

## **A Multidisciplinary Literature Review of Academic Research on the Green Bond Market**

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### **Abstract**

Climate finance is the mobilization of public and private capital toward climate mitigation and adaptation. Green bonds are one of a growing number of financial products used to facilitate climate finance investments. The green bond market has grown rapidly since the European Investment Bank’s inaugural issue in 2007. In November 2018, the total outstanding volume of green bond issues crossed the \$500 billion threshold, with an additional \$148 billion in green bonds issued since the beginning of 2019. As the bridge between scientists, policymakers, and the private sector, the field encompassing green bonds and other financial instruments could be critical to meeting the targets of the Paris Agreement under the United Nation’s Framework Convention on Climate Change (UNFCCC). And as that happens, it will become increasingly clear that this field will require a vast array of expertise and perspectives. This paper adopts an interdisciplinary approach to map the burgeoning field of literature on green bonds and climate finance more broadly. We situate the green bond market within the development of climate finance by outlining the role that scientific research plays in developing green bond guidelines and standards. We examine this trend from an anthropological and economic-history approach, before delving into the policy research that is emerging in the climate finance and green bond field. This provides the context for an analysis of the rapidly growing body of legal research on the green bond market, including a reflection on the legal ramifications of a pricing difference between vanilla and green bonds. Finally, we propose areas for further research in each of our respective disciplines of anthropology, policy, and law.

**Keywords:** green bonds; climate finance; law; policy; anthropology

## **1. Introduction: A Multidisciplinary Literature Review of Academic Research on the Green Bond Market**

The green bond market is expanding, and investors around the world are showing their appetite for the asset class. As green bonds and other environmental finance products continue to gain credence, the academic literature commenting on this field has also proliferated. This paper is intended to provide a mapping of existing academic climate finance discourse and highlight areas where further research is needed.

The climate finance and green bond debate is inherently interdisciplinary. In their paper, Linnenluecke et al. (2016) provide an overview of how the dynamics of sustainable finance bring together multiple disciplines. In a similar approach, this paper adopts a multidisciplinary approach, highlighting how different disciplines highlight different dimensions of climate finance. Anthropology provides an overview to interpret and connect developments in policy and law that are building the robustness of climate finance markets. As researchers and practitioners in the green bond market, we have attempted to review all published literature on green bonds from our respective disciplines: anthropology, policy, and law.

We begin by defining green bonds and situating the green bond market within the development of the wider environmental, green, and climate finance discourse. The demand from issuers has resulted in debates around a pricing difference, labeled a greenium, which has been studied by economists and market analysts. Pricing research is currently the mainstay of academic research on the green bond market. However, to deepen this understanding of the broader context of the green bond universe, we explore from an anthropological perspective how climate science is being translated into green bond guidance and action, and what the anthropological and sociological theory says on green bonds. This forms the basis for an examination of the political and legal research surrounding the green bonds market and climate finance in general.

## **2. Defining Climate, Green, and Environmental Finance**

The concepts of green, climate, environmental, and sustainable finance are often used interchangeably. Climate finance is generally understood to be the financing of assets and activities that support climate change mitigation (and, arguably, climate change adaptation and resilience). Climate finance can be considered a subset of environmental finance, a growing field concerned with the financial implications of environmental change for industries and firms, and the need to transition to a sustainable economy (Linnenluecke et al. 2016). Similarly, Donovan and Bardalai (2017) propose that green finance “matches sources of funding to new capital and operating expenditures that generate measurable progress toward the achievement of a well-recognised environmental goal.” These

definitions can be expected to change as these fields evolve to include a wider range of sectors that can be “greened” and larger scope financial products (Bergedieck et al. 2017; Lindenberg 2014). The concept of a “well-recognised goal” is reflected in the ongoing development of classification systems used to determine the climate-alignment of assets and activities, for example the European Union Technical Expert Group on Sustainable Finance’s (EU TEG) Taxonomy Technical Reports, commonly referred to as the EU Taxonomy (2020).

Concepts of sustainable, green, and climate finance have yet to be fully translated into law. The political agreement reached on December 18, 2019, between the European Parliament and the Council on a classification system for sustainable economic activities suggests that a binding regulation defining sustainable finance is underway in European Union law. Financial regulators in Europe have punctually released position papers on green finance products (for green bonds, see AMF [Autorité des Marchés Financiers] and AFM’s [Autoriteit Financiële Markten] common position paper, 2019), while in the United States, sustainable finance was the subject of an early 2010 Securities and Exchange Commission (SEC 2010) guidance on climate-related disclosures (revised in 2018), without much normative progress since. It stands in stark contrast with China, which published its 2016 Guidelines for Establishing the Green Financial System. These guidelines clarify the definition of green finance, which refers to financial services provided for economic activities that are supportive of environmental improvement, climate change mitigation, and more efficient resource utilization (UN PAGE, 2016).

The field of environmental finance is derived from the fundamentals of environmental economics discourse. For example, Chesney (2016) builds on the concepts of carbon pricing (either through cap-and-trade or a carbon tax) by applying the Black-Scholes model to determine a “fair price” for carbon credits. Contemporary research on green bond policy represents a significant departure from the incentive-based regulation and carbon-pricing research that emerged in the early 1990s and 2000s. Rather than attempting to reveal or establish a carbon price, this new field of green bond policy research is primarily concerned with monetary policy and financial regulation that is targeted at financial actors, rather than on imposing an operational limit on corporates. However, the financial sector has begun to adopt a different approach to “environmental finance,” which is more aligned with the definition provided by Donovan and Bardalai (2017).

As the subject of this issue, the development of financial products and, in particular, green bonds providing debt-finance to environmentally beneficial assets and activities marks a novel approach to dealing with the same problem. Research on the relationship between green bonds (and other green-finance products) and carbon prices is only starting to emerge, and there is evidence to suggest that carbon prices will support the growth of the green bond market (Heine et al.2019).

### 3. Defining Green Bonds

Green bonds are financial instruments that apply an environmental label to traditional bonds (commonly known as vanilla bonds), to signify that the proceeds will be used for financing green or climate-related products.<sup>1</sup> Green bonds are widely considered to be the flagbearer of the green finance agenda and are expected to deliver the volumes of capital necessary to make the transition to a sustainable economy.

To have an 80 percent chance of maintaining a 2°C limit, the IEA estimates an additional \$36 trillion in clean energy investment is needed through 2050—or an average of \$1 trillion more per year compared to a “business as usual” scenario over the next 36 years (Fulton and Capalino 2014, 2). The bond market is considered an important source of capital for meeting this target.

There are three ways in which a green bond can be labeled as such. Firstly, an issuer can self-label a financial product. In this case, the buyer of the financial product must rely on the reputation or trustworthiness of the issuer that the proceeds of the financial product are being used for expenditures that contribute to an environmental or climate-aligned objective.

Alternatively, the issuer can secure a Second Party Opinion (SPO) from an environmental consultancy or auditor who can confirm that the financial product being labeled as “green” meets the requirements of the International Capital Market Association (ICMA) Green Bond Principles (GBPs). The GBPs are voluntary process guidelines that recommend transparency and disclosure and promote integrity in the development of the green bond market by clarifying the approach for issuance of a green bond.

The GBPs have set a norm for reporting practices and proceeds management. However, the proliferation of the green bond market also brings into question whether the GBPs are robust enough to provide sufficient guidance on a bond’s environmental credentials and safeguard against the risk of greenwashing.<sup>2</sup>

In response to this risk of greenwashing and to meet the need for increased consistency within the green bond market, a third method for labeling a product as “green,” through the application of a “Taxonomy” has emerged. In this instance, issuers of a financial product hire third-party verifiers (who can be the same entities that provide SPOs), to assess the intended Use of Proceeds (UoP) of a financial instrument against a pre-defined standard. Bonds (or other financial instruments) showing that the assets or activities to be

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<sup>1</sup> Other financial products such as loans can also be labeled as “green.”

<sup>2</sup> Labeling or naming of an asset, activity, or financial product as providing an environmental benefit without the asset, activity, or financial product doing so.

financed will meet a technical or operational threshold that is aligned with Paris Agreement targets can be certified or labeled as compliant to a scheme. This method was pioneered by the Climate Bonds Initiative (Climate Bonds), which has developed the Climate Bonds Standard and Certification Scheme. The method has since been adopted by the People's Bank of China (through the Green Bond Catalogue) and is currently being adopted by the European Union Technical Expert Group on Sustainable Finance.

The taxonomic approach proposes that activities or asset-level thresholds can be developed based on climate-science to determine when that activity is providing a significant contribution to climate change mitigation. The concept of "labeling" a financial product raises numerous interdisciplinary questions on the value of labels in financial markets, the reliability and accuracy of such labels, and what an uptake in labeling activity represents in terms of market shifts. It is therefore necessary to maintain a multidisciplinary approach that draws on scientific, economic, financial, legal, policy, and anthropologic perspectives when examining the green bond market.

#### **4. The Market for Green Bonds**

The green bond market has grown rapidly from \$11 billion in outstanding issuances in 2013, to \$389 billion in 2018 (Climate Bonds Initiative 2018) and \$723 billion at the start of January 2020 (Climate Bonds Initiative 2020a). In 2007 the European Investment Bank (EIB) issued the world's first green bond. After this beginning, the market grew quickly. According to JPMorgan Chase, "since the first green bond was issued in 2007 by the EIB, over \$21 billion (USD equivalent) in green bonds have been issued, and \$10 billion worth of green bonds have been issued in 2013 alone." The year 2014 ended with \$36.6 billion issued by 73 institutions, bringing the market to a total of \$53.2 billion outstanding green bonds (Olsen-Rong 2015). In 2015, \$41.8 billion labeled green bonds were issued (Climate Bonds Initiative 2015). In 2016, large green bond issuances by New York City's Metropolitan Transportation Authority and by Apple, with a \$1.5 billion issuance, continued to grow the market (Climate Bonds Initiative 2016). As this growth continues, the green bond market now stands as one of the key sectors of climate finance and environmental finance more broadly.

In 2017, Fiji and Nigeria both issued sovereign green bonds, showing that developing countries were beginning to look at capital markets to finance their climate-aligned infrastructure projects. Commercial Banks such as BDO Unibank in the Philippines, Thai Military Bank in Thailand, and OCBC NISP in Thailand have also issued green bonds in the last twelve months. The growth of the green bond market has led to more diversity in the type of issuers to offer green bonds, which includes development banks, sovereigns, municipalities, corporates, and financial institutions.

Green bonds can also be tagged or labeled green by other entities for grouping in benchmark indices and for exchange listings (ICMA 2018). The Bank of America Merrill Lynch Green Bond Index covers corporate, government, treasury, and securitized bonds, with a fixed minimum issue size of US\$300 million, across a multi-currency benchmark. But this index has no explicit alignment with the GBPs or Climate Bonds certification scheme. Other green bond indices include the Barclays MSCI Green Bond Index, the S&P Green Bond Index/Green Project Bond Index, and the Solactive Green Bond Index. These indices all have varying methodologies for qualifying a bond as “green.” The S&P Dow Jones’ Green Bond index and the Solactive Green Bond index require bonds to be flagged “green” by Climate Bonds in order to qualify for listing. The Bloomberg Barclays MSCI Green Bond Index assesses bonds against six MSCI defined environmental categories. Unlike the Solactive and S&P indices, the latter also includes general-purpose bonds in which 90% of the bond is used for projects under the six categories. The methodological distinctions for green bond classification across the various indexes are in the different approaches for delineating the totality of the green bond market.

## **5. Anthropological and Sociological Theory on Green Bonds**

Over the last twenty years, anthropological and sociological studies of finance have developed into a productive and innovative subfield branching the two social sciences (Beunza 2019; Graeber 2014; Hertz 1998; K. Ho 2009; LiPuma and Lee 2004; Welker and Wood 2011; Zaloom 2019). This research builds on studies by sociologists looking at economic activity’s effects on society in the 1800s (Weber 1958; Simmel 1950), and from anthropologists studying systems of distribution and value in non-Western cultures (Malinowski 1978; Mauss 1967). The development of climate finance and the dramatic growth of the green bond market highlight elements of social change and the materiality of financial markets that have already been explored by social scientists in mainstream finance (Holmes 2014; Scott 2013; Smith 2014).

The rise of climate finance and green bond market practitioners marks a blending of multiple forms of expertise from outside finance to interpret environmental systems (Castree 2013), in a manner that is similar to the growth of Islamic finance (Maurer 2005; Rudnyckyj 2019). Green bond analysts are not only debt experts but also climate change experts (Mitchell 2002; Tripathy 2017). This blending of expertise reflects the embeddedness of financial markets in the social constructs of public and private or government, corporate, and household economic activity (Hann and Hart 2009; Polanyi 1944; Silver 2017).

Parallel to the development of climate finance markets, sociological and anthropological analysis began with reflections on carbon markets and the development of emissions trading schemes. Michel Callon and Donald Mackenzie have traced the construction of

carbon credit markets (Bridge et al. 2019; Callon 2008; Mackenzie 2008). They contextualize the development of these markets as new manifestations of the rule of experts with added forms of knowledge to complement financial expertise (Demeritt 2006; Mitchell 2002).

The green bond market's cross-sectional functioning between private and public entities also furthers market studies in anthropology. As Felix Stein argues in *A Research Agenda for Economic Anthropology*, "for more than a decade, anthropologists approaching states and markets as fundamentally different have tended to describe their relationship with reference to neoliberalism" (Stein 2019, 25). The growth of the green bond market, a whole sector of the bond market, as a result of supranational entities challenges this division of the public and private in distinguishing states and markets. Climate finance enmeshes countries and markets with governments, corporations, and global law firms, interacting in the same field of the market directly (Lovell 2014).

Through markets such as those for green bonds, nature is accounted for in finance, or at least potentially accounted for. This process involves the translation of and accounting for climate change in financial activity. As Jaume Franquesa notes in his review of Aneil Tripathy's longitudinal study of the green bond market, green bonds "involve the complex cultural task of accounting for nature, translating it into the language of finance. The complications that this translation involves promote the creation of novel intermediate financial instruments, further introducing nature into the logics of finance" (Franquesa 2019, 84). The dynamic of climate finance extending the governance and purveyance of financial markets has also been noted by Sian Sullivan, particularly in relation to the green bond market (Sullivan 2018).

In their work, climate finance practitioners argue that the history of successful capital markets goes hand in hand with strong public sector policies (Bainbridge et al. 2018; Rutherford 2019). For them, with the growing political will for climate action, green investment offers an opportunity to strengthen both public and private sectors by providing a space of collaboration. Their view of the green bond market is inherently pluralistic and defies the categorization of the market as private or public, as they see the market as a space of collaboration between NGOs, governments, and corporations. Climate finance operates as what Michel Callon would recognize as an "anthropology of entanglement... [that] frees us from the irritating and sterile distinctions between state and market" (Callon 1998, 40). Research on climate, environmental finance and the green bond market highlights the relationship between finance and the physical and environmental effects of human society.

Climate finance engenders an innovative assemblage of understandings of nature and finance that impacts materiality through the construction of green infrastructure, funded

by creative financial instruments (Rocky Mountain Institute 1998, 235). In the green bond market, nature is homogenized as green, and yet it is this homogenization that distinguishes green bonds from regular bonds. The value of a green bond comes from being different, as an innovative climate finance product, as well as from being similar in all practical aspects to a traditional bond. This sameness allows for the comparison between bonds to determine the added value of a bond issuance being green.

## **6. The Translation of Climate Science into Finance**

As capital markets have begun to take notice of the opportunities present in the environmental and climate space, the risk of “greenwashing” financial products has become visible. This is particularly pressing because, according to Bergedieck et al. (2017), the labeling of “green finance” depends on the purpose of the borrower’s or lender’s capital. There have been numerous examples of green bonds that have been issued by entities whose main economic activity is counter-intuitive to the climate change mitigation agenda. For example, Repsol recently issued a “green bond,” but this was poorly received by the green finance market because the firm’s primary economic activity is the production of fossil fuels. This utilization of climate science to determine the upper limit of an asset or activity’s operational emissions is intended to counter the risk of “greenwashing,” an existential threat to the environmental and climate agenda that has existed for decades (Bigger 2017).

Climate science, through modeling and analyzing the environment with quantified assumptions, already involves a translation of information into guidance on economic activity (Lahsen 2005, 899). Taxonomies such as the EU Taxonomy and the Climate Bonds Taxonomy are based on existing models and policy directives. For example, the electricity generation thresholds of the current draft EU Taxonomy, are based on the EU’s net-zero by 2050 target, a political target reflecting a science-based commitment to decarbonization of the economy.

## **7. The Policy Significance of Green Bonds**

There is a growing body of frameworks and policies that countries around the world are implementing to enable green finance to flourish. Central banks, financial regulators, and ministries of finance and other government bodies are engaging in coordinated efforts to increase the financing of green assets, and simultaneously working to “green” the financial system (UK BEIS 2019).

Sovereigns are increasingly issuing sovereign green bonds to finance green infrastructure projects and improve climate resilience. At the time of this writing, twelve governments had issued a total of 19 green bonds (Climate Bonds Initiative 2020b). The countries that



have issued sovereign green bonds have published Green Bond Frameworks outlining the specifics of the green bond, in line with the GBPs. The green bonds issued by Nigeria, the Netherlands, and Chile have also been certified by Climate Bonds (2020b). Such issuances have deepened the green bond market and exemplify its potential to decarbonize the global economy (OECD 2016).

As this sovereign green bond market grows, governments will need to improve the policy frameworks that surround it (Jun et. al. 2016; Clapp and Pillay 2017). Samuwai (2018) compares the climate finance readiness in 12 countries across the Asia-Pacific region. The study employs a multivariate model to examine the aggregate effect of policy and institutions, knowledge management and learning, and fiscal policy environment—all on a country's ability to attract climate finance.

The green bond discussion is complemented by a broader discussion on the need to embed climate and more extensive environmental and sustainability considerations into financial market activity. This field is primarily focused on understanding and addressing the risks that are presented by climate change. Climate change might lead to considerable losses in the financial and real economy owing to the stranding of assets, limited resource availability, fluctuations in prices, or the effects of policy choices, such as carbon pricing (Carbon Disclosure Project 2019). Similarly, at the sovereign level, Buhr et al. (2018), show that there is an increasing cost of capital faced by emerging countries that are most vulnerable to climate change.

Literature on the financial risks associated with climate change, and the macroprudential and financial tools available to policymakers to manage such risks, is growing. Since his landmark speech at Lloyd's of London in December 2015, Mark Carney, former governor of the Bank of England, has been leading the charge in creating a financial system that recognizes climate risk. In that speech, Carney lambasted the short-sighted, profit-seeking culture that led to the financial crisis and warned of the "tragedy of the horizon" (Carney 2015). He also discussed the ensuing establishment of the Task Force on Climate-related Financial Disclosures (TCFD), which has been instrumental to helping inform the financial market and policymakers about practices relating to climate risk disclosure (IAIS 2020).

The TCFD has sought to develop voluntary and consistent climate-related financial risk disclosures to be used by companies in providing information to investors, lenders, insurers, and other stakeholders. This has been a major step toward embedding awareness and action into the private sector. It expects that increasing transparency will make markets more efficient and economies more stable and resilient.

Prudential Regulation has become a core focus for climate finance. Campiglio (2015) and Liebreich & McCrone (2013) examine how macroprudential regulation affect environmental investments but can also be the key to unlocking them. Bolton et al. (2020) point to the role that central banks, regulators, and supervisors will play in addressing the risks that climate change poses to the financial system. Similarly, Dikau and Volz (2020) examine whether central banks have incorporated climate-related risks into their mandates. Matikainen et al. (2017) offer a variety of policy options for incorporating climate considerations into asset purchasing strategies, and Vaze et al. (2019) proposes policy levers available to central banks and financial regulators seeking to support climate-aligned investments and to reduce the climate-related risks facing the financial sector.

These studies have complemented the work of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), which was established to define and enhance the role of the financial system in managing risks and mobilizing capital “to support the transition toward a sustainable economy. . . . The Network’s purpose is to help strengthen the global response required to meet the goals of the Paris Agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development.” (NGFS 2019)

## **8. Green Bond Market Governance in the Legal Literature**

The legal literature on green bonds acknowledges a divide between Western countries on the one hand and China and other Asian countries on the other. In China, green bonds markets are regulated through public provisions set by the regulators of the Chinese bond markets (Franklin 2017; V. H. Ho 2018). Indian guidelines issued by the Securities and Exchange Board of India (SEBI) are also deemed by legal authors to provide public governance for the green bond market (Faske 2018; Wang 2018). Conversely, Western countries’ green bond regulations rest on private governance mechanisms (Park 2018).

Park (2018) mobilizes a substantial body of legal scholarship on Corporate Social Responsibility (CSR) and transnational law to describe how a plurality of private mechanisms (investment standards, certification schemes, ratings, and third-party assessments) enables Western green bond markets to function. Park assesses the degree of inclusiveness and prescriptiveness of private regulations (GBP, Climate Bonds green bond indices, certification schemes, and ratings). In doing so, he identifies green bond private governance’s legitimacy issues. To address them, he advocates a hybrid legal framework combining public and private regulation through different legal techniques. Illustrating this hybrid system, Park suggests that public regulators could set a private standard default

penalty: regulated entities are penalized unless they comply with the designated private standard (Park, 2018).

As a sub-element of green bond private governance, certification schemes received special attention from the legal literature. Cristina Banahan and Paul Rose demonstrate that green bond verifiers (GBVs) share many features with credit rating agencies (CRAs). According to them, GBVs and CRAs both act as intermediaries of information, operate on a license (be it granted by Climate Bonds or by a credit regulator), and are financed through an issuer-pays model (Rose 2018). Banahan adds a fourth similarity: GBVs' and CRAs' common reliance on reputation. She also identifies a difference: unlike GBVs, CRAs have been legally obliged to disclose their methodologies since the aftermath of the 2008 financial crisis (Banahan 2019). This overall likeness between GBVs and CRAs raises questions about the ability of GBVs to avert CRAs' systemic failures that led to the 2008 financial crisis. Rose and Banahan advance solutions to tackle GBVs' systemic weaknesses. Rose suggests that Climate Bonds should entice non-profit GBVs. In addition, Climate Bonds should allow investors to sue GBVs in case of poor climate verification (Rose 2018). Banahan advocates the creation of a Green Bonds Standards Committee in the United States which would, among other functions, monitor GBVs and create litigation rules to hold them accountable for the quality of their verifications (Banahan 2019).

In addition to certification schemes, green bonds' private governance raises a diversified set of legal questions. Regarding investors' legal drivers, legal authors have suggested that investors' green mandates and/or their fiduciary duties—which, at times, require them to take into account climate risks—may constitute legal incentives for becoming a green bondholder (for example, Mercier 2017; Park 2018).

However, both types of governance regimes—the Western private and the Asian public ones—are imperfectly integrated into international climate finance law. According to Zahar, climate finance in international law is “the United Nations Framework Convention on Climate Change (UNFCCC)—induced transfer or finance from richer to poorer countries for climate change action (mainly mitigation and adaptation)” (Zahar 2017). To be qualified as climate finance under the UNFCCC, finance flows must abide by several criteria (for instance: being new and additional, adequate and predictable). These criteria are not addressed by existing green bond governance regimes. As a consequence, in the *2018 Biennial Assessment and Overview of Climate Finance Flows Technical Report* released by the UNFCCC Standing Committee on Finance, green bonds are not reported as climate finance enabling developed countries to meet their commitments under article 9.1 of the Paris Agreement (“Developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention”), but only as a method for producing quantitative and qualitative information on capital stock and flows in order to

track consistency with Article 2.1(c) (“Making finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development”).

The fact that green bond governance imperfectly fits international climate finance law does not strip it from all normative value. For instance, Park considers the Green Bond Principles a “policy dissemination tool,” because they help spread recommended standards templates (Park 2018). Faske has also emphasized the relation between green bonds and regulations implementing climate information disclosures (Faske 2018), on which a rich legal literature has preceded the rise of green bonds (for example, Watchman et al. 2007).

Despite the accomplishments of private governance in the green bond market, calls for improved green bond regulation are almost as old as the market itself (Baily 2015; Malecki 2015). In addition to the proposals already mentioned (hybrid governance, improved certification, and contractual structure), legal authors support clearer transparency and litigation rules. Some recommend the opening of class action litigation, and litigation on an environmental due diligence standard (for example, Trompeter 2017). Others endorse the implementation of tiered standards (that is, standards with different shades of green) (for example, Franklin 2016; Clapp 2018; Wang 2018) or advocate the use of blockchain for better enforcement of green bond regulations (Zhang et al. 2018).

## **9. Pricing Research on Green Bonds**

The process of knowledge translation that has been linked to green bonds as green is now actively developing into a priced distinction within financial markets. Academic research on the green bond market has been most prolific within economics, where research focuses on pricing differences between green and vanilla bonds.

The search for a green bond discount or greenium initially started by looking for differences in yields for corporate green bonds compared with non-green corporate bonds (Preclaw and Bakshi 2015). Another paper in this issue of the *JEI* summarizes research trends and market conversations around green bond pricing (Harrison et al. 2020). Beyond economics, a greenium is also particularly significant for its potential legal ramifications.

## **10. The Legal Consequences of a Greenium**

The legal literature on green bonds stresses that no green-bond-related litigation has occurred so far. However, the literature on climate litigation underlines that “the development of green financial products such as ‘green bonds’ or ‘green loans’ will inevitably lead to litigation” (Solana 2019).

The literature on green bonds highlights that the majority of litigation risks materialize if qualifying a bond as “green” triggers financial gains or losses. In the United States, bondholders are offered civil liability and private rights of action under the Security Act of 1933 on condition that they show *loss* and available remedies (Czerniecki and Saunders 2016; Breen and Campbell 2017; Franklin et al. 2017). In France, bondholders could also be offered civil liability under the article 1240 of the Civil Code if they demonstrate, among other conditions, the existence of a loss (Mercier 2017). The pricing effect of green bonds does have legal consequences. However, some of the litigation risks extend beyond the pricing question. Lawyers underscore the need for appropriate environmental due diligence to be carried on by the underwriter in the process of issuing a green bond. Besides the control by financial regulators over information accuracy in issuance prospectuses, competition law and marketing law can also potentially prove fertile grounds for litigation (Czerniecki and Saunders 2016; Breen and Campbell 2017; Franklin et al. 2017; Mercier 2017).

Pricing has another legal consequence: it enables a more sophisticated contractual structure. To date, the legal specificity of green bonds is generally limited to a green promise described in the issuance prospectuses or, more exceptionally, in the definitive contracts between the issuer and the bondholders. These promises have never been adjudicated. Very specifically, some Asian green bonds include a green commitment in the underwriting agreement—the agreement between the issuer and its investment bank (Franklin et al. 2017). Even though legal practitioners state that green bonds reflect the diversity of the legal forms—for example, use of proceeds bond, secured bond, convertible bond, and so on—in use on the bond market itself (Czerniecki and Saunders, 2016; Breen and Campbell, 2017; Franklin et al. 2017; Mercier 2017), they stress that a wide array of legal tools in use on the bond market could be employed for green bonds: ESG, use of proceeds and reporting covenants, green event of default, put option, and so on. However, these tools imply additional legal fees and additional risks for the issuer (Czerniecki and Saunders, 2016; Breen and Campbell 2017). Therefore, their usability relies upon a green bond pricing effect that would be important enough to offset the cost of these legal tools.

In turn, more sophisticated contractual features for green bonds could open additional venues for litigation. For instance, as the green bond contract may include provisions requiring “the issuer or the borrower to guarantee that the finance raised will be only used to fund specific projects,” a “breach of these contractual obligations could lead investors and lenders to enforce early termination of rights that would trigger an acceleration of payments.” (Solana 2019)

## 11. Future Research Avenues

In this paper, we have analyzed the development of the green bond market in the context of its significance for current research in anthropology, law, and policy. We conclude with an overview and reflection on relevant ongoing research programs.

### 11.1 *Anthropology*

As the green bond market and climate finance continue to expand, and as environmental, social, governance, and climate risk assessments become embedded in mainstream finance, anthropologists and sociologists have crucial work to do in documenting the cultural and material impacts of these transitions.

These disciplines can provide a perspective on the lived reality of working in these financial markets that can allow us to comprehend the larger societal impacts of the accounting, legal regimes, market dynamics, and policy decisions that produce climate finance and the green bond market.

Currently, there are multiple initiatives within sociology and anthropology that look to be fruitful focal points for research on climate finance. The European Union's Horizon 2020 has funded two projects focused on analyzing both the dynamics of investment in fossil fuels as well as impact investing (European Commission 2017; 2019). Based at the University of St. Andrews and the University of Bologna, two teams of anthropologists are just beginning longitudinal studies of both brown and green finance.

Michel Callon states in *The Laws of Markets* that “the market must be constantly reformed and built up from scratch: it never ceases to emerge and re-emerge in the course of long and stormy negotiations in which the social sciences have no choice but to participate” (Callon 1998, 266). This reflection captures the transformation that we are experiencing in the growth of the green bond market and climate finance more broadly.

### 11.2. *Policy*

A cohesive policy agenda for mobilizing trillions toward climate change mitigation and adaptation and for other sustainable development goals is evolving rapidly, partly as a response to financial reforms, but also out of a growing policy acknowledgement of the cost of climate change.

The COP 25 in Madrid failed to reach an agreement on the guidelines for implementing the carbon market established by article 6 of the Paris Agreement. This failure, in theory, leaves the State Parties to the Agreement no choice but to develop other climate finance instruments—like green bonds—in order to meet their climate finance obligations, such as

the 100 billion dollars pledged by developed countries to developing countries for every year from 2020 onwards.

With this context considered, policy researchers should analyze how to best ensure that the world's financial system becomes more resilient while promoting climate-aligned investments. There is a growing suite of policy tools that can be used to incentivize investments in green bonds. The utility of these tools should be analyzed by policy researchers as the approaches are furthered by different public sector actors. These tools include

- Integrating climate risk into financial management by taking a precautionary approach.
- Understanding what climate risk is, through climate finance modeling and implementation of the TCFD recommendations (which should be expanded to other environmental areas).
- Accelerating taxonomy-aligned investment through
  - Green stimulus
  - Fiscal rules
  - Taxation
  - Private finance and credit guidance
  - Quantitative easing for green

### 11.3 *Law*

Further legal research on green bonds could draw on the emerging field of climate finance law (Bowman 2015; Sarra 2018; Zahar 2017). From an environmental law perspective, legal scholars have already started exploring the role of the precaution principle in finance (Cullen 2018), legal aspects around environmental information disclosure (Epstein 2015) and the 2015 Paris Climate Agreement's provisions on adaptation financing (Di Leva 2017). From a financial law perspective, legal scholars and practitioners have begun to uncover legal issues raised by other green finance products, such as carbon allowances (Olawuyi 2016). In light of environmental issues, legal scholars reinterpreted central financial law concepts like fiduciary duty (Richardson 2013).

Building on these works, further legal research could focus on the following questions: How consistent are the environmental legal characteristics of green bonds with existing environmental law instruments? To what extent can green bonds contribute to environmental reforms of financial law? Combining environmental and financial laws, what would be the ideal legal form of environmentally concerned, publicly traded debt instruments?

## 12. Conclusion

In this paper, we have outlined academic research on the green bond market with a focus on current climate finance, green bond market perspectives, and research in anthropology, policy, and law. We hope that academics in these disciplines will expand on the research agendas we have outlined here.

For many practitioners in climate finance, the growth of the green bond market and other climate finance instruments support a hope that our global financial system and global environmental sustainability can be symbiotic. The development of the science, policies, legislation, and technologies, as well as business and financial models to make this transition happen, requires interdisciplinary research. This paper is intended to introduce this field and to serve as a starting point for future research in these areas.



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