

Commercial Credit Intelligence: A Framework for Enterprise Debt Portfolio Management

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Abstract

Corporate borrowers manage an increasingly complex web of credit facilities—term loans, revolving lines, equipment financing, commercial real estate mortgages, and government-guaranteed programs—yet the tools available to them for managing that debt have lagged far behind the analytical infrastructure available to their lenders. While banks deploy sophisticated credit risk models, covenant surveillance systems, and portfolio analytics, the typical middle-market borrower monitors its own debt obligations through spreadsheets, filing cabinets, and institutional memory. This paper introduces *Commercial Credit Intelligence* as an emerging discipline: the systematic, borrower-side aggregation, monitoring, and analysis of an enterprise’s complete debt portfolio and the financial information that supports it. We situate the discipline within the established literatures on financial covenants, creditor control rights, relationship lending, and corporate liquidity management, and we develop a conceptual framework organized around five capabilities: portfolio consolidation, covenant lifecycle management, financial information integrity, proactive risk surveillance, and capital structure decision support. We argue that the informational asymmetry traditionally analyzed in credit markets—lenders knowing less than borrowers about firm prospects—coexists with a second, underappreciated asymmetry: borrowers frequently know less than their lenders about the state, terms, and interactions of their own credit agreements. Technology platforms operating within this framework, of which LORIQ is one example, aim to close that second gap. We discuss implications for corporate treasury practice, covenant compliance, lender relationships, and the

emerging role of artificial intelligence in borrower-side credit management, and we identify limitations and directions for future research.

Keywords: commercial credit, debt covenants, corporate treasury, debt portfolio management, financial technology, covenant compliance, middle-market lending

JEL Classification: G21, G30, G32, M15, M41

1. Introduction

The academic literature on commercial credit is overwhelmingly written from the perspective of the lender. Banks screen borrowers to mitigate adverse selection (Diamond, 1984; Fama, 1985), design covenant packages to constrain moral hazard (Smith & Warner, 1979), monitor performance through information production that public markets cannot replicate (Rajan, 1992), and exercise control rights when covenants are breached (Chava & Roberts, 2008; Nini, Smith, & Sufi, 2012). A parallel literature examines how firms choose capital structure (Modigliani & Miller, 1958; Myers, 1977; Graham & Harvey, 2001) and manage liquidity (Almeida, Campello, & Weisbach, 2004; Sufi, 2009). Between these two bodies of work lies a practical question that has received surprisingly little systematic attention: *how does a borrowing enterprise actually manage its portfolio of debt obligations on a day-to-day basis?*

The question matters because the answer, for most firms below the large-corporate tier, is: with remarkably little infrastructure. Large investment-grade issuers maintain treasury departments with dedicated systems for debt administration. But the middle market—firms generally described in industry practice as having revenues between roughly \$10 million and \$1 billion, which collectively account for a substantial share of private-sector output and employment in the United States—typically manages multi-facility, multi-lender debt structures with the same tools used for general office productivity. Loan agreements reside in scanned PDF files; covenant definitions live in the memory of a controller or outside counsel; compliance certificates are assembled manually each quarter; and the interaction effects among facilities—cross-default provisions, shared collateral, intercreditor priorities, springing covenants—are rarely visible in any single place.

This paper argues that the systematic management of borrower-side credit information constitutes an emerging discipline, which we term *Commercial Credit Intelligence* (CCI). We define CCI as the continuous aggregation, normalization, monitoring, and analysis of an enterprise's complete debt portfolio—its facilities, covenants, collateral, guarantees, payment obligations, and the financial statements and metrics that determine compliance—for the purpose of improving compliance outcomes, financing decisions, and lender relationships. The discipline is to the borrower what credit portfolio management has long been to the lender: an organizing framework that converts scattered documents and data into decision-relevant information.

Three developments make the present moment appropriate for articulating such a framework. First, the structure of middle-market credit has become more complex. The growth of private credit as an asset class has multiplied the number and variety of potential lenders, deal structures, and covenant styles that a single borrower may face across its facilities. Second, the regulatory and accounting environment has raised the informational stakes of borrowing: expected-credit-loss accounting under ASU 2016-13 (FASB, 2016) makes lenders more sensitive to timely borrower information, and post-crisis supervisory expectations for credit risk management (Basel Committee on Banking Supervision, 2000, 2015) cascade into more demanding reporting requirements on borrowers. Third, advances in document understanding and machine learning have made it technically feasible to extract structured terms from heterogeneous credit agreements at reasonable cost—a capability that was impractical when the covenant literature of the 1970s through 2000s was written.

Our contribution is conceptual rather than empirical. We synthesize the relevant literatures, characterize the borrower-side information problem, and propose a five-capability framework for Commercial Credit Intelligence. Throughout, we discuss the framework at the level of functions and principles rather than implementations. Where useful, we note that commercial platforms—LORIQ among them—have begun to operationalize elements of the framework, but the paper's purpose is to define and motivate the discipline, not to describe any particular product.

The remainder of the paper proceeds as follows. Section 2 reviews the relevant literature. Section 3 traces the evolution of commercial lending and the corresponding evolution of the borrower's information burden. Section 4 characterizes the modern debt management problem. Section 5 examines the fragmentation of enterprise financial information. Section 6 analyzes covenant management challenges in depth. Section 7 develops the Commercial Credit Intelligence framework. Section 8 discusses enterprise applications. Section 9 considers the role of artificial intelligence. Sections 10 and 11 discuss limitations and future research, and Section 12 concludes.

2. Literature Review

2.1 The Economics of Debt Contracts and Covenants

The theoretical foundation for understanding debt covenants begins with the recognition that debt and equity claimants have divergent incentives. Jensen and Meckling (1976) showed that levered equity holders have incentives to shift risk onto creditors; Myers (1977) demonstrated that debt overhang can cause firms to forgo positive net-present-value investments. Smith and Warner (1979) provided the canonical taxonomy of how bond covenants respond to these agency conflicts—restricting production and investment policy, dividend policy, financing policy, and requiring information provision—and articulated the “costly contracting hypothesis”: covenants exist because they raise firm value by reducing agency costs, net of the costs they impose.

Subsequent work formalized covenants as allocations of state-contingent control rights. Aghion and Bolton (1992) modeled financial contracts as mechanisms that transfer control to creditors in bad states, and Bolton and Scharfstein (1996) analyzed how the number of creditors and the design of default provisions shape renegotiation. In this tradition, a financial covenant is best understood not as a mechanical tripwire but as a *renegotiation trigger*: a device that gives the lender the option, in specified states of the world, to reprice, restructure, or accelerate. Gârleanu and Zwiebel (2009) showed that when borrowers are better informed, optimal contracts allocate strong initial control rights to lenders precisely because those rights will be renegotiated as information arrives.

The empirical literature confirms that covenants bind frequently and matter economically. Dichev and Skinner (2002) documented that private loan covenants are set tightly—slack at inception is small relative to bond covenants—and that violations are common rather than rare tail events. Chava and Roberts (2008) exploited the discontinuity at covenant thresholds to show that violations cause meaningful declines in capital investment as creditors intervene. Nini, Smith, and Sufi (2009) found that credit agreements frequently contain explicit capital expenditure restrictions that bind investment directly, and Nini, Smith, and Sufi (2012) showed that covenant violations are followed by increased creditor influence over governance, including elevated CEO turnover, alongside subsequent improvements in operating performance—evidence that creditor control is a real and consequential governance channel. Roberts and Sufi (2009) documented that over 90 percent of long-term private credit agreements are renegotiated before maturity, typically well in advance of distress, implying that the “contract” a borrower must manage is a living document whose economic terms evolve continuously.

Research on covenant design has further distinguished covenant types and measured intensity. Christensen and Nikolaev (2012) separated capital covenants (which regulate the balance sheet) from performance covenants (which regulate flow measures such as coverage ratios) and showed they serve different contracting roles. Bradley and Roberts (2015) documented the pricing implications of covenant packages, and Murfin (2012) showed that covenant strictness responds to the lender’s own recent portfolio experience—meaning that the terms a borrower faces depend on conditions the borrower cannot observe. Demerjian (2011) chronicled the rise and partial retreat of balance-sheet covenants as accounting standards evolved, underscoring that covenant measurement is entangled with accounting measurement.

2.2 Banks, Relationships, and Information Production

A second literature explains why bank credit is informationally special. Diamond (1984) modeled banks as delegated monitors that economize on duplicated monitoring costs; Fama (1985) argued that bank loans convey inside information that public debt cannot. Petersen and Rajan (1994) and Berger and Udell (1995) documented the value of lending relationships for small and mid-sized firms—relationships increase credit availability and can reduce collateral

requirements—while Rajan (1992) analyzed the dark side: an informed inside lender can extract rents from a locked-in borrower. Boot (2000) surveyed the relationship banking literature and emphasized that the borrower’s ability to credibly communicate its condition is central to the value the relationship creates. Bharath, Dahiya, Saunders, and Srinivasan (2011) showed that repeated borrowing from the same lender lowers spreads, particularly for opaque borrowers, quantifying the payoff to sustained information sharing.

For the purposes of this paper, the key implication of the relationship literature is symmetric to its usual reading: if lender information production creates value, then borrower information *readiness*—the ability to produce accurate, timely, well-organized financial information—is a complementary asset. A borrower that cannot efficiently demonstrate its own condition cannot fully harvest the benefits that the relationship literature attributes to information sharing.

2.3 Corporate Liquidity, Credit Lines, and Treasury Practice

The corporate finance literature on liquidity management establishes why continuous monitoring of credit capacity matters to borrowers. Almeida, Campello, and Weisbach (2004) showed that financially constrained firms systematically save cash out of cash flow; Sufi (2009) demonstrated that access to bank lines of credit is a valid measure of financial flexibility *only when the borrower maintains covenant compliance*—lines are routinely restricted or revoked following covenant violations, precisely when liquidity is most valuable. Ivashina and Scharfstein (2010) documented how credit supply contracted in the 2008 crisis, including drawdown runs on existing lines, and Berg, Saunders, and Steffen (2016) showed that fee structures on drawn and undrawn commitments embed option-like features that borrowers must actively manage. Graham and Harvey (2001) found that chief financial officers’ capital structure decisions are driven strongly by financial flexibility and credit ratings—both of which depend on the firm’s standing under its existing agreements.

Taken together, these literatures imply that a borrower’s *effective* liquidity is a joint function of cash, committed facilities, covenant headroom, and lender confidence—quantities that are computed from different documents and data systems and that interact in nonlinear ways. Yet the literature is largely silent on

the operational question of how borrowers should assemble and monitor this joint object. That silence is the gap this paper addresses.

2.4 Credit Risk Measurement and the Lender's Toolkit

Finally, we note the asymmetry in analytical tooling. Lender-side credit risk measurement is a mature field: accounting-ratio models date to Altman (1968), structural models to Merton (1974), and modern supervisory frameworks (Basel Committee on Banking Supervision, 2000, 2015) require banks to maintain rating systems, early-warning indicators, and portfolio-level concentration analysis. Supervisory guidance on model risk management (Board of Governors of the Federal Reserve System & Office of the Comptroller of the Currency, 2011) presumes an institutional apparatus of model inventories, validation, and governance. No comparable body of standards, tools, or scholarship addresses the borrower's side of the same relationship. The borrower is the subject of these models but rarely the operator of any. Commercial Credit Intelligence, as developed below, can be understood as the borrower-side counterpart to this lender-side apparatus. # 3. The Evolution of Commercial Lending

3.1 From Bilateral Relationship to Structured Market

For most of the twentieth century, middle-market commercial lending in the United States was a bilateral, relationship-driven activity. A firm banked with one institution; that institution held the deposits, extended the working capital line, financed the equipment, and often held the mortgage on the plant. Documentation was comparatively simple, covenant packages were standardized within each bank, and the loan officer served as an informal information intermediary who understood both the credit agreement and the business.

Several structural shifts eroded this simplicity. Deregulation and consolidation in banking during the 1980s and 1990s replaced local, relationship-centered institutions with larger organizations operating standardized underwriting and centralized credit administration. The syndicated loan market brought institutional investors into corporate credit, professionalizing documentation and introducing agented, multi-lender structures further down-market than before. The securitization of equipment finance and commercial mortgages introduced servicers and trustees whose obligations run to investors rather than

to the borrower relationship. Most recently, the rapid growth of private credit funds has added a class of lenders with distinct documentation styles, monitoring practices, and renegotiation incentives.

The consequence for the borrower is a portfolio of credit relationships rather than a single one. A representative middle-market manufacturer today might simultaneously maintain: a revolving credit facility with a commercial bank, subject to a borrowing base and financial covenants; a term loan from a private credit fund with a different leverage covenant computed on a differently defined EBITDA; equipment financing from a captive finance company; a commercial real estate mortgage with its own debt service coverage requirement, insurance covenants, and escrow provisions; and perhaps a government-guaranteed facility carrying program-specific compliance obligations. Each agreement was negotiated at a different time, drafted by different counsel, and references different definitions of the same underlying financial concepts.

3.2 The Documentation Arms Race

Credit documentation has grown in length and interdependence. Definitions sections of credit agreements have expanded substantially over recent decades as drafting has become more precise and more heavily negotiated; a single defined term such as “Consolidated EBITDA” may run to multiple pages, incorporating dozens of addbacks, caps, and carve-outs. Roberts and Sufi (2009) demonstrated that these documents are renegotiated repeatedly; each amendment layers new language onto old, so the operative terms of a facility at any moment are distributed across an original agreement and a sequence of amendments, waivers, and consent letters. Intercreditor agreements, subordination provisions, springing covenants that activate at utilization thresholds, and cross-default clauses create dependencies *across* documents that no single agreement discloses on its face.

Two features of this arms race deserve emphasis. First, complexity has been driven primarily by lender-side and sponsor-side sophistication; the borrower’s internal capacity to administer the resulting obligations has not grown commensurately. Second, the complexity is heterogeneous: unlike public securities, private credit agreements are not standardized instruments, so economies of scale in understanding them are hard for a borrower to achieve. A

firm negotiates a major credit agreement a handful of times per decade; its lenders negotiate hundreds per year. The experience asymmetry compounds the information asymmetry.

3.3 The Lender's Analytical Ascent

While documentation grew more complex, lenders' analytical infrastructure advanced dramatically. Modern commercial banks operate risk rating systems mandated and examined by supervisors; maintain early-warning frameworks that flag deteriorating borrowers from transaction data, financial spreads, and covenant results; and run portfolio-level analytics for concentration, migration, and expected loss (Basel Committee on Banking Supervision, 2000, 2015). The adoption of expected-credit-loss accounting (FASB, 2016) further institutionalized forward-looking borrower surveillance, since lifetime loss estimation requires banks to project borrower performance rather than merely observe delinquency. Specialized covenant-tracking and loan-administration software is a standard category of bank technology.

No equivalent category emerged historically on the borrower side. Treasury management systems used by large corporates focus on cash, payments, and market risk; enterprise resource planning systems record transactions but do not model credit agreements; contract lifecycle management tools store documents but do not compute covenant compliance. The middle-market borrower has therefore faced its analytically equipped counterparties with, in most cases, a spreadsheet. This asymmetry in tooling is the historical backdrop against which Commercial Credit Intelligence emerges.

4. The Modern Debt Management Problem

4.1 A Taxonomy of Borrower-Side Failure Modes

It is useful to characterize what can go wrong when an enterprise manages a modern debt portfolio without systematic infrastructure. We group the failure modes into four categories.

Compliance failures. The most direct failure is an unintended covenant breach or reporting default: a financial covenant test computed incorrectly or not at all; a compliance certificate delivered late; an insurance certificate lapsed; a

required notice (of a material acquisition, a change of control, a judgment) not given. Because Dichev and Skinner (2002) show covenants are set tightly, and Roberts and Sufi (2009) show agreements are amended frequently, the compliance perimeter moves constantly; a borrower relying on memory of the original deal terms is often complying with a contract that no longer exists. Technical defaults—breaches of administrative or informational covenants rather than payment obligations—are particularly insidious because they arise without financial deterioration yet confer the same contractual leverage on the lender.

Visibility failures. The second category is the inability to answer basic portfolio questions quickly and accurately: What is our total committed and outstanding debt? What matures in the next twenty-four months? What is our weighted average cost of debt, and how does it move if reference rates rise? How much covenant headroom do we have on the binding constraint, and which constraint binds first? Which facilities share collateral, and what would a default under one trigger under the others? For many firms, assembling these answers is a multi-day project involving several people and considerable judgment—meaning that in a fast-moving negotiation or a liquidity event, decisions are made without them.

Optimization failures. The third category is money left on the table. Facilities remain outstanding at above-market pricing because no one benchmarks them; prepayment or repricing windows pass unexercised; unused commitments accrue fees without serving a liquidity purpose; refinancing processes start too late to run competitive processes, converting what should be an auction into a bilateral negotiation with the incumbent. The liquidity literature implies these failures are most costly exactly when conditions tighten (Ivashina & Scharfstein, 2010; Sufi, 2009).

Relationship failures. Finally, poor information readiness degrades the lending relationship itself. The relationship banking literature (Boot, 2000; Bharath et al., 2011) implies that borrowers earn better terms by being reliably transparent. A borrower that delivers late, inconsistent, or error-prone reporting raises its lender's monitoring costs and its own perceived risk—independent of its true condition. Conversely, surprise is the cardinal sin of credit: a covenant issue

disclosed proactively, with analysis and a plan, is routinely waived; the same issue discovered by the lender first becomes a negotiation over consideration.

4.2 Why the Problem Persists

If these failure modes are costly, why has the market not already solved them? Three frictions stand out.

First, *episodic salience*. Debt management costs are incurred continuously but noticed episodically—at quarter-end certification, at renewal, or in a crisis. Between episodes, the function competes poorly for finance-team attention against daily operating demands. This is the organizational analogue of the inattention documented in household finance, operating inside the CFO suite.

Second, *fragmented ownership*. Responsibility for the debt portfolio is typically split among the CFO (strategy), the controller (covenant calculations), accounts payable (debt service), legal or outside counsel (documents), and operations (insurance, collateral). No single role owns the integrated picture, so no single role demands integrated tooling.

Third, *the extraction barrier*. Until recently, converting a heterogeneous stack of credit agreements into structured, computable data required expensive manual abstraction by professionals. The cost of building the data foundation exceeded the perceived benefit of the analytics it would enable. Advances in document understanding technology have lowered this barrier substantially, which is a principal reason the discipline described in this paper is emerging now rather than a decade ago.

4.3 The Stakes: Small Errors, Convex Consequences

The consequences of borrower-side information failure are convex: most errors cost little, but some cost a great deal, and the distribution's tail is fat precisely in bad states of the world. A missed notice requirement in benign conditions is cured with an email; the same miss during a downturn, when Murfin (2012) shows lenders tighten in response to their own portfolio losses, can become the lever for a repricing. Chava and Roberts (2008) and Nini, Smith, and Sufi (2012) document that covenant violations transfer real control—over investment, and even over management continuity. Sufi (2009) shows that the liquidity insurance

a firm believes it holds in its revolver is contingent on compliance. In other words, the option value that lenders hold through covenants is written on the borrower's information hygiene as much as on its financial performance. Managing that exposure systematically, rather than episodically, is the core purpose of Commercial Credit Intelligence. # 5. Fragmented Enterprise Financial Information

5.1 The Anatomy of Fragmentation

The debt portfolio problem is a special case of a broader condition: the financial information of a middle-market enterprise is distributed across systems, formats, and institutions that were never designed to interoperate.

Consider the information required to answer a single, routine question—"Will we pass our fixed charge coverage covenant this quarter?" The covenant definition resides in a credit agreement (a PDF, possibly amended three times). The numerator requires EBITDA as *contractually defined*, which starts from the general ledger (an ERP or accounting system), applies addbacks that may require detail from payroll systems, transaction records, or board minutes, and may be measured on a trailing-twelve-month basis spanning a fiscal year change. The denominator requires scheduled principal payments (amortization schedules held by each lender or servicer), interest (rate resets governed by reference rates and spread grids), taxes paid (tax filings), and perhaps distributions (equity records). No single system contains even half of these elements.

Fragmentation has several distinct dimensions:

- **Institutional fragmentation.** Each lender, servicer, and agent maintains its own records of balances, rates, and schedules, delivered in incompatible statements and portals. Borrowers routinely discover discrepancies between their own amortization assumptions and a servicer's records only at payoff.
- **Format fragmentation.** Legal terms live in unstructured prose; financial data lives in structured ledgers; collateral and insurance information lives in certificates and schedules; forecasts live in spreadsheets. Joining them requires translation across fundamentally different representations.

- **Temporal fragmentation.** Financial statements are periodic; covenant tests are periodic but on contract-specific schedules; rate resets are event-driven; amendments arrive irregularly. The “current state” of the portfolio is a composition of information with different timestamps and different staleness.
- **Semantic fragmentation.** The same word denotes different quantities in different documents. “EBITDA” in the bank agreement, “EBITDA” in the private credit agreement, and “EBITDA” in the board deck are three different numbers computed from three different definitions. Demerjian (2011) and Christensen and Nikolaev (2012) document how covenant measurement is entangled with accounting choices; contractual definitions add a second layer of divergence on top of GAAP itself.

5.2 Consequences for Decision Quality

Fragmentation imposes a tax on every decision that requires integrated information, and the tax is paid in three currencies.

The first is *latency*. When assembling the integrated picture takes days, decisions with shorter clocks are made without it. Lender questions get answered partially; acquisition financing is scoped by rough recollection of baskets and ratios; hedging decisions are made without an accurate rate-exposure profile.

The second is *error*. Every manual re-keying, spreadsheet link, and judgmental mapping between systems is an opportunity for mistakes. Research on spreadsheet reliability has consistently found high error rates in operational spreadsheets (Panko, 1998), and covenant calculations—where a single misapplied addback flips a pass to a fail or vice versa—are unforgiving of such errors in both directions: a false pass creates an undisclosed default; a false fail can trigger unnecessary and costly waiver negotiations.

The third is *asymmetry*. The lender sees its own facility clearly and the borrower’s condition through required reporting; the borrower often sees neither its full portfolio clearly nor its position as the lender sees it. In renegotiation—which Roberts and Sufi (2009) establish as the norm rather than the exception—the party with the better-organized information holds a structural advantage. Gârleanu and Zwiebel (2009) model control allocation under asymmetric information; in practice, the *operational* asymmetry of

information readiness can be as consequential as the classical asymmetry about firm prospects.

5.3 The Integration Requirement

Addressing fragmentation is not primarily a matter of collecting documents in one place, though that is a prerequisite. The essential step is *normalization*: expressing heterogeneous instruments and definitions in a common analytical schema, so that facilities can be aggregated, covenant definitions can be computed against the same underlying financial data, and cross-instrument interactions can be represented explicitly. Normalization must preserve provenance—every derived number should be traceable to the document language and source data from which it was computed—because in credit, the authority of a number depends on its lineage. A covenant result that cannot be tied to the operative contractual definition and to auditable financial inputs is an opinion, not a compliance position.

This integration requirement defines the data foundation on which the capabilities described in Section 7 rest. It is deliberately stated here as a set of properties—completeness, normalization, provenance, timeliness—rather than as a technical design, because the properties, not any particular implementation, are what the discipline requires.

6. Covenant Management Challenges

6.1 Covenants as a Continuous Obligation

The popular conception of covenant compliance is a quarterly ritual: compute the ratios, sign the certificate, file it away. The contractual reality is a continuous obligation with periodic attestation. Negative covenants—restrictions on liens, indebtedness, investments, dispositions, distributions, and affiliate transactions—apply to every transaction the firm undertakes, every day. Affirmative covenants—insurance maintenance, reporting deadlines, notice requirements—operate on their own calendars. Financial covenants are tested periodically but are *breached* when the underlying condition occurs, and incurrence-style tests must be computed at the moment of each restricted action. A borrower that

thinks about covenants quarterly is unmanaged for roughly sixty of every ninety days.

Effective covenant management therefore has at least four distinct temporal modes: *transactional* (does this contemplated action fit within baskets and permissions?), *continuous* (are ongoing conditions such as insurance and collateral maintenance intact?), *periodic* (will we pass the next test date, and by how much?), and *prospective* (under our forecast, when does any covenant approach its threshold?). Most manual regimes handle only the periodic mode with any rigor.

6.2 The Measurement Problem

Financial covenant compliance is a measurement exercise built on contested foundations. Three layers of difficulty compound.

First, *definitional divergence*, discussed above: contractual EBITDA, fixed charges, funded debt, and net worth diverge from their GAAP analogues and from one another across agreements. Each divergence is a place where an unaided preparer defaults to the familiar GAAP figure and thereby computes the wrong test.

Second, *accounting dynamics*. Covenant measurement inherits every change in accounting standards. Demerjian (2011) documents how the shift toward fair-value-influenced balance sheets undermined balance-sheet covenants; more recently, changes in lease accounting moved substantial obligations onto balance sheets, with credit agreements splitting between “frozen GAAP” treatment and renegotiated definitions. A covenant regime must therefore track not only the contract and the financials but the interaction between accounting change and contractual language.

Third, *headroom dynamics*. Dichev and Skinner (2002) established that private covenants are set tight, with initial slack often within a plausible quarter’s operating variance. Tight slack means the derivative matters: the decision-relevant quantity is not “did we pass?” but “what is the trajectory of headroom, and what operating or financing choices move it?” Murfin (2012) adds that newly negotiated covenants tighten when lenders have recently taken losses elsewhere—so a borrower refinancing in a stressed market may face materially

less slack than its own performance would suggest, raising the value of anticipating tests before signing.

6.3 The Violation Decision Tree

When a potential violation appears on the horizon, the borrower faces a sequence of decisions under time pressure: verify the computation; determine whether cure mechanisms (such as equity cure rights) apply; assess cross-default exposure to other facilities; decide when and how to approach the lender; and negotiate a waiver or amendment whose price depends on preparation. The empirical literature is unambiguous that these episodes are consequential: violations shift control rights (Chava & Roberts, 2008), restrict investment (Nini, Smith, & Sufi, 2009), and increase creditor influence over governance (Nini, Smith, & Sufi, 2012). Denis and Wang (2014) show that even renegotiations *not* triggered by violation systematically tighten or reset covenant terms, implying that every interaction over a stressed covenant reprices future flexibility.

Preparation asymmetries dominate outcomes in these episodes. A borrower that arrives with a verified computation, a bridge from the contractual definition to its financial statements, a forecast of the covenant path, and a proposed remedy is negotiating; a borrower that arrives having been notified of its own breach is petitioning. The difference between the two postures is not financial condition—it is information infrastructure, built in advance.

6.4 Portfolio-Level Covenant Interactions

Finally, covenants interact across the portfolio in ways invisible to facility-by-facility management. Cross-default and cross-acceleration provisions propagate a problem in one agreement to the others. Shared or conflicting collateral grants create priority questions that surface only under stress. Baskets consumed under one agreement may effectively constrain actions permitted under another. The binding constraint on a corporate action is the *tightest* applicable provision across all agreements—a quantity that can only be known if all agreements are represented in comparable, computable form. This portfolio character of covenant exposure is the strongest single argument that covenant management is an intelligence problem rather than a filing problem. # 7. The Commercial Credit Intelligence Framework

7.1 Definition and Design Principles

We define **Commercial Credit Intelligence (CCI)** as the discipline of continuously aggregating, normalizing, monitoring, and analyzing an enterprise's complete debt portfolio and the financial information that determines its standing under its credit agreements, in order to improve compliance outcomes, financing decisions, and lender relationships.

Four design principles distinguish the discipline from adjacent practices:

1. **Portfolio primacy.** The unit of management is the whole debt portfolio, not the individual facility. Interactions—cross-defaults, shared collateral, aggregate baskets, consolidated maturity walls—are first-class objects of analysis, because the binding constraint on any decision is defined across agreements, not within one (Section 6.4).
2. **Computability.** Contractual terms must be represented in a form that supports calculation, not merely retrieval. A stored PDF answers “where is the agreement?”; a computable representation answers “do we pass?” and “how much room do we have?” The normalization requirement of Section 5.3 is the foundation.
3. **Provenance.** Every derived quantity—a covenant result, an availability figure, a weighted average cost—must be traceable to the contractual language and financial inputs from which it was computed. In credit, numbers without lineage carry no authority with auditors, lenders, or boards.
4. **Continuity.** Monitoring is continuous, with periodic attestation as an output rather than the process itself. The regime must operate in the transactional, continuous, periodic, and prospective modes identified in Section 6.1.

These principles echo, on the borrower's side, the supervisory expectations long imposed on lenders: complete exposure identification, systematic monitoring, early warning, and governance over models and data (Basel Committee on Banking Supervision, 2000, 2015; Board of Governors of the Federal Reserve System & OCC, 2011). The symmetry is intentional. Credit is a bilateral relationship; the discipline of managing it should exist on both sides.

7.2 Capability One: Portfolio Consolidation

The first capability is a complete, current, normalized inventory of the enterprise's credit obligations: facilities and their economic terms (commitments, balances, rates, fees, amortization, maturities); collateral and guarantee structures; the web of amendments that determines operative terms; and the counterparties—lenders, agents, servicers—on the other side of each. Consolidation converts the visibility failures of Section 4.1 into queryable facts: total and available commitments, the maturity profile, fixed-versus-floating exposure, weighted average cost of debt, and effective liquidity after covenant conditionality of the kind Sufi (2009) documents.

Two disciplines make consolidation durable rather than a one-time abstraction project. First, *event capture*: rate resets, payments, drawdowns, amendments, and waivers must update the inventory as they occur, or it decays toward the spreadsheet it replaced. Second, *reconciliation*: the borrower's records should be reconciled against lender and servicer statements routinely, so discrepancies surface in ordinary course rather than at payoff.

7.3 Capability Two: Covenant Lifecycle Management

The second capability operationalizes Section 6: a complete register of affirmative, negative, and financial covenants across all agreements; contractual-definition-accurate computation of financial tests against the firm's actual financial data; forward-looking headroom projection under forecast scenarios; calendar management of test dates, reporting deadlines, and notice obligations; and structured support for the certification workflow, from computation through internal review to lender delivery. The lifecycle view extends to renegotiation: because Roberts and Sufi (2009) show amendment is the norm, the register must treat amendments as expected events that update the operative terms rather than exceptions filed in a drawer.

The prospective mode deserves emphasis. Given tight initial slack (Dichev & Skinner, 2002), the economically valuable output is early warning: the projected date and driver of the first covenant approach, with enough lead time to act—through operating adjustments, timing of discretionary items, proactive lender dialogue, or refinancing. Early warning transforms the violation decision tree of Section 6.3 from crisis response into planning.

7.4 Capability Three: Financial Information Integrity

The third capability addresses the measurement problem. Covenant computation is only as good as the financial data beneath it, and contractual definitions demand a mapping layer between the firm's books and each agreement's defined terms. Integrity requires: consistent ingestion of financial statements into a normalized presentation; explicit, documented mappings from ledger accounts to contractual definitions (the "bridge" from GAAP to each agreement's EBITDA, fixed charges, funded debt); versioned treatment of accounting change so that frozen-GAAP provisions are honored; and honest representation of missing or estimated data—an unavailable input should surface as "unavailable," never silently as zero, because a fabricated zero is indistinguishable from a catastrophic result in a coverage ratio.

This capability is where the discipline earns credibility with third parties. A compliance certificate supported by a documented, reviewable computation chain lowers the lender's verification cost—directly harvesting the relationship benefits that Boot (2000) and Bharath et al. (2011) associate with borrower transparency.

7.5 Capability Four: Proactive Risk Surveillance

The fourth capability generalizes early warning beyond covenants to the portfolio's full risk surface: approaching maturities and the refinancing runway they require; rate reset and benchmark exposure; concentration in a single lender or collateral pool; deterioration in the metrics lenders themselves watch; documentation risks such as expiring insurance, unperfected collateral changes, or unnotified corporate events; and external conditions—of the kind Ivashina and Scharfstein (2010) and Murfin (2012) show alter lender behavior—that change the market a borrower will face at renewal. Surveillance output should be prioritized and actionable: a small number of ranked exposures with dates, drivers, and suggested responses, rather than an undifferentiated dashboard. The design standard, borrowed from lender-side early-warning practice, is that nothing consequential should surprise the CFO that was computable from information the firm already possessed.

7.6 Capability Five: Capital Structure Decision Support

The final capability turns the same data foundation toward decisions: refinancing timing and sequencing against the maturity wall; debt capacity

under the binding constraint across all agreements; the marginal covenant impact of contemplated actions (an acquisition, a distribution, a capital program) before they are undertaken; benchmarking of existing facility economics against prevailing conditions; and preparation of the information package that supports a competitive financing process. The scenario logic matters more than any point estimate: Graham and Harvey (2001) document that CFOs prize financial flexibility, and flexibility is precisely the object that scenario analysis over a computable portfolio measures—how much adverse variance the structure absorbs before a constraint binds, and which lever restores room at least cost.

7.7 The Framework as a Maturity Model

The five capabilities are sequenced deliberately: consolidation enables covenant management; information integrity makes both trustworthy; surveillance and decision support are the returns on the foundation. Enterprises can locate themselves on this progression—from *reactive* (documents scattered, compliance episodic), through *organized* (inventory current, calendar managed), to *intelligent* (computation automated with provenance, headroom projected, decisions simulated). Commercial platforms operating in this space, of which LORIQ is an example, generally aim to move organizations along this maturity curve; the framework itself, however, is technology-agnostic. A disciplined treasury team with adequate staffing could implement much of it manually. The economic case for technology is that the middle market cannot ordinarily afford that staffing, while software makes the discipline accessible at middle-market scale.

8. Enterprise Applications

8.1 The Office of the CFO

For the chief financial officer, CCI functions as the debt-side complement to the planning and analysis apparatus that exists for operations. Its contributions are: a defensible, always-current answer to board and investor questions about leverage, liquidity, and maturities; forward visibility into constraint interactions before strategic commitments are made; and negotiation readiness—entering every lender conversation with a complete, verified picture of the firm’s own

position. In Section 4.1's terms, it converts visibility and optimization failures into managed processes.

8.2 Controllershship and Compliance

For controllers, the discipline's value is concentrated in the certification workflow: contractual-definition-accurate computations with documented bridges from the financial statements, review trails that satisfy auditors, and calendars that make reporting deadlines and notice obligations operationally unmissable. The measurement layer (Section 7.4) also insulates the compliance process against accounting change, by making the interaction between standards and covenant definitions explicit rather than tacit.

8.3 Treasury and Liquidity Management

For treasury professionals, the central object is effective liquidity: cash plus available commitments, adjusted for the covenant conditionality that Sufi (2009) shows can void nominal availability precisely under stress. CCI supplies the covenant-adjusted availability figure, the rate-exposure profile for hedging decisions, and the early warning that distinguishes a planned refinancing from a forced one—a distinction Ivashina and Scharfstein (2010) suggest is worth the most exactly when markets tighten.

8.4 Lenders and the Bilateral Relationship

Although CCI is a borrower-side discipline, lenders are indirect beneficiaries. Borrowers with reliable information infrastructure deliver more accurate reporting with lower verification cost, disclose issues earlier, and renegotiate on facts rather than estimates. The relationship literature predicts—and practitioner experience confirms—that such borrowers obtain better access and pricing over time (Berger & Udell, 1995; Bharath et al., 2011). To the extent the discipline spreads, it should modestly reduce the deadweight costs of monitoring and renegotiation across the middle market, a gain shared by both sides of the relationship.

8.5 Advisors, Sponsors, and Boards

Financial advisors and investment bankers benefit from client information readiness when running financing processes; private equity sponsors face the portfolio problem multiplied across holdings, where consistent covenant surveillance is a governance necessity; and boards, whose oversight duties extend to the capital structure, receive from the discipline what they rarely receive today—a current, provenance-backed view of the firm’s obligations and headroom, rather than a quarterly narrative. # 9. The Future of AI in Commercial Credit

9.1 What Machine Intelligence Changes

Artificial intelligence bears on Commercial Credit Intelligence in three distinct ways, of unequal maturity.

The first, and most consequential today, is *document understanding*. The extraction barrier identified in Section 4.2—the cost of converting heterogeneous credit agreements into structured, computable terms—has historically been the binding constraint on borrower-side tooling. Modern language models materially lower this barrier: identifying defined terms, covenant provisions, baskets, and notice requirements in unstructured agreements is now feasible at a cost compatible with middle-market economics. This is an enabling change for the entire framework, because Capabilities One and Two (Sections 7.2–7.3) presuppose exactly this structured representation.

The second is *analytical assistance*: summarizing a facility’s position, drafting the narrative sections of a compliance package, explaining the drivers of a headroom change, or answering natural-language questions over the portfolio. Here the technology augments professional judgment; in the terminology of Agrawal, Gans, and Goldfarb (2018), it lowers the cost of prediction and articulation while leaving judgment—and accountability—with the human.

The third, and least mature, is *predictive surveillance*: learning from patterns across borrowers and cycles which configurations of headroom trajectory, market conditions, and lender behavior precede stress. Any claims in this area should be treated with the caution the credit-modeling literature has learned over five decades: models fitted to benign periods degrade at turning points, and rare-event prediction in credit remains difficult (a lesson running from Altman, 1968, through the post-crisis model risk literature).

9.2 Governance Requirements for AI in Credit Workflows

Because credit information carries legal and financial consequence, AI deployment in this domain must satisfy governance standards analogous to those supervisors impose on lender models (Board of Governors of the Federal Reserve System & OCC, 2011). Four requirements follow.

Provenance and verifiability. AI-extracted terms and AI-drafted analysis must be traceable to source language and source data, and must be presented as drafts subject to review—not as authoritative conclusions. The provenance principle of Section 7.1 applies with double force to machine-generated content.

Determinism where determinism is due. Covenant compliance is arithmetic over defined terms; it should be computed deterministically from reviewed inputs, not estimated by a generative model. The appropriate division of labor assigns extraction and explanation to AI and calculation to auditable, deterministic logic. Conflating the two—allowing a language model to “estimate” a coverage ratio—imports model risk into a task that does not require it.

Honest uncertainty. Extraction confidence should be surfaced, low-confidence items routed to human review, and absent information represented as absent. In credit workflows, a fabricated value is strictly worse than a gap, because gaps prompt inquiry while fabrications propagate.

Confidentiality. Credit agreements and borrower financials are among a firm’s most sensitive documents. AI processing of such material must respect confidentiality obligations, including those embedded in the credit agreements themselves.

9.3 The Plausible Trajectory

Over the coming decade, the plausible trajectory is not the replacement of credit professionals but the compression of the information-preparation layer that currently consumes their time. If document abstraction, data assembly, and first-draft analysis approach negligible marginal cost, the scarce inputs become judgment, relationships, and negotiation—on both sides of the credit relationship. One testable implication is convergence in information readiness between large corporates and the middle market, and consequently some compression in the portion of middle-market credit spreads that compensates

lenders for borrower opacity and monitoring cost, a component the relationship-lending literature has long identified (Berger & Udell, 2006; Bharath et al., 2011). Whether that compression materializes is an empirical question worth tracking.

10. Limitations

This paper's argument is subject to several limitations, which we state plainly.

First, it is conceptual. We offer a framework grounded in established literature and practitioner experience, not an empirical test. The central causal claim—that systematic borrower-side credit management improves compliance outcomes, financing terms, and relationship quality—is supported by adjacent evidence (on covenant consequences, renegotiation frequency, and relationship value) but has not itself been measured. Selection effects will complicate any future test: firms that adopt the discipline early are likely to differ systematically from those that do not.

Second, the framework's scope is the middle market and the private credit relationship. Very small businesses with a single facility face a simpler problem; large investment-grade issuers already staff treasury functions that perform much of the framework internally. The marginal value of the discipline is greatest where complexity is high and internal infrastructure is thin, and our argument should be read as scoped accordingly.

Third, technology does not remove judgment. Contract interpretation is ultimately legal judgment; covenant definitions can be genuinely ambiguous; and no computation substitutes for counsel on a contested provision. The framework organizes and accelerates professional work; it does not replace it, and implementations that suggest otherwise would create new risks rather than reduce old ones.

Fourth, there is a systemic caveat. If borrower-side intelligence becomes widespread, lender responses will not be static: covenant design, monitoring intensity, and pricing may adapt, in the spirit of Murfin's (2012) evidence that contract terms respond to lender circumstances. The equilibrium effects of symmetric information infrastructure on credit market contracting are genuinely unknown.

11. Future Research

The framework suggests a research agenda at the intersection of corporate finance, accounting, and information systems.

Measurement of borrower-side information costs. The literature quantifies lender monitoring costs indirectly through spreads; no comparable estimates exist for the borrower's costs of compliance, information assembly, and renegotiation preparation, or for the frequency and cost of technical defaults in the middle market. Field data from adopting firms could ground these magnitudes.

Compliance infrastructure and credit outcomes. Does information readiness causally affect spreads, covenant slack, waiver pricing, or access during tightening cycles? Staggered adoption of borrower-side systems offers a plausible identification path, with the selection caveats noted above.

Contract design under symmetric tooling. How do covenant packages evolve when lenders know borrowers can compute compliance continuously? One hypothesis is a shift toward more information-intensive but less punitive designs—tighter reporting, looser tripwires—since the early-warning function of tight covenants (Gârleanu & Zwiebel, 2009) is partly substituted by the borrower's own surveillance.

Renegotiation dynamics. Roberts and Sufi (2009) and Denis and Wang (2014) establish that renegotiation is pervasive and consequential. Does borrower preparation measurably shift renegotiation outcomes—waiver fees, amendment pricing, covenant resets—and does earlier disclosure of prospective breaches change lender behavior as the practitioner consensus holds?

AI reliability in contract abstraction. The governance requirements of Section 9.2 presume measurable extraction quality. Benchmarks for credit-agreement abstraction—accuracy by provision type, error asymmetries, human-review efficiency—would discipline both vendor claims and academic evaluation.

Macroprudential implications. If middle-market borrowers collectively improve covenant surveillance, do credit cycles change shape—fewer surprise defaults but faster collective responses to tightening? The drawdown dynamics

documented by Ivashina and Scharfstein (2010) suggest borrower behavior aggregates in ways that matter for system stability.

12. Conclusion

The commercial credit relationship has always been informationally asymmetric, but the asymmetry conventionally studied—lenders knowing less than borrowers about firm prospects—is only half of the picture. The other half is operational: borrowers frequently know less than their lenders about the state, terms, and interactions of their own credit agreements, because lenders industrialized credit information management decades ago and borrowers, for structural reasons, did not. The costs of this second asymmetry are real and documented in their consequences: tight covenants breached inadvertently, control rights transferred at low points, liquidity insurance voided when most needed, renegotiations entered unprepared, and financing decisions made without an integrated view of the constraints that govern them.

Commercial Credit Intelligence names the discipline that closes this gap: portfolio consolidation, covenant lifecycle management, financial information integrity, proactive risk surveillance, and capital structure decision support, built on normalized, provenance-preserving representations of the firm's actual agreements and financial data. The discipline is conceptually straightforward and analytically conservative—most of its outputs are arithmetic over contracts and ledgers—yet its systematic practice has been rare outside large-corporate treasuries because the cost of building the data foundation exceeded episodic perceived benefits. Advances in document understanding technology have changed that calculus, and a category of platforms, LORIQ among them, has begun to make the discipline operational at middle-market scale.

We have argued that the discipline deserves recognition, and study, in its own right. For practitioners, the framework offers a maturity path from episodic compliance to continuous intelligence. For researchers, it opens questions about how symmetric information infrastructure reshapes contracting, renegotiation, and credit market equilibrium. For the credit system as a whole, the prize is a modest but broad one: fewer avoidable defaults, cheaper monitoring, better-prepared renegotiations, and capital structure decisions made with full knowledge of the commitments a firm has already made. In credit, as elsewhere

in finance, the returns to knowing one's own position are quiet, cumulative, and—until they are suddenly decisive—easy to underestimate.

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