



自然环境信用分析框架 暨绿色债券信用评级方法

(征求意见稿)

GOLDEN CREDIT NATURAL ENVIRONMENT CREDIT ANALYSIS FRAMEWORK
AND GREEN BOND CREDIT RATING METHODOLOGY (ED)

发表机构

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Green Finance Committee, China Society for Finance and Banking



INSTRUCTIONS



This report is one of the results of joint research project “Green bond assessment and credit rating” by Golden Credit Rating International Co.,Ltd and Trucost.

This report describes the mechanism by evaluating the internalization of environmental benefits or costs into cash flow of the issuer or a specific project. And by analyzing the impact of the cash flow, credit risk of the issuer or particular debt could be assessed.

The report also applies natural environment credit analysis framework for the development of green bond credit ratings methods. The methodology determines the credit level of green bond and its issuer by analyzing the impact of green factor on internalization of cash flow from the business or project the issuer is engaged in, and the protection degree of green bond principal and interest other than other debt from the same issuer.

The report was written by Golden Credit. During the researching and preparing process, we had received technical support from Green Finance Committee and Trucost.

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ABOUT US

Golden Credit Rating International Co., Ltd

Golden Credit Rating International Co., Ltd.(hereinafter referred to as Golden Credit) is one of the major credit rating agencies in China, which is qualified to conduct all kinds of credit rating business domestically and can provide rating service for both the interbank bond market and the stock exchanges. Golden Credit, headquartered in Beijing and with the registered capital of RMB 125 million, is China's largest rating agency in term of capital and has set branches in 24 provinces of China and has a wholly-owned subsidiary. Golden Credit, as the standing member of the Green Finance Committee under the People's Bank of China and the China Society for Finance and Banking, actively participates China's green finance business with a strong sense of social responsibility, and provides respective services through the exploration of green bond credit rating and green evaluation methodology.

Trucost

TRUCOST, an international professional research institute which conducts environment-related research and data standardization and assessment, has engaged in extensive cooperation with the Chinese Ministry of Environmental Protection, China Securities Regulatory Commission and other government departments on green certification and environmental cost analysis.

A decorative graphic consisting of several triangles in various colors (green, brown, yellow, grey) arranged in a cluster around the word "contents".

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ABSTRACT

The natural environment is becoming an important factor in the bond pricing mechanism. A considerable portion of the green bonds' interest rate is lower than comparable non-green bonds in the same period, reflecting to a certain extent the role that natural environment of risk plays in the bond pricing.

The reason why natural environmental factors will have an effect in the bond risk pricing depends on two aspects: 1) For green investors with preference for environmental benefits, they would incline to invest in the environmental benefits project and even willing to pay premium for the benefits; 2) natural environmental benefits or cost will convert into cash flow of the issuer, affecting its solvency and default risk.

Natural Environment Credit Analysis

Natural environmental benefit or cost will affect the cash flow of the subject being evaluated, thus leaving an impact on the credit level. Golden Credit believes that ultimately the impact of natural environmental leaves is on the amount and natural of the cash flow generated, and whether the cash flow generated could affect significantly the solvency level of the issuer or the debt.

Based on above judgments, Golden Credit analyze the mechanism of internalization of cash inflow, including but not limited to direct methods such as government subsidies, tax incentives, government procurement, environmental quota trading, fees and other rights, and other indirect methods. And for cash outflow, the analysis includes but not limited to direct methods such as environmental taxes, fines or punitive taxation, litigation and indirect method such as blacklist.

To evaluate the net cash flow that environmental factors bring, it is necessary to consider the environmental sensitivity of the business, regional differences in law and policy, environmental risk preference and environmental credit history. For debt, this framework could also be used combined with transaction structure.

Green Bond Credit Rating

For the credit rating of green bond, Golden Credit comprehensively analyze both the issuer's capability of cash flow generating and the impact of specific green project leaving on the issuer. Credit rating agencies will disclose separately the analysis result of environment impact.

Credit rating of green bond will help the market with more accurate pricing of environment risk: 1) credit rating agency's analysis of cash flow will help investors to determine the green benefit or cost

that brought by the green bond;2)the comprehensive assessment of credit risk raised by credit rating agency will provide a reference for investors to judge the financial security of green bond investment.

SECTION I THE DEFINITION OF NATURAL ENVIRONMENTAL BENEFIT AND COST

I. Natural environmental benefit and cost

1. Natural environmental benefit, also known as green benefit, mainly refers to that rated entities work on normal business or specific project to improve, repair, protect natural environment (including but not limited to climate, air, water, soil, vegetation) or reduce the natural environment damage extent. Natural environment usually benefits the whole community or specific area, with positive externality.
2. Natural environment cost, also known as natural cost, mainly refers to that the business or specific project the rated entities work on can cause damage to the natural environment. The consequence of the natural environment deterioration is usually suffered by the whole society or a specific region, with negative externality.

II. Natural environmental benefit and cost internalization.

1. Natural environmental benefits internalization means that rated entities who work on environmental benefit project can gain cash flow from direct or indirect environmental benefit output. The higher the degree of natural environmental benefit internalization, the more motivation enterprise have to produce environmental benefit; The lower the degree of natural environmental benefit internalization, the less possible enterprise is to produce environmental benefits, only depend on government to provide environment benefit.
2. Natural environmental cost internalization means that who work on environmental benefit project should make cash outflow to undertake direct or indirect environmental cost output. The higher the degree of natural environmental cost internalization, the more inhibition to enterprise and agency to damage environment, and more promotion to reduce environmental cost; on the contrary, the enterprise may ignore natural environmental cost during production process.

SECTION II THE INCREASING IMPORTANCE OF NATURAL ENVIRONMENT RISK ON BOND PRICING

The whole world is paying more attention on natural environment sustainable development, and China also has officially put forward concept of ecological civilization and green development. Therefore, the green finance market, whose aim is to invest capital with the use of financial activities in environmental benefit project, is developing quite rapidly in both domestic and international market. Natural environmental benefit and cost is becoming an important factor in green financial market pricing. For example, there is a significant portion of green bonds whose publication cost is lower than comparable non-green bonds(comparable means similar rated entities, same issued period, same debt category, same maturity), and also a considerable portion of green bonds is far more oversubscribed than non-green bonds.

Golden Credit believes the green bond market investors can be divided into green investors group and non-green investors group, therefore, natural environmental benefit or cost affect these two groups of investors by different mechanisms:

1. To green investors, environmental benefit and cost are one of the key factors in the investment and trading decisions. They prefer to invest in the project which could produce real environmental benefit, and they are willing to sacrifice financial income for environmental benefit(ie, pay for environmental cost premium); Just to avoid investing in projects whose environmental cost is higher than benefit or destructive projects, even though these projects are acceptable in terms of financial point.

2. Non-green investors make investment decisions based on financial purpose and their main concern is the related cash flow protection level to principal and interest of rated entities or debt subject.

Natural environmental benefit or cost internalization will cause cash inflow or outflow of rate entities or specific project, influencing the protection level to debt principal and interest. Therefore, non-green investors also pay attention to natural environmental benefit or cost internalization.

3. Thus, the effect of natural environmental factors on bond pricing mechanism mainly depends on debt investor group composition. If green investors are the main investors, the environmental benefit / cost has a more significant impact on green bonds publication or trading price; if non-green investors are the main investors, the sensitivity of cash flow to environmental factors is more likely to affect debt publication or trading price. In China, by far there is no relative mature green investor, so in current stage, the sensitivity of cash flow to environmental factors is more significant in green bond risk pricing compared with environmental benefit / cost. If there is a stable group of green investors with the development of green finance, then the environmental benefit/cost factor is possible to increase influence in bond pricing.



SECTION III CREDIT ANALYSIS ON NATURAL ENVIRONMENTAL FACTORS



I. The impact of natural environmental factors on credit risk

Natural environmental benefit or cost internalization will bring direct or indirect cash outflow or inflow to rated entities or specific project; this may affect the credit quality of rated entities or debt project. Specifically, if the environmental benefit produced by business or equity investment project of rated entities could be internalized cash inflow, this may have positive effect on rated entities/debt project credit quality; On the contrary, if the environmental cost produced by business or equity investment project of rated entities could be internalized cash outflow, this may have negative effect on rated entities/debt project credit quality. Golden credit rating believes natural environment factors effect on rated entity or debt credit rating is ultimately up to whether the nature and amount of cash flow produced from environmental benefit or cost internalization is sufficient to prove that the solvency of rated entities is significantly different from comparable reference object, and the solvency protection level of rated entity is significantly different from other debt project from the same rated entity.

II. The Internalization Mechanism and Cash Flow Predication of environmental benefit and environmental cost

The purpose of the credit analysis on natural environmental factors is to recognize the mechanism that internalize the environmental externality produced by the issuer's business or projects to the issuer's inner cash flow. Following this internalization mechanism, we can thus predict the probability and the magnitude of the influence on issuer's cash flow.

1. Cash inflow from internalization of environmental benefit

The projects that generates positive externality are mainly provided by government directly or produce the service purchased by government indirectly, since there is a limit for reasonable financial return through market-oriented approach. As the environmental benefits are typically type of positive externality, the internalization is always related to government, including but not limited to:

i. government subsidies for environmental benefit

It is the most direct internalization way that the government pays subsidies for environmental benefits generated by the projects. The form includes both granted subsidies for consumers, such as subsidies for energy-saving appliances, and subsidies directly to the supply side.

The amount and sustainability are the two major factors considered into the evaluation model of Golden Credit Rating to predict the cash flow produced by government subsidies.

ii. tax incentives on environmental projects

To support the environmental-friendly and sustainable development, governments may provide preferential tax rate and other tax incentives to environmental projects or to subjects engaged in environmental projects, which in turn results in the saving on the tax or tax return.

Golden Credit Rating assess the levels and credit quality of government that offers the tax incentives, the type of the tax incentives, the probability that subjects obtain the preferential policies as well as the duration of tax incentives to forecast the extent of cash inflows influenced by tax saving.

iii. purchases on services with environmental benefits by government or the third party

With the environmental benefits being considered as a type of public service, governments can purchase the service of environmental protection or environment repair service in accordance with the environmental benefits generated and thus can provide the cash inflow for the service provider. This is a common way of internalization mainly applied in the projects which generates some but not sufficient cash flows to cover the whole cost, and also the PPP projects of cooperation between the government and social capital.

Except for government, some international development organizations and green investment institutions may also be the buyers of environment-beneficial service to support the sustainable development.

To measure the cash flow generated by purchasing services, Golden Credit Rating takes credit quality of the buyers of environment-beneficial service, the relevance of deal price and service quality and the timeliness of payment into account.

iv. environment quota

Governments or international organizations usually base on domestic laws and regulations or specific international agreement such as Paris Climate Agreement to design quotas for environment purpose. These quotas can internalize environmental benefits through trading. The environment quota commonly seen in the market is emission reduction quota, such as Carbon Emission Permit quotas, renewable energy quotas.

Golden credit predicts that the cash flow generated from the quota trading mainly focus on the available quotas for trading of the rated entity and the trading price, therefore golden credit will follow the dynamic change of the trading prices for the quotas.

v. the revenue collecting rights designed based on environmental benefit

Certain project with environmental benefits can specify the beneficiary and therefore charge can be placed on the beneficiary. Projects such as treatment of sewerage, refuse disposal, clean energy and clean transportation can generate cash inflow through the setting of revenue collection from the beneficiary.

Golden Credit judges the cash flow from revenue collection rights from the legitimately effective period of the rights, the stability of revenue and the possibility of adjustment on prices.

vi. indirect internalization regime of environmental benefit

In addition to the above internalization regimes, there are some indirect internalization regimes:

a. the facilities or concessions provided by government body for green finance (green pass for issuance, release of restrictions on employment of capital or provide government investment), which will bring down the costs and provide extra financing cash flow.

b. extra policy support to the operator of the green project can be beneficial to the comparative advantage gained of the rated entity in the market competition, which will generate some cash flow.

This is a very common practice in urban infrastructure constructor or certain key investment projects of local governments.

In Golden Credit's point of view, the analysis of government support is mainly conducted through the credit quality of the government level, the specification of support, the sustainability of the indirect cash flow and the effective period of the government support.

2. Internal cash outflow of environmental cost

The mechanisms that the internal of environmental cost resulting from rated entities (or specific project) into the cash outflow of the rated entities (or specific project) include but not limited to:

i. the environmental tax government collected

Government sets the tax and charge for environmental sector, including resource tax, congestion tax, and emission fees etc., which are more conventional measures for the internalization of environmental cost.

Analysis of cash outflow resulting from environmental tax for the Golden Credit mainly based on the current tax rate government set to measure the amount of environment tax of the rated entities (or specific project).

ii. the fine of illegal act or tax penalty government set

For the illegal act of environmental sector, government probably imposes fines of tax penalty, so that the illegal entity has cash outflow to achieve the internalization. With China's increasingly emphasis on ecological civilization and the Green development idea, the law enforcement in the environmental sector is expected to be more rigorous and standardized, which may increase the degree of internalization of environmental costs.

Analysis of cash outflow resulting from environmental fines or tax penalty for the Golden Credit mainly evaluate the probability of violating environmental rules of the rated entity, the change of how rigorous government's enforce power is and the amount of punishment.

iii. compliance with cost of environmental policies

Government can set the mandatory environmental standards, such as the vehicle emission standards. If the rated entity is not meet the mandatory standard, it is faced the risk of unable to make production continually. Therefore, it has to reform the current equipment or doing extra investment to comply with the environmental standards.

Analysis of environmental policies complying with cost for the Golden Credit mainly evaluate the gap between the rated entity and environmental mandatory standard, and the cash outflow to eliminate the gap.

iv. environmental litigation

The environmental cost from specific project of the rated entity may not into cash outflow of the rated entity from the internalization of government administration, but it may violate the legal rights of adjacent Party, which induce the rated entity raise the environmental civil lawsuit. If the rated entity was ruled to be tort from court, the amount of compensation will be internally into cash outflow of the rated entity (or specific project).

Analysis of cash outflow resulting from environmental litigation for the Golden Credit normally is concern about whether the matters have environmental litigation, which mainly evaluate the probability of environmental litigation and lose by the rated entity, and the probable amount of compensation.

v. indirect mechanism of internalization of environmental cost

In addition to direct internalization mechanism of environmental cost, indirect mechanism to make the environmental cost internally at this stage is more effective, such as the joint punishment for blacklist in the environmental sector, the disciplinary measures include but not limited to:

- a. Prohibiting IPO and issuance of bonds, limiting access to the bank loan or other financing action, thus limiting financing cash inflow
- b. Prohibiting from participating in the bidding of government sector or engaging in specific project, thus affecting their business operation

For indirect internalization mechanism, Golden Credit mainly analyze the probability of the rated entity who was jointed into the blacklist of joint punishment in the environmental sector, and the government' s strength on implementing joint punishment.



SECTION IV THE NATURAL ENVIRONMENT CREDIT ANALYSIS OF THE RATED ENTITY



I. The procedures of natural environment credit analysis

The business and specific project for Different rated entities that produce environmental benefits(or environmental cost) probably exist quite difference, part of rated entities who are doing business and specific project more prone to produce environmental benefits, For instance the investment project of the rated entity of the Green bonds must be green; part of rated entities doing business of the specific project more prone to produce environmental cost, such as the high pollution and high energy–related industry; part of rated entities doing business and specific project may not directly produce environmental benefits pf environmental cost, and not sensitive for environmental factor.

Therefore, the Golden Credit firstly assess whether the industry is environmentally sensitive, and on the basis of evaluate the rated entity are environmental benefit or environmental cost, or both.

1. For environmental benefits entities, it is needed to identify the main mechanism of internalization of environmental benefits, and under this mechanism to evaluate the amount of internal cash inflow and its constancy, and on the basis of analyzing the proportion of cash inflow of internal environmental benefits to the future cash to determine its dependence to cash flow of environment benefits.
2. For environmental cost entities, it is needed to identify the main mechanism of its internalization of environmental cost, and under this mechanism to evaluate the internal cash outflow and its constancy, and on the basis of proportion of cash outflow of internal environmental cost to future cash flow to determine its sensitivity to cash outflow of environmental cost.
3. For entity who are both with environmental benefits and cost, it is needed to identify the mechanism of internalization of environmental benefits and that of environmental cost respectively, and separately

to evaluate each cash flow, and on the basis of analyzing the proportion of the net cash flow of environment factor to future cash flow to determine its sensitivity to environment factor.

4. The internal cash flow measurement of Environmental benefits or cost based on different assumptions and can get difference outcomes, thus it is needed to implement stress test for different measurement assumptions, in order to further clarify the impact of entities' credit quality for environment factor.

II. The elements of entities' Natural environment credit analysis

In order to estimate the sensitivity of capable of entities to obtain cash flow to cash flow of internal environmental benefits or costs, the Golden Credit normally doing the following analysis for the entity's natural environment factor:

1. The relationship between the industry and environment of the rated entities

Different industries have different environmental sensitivity. Therefore, to determine the environment benefits or cost of the rated entities' must analyze their business or industry:

- i. whether it is easy to damage the environment;
- ii. whether exist the technology and project that can reduce the environmental damage;
- iii. Whether it is environmental restoration and protection?

If it defined as one of those three, it is the environmental sensitive industry; on the contrary, the rated entities' business have no direct impact on environment, but probable indirectly affect environment by limiting the service of environmental damage product.

For whether the business of the rated entities are beneficial for environment, it is can determine by whether its business or project are supported by the official green directory such as “the green bonds supportive project directory” , “the green bonds issuance guideline” , etc.

2. Regional factors of environmental policy and law enforcement

The internal mechanism of environmental benefit and environmental cost is more dependent on the government, so the environmental policy and law enforcement are key factors to affect the internal mechanism. Environmental policy and law enforcement consist of national and local levels, different regional environmental policies may be set according to national levels; in terms of the local level, local government's understanding of environmental policy may not be the same, which leads to the existence of different environmental law enforcement. Therefore, in the sensitivity analysis of the performance for the rated entities to reflect the financial capacity of the environmental benefits / cost of internal cash flow, the regional environmental policy preferences and enforcement should be taken into consideration.

Golden Credit believes that the environmental policy implementation and enforcement is relatively higher in developed areas, also true for local government in the special natural ecological region; for those relatively less developed region, they may be more inclined to economic growth rather than the protection of environment. For rated entities, the probability of internalization of environmental benefits or environmental costs is relatively high in developed areas or special natural ecological areas; for other

areas, the probability is relatively low.

3. Rated entity's preference on environmental benefit and environmental risk

If the rated entity is more preferred on environmental benefits, it is relatively more likely to engage in environmentally friendly projects' investment and operation, and the management mechanism of environmental risk capital investment for avoiding the destruction of the environment, the use of non-environmental-friendly suppliers to provide products or services, also avoiding their own products or services sold to the non-environmental-friendly customers. Otherwise, it is possible for the entity to engage in projects directly or indirectly damaging the environment.

The rated entity's preference on environmental benefits or environmental risk will be affected by environmental policy and law enforcement. In this regard, Golden Credit will evaluate the entity based on:

- i. environmental risk strategy: whether there are official documents on environmental risk strategy clearly stating environmental risk factors in the business and investment strategy; whether the entity deviates from the strategy;
- ii. the ability of environmental risk management: whether there is a environmental risk management mechanism, including management team, risk management technology, etc.;
- iii. the scope of environmental risk management: whether the entity's environmental risk management covers suppliers and customers.

4. The entity's credit record in environmental protection field

The credit record of the entity in environmental protection field is the concrete embodiment of its environmental risk strategy. Increasing attention is attached to the credit record in the field of environmental protection, the entity's dishonest behavior in the field of environmental protection may lead to punishment from government departments and financial institutions, which could have a significant negative impact to its cash flow; on the contrary, if the entity is encouraged by government departments or financial institutions for achievements in the field of environmental protection, it is likely to bring competitive advantage to the rated entity, even possible to contribute to positive cash flows immediately.

Therefore, main concerns for Golden Credit to take into consideration in evaluating the entity's credit record in the field of environmental protection including the follows:

- i. whether the entity is included in the environmental protection blacklist or joint disciplinary dishonesty blacklist: the date of blacklisting, whether it has been punished or the possibility of going to be jointly punished in the future; the likelihood of eliminating dishonest behavior and hence to be removed from the blacklist.
- ii. the credit record in using green funds: whether there is a greenwash behavior; whether the green funds are strictly allocated to the green project; whether there is full disclosure of information.
- iii. the green benefits of the business or specific projects undertaken by the entity: the extent to which it is recognized by the government or international organizations.



SECTION V THE NATURAL ENVIRONMENT CREDIT ANALYSIS FOR BONDS



I. The natural environment credit analysis for project–revenue bonds

1. The characteristics of project–revenue bonds

Although the cash flow from investment projects is the main source of revenue for project–revenue bonds, yet if the cash flow is not sufficient to repay the principal and interest, law in China does not exempt the entity's responsibility repay from other sources, therefore the rated entity should repay with all its assets for the principal and interest.

Therefore, Golden Credit believes that the fundamental credit rating for project–revenue bonds should be the rating of the entity its own, to get the specific bond rating, further evaluation should be conducted according to the guaranteed level of the project–revenue bond, whether it is significantly higher than the same rating general unsecured debt from the same rated entity.

2. The environmental credit analysis for project–revenue bonds

The cash flow from investment projects is the main source of revenue for project–revenue bonds, therefore in estimating the project's cash flow, the expected environmental benefits or environmental cost should be taken into consideration, and also considers the level of internalization of environmental benefit or cost in the project's cash flow. Further judgment should be based on this analysis, that is, whether the project's internal net cash flow related to the cost or environmental benefits lead the rated bond to a significantly higher guaranteed level than the entity's other bonds.

In terms of the evaluating elements, there is no difference between the environment credit analysis of the project and the entity, and there is only one thing that is to accumulate the internalized cash flow to the cash flow statement of the investment projects.



II. The natural environment credit analysis for PPP debt financing instruments

1. The characteristics of PPP debt financing

PPP debt financing projects are included in project–revenue financing, compared with the pure project financing, the credit quality of PPP debt financing has the following characteristics: first, the main business and the financing entity of PPP project is usually a joint body composed of government and social capital, government investors and social capital investors have only limited liability to the antithetical couplet body by law, therefore it is the true project–revenue financing; second, a considerable part of the cash inflow of PPP is from government's purchase of services or fiscal subsidies, but the government only has the obligation to repay for the PPP entity, there is no obligation for payment on the joint body or fallback responsibility, but still, the government level and credit quality has vital influence on the PPP joint body and PPP project's cash flow; third, if the PPP project is an important government one, in order to ensure the continued operation of PPP project and service quality, it is possible to obtain government or social capital investors' support (such as

financial support, assistance projects and debt transfer, etc.), when there are management difficulties or repayment difficulties for the PPP project.

2. The natural environmental credit analysis for PPP debt instruments

Golden Credit's analysis of environmental credit for PPP debt instruments, including but not limited to the following aspects:

- i. social capital investors' credit quality and their environmental credit : social capital investors are actual operators of PPP projects, therefore their credit quality and environmental credit will have a significant impact on environmental benefits or environmental costs of PPP project.
- ii. government investor's credit quality: the government investor is the key to internalization of environmental benefits in PPP projects, therefore its credit quality is directly related to the stability of the cash flow in project's operating activities.
- iii. types of environmental benefits or environmental costs of PPP project: in addition to government's purchase of services, whether there is other environmental benefits or environmental cost internalization mechanism for the PPP project , if exists, it is necessary to estimate the cash flow amount internalized and its certainty.
- iv. the importance of the PPP project in its affiliated area: the main assessment is the possibility of the government's assistance in case there are operating difficulties or debt servicing difficulties.

III. Natural environment credit analysis of structured finance instruments

1. Characteristics of structured finance instruments

The most significant characteristics of structured finance instrument is the realization of bankruptcy separation of the cash flow of the originator from the cash flow of the financing project through the setting of SPV (which is normally through trust in China). This arrangement can avoid the influence on cash flow of the financing project from the bankruptcy risk of the originator. Theoretically, the credit quality of the structured finance instruments has no relation with the creditworthiness of the originator. However, in practice the credit quality of the structured finance instruments is influenced by the originator in certain degree in China. The main reasons can be summarized as follows: first, the originator normally may continue to participate in the asset management and operation after the underlying asset has been transfer to the trust or SPV, as a result the cash flow of the underlying asset still have certain reliance on the originator. Second, from the design of the cash flow mechanism, it is possible that the cash flow of the underlying asset is first collected by the originator and then transferred to the bank account of the trust or SPV, therefore the cash flow of the structured finance instruments can to certain extent determined by the creditworthiness of the originator or the designated trustee (i.e. the possibility of cash flow being retained by the originator). Third, under the circumstance of inadequate cash flow from the underlying asset, the obligation to supply incremental cash from the originator may be adopted, thus the cash flow of the originator itself constitutes the substitute cash flow available to the structured finance instruments.

2. Natural environment credit analysis of the structured finance instruments

Golden credit's natural environment credit analysis of the structured finance instruments includes but

not limited to:

- i. the evaluation of influence from environmental factors of the underlying asset cash flow: the types of underlying asset, the sensitivity to environmental factors, the possibility that environment benefit turn to cash flow of the underlying asset, and the proportion of cash flow accrued to environment in the total cash flow of the underlying asset.
- ii. the environmental credit of the originator: as the underlying asset mostly continues to be operated and managed by the originator, the environmental credit of the underlying asset is commonly determined by that of the originator, and possibly effect the cash flow of the underlying asset. Additionally in the setting of obligation for supplement of incremental cash, the effect from the environment on the cash flow of the originator may spill over to the cash flow of the structured finance instruments.
- iii. the creditworthiness of the originator: the possibility of cash flow being retained by the originator, and the willingness and ability to fulfill the obligation of supplement of incremental cash.
- iv. the tranches of structured finance instruments: the structured finance instruments are usually divided into different tranches, through which the equity tranche will first impair from the risk in order to provide extra guarantee on the senior tranche. Form the point view of environment credit analysis, the effect of tranche setting or the credit enforcement on senior tranche from the cash flow generated by environment benefit can be evaluated as well.



SECTION VI ANALYSIS FRAMEWORK OF GREEN BOND CREDIT RATING



I. Definition and characteristics of green bond

1. Green bond is the debt instrument that the raised fund can mainly be employed to improve, rehabilitate or protect (or restrain the damage to environment) the natural ecological environment such as the climate, air, water, soil, plants.

Compared to the non-green debt instrument, the characteristics of green bond can be recognized by the following three aspects.

- i. The purpose of issuing green bond can only be constrained to improve, rehabilitate or protect the environment or to restrain the damage to environment, and must not raise fund for project through greenwash.
- ii. The green bond could raise fund from the green investors who are put more focus on the environmental benefits through the investment on green bond.
- iii. From the issuance and supervision, the rated issuer of green bond is required a redundant information disclosure of the greenness to authorities and investors in order to prove the appropriate use of raised fund on green project.

2. Type of green bonds

The green bonds currently issued in China capital market include the followings.

- i. green finance bond: the securities issued by financial institutions from which the raised funds is invested to support green industries. The approval and supervise body is the People's Bank of China.
- ii. green enterprise bond: the raised funds are mainly applied to support Energy saving and emission reduction technology upgrading, green urbanization, clean and efficient use of energy, employment of new energy, development of cyclical economy, water saving and nonconventional water resource use, prevention of pollution, ecological agriculture and forestry, energy saving and environment protection industries, low carbon dioxide emission industries, ecological civilization. The National Development and Reform Commission (NDRC) is the regulate body for approval of issuance and consequent supervision.
- iii. green corporate bond: corporate bond issued on exchanges and supporting green industries. The stock exchanges and China Securities Regulatory Commission (CSRC) are the approval body and the CSRC is the supervision body.
- iv. green debt financing instruments for nonfinancial enterprises: this is registered with National Association of Financial Market Institutional Investors (NAFMII) and issued and traded on the interbank bond market.
- v. green structured finance instruments: the asset backed securitization of green credit, the financing facilities backed by cash flow from green project.

As the green finance market develop further, the innovation on financing tools of green project will soon emerge.

II. The definition of green bond's credit rating

1. The method of green bond's credit rating is that Golden Credit employs credit rating grades to comprehensively measuring the credit risk of green bond's issuer and debt .
2. The core task of credit rating is measuring the coverage of the cash flow produced by the rating subject and bond transaction structure in the future to the debt service. For green bond, Golden Credit mainly focus on the substantial effect on the cash flow of the issuer or the financed green project from the internalization of environment benefits, based on which can judge the difference on the guarantee of repayment of the green bond from other debt instrument of the issuer under the consideration of environment benefits. In the Golden Credit rating method, the enforcement of the rated entity's solvency and the guarantee on repayment under the cash flow from internalization of environment benefits will be conducive to improve the credit rating of the entity and the green bond, otherwise, it will have insignificant to the credit rating of the issuer and the green bond.
3. The functions of green bond's rating to green bond investors and other investors can be categorized as follows.
 - i. The credit rating attention on the cash flow generated by natural environment benefits and cost internalization is highly consistent to non green bond's investors.
 - ii. Although the green bond's investors is willing to pay for part of premium for the environment

benefits, the green bond's investors would unlikely to give up the financial returns, the safety of debt service is still considerable to the green bond's investors. So the credit quality of bond issuer and guarantee degree of bond are still the important considerations for the green bond's investors making transaction decisions.

iii. Besides the safety of fund, the green bond's investors especially focus on whether the fund is invested on the project generating the environment benefits other than greenwash project. Also the green bond's investors would care the financial capital in the duration whether used for the purpose indicated in the prospectus rather than other projects. Essentially, it is determined by the willingness of the issuer to fulfill its obligation. The credit rating to the issuer by the credit rating agency is the comprehensive measure of the repaying willingness and the debtor solvency which is the coverage of cash flow to the debt repayment. And the weight of the credit record and repaying willingness in the rating model is increasing. So the rating result is useful for green bond investors to judge the credit of the issuer and debtor, and the fund can flow to issuer and debtor with higher credit rating.

III. The credit quality of rated entities

1. The underlying credit quality of rated entities

The underlying credit quality of rated entities depends on the debt solvency and paying willingness, applicable to various Golden Credit rating method on various rated entities.

2. The natural environment credit analysis of rated entities

The credit analysis of rated entities natural environment mainly analyzes whether cash flow produced by the internalization of environmental benefits make the underlying credit quality of rated entities significantly higher than the reference rating object. ◦

IV. The credit quality of green bond

For further judging the guarantee degree of the green bond is remarkably above generally unsecured debt issued by the same issuer, the analysis of green bond's credit quality is based on the credit quality of its subject. And it's divided into two aspects as follows.

1. The analysis of green bond natural environment's credit quality

According to the types of green bond, Golden credit will adopt the corresponding environment analytical framework to judge that whether there is marked difference between green bond and other bond issued by the same issuer due to the environment factor.

2. Credit enforcement measures of green bond

Including conventional credit enforcement measures, the green bond may set specific credit enforcement measures to the green bond including but are not limited to the followings:

- i. interest subsidy afforded by the government to the green bond
- ii. fund support by the government green industry development fund
- iii. green insurance

iv. pledge of carbon emission permit and other

Golden Credit will assess the credit rating of green bond comprehensively by evaluating the effect of all the credit enforcement measures on the green bond.

V. The credit rating report of green bond

The credit rating report of green bond reflects the credit rating result of the green bond. In order to reveal the credit risks of green bond issuer and green bond's natural environment's risk, Golden Credit will attempt to separately disclose the impact on green bond and the rated entity from the natural environment factors, which can provide the respective reference for green investors and other investors.



声明

本报告是东方金诚和 Trucost 的联合研究项目“绿色评估与绿色信用评级”其中的一项研究成果。

本报告阐述了受评主体从事的业务或者特定项目所产出的自然环境效益或者环境成本内部化为受评主体或特定项目现金流的机制，并提出了一个分析自然环境效益或成本内部化所致的现金流影响受评主体或特定债项信用风险程度的基本框架。

本报告还应用自然环境信用分析框架开发了绿色债券信用评级方法，主要通过分析绿色债券受评主体从事的业务或绿色债券募投项目的绿色效益 / 环境成本的内部化现金流的程度判断绿色债券受评主体的信用风险是否受到绿色因素的显著影响、以及绿色债券本息的受保障程度是否显著异于同一受评主体的其他债项，在此基础上评定绿色债券受评主体和绿色债券的信用等级。

本报告由东方金诚撰写。在研究和撰写过程中，得到了绿金委和 Trucost 的技术支持。

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Trucost

Trucost 是一家全球性的环境咨询公司，专门从事环境数据和企业环境绩效的定量分析，专注于帮助投资人、企业、政府部门和智库等识别自然资本依赖性的经济后果，以应对当前和未来的风险和机遇。从 2000 年成立以来，Trucost 致力推广自然资本估值在企业、投资和政策设计的有机融合，合作机构遍布世界 20 多个国家。受绿色金融专业委员会邀请，Trucost 在 2015 年加入绿金委作为国际特邀单位。



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摘要

自然环境因素日益成为债券定价机制的重要因素。相当一部分绿色债券的发行利率低于同期可比的非绿色债券，一定程度上反映了自然环境因素在债券风险定价中的作用。

自然环境因素之所以会在债券风险定价中产生作用，取决于两个方面：（1）对于环境效益偏好型的绿色投资者而言，其会更倾向于投资产出环境效益的项目甚至愿意为环境效益支付一定溢价；（2）自然环境效益或成本会通过内部化不同程度的转化为发行人的现金流入或流出，从而影响其偿债能力和违约风险。

▲ 自然环境信用分析

自然环境效益或成本的内部化将给受评主体或特定项目带来直接或间接的现金流入流出，从而可能对受评主体或债项的信用质量产生影响。具体来说，如受评主体从事的业务或者募投项目所产生的环境效益能内部化为受评主体或债券募投项目的现金流入，对受评主体/债券的信用质量可能具有正面影响；反之如受评主体所从事的业务或者募投项目的环境成本能内部化为受评主体或债券募投项目的现金流出，则对受评主体/债券的信用质量可能具有负面影响。东方金诚认为，自然环境因素对受评主体或债券信用等级的影响最终取决于环境效益或成本内部化所产生的现金净流量的性质和金额是否足以导致受评主体的偿债能力显著异于可比参照对象，以及受评债券的偿债保障程度是否显著异于同一受评主体的其他债项。

基于上述判断，东方金诚对环境效益内部化为现金流的机制进行了分析，包括但不限于政府补贴、税收优惠、政府采购、环境配额交易、收费权等直接方式以及政府支持等间接方式，针对每种内部化的机制进行现金流入测算，从而估算环境效益带来的现金流入；同时，对环境成本内部化的机制进行分析，包括但不限于环境税费、罚款或惩罚性税收、诉讼等直接方式以及环保领域黑名单联合惩戒等间接方式，针对每种内部化机制进行现金流出测算，从而估算环境成本导致的现金流出。

在估算环境因素给受评主体或募投项目带来的净现金流时，需要综合考虑受评主体所从事业务的环境敏感性、环境执法与政策的区域差异、受评主体的环境风险偏好和环境信用记录等因素。对债项同样可以结合债券的交易结构进行自然环境信用分析。

▲ 绿色债券信用评级

对于绿色债券进行信用评级时，东方金诚既综合分析发行人或债券募投项目的现金流获取能力，同时要进一步测算绿色债券募投项目的自然环境效益/成本导致的现金流、绿色债券特有的增信措施是否足以使绿色债券的受保障程度显著高于同一发行人的一般无担保债务，并最终确定信用等级。信用评级机构还将在评级报告中单独披露对自然环境的信用分析

结果。

对绿色债券进行信用评级，将有助于绿色债券市场和绿债投资者对绿色债券进行更为准确的风险定价：第一，信用评级机构对环境效益 / 成本及其内部化为现金流的分析，这有助于投资者判断绿色债券募集资金用途的绿色效益 / 成本、尤其是环境效益 / 成本为绿债投资者间接带来的现金流；第二，信用评级机构综合评估债券的信用风险，能为投资者判断绿色债券投资的财务安全性提供参考。



一、自然环境效益与自然环境成本的定义



自然环境效益与自然环境成本

1、自然环境效益也称为绿色效益，主要是指受评主体从事的业务或特定项目改善、修复、保护自然生态环境（包括但不限于气候、空气、水、土壤、植被）程度或者降低自然生态环境破坏的程度。自然环境效益通常让整个社会或特定区域共同受益，具有正外部性。

2、自然环境成本也称为自然成本，主要是指受评主体从事的业务或特定项目对自然生态环境造成的破坏。自然生态环境恶化的后果通常需由整个社会或特定区域共同承担，具有负外部性。



自然环境效益与自然环境成本的内部化

1、自然环境效益的内部化是指让从事环境效益项目的受评主体直接或间接从其所产出的环境效益中获得现金流入。自然环境效益的内部化程度越高，越能激励企业产出环境效益；自然环境效益的内部化程度越低，则企业产出环境效益的可能性越小，只能依赖政府来提供环境效益。

2、自然环境成本的内部化是指让受评主体直接或间接现金流出以承担其从事的业务或者特定项目导致的自然环境成本。自然环境成本的内部化程度越高，越能抑制企业和机构对环境的破坏行为，并推动其降低自然环境成本；反之，则可能导致企业生产经营活动忽略自然环境成本。



二、自然环境风险日益成为债券定价机制的重要因素



各国对自然环境可持续发展越来越重视，中国也正式提出了生态文明和绿色发展的理念。因此，以利用金融活动为环境效益项目投入资金为主要目标的绿色金融市场在国际和国内均得到了相当快速的发展。自然环境效益和环境成本日益成为绿色金融市场定价的重要因素。

比如，国际和国内均有相当一部分绿色债券的发行成本低于可比（指类似受评主体、同发行时间段、同债品类、同期限）非绿色债券的发行成本，还有相当一部分绿色债券获得了远超过非绿色债券的超额认购。

东方金诚认为，绿色债券市场的资金提供者可以分为绿色投资者和非绿色投资者两类，自然环境效益或成本对这两类投资者具有不同的影响机制：

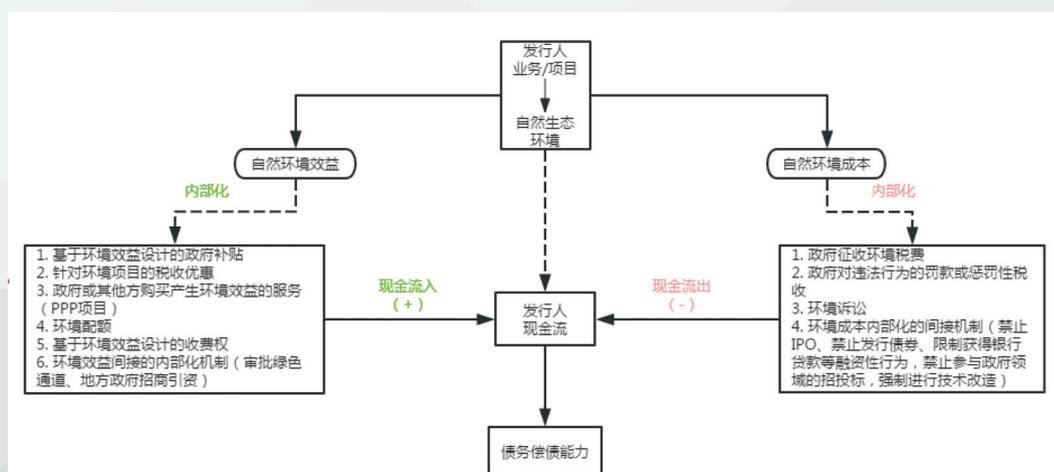
1、对绿色投资者来说，环境效益和成本是其投资和交易决策的关键性因素之一。绿色投资者偏好于投资能产生真实环境效益的项目，甚至愿意为环境效益产出让渡部分财务收益（即支付环境效益溢价）；并避免将资金投向环境成本大于环境效益的环境不友好型或破坏型项目，即使从财务回报角度来说是可接受的。

2、非绿色投资者基于财务目的进行投资，主要关注受评主体或债项相关的现金流对债券本息的保障程度。自然环境效益或成本的内部化会导致受评主体或特定项目现金流入或流出，从而影响对债券本息的保障程度，因而自然环境效益或成本的内部化也是非绿色投资者关注的方面。

3、因此，自然环境因素对债券的定价影响机制主要取决于该债券投资者群体的构成。如以绿色投资者为主，则环境效益 / 成本对绿色债券发行或交易价格的影响更为显著；如以非绿色投资者为主，则现金流对环境因素的敏感度更容易影响债券的发行或交易价格。在我国，目前尚未形成相对成熟的绿色投资者，故现阶段现金流对环境因素的敏感度在绿色债券风险定价中的影响比环境效益 / 成本的影响更为显著；如未来绿色金融的发展培育了一批稳定的绿色投资者，则环境效益因素在债券定价中的影响有望提高。

三、对自然环境因素进行信用分析

▲ 自然环境因素对信用风险程度的影响



自然环境效益或成本的内部化将给受评主体或特定项目带来直接或间接的现金流入流出，从而可能对受评主体或债项的信用质量产生影响。具体来说，如受评主体从事的业务或

者募投项目所产生的环境效益能内部化为受评主体或债券募投项目的现金流入，对受评主体 / 债券的信用质量可能具有正面影响；反之如受评主体所从事的业务或者募投项目的环境成本能内部化为受评主体或债券募投项目的现金流出，则对受评主体 / 债券的信用质量可能具有负面影响。东方金诚认为，自然环境因素对受评主体或债券信用等级的影响最终取决于环境效益或成本内部化所产生的现金净流量的性质和金额是否足以导致受评主体的偿债能力显著异于可比参照对象，以及受评债券的偿债保障程度是否显著异于同一受评主体的其他债项。

▲ 环境效益 / 环境成本的内部化机制及现金流预测

自然环境因素信用分析就是要识别受评主体从事的业务或特定项目产出的环境效益 / 环境成本被内部化为受评主体 / 特定项目现金流的机制，并在内部化机制下预测其从事的业务或特定项目产生内部化现金流的可能性以及内部化现金流的金额。

1、环境效益的内部化现金流入

具有正外部性的项目通常无法采取市场化的方式满足需求，主要由政府直接供给或者由政府购买服务来间接供给。环境效益属于典型的正外部性，因此对环境效益的内部化也主要与政府有关，包括但不限于：

（1）基于环境效益设计的政府补贴

即政府为项目所产生的环境效益支付一定的补贴，这是环境效益内部化最直接的方式，既包括面向消费者发放的补贴（如节能家电补贴），也包括直接向供应方提供的补贴。

东方金诚预测政府补贴所导致的现金流主要是评估政府补贴的金额及持续性。

（2）针对环境项目的税收优惠

为支持绿色发展，政府有可能为从事环境项目的主体或者环境项目本身提供优惠税率等税收优惠措施，即环境效益直接或间接导致税收现金流出的节约或者税收返还。

东方金诚预测税收现金流出的节约主要是评估提供税收优惠政府的层级及信用质量、税收优惠的类型、受评对象获得税收优惠的可能性、节约的金额和税收优惠的有效期。

（3）政府或其他方购买产生环境效益的服务

政府将环境效益作为一项公共服务，按照产生的环境效益向服务提供方采购环境保护或修复服务，从而给服务提供方带来部分现金流入，这也是环境效益内部化较为常见的方式。主要适用于既能产生部分现金流，但又不足以完全覆盖成本的项目，也常见于政府与社会资本合作的 PPP 项目。

除政府外，有些国际开发组织或者绿色投资机构为支持可持续发展也可能购买产生环境效益的服务。

东方金诚预测购买服务所产生的现金流主要是评估购买环境效益服务合同中购买方的信用质量、购买价格以及与服务质量的相关性、支付服务金额的及时性等。

（4）环境配额

政府或国际组织基于国内的法律法规或者巴黎气候气候协定等特定国际协议设置针对环境的配额，此类配额通过有偿交易实现环境效益的内部化。常见的配额通常是减排类配额，比如碳排放权等温室气体排放权、可再生能源配额等。

东方金诚预测配额交易所产生的现金流主要是评估受评主体可交易配额数以及交易金额，因此会关注碳排放等交易市场的价格波动情况。

（5）基于环境效益设计的收费权

部分产生环境效益的项目，可以明确较为具体的受益对象，因而可以由受益者付费或者部分付费。比如污水处理、垃圾处理、清洁能源、清洁交通等项目，可以由设定服务方的收费权来实现现金流。

东方金诚预测收费权所产生的现金流主要是评估收费权的有效期、收费流量的稳定性以及收费价格调整的可能性。

（6）环境效益间接的内部化机制

除上述有相对明确现金流入的内部化机制外，还存在一些间接的内部化机制，比如：

1）政府为绿色融资项目提供便利或优惠条件（比如发行绿色通道、对资金使用限制的放宽等，甚至直接进行投资），从而带来更低成本或者更多金额的筹资性现金流入；

2）政府为从事绿色项目的主体提供针对该项目或者项目外的政策支持，有利于受评主体在市场竞争中获得相对优势，从而带来相应的现金流。这在城市基础设施建设公司中或者部分地方政府的重点招商引资项目中尤为常见。

东方金诚对政府支持主要分析提供支持的政府层级及信用质量、提供支持的类型与力度、所带来间接现金流的持续性、政府支持的有效期等。

2、环境成本的内部化现金流出

将受评主体 / 特定项目所导致的环境成本的内部化为受评主体 / 特定项目现金流出的机制包括但不限于：

（1）政府征收环境税费

政府针对环境领域设立税收和收费项目。比如资源税、拥堵税、排放费等，这是内部化环境成本较为常规化的措施。中国和其他各国均有针对环境成本的税费，但中国较长时期内过于注重经济增长速度对环境重视程度，不够，导致环境税费通常并不构成重要的现金流出，对环境成本的内部化程度较低，未能带来实质性的负面约束。东方金诚对环境税费所导致现金流出的分析主要是基于政府设定的现有税费率测算受评主体或特定项目的环境税费金额。

（2）政府对违法行为的罚款或惩罚性税收

对于环境领域的违法性行为，政府有可能征收罚款或者惩罚性税收，从而让违法主体产生现金流出，从而实现内部化。基于类似的原因，目前环保领域的执法以及罚款并未能使环境成本有效内部化。预计随着中国对生态文明和绿色发展理念的日益重视，环境领域的执法有望进一步严格和规范化，从而可能提高环境成本内部化的程度。

东方金诚对环境罚款或惩罚性税收所导致现金流出的分析主要评估受评主体违法环境规定的可能性、政府执法严格程度的变化以及处罚金额。

（3）遵循环境政策的成本

政府可以设定环境方面必须遵循的强制性标准，比如汽车尾气排放标准。如受评主体未达到强制性标准，则面临无法持续生产的风险，因此必须对现有设备进行改造或者进行额外的投资以遵循环境效益标准。

东方金诚对环境政策遵循成本的分析主要评估受评主体与环境强制性标准之间的差距，

以及消除差距所需的现金流出。

(4) 环境诉讼

受评主体特定项目产生的环境成本可能并没有被政府的行政性内部化为受评主体的现金流出，但有可能侵犯相邻方的合法权益，从而诱发对受评主体提出环境民事诉讼。如被法院裁定受评主体侵权，赔偿金将内部化为受评主体或特定项目的现金流出。但从实际的案例来看，环境领域的诉讼并不多，且赔偿金额相对较小，因而尚难以判断其是否能将环境成本有效内部化。

东方金诚对环境诉讼所导致现金流出的分析通常是关注或有事项中是否存在环境诉讼，主要评估受评主体被环境诉讼且败诉的概率、以及可能的赔偿金额。

(5) 环境成本内部化的间接机制

除上述环境成本直接内部化机制外，间接将环境成本内部化的机制在现阶段可能更为有效，比如对环保领域黑名单的联合惩戒，惩戒措施包括但不限于：

- 1) 禁止 IPO、禁止发行债券、限制获得银行贷款等融资性行为，从而限制筹资性现金流入；
- 2) 禁止参与政府领域的招投标或者禁止从事特定项目，从而对其经营产生影响。

对间接内部化的机制，东方金诚主要分析受评主体被列入环境领域联合惩戒黑名单的可能性以及政府实施联合惩戒的力度，从而评估其对受评主体现金流的影响。

四、主体自然环境信用分析

自然环境信用分析程序

不同的受评主体从事的业务或特定项目所能产生的环境效益 / 环境成本可能存在较大差异，部分受评主体从事的业务或特定项目更容易产生环境效益，比如绿色债券受评主体募投项目必须是绿色的；部分受评主体从事的业务或特定项目则更容易产生环境成本，比如高污染高能耗相关的行业；部分受评主体从事的业务或者特定项目可能并不会直接产生环境效益或者环境成本，对环境因素并不敏感。

因此东方金诚首先对受评主体所在的行业是否环境敏感型作出判断，在此基础上判断受评主体属于环境效益型还是环境成本型主体或者二者兼而有之。

1、对于环境效益型主体，需识别其环境效益被内部化的主要机制，在该机制下评估被内部化的现金流入金额及其持续性，在此基础上通过分析被内部化的环境效益现金流入占未来现金的比重判断其对环境效益现金流的依赖程度。

2、对于环境成本型的主体，需识别其环境成本被内部化的主要机制，并在该机制下评估被内部化的现金流出及其持续性，在此基础上通过被内部化的环境成本现金流出占未来现金流的比重判断其对环境成本现金流出的敏感度。

3、对于同时产生环境效益和环境成本的主体，则需要分别识别环境效益内部化的机制和环境成本内部化的机制，并分别评估各自的现金流，在此基础上通过分析环境因素净现金流占未来现金流的比重判断其对环境因素的敏感度。

4、环境效益或成本内部化现金流的测算基于不同的假设可以得出不同的测算结果，因此应针对不同的测算假设实施压力测试，以进一步明确受评主体信用质量受环境因素的影响程度。

▲ 主体自然环境信用分析要素

为了测算受评主体的现金流获取能力对环境效益 / 成本内部化现金流的敏感度，东方金诚通常对受评主体的自然环境因素进行如下分析：



不同的行业具有不同的环境敏感度。因此判断受评主体所致环境效益或环境成本必须分析受评主体从事的业务 / 所处的行业：（1）是否易于对环境造成破坏；（2）是否存在减少环境破坏的技术和项目；（3）是否属于环境修复和保护？如属于三者之一，则属于环境敏感型行业；反之，受评主体从事的业务对环境并不会造成直接的影响，但通过限制环境破坏型产品或服务可能会间接影响环境。

对受评主体从事的业务是否有利于环境，可以从其从事的业务或者项目是否属于《绿色债券支持项目目录》或者《绿色债券发行指引》等官方出具的绿色目录来判断。

2、环境政策与执法力度的区域因素

环境效益与环境成本的内部化机制对政府均较为依赖，因而环境政策与执法力度是影响内部化机制的关键性因素。环境政策与执法力度分为国家和地方两个层面，从国家来说可能设定针对不同区域的环境政策；对地方来说，不同地方政府对环境政策的理解可能并不相同，从而导致存在不同的环境执法力度。因此，在评估受评主体现金流获取能力对环境效益 / 成本内部化现金流敏感度时应考虑受评主体所处区域的环境政策偏好及执行力度。

东方金诚认为，相对而言，发达地区对环境政策的执行和执法力度较高，处于特殊自然生态区域的地方政府对环境政策执行也较高；部分经济发展较为落后的区域，则可能更倾向于经济增长而非对环境的保护。对受评主体来说，如处于发达地区或者特殊自然生态区域，则环境效益或环境成本被内部化的概率相对较高；反之，则被内部化的概率相对较低。

3、受评主体对环境效益或环境风险的偏好

受评主体如对环境效益偏好，则相对更可能从事环境友好型项目的投资和运营，并通过环境风险管理机制避免将资金投入破坏环境的领域，甚至避免使用破坏环境的供应商提供的

产品或服务，避免将自身的产品或服务销售给破坏环境的客户。反之，则有可能为获取自身盈利从事直接或间接破坏环境的业务或项目。

受评主体环境效益或环境风险的偏好显然会受到环境政策及执法力度的影响，在此基础上，东方金诚主要考察受评主体：

（1）环境风险策略：受评主体是否具有环境风险策略方面的正式文件以明确环境风险因素在经营和投资策略中的作用；受评主体的已有环境表现是否与该策略相背离；

（2）环境风险管理能力：受评主体是否为其环境风险策略的执行制定了环境风险管理机制，如管理团队、风险管理的技术等；

（3）环境风险管理的范围：受评主体的环境风险管理是否涵盖供应商和客户。

4、受评主体在环保领域的信用记录

受评主体在环保领域的信用记录是其环境风险策略的具体体现。在国家越来越重视环保领域信用记录的情况下，受评主体在环保领域的失信行为可能导致其被政府部门或金融机构联合惩戒，从而对其现金流产生重大负面影响；反之，如受评主体在环保领域取得的成就被政府部门或金融机构联合激励，则可能为受评主体带来竞争优势，甚至可能立即产生正向的现金流入。

因此，东方金诚对受评主体在环保领域的信用记录主要关注：

（1）是否被列入环保领域失信黑名单或联合惩戒黑名单：被列入黑名单的时间以及事实、是否已受到联合惩戒或者未来被联合惩戒的可能性；消除失信行为从而被移出黑名单的可能性。

（2）绿色资金使用方面的信用记录：是否存在漂绿行为；是否将绿色资金严格应用于绿色项目；是否进行充分的信息披露。

（3）受评主体所从事的业务或者特定项目已经取得的绿色效益：被政府或者国际组织认可的程度。

五、债券的自然环境信用分析

项目收益类债券的自然环境信用分析

1、项目收益类债券的特点

项目收益类债券虽然以募投项目所产生的现金流为主要来源，但如项目现金流并不足以偿付债券本息，中国的法律并未豁免受评主体以项目之外现金流偿付项目收益类债券的责任，因此受评主体仍应以其全部资产对项目收益类债券本息进行偿付。

因此，东方金诚认为项目收益类债券的基础信用等级为受评主体的信用等级，在此基础上进一步判断项目收益债券受保障程度是否显著高于同一受评主体的一般无担保债务的保障程度，以此决定项目收益债券的信用等级。

2、项目收益类债券的环境信用分析

项目收益类债券以募投项目所产生的现金流为其主要偿债来源，因此在项目现金流测算

时应考虑募投项目所致的预期环境效益或环境成本，并分析环境效益或成本被内部化为该项目现金流的程度。在此基础上判断，该项目的内部化的环境效益或成本净现金流是否导致项目收益类债券的受保障程度显著高于同一受评主体的其他债项。

从分析要素上来看，针对募投项目的环境信用分析要素与受评主体的并无差异，只需要进一步把内部化的现金流归集到募投项目的现金流中。

PPP 债务工具的自然环境信用分析

1、PPP 项目债务融资的特点

PPP 项目的债务融资虽然也是项目收益类融资，但与单纯的项目融资相比，其信用质量存在以下特点：第一，PPP 项目的经营主体和融资主体通常是由政府和社会资本共同组成的联合体，政府投资者和社会资本投资者对联合体在法律上只承担有限责任，因而是真正意义上的项目收益类融资；第二，PPP 相当部分的现金流入来自于政府购买服务或者财政补贴，但政府只承担向 PPP 实体如期付款的义务而并不承担对 PPP 联合体债务的偿付或兜底责任，尽管如此承担付款义务政府层级及信用质量对 PPP 联合体及 PPP 项目的现金流可靠性仍存在关键影响；第三，如 PPP 项目属于政府的重要项目，则当 PPP 项目发生经营困难或偿债困难时，为保障 PPP 项目的持续运营和服务质量，仍有可能获得政府或社会资本投资者某种程度的救助（比如资金支持、项目及债务转让等）。

2、PPP 债务工具的自然环境信用分析

东方金诚对于 PPP 债务工具的环境信用分析，包括但不限于如下方面：

（1）PPP 社会资本投资人的信用质量及其环境信用：社会资本投资人是 PPP 项目的实际运营方，因而其信用质量和环境信用对 PPP 项目的环境效益或环境成本会构成重大影响。

（2）PPP 政府投资人的信用质量：政府投资人是将 PPP 项目环境效益内部化的关键，因而其信用质量直接关系到项目经营活动现金流入的稳定性。

（3）PPP 项目的环境效益或环境成本类型：在政府购买服务之外，PPP 项目是否还存在其他的环境效益 / 环境成本内部化为现金流的机制，如存在，则需要估测被内部化的现金流金额及确定性。

（4）PPP 项目在所在区域的重要性：主要评估如项目发生经营困难或偿债困难时得到政府救助的可能性。

结构融资工具的自然环境信用分析

1、结构融资工具的特点

结构融资工具的最大特点是将项目或项目组合的现金流与原始权益人之间的现金流通过 SPV（在国内通常是信托）实现破产隔离，从而避免原始权益人的破产风险对项目的现金流产生影响。从理论上讲，结构融资工具的信用质量与原始权益人的信用之间应该不存在关系。但在我国的实际操作过程中，结构融资工具的信用质量或多或少仍受到原始权益人的影响，主要是因为：第一，原始权益人通常会在向信托出让基础资产后继续担任资产管理人或运营方，为信托提供运营服务，因而基础资产的现金流仍然有赖于原始权益人；第二，从现金流机制

来看,有可能是原始权益人/资产管理人从基础资产获取现金流后再将现金流划入信托专户,因而结构融资工具的现金流还有可能取决于原始权益人/资产管理人的信用(主要判断现金流被原始权益人/资产管理人截留的可能性);第三,在基础资产现金流可能并不充裕的情况下,为使结构融资工具增加对投资人的吸引力,有可能设置了让原始权益人承担差额补足义务,因而原始权益人的现金流构成了结构融资工具的第二现金流。

2、结构融资工具的自然环境信用分析

东方金诚对结构融资工具的环境信用分析,包括但不限于:

(1) 评估基础资产的现金流受环境因素影响的程度:基础资产的类型、对环境的敏感程度、环境效益/成本内部化为基础资产现金流的可能性,以及环境因素现金流占基础资产现金流的比例。

(2) 原始权益人的环境信用:由于基础资产通常由原始权益人继续运营和管理,因此原始权益人的环境信用通常决定了基础资产的环境信用,从而可能对基础资产的现金流产生影响;此外在设置了原始权益人提供差额补足机制情况下,原始权益人现金流受环境因素的影响也会波及结构融资工具的现金流入。

(3) 原始权益人的信用质量:主要是评估原始权益人截留基础资产现金流的可能性,以及履行差额补足义务的能力和意愿。

(4) 结构分层:结构融资工具通常对现金流进行内部分层,让劣后级先行承担风险的方式从而为优先级资产支持证券提供额外的支持。从环境信用分析的角度,也可以评估环境效益或成本内部化导致的现金流对结构分层设计及对优先级增信效果的影响。

六、绿色债券信用评级分析框架

绿色债券的定义及特点

1、绿色债券是将募集资金主要用于改善、修复、保护特定区域的气候、空气、水、土壤、植被等自然生态环境(以及降低对环境破坏程度)的债务工具。

与非绿色的债务工具相比,绿色债券最主要的特点有以下三个:

(1) 发行目的应当且应当是为改善、修复、保护环境或降低环境破坏程度项目筹集资金;而不应当为漂绿项目发行绿色债券;

(2) 绿色债券有可能吸引绿色投资者的资金,绿色投资者更关注投入资金所能产生的环境方面的效益;

(3) 在发行和管理上,绿色债券受评主体需要向监管机构、投资人进行充分的绿色信息披露,证明募集资金用途是绿色的。

2、绿色债券的类型

目前活跃在中国资本市场的绿色债券包括:

(1) 绿色金融债:金融机构法人依法发行的、募集资金用于支持绿色产业并按约定还本付息的有价证券,由中国人民银行(以下简称为“央行”)核准发行和监管。

(2) 绿色企业债:募集资金主要用于支持节能减排技术改造、绿色城镇化、能源清洁

高效利用、新能源开发利用、循环经济发展、水资源节约和非常规水资源开发利用、污染防治、生态农林业、节能环保产业、低碳产业、生态文明先行示范实验、低碳试点示范等绿色循环低碳发展项目的企业债券，由国家发展和改革委员会（以下简称为“国家发改委”）核准发行和进行存续期监管。

（3）绿色公司债：在交易所发行的，支持募集资金用于支持绿色产业的公司债券，由交易所或中国证券监督管理委员会（以下简称为“证监会”）核准发行，由中国证监会监管。

（4）非金融企业绿色债务融资工具：在银行间交易商协会注册，在全国银行间债券市场发行和流通的，支持募集资金用于绿色产业的债务融资工具。

（5）绿色结构融资类工具：绿色信贷资产证券化、绿色项目收益权资产支持计划等。随着绿色金融市场的发展，创新型的绿色债务融资工具也有望陆续出现。

绿色债券信用评级的定义

1、本方法所指的绿色债券信用评级是指东方金诚对绿色债券的发行人及债项的信用风险的程度进行综合评价，并用信用等级标识信用风险程度的活动。

2、信用评级的核心任务是测算受评主体及债券交易结构在未来一段时期内所能产生的现金流对债券本息的覆盖程度。对绿色债券，东方金诚主要关注环境效益内部化现金流是否给发行人或债项募投项目的现金流入带来了实质性的影响，在此基础上判断环境因素是否导致绿色债券本息的受保障程度存在相对于同一受评主体其他债项的显著差异。东方金诚认为，如环境效益内部化现金流入导致受评主体偿债能力或绿色债券受保障程度显著提高，将有助于提升绿色债券受评主体或绿色债券的信用等级；反之，则并不会对绿色债券受评主体或绿色债券的信用等级有显著影响。

3、绿色债券信用评级对非绿色投资者和绿色投资者的作用：（1）信用评级对自然环境效益 / 成本内部化现金流的关注与非绿色投资者的关注点高度一致。（2）尽管绿色投资者愿意为环境效益支付部分溢价，但这并不代表绿色投资者会完全放弃财务回报，债券本息的安全性对绿色投资者来说仍然相当重要。因此绿色债券发行人的信用质量和债券的受保障程度仍是绿色投资者进行投资和交易决策的重要考量。（3）除资金的安全性外，绿色投资者尤为关注资金是否投向了真正能产生环境效益的项目，而非“假装是绿色”的漂绿项目；以及债券募投资金在存续期间是否真的被用于募集说明书声称的绿色项目，而非其他项目。这本质上是发行人履约意愿的问题。信用评级机构对发行人 / 债务人的信用评级是对其履约能力（现金流对债务的覆盖程度）和履约意愿（偿债意愿）的综合判断，且信用记录和履约意愿在信用评级模型中的权重日益提升。因此，信用评级结果还有助于绿色投资者判断发行人 / 债务人的信用，从而将资金投向具有更高信用的发行人 / 债务人。

受评主体的信用质量

1、受评主体的基础信用质量

受评主体的基础信用质量由其偿债能力和偿债意愿决定，东方金诚针对各类主体的信用评级方法均适用于评定基础信用等级。

2、受评主体的自然环境信用分析

对受评主体的环境信用分析，则主要是分析受评主体从事包括绿色资金募投项目等业务所产出的环境效益内部化所致的现金流是否能让受评主体的基础信用质量显著高于评级参照对象。

▲ 绿色债券的信用质量

绿色债券的信用质量分析是在受评主体信用质量基础上进一步判断绿色债券偿债保障措施是否让绿色债券的受保障程度显著高于同一发行人的一般无担保债务。主要分为两个方面：

1、绿色债券的自然环境信用分析

东方金诚针对绿色债券的类型适用相应的环境信用分析框架来判断环境因素是否导致绿色债券信用质量显著异于同一发行人的其他债项。

2、绿色债券的增信措施

绿色债券可能设置了增信措施，除采用常规的增信措施外，还有针对绿色债券的特有增信措施，包括但不限于：

- (1) 政府对绿色债券的贴息；
- (2) 政府绿色产业发展基金提供资金支持；
- (3) 绿色保险；
- (4) 碳排放权等收益权的质押。

东方金诚针对绿色债券的每项增信措施进行增信效果评估，在此基础上综合评定绿色债券的信用等级。

▲ 绿色债券信用评级报告

绿色债券信用评级报告是对绿色债券进行信用评级最终成果的体现。东方金诚将尝试单独披露自然环境因素对绿色债券受评主体和绿色债券受保障程度的影响，为绿色债券投资者充分揭示受评主体及绿色债券的自然环境风险及导致的信用风险，从而为绿色投资者和非绿色投资者提供相应参考。





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