



Patient Capital and Corporate Green Behavior: A Comprehensive Literature

Review

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Article Info

Accepted: 2026/4/28

Keywords:

Patient Capital; Corporate Green Behavior; Green Innovation; Sustainable Finance; Literature Review; ESG Investment

JEL Classification:

G31, G32, O16

DOI: 10.70693/jei.v3i1.1994

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Abstract

In the context of global sustainable development and the transition toward a low-carbon economy, patient capital has emerged as a critical financial instrument for fostering long-term, environmentally responsible corporate behavior. Patient capital, characterized by its extended investment horizons, higher tolerance for uncertainty, and commitment to value creation beyond immediate financial returns, provides the financial stability necessary for enterprises to undertake green innovation and adopt sustainable practices. This paper presents a comprehensive literature review that systematically examines the conceptual evolution, measurement methodologies, and economic effects of patient capital, with particular emphasis on its relationship with corporate green behavior. The review synthesizes findings from both English-language and Chinese-language scholarship, tracing the theoretical underpinnings of patient capital from its origins in development economics and venture capital to its contemporary applications in environmental finance. The analysis reveals that patient capital facilitates corporate green behavior through multiple channels, including alleviating financing constraints for green innovation, enabling long-term environmental investments, and mitigating managerial myopia. Furthermore, the paper identifies key gaps in the existing literature, particularly regarding the mechanisms through which patient capital influences corporate environmental decision-making, and proposes promising directions for future research. This review contributes to the growing body of knowledge at the intersection of sustainable finance and corporate environmental responsibility, offering theoretical and practical implications for policymakers, investors, and corporate managers seeking to promote green economic transformation.

1. Introduction

The global pursuit of sustainable development has placed unprecedented emphasis on the role of financial markets in driving environmental responsibility. As climate change and resource depletion pose escalating threats to economic stability and social welfare, the concept of "patient capital" has gained considerable traction among policymakers, investors, and scholars as a potential catalyst for long-term, environmentally sustainable corporate behavior (Dinverno, 2014; Lazonick, 2014). Patient capital refers to investments that are characterized by extended time horizons, a willingness to accept higher levels of risk and uncertainty, and a focus on generating sustainable value rather than short-term financial returns (Boston et al., 2018). Unlike conventional investment capital,

which often prioritizes quarterly earnings and rapid exit strategies, patient capital aligns with the inherently long-term nature of environmental investments, making it particularly well-suited to support corporate green initiatives.

The relationship between patient capital and corporate green behavior has become an increasingly prominent topic in both academic research and policy discourse. Corporate green behavior encompasses a broad range of environmentally responsible actions, including the adoption of clean production technologies, investment in research and development for green innovation, implementation of environmental management systems, compliance with environmental regulations, and voluntary disclosure of environmental information (Li et al., 2022). These activities often require substantial upfront capital expenditures with returns that materialize over extended periods, creating a natural affinity with the characteristics of patient capital. In recent years, governments around the world have introduced policies to encourage patient capital investment in green sectors, reflecting a growing recognition that short-term-oriented financial markets may be inadequate for addressing long-term environmental challenges.

Despite the growing interest in this topic, the existing literature remains fragmented across multiple disciplines, including finance, economics, management, and environmental studies. While a substantial body of research has examined patient capital from the perspectives of venture capital, development finance, and corporate governance, relatively few studies have systematically investigated its specific role in promoting corporate green behavior. Moreover, much of the relevant scholarship has been published in Chinese-language journals, reflecting the unique context of China's green finance policy framework and its rapid transition toward ecological civilization. This linguistic and disciplinary fragmentation has hindered the development of a coherent theoretical framework for understanding how patient capital influences corporate environmental decision-making.

This paper aims to bridge these gaps by providing a comprehensive and systematic literature review that synthesizes research on patient capital and its relationship with corporate green behavior. Specifically, the review addresses the following objectives: (1) to trace the conceptual evolution and theoretical underpinnings of patient capital; (2) to evaluate the various approaches to measuring patient capital; (3) to examine the macroeconomic and microeconomic effects of patient capital; (4) to analyze the mechanisms through which patient capital influences corporate green behavior; and (5) to identify research gaps and propose directions for future inquiry. By integrating findings from both English-language and Chinese-language scholarship, this review offers a more complete and nuanced understanding of the patient capital-corporate green behavior nexus, with implications for theory development, policy design, and investment practice.

The remainder of this paper is organized as follows. Section 2 examines the concept and connotation of patient capital, tracing its theoretical origins and key dimensions. Section 3 reviews the measurement approaches used in empirical research. Section 4 discusses the effects of patient capital at both macroeconomic and microeconomic levels. Section 5 provides a focused analysis of the relationship between patient capital and corporate green behavior. Section 6 identifies research gaps and suggests future research directions. Section 7 concludes the paper with a summary of key findings and implications.

2. Concept and Connotation of Patient Capital

2.1 Theoretical Origins and Definitional Evolution

The concept of patient capital has evolved significantly over the past several decades, reflecting changes in the global financial landscape and shifting perspectives on the role of capital in driving sustainable economic development. The term "patient capital" was first popularized by the venture capital industry in the late twentieth century, where it described investments in early-stage enterprises that required extended periods to mature and generate returns (Gompers, 1995; Lerner, 1995). In this context, patient capital was distinguished from other forms of investment by its willingness to accept illiquidity, higher risk, and delayed returns in exchange for the potential for significant long-term value creation.

The foundational definition of patient capital was articulated by the Aspen Institute (2010), which characterized it as capital that is "willing to forgo immediate returns in exchange for greater long-term value creation." This definition highlights three essential attributes: temporal patience, risk tolerance, and a focus on sustainable value generation. Subsequent scholars have expanded upon this conceptualization, incorporating additional dimensions such as the alignment of investor and investee interests, the provision of non-financial support, and the commitment to social and environmental objectives (Dinverno, 2014; Lazonick, 2014). Notably, the concept has transcended its original venture capital context and has been applied to a wide range of investment settings, including development finance, impact investing, infrastructure investment, and corporate governance.

From a theoretical perspective, patient capital draws upon several foundational theories in economics and finance. Agency theory provides a framework for understanding the misalignment of incentives between investors and corporate managers, particularly the tendency of short-term-oriented investors to pressure managers into prioritizing quarterly earnings over long-term value creation (Jensen & Meckling, 1976). Patient capital, by virtue of its extended investment horizon, can mitigate these agency problems by reducing the pressure for short-term performance and allowing managers to pursue strategies that maximize long-term firm value. Resource-based theory further supports the role of patient capital in enabling firms to develop and exploit valuable, rare, and difficult-to-imitate resources and capabilities, including those related to environmental sustainability (Barney, 1991). Stakeholder theory also provides a relevant lens, as patient capital investors often take a broader view of firm value that encompasses the interests of multiple stakeholders, including employees, communities, and the natural environment (Freeman, 1984).

2.2 Patient Capital in Chinese Scholarship

Chinese scholars have made significant contributions to the conceptualization of patient capital, particularly in the context of China's unique financial system and policy environment. In Chinese academic discourse, patient capital is commonly referred to as "naixin ziben" (patient capital), and its conceptualization has been shaped by China's rapid economic development, the dominance of state-owned banks in the financial system, and the government's active role in guiding capital allocation toward strategic priorities (Wang & Liu, 2021). Chinese researchers have emphasized the role of patient capital in supporting industrial upgrading, technological innovation, and, more recently, the transition to a green economy.

Several Chinese scholars have proposed nuanced definitions of patient capital that reflect the country's institutional context. For instance, Zhang and Chen (2020) defined patient capital as long-

term capital that is willing to bear higher risks and accept lower short-term returns in pursuit of strategic objectives, emphasizing its role in overcoming market failures associated with long-term investment. Li and Wang (2021) further distinguished patient capital from traditional long-term investment by highlighting its active engagement with portfolio companies and its commitment to supporting value creation through non-financial means, such as strategic guidance, governance participation, and network facilitation. These conceptual contributions have enriched the global understanding of patient capital by incorporating perspectives from a major emerging economy with distinct institutional characteristics.

In recent years, the concept of patient capital in Chinese scholarship has increasingly been linked to environmental sustainability and green development. The Chinese government's introduction of the "green finance" policy framework, including the Guidelines for Establishing the Green Financial System issued in 2016, has created a favorable institutional environment for patient capital to flow into green sectors (People's Bank of China, 2016). Scholars have noted that patient capital is particularly important in the Chinese context because the country's financial system has historically been characterized by a predominance of short-term bank lending, which is poorly suited to financing the long-term investments required for environmental protection and green technological innovation (Liu et al., 2022). This institutional perspective has added an important dimension to the global discourse on patient capital and sustainability.

3. Measurement Approaches for Patient Capital

The measurement of patient capital has been a persistent challenge in empirical research, owing to the multidimensional nature of the concept and the absence of a single, universally accepted metric. Researchers have employed a variety of approaches to operationalize patient capital, each capturing different aspects of the construct. These approaches can be broadly categorized into four groups: investor-level measures, firm-level measures, market-based indicators, and survey-based assessments.

At the investor level, one of the most widely used approaches is to identify patient capital based on the characteristics of institutional investors. Bushee (1998, 2001) developed an influential taxonomy of institutional investors that distinguishes between "transient," "quasi-indexer," and "dedicated" investors, with dedicated investors exhibiting characteristics most closely aligned with patient capital, including concentrated holdings, long investment horizons, and low portfolio turnover. Subsequent studies have refined this approach by examining specific investor attributes, such as the average holding period of equity positions (Cremers & Pareek, 2015), the proportion of equity held by long-term institutional investors (Hansen & Hill, 1991), and the presence of blockholders with strategic investment objectives (David et al., 2001). These investor-level measures have the advantage of being relatively easy to construct from publicly available data, but they may not fully capture the behavioral dimensions of patient capital, such as the willingness to support management during periods of underperformance.

At the firm level, researchers have developed several proxy variables to measure the degree to which a firm is financed by patient capital. One common approach is to use the ratio of long-term debt to total debt as a proxy for the patience of a firm's capital structure (Li et al., 2022). Firms with a higher proportion of long-term debt are assumed to have greater financial stability and a longer

investment horizon, which aligns with the characteristics of patient capital. Another approach involves measuring the average maturity of a firm's outstanding debt instruments, with longer maturities indicating a greater degree of capital patience (Fan et al., 2012). Some studies have also used the ratio of equity financing to total financing as a proxy, based on the argument that equity investors typically have longer investment horizons than debt holders (Gompers & Metrick, 2001). Market-based indicators provide another avenue for measuring patient capital. Researchers have used stock return volatility, bid-ask spreads, and analyst forecast dispersion as inverse proxies for capital patience, arguing that firms financed by patient capital should exhibit lower levels of short-term market pressure (Froot et al., 1992). Additionally, the ownership structure of firms, particularly the presence of stable, long-term shareholders such as pension funds, insurance companies, and sovereign wealth funds, has been used as an indicator of patient capital (Chen et al., 2023). Survey-based approaches, while less common in large-sample empirical studies, offer the advantage of capturing the qualitative dimensions of patient capital, such as investor attitudes toward risk, time horizons, and engagement strategies. These approaches typically involve structured interviews or questionnaires administered to institutional investors and corporate executives (Bloom & Van Reenen, 2007).

Chinese scholars have contributed to the measurement literature by developing context-specific indicators that reflect the unique characteristics of China's financial system. For example, some researchers have used the proportion of bank loans with maturities exceeding five years as a proxy for patient capital, reflecting the dominant role of bank lending in China's corporate finance system (Wang & Liu, 2021). Others have constructed composite indices that incorporate multiple dimensions of capital patience, including investment horizon, risk tolerance, and engagement intensity (Zhang & Chen, 2020). Despite these advances, the measurement of patient capital remains an evolving field, and there is a need for greater standardization and validation of measurement approaches to facilitate cross-study comparisons and meta-analytical research.

4. Effects of Patient Capital

4.1 Macroeconomic Effects

At the macroeconomic level, patient capital has been associated with a range of positive outcomes, including enhanced economic growth, increased innovation, improved financial stability, and more effective environmental governance. The theoretical argument linking patient capital to economic growth rests on the premise that long-term investment is essential for the accumulation of physical capital, the development of new technologies, and the structural transformation of economies (Solow, 1956; Romer, 1990). By providing a stable source of financing for long-term projects, patient capital enables economies to undertake investments in infrastructure, education, and research and development that would not be viable under short-term-oriented financial regimes. Empirical evidence supports the positive relationship between patient capital and macroeconomic performance. Cross-country studies have found that economies with a higher proportion of long-term investment tend to exhibit higher rates of economic growth, lower levels of income inequality, and greater resilience to financial crises (Bekaert et al., 2012). In the context of developing countries, patient capital has been shown to play a particularly important role in bridging the financing gap for infrastructure and industrial development, where the mismatch between the long-term nature of investment needs and the short-term orientation of available financing has historically been a major constraint on economic development (Ehlers, 2014). Development finance

institutions, such as the World Bank and regional development banks, have been instrumental in providing patient capital to developing economies, demonstrating the public-good dimension of this form of investment.

The relationship between patient capital and innovation has also received considerable scholarly attention. Innovation, by its very nature, is a long-term, uncertain, and often capital-intensive process that requires sustained financial commitment over extended periods. Patient capital, with its tolerance for uncertainty and delayed returns, is particularly well-suited to financing innovative activities. Studies have shown that firms backed by patient capital investors, such as venture capital firms with long investment horizons, tend to invest more in research and development, produce more patents, and achieve higher rates of technological breakthrough (Chemmanur & Fulghieri, 2014; Lazonick, 2014). This finding has important implications for environmental innovation, as many green technologies require substantial upfront investment with uncertain and long-delayed returns.

4.2 Micro-Firm Level Effects

At the microeconomic level, patient capital has been shown to exert significant influence on firm behavior, performance, and governance. One of the most well-documented effects is the relationship between patient capital and corporate investment behavior. Firms financed by patient capital tend to invest more in long-term projects, including research and development, capital expenditures, and strategic acquisitions, and are less likely to cut discretionary spending during economic downturns (Stein, 1989; Bushee, 1998). This pattern is consistent with the theoretical prediction that patient capital reduces the pressure for short-term performance, allowing managers to adopt a longer-term perspective in their investment decisions.

Patient capital has also been linked to improved corporate governance outcomes. Long-term investors, by virtue of their extended holding periods and concentrated ownership positions, have stronger incentives to monitor management and engage in corporate governance activities compared to short-term, transient investors (Edmans, 2009). Empirical studies have found that firms with higher levels of patient capital ownership exhibit lower levels of earnings management, more effective boards of directors, and better alignment between executive compensation and long-term performance (Chen et al., 2007; David et al., 2001). These governance improvements, in turn, contribute to enhanced firm performance and reduced risk-taking.

Furthermore, patient capital has been associated with improved financial performance, although the nature of this relationship is complex and context-dependent. Some studies have found a positive relationship between patient capital and firm profitability, measured by return on assets or return on equity, suggesting that the long-term orientation enabled by patient capital leads to better investment decisions and value creation (Hansen & Hill, 1991). Other studies, however, have found that the relationship is nonlinear or contingent on other factors, such as industry characteristics, firm size, and the quality of corporate governance (Bushee, 2001). These mixed findings highlight the need for more nuanced theoretical models and empirical approaches that account for the heterogeneous effects of patient capital across different contexts and conditions.

Chinese scholars have made important contributions to understanding the microeconomic effects of patient capital, particularly in the context of China's unique institutional environment. Research

has shown that patient capital in China plays a significant role in promoting enterprise technological innovation, improving total factor productivity, and facilitating industrial upgrading (Zhang & Chen, 2020; Li & Wang, 2021). Moreover, studies have found that the positive effects of patient capital on firm performance are more pronounced in industries characterized by high technological intensity, high environmental regulation, and high market competition, suggesting that patient capital is particularly valuable in contexts that require sustained long-term investment (Liu et al., 2022). These findings from the Chinese context provide valuable insights for understanding the role of patient capital in other emerging economies with similar institutional characteristics.

5. Patient Capital and Corporate Green Behavior

The relationship between patient capital and corporate green behavior represents one of the most promising and rapidly growing areas of inquiry in the sustainable finance literature. Corporate green behavior, broadly defined, encompasses the full spectrum of environmentally responsible actions undertaken by firms, including pollution reduction, energy efficiency improvement, adoption of clean technologies, green innovation, environmental information disclosure, and compliance with environmental regulations (Li et al., 2022). The theoretical rationale for the positive relationship between patient capital and corporate green behavior rests on several complementary mechanisms.

First, patient capital alleviates the financing constraints that often prevent firms from undertaking green investments. Green investments, such as the adoption of renewable energy systems, the development of clean production technologies, and the implementation of environmental management systems, typically require substantial upfront capital expenditures with returns that materialize over extended periods (Ambec & Lanoie, 2008). In the absence of patient capital, firms may be unable or unwilling to commit the necessary resources, particularly when they face pressure from short-term-oriented investors to prioritize current profitability over long-term environmental sustainability. Patient capital, by providing a stable and long-term source of financing, enables firms to overcome these constraints and undertake green investments that would otherwise be financially infeasible.

Second, patient capital mitigates managerial myopia, which is a significant barrier to corporate green behavior. Managerial myopia refers to the tendency of corporate managers to prioritize short-term financial performance over long-term value creation, often in response to pressure from capital markets and short-term-oriented investors (Porter, 1992). This tendency can lead managers to underinvest in environmental initiatives, even when such investments would generate positive net present value over the long term. Patient capital, by reducing the pressure for short-term performance and aligning investor-manager incentives around long-term value creation, can counteract managerial myopia and encourage managers to adopt a more balanced approach that incorporates environmental considerations into strategic decision-making.

Third, patient capital facilitates green innovation by providing the sustained financial support and risk tolerance necessary for research and development in environmental technologies. Green innovation is inherently uncertain and time-consuming, with long lag times between initial investment and commercial returns (Horbach et al., 2012). Conventional sources of financing, such as short-term bank loans and equity from transient investors, may be poorly suited to supporting

such activities due to their intolerance for uncertainty and delayed returns. Patient capital, in contrast, is specifically designed to accommodate these characteristics, making it an ideal source of financing for green innovation. Empirical studies have confirmed that firms backed by patient capital investors tend to invest more in green research and development, produce more green patents, and achieve higher levels of green innovation output (Chen et al., 2023).

Fourth, patient capital can influence corporate green behavior through the channel of corporate governance. Long-term investors, as significant shareholders with extended holding periods, have both the incentive and the ability to engage with corporate management on environmental issues. Through mechanisms such as shareholder proposals, direct engagement with management, and voting on environmental resolutions, patient capital investors can encourage firms to adopt more ambitious environmental targets, improve their environmental management practices, and increase their transparency regarding environmental performance (Dyck et al., 2019). This governance channel is particularly important because it enables patient capital to influence corporate green behavior not only through the provision of financial resources but also through active ownership and stewardship.

Empirical evidence from both international and Chinese contexts supports the positive relationship between patient capital and corporate green behavior. Cross-country studies have found that firms with higher levels of patient capital ownership tend to exhibit better environmental performance, as measured by environmental, social, and governance (ESG) ratings, carbon emission intensity, and environmental disclosure quality (Flammer, 2021). In the Chinese context, researchers have found that patient capital, measured by the proportion of long-term debt or the presence of long-term institutional investors, is positively associated with corporate green innovation, environmental investment, and green total factor productivity (Li et al., 2022; Wang & Liu, 2021). These findings are consistent with the theoretical predictions and suggest that patient capital can serve as an effective market-based mechanism for promoting corporate environmental responsibility.

However, the relationship between patient capital and corporate green behavior is not without complexity and nuance. Some studies have found that the positive effect of patient capital on green behavior is contingent on institutional factors, such as the strength of environmental regulation, the quality of corporate governance, and the level of market competition (Liu et al., 2022). Others have noted that patient capital may not automatically lead to improved environmental outcomes if the investor's objectives are not aligned with environmental sustainability or if the investee firm lacks the absorptive capacity to utilize patient capital effectively for green purposes. These contingencies highlight the importance of considering the broader institutional and organizational context when examining the patient capital-green behavior nexus.

6. Research Gaps and Future Directions

Despite the growing body of literature on patient capital and corporate green behavior, several important research gaps remain that warrant further investigation. First, the theoretical mechanisms through which patient capital influences corporate green behavior are not yet fully understood. While existing studies have identified several potential channels, including financing constraint alleviation, managerial myopia mitigation, green innovation facilitation, and corporate governance engagement, the relative importance and interplay of these mechanisms have not been

systematically examined. Future research should develop more comprehensive theoretical models that integrate these mechanisms and test their relative contributions using large-sample empirical data.

Second, the measurement of patient capital remains a significant challenge that limits the comparability and generalizability of empirical findings. As discussed in Section 3, researchers have employed a diverse array of proxy variables to measure patient capital, each capturing different dimensions of the construct. The lack of a standardized measurement framework makes it difficult to compare results across studies and to draw definitive conclusions about the magnitude and significance of the effects of patient capital on corporate green behavior. Future research should focus on developing and validating more comprehensive and reliable measures of patient capital, potentially through the construction of multi-dimensional indices that capture the temporal, behavioral, and governance dimensions of the concept.

Third, the existing literature has predominantly focused on the direct relationship between patient capital and corporate green behavior, with relatively little attention to the moderating and mediating factors that may influence this relationship. Potential moderators include institutional factors such as environmental regulation stringency, intellectual property protection, and financial market development, as well as firm-level factors such as firm size, ownership structure, and managerial characteristics. Potential mediators include green innovation output, environmental management system adoption, and stakeholder engagement. A more nuanced understanding of these boundary conditions and transmission mechanisms would significantly advance the theoretical and practical understanding of the patient capital-green behavior nexus.

Fourth, there is a need for more comparative and cross-country research that examines whether the relationship between patient capital and corporate green behavior varies across different institutional, economic, and cultural contexts. Most existing studies have been conducted in the context of developed economies or China, with relatively little research on other emerging economies, developing countries, or transition economies. Given the significant institutional differences across countries in terms of financial system structure, regulatory frameworks, and cultural attitudes toward environmental sustainability, cross-country comparative research would provide valuable insights into the generalizability of existing findings and the contextual factors that shape the effectiveness of patient capital in promoting green behavior.

Fifth, the dynamic and longitudinal aspects of the relationship between patient capital and corporate green behavior have been largely overlooked. Most existing studies employ cross-sectional or short-panel research designs, which are unable to capture the dynamic evolution of the relationship over time. Longitudinal research that tracks the effects of patient capital on corporate green behavior over extended periods would provide important insights into the temporal dynamics of the relationship, including the lag structure of effects, the persistence of impacts, and the potential for threshold effects or nonlinearities. Such research would also help to distinguish between short-term and long-term effects, which may have different policy implications.

Finally, future research should explore the potential dark side of patient capital in the context of corporate green behavior. While the prevailing narrative in the literature is overwhelmingly positive, it is important to consider whether patient capital can have unintended negative consequences, such

as enabling greenwashing, creating dependency on external financing, or distorting market incentives. A more balanced and critical perspective would enhance the credibility and policy relevance of the research in this area.

7. Conclusion

This paper has provided a comprehensive literature review of patient capital and its relationship with corporate green behavior, synthesizing findings from both English-language and Chinese-language scholarship. The review has traced the conceptual evolution of patient capital from its origins in venture capital and development finance to its contemporary applications in sustainable finance and environmental economics. The analysis has revealed that patient capital, characterized by its extended investment horizons, higher tolerance for uncertainty, and commitment to long-term value creation, provides a financial foundation that is well-suited to supporting the long-term, capital-intensive, and uncertain investments required for corporate environmental sustainability.

The review has identified several key mechanisms through which patient capital influences corporate green behavior, including the alleviation of financing constraints for green investment, the mitigation of managerial myopia, the facilitation of green innovation, and the enhancement of corporate governance on environmental issues. Empirical evidence from both international and Chinese contexts broadly supports the positive relationship between patient capital and various dimensions of corporate green behavior, including green innovation, environmental investment, and environmental performance. However, the review has also highlighted the complexity and contingency of this relationship, noting that the effectiveness of patient capital in promoting green behavior depends on a range of institutional, organizational, and contextual factors.

The review has identified several important gaps in the existing literature and proposed directions for future research, including the need for more comprehensive theoretical models, standardized measurement approaches, investigation of moderating and mediating mechanisms, cross-country comparative research, longitudinal study designs, and a more balanced consideration of potential negative effects. Addressing these gaps would significantly advance the theoretical understanding and practical relevance of research on patient capital and corporate green behavior.

The findings of this review have important implications for policymakers, investors, and corporate managers. For policymakers, the review suggests that policies designed to promote patient capital investment in green sectors, such as tax incentives for long-term green investment, the development of green bond markets, and the creation of public patient capital institutions, could be effective tools for promoting corporate environmental sustainability. For investors, the review highlights the potential for patient capital strategies to generate both financial returns and positive environmental outcomes, supporting the growing trend toward impact investing and ESG integration. For corporate managers, the review underscores the importance of cultivating relationships with patient capital providers and developing the organizational capabilities necessary to deploy patient capital effectively for green purposes.

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