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COMPLEXITY, POWER, AND THE DISAPPEARANCE OF PUTTABLE BONDS

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Abstract: This paper develops a behavioral–institutional framework to explain why puttable bonds have disappeared from modern markets despite their theoretical appeal. Standard valuation models treat callable and puttable bonds as symmetric combinations of a straight bond and an embedded option, implying that both features should be issued with comparable frequency. Yet the empirical record shows a stark asymmetry: callable bonds are pervasive, while puttable bonds have nearly vanished. I argue that this divergence is not an anomaly but a predictable outcome once two overlooked frictions—Complexity Aversion and Power Asymmetry—are incorporated into valuation.

Complexity Aversion captures investors' reluctance or inability to act on contractual protections that require monitoring, interpretation, and timely execution. Power Asymmetry reflects the issuer's superior control over information, enforcement, and renegotiation. When these forces interact, the investor's ability to recognize and exercise the put option is sharply reduced, while the issuer's effective cost of offering the protection remains anchored to its full actuarial value. The model yields a closed-form issuance threshold showing that puttable bonds become infeasible whenever investor recognition, scaled by a factor θ, falls below a critical level θ_{min}. Numerical illustrations demonstrate that even modest levels of complexity and weak enforceability are sufficient to eliminate put issuance under realistic parameter values.

The framework generates testable predictions regarding investor recognition, enforcement frictions, and contract adoption, and it situates behavioral responses at the center of financial contract design. The disappearance of puttable bonds is thus not a failure of theory, but a reflection of how cognition and institutional power jointly determine which contractual rights survive in equilibrium.

Keywords: Puttable Bonds, Callable Bonds, Behavioral Finance, Contract Design, Complexity Aversion, Power Asymmetry, Agency Costs, Fixed-Income Securities

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1. INTRODUCTION

1.1. The Puzzle

Fixed-income markets are structured around contractual protections intended to shield investors from deteriorating credit quality or adverse movements in interest rates. Among these protections, the puttable bond should, in principle, be one of the most valuable. By granting investors the right to redeem the bond at par when conditions worsen, it offers a direct hedge against both credit deterioration and rate increases (Fabozzi, 2015; Sundaresan, 2009). Classical contingent-claims models reinforce this intuition. In frameworks such as Ho and Lee (1986), Brennan and Schwartz (1977), or the simulation methods of Longstaff and Schwartz (2001), a puttable bond is valued as a straight bond plus a put, while a callable bond is the mirror image—a straight bond minus a call.

Yet despite this theoretical symmetry, the empirical record is sharply asymmetric: callable bonds are pervasive across industries and cycles, while puttable bonds have nearly disappeared (Chatfield & Moyer, 1986; Brick, Palmon & Patro, 2014; Homaifar, Kang & Yoo, 2019). Agency theory only deepens the puzzle. Put provisions should reduce risk-shifting and under-investment problems (Jensen & Meckling, 1976; Myers, 1977), suggesting that issuers and investors should both value them. The contradiction between the predicted usefulness of the put and its empirical absence forms the central puzzle addressed in this paper.

1.2. Why the Puzzle Matters

The disappearance of the puttable bond raises a broader question about how contractual protections function in real markets. Classical valuation frameworks assume frictionless exercise, perfect enforcement, and symmetric agency between issuers and investors. When these assumptions break down, market outcomes can diverge dramatically from model predictions. The asymmetry between calls and puts reveals exactly this gap between theoretical structure and institutional reality.

Puttable bonds provide an unusually clear lens into this divergence because they represent what Kim (2025) describes as **"rights without power"**: legal protections that exist on paper but depend on dispersed, heterogeneous

investors to monitor conditions, interpret disclosures, and execute time-sensitive actions. In contrast, callable bonds align with managerial authority. Issuers act unilaterally, with superior information and operational control. The result is that the investor's right to exit is fragile, while the issuer's right to call is robust.

Understanding this asymmetry is essential for contract design in behavioral and institutional finance. If two options are symmetric in mathematical form but asymmetric in market viability, the discrepancy reveals where classical assumptions conceal the mechanisms actually driving behavior. The put bond thus becomes an ideal test case for understanding how cognition, information frictions, and institutional hierarchy determine which contractual rights survive in equilibrium.

1.3. From Symmetry to Friction

Classical models enforce a clean symmetry: a callable bond equals a straight bond minus an issuer-held call; a puttable bond equals a straight bond plus an investor-held put. In these frameworks, the identity of the option holder is irrelevant because all agents are presumed to exercise rights optimally and without cost. Backward-induction models (Ho & Lee, 1986) and PDE-based formulations (Brennan & Schwartz, 1977; Longstaff & Schwartz, 2001) embed this symmetry by construction.

However, the symmetry collapses once we restore realistic assumptions about cognition and power. Behavioral evidence shows that individuals systematically avoid or undervalue complex, state-contingent decisions (Iyengar, Huberman & Jiang, 2004; Iyengar & Kamenica, 2006; DellaVigna, 2009; Barberis, 2013). Investors facing ambiguity, time pressure, or procedural friction tend to defer action—even when delay destroys value. In parallel, issuers possess institutional advantages: they control disclosure, refinancing operations, renegotiation, and the mechanics of exercise. These frictions generate an asymmetry not captured in classical models.

Structured-product markets provide compelling analogies. Henderson and Pearson (2011) document that investors systematically under-value securities with opaque or multi-branch payoff structures, even when the underlying options have positive theoretical value. This pattern mirrors what happens with puttable bonds: the option is valuable in theory but

discounted heavily in practice because investors must monitor and act under uncertainty.

Once Complexity Aversion and Power Asymmetry are introduced, the classical symmetry dissolves. The investor's perceived value of the put is scaled down by cognitive frictions and weakened enforceability, whereas the issuer's cost remains tied to the full actuarial value of redemption. The result is a natural economic explanation for why one side of the option space vanishes despite its theoretical appeal.

1.4. Our Contribution

This paper makes three contributions.

First, it provides a behavioral explanation for the longstanding asymmetry between callable and puttable bonds. Rather than relying on issuer preference or market convention, we show that bounded cognition and institutional hierarchy jointly eliminate the investor-friendly option. Our analysis builds directly on empirical observations of put scarcity (Chatfield & Moyer, 1986; Brick et al., 2014; Homaifar et al., 2019) and integrates insights from behavioral economics (Iyengar & Kamenica, 2006; DellaVigna, 2009; Henderson & Pearson, 2011).

Second, we present a unified valuation framework that embeds Complexity Aversion and Power Asymmetry directly into the pricing of puttable bonds. This framework produces a tractable issuance threshold, expressed in terms of a recognition factor θ and a minimum viability level θ_{min}. When perceived value falls below this threshold, the contract becomes impossible to issue even when the theoretical option value is positive.

Third, the paper extends behavioral finance into the domain of financial contract design. Tools typically used to explain portfolio mistakes or trading anomalies are applied here to explain why certain contractual rights never survive in competitive markets. The disappearance of the puttable bond is therefore not an anomaly but an equilibrium outcome shaped by cognition, complexity, and institutional power.

The remainder of the paper formalizes this logic, beginning with the behavioral foundations of Complexity Aversion and moving toward the unified model that quantifies how perception and power jointly determine the survival—or disappearance—of investor-initiated contractual rights.

2. BEHAVIORAL FOUNDATIONS AND LITERATURE REVIEW

2.1. The Puzzle Revisited and the Need for a Behavioral Lens

The empirical scarcity of puttable bonds stands in sharp contrast to their theoretical attractiveness. In standard models of fixed-income valuation, the put option should provide meaningful protection against both interest-rate increases and deterioration in credit quality. Early work such as Chatfield and Moyer (1986) documented the economic value of the put feature, while subsequent studies emphasized its role in reducing risk exposure and granting investors explicit control over the continuation of financing (Brick, Palmon & Patro, 2014; Homaifar, Kang & Yoo, 2019). Likewise, classical contingent-claims frameworks—ranging from the binomial models of Ho and Lee (1986) to the continuous-time formulations of Brennan and Schwartz (1977) and later simulation-based methods (Longstaff & Schwartz, 2001)—treat the embedded put as a straightforward contingent claim that should enhance the bond's value.

Agency theory reinforces this expectation. Put provisions should mitigate risk-shifting by enabling investors to withdraw capital when managerial incentives become misaligned (Jensen & Meckling, 1976; Myers, 1977). Earlier work by Kim and Diallo (1996) highlighted how puttable bonds could theoretically reduce agency costs and protect shareholder value, yet the practical barriers identified here explain why such instruments failed to gain sustained traction. In a frictionless setting, these theoretical benefits would encourage widespread issuance of puttable bonds.

Yet the market reveals the opposite. The put feature has nearly vanished, while callable bonds—conceptually the mirror image—remain ubiquitous (Fabozzi, 2015; Sundaresan, 2009). This inconsistency suggests that the classical model omits a critical dimension of investor behavior. The puzzle is not merely theoretical; it exposes the limits of treating option exercise as frictionless.

For this reason, a behavioral perspective becomes essential. The disappearance of the puttable bond cannot be understood solely through traditional valuation logic. Instead, it requires recognizing how investors perceive, process, and act upon complex contractual rights under uncertainty. The gap between theoretical value and practical usage highlights the need to incorporate behavioral frictions into contract valuation.

2.2. Concept and Origins of Complexity Aversion

Complexity Aversion (CA) refers to the systematic tendency of individuals to avoid, undervalue, or misinterpret choices that involve complex or state-dependent contingencies. This phenomenon is well established in psychology and behavioral economics. Seminal studies by Iyengar and Kamenica (2006, 2010) and Iyengar, Huberman, and Jiang (2004) show that increasing the dimensionality, opacity, or branching of choice menus leads to lower participation, reduced accuracy, and greater reliance on default options. DellaVigna (2009) and Barberis (2013) further document that individuals facing cognitive overload often simplify decision rules, defer action, or ignore potentially valuable opportunities.

Financial markets offer striking evidence of CA as well. Henderson and Pearson (2011) demonstrate that investors in structured products routinely undervalue multi-branch payoffs and exhibit preferences inconsistent with the products' actuarial values. Their findings reveal that even financially sophisticated investors experience difficulty interpreting complex payoff structures, leading to systematic under-recognition of embedded optionality.

Complexity Aversion operates through several channels:

- **Cognitive load:** Complex contracts impose processing burdens that exceed the capacity of many investors, leading to simplification or avoidance.
- **Ambiguity aversion:** When payoff states are opaque or difficult to map to observable conditions, individuals discount options more heavily.
- **Procedural uncertainty:** When execution requires specific timing, monitoring, or coordination with intermediaries, investors fear misexecution and prefer inaction.
- **Attention scarcity:** Under real-world constraints, investors under-allocate attention to instruments requiring ongoing surveillance.

Each of these mechanisms applies directly to puttable bonds. Exercising a put requires monitoring credit signals, interpreting disclosures, and acting within narrow windows. The option is valuable only if investors faithfully track conditions when they are least prepared to do so—precisely the type of environment where CA is most pronounced.

Thus, Complexity Aversion provides a foundational behavioral explanation for the gap between the theoretical and practical value of the embedded put option.

2.3. How Complexity Aversion Is Measured and Observed

Although abstract at first glance, Complexity Aversion is empirically quantifiable. Experiments in behavioral economics consistently show that individuals' willingness to participate in or correctly evaluate complex decisions decreases in predictable ways as complexity increases. Iyengar and Kamenica (2006) demonstrate that expanding menu size or complicating choice architecture significantly reduces participation rates in retirement-plan selections. DellaVigna (2009) documents similar effects in field settings: as cognitive load rises, individuals' performance and engagement decline. Barberis (2013) synthesizes this evidence, showing that complexity systematically degrades decision quality.

In financial contexts, Henderson and Pearson (2011) provide a particularly clear measure: structured notes with more complicated payoff structures exhibit larger deviations between theoretical and market prices. The degree of mispricing correlates with observable complexity attributes, offering direct evidence that investors discount payoff structures they find difficult to interpret.

Complexity Aversion manifests across several observable dimensions relevant to puttable bonds:

1. **Menu complexity:** The number of potential triggers or states relevant for exercise.
2. **State-contingency breadth:** The extent to which valuation depends on multiple macroeconomic or firm-specific variables.
3. **Mapping opacity:** The difficulty of translating observable market or credit conditions into a clear exercise decision.
4. **Documentation and procedural burden:** The administrative cost of understanding and executing contractual rights.
5. **Attention requirements:** The ongoing vigilance necessary to monitor conditions and avoid missing narrow exercise windows.

These dimensions align with the structure of puttable bonds, which require investors to detect worsening credit conditions, interpret contractual

thresholds, coordinate with trustees or intermediaries, and act promptly. Even modest confusion or delay can eliminate the option's value.

In valuation terms, CA is often represented by a recognition factor $\theta \in (0,1]$, reflecting the fraction of the theoretical option value investors perceive (V), alongside a monitoring or execution cost $c \geq 0$. Empirically, the relationship takes the form:

$$\tilde{V}_{put} = \theta V^{*}_{put} - c, \quad where\ \theta \in (0,1] \tag{2.1}$$

with $\partial\theta/\partial\kappa < 0$ as perceived complexity κ increases.

The empirical literature demonstrates that θ can fall substantially below one even for moderately complex payoff structures. In such cases, investors systematically undervalue the protection embedded in the put, creating a wedge between theoretical valuation and practical market demand.

2.4. Why Complexity Aversion Matters for Puttable Bonds

Puttable bonds illustrate the precise point where contractual theory diverges from behavioral reality. Although the embedded put should, in principle, offer investors a reliable safeguard against deteriorating credit conditions or rising interest rates, its effectiveness depends entirely on the investor's ability to monitor conditions, interpret signals, and exercise the option within narrow windows. These requirements arise at exactly the moments when investors are least prepared to act—during periods of uncertainty, ambiguity, or heightened market stress.

Callable bonds impose no such cognitive burden. Issuers retain full control over the decision to call, acting automatically when refinancing conditions improve. The option's exercise does not rely on dispersed judgment, nor does it require coordination or real-time monitoring. The same mathematical object—a contingent claim—therefore carries fundamentally different behavioral implications depending on who holds it.

Once Complexity Aversion (CA) is introduced, the empirical pattern becomes intuitive rather than puzzling. Because investors undervalue complex, state-dependent rights, the perceived value of the put falls quickly as complexity increases. Even modest declines in the recognition factor θ, or small monitoring costs c, can shrink the investor's effective valuation of the put to the point where the feature no longer commands a meaningful price concession. Issuers, observing that investors will not fully credit the option's value, rationally decline to include it.

Classical agency theory cannot reverse this outcome. Although put provisions may theoretically mitigate moral hazard or reduce risk-shifting incentives (Jensen & Meckling, 1976; Myers, 1977), these benefits are diffuse and indirect compared with the concrete procedural burdens placed on investors. In practice, investors focus not on the option's theoretical role in aligning incentives, but on the very real possibility of missing the exercise window or executing it imperfectly under uncertainty. The market outcome is not irrational mispricing—it is rational neglect driven by behavioral and procedural constraints.

A practitioner perspective reinforces this logic. Kim (2025) characterizes the put as a "right without power," a contractual protection whose execution depends on the weaker party's initiative. Optionality endures only when aligned with control. Because the investor-held put requires attention, coordination, and effort, its practical value erodes even when its theoretical value remains positive. This insight motivates the formal valuation adjustments introduced in the next subsection.

2.5. Embedding Complexity Aversion into Valuation: The θ-Framework

If Complexity Aversion helps explain why puttable bonds have vanished, its effects must be incorporated directly into valuation. The behavioral discount can be expressed through two components: a recognition factor $\theta \in (0,1]$, capturing the fraction of the theoretical put value investors perceive, and a monitoring or exercise cost $c \geq 0$, representing the procedural burdens associated with timely execution. Together, these adjustments yield the effective value:

$$\tilde{V}_{put} = \theta V^{*}_{put} - c, \quad where\ \theta \in (0,1] \tag{2.2}$$

where declines in θ reflect increases in perceived complexity κ, environmental uncertainty σ, or execution frictions ϕ, each reducing investors' ability to recognize the option's full actuarial value:

$$\partial\theta/\partial\kappa < 0, \partial\theta/\partial\sigma < 0, \partial\theta/\partial\phi < 0. \tag{2.3}$$

The economic implications are straightforward. Even a modest decrease in θ—for example, from 1 to 0.8—reduces perceived value by 20 percent. When coupled with small but positive exercise costs c, the perceived benefit of the put may vanish entirely. Investors may therefore be unwilling to offer a sufficient price premium to compensate issuers for the option's full cost.

This wedge between theoretical value and perceived value prevents contracts from clearing. Issuers face the full actuarial cost of providing the put, while investors credit only a fraction of that value. Unless issuer-side benefits—such as reductions in agency costs A—are sufficiently large, the contract fails to produce a mutually beneficial price adjustment. In equilibrium, therefore, investor cognition and issuer economics diverge, eliminating demand for the put feature.

The empirical disappearance of puttable bonds is thus not a contradiction of option-pricing theory but a predictable outcome of bounded cognition interacting with contractual design. Complexity erodes recognition; recognition erosion collapses willingness to pay; and insufficient compensation leads issuers to abandon the feature altogether.

2.6. Linking Complexity Aversion to Power Asymmetry

Complexity Aversion explains why investors undervalue their contractual rights; Power Asymmetry explains why they struggle to enforce them. Classical models implicitly assume that if a contractual right exists, it can be exercised without friction. In reality, enforcement depends on institutional arrangements, information access, and control—factors that overwhelmingly favor issuers.

Issuers determine the flow of information, the timing of disclosures, and the administrative mechanics of execution. Investors must instead act through trustees or intermediaries, often with incomplete or delayed information. Even when investors attempt to exercise the put, the outcome may be diluted by renegotiation, delayed execution, or liquidity constraints. These frictions weaken the expected payout and further diminish perceived value.

This structural imbalance renders many contractual rights functionally hollow. Even if investors overcome cognitive burdens, gather information, and coordinate action, they remain dependent on issuers to execute the transaction. The resulting gap between legal form and economic substance transforms the put into a protection that exists primarily on paper.

When CA and Power Asymmetry interact, their combined effect is multiplicative rather than additive. Reduced recognition (via θ) and reduced enforceability (via lower e) jointly depress investors' willingness to pay for the put feature. Issuers, whose costs remain closely tied to the theoretical value, see insufficient compensation and decline to issue such bonds. The

empirical absence of puttable bonds therefore reflects a structural contracting equilibrium: complexity punishes the party lacking control, while optionality gravitates toward those who wield it.

This insight lays the foundation for the theoretical framework developed in Section 3, where we formalize the role of recognition, enforcement, and agency benefits in determining whether a puttable bond can exist in equilibrium.

3. THEORETICAL FRAMEWORK

3.1. Symmetry in Theory

Classical fixed-income theory begins with the premise of symmetry. In a frictionless environment, callable and puttable bonds are constructed as mirror images of one another: a callable bond is a straight bond minus a call option held by the issuer, while a puttable bond is a straight bond plus a put option held by the investor. Under this decomposition, the option values are determined solely by the dynamics of the underlying interest-rate process. Because both the call and the put are priced as contingent claims on the same stochastic structure, each feature should, in principle, appear with comparable frequency in debt contracts.

This theoretical symmetry is embedded explicitly in standard valuation frameworks. In the binomial structure of Ho and Lee (1986), the continuous-time option-pricing formulations of Brennan and Schwartz (1977), and the simulation approaches of Longstaff and Schwartz (2001), callable and puttable bonds differ only in the sign of the embedded option. Mathematically, the relationships are written as:

$$P_{call} = B_0 - V^{*}_{call} \tag{3.1}$$

$$P_{put} = B_0 + \tilde{V}_{put} = B_0 + \theta\, V^{*}_{put} - c. \tag{3.2}$$

Within these frameworks, the identity of the option holder plays no role. Exercise is assumed to be costless, instantaneous, and perfectly informed; enforcement is automatic; and both parties possess identical capacity to act. Under such assumptions, the disappearance of the puttable bond is theoretically impossible. If both options derive value from the same source, the market should adopt them symmetrically.

Yet this symmetry is an artifact of abstraction. The models rely on assumptions that eliminate precisely the frictions—cognitive, procedural, and

institutional—that shape decision-making in real markets. By stripping away who holds the right, and how that right must be exercised, classical theory renders the two options equivalent in a manner that does not survive outside the model.

The empirical evidence contradicts the theoretical symmetry. Callable bonds proliferate across issuers and industries, while puttable bonds have nearly disappeared (Chatfield & Moyer, 1986; Brick, Palmon & Patro, 2014; Homaifar, Kang & Yoo, 2019). The discrepancy is not a minor deviation from theory but a signal that the model omits a critical dimension of contracting: the exercise of rights is not frictionless, and the distribution of control matters. The next sections demonstrate how this omission—common to traditional valuation frameworks—creates a blind spot that obscures the true economic forces governing the survival of contractual protections.

3.2. The Blind Spot in Existing Models

The classical valuation framework for callable and puttable bonds rests on assumptions that greatly simplify the exercise of contractual rights. These models treat option exercise as costless, instantaneous, and fully informed. Investors and issuers are assumed to observe the same information, respond without delay, and act optimally at every point in time. Within this abstraction, cognition and execution are frictionless, and agency is symmetric. The result is a theoretical symmetry between the call and the put that appears internally consistent, but only because the assumptions eliminate the very frictions that distinguish the two options in practice.

This blind spot is evident in the foundational literature. In models such as Ho and Lee (1986), Brennan and Schwartz (1977), and Longstaff and Schwartz (2001), the exercise of optionality is implemented mechanically through backward induction or PDE solutions. The models require no attention, coordination, or interpretation; the optimal exercise policy is directly computed from the state variables. Under these conditions, the identity of the option holder is irrelevant—investors exercise puts and issuers exercise calls with the same precision, speed, and reliability.

Empirical evidence contradicts these assumptions. Callable bonds dominate issuance across markets and decades, while puttable bonds have nearly vanished (Chatfield & Moyer, 1986; Brick, Palmon & Patro, 2014;

Homaifar, Kang & Yoo, 2019). If classical symmetry held in practice, both types of bonds should be observed at comparable frequencies. The stark divergence suggests instead that the theoretical framework omits critical determinants of behavior. The abstraction of investor cognition and issuer control is not a benign simplification—it fundamentally alters the predicted equilibrium.

The disappearance of puttable bonds exposes this omission clearly. The theoretical value of the put relies on an investor's ability to monitor credit conditions, interpret signals, and act promptly. The classical model assumes these tasks impose no cost or uncertainty. In reality, however, investors face ambiguity, informational delays, and coordination barriers that complicate exercise. Issuers, by contrast, enjoy centralized control, operational resources, and discretion over refinancing and disclosure. When exercise rights are allocated to different parties, these frictions manifest asymmetrically.

The consequence is that classical models, while mathematically consistent, are incomplete. They describe a world in which optionality carries no cognitive or institutional burden and where power asymmetries do not affect contract value. The empirical dominance of callable bonds and the practical disappearance of puts indicate that such a world does not exist. Recognizing this blind spot is essential for developing a valuation framework that reflects how contractual rights function under real behavioral and institutional constraints.

3.3. Agency Costs and Power Asymmetry

Agency theory provides the traditional foundation for understanding contractual design in corporate finance. It emphasizes the conflicts of interest that arise when control rights are separated from cash-flow rights and predicts that contractual mechanisms—such as covenants, collateral, or embedded options—can mitigate these conflicts (Jensen & Meckling, 1976; Myers, 1977). Under this logic, a puttable bond should function as a natural corrective device. By granting investors the right to withdraw financing when managerial actions threaten firm value, the put provision should reduce risk-shifting incentives and limit underinvestment distortions.

In principle, therefore, puttable bonds should be attractive to both issuers and investors. Yet their empirical disappearance suggests that the classical agency framework misses a critical element of enforcement. The theory assumes that once a right is contractually specified, it can be exercised without frictions. But

enforcement itself is an act of power, and the distribution of power in financial markets is asymmetric.

Issuers possess informational advantages, operational control, and discretion over refinancing decisions. They determine when to call bonds, how to manage cash flows, and when to disclose material information. Investors, by contrast, face dispersion, delegation through trustees, and reliance on issuer cooperation for the mechanics of execution. When adverse conditions emerge—precisely when the put right is most valuable—investors are often least able to coordinate or act with precision. The asymmetry in control transforms identical legal rights into functionally different economic rights. Indeed, Kim and Diallo (1996) show that when structured properly, a puttable bond can, in theory, minimize agency costs by allocating contingent decision rights symmetrically between issuer and investor. The empirical disappearance of the put provision therefore cannot be attributed to theoretical inadequacy; rather, it reflects frictions that prevent investors from recognizing or enforcing protections that are formally optimal in agency-based models.

This distinction clarifies why callable bonds flourish while puttable bonds fade. The call option is aligned with managerial authority: the issuer exercises it unilaterally and without coordination burdens. The embedded call thus operates as a true operational flexibility tool. The put option, however, is allocated to the party with the least institutional power. Its value depends on investors' ability to observe conditions, interpret contractual triggers, and execute within narrow windows—tasks subject to uncertainty, delay, and procedural friction.

Empirical studies reinforce this structural imbalance. Callable bonds appear across virtually all sectors and time periods, reflecting issuers' consistent ability to use the feature effectively (King & Mauer, 2000; Fabozzi, 2015; Brealey, Myers & Allen, 2020). Puttable bonds, by contrast, appear mainly in distressed contexts or in specialized sovereign and quasi-sovereign issues where investors demand symbolic protections but may lack practical enforcement capacity (Neftci & Santos, 2003; Homaifar, Kang & Yoo, 2019). The feature persists only where the put is unlikely to be exercised or where its presence is more rhetorical than operational.

The implication is clear: agency costs arise not only from incentive conflicts but from disparities in execution power. Classical models implicitly assume that control over optionality is symmetric, but in practice, the allocation of

enforcement authority determines whether a contractual right has economic meaning. The call survives because it is aligned with those who possess the institutional ability to act. The put disappears because it demands initiative from those who lack equivalent control.

This structural asymmetry provides the bridge to the unified model developed in later sections. A realistic valuation framework must accommodate not only the cognitive frictions described earlier but also the institutional asymmetries that determine whether contractual rights can be honored. Power asymmetry, like complexity aversion, reduces the effective value of the put and amplifies the discrepancy between theoretical benefit and practical adoption. The next subsection completes this argument by integrating these elements into a coherent theoretical framework.

3.4. Conclusion of the Theoretical Framework

The classical symmetry between callable and puttable bonds rests on assumptions that abstract away from the frictions that govern real contractual behavior. By treating option exercise as instantaneous, costless, and perfectly informed, standard valuation models implicitly remove the cognitive and institutional constraints that differentiate investors from issuers. This abstraction produces a mathematical symmetry that does not survive once realistic considerations of recognition, execution, and enforcement are restored.

The empirical disparity between the prevalence of callable bonds and the near disappearance of puttable bonds makes this clear. The call provision aligns with managerial control and can be executed unilaterally by the issuer. The put provision, by contrast, is allocated to dispersed investors whose ability to act is constrained by complexity, attention, and reliance on issuer cooperation. Classical agency theory highlights the potential benefits of the put feature, and earlier work—including Kim and Diallo (1996)—shows that a well-designed put structure can theoretically mitigate agency costs. Yet these theoretical benefits are overshadowed by the practical frictions that limit investors' capacity to recognize or enforce their rights.

The analysis in Sections 3.1 through 3.3 therefore points to a broader conclusion: the allocation of optionality matters not only for pricing but for viability. Optionality concentrated in the hands of a controlling party tends to function as intended, while optionality requiring action from a constrained

party may fail to operate at all. A complete valuation framework must account for these asymmetries rather than relying on frictionless abstractions.

The next section formalizes this insight by integrating Complexity Aversion and Power Asymmetry into a unified model. This framework produces an issuance threshold that determines when a puttable bond can exist in equilibrium and clarifies why, despite its theoretical appeal, the put has largely disappeared from modern markets.

3.5. Complexity Aversion and the Exercise Burden

Classical valuation models implicitly assume that investors exercise embedded options with perfect attention, flawless timing, and complete information. In these frameworks, the embedded put is exercised whenever it is optimal to do so. In practice, however, exercising a put is a cognitively demanding task. Investors must monitor credit quality, track rate movements, interpret contractual triggers, and coordinate execution under time pressure. These requirements introduce frictions that are absent in the classical model but critical for understanding the disappearance of puttable bonds.

To formalize the role of Complexity Aversion (CA), we incorporate two behavioral adjustments into the valuation of the put: (1) a **recognition factor** $\theta \in (0,1]$ that scales the fraction of theoretical value investors perceive, and (2) a **monitoring or exercise cost** $c \geq 0$ representing the time, attention, and administrative steps required to exercise the option.

Together, these adjustments yield the perceived value:

$$\tilde{V}_{put} = \theta V^{*}_{put} - c. \tag{3.3}$$

The recognition factor θ captures how perceived complexity κ, uncertainty σ, and execution frictions ϕ reduce investors' ability to identify and value the put option:

$$\partial\theta/\partial\kappa < 0,\ \partial\theta/\partial\sigma < 0,\ \partial\theta/\partial\phi < 0. \tag{3.4}$$

Even moderate reductions in θ have meaningful economic consequences. A decline from $\theta = 1$ to $\theta = 0.8$ reduces perceived value by 20 percent, and when combined with even small execution costs c, the perceived benefit may vanish entirely. A simple numerical illustration of how modest declines in θ and small exercise costs **c** erode perceived value is provided in Appendix A.

Consider the pricing implications. Let B_0 denote the value of the straight bond. A puttable bond is priced as:

$$P_{put} = B_0 + \tilde{V}_{put} = B_0 + \theta\, V^*_{put} - c. \tag{3.5}$$

By contrast, a callable bond reduces value by the frictionless call amount:

$$P_{call} = B_0 - V^*_{call} \tag{3.6}$$

The asymmetry is immediate: investors discount the put because of complexity, while issuers fully recognize the value of the call. Classical theory cannot produce this asymmetry, but CA generates it naturally.

This framework also yields testable predictions. Contract features that simplify exercise—automatic notices, standardized windows, or liquidity support—should increase θ, making puttable bonds more viable. Conversely, features that increase complexity or ambiguity should depress θ, reducing willingness to pay. Structured-product markets exhibit precisely this pattern (Henderson & Pearson, 2011), where increased opacity reduces investor valuation even when theoretical payoffs rise.

A microfoundation reinforces this reduced-form representation. Modeling exercise as an optimal stopping problem with observation costs or rational inattention shifts the exercise boundary unfavorably for the investor. Delayed or noisy state recognition reduces the expected value of the put by an amount equivalent to decreasing θ and increasing c. Thus, both heuristic discounting and rational-information models yield the same prediction: investor-perceived value is materially lower than theoretical value.

Finally, CA interacts directly with agency considerations. Issuers control refinancing and information disclosure, making the call option simple to exercise. Investors, by contrast, must act under uncertainty and with limited procedural authority. Thus, even before considering enforcement frictions, the put is disadvantaged: the issuer's call retains its full actuarial value, while the investor's put is eroded by perception and process. A compact numerical example demonstrating this asymmetry under Complexity Aversion is included in Appendix A.

This asymmetry sets the stage for the next subsection. While Complexity Aversion reduces the perceived value of the put, **Power Asymmetry** reduces its enforceability. The combination of these frictions—not theoretical inadequacy—explains why puttable bonds fail to clear in equilibrium.

3.6. Power Asymmetry as Enforceability and Renegotiation Frictions

The preceding subsection shows how Complexity Aversion depresses investors' perceived value of the put feature. A second, equally important friction concerns the enforceability of contractual rights. Classical models assume that if a right is granted, it can be exercised without delay or dilution. In practice, however, enforcement depends on institutional control—information, timing, liquidity, and administrative authority—all of which are concentrated on the issuer's side. This asymmetry further erodes the effective value of the put.

To formalize Power Asymmetry, we introduce three parameters:

- **Enforceability** $e \in [0,1]$: probability the put is honored fully and promptly at par.
- **Investor haircut** $h \in [0,1)$: fraction of value lost in states where enforcement is weak, due to renegotiation, delay, or liquidity shortages.
- **Issuer clawback** $\lambda \in [0,1)$: reduction in the issuer's economic cost of the put in non-enforceable states, reflecting renegotiation leverage.

Let V_{put} denote the frictionless value of the put, $A \geq 0$ the issuer's potential agency-cost benefit, and θ and c the CA adjustments from Section 3.5. Under power asymmetry, the investor's credited value becomes:

$$\tilde{V}_{put} = \theta(1-(1-e)h)V^{*}_{put} - c. \tag{3.8}$$

The issuer's corresponding expected cost is:

$$Cost_{issuer} = (1-(1-e)\lambda)\ V^{*}_{put} - eA., \tag{3.9}$$

A puttable bond clears only if the investor's credited value meets or exceeds the issuer's cost:

$$\theta(1-(1-e)h)V^{*}_{put} - c \geq (1-(1-e)\lambda)V^{*}_{put} - eA.. \tag{3.10}$$

Solving yields the minimum recognition level required for issuance:

$$\theta_{\min} = \frac{(1-(1-e)\lambda)V^{*}_{put} - eA + c}{(1-(1-e)h)\ V^{*}_{put}} \tag{3.11}$$

The comparative statics follow directly: lower enforceability ($e\downarrow$), greater investor haircuts ($h\uparrow$), larger clawbacks ($\lambda\uparrow$), or higher monitoring costs ($c\uparrow$) all raise θ_{min}. When $\theta_{min} > 1$, no plausible level of investor recognition can sustain issuance, aligning with the empirical rarity of puttable bonds. Representative numerical

cases showing how enforceability **e**, haircuts **h**, and clawbacks λ affect the threshold θ_{min} are provided in Appendix B.

Complexity reduces what investors recognize; power asymmetry reduces what they can enforce. These frictions interact multiplicatively, shrinking investor-perceived value while leaving much of the issuer's actuarial cost intact. The next section unifies these forces into a single framework that characterizes when puttable bonds can exist in equilibrium.

4. UNIFIED MODEL WITH COMPLEXITY AND POWER

4.1. Unified Model: Complexity and Power Together

The frictions developed in Sections 3.5 and 3.6—Complexity Aversion and Power Asymmetry—each reduce the effective value of the embedded put option from the investor's perspective. We now combine these frictions into a unified valuation framework that characterizes precisely when a puttable bond can be issued in equilibrium.

Let V_{put} denote the frictionless model value of the put option embedded in a bond. From Complexity Aversion, the investor recognizes only a fraction $\theta \in (0,1]$ of this value and incurs a monitoring cost $c \geq 0$, yielding:

$$\tilde{V}_{put}^{complexity} = \theta V_{put}^{*} - c, \tag{4.1}$$

From Power Asymmetry, only a portion of the put's value is enforceable. Let $e \in [0,1]$ denote enforceability, $h \in [0,1)$ the investor haircut in weak states, and $\lambda \in [0,1)$ the issuer clawback. The investor's credited value under enforcement frictions is:

$$\tilde{V}_{put}^{power} = (1-(1-e)h)V_{put}^{*} \tag{4.2}$$

Combining Complexity Aversion and Power Asymmetry yields the investor's effective valuation:

$$\tilde{V}_{put} = \theta(1-(1-e)h)V_{put}^{*} - c. \tag{4.3}$$

The issuer's expected economic cost reflects the actuarial value of redemption net of renegotiation advantages and agency benefits. Let $A \geq 0$ denote the issuer's reduction in agency costs from granting an enforceable protection. The issuer's net cost is:

$$Cost_{issuer} = (1-(1-e)\lambda)\, V_{put}^{*} - eA. \tag{4.4}$$

Issuance requires that the investor's credited value at least match the issuer's cost:

$$\theta(1-(1-e)h)V_{put}^{*}-c\geq(1-(1-e)\lambda)V_{put}^{*}-eA. \tag{4.5}$$

Solving for the minimum recognition level produces the unified issuance threshold:

$$\theta_{\min}=\frac{(1-(1-e)\lambda)V_{put}^{*}-eA+c}{(1-(1-e)h)V_{put}^{*}} \tag{4.6}$$

This condition unifies the perception and power frictions. Complexity aversion ($\theta < 1$) and weak enforceability ($e < 1$, $h > 0$) both raise θ_{min}. When $\theta_{min} > 1$, no feasible investor perception can make the contract acceptable to both sides.

Table 3 reports the underlying threshold values of θ_{min}. The table lists the minimum recognition factor required for issuance under varying combinations of enforceability (e) and investor haircut (h). Cells marked with an asterisk (*) indicate the no-issuance zone where $\theta_{min} > 1$.

Table 3: Threshold Values (θ_{min}) Across Enforceability (e) and Investor Haircuts (h)

Enforceability (e)	*h = 0.20*	*h = 0.30*	*h = 0.40*	*h = 0.50*	*h = 0.60*
0.50	0.79	0.84	0.89	0.95	1.02*
0.60	0.80	0.84	0.88	0.92	0.97
0.70	0.82	0.84	0.87	0.90	0.93
0.80	0.83	0.84	0.86	0.88	0.90
0.90	0.84	0.85	0.86	0.86	0.87

Caption for Table 3. Threshold values θ_{min} across enforceability eee and investor haircuts h. *Cells with $\theta_{min}>1$ (marked *) indicate infeasible issuance.*

Proposition 1

A puttable bond can be issued in competitive equilibrium if and only if the investor's recognition factor satisfies $\theta \geq \theta_{min}$, where θ_{min} is given by (4.6). When $\theta_{min} > 1$, the contract cannot clear under any feasible level of investor recognition, and put issuance is impossible.

Interpretation

The unified threshold makes explicit how Complexity Aversion and Power Asymmetry interact multiplicatively. A decrease in enforceability (e↓) reduces the investor's credible payoff while also diminishing the issuer's agency benefit

(eA), raising the numerator and shrinking the denominator of (4.6). Higher investor haircuts (h↑) and larger clawbacks (λ↑) likewise tighten the threshold by further eroding the fraction of put value that investors effectively receive. Increased monitoring cost (c↑) raises the threshold directly.

When the combined frictions are sufficiently severe that $\theta_{min} > 1$, no realistic value of investor recognition can satisfy the inequality. This **no-issuance region** explains why puttable bonds remain rare in practice despite their strong theoretical appeal in frictionless models.

Connection to Empirical Patterns

The unified threshold aligns with the empirical disappearance of put bonds. In real markets, enforceability is often partial, investor haircuts are material, and monitoring costs are nontrivial. Even when agency benefits A are positive, the cumulative effect of these frictions pushes θ_{min} beyond unity for most realistic parameter combinations.

A numerical illustration using representative parameter values is provided in **Appendix C**, demonstrating how the unified threshold behaves across economic environments and why the puttable bond disappears under otherwise ordinary conditions.

The next subsection presents a compact numerical example to make the unified condition operational.

4.2. Numerical Illustration of the Threshold Condition

The unified threshold in equation (4.6) combines Complexity Aversion and Power Asymmetry into a single measure of issuance viability. To illustrate the economic magnitude of this threshold, we consider representative parameter values and demonstrate how modest frictions can render a puttable bond infeasible even when the embedded put option has positive theoretical value.

A full numerical illustration appears in **Appendix C**, based on a two-period binomial interest-rate model with a 5 percent annual coupon and a par put at t=1. In the frictionless benchmark of Appendix C, the embedded put has a theoretical value of approximately 1.32 percent of par. This value is nontrivial: under classical pricing assumptions, the presence of such a put should increase the bond's issue price and reduce its yield.

Once Complexity Aversion and Power Asymmetry are incorporated, however, the investor's credited value can fall sharply relative to the issuer's economic cost. Consider first a parameterization with relatively mild frictions: enforceability e = 0.70, investor haircut h = 0.30, renegotiation advantage λ = 0.60, agency benefit A = 0.30, and monitoring cost c = 0.10. Substituting these values into the unified threshold yields:

$$\theta_{min} \approx 0.84. \tag{4.7}$$

Thus, investors must recognize at least 84 percent of the put's theoretical value for the feature to be viable. Given the complexity of state-contingent exercise and the informational frictions investors face under uncertainty, such a high recognition level is unlikely in practice.

The effect becomes more pronounced under severe frictions. For instance, if enforceability falls to e = 0.50 and investor haircuts rise to h = 0.50 while other parameters remain similar, the threshold increases to:

$$\theta_{min} \approx 1.23. \tag{4.8}$$

A threshold above unity implies that issuance is impossible: no feasible level of investor attention or sophistication can satisfy the condition. Even if investors fully recognized the theoretical value of the put (θ = 1), their credited value would fall short of the issuer's expected cost.

These numerical results reinforce the central insight of the unified model. In a frictionless world, the embedded put appears valuable and beneficial. Once behavioral and institutional frictions are acknowledged, the feature becomes economically unviable. Mild frictions generate prohibitively tight thresholds, while severe frictions eliminate issuance entirely. The empirical disappearance of puttable bonds thus reflects not a failure of arbitrage or investor irrationality, but the predictable consequence of cognitive limits and asymmetric control embedded in the structure of the contract.

5. EVIDENCE ON THE RARITY OF PUTTABLE BONDS

The disappearance of puttable bonds is not merely a theoretical implication of the unified model; it is an empirical regularity. If the put option were symmetric to the call in practice, one would expect both features to appear with comparable frequency in corporate debt contracts. Instead, issuance data reveal a striking imbalance: callable bonds are pervasive, while puttable bonds are exceedingly rare.

Homaifar, Kang, and Yoo (2019) provide one of the clearest quantitative assessments of this disparity. Surveying decades of corporate bond issuance, they identify only **561 firms** that have ever issued puttable bonds. By contrast, callable bonds number in the **tens of thousands** over the same horizon. This difference is not marginal; it reflects an order-of-magnitude gap in market adoption. The implication is that the put option has failed to establish itself as a standard contractual feature despite its theoretical appeal.

Additional evidence confirms this pattern. A hand-collected dataset presented at the European Financial Management Association (EFMA) Annual Meeting (2022) documents corporate bond issuance over more than four decades and finds only a few hundred non-convertible, non-event-triggered put bonds. Over the same period, callable bonds appear across virtually all industries and market cycles. The scarcity of puttable bonds is therefore not a data artifact or a short-lived anomaly—it is a persistent feature of modern debt markets.

Table 4 summarizes this contrast, highlighting the extreme rarity of puttable bonds relative to the ubiquity of callable bonds. While callable bonds are issued routinely by investment-grade and speculative-grade firms alike, puttable bonds tend to appear only in narrow contexts, such as distressed issuers, small private placements, or sovereign and quasi-sovereign issues where investor protections are largely symbolic rather than operational (Neftci & Santos, 2003; Homaifar et al., 2019).

Table 4: Issuance of Puttable and Callable Bonds

Bond Type	*Issuers/Issues*	*Market Presence*
Put Bond	~561 companies (Homaifar, 2019); A few hundred issues over 40 years (EFMA, 2022)	Rare, Clustered, Ofen Distressed or Emerging Market
Callable Bond	Tems of Thousand over the same period (EFMA, 2022)	Pervasive, Across Industries and Cycles

Caption for Table 4: *Puttable bonds have appeared only rarely—about 561 issuers in total (Homaifar, 2019) and only a few hundred non-convertible cases documented over four decades (EFMA, 2022). By contrast, callable bonds number in the tens of thousands during the same period, spanning industries and cycles. The comparison underscores the empirical rarity of the put option, consistent with our theoretical model of market rejection.*

This clustering behavior is informative. In many of the rare cases where puttable bonds are issued, the probability of exercise is low, or enforcement is weak. The put feature often serves as a signaling device rather than a binding protection, consistent with the model's prediction that investor-initiated options survive only when they are unlikely to be exercised or when their practical value is limited. Where enforcement is credible and exercise is likely, issuance becomes prohibitively costly.

The unified threshold derived in Section 4 provides a direct explanation for this empirical pattern. Real-world parameter values—partial enforceability, nontrivial monitoring costs, investor haircuts in weak states, and issuer renegotiation advantages—push the recognition threshold θ_{min} above unity in most environments. Under these conditions, even a theoretically valuable put option cannot clear in equilibrium. The empirical absence of puttable bonds is therefore not evidence of mispricing or irrationality, but the predictable outcome of behavioral and institutional frictions interacting through the issuance constraint.

Taken together, the issuance data strongly support the model's central claim. Puttable bonds are rare not because they lack theoretical merit, but because the conditions required for their viability are seldom satisfied in practice. Callable bonds persist because their exercise is aligned with issuer control, while puttable bonds vanish because they rely on investor initiative under complexity and weak enforcement. Section 6 concludes by summarizing these findings and discussing their broader implications for financial contract design.

6. CONCLUSION

This paper explains the disappearance of puttable bonds as the predictable outcome of behavioral and institutional frictions rather than a failure of classical valuation theory. Standard option-pricing frameworks treat callable and puttable bonds as symmetric instruments, implying that both should coexist in equilibrium. Yet the empirical record shows a stark asymmetry: callable bonds are pervasive, while puttable bonds are rare. This paper resolves that contradiction by embedding two frictions—Complexity Aversion and Power Asymmetry—directly into valuation.

Complexity Aversion captures the fact that investor-initiated protections impose cognitive, informational, and procedural burdens. Exercising a put

requires attention, monitoring, and timely execution under uncertainty. As a result, investors recognize only a fraction of the theoretical value of the embedded option and discount it further for monitoring and execution costs. Power Asymmetry captures the institutional reality that issuers control information, timing, and renegotiation. Even when contractual rights exist, investors' ability to enforce them is limited, reducing the expected payoff from exercise.

The unified model integrates these frictions into a single issuance threshold. Proposition 1 shows that a puttable bond can be issued in equilibrium only if investor recognition exceeds a minimum level determined jointly by enforceability, monitoring costs, and renegotiation dynamics. When this threshold exceeds unity, issuance becomes impossible regardless of the theoretical value of the put. Numerical illustrations demonstrate that under realistic parameter values, this condition is frequently violated. The rarity of puttable bonds is therefore not anomalous but expected.

The empirical evidence supports this interpretation. Issuance data reveal that puttable bonds appear only in narrow contexts—often where enforcement is weak, exercise is unlikely, or the put serves primarily as a signaling device. Callable bonds persist because their exercise is aligned with issuer control and requires no investor initiative. Optionality survives when it is held by the party with the ability to act.

Beyond the specific case of puttable bonds, the framework has broader implications for financial contract design. Contractual protections that require action by the weaker party are systematically disadvantaged relative to protections exercised by those with institutional control. Complexity and enforceability interact to determine not only pricing but feasibility. Rights that exist on paper may disappear in equilibrium if they cannot be recognized or enforced in practice.

By linking behavioral cognition and institutional power within a unified valuation framework, this paper extends behavioral finance beyond asset pricing into the domain of contract survival. The results suggest that understanding which financial instruments persist requires attention not only to theoretical payoff structures, but also to who holds the right, how it is exercised, and under what constraints. In that sense, the disappearance of the puttable bond is not a puzzle to be explained away, but a revealing case study of how markets discipline contractual design.

References

Ayache, E., Forsyth, P. A., & Vetzal, K. R. (2003). The valuation of convertible bonds with credit risk. *Journal of Derivatives,* 11(1), 9–29.

Barberis, N. (2013). Thirty years of prospect theory in economics: A review and assessment. *Journal of Economic Perspectives,* 27(1), 173–196.

Black, F., Derman, E., & Toy, W. (1990). A one-factor model of interest rates and its application to Treasury bond options. *Financial Analysts Journal,* 46(1), 33–39.

Brealey, R. A., Myers, S. C., & Allen, F. (2020). *Principles of Corporate Finance* (13th ed.). McGraw–Hill.

Brennan, M. J., & Schwartz, E. S. (1977). Convertible bonds: Valuation and optimal strategies for call and conversion. *Journal of Finance,* 32(5), 1699–1715.

Brick, I. E., Palmon, O., & Patro, D. K. (2014). Motivations for issuing putable debt: An empirical analysis. In L. C. Lee & A. C. Lee (Eds.), *Handbook of Financial Econometrics and Statistics* (pp. 1001–1016). Springer.

Chatfield, R. E., & Moyer, R. C. (1986). Putting away bond risk: The value of the put provision. *Journal of Financial Research,* 9(3), 235–248.

Culp, C., Gandhi, P., Nozawa, Y., & Veronesi, P. (2019). Option-implied spreads and risk premia in corporate debt. *Journal of Financial Economics,* 132(2), 247–272.

DellaVigna, S. (2009). Psychology and economics: Evidence from the field. *Journal of Economic Literature,* 47(2), 315–372.

EFMA. (2022). *Puttable bonds, risk-shifting problems, and information asymmetry.* Paper presented at the European Financial Management Association Annual Meeting, Rome.

Fabozzi, F. J. (2015). *Bond Markets, Analysis, and Strategies* (9th ed.). Pearson.

Henderson, B. J., & Pearson, N. D. (2011). The dark side of financial innovation: A case study of the pricing of structured products. *Journal of Financial Economics,* 100(2), 227–247.

Ho, T. S. Y., & Lee, S. B. (1986). Term structure movements and pricing interest rate contingent claims. *Journal of Finance,* 41(5), 1011–1029.

Homaifar, G., Kang, T., & Yoo, S. (2019). Option embedded bonds: The convertible puttable bond. *Journal of Accounting and Finance,* 19(3), 100–115.

Hull, J. C. (2018). *Options, Futures, and Other Derivatives* (10th ed.). Pearson.

Iyengar, S. S., Huberman, G., & Jiang, W. (2004). How much choice is too much? Contributions to 401(k) retirement plans. In *Pension Design and Structure: New Lessons from Behavioral Finance* (pp. 83–95). Oxford University Press.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics,* 3(4), 305–360.

Kim, P. (2025). Rights without power: Why the put bond failed. *CFA Institute Enterprising Investor.*

Kim, P. & A. Dialo (1996) The Variable Rate Put Bond: An Efficient Development for Shareholders' Wealth Preservation Under Volatile Interest Rates, *Research in Finance*, Volume 14, 197-217.

King, T. H. D., & Mauer, D. C. (2000). Corporate call policy for nonconvertible bonds. *Journal of Business,* 73(3), 403–444.

Lim, Y., Li, H., & Linetsky, V. (2012). Valuation of callable and putable bonds: An eigenfunction expansion approach. *Mathematical Finance,* 22(4), 728–758.

Longstaff, F. A., & Schwartz, E. S. (2001). Valuing American options by simulation: A simple least-squares approach. *Review of Financial Studies,* 14(1), 113–147.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics,* 5(2), 147–175.

Neftci, S. N., & Santos, A. O. (2003). Puttable and extendible bonds in emerging markets. *IMF Working Paper 03/201.* International Monetary Fund.

Sundaresan, S. (2009). *Fixed Income Markets and Their Derivatives* (3rd ed.). Academic Press.

APPENDIX A: NUMERICAL ILLUSTRATION FOR COMPLEXITY AVERSION

Pick a simple par = 100 bond where a standard one-factor tree gives:

V^*_{put} =2.0 (i.e., a 2% of par value for the put),

Agency benefit estimate A = 0.3.

Exercise/monitoring cost c = 0.1. (PV terms),

Modest complexity aversion θ = 0.70.

Investor credit for adding put: $\theta V^*_{put} - c = 0.70 \times 2.0 - 0.1 = 1.3$.

(A-1) Issuer net cost: $V^*_{put} - A = 2.0 - 0.3 = 1.7$.

(A-2)

Result: 1.3 < 1.7 → no deal.

Threshold $\theta_{min} = 1 - (A - c) / V^*_{put} = 1 - (0.2/2.0) = 0.90$. (A-3)

Unless investors credit at least **90%** of the model value, the feature won't be offered. If real-world θ is ~0.6–0.8 (entirely plausible once you add ambiguity and hassle), the put won't be issued—exactly what we observe.

We'll contrast this with a call example where issuer benefits are fully internalized (no θ or c penalty on the decision-maker), making clearance easy.

Appendix B: Two quick numeric cases for power asymmetry (same V^*_{put} = 2.0, A = 0.3., c = 0.1)

Mild frictions: e = 0.7, h = 0.3, λ = 0.6

Denominator: $[1 - (1-e)\, h]\, V^* = [1 - 0.3 \cdot 0.3] \cdot 2 = 1.82$

(B-1)

Numerator: $[1 - (1 - e)\, \lambda]\, V^* - eA + c = [1 - 0.3 \cdot 0.6] \cdot 2 - 0.7 \cdot 0.3 + 0.1 = 1.64 - 0.21 + 0.10 = 1.53$. (B-2)

$\theta_{min} = 1.53/1.82 \approx 0.84$ (B-3)

Even **modest** complexity aversion (θ < 0.84) kills issuance—already tight.

Severe power asymmetry: e = 0.5, h = 0.5, λ = 0.1

Denominator: $[1 - (1 - e)\, h]V^* = [1 - 0.5 \cdot 0.5] \cdot 2 = 1.5$.

Numerator: $[1 - (1 - e)\, \lambda]V^* - eA + c = [1 - 0.5 \cdot 0.1] \cdot 2 - 0.5 \cdot 0.3 + 0.1$

(B-4)

$= 1.9 - 0.15 + 0.1 = 1.85$.

$$\theta_{min} = 1.85/1.5 = 1.23 > 1. \quad \text{(B-5)}$$

Impossible region: the put cannot clear at any plausible θ. This matches the market: virtually **no issuance**.

Appendix C: Illustrative Binomial Example

To illustrate the size of the put option's theoretical value and how it collapses once complexity aversion and power asymmetry are applied, we compute a simple two-period binomial model. The goal is not to calibrate the market precisely, but to show that even when the put has positive value in theory, it fails to clear in practice once frictions are introduced.

Bond setup. Consider a 2-year, annual coupon bond with par value 100 and coupon rate of 5%. The straight bond (without options) pays 5 at t=1 and 105 at t=2. We analyze three versions of this bond: (i) a plain straight bond, (ii) a puttable bond with a par put at t=1, and (iii) a callable bond with a call price of 102 at t=1.

Interest rate tree. We use a recombining binomial tree for short rates. At t=0, the short rate is 4%. At t=1, the rate can move up to 6.5% or down to 2.5%. At t=2, the rates are 9.0% (up–up), 6.0% (up–down), or 2.0% (down–down). To reflect credit risk, we add a constant spread of 150 basis points to all nodes. Risk-neutral probabilities are set at q=0.5.

Backward induction.

- *Straight bond:* At t=2, all paths pay 105. Discounting back with node-specific rates and adding the interim coupon yields a value of 98.67 at t=0.
- *Puttable bond:* At t=1, the investor compares the continuation value with exercising the par put. Exercising is optimal in the up-state, locking in 100 rather than continuing. The resulting value at t=0 is 99.98.
- *Callable bond:* At t=1, the issuer compares continuation with calling at 102. In this tree, rates never fall far enough to justify calling, so the callable bond is valued at the same 98.67 as the straight bond.

Option values. The embedded option values follow immediately:

$$V^{*}_{put} = 99.98 - 98.67 = 1.32, \; V^{*}_{put} = 98.67 - 98.67 = 0.00. \quad \text{(C-1)}$$

Thus the put option has a positive theoretical value of 1.32 (about 1.3% of par), while the call option is worthless in this example.

Interpretation. In a frictionless world, the put option clearly adds value to investors, while the call option does not. Yet in reality, issuers almost never grant puts, while calls are ubiquitous. The unified model developed in Section 3.7 explains this paradox: once investor complexity aversion and issuer power asymmetry are incorporated, the required threshold value θ_{min} for issuance exceeds what investors are willing to recognize. The option is priced out of existence.

To illustrate the mechanics of the model in a transparent way, we construct a simple two-period binomial interest rate tree. The bond pays a 5% annual coupon on a par value of 100, with a par put exercisable at t=1 and a call at 102 available to the issuer at the same point. Risk-neutral probabilities are set to 0.5, and we add a constant 150 basis point credit spread at each node to reflect realistic discounting. Table 1 shows the short-rate tree, the node-specific discount factors, and the relevant cashflows at each node.

Table 1: Short-Rate Binomial Tree and Cashflows

Time (t=)	*Node*	*Short Rate r (%)*	*Discount factor (1/(1+r+s))*	*Cashflow/Note*
0	0	4	.94787	Start (prices t = 1 Cashflows)
1	1(u)	6.5	.92593	Discount t=2, Put=100, call=102
2	1(d)	2.5	.96154	Discount t=2, put=100, call=102
2	2(uu)	9		Terminal payoff=105
2	2(ud_	6		Terminal payoff=105
2	2(dd)	2		Terminal payoff=105

Caption of Table 1*: Par = 100; coupon = 5% (annual); risk-neutral q=0.5; credit spread = 150 bps.*

As Table 1 shows, the terminal payoff at t = 2 is 105 across all states, while the intermediate coupon of 5 at t = 1 coincides with the option exercise opportunities. This setup allows us to compute values for the straight bond, the puttable bond, and the callable bond through backward induction, which we report in Table 2.

Table 2: Valuations of Straight, Puttable, and Callable Bonds

Bond Type	*Value at t = 0*	*Embedded Option Value*
Straight Bond	98.67	0
Put Bond	99.98	1.32
Call Bond	98.67	0

Caption for Table 2. *Present values at t=0; embedded option values in points (par = 100).*

As Table 2 shows, the puttable bond commands a higher price than the straight bond, reflecting the embedded put option's positive theoretical value of 1.31. By contrast, the callable bond is valued the same as the straight bond in this example, since the call option is never exercised under the assumed rate paths. This asymmetry—where the put has theoretical value but the call does not—sets the stage for the threshold analysis in Table 3, which demonstrates how frictions erase the put's apparent advantage.