Privatisation of Power Generation in Malaysia: Impact on the Entry of Malays into Power Business

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Abstract: This paper reviews Malaysia's experience in privatisation in power generation from the first half of the 1990s and the role it played in promoting Malay entry into business. In the pre-1949 period, privately-owned independent power producers and distributors (IPPs and Ds) were the dominant players. The government-owned integrated power utility, Tenaga Nasional Berhad (TNB), became a monopoly only since 1976. TNB's finances were strained during the Asian Financial Crisis (AFC) period, but contracts were honoured despite strong calls for renegotiation of power purchase agreements (PPA). With the open tender era from 2012, the PPA terms have become very competitive. However, as TNB can continue to bid, this has not made for a level playing field. With competition and fall in interest rate, there has been a significant decline in internal rate of returns (IRRs). Guaranteed off-take enabled some concessionaires to still earn a good equity IRR through aggressive gearing. Development of a more active and liquid bond market has played a key role in privatisation.

Keywords: Power sector, independent power producers (IPPs), privatisation, promoting Malay entry into business
JEL classification: L33, Q48

1. Introduction

This paper examines the opening up of the power sector in Malaysia from the first half of the 1990s to the entry of independent power producers (or IPPs). Its specific focus is on the nature or extent of liberalisation and deregulation of the market for power, award of concessions and issue of bonds and of their resulting impact on the return and risk of the IPPs, as well as on the entry of Malays into business, which has been a key goal of the country's privatisation agenda. A quick review of the evolution and development of the power sector in Peninsular Malaysia shows that privately-owned and operated independent power producers and distributors (IPPs and Ds) were the dominant players in colonial Malaya. Even in 1949, the forerunner of today's integrated

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power utility, Tenaga Nasional Berhad (TNB), namely the Central Electricity Board (CEB), only "served about one-third of the power needs of the country" (Tate, 1990, p. 130). TNB acquired the Perak River Hydro Electric Project (PRHEP), the last remaining IPP and D, only in 1976. By then TNB had already emerged as a "virtual monopoly" (Tate, 1990, p. 268). So, the government's initiative to break up TNB's monopoly in power generation in the first half of the 1990s should not be a surprise, given the long history of private ownership in the power sector.

Privatisation launched in Malaysia from the mid-1980s displays a few unique features. A key goal of the government has been in promoting Malay entry into business. The power sector offered better prospects, certainly in comparison to the many failed ventures the government promoted in manufacturing. And the government has come to accept continued public ownership, to overcome the constraint of capital and borrowing often faced by Malay business. Competition may or may not have mattered to the government in the choice of privatisation as a mode for Malay entry into the power sector, as it may have been inclined to address them through regulation.

The choice for study of privatisation of infrastructure is based not only on the availability of data but also on the changing character and scope of privatisation, and on the relative importance, based on debt outstanding as a proxy variable, of infrastructure and of its two key sub-sectors.[1]

2. Malaysian Studies on the Power Sector and Privatisation

There are only a few substantive economic or business studies of Malaysia's power sector, and of its privatisation and financing. Studies by Tate (1989, 1990, 1999) on the business history of the power sector of Peninsular Malaysia and Sarawak, and specifically of their integrated power utilities, namely Tenaga Nasional Berhad (TNB) and Sarawak Electricity Supply Corporation (SESCO), provide a valuable backdrop for the privatisation discussion in this paper.[2] On privatisation of power generation in Malaysia, the only significant paper is that by Rector (2005), which gives an overview of the IPP investment experience in Malaysia. The work of Pua (2011) on privatisation dealt with the richness of the concession agreements (CAs) awarded in the infrastructure sector, as well as the scope and cost to the government of terminating these CAs, but his analysis of IPPs pales in comparison with his analysis of the privatisation of toll roads and of water treatment and distribution. The following studies on the role of the bond market in infrastructure financing (Yeah et al., 2007, Yeah et al., 2011; Maybank Kim Eng, 2019) provide a comprehensive listing and key terms of the bonds issued, including those to the power sector, but there is little or no discussion of how or why the bond market was better placed than the bank market to serve the more demanding financing needs of privatised infrastructure projects.

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[1] Of the total private debt securities (PDS) outstanding of RM712 billion in November 2019 (representing about 50% of nominal GNP vs bank loans which stood at about 120%), the PDS share of the infrastructure sector was close to RM300 billion or 43.6% of the total.

[2] Tate had full access to all documents, including board papers and consultancy reports, and reviewed and assessed these documents with a critical eye.

As Thillainathan (2021) highlighted, a few studies have a more specific focus on the impact of privatisation on ownership and control as well as on the extent to which it has led to more competition or rent-seeking. On ownership and control, the focus of a key study by Gomez et al. (2017) is on the rise of state-owned enterprises (SOEs) to dominate the commanding heights of the Malaysian economy as well as on inter-ethnic state-business ties. The paper on toll road privatisation by Thillainathan (2021) is the first to examine how the Malay business class has fared in this sub-sector in vying for these concessions *vis-à-vis* non-Malays as well as in comparison with the Malay managerial class, and of their resulting implications for the country's stance on distribution. To-date there have been no enquiry into inter-ethnic state-business ties of corporatised or privatised infrastructure activities.

Given the confidential nature of the concessions awarded, the lack of data has been a severe constraint on the study of infrastructure privatisation in the country. We have tried to overcome this problem, as set out more clearly in the section on sources and use of data in Thillainathan (2021), by looking at the available data from the bond market on such privatisation, as they have been typically financed through bond issues.

3. The Evolution and Development of the Power Sector in Peninsula Malaysia

When the IPPs were licensed in the early 1990s, TNB,[3] the integrated power utility, was already operating as the sole producer and seller of power in Peninsular Malaysia.[4] TNB became an integrated power utility only in the post-Second World War period, and as the sole producer and seller of power in 1976 after it completed the acquisition of the two remaining independent power producers and distributors[5] (IPPs and Ds). The history and evolution of TNB has been documented in Tate (1989, 1990).

It should be noted that where an electricity undertaking owned by a government entity is operated as a government department, to accord it more business flexibility, there was a strong case for it to be reconstituted as a statutory body, so as to give it more autonomy to operate, finance and grow its business without being subject to civil service rules. A privately run electricity undertaking would enjoy full business flexibility. But both types of undertakings, are subject to government regulation, to ensure that they do not abuse their monopoly position by restricting supply and over-charging its customers. But this was not the case until the acquisition and merger of all IPPs and Ds into an integrated power utility. With the merger and even after privatisation, the government's goal in regulating the integrated power utility has been to ensure that the level of power tariff set was affordable as well as competitive (benchmarked against

[3] Tenaga Nasional Berhad (TNB) is the name Malaysia's integrated power utility assumed on its privatisation and listing on the Malaysian Stock Exchange in 1992, which is how it will be referred to in this paper.

[4] Sabah and Sarawak also had by then their own integrated power utilities, with an exclusive licence to produce and sell power within their respective states.

[5] Namely of the shares and assets of the Penang City Council, a local government entity, and of the London Stock Exchange listed Perak River Hydro Electric Power Company (PRHEP) and its distribution arm, Kinta Electrical Distribution Company (KED).

other well-managed and rapidly growing economies in the region), and the output was adequate to meet the rapidly growing demand for power. As in the case of a typical growth company, the tariff set was in fact driven not by consideration of dividend payments but by the need to generate enough surplus to support capacity expansion through prudent borrowing and debt servicing (and with little or no reliance on government budgetary support), so as not to stifle demand or growth.

TNB remains a monopoly in transmission and distribution but in generation, several new IPPs have been licensed but TNB is re-emerging as the dominant player. TNB became a monopoly in generation and distribution only in 1976 after its acquisition of the privately-owned and London listed Perak River Hydro Electric Project (PRHEP) and of its wholly owned subsidiary Kinta Electrical Distribution (KED), on expiry of the group's 50-year concession. Interestingly, in the late 1930s, PRHEP, then "the single largest producer of electricity … possessed along with a handful of major tin mining companies 85% of total generating capacity in the country"[6] (Tate, 1990 p. 90). The IPPs that are being licensed now are all of the regulated type, and receive their capacity payments, so long as they meet the minimum availability factor for despatch under a fixed price, long-term offtake contract, all signed with TNB, which remains the sole buyer of power. Under the Concession Agreements (CA) signed, the government or TNB, has the step-in right to take over an IPP if it ceases to be a going concern (Pua, 2011; World Bank, 1999). But to-date, no such occasion has arisen. No merchant plants have also been licensed to sell in the spot market on a competitive, wholesale basis, that is, with no off-take contracts. The non-licensing of merchant plants may have been a blessing in disguise as the financial performance of such merchant plants have turned out to be poor even in developed economies (Wilkinson et al., 2017).

4. Power Generation Privatisation: Ownership and Distributional Implications

When power generation was opened up to the private sector, both Malays as well as non-Malays were given the licence, no doubt because the Mahathir administration wanted to make sure that privatisation was a success.[7] Given the rich terms on which the 1st generation IPPs were licensed, privatisation was in fact a roaring success, with gearing raising return manifold. In subsequent phases of privatisation, the terms were tightened and the licences increasingly issued to the Bumiputera to achieve

[6] In the late 1930s, some 80% of all power generated went to the tin mines (Tate, 1990, p. 90). In the post-war period, the increase in power demand was so great that, over the 10-year period from 1964-1974, when a Malaysian had taken over as CEO of TNB, its "contribution to the total power generated in the Peninsular … rose by 40% to 96%" (Tate, 1990, p. 187).

[7] Of the five 1st generation IPPs, YTLP was issued a licence, as it is likely it represented to the Mahathir administration, the opening up into power generation by the private sector. The Genting group was also issued with a licence, as it was then the only group in the country with a co-generation power plant to generate power for use on an exclusive basis for its Kuala Langat paper mill complex and as it was willing to accept a tariff rate of 13.7 sen per kWh, whereas the other two base load plants were only willing to settle for a tariff rate of 15.5 sen per kWh (Yeah et al., 2007). Also, YTLP was allowed to hold a stake of 50% whereas Genting had a stake of 40% with TNB and another Bumiputera party holding a stake (of at least 40% in each plant). For the 3rd base load plant and the two open cycle IPPs, the lead investors were Bumiputera parties.

Table 1. Ownership of generation capacity by group

	SOEs	Malays or Bumiputera	Non-Malays	Foreigners	Total
MW	19,918	7,162	1,461	3,565	32,106
% share	61.6	22.6	4.5	11.2	99.9

Source: Extracted from Annex Table 1.

the country's race based affirmative action (AA) agenda.[8] In more recent years, a few non-Bumiputera were again issued with licences, to increase the country's reliance on renewable energy to 25% by 2025.

Out of a total of 18 entities with one or more IPP licences[9] (Table 1), five are SOE entities,[10] which account for a 61.6% share of total generating capacity. The seven Bumiputera players, account for a 22.6% share of power generation. The four non-Malay players out of the 18, one of which is YTLP, account for a 4.5% share of generation. If YTLP is excluded, as its operating licence expired in 2020, the non-Malay share drops to 0.8%. For foreign players, it drops from 11.2% to almost zero if China Nuclear General is excluded. By popular reckoning, this Chinese party came in to bailout the Najib administration from the 1MDB scandal.[11]

The privatisation of the power generation sector has, over time, led to a significant increase in Malay participation in the modern sector. The share of power plants owned and managed by Malays is around 85%, well in excess of the broader 30% target set for Malay participation in the modern business sector. However, the number of entities which have benefited from the award of IPP licences is very few. Three groups with multiple concessions dominate (Annex Table 1). TNB and SEB are SOEs and each account for 44% and 16% of the total generating capacity. Malakoff, controlled by Syed Mokhtar, accounts for another 18%. The supplanting of the Malay business class by its managerial class in power generation is not due to any takeover of privatised entities by the SOEs.

The number of private concessionaires in generation is just a few. The dominance of the SOEs over private concessionaires, has become even more pronounced in

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[8] The restriction applied to a non-Malay not only as a concessionaire, but also as a member of a consortium. Though YTLP was a contender for the Jimah Energy Ventures Sdn. Bhd. IPP, it failed (Rector, 2005). The winner had to settle for TNB and a state government, even as its joint 25% shareholder. With respect to the issue of a licence to Track 4A, YTLP also had to drop out, as a non-lead member, following a political protest led apparently by the United Malays National Organisation (CIMB, 2014).

[9] IPP licences at 18 entities were based primarily on the Bloomberg database. The considerable variability in plant size is most apparent in the case of the Sarawak Electricity Board (SEB) Group. Of the three GLC players, one, Kimanis Power Sdn Bhd, is in the <300 MW capacity category, and is owned 60% by Petronas Gas Bhd and 40% by Yayasan Sabah Group.

[10] In Malaysia, a SOE is referred to as a government linked company (GLC) if it is a major operating company. Where a GLC is owned by an intermediate holding company and only ultimately by the government, such a holding company has been dubbed a government linked investment company (GLIC). In this paper, we refer to a GLC, a GLIC or any of their subsidiaries, as a SOE.

[11] This is in return apparently for other sweetheart deals that the Najib administration entered into with a few other mainland Chinese parties.

generation, despite the introduction of competitive bidding from 2012. The size of the private concessions awarded are now much smaller. In the case of even Malakoff, 39% of its plants by capacity are old.[12] Even in the case of the foreign group with a 11% share of capacity, no less than 2/3rds of the capacity are old.[13] And in respect of the non-Malay share of 4.5%, the concessions of the two YTLP plants, accounting for 3.8% of total capacity, have expired. The dominance of the SOEs will thus become even more pronounced with the scrapping of the ageing plants of the private concessionaires.

Thus, the government is more than happy to undertake generation using a corporatised entity and not necessarily one that is privatised. The impact on the state of distribution and the crowding out of the Malay businessmen should be evident. This may have been caused by the failings of the Malay businessmen, the government's fear of increasing wealth inequality, the unwillingness of the Malay SOE managers to concede, or the SOE lends itself more readily to looting. There is a more extended analysis of these considerations in Thillainathan (2021), and to an extent in the next section.

5. Rent-seeking: Opportunities and Constraints

The Malaysian experience showed that any entity, whether it is characterised by a concentration in shareholding or a separation of ownership from control, will be exposed to the risk of expropriation, more so if the laws and/or their enforcement are weak and if there is no check and balance on the abuse of power by the executive branch of government. With the major reforms after the governance scandals of the mid-1990s, there has been a significant decline in the number of governance scandals among public listed companies (PLCs). Nonetheless, as amply demonstrated and cited in Thillainathan (2021), several major cases of shareholder expropriation have occurred even in the post-AFC period. But these scandals have been more marked among the management-controlled SOEs. This has been popularly attributed to abuse of power by the executive branch as a result of the weak checks and balances exercised by the legislature and the judiciary.

With the dawn of the open tender era from 2012, opportunities for rent-seeking in power generation is a lot less now. In the pre-2012 period, we can distinguish between three generations of IPPs, with the first two gas-fired and the third coal-fired. The tariff rate awarded to the 1st generation IPPs was about 30% higher than that for the 2nd generation. As there was also a significant decline in bond yields over the two periods, we are unable to estimate by how much the concessions awarded to the 1st generation IPPs were richer than those awarded to the next round of IPPs. Interestingly, there was a difference in rates of 13% to 20% within each generation of IPPs. And the corresponding difference in bond yields within each generation of IPPs is likely to have been lower. One may then question the competence or integrity of the party awarding the concession, especially as there was no shortage of or engagement with parties bidding for an IPP concession, and as there was little or no difference between the parties with respect to experience or expertise.

[12] Their commercial operation dates (COD) are 1996, 2002 and 2003 with no debts.

[13] The COD of 78% of these old plants by capacity date back to 1999 or before and the balance 22% to 2002.

In the negotiation with prospective bidders for the award of a concession to the 1st generation IPPs, TNB was a party to the negotiation but the Economic Planning Unit (EPU) played the key role, given the decision of the Mahathir administration to break up TNB's monopoly in power generation. In negotiation with subsequent generation of IPPs, TNB played a more active role in driving a harder bargain as a sole buyer of power. TNB's well-being, as a commercial entity depended on the terms of the contract negotiated, and more so as it was the sole seller of power to the end user and as the price at which it could sell the power was subject to government regulation. Nonetheless, this does not mean that a manager of TNB may not engage in expropriation or rent capture, by paying himself excessively through salaries or fees, and through the award of stock options and or fringe benefits (Minhat & Dzolkarnaini, 2019). The management and board may also be exposed to the risk of awarding local procurement contracts on a negotiated basis or to a non-competing group, based on government policy or due to political pressure.

There will be less of a constraint to generate and extract rents if the concessionaire is favoured with a grant, a government support loan or takeover of a government-owned asset. From the available data, it is clear that no IPP concessionaires have been accorded such a favoured treatment. It is also clear from available data that the award of procurement contracts has been more on competitive terms in the power sector (especially with respect to the big-ticket expenditure on plant and equipment).

One measure of Malaysia's success in breeding entrepreneurs can be seen from the number of those given a concession who have ventured abroad, to grow their business. Of the approximately twenty entities favoured with a concession in generation (and none with any initial track record), only three IPPs have ventured abroad, with some limited success, in the more open global marketplace. Almost none who ventured abroad with some success, have been able to secure any other concessions domestically. Of those who did not venture abroad, and were contend to grow their government-related concession business at home, a few were able to do so, underlying the fact that non-commercial consideration may still be the key factor in securing or not securing a government-related concession at home.

6. IPPs: A Risk and Return Analysis

To compare the return and risk of IPPs of different generations as well as of concessions awarded before and after the open tender era, we use an IPP's internal rate of return (IRR), profit margins and/or credit rating. Comparison using the IRR or profit margin measure has been constrained by the availability of data by projects. We have tried to overcome this constraint through the use of their credit rating, as it is the most widely available measure. The credit rating of a project can be used not only to measure the riskiness of a project but also of the strength or weakness of the cashflows between projects of different generations or of different eras. Data was available to estimate profit margins only for one of the key IPPs. These estimates are given in Table 2.

We use three variants of the IRR measure, again dictated by data availability. The project IRR is estimated based on project cashflows on the assumption that all project outlays are equity financed. The equity IRR, actual or implied (see Table 2),

is an alternative variant which takes the stream of earnings before depreciation but after payment of interest and taxes. The third variant is the investor IRR. In calculating the equity IRR, we assume that the equity is held until the expiry of the concession, whereas the investor IRR assumes that the concessionaire liquidates its investment on listing in the public market at the initial public offering (IPO) price or through a block sale of shares, based on the price at which the investment is liquidated or cashed out. We also use three alternative measures of profit margins, again as set out in Table 2, to assess the profitability of a concession.

It is clear from the available data on the 1st generation IPPs that the privatisation concessions awarded in the mid-1990s, have been highly lucrative, based on a representative sample of the concessions examined. For instance, as shown in Table 2, the project IRR of YTLP, one of the five 1st generation IPPs, was 16% pa, based on projected cash flows set out in the 1997 Prospectus for its IPO. This is certainly supported by the inside information the writer has on one of the other 1st generation IPPs. In spite of this second IPP agreeing to a lower tariff, even its project return, on a comparable basis, was 14.5% pa, that is, it was not significantly different from that of YTLP.

The equity IRR can be significantly higher than the project IRR so long as the share of capital financed through debt is higher and so long as the debt interest rate is below the project IRR. YTLP's equity IRR, based on debt financing terms similar to those of other 1st generation IPPs, was estimated at about 56% pa. YTLP's extremely high equity IRR is based on the then prevailing fixed rate, which was about 7% below its project IRR, and a borrowing of RM9 for every ringgit of equity invested,[14] given that the debt servicing was backed by cash flows from TNB, the power utility, a quasi-sovereign credit. The actual project and equity IRR was higher due to a refinancing of debt at a lower interest rate, cut in income tax rate and efficiency gains from higher plant utilisation.[15] The equity IRR of the 2nd IPP worked out at only about 33% pa as borrowing was a lot lower at about RM2.33 for every ringgit of equity invested.

The table also sets out the investor IRR, the return to shareholders, had they liquidated their holdings at the IPO price. In the case of YTLP, the initial value of investment grew 29-fold by the time of its listing in May 1997, i.e., within a short period of about 3.6 years if the concessionaire had liquidated its investment on listing, representing an IRR of 110% pa. The phenomenal growth in the market value of the initial investment in YTLP was not from the free takeover of any government assets

[14] Of the total capital expenditure (CapEx) of RM3,292 million, YTLP was funded by borrowings of RM2,660 million and equity injection of RM300 million. The balance of RM332 million was funded by internal cash flows, generated from the operation of its plants in open cycle phase from 1995.

[15] Over YTLP's 21-year concession period, the tax rate dropped to 25% from the projected rate of 30%. With respect to YTLP's debt, as its floating rate debt was 44% of its total debt, it was able to refinance it a lot more cheaply, as the actual interest rate over the concession period was a lot lower than the 10% pa YTLP was paying on its fixed rate loan. However, as its off-take contract was at a fixed price, YTLP took an interest rate risk on its use of floating rate debt. Further, in the case of YTLP's plant utilisation, the projected rate was 80% as against the required minimum availability factor (MAF) of 70%. But capacity payment was paid so long as the IPP was available for despatch above the set MAF of 70%. Therefore, YTLP will benefit from a higher plant utilisation, not from higher capacity payments, but from higher energy payments provided the energy used per kWh of power generated is lower than the threshold set in the PPA.

Table 2. Profitability of selected privatised projects in power sector (%)

		Investor IRR	Equity IRR	Project IRR	WACC	EBIDA margin	EBIT margin	PBT margin
1st Gen								
YTLPG	1994-1996	110	55.6	16		60	51	34
3rd Gen								
JEV		47						
Open Era	Post 2012				8			

Notes to Table 2 on profit return and margins of selected power projects:

(1) In calculating the project IRR, the stream of cash flows includes all outlays on fixed assets as well as on net current assets and earnings before depreciation and interest payments but after-tax payments. Further the project IRR has been calculated on the implicit assumption that all project outlays are entirely equity financed.

(2) In calculating the equity IRR, we have distinguished between equity and debt finance and taken the stream of earnings before depreciation but after payment of interest and taxes.

(3) The equity IRR has been worked out under two alternative scenarios. In the first scenario, the equity IRR is calculated on the assumption that the equity is held until the expiry of the concession. And in the second scenario, where the required data to calculate the equity IRR is not available, an implied equity IRR has been calculated from a concessionaire's weighted average cost of capital (WACC) and debt interest rate, as it may be easier to obtain such market data.

(4) The investor IRR is calculated on the assumption that the concessionaire liquidates its investment on listing in the public market at the IPO price or through a block sale of shares. This alternative equity IRR, referred to as the Investor IRR in Table 2, is based on the price at which the investment is liquidated or cashed out.

(5) With respect to profit margins, we have calculated three alternative ratios, namely the ratio of PBT (or profit before tax) to revenue, of EBIT (or earnings before interest and taxes) to revenue and of EBIDA (or earnings before interest, depreciation and amortisation) to revenue. These profit margins have been used in assessing the performance of a privatised project where the available data does not permit the calculation of the project or equity IRR, as is the case with several projects reviewed in this study.

Sources: (1) YTLP (1997), (2) Yeah et al. (2007), (3) RAM Ratings (2014), (4) *StarBiz* (2020), (5) *The Edge* (2013), (6) Hisyam (2015).

but it was due more to its high tariffs and even more so to its high gearing in a very favourable interest rate environment.

As we have noted, YTLP is one of the five 1st generation IPPs set up. The project and equity return they would have earned would not have been dissimilar, as their capacity charge and borrowing rate, are not likely to have been significantly different from each other for these five projects.[16] Our estimate of the after-tax project IRR pa of the 1st generation IPPs, based on a 30% corporate income tax rate, was 16% and equity IRR was 56%. By the time open competitive bidding was introduced from about 2012, the weighted average cost of capital (WACC) was driven down to 8% pa and the implied equity IRR was driven down to a range of 10.36% to 26% pa, depending on gearing

[16] While there was less difference in the capacity charge between a base load and an open cycle plant, the energy charge was much higher for two of the five open cycle or peaking plants. But this made little difference to their return as the energy charge was a full pass-through expense to be borne by the off-taker.

(the ratio of equity to total funds used), and interest rate. This was brought about through a lower tariff rate and by requiring an increase in the plant availability factor.[17] Though the equity IRR was pressed down to 20% pa or below, in a few cases, this was offset by the concessionaires even going for a more aggressive debt equity structure. This was certainly so with JEV, a 3rd generation IPP. Its very high equity and investor IRR was achieved through a highly aggressive borrowing program, and by paying the utmost attention to optimising plant management and plant despatch. Of the total capital invested of RM5,733 million, the share of shareholders was only 4%,[18] made up of RM5 million of equity and RM215 million of tranche two junior debt. Syarikat Pesaka, JEV's 75% shareholder, divested its interest to 1MDB in 2013, after an eight-year holding period, at a price of RM1.2 billion (*The Edge*, 2013; Hisyam, 2015). This gives an investor IRR of 47% pa, after taking into account RM30 million of annual profit payable on junior debt two[19] (RAM Ratings, 2013, 2014). Its actual investor IRR may have been an astonishing 150% pa given its early successful placement with another investor of its share of tranche two junior debt.

As we have only selected data and for selected projects to calculate the IRR of an infrastructure project, we also rely on profit margin as an alternative measure of the financial performance of a concession. In this alternative measure, the key profit margins examined as a ratio of revenue, are the EBITDA (earnings before interest, tax, depreciation and amortisation), EBIT and PBT (profit before tax) margins. However, comparing these profit margins between enterprises of different capital intensity (which is the capital used per RM of revenue generated) can pose severe problems.[20] There is less of a problem if the enterprises we are comparing are all capital-intensive projects, as is the case in the infrastructure sector. For the present, let us note that YTLP's profit margins are robust with its EBITDA margin recorded at 60%, EBIT at 51% and PBT at 34%.

The privatised projects we have considered may be few but they are all key projects. There are a lot more privatised projects in the power sector. This being the case, are the inferences made on returns based on the few cases we have considered applicable to the other IPPs? We can use the data on the more widely available credit rating of IPPs to make this inference.

Interestingly, the current generation of IPPs are now being given the lowest investment grade rating of BBB3 on an equivalent global scale (AA3 on the local scale), whereas the 1st generation IPPs have been enjoying a rating of BBB1 on the global scale (or AA1 on the local scale). The rating has been better for the 1st generation IPPs

[17] The reduction in the WACC to 8% and equity return to around 20% pa for IPPs during the era of open tenders is based on information obtained from highly reliable market sources and inferences made from bids submitted by known bidders. The penalties imposed were also raised over time when the increased requirement with respect to plant availability factor was not met.

[18] Of the balance 96%, RM4,837 million was funded by senior debt and RM676 million of tranche one junior debt (Yeah et al., 2007).

[19] In 2020, TNB increased its stake to 25% by buying the state government's 5% stake in equity and junior debt two, for RM80 million (*StarBiz*, 2020). JEV's valuation by TNB, an insider, was still a whopping RM1.6 billion, despite its loss (as compared to 1MDB), of eight years of concession life and dividends.

[20] For an excellent discussion of the issues related to margins and profits, see Stan Leibowitz, *Re-thinking the Network Economy*, Chapter 5, American Management Association, 2002.

at BBB1 and BBB2 for the 2nd generation IPPs whereas the IPPs, beginning with the 3rd generation IPPs, have a rating which is two notches below at BBB3. The number of power sector projects with a rating below BBB3 or which experienced a downgrade, were an exception (Annex Table 2). For instance, the share of non-investment grade issues, based on the initial and current rating, only increased from 3% to 9%. The share of IPP issuers with a triple B investment grade rating only declined from 76% to 68%. These comparative rating data clearly show that risk in the IPP sector was lower as the projects were not green field projects. The concessionaires were not exposed to price or demand risk as they had entered into a fixed price, guaranteed off-take contract with TNB, which was a quasi-sovereign risk.

In concluding our discussion in this section, we note that prospective investors in the power sector are now willing to invest in new IPPs so long as the net present value of their cash flows are positive at a weighted average cost of capital of 8%. For any given interest rate and stream of expected cash flows, and so long as there is more certainty with such cash flows, the acceptable gearing ratio will be higher and we can expect the equity IRR and the WACC to be lower. Where cash flows are given and more certain, we can also expect WACC and equity IRR to be declining in an environment of declining interest rate, as has been the case in the 2010s in Malaysia.

7. Bond Market Deregulation, Infrastructure Privatisation and Equity Returns

Typically, the development of infrastructure facilities is highly capital intensive and has a long life span. An over-reliance on banks or foreign currency funding[21] to finance such infrastructure development will cause maturity and/or currency mismatches, thus exposing the borrowers to the risk of insolvency (Thillainathan, 2011a, 2011b). To minimise such mismatches, the best way to finance such infrastructure development is through the issue of longer dated fix rate bonds denominated in local currency.

The bond market plays a critical role in financing such infrastructure development. If the government relies on a captive bond market to finance infrastructure development, this can cause distortions in the financial system and the economy and result in a misallocation of capital. And if the bond market is under-developed, it may not be possible to develop infrastructure on a privatised basis.

The Malaysian bond market became more active and liquid with more trading in the secondary market only after the deregulation, over a ten-year period to the late 1990s. With deregulation, the Malaysian bond market has grown by leaps and bounds, as attested to by the development especially of the market for private debt securities (PDS). In 1992, the PDS outstanding,[22] as a ratio of money GDP, was 6.8% from a nil level before. By 2001, its ratio had shot up to 44.9%. Thereafter it was ranging between 35-40% until 2011 and since then it has again climbed marginally above the 40% level.

When the 1st generation IPPs were accessing project finance, the primary market in PDS was in its infancy and the secondary bond market was still inactive and illiquid.

[21] Unless it is a preferential, long-term loan, say from a development bank.

[22] The PDS includes mortgage bonds but excludes issues by the bank restructuring agencies as well as issues of commercial papers, mortgage notes and asset-backed securities.

This may explain why these IPPs were then uncertain not only on the interest rate they would have had to pay on their borrowings but also on whether they would have been able to raise the required debt. These uncertainties about the interest rate and gearing level, and equally importantly, the lack of open competitive bidding for the concessions, may account for the much higher returns they were able to secure.

For the 1st generation IPPs, the spread between the risk-free rate and the IPP bond yields were indeed excessive.[23] These IPPs were initially accorded a AA3 local rating as against the rating then of TNB, the off-taker, of AAA. This may have been due to the high capital intensity of the projects, the required high gearing, the fixed price off-take contract, decision by a few prominent business groups, such as the Kuok Group, not to accept the invite to be an IPP's substantial shareholder, uncertainty both on the quantity and interest rate at which the required fixed rate funds could be raised,[24] and hence the resulting uncertainty as to whether these projects are financeable on the right terms.[25] Once there was a realisation that Malaysia was operating in a changed interest rate and credit environment from the late 1990s, and that there was an ample supply of fixed rate funds, the rating agencies upgraded YTLP's rating (on the local scale) to AA1.[26]

Of all the ASEAN countries then, only Malaysia had a local currency fixed rate bond market. Thailand and Indonesia which undertook IPPs under a fixed price contract, chose to fund them with USD fixed rate funds. In Thailand, there was thus a currency mismatch as the off-take contract was in baht whereas the fixed rate borrowings were in USD. In Indonesia, though its central bank guaranteed its off-take contract in USD, it did not have the capacity to honour its obligations in the aftermath of the Asian financial crisis. So, the Thai[27] and Indonesian IPPs went bankrupt but not the Malaysian IPPs (Desai, 2003; Sheng, 2009; Thillainathan, 2003, 2011a).

Apart from the key role the deregulated bond market played in the development of the privatised infrastructure projects, the significant decline in bond yields may also have played an equally key role in bringing about a not insignificant decline in the expected returns from the investments in the privatised infrastructure projects. Over

[23] The credit spread between AAA and AA3 bonds was about 5% vs about 1% then in the global market place. (Bank Negara Malaysia; Thillainathan, 1996). The spread over the 2016-2019 period was also about 1% or a little higher (Refinitiv).

[24] This was due to the under-developed bond market with no certainty that its yield curve was market-determined or that the market had the capacity to supply the required funds on a long-term fixed rate basis.

[25] A few, such as Sime Darby, the substantial shareholder of a 1st generation IPP, PD Power, chose to issue a corporate guarantee to raise the required fixed rate funding, and another, YTLP, could only raise 57% of its required debt on a fixed rate basis. The maximum tenor of the fixed rate bonds issued by Genting Sanyen Power and YTLP was 10 and 15 years respectively, with the serial bonds issued by the former matching its annual cashflows, whereas the latter chose to repay the principal on expiry of the 15-year period on a bullet basis. This made for a difference in their average borrowing rate of about 2% pa.

[26] The adjustment to the new environment was partly delayed by the outbreak of the Asian financial crisis in 1997.

[27] Genting, the sponsor of GSP, also put in a bid for a Thai IPP, which was unsuccessful for a good reason. In the absence of a Thai fixed rate bond market, Genting chose, unlike the successful bidders, to base its bid not on the much lower USD fixed rate, but at the significantly higher implied Thai fixed rate, by reference to the then prevailing quotes in the offshore cross currency swap (CCS) market for Thai baht.

the 30-year period 1990 to 2019, the 10-year MGS yield to maturity (YTM) had declined by about 5% (Bank Negara Malaysia). Based on the 8% WACC that was used in bidding for IPP concessions in the post-2012 period, and taking the YTM of AA3 rated PDS issues as 6% pa, the implied equity IRR of these concessionaires is likely to have ranged between 16-26% pa, depending on gearing (the ratio of equity to total funds used), of 0.1 or 0.2. We had estimated the investor IRR of a 3rd generation IPP at 47% pa. Its WACC may have been around 12%, based on the average YTM of its PDS issues of about 8.5% pa due to its excessive gearing.

8. Privatisation of Power Generation: Trends and Lessons

The motivation for Malaysia to have embarked on privatisation may have been promoting the entry of Malays into business. But the focus has also shifted from privatisation to corporatisation and from promoting the entry of Malays as owners to nurturing them as managers of an undertaking, run on a commercialised basis. This is evident with SOEs manned by Malay managers as the dominant operating enterprise mode. Concessions contracted on a negotiated basis are now awarded by open tender from 2012. However, as TNB, Malaysia's integrated power utility, can continue to put in a bid, the playing field is not level, as argued below.

TNB, which continues to have a monopoly in transmission and distribution, was certainly against the licensing of IPPs. Though it was a party in the negotiation with prospective bidders for the IPP concessions, the lead role was taken by the Economic Planning Unit (EPU). EPU was reporting directly to Prime Minister Mahathir Mohamad, who had taken the decision to break up Tenaga's monopoly in power generation, even before the national power blackout of 1992. The Electricity Supply Act, which was passed in 1990 at the same time Tenaga was corporatised, already provided for the establishment of IPPs. The power blackout took place in 1992, the same year TNB was privatised and floated as a PLC, with an initial offer for sale of 20% of its shares to private investors (Rector, 2005).

If TNB had played the lead role in negotiation with the 1st generation IPPs, it may only have agreed to a tariff rate of 12 sen per kWh. One of the bidders, which was probably the only one actively negotiating with TNB, was prepared to look at that rate, but was persuaded from doing so by EPU, which had agreed to a rate of over 15 sen with the other base load plants (Arope, 2013; *StarBiz*, 2006). In subsequent rounds of negotiation, TNB played a more active role and the prospective bidders found it a more formidable player to contend with. It had the required technical and market knowhow, the bargaining power and the motivation to drive a hard bargain. Though it no longer had a monopoly position in generation, it was still the sole buyer and seller of power. TNB thus had an upper hand, as its dispatch decisions, was critical in an IPP's ability to minimise its running cost. As a commercial entity, TNB's well-being in turn, depended on the terms of the contract negotiated, especially given that the price to its end consumer was subject to government regulation. The key component of its capital cost to generate power, namely the plant and equipment, are traded goods, with price transparency and with multiple suppliers, and therefore the terms it negotiated, were also more readily amenable to public scrutiny and therefore tighter.

There was an attempt in Section 6 of this paper to estimate the likely impact of competition on privatisation concession terms. This was by comparing, in broad terms, the differences in returns and rating of IPPs, both before and after the dawn of the open tender era in 2012. With respect to IPPs of different generation before 2012, the available data only allows us to make a credible comparison between these IPPs based on their rating but not on their returns. A credible comparison of the tariff rates awarded is possible, as they are all gas-fired power plants (Table 3). The tariff rate of the 1st generation IPP which fared the best, was higher than that of its 2nd generation counterparts, by 29.2% (i.e., 15.5 sen per kWh vs 12 sen). The tariff rate enjoyed by the most favoured IPP within the 1st generation, was higher by 13.1% (i.e., 15.5 sen vs 13.7 sen). Within the 2nd generation IPPs, the corresponding difference was 20% (i.e., 10 sen vs 12 sen).[28] One is forced to question the competence, if not even the integrity of the awarding body, as to why a concessionaire had to be given a higher rate, when there were other bidders within the same generation, who willingly accepted a lower rate. However, the higher tariff rate enjoyed by the 1st generation IPPs may be explained, partly, by the higher interest rate they had to pay on the bonds issued to finance their IPPs. In view of the decline in interest rate, one cannot estimate by how much the concession enjoyed by the 2nd generation IPPs is less rich. However, one can rely much less on differences in bond yields, to explain the noted differences in tariff rates of within generation IPPs.

We have noted the differential returns among different generation IPPs. For the 1st generation IPPs, capacity charge was always paid if the IPPs met the availability factor of 80% and where the heat rate achieved is better than the benchmark set, IPPs were rewarded with a bonus payment. For the 2nd generation IPPs, the capacity charge was not paid only if the increased availability threshold of 85% was not achieved. And with the 3rd and subsequent generation IPPs, if an IPP does not meet the specified availability factor, not only will the IPP not be paid the capacity charge, it will be required to pay a penalty i.e., it will end up with a negative cash flow.

There are grounds to question if the playing field is level even under the open tender era. For example, under Track 1, bids were invited to refurbish the old Prai (gas-fired) plant. TNB and Petronas subsidiaries also competed in this tender. Though tenders are open, so long as TNB and Petronas units bid, the playing field is not level. Potential bidders are given the government Energy Commission's expected concession terms (including its indicative capacity charge), and the fuel supply agreement (with the minimum quantity of gas off-take expected by Petronas). Any qualified prospective bidder may put in a bid, with a mark-up on the indicated capacity charge, which may be too fine, and which may not be acceptable to financiers for raising loans, on a stand-alone basis. On the other hand, a TNB unit may have no qualms about a bid at the indicated rate, as it may still be able to raise the required financing, as a wholly owned subsidiary of TNB.[29] Moreover, so long as its end tariff is regulated and controlled, TNB

[28] The numbers we have for the first 1st generation IPPs are comparable, as they are base load plants. As per market enquiry, this is also the case for the 2nd generation IPPs.

[29] It can issue bond as a TNB subsidiary and need not worry about financing, unlike a privately owned and operated IPP whose financiers will be looking primarily at its balance sheet and cash flows.

Table 3. 1st and 2nd generation IPPs: A between and within comparison of tariff rates and bond yields

	Tariff rate range per kwh	Comparison between % difference	Comparison within % difference	Commercial operation dates (CODs) (3)	Bond yields % (4)
1st generation IPPs	13.7–15.5		13.14 (2)	Jan 1995 to July 1996	
1993-1994					10
2nd generation IPPs	10.0–12.0		20.0 (2)	Nov 2002 to June 2003	
2000-2001					6.5–8.0
% difference		29.2% (1)			

Notes: (1) The % difference in the tariff rates of the 1st and 2nd generation IPPs (or Gen 1 and 2 in short), is calculated as the difference between the highest tariff rate of Gen 1 and 2 IPPs, expressed as a % of the highest rate of Gen 2 IPPs.

(2) The % difference in the tariff rates within Gen 1 and Gen 2 IPPs, is calculated as the difference between the highest and the lowest tariff rates of each generation of IPPs, expressed as a % of its lowest rate.

(3) The commercial operation dates (CODs) given, are the actual year and month of the CODs of the various IPPs in each generation. With respect to the 2nd generation IPPs, the COD of one of the IPP, Pahlawan, has been left out as it is an outlier with a COD of Aug 1999.

(4) For the period covered, no data is available on market yields of private debt securities (PDS). For each generation of IPPs, we have been able to obtain the yield at which at least one of the IPPs in the cohort had made its bond issue. The yield at which YTLP and GB3 Sdn. Bhd. had issued their PDS (Yeah et al., 2007) is taken as the representative yield for the 1st and 2nd generation IPPs respectively.

Source: The data on tariff rates and bond yields are extracted from Yeah et al. (2007).

is better placed, as a dominant generator and a monopoly buyer of power, to press down the capacity charge it has to pay (and hence to minimise its losses or maximise its profits), if its (wholly owned) subsidiary can enter the bid. The same applies to Petronas and its subsidiary.

It may cost a bidder as much as USD1 million to put in a bid. A bidder has to incur legal fees, technical advisory fees and do layer upon layer of due diligence. International bidders have been put off from putting in a bid due to their doubts as to whether the playing field was level.

We conclude this section by a brief review of risk sharing between the key stakeholders and of the extent to which the sanctity of contracts was preserved, especially in the face of the AFC. We have noted that the long-term fixed price power purchase agreements (PPAs) with full fuel pass-through, that the IPPs had signed with TNB were rich in the pre-open tender era in general, and in particular in the 1st IPP generation phase. The question is whether the risk sharing arrangement was also a problem for TNB?

TNB did not suffer from the big increase in market price of gas. The government had shifted that risk to Petronas, as a result of which Petronas incurred billions in forgone earnings until the 2010s, when price was allowed to adjust to market forces (Pua, 2011). With the passing of the gas price risk, it is not likely to be a burden on TNB or cause a resource misallocation. IPPs, too, faced little or no risk from their long-term fixed price offtake contract with TNB, as they had in turn hedged it by issuing RM-denominated fixed rate bonds. There was a mismatch in the dispatch contract that most IPPs had signed with TNB as compared to the take or pay gas supply contract that they had to sign with Petronas. The IPPs' financiers only agreed to financial close, when Petronas agreed to insist on this take or pay provision, for a part of the annual contracted capacity. In the open tender era, as there has been no change in the risk sharing arrangement, this suggests that TNB is not opposed to it. If there is to be a change in the fix price off-take contract, this may require a move to the licensing of merchant plants without off-take contracts, which has proved to be a failed business model, even in many developed economies.

TNB's heavy payment obligations to the IPPs arising from the rich concessions it had to sign with the 1st generation IPPs, combined with an unexpected demand shortfall during the AFC period, certainly strained its finances. This caused a great deal of unease within TNB and even was leading to a call for the renegotiation of the PPAs. TNB also recorded a massive loss in 1998. This was caused partly by the above two factors but mostly by the hit TNB took on 40% of its debt denominated in foreign currency, as a result of the 68% depreciation in RM. The very next year, TNB returned to profitability. The sanctity of the PPA contract, however, was preserved, when TNB reluctantly agreed not to reduce the agreed tariff rate in return for an increase in the concession period (Rector, 2005).

We have noted that in the power sector since 2012, the award of concessions for power generation has been done on a competitive basis. TNB may have continued to play a key role in generation even after the opening up of generation to competition, partly because the power tariff it could charge the end consumer was regulated and partly because the remuneration of members of the Malay managerial class which is running TNB depends on how much profit it is able to make. To that extent, one can see the conflict between members of the Malay managerial class which has been running TNB and the Malay business class who were bidding for concessions. This conflict was made more acute as TNB itself entered the field with private sector players to win the bid to develop and operate new power generating plants. However, as noted, the entry of TNB and Petronas into the fray does not make for a level playing field.

9. Concluding Remarks

In studying and reviewing Malaysia's privatisation experience in the power sector, the award of the concessions in the pre-open tender era before 2012 has always been on a negotiated basis whereas it is now on a competitive basis. The opening up of the power generation sector to the entry of the private sector was carried out despite considerable opposition from TNB, the state-owned power utility. Until then TNB had a monopoly, but thereafter it has re-emerged as the dominant generator, and remained

as the sole owner and operator of the transmission and distribution network, even after its own privatisation and listing on the stock exchange (though the government continues to own the majority interest until today).

Privatisation has, over time, led to a significant increase in Malay participation in the power sector. The share of power plants owned and managed by Malays is around 85%, well above the broad 30% target set for Malay participation in the modern business sector. Of this 85%, only about 1/4 is both Malay owned and managed with the balance 3/4 Malay managed and controlled. The groups with multiple concessions dominate, accounting for over 3/4ths of total generating capacity, with the share of TNB and SEB (both SOEs), at 44% and 16% and that of the Syed Mokhtar group at 18%. Privatisation in the power sector did not necessarily involve a change in majority ownership. The privatised provision of goods or services was also not a consideration. From the colonial era, the provision of power has always been subject to the levy of a user charge (Tate, 1990, p. 33).

As the privatised entities are operating more as a commercial enterprise, the extent to which they are exposed to competition from the entry of new competitors is certainly an interesting question. In the power sector, a prospect has to compete in bidding to be a generator. Once it is successful in securing a concession to supply power to TNB under a long-term fixed price offtake contract and achieved financial close on the right terms, it can lead a quiet life without the threat of competition, as it faces no demand or price risk. Its challenge is to ensure that the plant it installs and maintains is technically capable of meeting the minimum threshold with respect to such key variables as the output of power and consumption of fuel.

The dominance of the SOEs over private concessionaires has become even more pronounced in generation, despite the introduction of competitive bidding from 2012 and is expected to become even more pronounced with the scrapping of the ageing plants of the private concessionaires. The government is more than happy to undertake generation using a corporatised entity, without necessarily privatising it. This trend may have been dictated by the factors mentioned above. To-date there has been no case of looting in the power sector, but the risk cannot be ruled out given the vulnerability of a SOE to such looting (Thillainathan, 2021).

The opportunities for rent-seeking by managers or controlling shareholders, will depend on the form and substance of privatisation with respect to the bid for concessions, in competing for customers, as well as on the support and subsidy accorded to these concessions. With the dawn of the open tender era from 2012, active bidding for concessions have reduced opportunities for rent-seeking. But as the playing field may be tilted in favour of TNB in such biddings, its managers stand to benefit from its re-emergence as the dominant player in generation. As TNB is the sole buyer of power produced, the IPPs do not have to compete for customers. But they have to compete with other prospective bidders for the right to produce and sell power to TNB, thus minimising their opportunities to engage in rent-seeking.

Interestingly, there is ample evidence in the power sector of very high returns and low risk for the lucky concessionaires. The authorities however chose, despite the strong calls for a renegotiation of the PPA (including from TNB), to respect the sanctity of contract. From 2012, new IPP concessions are being awarded at a weighted average

cost of capital (WACC) of 8%. Given their AA3 local rating, a yield to maturity (YTM) of 6-7% pa and a gearing ratio of 0.1 – 0.2, the implied equity IRR can fall within the range of 12-26% pa, i.e., depending on how much risk the concessionaire is prepared to take.

Given the high capital intensity and long-life span of infrastructure projects, the financing of such projects invariably requires an active and liquid bond market, especially if they are to be undertaken on a privatised basis. This is readily evident from the experience of IPP projects in Thailand and Indonesia during the Asian financial crisis (AFC). The under-developed state of the local currency bond market in these two countries let to their financing in USD. The resulting massive currency mismatches caused the independent power producers (IPPs) to become insolvent. The existence of a RM bond market in Malaysia enabled the IPPs to be funded more on a matched basis. However, as the bond market had been operating in a world of an administered yield curve for decades, and as it only dealt in sovereign or bank-guaranteed debt, the suppliers of the captive long-term funds were still not familiar with the risk profile of the new issuers of privatised debt. Under these circumstances, the credit spread between the Malaysian government securities (MGS) and private debt securities (PDS) were unusually wide. Fortunately, the 1st generation IPP concessions were rich enough for the issuers to be willing to pay the higher yield and tap this emerging PDS market, to minimise the mismatches they would have been exposed to, if they had tapped the bank or foreign currency debt market. Luckily the wait was not long for an adjustment to take place in the bond portfolio. With bond market deregulation, improving government finances and decreasing MGS supply, the widening credit spread forced even more investors to switch out of MGS into PDS, which also provided a much needed push for privatised infrastructure development.

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Annex Table 1. Ownership and bond outstanding of power sector

By size of entity or group		Total capacity by size class		Ownership by entity or group								Bond outstanding by size class	
				GLCs or GLICs		Bumiputera		Non-Bumiputera		Foreigners			
MW	No.	MW	%	# entity or group	% of capacity	# entity or group	% of capacity	# entity or group	% of capacity	# entity or group	% of capacity	(RM mil.)	%
<100	8	529	1.6	2	0.6	3	0.6	2	0.3	1	0.2	2,088	4.5
<200	1	150	0.5					1	0.5			1,793	1.5
<300	2	505	1.6	1	0.9	1	0.7					1,090	1.7
<500	1	380	1.2			1	1.2					490	0.8
<1000	1	650	2.0			1	2.0					390	0.6
<2000	1	1,212	3.7					1	3.7			0	0
<5000	1	3,565	11.1							1	11.0	5,520	8.6
<6000	2	11,026	34.3	1	16.2	1	18.1					24,500	38.0
>6000	1	14,089	43.9	1	43.9							28,555	44.3
Total	18	32,106	100		61.6		22.6		4.5		11.2	64,426	100.0

Notes to Annex Table 1:

(1) Ownership or control of an entity or group, is measured by the cumulative size of generating capacity owned by that entity or group.

(2) Divergences in the share of total generating capacity and of bond outstanding by size class can be explained either by looking at the fuel used, scale of operation or age of plant.

(3) For the 5000 to 6000 MW size group, the two groups are the Sarawak Electricity Bhd (SEB) and Malakoff Corporation Bhd (MCB).

(4) For the foreign group with capacity of 3,565 MW, bond outstanding share should have been a lot less as four out of the five plants are old with little or no debt. JEV is the only plant in its portfolio with a COD of 2009. For the others the COD dates back to the 1990s for two and the third and the fourth had a 2002 COD. About 70% of the bond outstanding was incurred on acquisition of the five plants.

(5) The group with a capacity of 1,212 MW is YTLP with a COD in the mid-1990s, as its two Malaysian plants were part of the 1st Power Purchase Agreement (PPA) that was signed in the country. So, debt outstanding on these two plants is zero.

(6) Of the entities in the 100 or less MW category, six are small scale renewable solar or hydro projects, with a capacity of 50 MW for five of the six plants and with a high cost base.

Annex Table 2. Initial and current rating of IPPs

	By rating scale		Initial rating %	Current rating %
	Global	Local		
1) Bloomberg (2019)	A3	AAA	15	18
2) Yeah et al. (2007)	BBB1-BBB3	AA1-AA3	76	68
3) Yeah et al. (2011)	BB1 and <	A1 and <	3	9
4) Maybank Kim Eng (2019)	Unrated		6	6
	Number of issuers		34	34

Notes to Annex Table 2:

(1) This is based on an analysis of data on initial and current rating for the period 2010 to 2019 taken from Maybank Kim Eng, *Malaysia Infrastructure Bonds*, 15 November 2019.

(2) The rating of the issuers is by the local rating agencies, namely Rating Agency of Malaysia (RAM) and Malaysian Rating Corporation Berhad (MARC), and hence is based on the local rating scale.

(3) In the scoring tabulated above for IPPs, the current rating of an issuer is as given in Maybank Kim Eng (2019). However, as Maybank's initial rating only covers the post-2010 period, it may differ from that given by Yeah et al. (2007) and Yeah et al. (2011) for the pre-2010 period for some issuers.

(4) By basing the rating trend on the Maybank Report which only covers the period from 2010 and only deals with PDS issues which are still outstanding, we have missed out on some key developments on the rating trend.

(5) By including the pre-2010 data, the upgrades increased from 2 to 6 and the number of downgrades increased from 2 to 3. On average, the actual credit outcome was better than the assessment made in the text. This is shown not only from the rating changes but also from the fact that with time more IPPs accessed the debt market as well as raised a greater share of their funding needs.

Sources: As above.