist, in Finance and Development, The International Monetary Fund, March 2010.
2 “Growth Impact of Major Sporting Events”, by Elmer Sterken, in European Sport Management Quarterly, December 2006.
that hosting a mega-event like the Olympics has a positive impact on national exports. This effect is statistically robust, permanent, and large; trade is around 30% higher for countries that have hosted the Olympics. Interestingly however, the study also finds that unsuccessful bids to host the Olympics have a similar positive impact on exports, therefore concluding that the Olympic effect on trade is attributable to the signal a country sends when bidding to host the games, rather than the act of actually holding a mega-event.

Brazil’s Ministry of Sports estimates that R$28.8 billion would be spent in the 2016 Olympic games, considering both the Organizing Committee expenses and infrastructure investment. A government-sponsored study estimates that, through 2027, such investment would generate US$ 51.1 billion worth of economic transactions in various sectors, 120 thousand jobs per year (during the preparation period and during the games), and 130 thousand jobs in the subsequent years. The official report argues that one of the direct benefits from the Olympic Games would be additional revenues equivalent to 97% of the total invested amount, which would benefit not only the 12 cities where games would take place, but also state and federal coffers.

Academic studies typically offer less upbeat conclusions than official estimates. Some academic studies indicate that, although a modest number of jobs may be created as a result of hosting the games, there appears to be no detectable effect on income, suggesting that existing workers do not benefit (Hagn and Maennig, 2009; and Matheson, 2009). Moreover, the impact of hosting the games depends on the overall labor market response to the new jobs created by the games and might not be positive (Humphreys and Zimbalist, 2008). The economic impact of hosting the World Cup appears, if anything, to be even smaller (Hagn and Maennig, 2008 and 2009) 5.

Indirect economic benefits of mega sporting events are potentially more important than the direct benefits, but are also more difficult to quantify. One possible indirect benefit is the advertising effect of such events. Many Olympic host metropolitan areas and regions view the Olympics as a way to raise their profile on the world stage. In this sense, the intense media coverage before and during the Olympic Games or other big events is a form of advertising, possibly attracting tourists who would not have otherwise considered the city or region, and who may generate significant, broad, and long-lasting economic benefits. Reality, however, often departs from theory. Academic researches suggest that “in cold hard terms it’s actually hard in international experience to determine if there has been a positive, lasting impact on tourism from having that brief burst of exposure” (Burton, 20037). And if accompanied by bad weather, pollution, unsavory politics, or terrorist acts, the games may actually damage a location’s reputation.

Finally, initially publicized budgets invariably understate the ultimate cost of staging the games. Between the time a host city puts in its bid for an event and the time it takes place, construction costs and land values may increase significantly. Projected budgets are never enough to cover actual costs. Athens initially projected that its games would cost $1.6 billion, but they ended up costing closer to $16 billion (including facility and infrastructure costs). Beijing projected costs of $1.6 billion (the operating cost budget of the Beijing OCOG), but the final price tag was $40 billion, including facility and infrastructure expenditures such as expansion of the Beijing subway system. London expected its 2012 Games to cost less than $4 billion, but they are now projected to cost $19 billion (Sports Business Daily, 2009). If there is an economic benefit from hosting the Olympic Games, it is unlikely to come in the form of improving the budgets of local governments, which raises the question of whether there are broader, longer-term, or less tangible economic gains.


Appendix IV: Morgan Stanley Brazil Infrastructure Basket Constituents (Bloomberg ticker: <MSBZINFR>)

Our Brazil infrastructure basket contains 20 stocks in the industries with the highest ROEs and Sharpe ratios greater than 1: Toll Roads, Industrials, Metals, Auto Parts and Utilities. Liquidity constraints were applied, and for balance Utilities, Metals, and a combination of the other industries are each equally weighted (1/3 each), with the stocks in each grouping weighted by market capitalization. The basket is denominated in USD.

<table>
<thead>
<tr>
<th>Company</th>
<th>Ticker</th>
<th>Sector</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
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<td>Gerdau</td>
<td>GGBR4</td>
<td>Metals</td>
<td>15.5%</td>
</tr>
<tr>
<td>Usiminas Siderurgicas de Minas Gerais</td>
<td>USIM5</td>
<td>Metals</td>
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<td>GOAU4</td>
<td>Metals</td>
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<td>Ferbas-Ferro Ligas da Bahia</td>
<td>FESA4</td>
<td>Metals</td>
<td>0.5%</td>
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<td>CPFE3</td>
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<td>TBLE3</td>
<td>Utilities</td>
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<td>ENBR3</td>
<td>Utilities</td>
<td>2.3%</td>
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<td>LIGT3</td>
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</tr>
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<td>2.9%</td>
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<td>0.8%</td>
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Source: Morgan Stanley Research
## Appendix V: Companies Leveraged to Infrastructure Investment

<table>
<thead>
<tr>
<th>Sector</th>
<th>Company name</th>
<th>Ticker*</th>
<th>Price</th>
<th>Analyst Name</th>
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</thead>
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<td>Auto parts</td>
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<td>Subhojit Daripa</td>
</tr>
<tr>
<td>Utility</td>
<td>MPX Energia</td>
<td>MPXE3</td>
<td>R$ 21.49</td>
<td>NC</td>
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<td>TBLE3</td>
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<tr>
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<td>TRNA11</td>
<td>R$ 38.60</td>
<td>NC</td>
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</tbody>
</table>

* = Not covered.

* Brazil equity, except where noted.

Source: Morgan Stanley Research
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