



GMA CASE STUDY - FINANCIAL MODEL

# **FINANCIAL MODEL OF THE GAUTRAIN RAPID RAIL LINK PUBLIC PRIVATE PARTNERSHIP**

The purpose of this case study is to explain the process by which the Gautrain Financial Model was developed, as well as the assumptions made and the manner in which the Model was interlinked with decisions on how the project would be structured and funded. It draws lessons that were learnt and leads these into recommendations for financial models on future large infrastructure projects, specifically those procured by means of the Public Private Partnership (PPP) mechanism.

## LEARNING OUTCOME

To gain an understanding of the process by which the Gautrain Financial Model was developed.

## BUSINESS OBJECTIVE

To make recommendations as to how the Financial Model can be used for future large infrastructure projects procured by Public Private Partnerships (PPPs).



## 1. BACKGROUND

The Gautrain Rapid Rail Link (Gautrain) is a modern state-of-the-art high-speed rail system in South Africa linking Johannesburg, Tshwane and OR Tambo International Airport (ORTIA). It is both the first high-speed rail link in Africa, as well as the largest project procured on the continent by means of a Public Private Partnership (PPP). The network consists of 10 stations, 80 km of railway lines, of which 15 km are underground and another 15 km are raised above ground on viaducts.

The Gautrain is a PPP project, with the Gauteng Provincial Government (the Province) the public partner and the primary promoter of the project. Other key role players through the various phases of the project are the Gauteng Department of Roads and Transport (Gautrans), the National Treasury and its PPP Unit (through which the Gautrain obtained the necessary approvals in order to conclude the procurement

phase) and the Gautrain Management Agency (GMA). The private partner is the Bombela Concession Company (Pty) Ltd (the Concessionaire), which holds a 20 (actually 19.5) year concession for the construction, operation and maintenance of the Gautrain.

The Gautrain was formally announced in February 2000 by the then Gauteng Premier Mbazima Shilowa as one of ten Spatial Development Initiatives, which later became known as Blue IQ Projects. Following on from the announcement a consortium of consulting companies were appointed in April 2000 to advise the Province on the execution of the project. This technical team initially consisted of Khuthele Projects, Arcus Gibb, Lebone Engineering, Gibb-Rail (a United Kingdom-based railway consultancy), APS Plan Africa and Equinox.

The technical team focused on two major aspects, namely the system planning and needs assessment. The system planning focused on the aspects of land use, route alignment, station placement, technology and operations, whilst the needs assessment considered the market, demand estimates and revenue forecasts. The system planning component of this process resulted in a presentation to the Province in September 2000 on the route determination and the various alignments being considered. The needs assessment component of the investigation continued to the end of the year and resulted in the submission of a second report in January 2001 detailing the envisaged demand, income and cost, as well as the now further developed route alignment proposed.

The decision that the Gautrain would be done under Treasury Regulation 16 (TR 16) meant that there were additional requirements related to determining financial and risk-related indicators for the Gautrain. As a result financial and legal advisors were needed to supplement the technical team. Kagiso Financial Services, in association with Rothschild's of London, were appointed to assist with the financial feasibility components of the project, whilst Ledwaba Mazwai Attorneys, in association with Masons of London, were appointed as the legal advisors.

The Project was always conceptualised as a PPP, owing to the unproven nature of a high-speed rail link project, optimistic timelines and a high degree of technical complexity. This is largely supported by the growing global trend in procuring such capital-intensive projects by means of a PPP.

The requirements of TR16 meant that the Project would now need very specific approvals from the National Treasury at various points within the process. The first approval (or TA I) required the submission of a feasibility report (National Treasury, 2004). Three subsequent approvals would also be required, introducing a series of progressive hold-points on the procurement of the Project so as to allow for sufficient scrutiny

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and oversight. At each stage a detailed financial model (or update of an existing model) would be required.

The Financial Model forms a critical component of a PPP project throughout its life cycle. Initially the Model is developed by the public sector authority, or their appointed advisor, in order to predict the bidder's costs, financing structure and other assumptions so as to assess the acceptability of the cost to the public sector. The Model is then developed further by the bidder and lenders to arrive at the base case (or banking case) scenario. This Base Case Financial Model ultimately becomes an integral part of the concluded Concession Agreement (CA).

The Base Case Financial Model continued to be used throughout the actual period of construction and operation by the Concessionaire and the project proponent to review long-term prospects and risk exposure, to consider price variations and compensation payments in terms of the CA, and to calculate amongst other aspects any potential refinancing gain, as well as the amounts payable in the event of variations.

Inputs into the Financial Model include macroeconomic assumptions, capital expenditure, operating and maintenance costs and revenues, and financing costs (e.g. margins, fees and loan amounts). Outputs include details on the drawdown of equity and debt, patronage guarantee payments (revenue support) and grants (capital support), interest, tax, debt repayments, cash flow, cover ratios, investors' returns, as well as the Net Present Value (NPV) of all relevant inputs and outputs.



## 2. PROBLEM STATEMENT AND EARLY FINDINGS

Given the formal requirements of TR 16 and the need to structure the Gautrain as a PPP, the feasibility study had to include a financial model that would be used to demonstrate the affordability, value for money and, most importantly, the risk transfer of the proposed Project so that the necessary approvals could be obtained. This financial model was developed and owned by the Province and is known as the Province Financial Model.

The Base Case Financial Model that now forms part of the CA has a different purpose and that is to set out the contractual basis of the arrangement with the Concessionaire, establish the capital cost of the project and financing arrangements and forecast the operating costs and revenues during the concession period. The Province Financial Model is therefore there to primarily demonstrate viability, whilst the Base Case Financial Model is there to capture and manage the contractual relationship.

The development of two financial models by different parties and for different purposes, but for the same project, required robust processes consistent with those required by TR 16. Various stakeholders and regulatory authorities had to agree and sign off on the financial models as they moved through the various processes and were continually updated to reflect changes and specifically the continual evolution of the design and the technical process that were being run in parallel. The entire process spanned a period from 2001 and 2006 and required continuity in people together with a good understanding of the processes involved.

The financial models also had to be flexible and take into consideration sensitivities to varying scenarios. Typical sensitivity scenarios considered include construction cost overruns, project delays, reduced usage, higher operating costs, change in interest and exchange rates and inflation. Over the period spanned, the

Gautrain was affected by many of these factors, most notably by exchange rates, inflation and the capital cost estimate for the Project.

### 3. ANALYSIS OF ISSUES

#### 3.1 Two Financial Models

The Province's Financial Model was prepared in accordance with National Treasury requirements applicable at the time in 2001. This was prior to the 2004 issuance of the National Treasury Practice Notes on PPPs and especially Module 4 on Feasibility Studies and was therefore based on the shortened guidance of the National Treasury.

This required that the Province demonstrated Affordability, Value for Money and significant and appropriate Risk Transfer as required under TR 16. Affordability was defined in two parts – the

capital contribution that the Province would have to make in the development period (i.e. the time to design, construct, commission and integrate the Gautrain) and the Patronage Guarantee that the Province would have to make during the operating period. An integral component of assessing affordability was the balancing of the capital contribution with ongoing patronage support and ensuring that at the same time this constituted effective risk transfer.

The graphic below illustrates these two concepts of a Provincial Contribution and a Patronage Guarantee as an unbalanced see-saw or fulcrum. On the short side of the fulcrum is the 4½-year development period when capital had to be provided and on the long side of the fulcrum is the 15-year operating period when operating and maintenance costs as well as debt service and the Concessionaire's profit accrued.

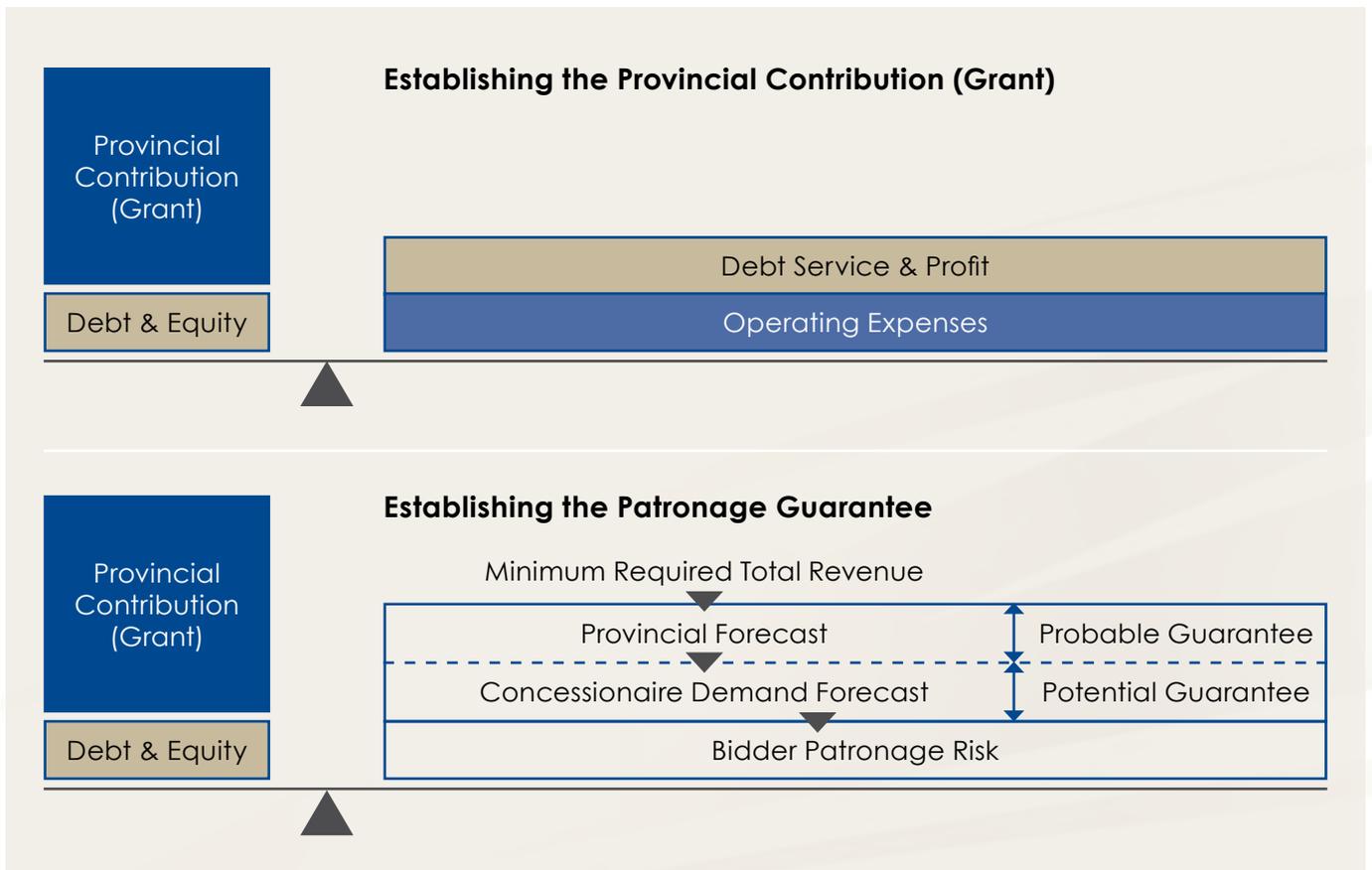


Figure 1: Illustration of the Provincial Contribution and Patronage Guarantee

Simply put, the debt service and profit in the operating period must “balance” or equal the private sector debt and equity invested in the Gautrain. The private sector cannot invest more capital than it can recover or pay back over the operating period. The total capital requirement is, however, far greater than that which the private sector can invest, exacerbated by the unproven nature of the Project. The difference between the total capital requirement and the amount that the private sector can invest is therefore the Provincial Contribution. The Provincial Contribution is a grant – in other words it is not required to be repaid, but under the PPP model ownership of the asset remains with the Province.

Due to the revenue that would accrue to the private party during the operating period of the Gautrain PPP being viewed as highly uncertain<sup>1</sup>,

<sup>1</sup> It was the first public transport project that relied on a diversion of demand from private car to rail in South Africa and was thus viewed by the Province and the bidders as having a high degree of uncertainty of usage and revenue. For further reading on the topic of demand risk readers are referred to Robert Bain “Toll Road Traffic & Revenue Forecasts: An Interpreter’s Guide” April 2009.

the Financial Model was based on a concept of establishing Minimum Required Total Revenue (MRTR). Revenue projections below this level would therefore require revenue support in the form of a Patronage Guarantee from the Province. The bidders for the Project during the procurement process would therefore be competing on the basis of the combined lowest Provincial Contribution and Patronage Guarantee payable by the Province.

**This would work as follows:**

1. The Province’s Financial Model would calculate the MRTR required by a private party to operate and maintain the Gautrain system and provide the specified train and bus services as well as pay taxes and pay back debt-raised equity invested and offer a reasonable return to the Concessionaire. These would be calculated based on the Province’s advisors’ cost estimates of all the input operating costs over the full 15 years of operation. The costs making up the MRTR are illustrated in Figure 2 below.

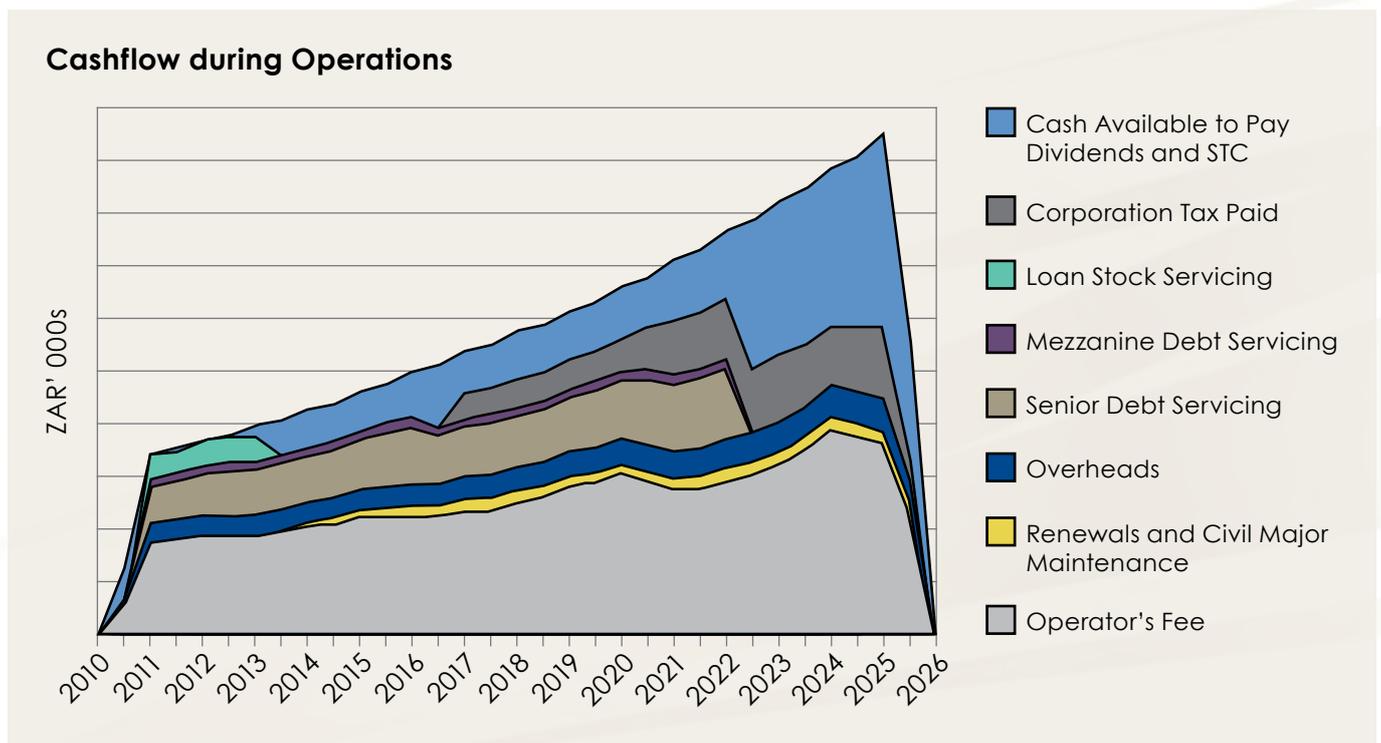


Figure 2: Illustration of the Cost Components Making up the Minimum Required Total Revenue

2. Then the Province's Financial Model would calculate the estimated revenue over the same 15 years of operations. This would include the ridership revenue from users of the trains and buses as well as other revenue such as advertising, commercial use and retail opportunities. This was known as the Province's Demand Forecast (PDF) and was based on a Demand Model prepared by the Province's technical advisors.
3. The difference between the two (i.e. costs and revenues or MRTR and PDF) would be the Patronage Guarantee or level of revenue support required. The Patronage Guarantee would have to be tested for affordability by the National Treasury as part of the feasibility investigations.
4. Bidders would be required to develop their own forecasts of MRTR to cover the costs of operations and their forecasts of revenue (called the Concessionaire's Demand Forecast or CDF). All bidders would be compared on the basis of the difference between their MRTR and CDF, that is, their estimated requirement for a Patronage Guarantee. The Concessionaire would assume all revenue risk below their estimated CDF.
5. The bidder with the lowest cost combination of Provincial Contribution and Patronage Guarantee on a NPV basis would be appointed as the preferred bidder and, subject to successful negotiation of risk and other technical related issues, the Concessionaire.
6. Then because the PDF and the CDF differed (the PDF was higher than the CDF), the Province had to differentiate between a Probable and a Possible Patronage Guarantee as shown in Figure 3. The Probable Patronage Guarantee was the difference between the MRTR and the PDF and was the amount that would, in all probability and according to the Province's own estimations, be payable to the Concessionaire. The Possible Guarantee was the maximum Patronage Guarantee and was the difference between the MRTR and the CDF. This was the maximum exposure of the Province and was reported as such as a contingent liability to the National Treasury.

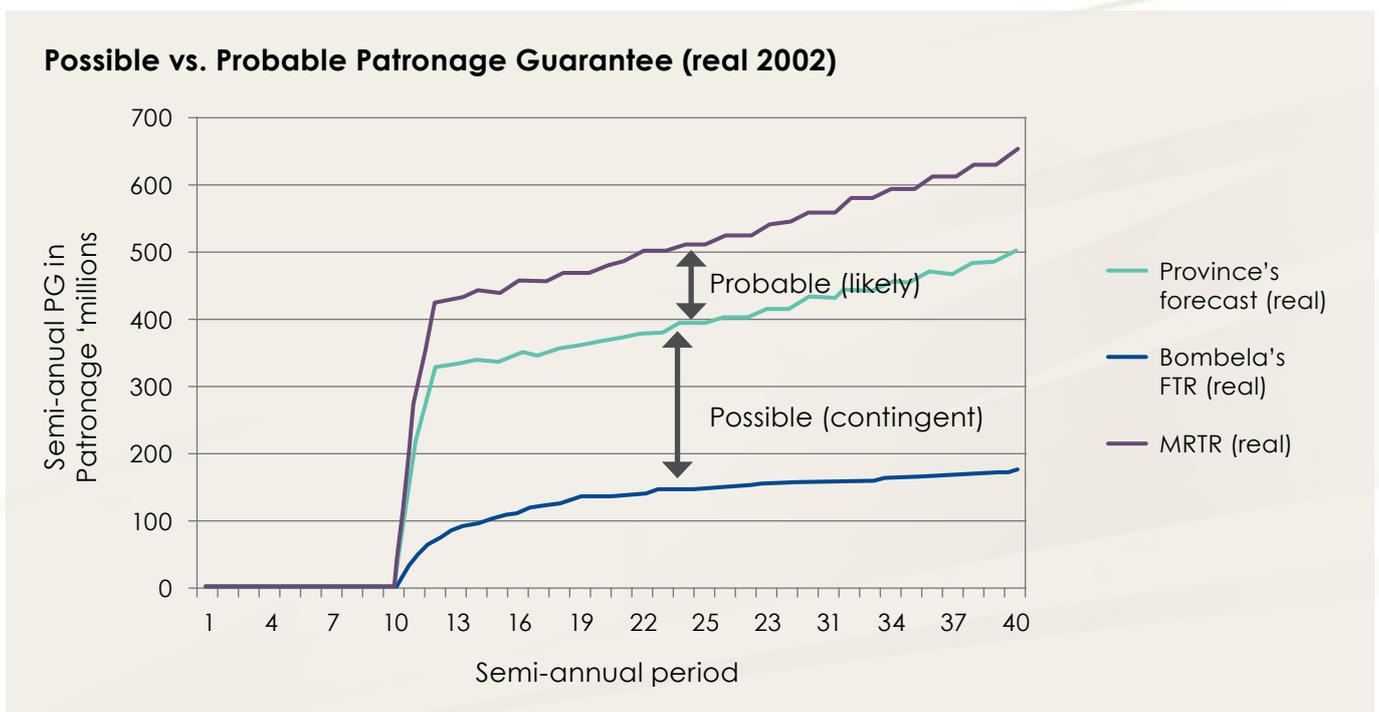


Figure 3: Illustration of the Patronage Guarantee

### 3.2 The Province Financial Model

National Treasury received applications for approvals in terms of TR 16 on nine occasions and, after due consideration thereof, the Province received the following approvals:

- Treasury Approval I (TA I) – February 2002, December 2002, June 2005, September 2006
- Treasury Approval IIA (TA IIA) – February 2002, November 2002, December 2004
- Treasury Approval IIB (TA IIB) – July 2005
- Treasury Approval III (TA III) – September 2006.

Treasury Approval I (and its revisions) as well as TA III all required updates of the Province's Financial Model. The final approvals in this sequence were provided in September 2006, when the Province simultaneously submitted and requested a revised TA I and TA III based on a revised feasibility study reflecting the changes in assumptions to the initial feasibility study and now firm pricing information from the bidders. Through the process the primary changes to the model were the increase in the capital cost estimate of the project in response to both the evolution of the design and factoring in of the risk transfer/pricing by the bidders, as well as changes to the underlying macroeconomic variables. These all have a material impact on assumptions applicable to the Concession Period.

### 3.3 The Base Case Financial Model

In November 2002, the Request for Proposal (RFP) was approved by National Treasury and issued to the two pre-qualified bidders, namely the Bombela and Gaudiwe consortiums. Given the requirements for bidders to bid on both the Provincial Contribution and the Patronage Guarantee, each bidder had to develop its own financial model. Bidders were not provided with the Province Financial Model but were instead given certain parameters of affordability to guide them as to the Province's assumptions on costs and revenues in the Province Financial Model.

After a protracted and complex procurement process one bidder, Bombela, was appointed as the Preferred Bidder in July 2005. Bombela and its advisors were then responsible for

developing the Base Case Financial Model, which was compiled by Societe Generale. This was primarily because of the importance of the Concessionaire owning the financing solution proposed, inclusive of the cost and revenue assumptions in the financial model.

The Base Case Financial Model is based on contractually committed fixed costs from Bombela and its sub-contractors during the development phase of the Concession Period. During the operational phase the cost and revenue projects are based on (and in most instances linked to) assumptions on inflation and other economic variables such as interest rates and foreign exchange rates. It was developed in Microsoft Excel.

The target return for the Concessionaire in terms of the Base Case Financial Model was a real internal rate of return (IRR) of 18%, meaning the MRTR is essentially modelled or solved to arrive at this return. Being a dynamic document this modelling continues for the duration of the Concession Agreement as variables change and outputs are updated. This is achieved using a series of macros.

Approximately 28% of the costs during the development period of the project were in foreign currency and this was managed in terms of the modelling of the Base Case Financial Model by converting all foreign denominated costs into South African Rands (ZAR) at a spot rate in 2006, thereby fixing the exchange rates up to 2011. This was achieved through the National Treasury providing the foreign exchange through the Reserve Bank so as to save on the high hedging costs proposed by Bombela. Bombela hedged the forex risk during the operating period.



## 4. LESSONS LEARNT IN THE DEVELOPMENT OF THE TWO MODELS

The table below shows how the two key indicators, being the Provincial Contribution and the Patronage Guarantee, changed over time as reflected in the different Treasury Approvals over the four years between 2002 and 2006.



Treasury Approval	Date of Approval	Base Date	Capital Expenditure	Maximum Annual Patronage Guarantee
TAI	Feb 2002	2002	3,832	150
TAI	Nov 2002	2002	7,120	150
TAI	June 2005	2005	19,990	560
TAI and TAIII	Sept 2006	2005	22,290	590

Table 1: Outputs of the Models over Time in ZAR Million

It is immediately apparent that the outputs of the Province Financial Model (i.e. pre-2005) are completely different from the Base Case Financial Model (post-2005) as reflected in the final Treasury approvals. The capital expenditure (to be funded by the Provincial Contribution and the Concessionaire's debt and equity) more than doubled in real terms between 2002 and 2005. The Patronage Guarantee went up by a factor of more than three, owing to the increased debt servicing burden and lower than expected CDF.

The positive lessons learnt are:

- The Base Case Financial Model and the Province Financial Model, once aligned, became a very powerful tool that was accurate to the point that funds could be allocated and spent to very high levels of accuracy. Over the Development Period costs were maintained to 98% consistency with the Base Case Financial Model<sup>2</sup>. This is

<sup>2</sup> The 2006 concession contract value in nominal (2011) terms was ZAR25,7 billion and Development Period costs amounted to a total ZAR26,4 billion. Cost increases made up over all five years included a CPI variance cost of ZAR960 million and Foreign Exchange savings of ZAR360 million. Variations to scope were less than 1%.

an unheard of degree of accuracy in large public infrastructure projects in South Africa.

- The Province Financial Model facilitated the effective evaluation and understanding of the bids received.
- The Province Financial Model was used as a fund-raising tool whereby the Province was able to raise grants from the DoRA (Division of Revenue Act) from Central Government via the Department of Transport as well as borrowings of ZAR4,9 billion by the Province under the Provinces' Borrowing Powers Act – the first and last provincial borrowing since 2000.
- In total the Gautrain was able to access five sources of finance:
  - DoRA from Central Government via the Department of Transport
  - MTEF (Medium Term Expenditure Framework) from Gauteng Provincial Government
  - Private Sector Equity
  - Private Sector Borrowing
  - Provincial Borrowing.

These are illustrated in the graphic below:

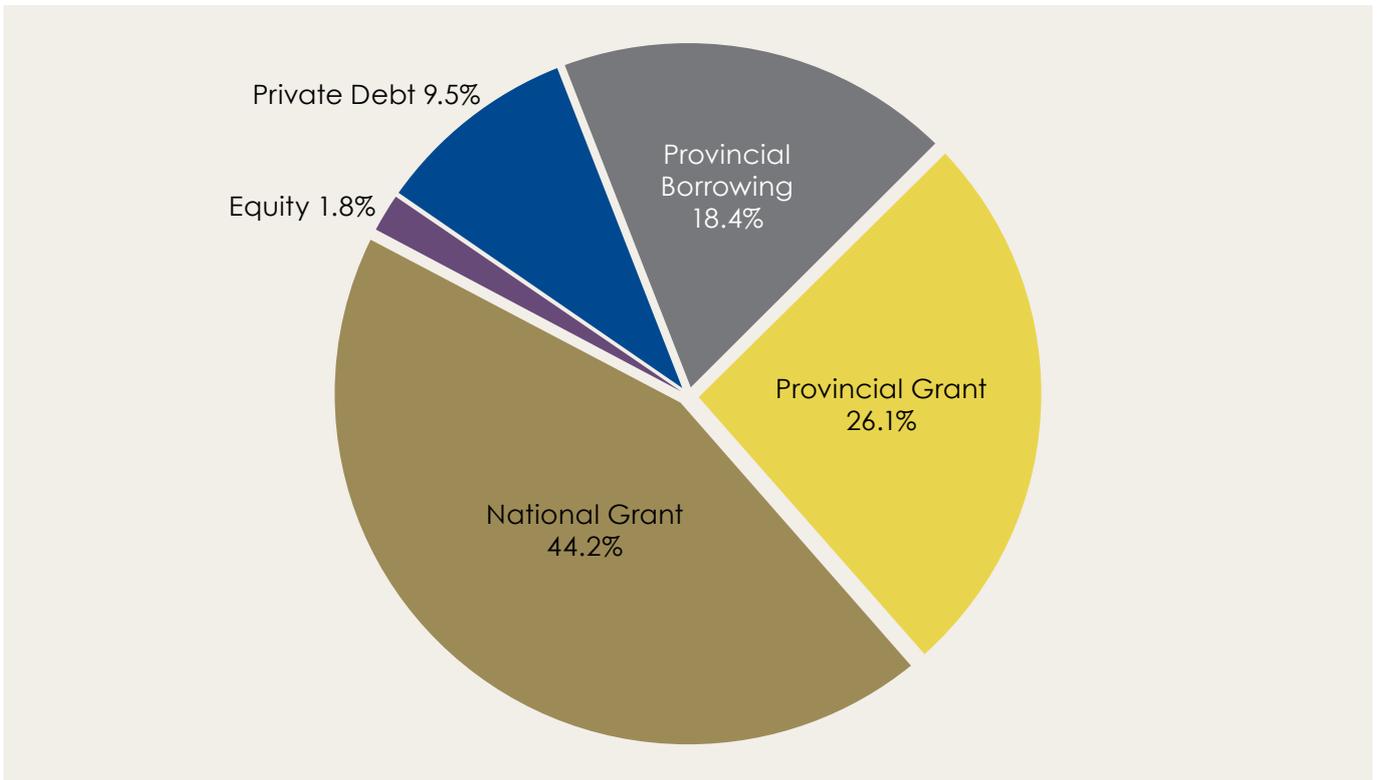


Figure 4: Financing Sources

- The Province Financial Model was acceptable to the National Treasury Fiscal Liability Committee and led to the approval of the Gautrain by the Minister of Finance, the Gauteng MEC for Finance, and the Provincial and National Government Cabinets.

The negative lessons learnt are:

- The Province Financial Model was a theoretical model prepared by consultants and advisors. The Base Case Financial Model was prepared by bidders who had to raise finance and then deliver the project in real life. The interpretation of risk and acceptable returns are fundamentally different between the two parties.
- The Province Financial Model underestimated the significant risk premiums and costs that the bidders included in the Base Case Financial Model. The Concession Agreement

transfers significant amounts of risk to the Concessionaire and the cost of this risk was not adequately reflected in the Province Financial Model, despite risk transfer being the overarching principle behind the PPP mechanism.

- The Province Financial Model and its key cost and revenue assumptions were not independently reviewed before 2005. Reviews of the cost assumptions and demand model were done within the Province's advisory team and, despite being conservative, did not fully take into consideration demand forecasting of an unproven project.
- The bidders both took commercial and highly risk-averse views on the CDF and submitted low projections of demand for the services. This substantially increased the maximum Patronage Guarantee payable by the Province.

In terms of applying the lessons learnt to future projects with large capital investments it is recommended that:

- The concept of two financial models, one prepared by the project proponent (i.e. government) and one by the private party be continued. They serve different purposes and both are very important.
- However the gap between the two must be minimised, through better understanding of the risk transfer pricing and premium.
- The government financial model must be independently reviewed prior to any approval being granted.
- The government financial model must have cost-input assumptions reviewed by independent cost reviewers who are experts in PPPs and risk. Costs must be benchmarked against comparator projects.
- The revenue demand model must not only be independently reviewed but must be declared as investment graded by an independent expert with international experience. On very large projects, it may even be part of the project being rated by a credit rating agency.
- The consultants used by the government to develop the model must be highly reputable internationally recognised advisors.
- The Base Case Financial Model must also be reviewed by the government and signed off for accuracy and correctness before becoming part of the PPP Agreement.
- The Base Case Financial Model must remain a living model in that it can be updated and used to value changes over the whole life of the PPP.
- A pragmatic view of the potential maximum exposure of any revenue support over the lifecycle of a CA versus the upfront capital contribution, and the consideration of the balancing of the two, must be taken.

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