# An Assessment of the Factors Affecting the Credit Quality of Private Power Developers

by Scott Taylor

**ABSTRACT:** The trend toward privatization in the electric power industry both domestically and globally has lead to the emergence of private power project developing as a powerful industry. The evaluation of the credit strength of developers is difficult given the uncertainty in how markets will develop and how deregulation will play out. This paper discusses the regulatory environment that has led to the emergence of this industry, along with the typical capital structure of these firms. The factors that go into rating firms in the industry as presented by Standard & Poor's are then examined for any relationships between these factors and default probability. Lastly, a theoretical framework for assessing the benefits of portfolio diversification given various levels of leverage and risk in the assets is presented.

## I. REGULATORY BACKGROUND

In the United States and globally, major segments of the electricity industry are being restructured. In the U.S., the change began in 1978 with the Public Utilities Regulatory Policies Act (PURPA), which made it possible for non-utility generators to enter the wholesale power market. Basically, PURPA required that electric utilities had to interconnect with and buy, at the utilities' avoided cost, capacity and energy offered by any qualifying non-utility. The aim of PURPA was to reduce the country's dependence on foreign oil by encouraging the efficient use of fossil fuels through cogeneration and the use of renewable resources through small power producers. Cogeneration consists of simultaneously producing electric energy and some other form of energy such as heat or steam using the same fuel source. Renewable resources are energy sources that are regenerative or virtually inexhaustible such as solar, wind, biomass, geothermal, and hydroelectric.[1] PURPA ensured that Qualifying Facilities (QFs) had a guaranteed market for their power at a price equal to the purchasers

[1] Energy Information Administration, "The Restructuring of the Electric Power Industry: A Capsule of Issues and Events," January 2000.

avoided cost. This differs from traditional regulation, which generally sets the price based upon the cost of producing it.

In 1992, the Energy Policy Act of 1992 (EPACT) was signed into law. This law made it easier for non-utility generators to enter the wholesale market for electricity by exempting them from constraints imposed by the Public Utilities Holding Company Act of 1935 (PUHCA). EPACT created a new category of power producers called exempt wholesale generators (EWGs). These differ from QFs in that they are not required to meet PURPA's cogeneration or renewable resources requirements, and in that utilities are not required to purchase the power produced by these entities. Marketing of the power produced by EWGs is facilitated by transmission provisions that have led to a nationwide open-access electric power transmission grid for wholesale transactions. Independent Power Producers, as well as other non-transmission owning entities, gained the ability to win orders requiring transmission owning entities to provide access to that transmission at "just and reasonable" rates. In 1996, the Federal Energy Regulatory Commission (FERC) issued orders 888 and 889, requiring that shareholder owned utilities, which own about 75% of transmission capacity, open up transmission to all suppliers in the wholesale market.[2]

## II. THE EMERGENCE OF THE INDEPENDENT POWER DEVELOPER

The above-described regulatory changes have opened the door to non-regulated electricity producers entering the industry to compete with the traditional utilities. Many of these companies are large, well-known international energy corporations. Others are new firms that were started purely to

[2] Energy Information Administration, "The Changing Structure of the Electric Power Industry: An Update", December 1996.

get into this business. Non-utility producers' nationwide share of generating capacity has grown from 6% in 1990 to 12% at the end of 1998. Non-utility capacity grew at an average annual rate of over 10% from year-end 1990 to 1998, while utility capacity grew at a rate of less than 1% for the same period. Since 1990, non-utility generators have contributed 46% of all new investment in electricity generation, and this does not include 25,000 megawatts of capacity which were divested by utilities and reclassified as non-utility.[3]

Many of today's Independent Power Producers (IPPs) started out by owning and operating one or two PURPA QFs. These facilities entered into long-term contracts with utilities at the utilities' avoided costs. The contracts were approved for recovery by the regulatory authority, and costs was passed on to ratepayers. It is important to note that at the time of PURPA, oil prices were skyrocketing, and future avoided costs for utilities were estimated based on oil prices reaching as high as $100 per barrel. Of course, oil prices never approached these levels, leaving the non-utility generators with contracts that locked in revenues well in excess of their expenses. With the passage of EPACT, these excess cash flows could be reinvested in a much wider variety of competitive power projects. Furthermore, deregulation is not a purely American phenomenon, but is proceeding at different rates worldwide, presenting international opportunities as well for IPPs. With the cash flow projections based upon the PURPA contracts, IPPs were able to approach the capital markets to provide funding for new power projects.

Evaluation of the credit strength of IPPs (also referred to as "developers") can be quite difficult, given that this is a new business in a market for which the development profile is very uncertain. Several characteristics of developers can be analyzed with respect to risk. These include, but are not limited to:

[3] Edison Electric Institute, "The Explosive Growth of Non-Utility Electric Generation Sources", February 2000.

**Table 1: Portfolio of Rated Power Project Developers**

| | |
|---|---|
| AES | BB |
| Cogentrix | BB+ |
| Calpine | BB+ |
| Edison Mission Energy | A- |
| MidAmerican | BBB- |
| NRG | BBB- |
| CSWE | BBB |
| CSWI | BBB+ |
| Southern Energy | BBB |
| USGEN | BBB+ |

the level diversification of assets, the proportion of projects with contracted revenues, the sovereign risks of the countries where assets are held, credit support provided by a stronger parent company, and the amount of non-recourse debt used to finance individual projects. While a number of developers have emerged, this paper will focus on the rated portfolio of developers. This portfolio is presented in Table 1. The goal is to present a profile of the credit strength of these developers, and to understand what factors play the most significant role in rating them.

## III. CREDITWORTHINESS OF DEVELOPERS

### *A. Capital Structure Discussion*

A developer is essentially a parent level holding company that owns several power projects. Often the parent company is itself a subsidiary of a larger company. The projects are typically highly levered (70-85% debt ratio). Some project developers prefer to use non-recourse project level debt, while others do not. The advantage for the company of non-recourse debt is that in the event of default, lenders can only look to the project itself for reparations. The disadvantage of non-recourse debt is that lenders demand very strict covenants with regard to new investments and the distribution of cash to the parent level companies. The remainder of the capital for the individual projects comes from “equity” contributed by the parent. This equity comes predominantly from debt issued at the parent level, as well as true equity. Some developers, especially those that are growing rapidly, have also issued convertible debt. Therefore, cash generated by projects must service project level debt first, then satisfy any cash traps or indentures at the project level, and then service parent level debt (sometimes multiple levels), before flowing to equity holders. Because this is a new industry in its high growth stage, typically cash flows to equity are reinvested into new projects.

*B. Risk Criteria*

Given the multiple layers of debt, and the fact that the private power industry is in its infancy and is rapidly developing, it is difficult to assess the credit strength of developers with a high level of certainty. Standard & Poor's points to five general criteria when rating developers:[4]

1) "Quality of Cash Flows" - an assessment of the credit strength of the individual projects;
2) "Portfolio Cash Flow Characteristics" - a qualitative assessment of the portfolio effect gained by the diversification of the assets in the portfolio;
3) "Financial Analysis" - an assessment of the financial strength of the developer based upon cash flow, capital structure and liquidity considerations;
4) "Management and Ownership Structure" - an assessment of management's strategies and track record; and
5) "Credit for Parental Ownership" - an assessment of (if applicable) the strategic and financial importance of the developer to its parent company.

An attempt was made to understand the degree to which these criteria are encapsulated in the ratings by examining the ratings and characteristics of the various developers. For each rating category,

[4] Standard & Poor's, "Rating Criteria for Project Developers," Infrastructure Finance Criteria and Commentary, October 1999.

a default probability was assigned based upon the Standard & Poor's data for cumulative 10-year defaults at various rating levels[5] As proxies for “Quality of Cash Flows”, the percentages of projected cash flows coming from investment grade projects, from investment grade countries, and from U.S. based projects were obtained from various Standard & Poor's credit reports, as well as company annual reports and 10-K filings. As a proxy for “Portfolio Cash Flow Characteristics”, the number of assets held by each entity was obtained from the same sources. “Financial Analysis” information was based on various ratios, determined from the latest annual reports and 10-Ks of the companies. No suitable proxy variable could be ascertained to describe “Management and Ownership Structure”. A dummy variable was introduced for “Credit for Parental Ownership”, using 0 for those stand-alone companies and 1 for those companies that are subsidiaries of larger utilities. The database can be found in Appendix A.

In observing the data, it becomes immediately obvious that parental support is an important factor in rating these entities. Of the ten developers examined, seven had investment grade ratings, and all of these were subsidiaries of other companies. The three speculative grade companies were stand-alones. Therefore, when examining the data, subsidiaries are plotted with different symbols from stand-alones.

Next, financial data were observed. Figures1a through 1d present graphs of default probability as a function of various capitalization and coverage ratios.[6] Squares on the graphs represent stand-alone companies while triangles represent subsidiaries. Figure 1a displays the effect of the recourse debt to capitalization ratio. Recourse debt represents that debt for which lenders can look to the parent

[5] Standard & Poor's Commentary, “Corporate Defaults Rise Sharply in 1998,” May 1999.
[6] Recall that default probability is assigned upon the firm’s Standard & Poor’s rating and the associated default frequency for that rating given in the Default Study.

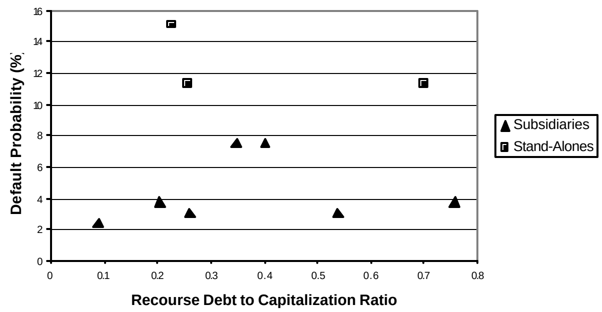

**Figure 1a: Default Probability as a Function of Recourse Debt to Capitalization Ratio**

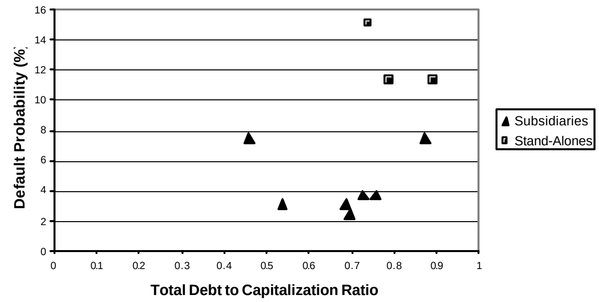

**Figure 1b: Default Probability as a Function of Total Debt to Capitalization Ratio**

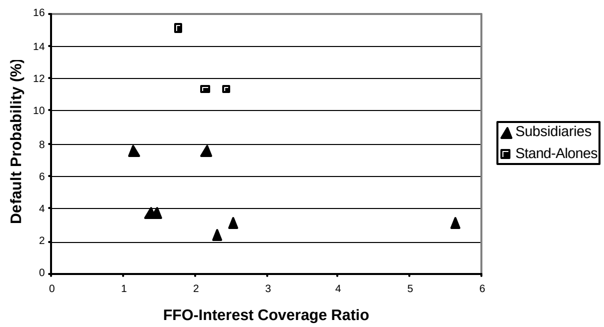

**Figure 1c: Default Probability as a Function of FFO-Interest Coverage Ratio**

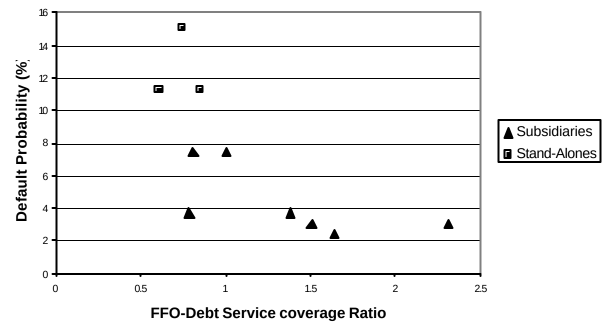

**Figure 1d: Default Probability as a Function of FFO-Debt Service Coverage Ratio**

company for reparations in an event of default. We would expect that as recourse debt to capitalization increases, probability of default would increase. In observing the graph, while the separation between subsidiaries and stand-alones is obvious, any trend in the data with respect to recourse debt to capitalization for either subset is virtually nonexistent. However, a plot of total debt to capitalization in Figure 1b exhibits some evidence of an upward trend if all the data are observed together (i.e., not broken out by subsidiary and stand-alone.

Of course, capitalization ratios cannot be taken on their own as an indicator of credit strength. The strength of the investments as measured by funds from operation (FFO) coverage ratios are also important financial indicators. We would expect that as coverages increase, probability of default would decrease. Figure 1c displays FFO-Interest Coverage Ratio, while Figure 1d displays FFO-Debt Service Coverage ratio. These plots reveal stronger trends than do the plots of capitalization ratios.

The trend in FFO-Debt Service Coverage is much more obvious than FFO-Interest Coverage, especially when observing the subsets together. A conclusion that can be drawn is that while parental support does in and of itself improve the creditworthiness of a developer, it is also true that the stand-alones tend to have more debt in their capital structure and lower coverage ratios.

Factors other than financial ratios are considered when evaluating the credit strength of developers. These factors are a little more difficult to quantify. In fact, no attempt is made herein to quantify "Management and Ownership Structure". However, an attempt was made to quantify the "Quality of Cash Flows" and the "Portfolio Cash Flow Characteristics" based on the percentage of projects with investment grade characteristics[7] and the total number of projects, respectively. Figures 2a and 2b display the default probability as a function of these two variables. Given that investment grade projects represent higher quality cash flows, we would expect that as percentage of investment grade projects increase, probability of default would decrease. Any relationship of the sort can not be observed in Figure 2a. Also, if we assume that number of projects is a surrogate for portfolio diversification (which may be a stretch, given that all of a firm's projects could be in one region or of similar type), we would expect that as the number of projects increases, probability of default would decrease. Figure 2b shows no evidence of such a trend for the subsidiary companies, and the opposite appears true for the stand-alones. The reason for this is that the lowest rated company (i.e., highest probability of default) is AES Corporation, which also happens to be the most diversified. AES had 91 separate operating assets as of its last year-end report.[8] AES is represented by the upper right data

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[7] The percentage of cash flows from projects in investment grade countries, as well as the percentage of projects in the U.S. were also considered, however these are not presented due to incomplete data.

[8] Based on AES' 1998 Annual Report. It is recognized that AES currently has significantly more operating assets, however, for consistency all data is based upon year-end 1998 information- the latest readily available for the rated portfolio.

**Figure 2a: Default Probability as a Function of Percentage of "Investment Grade" Cash Flows**

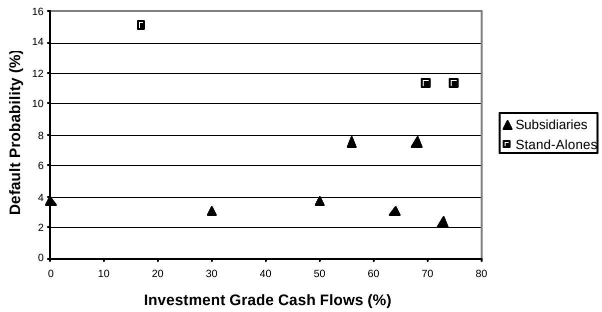
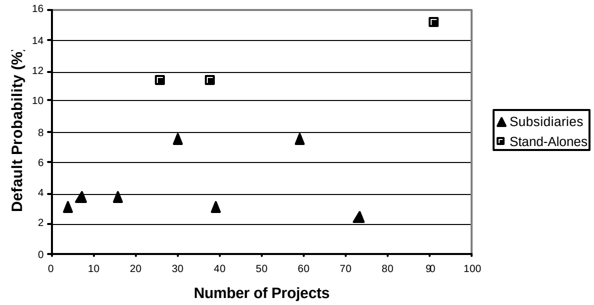



**Figure 2b: Default Probability as a Function of Number of Projects**




point in Figure 2b. However, while AES' portfolio diversification is high, the quality of its assets based upon the percentage of investment grade cash flows is low. AES' stated mission is to help meet people's electricity needs around the world.[9] In executing this mission, AES operates a significant number of assets in developing nations such as Pakistan, Kazakhstan and other highly speculative sovereigns resulting in riskier projects. The upper left data point in Figure 2a represents the quality of assets for AES.

In observing the data herein, we have found that parent support provides the greatest influence on credit ratings for power project developers. This is not surprising, given the fact that developers are operating in a new and highly uncertain environment. The resources of a strong and stable parent company can go a long way in providing comfort to creditors. Relationships between default probability and financial factors were also observed to a lesser degree (coverage ratios more so than capitalization ratios). An attempt to quantify more qualitative factors such as quality of assets and diversification revealed no meaningful relationships.

In observing trends in these latter two parameters, it became obvious that looking at each parameter individually cannot tell the whole story. Rather, all parameters must be analyzed in concert.

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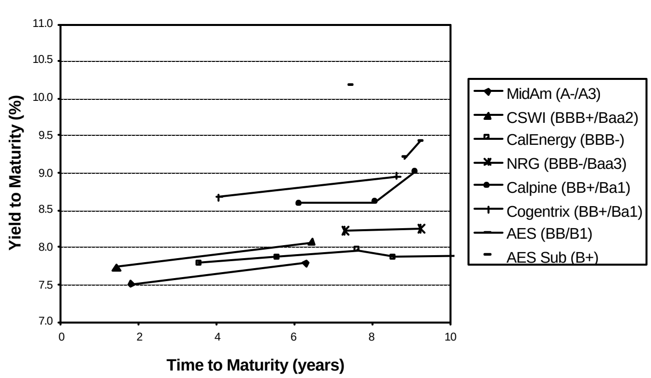
[9] AES Annual report, 1998

Statistical techniques such as multiple regression can be used for such an exercise, however, given the small population of companies in the rated portfolio, a regression on a large number of parameters will tend not yield significant results. An attempt was made to perform such a regression, and the closest to a significant relationship was found to be an equation relating default probability to parent support and FFO-Debt Service coverage. The results of this regression are presented in Appendix B.

## III. PORTFOLIO EFFECT

Markets tend to price bonds consistently with their ratings and this industry is no exception. Figure 3 displays the market yield to maturity for corporate level, non-callable bonds at the end of the month of February 2000 as obtained from Bloomberg. As can be seen, the yield to maturity for bonds of these companies tends to increase with lower ratings. Therefore, it is important that all factors be properly considered when undertaking credit analysis for these companies.

**Figure 3: Yield to Maturity vs. Time to Maturity for Corporate Level, Non-Callable Developer Bonds**
(End of February 2000)




One aspect of credit analysis that may not be given the weight it deserves is the portfolio diversification effect. In order to make a complete assessment of the impact of diversification, it would be necessary to understand the average and variance of cash flows from each project, as well as their covariance. Cash flows to the parent from individual projects is not information that developers readily disclose. The following discussion presents a theoretical framework for understanding the power of diversification in a developer's portfolio.

For simplification, assume that a development project will either distribute its expected excess cash, or it will default and distribute no cash. In this case, the asset can be described by a binomial variable. Further, assume that the asset is of BB credit quality, which corresponds to a default probability of approximately 15%[10]. In this simple case of one asset, cash will either be distributed, covering corporate debt (85% chance), or it will not be distributed, resulting in corporate default (15% chance).

Now consider a pool of equal-sized, independent assets whose total cash flow is projected to cover corporate level debt and expenses by 1.5 times. For example, the pool could consist of two assets, each projected to provide cash flows of 0.75 times corporate level debt and expenses, or five assets, each projected to provide cash flows of 0.30 times corporate level debt and expenses. In all cases, the expected cash flow will be 85% of 1.5 or 1.275. However, the standard deviation of those cash flows will drop as the number of assets increases. This is because assuming a normal approximation to the binomial variable, the standard deviation of a binomial variable is equal to $CF\sqrt{np(1-p)}$ ; where CF is the cash flow per asset, n is the number of assets and p is the probability of successful distribution of cash flow. When the number of assets increases in that equation, cash flow decreases proportionally. However, the impact of cash flow is greater because the square root of number of assets is taken. Obviously, the lower the standard deviation of the expected cash flows, the lower the probability that the cash flow to the developer will fall below 1.0, resulting in corporate level default.

Table 2 displays the expected cash flow, standard deviation of the expected cash flow and probability of cash flow falling below 1.0 (i.e., probability of default) for various pools of equal-sized,

[10] Standard & Poor's Commentary, "Corporate Defaults Rise Sharply in 1998," May 1999

independent assets. The calculation in the table assumes that if all projects distribute cash, the corporate level coverage would be 1.5 times. As can be seen from the Table, the probability of default drops significantly as the number of assets increases. The probability of default for a two asset portfolio is 23.4%, which corresponds to approximately a B+ rating, while a 20 asset portfolio has a probability of default of 2.3%, corresponding to approximately a AA- rating.

Table 2
Probability of Corporate Level Default Given
Various Pools of BB Quality Assets (i.e., Default Probability of 15%)

| Number of Projects | Cash Flow per Project | Expected Total Cash Flow given Quality of Assets | Standard Deviation of Cash Flow given Quality of Assets | Probability of Corporate Level Default |
|---|---|---|---|---|
| 2 | 0.75 | 1.275 | 0.379 | 23.4% |
| 3 | 0.50 | 1.275 | 0.309 | 18.7% |
| 5 | 0.30 | 1.275 | 0.240 | 12.5% |
| 7 | 0.21 | 1.275 | 0.202 | 8.7% |
| 10 | 0.15 | 1.275 | 0.169 | 5.2% |
| 15 | 0.10 | 1.275 | 0.138 | 2.3% |
| 20 | 0.08 | 1.275 | 0.120 | 1.1% |

Of course, this could not be directly applied across the board for developers. The variation in cash flow size and quality across the pool of assets as well as the correlation between the cash flows on the various assets would have to be examined on a case by case basis. Such information is typically not disclosed by developers, but developers can, and probably do, use such information to understand the characteristics of their own investment portfolio. However, this analysis does reveal some interesting characteristics of the benefits of diversification with respect to credit quality discussed below.

**Figure 4: Probability of Default vs. Number of Assets**
(Varying Projected DSCR)

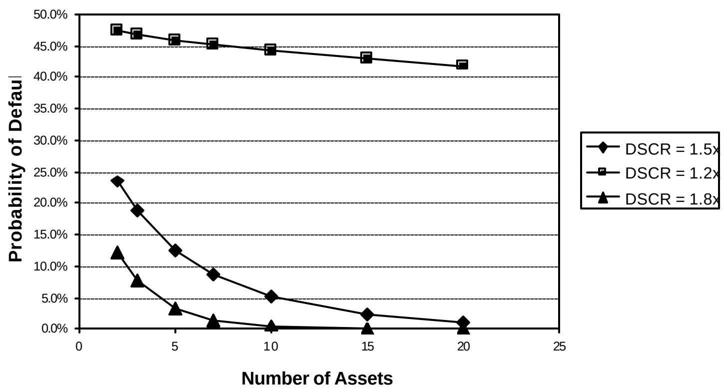
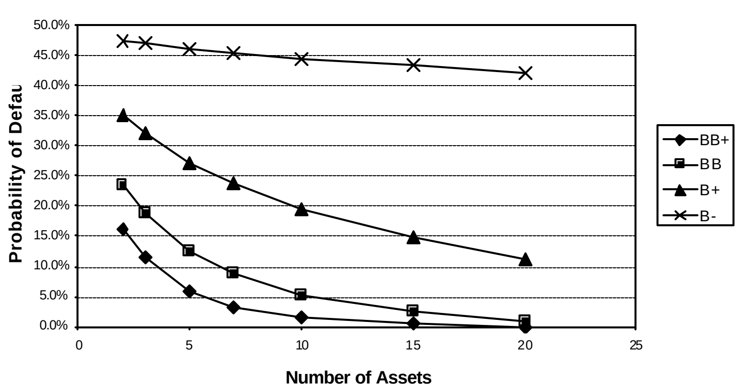



Figure 4 displays the calculated probability of default vs. the number of assets for various projected debt service coverage ratios (DSCR). The results in Table 2 for a 1.5x DSCR are represented by the middle line in the Figure while the top and bottom lines represent 1.2x and 1.8x DSCR, respectively. As would be expected, lower parent level DSCR (which implies higher leverage), leads to higher probability of default for the parent level debt. As can be seen, the drop in default probability as the number of assets is increased is not nearly as great for a company with 1.2x projected coverage as it is for a company with 1.5x or 1.8x DSCR. The conclusion from this exercise is that the benefits of diversification are not as great for those highly leveraged developers.

Figure 5 displays the probability of default vs. the number of assets for various projected qualities of assets as described by a debt rating. The results in Table 2 for a portfolio of BB assets are represented by the second line from the bottom in the Figure. Note that all other factors were held constant. As would be expected, lower rated (i.e.,

**Figure 5: Probability of Default vs. Number of Assets**
(Varying Project Credit Quality)



lower quality assets) result in higher parent level default probability. As can be seen, the drop in default probability as the number of assets increases is not nearly as great for a company with B- quality assets (i.e., lower quality assets), as it is for the other firms with higher quality assets. The conclusion from this exercise is that, as with more highly leveraged developers, the benefits of diversification are not as great for a developers which hold lower quality assets. This is consistent with the observation of the developer data where it was observed that AES, although more diversified, was still judged to have a higher probability of default due to its riskier assets.

The above exercise should serve as a guideline in assessing credit quality, and should serve to help developers understand the kinds of benefits they should expect from a diversified portfolio. It should be noted that this exercise assumed completely uncorrellated asset cash flows, and would change accordingly if cash flows from assets were found to be positively or negatively correlated.

## V. CONCLUSIONS

In this study, an attempt was made to understand trends in credit quality for the emerging private power business. Specifically, the rated portfolio of ten power project developers was examined for trends in credit quality. The data revealed that credit for parental ownership was the strongest determinant of credit quality, while some trends were also observed with financial variables. Proxies for diversification and asset risk revealed no noticeable relationships. Multiple regression analyses revealed significant relationships between default probability and parental ownership as well as FFO-Interest Coverage Ratio. A theoretical approach to assessing the benefits of diversification revealed that such benefits are much smaller for those developers holding riskier assets or with higher leverage.

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Standard & Poor's - Analysis, "Southern Energy, Inc." June 1999.

Standard & Poor's - Analysis, "USGen New England, Inc." October 1999.

Standard & Poor's - Commentary, "Corporate Defaults Rise Sharply in 1998" May 1999.

# Appendix A: Data Used for Credit Quality Analyses

| Company | AES | Cogentrix | Calpine | Edison Mission | Mid-American | NRG | CSWE | CSWI | Southern Energy | USGEN | average (St. Dev.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Rating | BB | BB+ | BB+ | A- | BBB- | BBB- | BBB | BBB+ | BBB | BBB+ | Not Applicable |
| Recourse Debt to Capitalization Ratio | 0.226 | 0.256 | 0.701 | 0.089 | 0.403 | 0.349 | 0.758 | 0.538 | 0.204 | 0.259 | 0.378 (0.221) |
| Total Debt to Capitalization Ratio | 0.740 | 0.892 | 0.789 | 0.698 | 0.874 | 0.459 | 0.758 | 0.538 | 0.728 | 0.688 | 0.716 (0.135 |
| Recourse Debt to Total Debt Ratio | 0.306 | 0.287 | 0.888 | 0.128 | 0.461 | 0.761 | 1.000 | 1.000 | 0.280 | 0.377 | 0.549 (0.330) |
| FFO-Interest Coverage Ratio | 1.78 | 2.17 | 2.45 | 2.30 | 2.16 | 1.14 | 1.38 | 2.53 | 1.46 | 5.63 | 2.30 (1.26) |
| FFO-Debt Service Coverage Ratio | 0.74 | 0.60 | 0.85 | 1.64 | 1.00 | 0.80 | 1.38 | 2.31 | 0.78 | 1.51 | 1.16 (0.54) |
| Parent | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Not Applicable |
| Number of Projects | 91 | 26 | 38 | 73 | 30 | 59 | 7 | 4 | 16 | 39 | 38 (28) |
| Percent CF From Investment Grade Projects | 17 | 75 | 70 | 73 | 68 | 56 | 0 | 64 | 50 | 30 | 50 (26) |
| Percent CF From Investment Grade Sovereigns | 70 | 100 | 100 | 95 | Not Available | 86 | 100 | 64 | Not Available | 100 | 72 (40) |
| Percent CF From U.S. Based Projects | 47 | 100 | 100 | 60 | Not Available | 62 | 100 | 0 | Not Available | 100 | 57 (44) |

APPENDIX B: Multiple regression analysis between log(default ratio) and the two variables FFO-Debt Service Coverage and the dummy variable of 1 being a subsidiary company and 0 being a stand-alone.

## Regression Analysis

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The regression equation is
logdef = 1.24 - 0.205 FFODSCov - 0.414 parent

Predictor        Coef       StDev          T        P
Constant       1.2450      0.1087      11.45    0.000
FFODSCov     -0.20527     0.09236      -2.22    0.057
parent        -0.4140      0.1099      -3.77    0.005

S = 0.1474      R-Sq = 79.9%     R-Sq(adj) = 74.8%

Analysis of Variance

Source            DF          SS          MS         F        P
Regression         2     0.68921     0.34461     15.87    0.002
Residual Error     8     0.17371     0.02171
Total             10     0.86293
```

logdef = $\log_{10}$ Default Probability

FFODSCov = FFO-Debt Service Coverage Ratio

Parent = dummy variable for parental ownership - 1 for a subsidiary and 0 for a stand-alone