

From Credit History to Operational Behavior: A Framework of Operational Creditworthiness for Thin-File Commercial Vehicle Borrowers in Emerging Markets

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Abstract

Traditional commercial vehicle underwriting in emerging markets relies heavily on credit bureau histories, collateral values, and standardized asset-depreciation grids. This approach often excludes First-Time Users and First-Time Buyers who operate viable transport businesses but lack a formal credit record. Drawing on longitudinal field observation from the Indian Non-Banking Financial Company (NBFC) sector, this paper develops a qualitative, practitioner-grounded framework for assessing thin-file commercial vehicle borrowers through operational behavior rather than historical credit visibility.

The study contrasts two observed underwriting tracks within a single lending ecosystem: a conventional bureau-led approach and an alternative operational approach. It proposes evaluating repayment capacity through route stability, freight-contract continuity, digital transaction velocity, driver vintage, and asset-driver fit, and translates these signals into an Operational Underwriting Scorecard intended for field deployment by credit and risk teams.

The paper argues that operational creditworthiness offers a more context-sensitive reading of risk in informal logistics markets, particularly where bureau records are absent or uninformative. Stable corridors, recurring enterprise freight arrangements, consistent digital inflows, and experienced operators can signal repayment capacity that bureau history alone would miss. The framework also supports earlier risk detection by surfacing operational disruptions, such as route fragmentation or contract loss, before they appear as formal delinquency.

Positioned within the enterprise-development, financial-inclusion, and SME-finance literatures, the framework reframes thin-file borrowers not as inherently risky but as under-observed. By widening access to productive-asset finance, it also speaks to enterprise formation and livelihood mobility among informal-sector operators. Distinct from digital-footprint models that draw on personal device, social, or call-log data (Agarwal et al., 2019; Berg et al., 2020), the proposed approach relies only on consented, aggregate operational and transactional signals, aligning it with consent-based digital public infrastructure and contemporary data-protection standards.

Keywords: *operational creditworthiness; thin-file lending; commercial vehicle finance; alternative-data underwriting; financial inclusion; NBFC; account aggregator; emerging markets.*

1. Introduction

1.1 Background and Institutional Context

Extending formal finance to economically productive but credit-invisible micro-entrepreneurs is a central concern of development finance and a precondition for inclusive growth in the global South. Commercial vehicle finance offers

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a revealing case. The sector's financing ecosystem in emerging economies has historically depended on rigid, asset-backed lending models and centralized credit-bureau verification networks. Field evidence accumulated within the Non-Banking Financial Company (NBFC) sector suggests that these legacy underwriting paradigms systematically under-assess and misprice the repayment capacity of thin-file transport entrepreneurs.

In these economies, transport micro-enterprises form the physical backbone of supply chains, moving core commodities across vital industrial and agricultural corridors. For many low-income transport workers, ownership of a commercial vehicle represents the first formal enterprise asset they acquire, marking a transition from wage labour as a salaried driver into self-directed entrepreneurship. Such entrants typically fall into two groups: First-Time Users (FTUs), who acquire and operate a commercial vehicle for the first time, and First-Time Buyers (FTBs), experienced drivers financing their first vehicle; both characteristically lack an established formal credit relationship. Yet when these operators attempt to make that transition into independent owner-operators, they confront an immediate institutional barrier: credit invisibility. Traditional deployment models condition access to capital on a historical credit footprint, structurally excluding productive new entrants who possess deep operational expertise but lack a formal banking track. The result is a financing gap that constrains livelihood-enterprise formation precisely among the operators most capable of running a viable business.

1.2 The Research Problem

Conventional credit scoring is fundamentally backward-looking. It assumes that an enterprise's future behavior is best predicted by its historical compliance with formal credit lines, an assumption rooted in the classic information-asymmetry account of credit markets (Akerlof, 1970; Stiglitz & Weiss, 1981). In the informal transport sector this assumption frequently breaks down. A commercial vehicle operator's true earning capacity is determined less by past borrowing than by day-to-day operational velocity: how the operator navigates regional freight lanes, maximizes vehicle uptime, secures backhaul opportunities, and manages decentralized broker networks.

Borrowing the language of statistical decision theory as a heuristic, reliance on bureau indicators alone exposes lenders to two error types:

- **False rejections:** Declining competent, operationally secure drivers who run regular, high-yielding routes simply because they lack a credit history.
- **False approvals:** Approving borrowers with clean bureau scores who later default because they lack the localized broker networks or route resilience needed to absorb sudden freight-rate shocks.

1.3 Research Questions and Objectives

This study addresses a foundational question in development finance: *can structured operational-behavior parameters serve as the primary basis for underwriting thin-file commercial vehicle borrowers for whom traditional credit bureau scores are absent or uninformative?*

The framing is deliberately one of primacy rather than wholesale replacement. Where bureau data exists, operational signals are best understood as complementary; their decisive value emerges precisely in the thin-file segment. The paper pursues four objectives:

1. Introduce and articulate the concept of Operational Creditworthiness as an alternative risk-assessment lens.
2. Provide a field-usable definition of route consistency grounded in a spatial-overlap logic.
3. Present qualitative observations contrasting bureau-vetted and operational underwriting tracks.
4. Outline a deployable Operational Underwriting Scorecard suited to institutional use.

1.4 Research Design and Method

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This paper adopts a qualitative, single-institution case-study design grounded in reflective practitioner observation. Such designs are well suited to process tracing, where deep institutional access reveals mechanisms that aggregate, multi-firm datasets tend to obscure (Eisenhardt, 1989; Yin, 2018). The study follows an abductive case-study logic, in which recurring field observations were iteratively compared against existing theories of information asymmetry, relationship lending, and alternative-data underwriting, allowing the construct to emerge from the interplay of evidence and theory. The analysis draws on longitudinal observation of two contrasting underwriting tracks within one NBFC lending ecosystem, supported by field logs, credit-committee exception notes, and ground-level collection records.

Consistent with institutional confidentiality and data-protection obligations, the study reports normalized directional patterns and relative comparisons rather than absolute portfolio figures, and works only with aggregate, de-identified operational signals. No individual-level identifiers, communication logs, or device data are used. The contribution is therefore conceptual and design-oriented: it advances a theoretical construct and a practical scorecard rather than a statistical estimate of default probabilities. The remainder of the paper reviews the relevant literature (Section 2), develops the construct and its variables (Sections 3 and 4), presents the two observed underwriting tracks (Sections 5 and 6), sets out the scorecard (Section 7), and discusses managerial and policy implications (Sections 8 and 10), before examining boundary conditions (Section 9).

This paper makes three contributions. First, it introduces Operational Creditworthiness as a sector-specific construct for assessing thin-file commercial vehicle borrowers. Second, it develops a practical underwriting framework that translates operational behaviour into observable credit signals. Third, it extends the financial-inclusion literature by showing how productive-asset finance can be evaluated using consented operational data rather than historical credit records or intrusive personal digital footprints.

2. Literature Review

The literatures on micro-enterprise lending, credit risk, and financial inclusion leave a persistent gap at the intersection of credit scoring and logistics operations. This section locates the present study within four strands of work.

2.1 Information Asymmetry and Structural Credit Rationing

The foundational account of credit-market friction rests on information asymmetry. Where quality is unobservable, markets ration or unravel (Akerlof, 1970), and lenders facing imperfect information adopt rigid screening rules that produce structural credit rationing rather than price-clearing (Stiglitz & Weiss, 1981; Mishkin, 1990), though instruments such as collateral can partly screen borrowers and relax that rationing where borrowers can pledge it (Bester, 1985). Small and informal enterprises bear the brunt of this friction: financial and legal constraints bind small firms far more tightly than large ones, directly impeding their growth and asset acquisition (Beck, Demirguc-Kunt & Maksimovic, 2005). When formal channels rely solely on centralized bureaus to mitigate asymmetry, they inadvertently entrench exclusion for thin-file operators who have never interacted with a formal lender.

2.2 Relationship Lending and Cash-Flow Underwriting

To circumvent the limits of arm's-length, hard-information lending, institutions have long relied on relationship-based methods. Lending relationships improve credit availability and cushion small borrowers against short-term shocks (Petersen & Rajan, 1994), while collateral and loan quality interact in ways that shape bank risk (Berger & Udell, 1990). Relationship banking creates value chiefly by producing borrower-specific information over time (Boot, 2000), and the comparative advantage of different lending technologies varies with firm size and informational opacity (Berger & Black, 2011). More recent work charts a transition toward genuine cash-flow lending, in which decisions turn on a borrower's capacity to generate revenue rather than on accumulated hard collateral (De la Torre, Martinez Peria & Schmukler, 2010). In informal economies, however, clean audited cash-flow statements are rarely available, forcing lenders to identify behavioral patterns that proxy reliably for income velocity.

2.3 Alternative Data and Fintech Analytics

A growing literature evaluates unbanked borrowers through alternative data. Easily accessible digital-footprint variables can match the information content of bureau scores in predicting default (Berg, Burg, Gombovic & Puri, 2020), and big-tech and fintech platforms are reshaping intermediation by tracking continuous behavioral signals rather than static financial events (Frost et al., 2019). In the Indian context specifically, mobile and social footprints, including call-log-based measures, have been shown to predict loan outcomes for borrowers lacking bureau histories (Agarwal, Alok, Ghosh & Gupta, 2019), and digital payments have materially advanced financial inclusion (Demirguc-Kunt, Klapper, Singer & Ansar, 2022).

Two qualifications matter for the present study. First, Berg et al. (2020) find that digital footprints complement rather than fully replace bureau information; this paper retains that nuance, treating operational signals as decisive chiefly where bureau data is thin or absent. Second, much of this literature draws predictive power from personal, device-level, or call-log data. That raises consent and data-minimization concerns that the framework developed here is explicitly designed to avoid.

2.4 The Missing Intersection: Logistics Operations and Credit Risk

While alternative-data research has mapped urban consumer footprints in detail, it largely overlooks industrial and logistics micro-enterprises. A commercial vehicle operator's cash flow is comparatively independent of retail or consumer-behavior trends; it is tied instead to physical parameters such as route consistency, vehicle uptime, and contract security. This paper bridges that gap by linking sector-specific logistics behavior to credit risk, introducing an operational model designed for the commercial vehicle lending segment rather than borrowed from consumer scoring.

Table 1 positions the proposed approach against the dominant underwriting paradigms. Relative to bureau scoring, digital-footprint scoring, and generic cash-flow lending, operational creditworthiness is distinguished by its high sector specificity and its reliance on low-intrusiveness, consented data.

Table 1. Positioning operational creditworthiness against existing underwriting approaches.

Approach	Primary data source	Privacy intrusiveness	Sector specificity
Bureau scoring	Credit history	Low	Low
Digital-footprint scoring	Mobile, device, social, call-log data	High	Low
Cash-flow lending	Banking transactions	Medium	Medium
Operational creditworthiness (this study)	Routes, contracts, transaction velocity, driver experience	Low	High

3. Theoretical Contribution: Defining Operational Creditworthiness

This study proposes the concept of **Operational Creditworthiness**, defined as *the observable capacity of a commercial borrower to generate stable, predictable cash flows through recurring operational activity, independent of formal credit history*. The construct extends information-asymmetry and relationship-lending theory into the micro-logistics sector, holding that a borrower's risk should be read through active operational metrics rather than historical debt records.

Its distinct contribution is twofold. Conceptually, it isolates a sector-specific behavioral layer, route stability, contract anchoring, and asset-driver fit, that is causally linked to a transport micro-enterprise's cash generation and is not captured by generic digital-footprint or consumer-scoring models. Methodologically, it specifies signals that can be

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observed through consented, aggregate financial and operational data rather than personal device or communication records, distinguishing it from call-log-based approaches such as Agarwal et al. (2019). Under this lens, credit risk falls when an operator establishes a stable operational loop, consistent routes and predictable contract terms, that insulates cash flows from spot-market shocks and lowers default likelihood. Framed this way, the construct is not only a risk tool but a development lever: by extending productive-asset finance on the basis of how an operator runs the business rather than a borrowing past, it supports microenterprise formalization and the entrepreneurial mobility of informal-sector workers.

Figure 1 summarizes this logic, tracing the path from observable operational behavior, through the operational-creditworthiness construct and access to productive-asset finance, to enterprise formation and the wider livelihood mobility of the operator.

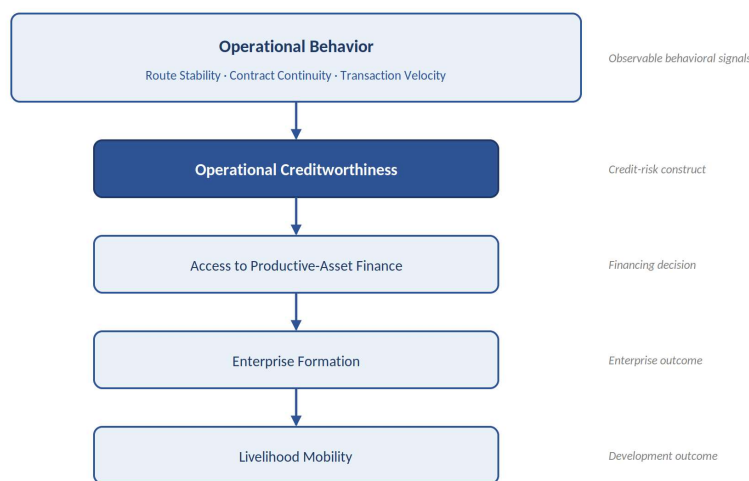


Figure 1. Conceptual model: from operational behavior to livelihood mobility.

3.1 Research Propositions

The construct yields three propositions that frame the observations and the scorecard developed in the remainder of the paper. They are offered as theoretically grounded conjectures for future testing rather than as empirically confirmed results.

Proposition 1. Operational behavior provides observable evidence of repayment capacity among thin-file commercial vehicle operators when formal credit histories are absent or limited.

Proposition 2. Route stability, contract continuity, and transaction velocity function as practical proxies for income predictability and operational resilience.

Proposition 3. Operational disruptions tend to precede financial delinquency and may therefore serve as early-warning indicators of emerging credit stress.

4. Operationalization of Variables

To keep the framework actionable, each variable is given a working definition, a practical verification method, and an expected directional relationship. These are proposed field constructs for qualitative assessment, not statistically estimated coefficients.

- **90+ DPD (default) status:** A binary indicator of whether a loan account reaches ninety or more days past due within the observation cycle, used as the primary reference point for portfolio risk.

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- **Repossession event:** A binary indicator of whether the vehicle asset is legally repossessed for prolonged non-payment, a secondary marker of severe structural default.
- **Route Stability Index (RSI):** A conceptual measure of corridor consistency based on the degree of overlap between the routes operated in the current period and those operated previously, analogous in logic to a set-overlap (Jaccard-type) comparison. Higher overlap reflects operational specialization and corridor predictability; low overlap signals erratic, spot-market movement. The index is described qualitatively and assessed from operational records rather than computed as a formula.
- **Contract anchor flag:** A binary indicator of whether the operator holds a verified, multi-month contract with an enterprise or e-commerce client, proxying structural cash-flow insulation.
- **Digital transaction velocity:** A qualitative reading of the frequency and consistency of distinct incoming business transactions, such as portal receipts or digital freight-wallet transfers, over a recent window, capturing short-term operational liquidity.
- **Inward mandate bounce frequency:** The incidence of inward automated-mandate failures within a recent cycle, signaling immediate cash-coordination friction.
- **Driver vintage:** Accumulated years of valid commercial driving experience held by the primary operator, capturing human capital and operational expertise.
- **Asset-driver balance:** A qualitative judgment balancing vehicle age against driver experience, assessing whether operator competence can offset physical asset depreciation.

5. Underwriting Logic and Observed Portfolio Patterns

The framework is illustrated by contrasting two account groups observed within the institution's book, drawn from comparable origination windows and followed across a comparable loan tenure. These are observational comparison groups, not randomized or statistically matched samples; the patterns below are reported as field-observed tendencies.

- **Track A (traditional bureau group):** Commercial vehicle accounts approved under conventional policy. Each borrower held an established bureau footprint at origination, with loans structured using standard debt-to-income limits and asset-depreciation tables.
- **Track B (operational framework group):** Thin-file accounts granted to First-Time Users or First-Time Buyers without a bureau history, approved under the operational model using cash-flow proxies, route-stability signals, and verified freight contracts.

Table 2. *Comparative profile of the two observed underwriting tracks.*

Characteristic	Track A	Track B
Bureau history	Established	Thin-file / none
Primary underwriting basis	Bureau score	Operational scorecard
Typical borrower	Existing credit user	First-time user / buyer
Monitoring style	Standard	High-touch
Observed early delinquency	Lower	Higher
Observed long-term stabilization	Moderate	Strong

5.1 Lifecycle Performance Patterns

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Across the lifecycle, the two tracks follow visibly different seasoning paths. The bureau-vetted track (A) resembles a mature, prime retail pool: low early-stage delinquency, steady amortization, and only marginal collection strain in the later tenure, with low and predictable prepayment throughout.

The operational track (B) shows higher early-stage delinquency in the first year, consistent with the behavioral adjustment and cash-flow timing hurdles common to informal transport micro-enterprises. Notably, after the second year the delinquency pattern flattens. Once an operator establishes route stability and steady cash-flow velocity, observed repayment patterns appear to stabilize over time and become increasingly comparable to those observed in the bureau-vetted track.

5.2 Repayment-Persistence Patterns

Tracking how repayment behavior evolves, where persistence means an account remaining clean and avoiding a default event, the operational track appears to maintain strong repayment persistence across the full tenure. The gap between the two groups is clearest in the middle of the loan term, when spot-market operators are most exposed to macroeconomic freight-rate declines. In this window, field observations suggest the operational group exhibits greater structural resilience, supported by consistent routes and active enterprise contracts that protect its earning baseline; the observed patterns are consistent with the proposition that operational stability may support repayment persistence.

6. Comparative Risk-Return Observations

Comparing the two tracks at maturity surfaces several risk-return tendencies. These are qualitative observations from institutional experience rather than computed performance metrics.

6.1 Yield Premium and Loss Absorption

The operational track carries an elevated yield premium relative to the bureau track. Institutional experience suggests this pricing premium acts as an effective buffer: although the operational pool incurs higher cumulative credit losses and demands substantial servicing intensity, through high-touch field collection and hands-on verification, the premium appears to more than offset those costs over the full tenure, supporting a more favorable risk-adjusted return.

6.2 The Micro-Enterprise Velocity Effect

The operational group also exhibits an accelerated lifecycle driven by higher prepayment. Successful thin-file operators appear to scale quickly: once cash flows stabilize through regular digital inflows and verified route networks, they tend to clear higher-cost debt early or graduate into cheaper credit tiers.

6.3 Delinquency Volatility versus True Credit Risk

Taken together, the patterns suggest that early delinquency in informal lending is often a matter of short-term cash-flow timing rather than permanent uncreditworthiness. Where field teams combine digital-transaction monitoring with flexible collection adjustments, thin-file operators appear to sustain durable long-term repayment. This suggests that operational parameters may serve as practical proxies for managing credit risk in this segment.

7. A Deployable Framework: The Operational Underwriting Scorecard

To translate these observations into practice, the framework is consolidated into an **Operational Underwriting Scorecard (OUS)**, which is designed to let risk teams translate day-to-day logistics behavior into structured credit signals.

Figure 2 sets out the logic of the scorecard: five operational parameters feed a composite Operational Underwriting Score, which maps to a risk tier and, in turn, to pricing, loan-to-value, and approval decisions.

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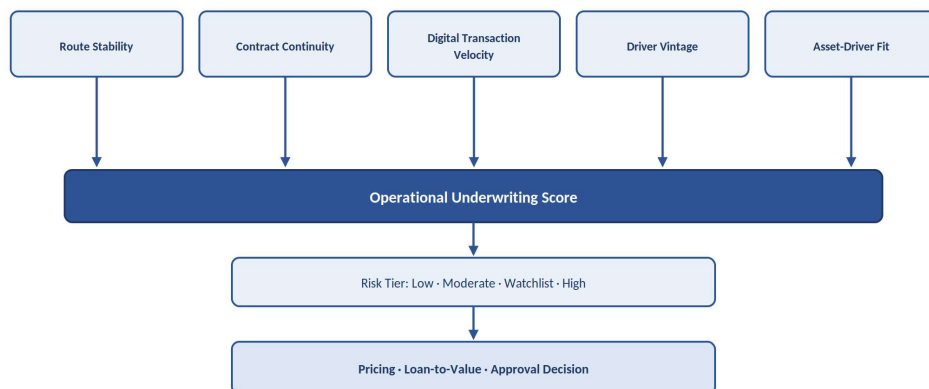


Figure 2. *Operational Underwriting Scorecard: from operational parameters to credit decision.*

7.1 Scorecard Parameters

The scorecard distributes evaluation across five operational parameters:

- **Route stability:** Spatial consistency. Operators running regular corridors, with established broker ties, reliable backhaul, and manageable turnaround, score highest.
- **Contract anchor:** Income predictability. Active multi-month corporate or e-commerce agreements receive maximum weight; total reliance on spot-market brokers receives none.
- **Digital transaction velocity:** Frequency and consistency of distinct incoming business transactions.
- **Driver vintage:** Human capital, with long operational experience indicating competence, route familiarity, and survival capacity.
- **Asset-driver balance:** Asset risk against operator experience, recognizing that an experienced driver can offset the age of a mature vehicle.

7.2 Operational Risk Tiers

The resulting assessment places an applicant in a risk band that guides pricing and terms:

- **Low operational risk:** Maximum loan-to-value allocation and optimized pricing.
- **Moderate operational risk:** Standard terms with periodic localized route monitoring.
- **Watchlist operational risk:** Restricted loan-to-value caps; upfront deposits or additional guarantor backing.
- **High operational risk:** Decline.

8. Discussion and Managerial Implications

These observations challenge the assumption that a bureau score is a mandatory prerequisite for managing portfolio risk in commercial vehicle lending. By suggesting that thin-file borrowers selected on structured operational behavior may sustain strong long-term repayment, the study offers a defensible alternative template for development finance, consistent with the cash-flow-lending direction identified by De la Torre et al. (2010).

8.1 Updating Institutional Credit Policy

Two policy adjustments follow for risk teams:

- **Bureau-score exceptions:** Replace blanket rejection of thin-file applicants with a dual-track policy, under which a zero-history applicant can proceed if they achieve a strong operational score.

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- **Route-stability adjustments:** Let loan-to-value and pricing look beyond depreciation grids, so operators running highly consistent corridors qualify for optimized pricing that reflects their lower cash-flow volatility.

8.2 Phygital Field Verification

Moving to an operational model does not mean relying purely on algorithms. It calls for a *phygital* approach that pairs digital tools with ground verification. In the Indian context, credit officers can audit consented digital bank logs through the Account Aggregator framework (Reserve Bank of India, 2016), analyzing transaction counts, median wallet inflows, and payment regularity instead of requiring formal profit-and-loss statements. Field checks should expand from residential confirmation to operational audit, reviewing freight slips, transport-association records, and active broker assignments to confirm that income streams are stable and recurring.

8.3 Operational Early-Warning Systems

Where traditional monitoring relies on lagging metrics such as a late-stage bounce or mandate failure, operational deviations can act as leading indicators of stress. Identifying the root operational cause early lets collection teams shift from reactive recovery to proactive management. If a driver loses an enterprise contract, for instance, risk teams can work with local logistics networks to re-allocate the vehicle to a new route before a formal default occurs.

8.4 Theoretical Implications

The framework speaks to four bodies of theory. It extends information-asymmetry theory (Akerlof, 1970; Stiglitz & Weiss, 1981) by reframing the thin-file borrower as an information problem rather than a risk type, and by identifying consented operational signals that narrow the asymmetry without resort to collateral-based screening (Bester, 1985). It extends relationship-lending theory (Petersen & Rajan, 1994; Boot, 2000) by showing that the borrower-specific information traditionally generated through repeated lending relationships can be partly substituted by structured observation of operational conduct, a relevant move where lending technologies must suit small, opaque firms (Berger & Udell, 2014). It extends the alternative-data literature (Berg et al., 2020; Agarwal et al., 2019) by proposing a sector-specific, privacy-preserving signal set that contrasts with personal device, social, and call-log data. Finally, it contributes to the enterprise-development literature by linking underwriting reform to productive-asset acquisition and livelihood mobility, positioning credit assessment as an instrument of inclusive market participation rather than only of risk control.

9. Limitations, Selection Bias, and Boundary Conditions

This study establishes a qualitative framework rather than a statistical test, and several boundary conditions require explicit acknowledgment.

9.1 Proprietary Data Constraints and Result Disclosure

Because the underlying loan performance data belongs to a single commercial entity, non-disclosure agreements and regulatory privacy mandates prevent publication of absolute asset volumes, proprietary yields, and absolute loss figures. To preserve analytical validity without breaching confidentiality, the study relies on normalized directional patterns and relative comparisons across the two tracks on comparable dimensions. This limits direct numerical replication, but the directional tendencies and relative risk differentials remain informative for external risk teams. Because the study develops a conceptual framework rather than estimating predictive relationships, no claims are made regarding the relative statistical performance of the proposed variables.

9.2 The Single-Institution Design

The observations come from one large NBFC ecosystem, and reviewers may reasonably question generalizability from a single source. The design is a deliberate trade-off: single-site access permits the process tracing championed in case-study methodology (Eisenhardt, 1989; Yin, 2018), letting the study connect specific operational changes to loan performance through direct sight of field logs, credit-committee exceptions, and collection notes, detail that

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aggregate multi-institution datasets typically obscure. Generalization remains a task for subsequent cross-institutional work (Section 9.4).

9.3 Selection Bias and the Reject-Inference Problem

A recurring challenge in credit research is the **reject-inference problem** (Hand & Henley, 1997). Because the study observes approved loans only (Tracks A and B), it lacks data on applicants rejected under traditional rules. The observed performance of the operational group may therefore overstate its security, since it cannot capture unobserved defaults among rejected applicants who would also have scored poorly on the scorecard.

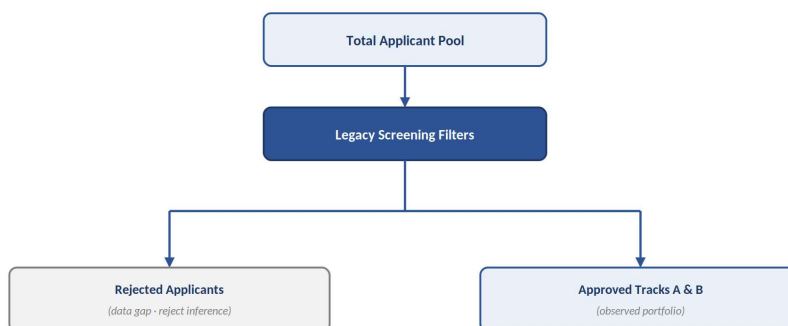


Figure 3. *The reject-inference problem: only approved applicants are observed.*

Future work can mitigate this by deploying the scorecard within a controlled, parallel-testing framework or a regulatory sandbox, tracking a sample of thin-file applicants who would normally face automatic rejection under legacy rules.

9.4 Cross-Validation Across Lenders and Environments

The framework has not been cross-validated across multiple lenders, balance-sheet sizes, or geographies. Risk tolerance, funding costs, and field operations differ markedly between tier-one banks, microfinance institutions, and diversified NBFCs, so a variable that works for a high-touch localized lender may behave differently on a centralized digital-only platform. Regional differences in broker networks, toll processing, and supply-chain hubs may also shift the Route Stability Index, underscoring the need for cross-institutional testing.

9.5 Further Boundary Conditions

Three additional conditions frame interpretation. First, regional concentration: the records analyzed sit primarily within specific transport corridors, and local variation in industrial output, toll infrastructure, and border procedures may limit immediate transfer to other markets. Second, freight-segment variability: the model treats light and heavy commercial vehicles uniformly, yet route-stability dynamics differ between, say, short-haul agricultural transport and long-haul industrial shipping. Third, informal-transaction noise: cash still funds secondary costs such as ad-hoc maintenance and local broker fees, introducing measurement noise into any digital cash-flow reading.

10. Policy Implications and Conclusion

10.1 Aligning with Consent-Based Digital Infrastructure

The framework aligns naturally with India's emerging digital public infrastructure. Through consent-based account aggregation (Reserve Bank of India, 2016), lenders can review essential transactional signals, such as digital inflows and business-transaction frequency, without collecting, sharing, or archiving sensitive personal identifiers. Because the scorecard works from aggregate behavioral indicators, the Route Stability Index, driver vintage, and contract flags, and omits personal identifiers, communication logs, and device tracking, it offers a privacy-preserving template

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consistent with the consent and data-minimization principles of the Digital Personal Data Protection Act, 2023 (Government of India, 2023). It suggests that financial inclusion can be scaled without compromising individual privacy.

10.2 Future Research Directions

As logistics networks and public data platforms digitize further, the framework can extend in two directions:

- **Public logistics integration:** Examining how real-time public logistics data, toll history, digital e-way-bill portals, and regional market registries, affects the scorecard's predictive accuracy.
- **Green logistics and EV fleets:** Adapting the framework to electric commercial fleets, where charging-station turnaround, battery-degradation profiles, and green freight contracts reshape cash-flow predictability and repayment sustainability.

The propositions of Section 3.1 also translate into testable hypotheses for a future controlled or sandbox study, in which the qualitative construct could be examined against recorded outcomes:

H1. A higher Route Stability Index is associated with a lower probability of 90+ DPD status.

H2. Verified contract continuity is associated with greater repayment persistence over the loan tenure.

H3. Operational disruptions precede delinquency events, supporting their use as early-warning indicators.

10.3 Implications for Enterprise Development and Livelihood Mobility

Beyond portfolio economics, the framework carries a development dividend. By enabling experienced drivers to transition into owner-operators, operational underwriting may contribute to enterprise formation, productive-asset ownership, income stabilization, and broader participation in the formal financial system. Each financed operator represents a livelihood enterprise that, once creditworthy in operational terms, can upgrade its asset base, build a formal repayment record, and graduate toward cheaper and larger credit. Read in this light, reforming underwriting is not merely a lending efficiency question but a pathway to entrepreneurial mobility for informal-sector workers who are typically excluded from formal capital, the kind of inclusive, market-based development outcome that development finance seeks to enable.

More broadly, access to commercial vehicle ownership often marks the transition from wage employment to enterprise ownership for transport workers. By helping to enable that transition, operational underwriting may facilitate livelihood upgrading, asset accumulation, enterprise formalization, and fuller participation in the broader market systems on which inclusive growth depends.

10.4 Conclusion

The central claim of this study is that credit invisibility should not be mistaken for credit risk. In the thin-file commercial vehicle segment, operational behavior, route consistency, contract institutionalization, transaction velocity, and operator experience offer a richer reading of repayment capacity than bureau history can provide on its own, and are most decisive precisely where bureau records are absent. As the logistics economy digitizes and consent-based public infrastructure matures, lenders have an opportunity to replace exclusionary underwriting with operationally grounded frameworks, provided the framework's single-institution and selection-bias limitations are addressed through the cross-institutional validation outlined above.

Rather than treating the absence of credit history as evidence of risk, lenders may instead view it as an information problem. Operational creditworthiness offers a framework for reducing that information gap by observing how transport entrepreneurs generate income in practice. In doing so, it points toward more inclusive underwriting, more efficient allocation of productive credit, and broader participation in formal financial systems across emerging markets.

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From Credit History to Operational Behavior: A Framework of Operational Creditworthiness for Thin-File Commercial Vehicle Borrowers in Emerging Markets

Conflict of interest. The author is a Director of JFC Leasing Pvt Ltd, the non-banking financial institution whose anonymized field observations inform this practice-based study. This affiliation is the basis of the author's practitioner access and is disclosed here in the interest of transparency. The author reports no other competing interests.

Data availability. The underlying loan-performance records are proprietary and subject to confidentiality and data-protection obligations and therefore cannot be made publicly available. The paper reports only normalized, de-identified, and directional observations; no individual-level or account-level data are disclosed.

Ethics. The study uses aggregate, de-identified operational and transactional signals only. No personal identifiers, communication logs, or device data were collected or analysed.

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Pankaj Jindal is a Director of JFC Leasing Pvt Ltd, where his work centres on secured commercial vehicle financing for first-time and thin-file borrowers in India's non-banking financial company (NBFC) sector. His practitioner focus spans credit risk, operational underwriting, and the extension of formal finance to informal-sector micro-entrepreneurs and livelihood enterprises.

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