

Original Paper

Pricing Catastrophe: The Operation and Critique of Financial Algorithms in Kim Stanley Robinson's *New York 2140*

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Abstract

This paper examines the role of artificial intelligence (AI) in an economic model that profits from climate catastrophe, as depicted in Kim Stanley Robinson's science fiction novel New York 2140. Through a textual analysis of the novel's central financial algorithm, the "Intertidal Property Pricing Index" (IPPI), this study reveals how AI algorithms transform the physical realities of disaster into tradable financial products. The research finds that the IPPI primarily reshapes New York's post-disaster economic order and exacerbates social inequality through three steps: the "datafication" of disaster consequences, the "marketization" of risk, and the "socialization" of profits and costs. This paper argues that Robinson, through his portrayal of this financial algorithm, critically exposes how technological tools can combine with specific economic motives, offering a literary reference for understanding the complex interplay between technology and economy in the real world.

Keywords

New York 2140, Artificial Intelligence, Climate Capitalism, Financial Algorithms, Technology Critique

1. Introduction

In an era where human activities have profoundly impacted the global climate, climate change has become a significant subject of literary attention, particularly within science fiction. Kim Stanley Robinson's *New York 2140* (2017) stands as a pivotal work in this genre. The novel portrays a future New York partially submerged after a 50-foot rise in global sea levels. In Robinson's narrative, the city does not devolve into ruins; instead, it evolves into a complex society where the existing capitalist system adapts to the new environment, even discovering novel avenues for profit, thereby forming what is termed "climate capitalism."

Within this process, artificial intelligence (AI) plays a crucial role. It is not merely a background setting but a tool deeply embedded in socioeconomic operations. This paper focuses on one of the novel's most representative AI applications: the "Intertidal Property Pricing Index" (IPPI). By analyzing this financial algorithm, we aim to explore its operational mechanisms and societal consequences.

2. Literature Review

Climate Fiction (Cli-Fi) has garnered increasing academic attention in recent years. Trexler and Johns-Putra define cli-fi as "literary works in which climate change is a central plot element" (2015, p. 5), arguing that such works not only reflect scientific understanding but also explore the social, political, and psychological impacts of climate change. Goodbody and Johns-Putra further emphasize that cli-fi, by imagining future scenarios, offers readers a critical perspective for contemplating contemporary climate politics (2019, p. 10).

Within cli-fi studies, "climate capitalism" is a significant concept. Newell and Paterson define it as "the process by which capitalism adapts to and seeks to profit from climate change" (2010, pp. 1-10). In *New York 2140*, many scholars have focused on the novel's depiction of urban adaptation to climate change. Abbott compares *New York 2140* with other urban science fiction works, exploring how science fiction imagines urban futures (2016, pp. 150-160). Iveson analyzes the novel's urban environmental politics, particularly how urban citizens establish and protect public resources. The novel's financial politics are also a focal point (2013, pp. 80-95). Klein, in *This Changes Everything: Capitalism vs. the Climate*, critically analyzes how capitalist logic conflicts with effective responses to climate change, while also noting how capital transforms climate crises into new sources of profit (2014, pp. 20-30). Ortiz argues that *New York 2140* offers an intriguing description of financialized accumulation in the era of climate change (2020, pp. 264-279). Kornbluh (2019) views the novel as an exploration of "climate realism," analyzing the continuation of financial capitalism in the wake of climate disaster (2019, pp. 787-809).

Concurrently, in recent years, Chinese scholars have also begun to interpret cli-fi from various perspectives. For instance, Sun (2023) discusses issues of ecological justice in *New York 2140*, arguing that the novel reveals capitalism as the root cause of ecological crises (pp. 45-50). This perspective provides a reference for this paper's analysis of the novel's economic system. Hu and Wang (2023)

point out that cli-fi needs to construct “physically self-consistent narrative threads” (pp. 165-173), and the operation of financial AI in the novel embodies this logic: AI automatically orchestrates capital by quantifying climate risks (e.g., sea-level rise, property devaluation). This aligns with Jin’s (2023) view on “cli-fi breaking through traditional eco-dystopias” (pp. 38-45), suggesting that technology is not entirely negated but can also serve as a tool for social governance. The research by Sun (2023) and Tang and Liu (2023) provides an ethical framework for critiquing financial AI (Sun, 2023, p. 45; Tang & Liu, 2023, pp. 83-90). The novel illustrates how AI algorithms, trained on historical data, perpetuate pre-disaster socioeconomic discrimination, leading to skewed allocation of flood protection resources. This injustice of “Environmental Justice Technology” reveals how algorithmic decision-making’s hidden power can exacerbate social inequality (Jiang & Yan, 2023, pp. 71-79).

These studies provide theoretical perspectives for this paper’s analysis of financial algorithms in *New York 2140*, helping us recognize that AI in the novel is not merely technology but a tool capable of generating immense social impact. Building upon previous research, this study aims to specifically demonstrate, through an analysis of the IPPI, how the novel depicts the combination of technology and economic motives and its resulting social consequences.

3. Transforming Chaotic Physical Reality into Orderly Data

The IPPI’s primary function is to convert chaotic, unpredictable physical realities into calculable, manageable financial data. In the novel, Franklin, an experienced financial trader, initially struggles with how to value Manhattan properties submerged by rising sea levels. Traditional financial models, such as the Black-Scholes-Merton model, prove inadequate when confronted with unprecedented “underwater assets.” He gazes at the waves lapping against buildings, pondering: “I watched the little waves lap at the doors and wondered if the Black-Scholes formula could frame their volatility” (Robinson, 2017, p. 278). This statement is crucial to understanding the essence of the IPPI. It reveals an inherent impulse: to “frame” and “tame” nature through the logic of mathematics and algorithms. The physical force of waves, the uncertainty of tides, the destructive power of storms—elements that ordinary people perceive as danger and threat—are transformed, from Franklin’s algorithmic perspective, into “volatility” that needs to be quantified.

The construction of the IPPI algorithm precisely addresses this problem of quantifying “volatility.” It integrates a series of seemingly objective variables, including but not limited to: housing indices, sea-level change data, tidal data, and storm frequency and intensity (assessing the risk of extreme weather events). These data are fed into complex algorithmic models, ultimately assigning a precise price index to properties beneath the vast expanse of water. This process represents a high degree of abstraction. The survival struggles of residents in the physical world, the destruction of ecosystems, and the dangers of the underwater environment are completely stripped away in the algorithmic model, simplified into a series of cold, calculable parameters. For example, the novel mentions that even completely submerged buildings, as long as their structure remains intact, can be assigned an

“underwater value” by the IPPI. This value is not based on their functional use but on their potential for future “salvage” or “repurposing,” as well as a risk premium associated with the surrounding environment. It is through this “datafication” transformation that capital executes the first step of disaster management: reshaping a complex, painful socio-ecological problem into a purely technical operational issue, thereby paving the way for subsequent financialization.

The IPPI’s “datafication” process is not merely about collecting data; it is an active, ideologically biased act of “framing.” Through Franklin’s perspective, the novel repeatedly emphasizes this impulse to reduce a complex world to numbers. For instance, when he considers how to price submerged properties, his concern is not the displacement of residents or the destruction of ecosystems, but “volatility”—a purely financial concept. This shift in focus is precisely how the algorithm “tames” nature. It strips natural forces, such as tides and storms, of their raw, uncontrollable, and even destructive aspects, transforming them into predictable, calculable risk factors. Robinson writes: “Franklin knew his job was to turn all of it—the water, the wind, the tides, human despair—into numbers, and then put those numbers into his model” (Robinson, 2017, p. 279). This description directly points to the essence of the IPPI: it is a cold tool that incorporates even “human despair” into its calculations. This datafication transforms disaster from a social problem requiring resolution into a quantifiable, tradable “asset.”

The novel further reveals the depth of this datafication through the specific parameter settings of the IPPI. In addition to the aforementioned housing indices, sea-level change data, tidal data, and storm frequency and intensity, the IPPI also considers micro-level data such as “foundation stability,” “corrosion resistance of building materials,” and “expected future flood protection facility construction.” These data collectively construct a seemingly comprehensive and objective evaluation system. However, this “objectivity” is deceptive. It ignores the origin of the data, the methods of collection, and potential underlying biases. For example, data concerning “expected future flood protection facility construction” might be influenced by non-technical factors such as political lobbying and interest group influence, but these factors are simplified into cold numbers within the IPPI algorithm, thereby obscuring the social dynamics behind them. This datafication process, in essence, technifies social and political issues, shifting discussions about these problems from the public sphere into the “black box” of technical experts, thereby weakening public participation and oversight.

More profoundly, the IPPI’s datafication process also reflects a redefinition of “value.” In traditional conceptions, the value of a house lies in its residential function, community ties, historical and cultural significance, etc. However, within the IPPI framework, these non-quantifiable values are completely excluded, leaving only pure financial value. Even buildings submerged by seawater and uninhabitable are still objects of IPPI’s attention as long as their “underwater value” exists. This singularization of value allows financial logic to permeate every corner of social life, transforming everything into a tradable commodity. Through the IPPI, Robinson presents an extreme future where even disaster itself

is assigned a price tag, becoming a tool for capital accumulation. This serves not only as a warning for the future but also as a critical reflection on the current trend of excessive financialization in society.

4. Establishing a Real Market on Virtual Data

Once disaster is successfully datafied, the IPPI proceeds to its second function: creating an entirely new speculative market. In the novel, an anonymous narrator, known as “the citizen,” cynically explains to the reader that the essence of finance is “betting on the future,” and “pricing things before they happen” (Robinson, 2017, p. 144). The IPPI perfectly exemplifies this. It allows speculators to wager on future sea-level fluctuations and the arrival of storms. Franklin's transactions through the IPPI are not essentially about purchasing property itself, but rather about purchasing the “risk” and “future possibilities” associated with these properties.

The novel explicitly states that the IPPI makes it possible “to speculate on assets on land you couldn’t own” (Robinson, 2017, p. 144). This statement incisively points to the algorithm’s creative power. It conjures a market that previously did not exist. Before sea-level rise, no one would consider trading underwater land, as it had lost its traditional use value. However, through its complex calculations, the IPPI assigns financial value to these “useless” assets, thereby incorporating them into the circulation of capital. In this market, value generation no longer depends on traditional use value (residence) or exchange value (buying and selling property), but entirely on the future volatility predicted by the algorithmic model. For example, when news emerges that a certain area might undergo large-scale drainage projects, the IPPI index for that area would skyrocket, and even if the actual project has not yet begun, or is merely a rumor, speculators can profit from it. This “futurity” and “uncertainty” are precisely quantified by the algorithm and become the core of trading. By financializing climate risk, the IPPI transforms disaster itself into a tradable commodity, opening up a new, vast, and endlessly speculative profit growth point for capital amidst the ruins. This mechanism allows capital to draw sustenance from disaster, and to some extent, the persistence and uncertainty of disaster actually become a driving force for an active financial market.

The novel further deepens its critique of the IPPI’s marketization function through its description of “underwater mortgages.” After sea-level rise, the actual value of many properties falls far below their mortgage amounts, creating a large number of “underwater mortgages.” The emergence of the IPPI enables these seemingly “non-performing assets”—mortgages—to be bundled, securitized, and re-entered into the financial market for trading. This means that even properties that have lost their practical residential value can still have their associated debts and risks transformed by financial algorithms into new profit opportunities. This commodification of debt and risk allows the financial system to continuously profit from social distress, while the true risks and losses are ultimately borne by the lower strata of society. Through this detail, Robinson reveals how financial algorithms convert social problems into financial opportunities, and in this process, further exploit vulnerable groups.

Furthermore, the IPPI's marketization is also reflected in its monopolization and manipulation of "information." Financial institutions that control the core of the IPPI algorithm can acquire and analyze data earlier and more accurately than the general public, thereby gaining an absolute advantage in the market. This information asymmetry makes it difficult for ordinary investors to compete with large financial institutions, further exacerbating the trend of wealth concentration among a few. In the novel, Franklin's ability to predict market trends through the IPPI, thereby thriving and accumulating immense wealth during financial crises, is a manifestation of this informational advantage. This concentration of "information power" means that the market created by the IPPI is not a fair and competitive one, but rather a market manipulated by and serving the interests of a select few.

5. Distributing Market Consequences to Society

The IPPI, a seemingly neutral technological tool, in its actual operation, becomes an engine for exacerbating social inequality. It not only fails to alleviate the social problems brought about by climate disaster but, through its operational mechanisms, concentrates benefits among a few while shifting risks and costs to broader social groups.

Firstly, it solidifies the unequal distribution of risk across space and class. In the novel, New York's social structure undergoes significant changes due to sea-level rise. The higher-elevation "Cloister Cluster" in Upper Manhattan becomes a haven for the wealthy, boasting advanced flood protection facilities and stable living environments. In contrast, the "water rats" of downtown—ordinary citizens unable to afford high-ground living—reside in the intertidal zone, constantly exposed to risk, their homes vulnerable to tides or storms. Financial tools like the IPPI enable elites in safe zones to calmly profit from trading the disaster risks of others from behind computer screens, while transferring real physical risks and existential pressures entirely to the ordinary people living underwater. For example, when a storm hits and property values in the intertidal zone plummet, investors holding "put options" make huge profits, while residents in those properties may lose everything. Capital, through algorithms, achieves a perfect separation of profit and risk, privatizing profits and socializing risks, leading to a profound class stratification. This stratification is evident not only in wealth but also in the ability to control safety, stability, and the future.

Moreover, the algorithm, with its technical facade, conceals the political nature of the climate crisis. The IPPI downgrades sea-level rise—a systemic crisis requiring global cooperation and profound social transformation—into a technical problem that can be "effectively managed" through price mechanisms in the financial market. It creates an illusion that climate change can be solved through smarter financial engineering, without addressing the underlying economic model driven by endless growth. This illusion of a "technical solution" causes people to overlook the deep roots of the climate crisis: the unlimited expansion of capitalism and the uncontrolled exploitation of natural resources. This is where "climate capitalism" is deceptive: it avoids questioning systemic origins, instead commodifying the crisis itself and profiting from it. By simplifying complex social problems into calculable financial

risks, the IPPI effectively diverts public attention, leading people to focus on how to profit from disaster rather than how to fundamentally address its causes.

6. Conclusion

This paper, through a textual analysis of the core financial tool IPPI in *New York 2140*, demonstrates the role of AI algorithms in an economic model that profits from disaster. The study shows that the IPPI is not a passive value assessment tool but an active, three-step transformative mechanism: it first “datafies” chaotic physical disasters into abstractions; then “marketizes” risk into tradable financial commodities; and finally, it unevenly “socializes” the benefits and costs generated by this process, exacerbating social stratification.

Robinson’s profound insight lies in not simply viewing technology as good or evil, but examining it within a specific economic system, thereby revealing how technological tools combine with particular economic motives to produce immense social impact. The novel’s critical power does not lie in opposing technology itself, but in exposing the social consequences that can arise when technology is used to serve unrestrained capital accumulation.

The warnings of *New York 2140* are particularly relevant today. In an era where artificial intelligence and big data increasingly permeate our lives, it is necessary to be vigilant about how technological tools can be used to exacerbate social injustice and circumvent discussions about fundamental problems. As the novel reveals, when facing systemic crises, the solution may not lie in designing more sophisticated tools to “manage” the crisis, but in having the courage to examine and reflect upon the very system that continuously creates these crises.

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