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Corporate Credit Portfolio Growth in Emerging Markets: A Review of Advances in Credit Decisioning and Governance

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Abstract
Corporate credit in emerging market economies expanded rapidly through the second half of the 2010s, and by 2020 the portfolios lenders held had changed in composition as well as in size. This paper reviews what changed over that period in the two capabilities that determine whether such an expansion is durable: the decisioning machinery that selects, prices, structures and monitors exposures, and the governance architecture that constrains, validates and reviews the resulting decisions. The review synthesises 200 sources published up to 2020, combining 120 recent applied and conceptual studies concentrated in the five years to 2020 with 80 established scholarly and institutional works on credit measurement, bank governance and supervision, drawn from the credit, audit, financial analytics and compliance literatures and from the technical literatures on the sectors in which emerging market corporate exposure is concentrated. Three findings emerge. Decisioning advanced through a series of cost reducing innovations, including structured risk evaluation models built for sparse data conditions, financial analytics oriented to cross border cash flow and tax exposure, predictive methods imported from marketing and operations, improved reconciliation and reporting infrastructure, and a sharp fall in the cost of verifying physical assets through remote inspection and condition monitoring. Governance advanced less evenly, and the most developed and most directly tested risk governance practice in the corpus comes from industrial safety, construction and regulated manufacturing rather than from banking, where four requirements recur independently: independent assurance, documented risk assessment before authorisation, defined escalation with named accountability, and retrievable evidence that controls were in force. The two capabilities diffused at different speeds because analytical improvement is demonstrable within a planning cycle while control effectiveness is observable only as a counterfactual. The paper develops a conceptual model in which decisioning capability sets the attainable reach of a portfolio, governance capability determines how much of that reach is realised without unintended loss, and measurement and access integrity moderates both, together with four propositions and three stated boundary conditions. Implications are drawn for lenders, supervisors, policymakers and borrowers, and five research directions are identified, the most significant being the absence of any work linking the operational determinants of borrower performance to realised credit outcomes.

Keywords: corporate credit, emerging markets, credit decisioning, risk evaluation, credit scoring, risk governance, internal audit, model risk, data governance, regulatory compliance, expected credit loss, asset verification, small and medium enterprises

1. Introduction
Corporate credit in emerging market economies expanded rapidly through the second half of the 2010s, and by 2020 the portfolios lenders held had changed in composition as well as size. This paper reviews what changed in the two capabilities that determine whether such an expansion is durable: the decisioning machinery that selects, prices and structures exposures, and the governance architecture that constrains, validates and reviews the resulting decisions.

The two capabilities are usually examined separately, decisioning in the risk evaluation and analytics literatures and governance in the audit and compliance literatures, but they describe a single problem. Data driven risk evaluation models built for emerging market institutions address the estimation difficulty created by short default histories and incomplete credit registries (Akomolafe

& Agu, 2019b), while risk based internal control models address who may act on those estimates and under what constraint (Akomolafe & Agu, 2019a). Neither suffices alone: technology enabled risk assessment raises internal audit quality only where the audit function can act on what it finds (Akomolafe & Agu, 2018), and financial resilience depends on integrating governance and compliance strategy rather than on either component alone (Akomolafe & Agu, 2019c).

Emerging markets sharpen the question in three ways. Credit deepening there is a development objective and not only a commercial one, so excessive caution carries a social cost: the determinants of access to agribusiness finance bear directly on enterprise growth in rural communities (Michael & Ogunsola, 2019a), and legal barriers to trade participation exclude firms from credit markets before any lender has assessed them (Jones & Ominyi, 2020). Public financial management is frequently weak, so the reporting on which credit assessment depends is itself uncertain, as the record on budget compliance and statutory reporting in Sub Saharan Africa shows (Dogbatsey & Ebhojie, 2018). And regulatory perimeters are shifting, with cross border transactions and post merger integration in multi jurisdictional banking raising compliance questions that directly affect exposure measurement (Ominyi, 2020). Institutions in these markets must also anticipate policy change rather than react to it, which is the capability that sectoral impact mapping and regulatory scenario analysis of finance legislation attempts to supply (Akinola *et al*., 2020).

Two arguments are developed. The first is descriptive: both capabilities advanced, but through different channels and at different speeds, with analytical advances spreading faster than the control arrangements that should accompany them. The second is analytical: the two are complements rather than substitutes, so growth is sustainable only where both are present. Section 2 describes the method, Section 3 presents the synthesis, Section 4 sets out a conceptual model, Section 5 discusses it, and Sections 6 to 9 cover implications, limitations, future research and conclusions.

2. Method and Scope of the Review

Two definitions are needed. Decisioning means the whole sequence through which an exposure is selected, sized, priced, structured and monitored, not the approval event alone. Governance means the arrangements determining who may decide what, on whose assessment, subject to what independent challenge, and with what evidence retained. So defined, the two are parallel systems operating on the same transactions rather than sequential stages.

The question has a long theoretical lineage. Credit rationing under asymmetric information establishes why price alone cannot clear a credit market and why screening therefore does the work that pricing cannot (Stiglitz & Weiss, 1981), and relationship lending research shows how repeated interaction generates the private information that screening depends on (Petersen & Rajan, 1994). The governance side has an equally established basis. Lending standards erode over an expansion because loan officers face volume incentives and because the institutional memory of the previous downturn decays (Rajan, 1994; Berger & Udell, 2004), and credit growth is among the more reliable antecedents of subsequent banking distress across long historical samples (Schularick & Taylor, 2012; Mendoza & Terrones, 2008). Deteriorating standards during booms have been documented directly rather than inferred (Dell'Ariccia *et al*., 2012), and the procyclicality of the financial system was identified as a policy problem well before the period examined here (Borio *et al*., 2001). The review that follows asks how far practice in emerging markets had internalised these findings by 2020.

The review is a thematic synthesis of conceptual and review literature on credit decisioning, risk governance and their supporting disciplines, restricted to work published up to and including 2020. The restriction is deliberate: a review of what was known and practised by 2020 loses its meaning if it draws on later codifications, because subsequent sources describe as settled what was then contested. It also reduces the available corpus considerably, a point returned to in Section 7.

Sources were selected against three criteria. Core sources address credit, risk evaluation, audit, financial reporting, banking operations or financial analytics directly. Adjacent sources supply a capability the credit process depends on, including data governance, identity and access control, predictive analytics, cybersecurity assurance and regulatory compliance. Contextual sources describe the operating environments in which emerging market corporate credit is concentrated, including procurement and supply chain operations, construction and industrial safety, healthcare and diagnostic infrastructure, pharmaceutical distribution, energy and housing. The corpus comprises 200 sources published up to 2020: 120 applied and conceptual sources concentrated in the five years to 2020, mostly from emerging market settings, and 80 established scholarly and institutional works supplying the benchmarks against which they are read. The first stream is recent, regional and largely conceptual, the second older, international and largely estimative, and the synthesis treats the tension between them as informative.

The contextual sources require justification, since none is a credit study. Emerging market credit quality is determined only partly by borrower financial condition. Literature modelling those conditions describes the credit risk of the borrowers concerned even when it never uses the word credit. Each source was coded against five themes: growth conditions and intermediation, decisioning method, governance mechanism, operating environment, and measurement infrastructure. Codes were read against one another for convergence, divergence and silence. Convergence is reported where independent literatures reach compatible conclusions from different starting points, which occurs most notably between financial risk governance and industrial safety governance. Silence, where the synthesis requires a construct for which no supporting literature exists, supplies most of the agenda in Section 8. The procedure is interpretive and used a single coder. Systematic review practice in the safety literature provided the procedural model (Arumosoye & Obriki, 2019; Obogo, Uduokhai, & Ozobu, 2019).

Three characteristics of the corpus shape what the review can claim. It is dominated by conceptual models and structured reviews rather than empirical estimation, reflecting the publication patterns of applied work in these markets. It is concentrated in African and, to a lesser extent, South Asian settings. And it is multidisciplinary by necessity, since the credit relevant literature on these sectors was not produced by finance researchers.

3. Literature Synthesis

3.1. Portfolio Growth and The Conditions of Intermediation

The expansion of emerging market corporate credit rested on conditions largely outside the lending decision itself. Access to finance in rural and agricultural markets was constrained by distance, information and the absence of usable collateral, and the determinants of that access shaped enterprise growth more strongly than pricing did (Michael & Ogunsola, 2019a). Entrepreneurial and managerial capability constrained the borrower population from the other direction, which is why work on strengthening agribusiness education and entrepreneurial competencies belongs to the credit supply question rather than to education policy alone (Michael & Ogunsola, 2019b). The same logic extends upstream to skills formation generally, since professional competence in the workforce a borrower draws on is a determinant of its operating reliability (Yeboah *et al*., 2019), as is the integration of information technology and quantitative reasoning into that formation (Boakye *et al*., 2020). In cross border trade the constraint was legal: firms unable to satisfy import and export requirements were excluded from the transactions that would have generated the receivables against which they might have borrowed (Jones & Ominyi, 2020).

Financing structures in social infrastructure illustrate how far the credit question extends beyond the balance sheet. Health insurance financing mechanisms and provider payment reform determine the revenue predictability of healthcare borrowers, and therefore their creditworthiness, more directly than any ratio on their accounts (Ilodigwe & Adesemoye, 2019a). The observation that scientific innovation frequently fails to improve population outcomes because delivery systems cannot absorb it applies with equal force to credit: a facility extended to a borrower whose operating model cannot absorb it produces neither growth nor repayment (Ilodigwe & Adesemoye, 2019b). Pharmacy led delivery and access models show the same dynamic on the expansion side, where growth depends on distribution capability rather than on capital alone (Ilodigwe & Adesemoye, 2020).

Built environment and energy conditions form a third layer. Socioeconomic determinants of housing affordability define the collateral values against which much emerging market lending is secured (Gil-Ozoudeh *et al*., 2018), architectural interventions for urban resilience and flood vulnerability bear on the durability of that collateral (Nwafor *et al*., 2019a), and quantitative evaluation of locally sourced building materials affects both construction cost and asset life (Nwafor *et al*., 2019c). On the energy side, integrating solar power into small scale manufacturing changes the cost structure of a common borrower class (Sunday & Omoegun, 2018), load distribution optimisation for hybrid installations affects its reliability (Sunday & Omoegun, 2019), and co-optimising technical performance against community affordability in microgrids frames the tension between commercial return and access in infrastructure lending (Komi & Adeniji, 2020). For renewable projects the resource estimate is the revenue forecast, so statistical estimation of daily solar radiation is a credit input rather than an engineering detail (Odejobi & Ahmed, 2018a), while grounding design and voltage control under distributed generation determine whether the delivered asset performs as forecast (Adeniji *et al*., 2020; Oshevire *et al*., 2017).

Finally, the operational exposure of industrial borrowers determined a large part of realised credit risk. Supply chain risk management models for engineering, procurement and construction and gas processing projects describe the failure modes that convert a performing contractor into a defaulted one (Agbabiaka *et al*., 2019). Strategic procurement optimisation in oil and gas operations and models for inventory availability and plant uptime describe the conditions under which the same borrower performs (Okonkwo *et al*., 2018a; Okonkwo *et al*., 2018b). These are credit variables in all but name.

International evidence supplies the aggregate context. The build up of corporate leverage across emerging economies was identified as a systemic vulnerability well before 2020, with the corporate sector becoming the main channel through which global financial conditions transmit into these economies (Acharya *et al*., 2015). Dollar credit to emerging market firms was associated with carry trade activity rather than real investment demand, so part of the growth in any loan book reflected funding conditions rather than borrower quality (Bruno & Shin, 2017). Currency mismatch migrated from sovereign to corporate balance sheets (Chui *et al*., 2016), and firm size conditions the relationship between corporate debt and fragility, with smaller firms more exposed at any given leverage (Alfaro *et al*., 2019). Debt overhang and rollover risk suppress investment independently of solvency (Kalemli-Özcan *et al*., 2018), and institutional assessments reached compatible conclusions about the scale of accumulated exposure (International Monetary Fund, 2019; Bank for International Settlements, 2020).

The information infrastructure needed to assess this widening borrower base developed unevenly. Firm size predicts financing constraints, and the constraint operates through legal and institutional development rather than firm characteristics alone (Beck *et al*., 2005; Beck & Demirgüç-Kunt, 2006). The framework for small enterprise lending distinguishes transaction technologies relying on hard information from relationship technologies relying on soft information, and the availability of each depends on infrastructure the lender does not control (Berger & Udell, 2006). Credit reporting relaxes financing constraints where it exists (Love & Mylenko, 2003), private credit depth varies with creditor rights and information sharing institutions (Djankov *et al*., 2007), and firm level evidence confirms that information sharing improves availability and cost (Brown *et al*., 2009). Against that background, digital payment and mobile money infrastructure mattered as much for the information it generated as for the transactions it settled (Demirgüç-Kunt *et al*., 2018; Beck *et al*., 2018; Suri & Jack, 2016).

3.2. Advances in Credit Decisioning

From judgement to structured risk evaluation: The central decisioning advance of the period was the replacement of unstructured credit judgement with structured, documented risk evaluation. Data driven risk evaluation models designed for emerging market financial institutions provided the template, addressing directly the problem that conventional estimation methods assume data these institutions do not have (Akomolafe & Agu, 2019b). Risk based internal control models supplied the complementary structure on the decision side, specifying the control points at which an assessment becomes an authorisation (Akomolafe & Agu, 2019a). Risk

based decision making frameworks developed for regulated manufacturing environments show the same logic operating in a different domain, where a risk assessment determines the intensity of subsequent control rather than producing a binary pass (Aneke & Adesemoye, 2020).

The international modelling base: The structured evaluation approaches in the regional literature rest on a tradition established decades earlier. Ratio based discrimination between failing and surviving firms originates in univariate and multivariate discriminant analysis (Beaver, 1966; Altman, 1968), extended to conditional probability estimation through logit specifications (Ohlson, 1980) and to structural models deriving default from asset value and leverage (Merton, 1974). Two developments matter here. Hazard specifications using all available firm year observations rather than a single pre failure snapshot forecast materially better, which matters where default counts are low (Shumway, 2001), and multi period models with stochastic covariates make the term structure of default probability explicit (Duffie *et al*., 2007). Distress risk is systematically mispriced in equity markets, a caution for any lender using market signals as a rating input (Campbell *et al*., 2008). Reviews document the shift from accounting based to market based and hybrid approaches (Altman & Saunders, 1997), and the specialisation of this apparatus to smaller firms, including the incremental value of non financial information, applies directly to the segments where most portfolio growth occurred (Altman & Sabato, 2007; Altman *et al*., 2010).

Financial analytics as the analytical core: A body of work developed the analytical apparatus that credit assessment came to rely on. Financial analytics driven enterprise value creation reframed the assessment question from solvency to value generation (Lawal & Oduleye, 2018a), and data driven executive decision systems for strategic financial planning described the architecture through which such analysis reaches decision makers (Lawal & Oduleye, 2019b). Two contributions matter particularly for cross border corporate exposure. Tax governance and cross border compliance analytics determine the after tax cash flows from which any obligation is actually serviced (Lawal & Oduleye, 2018b), and transfer pricing risk assessment determines whether a local subsidiary retains the earnings its consolidated accounts imply (Lawal & Oduleye, 2019a). For lenders to multinational groups in emerging markets, these are first order credit variables rather than tax technicalities. Strategic accounting systems designed to strengthen financial transparency and regulatory compliance supply the reporting foundation on which all of it rests (Bola-Sadipe *et al*., 2019).

Predictive analytics and forecasting: Predictive methods entered credit adjacent decision making through several routes. Churn reduction work established the survival modelling logic that transfers to borrower attrition and early repayment (Oziri *et al*., 2020), and geomarketing analytics supplied spatial methods relevant to lending against physical footprint (Seyi-Lande *et al*., 2020). Marketing return measurement confronts the attribution problem that also defeats naive assessment of credit interventions (Sanni *et al*., 2020a), brand positioning frameworks demonstrate segmentation applicable to portfolio construction (Sanni *et al*., 2020b), and product management in network rollouts describes staged investment under uncertainty, structurally the problem a lender faces in a drawdown facility (Sanni *et al*., 2020c). In supply chain settings predictive models made borrower throughput observable (Aifuwa *et al*., 2020), profitability analysis using standard business intelligence tooling lowered the barrier to quantitative assessment (Akin-Oluyomi *et al*., 2020), and machine learning applied to cloud resource scaling illustrates the shared pattern of forecasting under volatile demand (Ahmed *et al*., 2020).

Scoring and statistical learning: The scoring literature is the methodological benchmark for these applications. Reviews of statistical classification set out the comparative properties of available methods (Hand & Henley, 1997; Thomas, 2000), and successive benchmarking exercises across many classifiers and datasets found that sophisticated methods improve discrimination by margins that are consistent but modest (Baesens *et al*., 2003; Lessmann *et al*., 2015). Machine learning on transaction level data improves accuracy where observation is dense (Khandani *et al*., 2010), with comparable gains for platforms using non traditional data, concentrated among borrowers whose conventional files are thin (Gambacorta *et al*., 2019; Jagtiani & Lemieux, 2019). Reviews of the inclusion case agree while cautioning on validation (Bazarbash, 2019), and technology intensive lenders process applications faster and respond more elastically to demand (Fuster *et al*., 2019). Three findings temper this. Models estimated during an expansion degrade when the relationship between characteristics and default shifts (Rajan *et al*., 2015), screening effort falls where the originator does not retain the exposure (Keys *et al*., 2010), and human discretion applied on top of a model can add value rather than noise, which bears on how override processes should be designed (Costello *et al*., 2020).

Measurement and reporting infrastructure: Decisioning quality is bounded by the reliability of the numbers on which it operates. Reconciliation control and financial workflow redesign in emerging market organisations addressed the integrity problem at source (Dogbatsey *et al*., 2019), and the systematic evidence on budget compliance and statutory reporting shows how wide the gap between framework and execution had become (Dogbatsey & Ebhojie, 2018). Data and integration engineering supplied the technical layer: extract, transform and load design for enterprise architectures determines whether reporting is reproducible (Badmus *et al*., 2019a), approximation complexity models for database optimisation bound what can be computed within a reporting cycle (Odejobi *et al*., 2019), and performance evaluation of multi tenant deployments under high concurrency determines whether systems remain usable at month end (Odejobi & Ahmed, 2018b). Conceptual work on data informed platforms in applied settings illustrates how evidence generation is embedded in operational systems rather than bolted on afterwards (Orise & Niniola, 2020).

Digital footprints as credit information: The proposition that behaviour observed through digital channels substitutes for conventional credit information was established empirically during this period. A small set of digital footprint variables was shown to match or exceed the predictive power of a bureau score (Berg, Burg, *et al*., 2020), and mobile phone usage patterns were shown to predict repayment in a developing market context where formal credit histories are largely absent (Björkegren & Grissen, 2020). The institutional literature documents the scale at which this was occurring: platform based lenders use data generated by their own commercial activity to lend to participants in their ecosystems (Frost *et al*., 2019), and the first comparable cross country measurement of fintech and big tech credit volumes found the phenomenon disproportionately large in emerging

economies with less competitive banking sectors and lighter regulation (Cornelli *et al*., 2020; Claessens *et al*., 2018).

Monitoring, inspection and asset verification: Much of the period's monitoring content comes from engineering rather than finance. Predictive maintenance and condition monitoring in power and energy infrastructure describe the shift from periodic inspection to continuous observation of asset condition (Adaramola *et al*., 2018), formalised in the broader move from reactive to predictive maintenance (Sunday *et al*., 2020). Non destructive testing based integrity management and corrosion risk assessment establish asset condition without dismantling the asset, precisely the secured lender's problem (Atta *et al*., 2020), while reliability engineering supplies the theory of time to failure a recovery estimate depends on (Gideon *et al*., 2019). Unmanned aerial systems changed the economics of verification, cutting the cost of observing dispersed assets (Dagodzo, 2018a; Dagodzo, 2018b) and extending to pipeline and corridor monitoring (Dagodzo & Ahiaeke Patrick, 2020); remote sensing interpretation illustrates the same substitution of imagery for physical presence (Dagodzo, 2018c), and geographic information systems were integrated into procurement planning on comparable logic (Ahiaeke Patrick *et al*., 2020). The financial equivalent is that transaction account activity carries monitoring information, since checking account behaviour and credit line usage predict default well before formal deterioration (Mester *et al*., 2007; Norden & Weber, 2010).

Environmental and contingent exposure: Two contributions extend measurement to liabilities that do not appear in financial statements. Data driven frameworks for predicting subsurface contamination pathways in remediation projects quantify an exposure that can exceed the value of the asset securing a facility (Azeez & Badmus, 2018), and spatially explicit risk modelling for contaminant migration in data limited settings addresses the estimation problem where monitoring records are sparse (Lamidi & Olamide, 2018). Decision frameworks reconciling chemical safety with circular economy targets show the same contingent exposure arising from regulatory change rather than from incident (Okojie & Abioye, 2020). Hydrological modelling of climate induced watershed vulnerability extends the same treatment to exposures that accumulate gradually rather than arriving as an event, which is the form most climate related credit risk takes in agricultural and infrastructure portfolios (Badmus & Olamide, 2019).

What the decisioning advances did not solve: Four limitations recur. Data quality remains binding, since no method compensates for reporting that cannot be reconciled (Dogbatsey *et al*., 2019). Conceptual models outnumber validated ones, so claimed performance is usually argued rather than demonstrated (Lawal & Oduleye, 2019b; Bola-Sadipe *et al*., 2019). Methods transfer unevenly across domains, since a churn model on high frequency transactions and a default model on annual statements differ in observation density even with identical apparatus (Oziri *et al*., 2020). And verification advances apply asymmetrically, transforming assessment of physical dispersed assets while doing nothing for receivables, inventory in transit or intangible value (Dagodzo, 2018b).

Provisioning and the measurement of expected loss: Alongside these developments, the recognition of credit loss changed. Supervisory guidance set expectations for credit risk practice under an expected loss framework, including data quality and governance of the estimate (BCBS, 2015a), with transitional arrangements for the capital consequences (BCBS, 2017). The motivating concern was long established: incurred loss provisioning was too small during expansions and rose sharply during contractions, amplifying the cycle (Laeven & Majnoni, 2003; Jiménez & Saurina, 2006). The accounting literature identifies the countervailing risk that provisioning discretion is used to manage reported outcomes, with effects depending on the surrounding disclosure and supervisory environment (Bushman & Williams, 2012; Beatty & Liao, 2014). Analysis of the expected loss approach anticipated both its stabilising intent and its capacity to transmit forecast revisions into capital at the least convenient moment (Novotny-Farkas, 2016). For emerging market institutions it imported a forecasting requirement at a point when forecasting capability was still uneven.

The economics underlying the advances: A common thread is the reduction of the unit cost of an assessment. Structured risk evaluation reduces analyst time per exposure (Akomolafe & Agu, 2019b), business intelligence tooling brings profitability analysis within reach of a small team (Akin-Oluyomi *et al*., 2020), predictive scaling and database optimisation reduce the computational cost of portfolio scale assessment (Ahmed *et al*., 2020; Odejobi *et al*., 2019), and remote methods cut the cost of verifying an asset by an order of magnitude (Dagodzo, 2018a).

3.3. Advances in Credit Governance

Internal audit and risk based control: Governance advances centred on making the credit process auditable. Technology enabled risk assessment moved internal audit from sampling toward continuous coverage (Akomolafe & Agu, 2018), risk based internal control models defined the control taxonomy against which credit processes were mapped (Akomolafe & Agu, 2019a), and integrated governance and compliance strategy was linked to financial resilience rather than to compliance for its own sake (Akomolafe & Agu, 2019c). Industrial internal audit converges from a different starting point, describing an assurance function that is continuous, evidence based and independent of the operation it reviews (Obogo *et al*., 2020a).

The bank governance evidence base: International standards set out board responsibility for risk appetite and the standing of the risk function (BCBS, 2015b), with expectations for risk data aggregation and reporting that make oversight possible (BCBS, 2013). The empirical literature behind them is largely crisis derived and consistent. Banks with stronger, more independent risk management took less risk and performed better (Ellul & Yerramilli, 2013; Aebi *et al*., 2012), while conventional shareholder oriented governance was associated with worse outcomes, since better aligned boards took more risk on behalf of owners who wanted it (Beltratti & Stulz, 2012; Laeven & Levine, 2009), and executive incentive alignment did not protect institutions from loss (Fahlenbrach & Stulz, 2011). The supervisory evidence is more sceptical than the standards imply: official supervisory power correlates weakly with outcomes while private monitoring and disclosure perform better (Barth *et al*., 2004; Barth *et al*., 2013), and implementation varies widely in scope and proportionality (Hohl *et al*., 2018). Two findings bear on emerging markets: related party lending carries better terms, higher default rates and lower recoveries (La Porta *et*

al., 2003), and formal adoption of governance mechanisms frequently outruns their effectiveness (Claessens & Yurtoglu, 2013).

Risk governance models from adjacent high hazard domains: The strongest governance material in the corpus does not come from finance. Governance oriented models of contractor safety performance in multi contract industrial projects address the problem of controlling outcomes through parties the principal does not employ, which is the structure of syndicated and intermediated lending (Arumosoye & Obriki, 2020). Construction safety risk governance models for multi contractor projects extend the analysis to layered accountability (Obogo *et al*., 2019b), and systematic review of hazard identification and risk control practice in urban construction documents how such controls perform in practice rather than on paper (Obogo, Uduokhai, & Ozobu, 2019). Leadership driven safety culture transformation in large workforces addresses the question of whether formal control changes behaviour (Obogo *et al*., 2019a), and the framework linking management walkthrough frequency and coverage to safety culture outcomes is an unusually direct treatment of the supervisory intensity question that credit governance mostly leaves implicit (Obriki & Arumosoye, 2019).

Three further contributions transfer cleanly. Data driven occupational safety risk control in large scale energy infrastructure demonstrates the same coupling of analytics to control that credit risk management was attempting (Obriki & Arumosoye, 2018). Human error causation frameworks in high risk activities describe the failure mechanism that override and exception processes in credit are designed to contain (Obriki & Arumosoye, 2020). Near miss and hazard observation data utilisation shows how leading indicators are collected and acted upon before loss occurs, which is the early warning problem in credit stated in another vocabulary (Arumosoye & Obriki, 2019). Integrated heat stress risk modelling for operations in extreme environments (Arumosoye & Obriki, 2018), risk management models for heavy lifting and crane installation (Obogo *et al*., 2020b), and critical review of safety management systems in oil and gas maintenance (Obogo *et al*., 2020c) complete a picture of risk governance practice in exactly the sectors that dominate emerging market corporate loan books.

Data governance, identity and access: An institution that cannot control who alters a rating or releases a limit does not govern its credit process, whatever its committee structure. Legal and ethical risk modelling frames the obligations (Mbonu *et al*., 2018), and comparative review of data protection regulation with secure cloud implementation addresses the cross jurisdictional case facing regional banking groups (Mbonu, Aliliele, *et al*., 2019). Identity and access management in hybrid and multi cloud environments is the operational core (Mbonu *et al*., 2020; Oshoba *et al*., 2019), enterprise log analytics with automated incident response the detective control (Mbonu, Iwuanyanwu, *et al*., 2019), infrastructure as code governance the answer to configuration drift (Mbonu *et al*., 2020b), and blockchain enabled audit trails the evidentiary problem of demonstrating that controls were in force at a past date (Oshoba *et al*., 2020). The same control set appears in operational rather than financial systems (Mbonu *et al*., 2020a).

Assurance, cybersecurity and platform governance; Security assurance became part of credit governance once credit systems moved onto shared infrastructure. Security audit and enterprise risk assessment frameworks describe the assessment discipline (Dosunmu & Ogundele, 2019), intrusion detection and prevention the detective layer (Dosunmu & Ogundele, 2020), and risk based cybersecurity assurance the standard against which both are judged (Fadayomi *et al*., 2019). Insider threat modelling addresses the failure mode most damaging to a credit process, since the party best placed to manipulate a rating is an authorised user (Akeju *et al*., 2018). Privacy centric security engineering places the obligations on a design footing (Okoruwa *et al*., 2020), security awareness research addresses the human layer (Onche *et al*., 2020), and operational technology security shows the same requirements where exposure is physical (Adegbite *et al*., 2020). Platform governance completes the set: control expectations for systems of record (Badmus *et al*., 2019b), pipeline practice determining whether changes are traceable (Badmus *et al*., 2018; Badmus *et al*., 2020), assurance where live testing is impossible (Ladapo *et al*., 2018), directory services underpinning access control (Ladapo *et al*., 2019), and the cloud architecture and allocation models that determine the operating environment (Ahmed & Odejobi, 2018a; Ahmed & Odejobi, 2018b; Ahmed *et al*., 2019).

Regulatory compliance and the external perimeter: The compliance perimeter around emerging market corporate credit widened materially. Regulatory clearance frameworks for cross border mergers and acquisitions in African financial markets describe the approval architecture governing consolidation (Ominyi & Anichukwueze, 2020), and post merger compliance integration in multi jurisdictional banking addresses the reconciliation of divergent credit policies and rating scales that follows approval (Ominyi, 2020). Compliance culture received attention alongside compliance rules: ethics and compliance training frameworks aimed at measurable behavioural change address the gap that formal policy leaves open (Anichukwueze *et al*., 2020), and global marketing law with consumer protection obligations illustrates the multinational compliance problem in an adjacent domain (Anichukwueze *et al*., 2019). Multi stakeholder governance alignment in joint venture operations addresses the same question where ownership itself is shared (Eyetsemitan *et al*., 2020).

Regulatory oversight models from aviation and pharmaceuticals: Two regulated sectors supply oversight models with direct application to credit supervision. Predictive compliance monitoring using consumer complaint data to detect systemic safety risk demonstrates how a supervisor can identify emerging problems from routinely collected, low cost data rather than from examination (Adeyelu, 2018). Adaptive safety management system implementation in developing economy contexts addresses proportionality, meaning how a demanding oversight standard is applied where capability is limited, which is the central practical question in emerging market prudential supervision (Adeyelu, 2019). Risk quantification models for low frequency, high severity events address the tail estimation problem that credit supervision shares (Adeyelu, 2020). From pharmaceuticals, traceability and chain of custody integrity frameworks describe how provenance is maintained across a chain of independent parties (Aneke & Adesemoye, 2019), which is the structural problem in tracing exposure across a counterparty group.

Where the governance literature is thin: Three gaps are as informative as the content. There is almost no treatment of

model risk as a distinct category, the risk that a validated model is wrong or applied outside its conditions, even though the corpus contains numerous models proposed for adoption. There is little on concentration and connected exposure, historically the dominant source of loss in emerging market banking, and the closest treatments concern dependence on a single counterparty in procurement (Okonkwo *et al*., 2019; Agbabiaka *et al*., 2019). And there is almost nothing on the governance of judgement itself, though the industrial literature on human error causation addresses the same problem operationally (Obriki & Arumosoye, 2020).

Model risk and the governance of discretion; The reference framework defines model risk as arising from both fundamental error and inappropriate use, and requires effective challenge through independent validation, a model inventory with ownership and criticality, ongoing performance monitoring, and documentation sufficient for a third party to reconstruct the model (Board of Governors of the Federal Reserve System & Office of the Comptroller of the Currency, 2011). Early assessment of machine learning in financial services identified the resulting tension, since validation conventionally relies on judging whether a functional form is economically sensible (Financial Stability Board, 2017). The governance of discretion is the same problem from the other side. Rules and discretion in loan pricing have measurably different consequences and the balance is a design choice (Cerqueiro *et al*., 2011), soft information is lost when origination is reorganised around volume (Agarwal & Ben-David, 2018), and the properties making information hard or soft determine how far it survives transmission (Liberti & Petersen, 2019). Loan officer incentives distort internal ratings in ways that later show up in default rates, the strongest argument for treating override data as a governance instrument (Berg, Puri, *et al*., 2020). Algorithmic pricing also changes who is accepted and on what terms, with effects neither uniformly favourable nor adverse across groups (Fuster *et al*., 2020; Bartlett *et al*., 2019).

3.4. Sectoral Settings of Emerging Market Corporate Credit

Advances in method matter in proportion to their fit with the sectors where exposure actually sits. In procurement and industrial operations, demurrage elimination and port logistics optimisation models describe a working capital problem that is simultaneously an operational one (Okonkwo *et al*., 2020), and cost reduction through contract negotiation and supplier management describes the margin on which repayment capacity depends (Okonkwo *et al*., 2019). Talent development in the supply chain function is the capability constraint underneath both, since procurement performance depends on people the borrower must recruit and retain in markets where such skills are scarce (Falemi *et al*., 2020). Sustainable procurement with environmental, social and governance integration introduces a second screening dimension into supplier and borrower assessment (Okojie *et al*., 2020), and programmatic strategy for renewable energy integration drawn from large scale solar deployment describes the project structures through which much emerging market infrastructure credit is extended (Yeboah & Ike, 2020).

In healthcare and diagnostics, capital project delivery models for high risk infrastructure in developing nations address delivery risk directly, which for a project lender is the dominant risk (Aminu-Ibrahim *et al*., 2019). Sustainable diagnostic laboratory infrastructure models for resource constrained settings describe the operating economics of the completed asset (Aminu-Ibrahim *et al*., 2018), and infrastructure driven expansion of diagnostic access across underserved areas describes the demand conditions that determine whether it generates revenue (Aminu-Ibrahim *et al*., 2020). Spatial planning, regulatory compliant design for highly controlled facilities, and materials and energy efficiency decisions together determine construction cost, operating cost and regulatory risk, and therefore the credit profile of the borrower (Ogbete *et al*., 2018; Ogbete *et al*., 2019; Ogbete *et al*., 2020).

In the built environment, comparative analysis of traditional and contemporary architectural morphologies bears on the marketability of collateral (Nwafor, Uduokhai, Giloid, *et al*., 2018), climatic variables affect building energy optimisation and therefore operating cost (Nwafor, Uduokhai, Ifechukwu, *et al*., 2018), and analytical frameworks for efficiency in the delivery process bear on construction risk (Nwafor *et al*., 2019b). In industrial energy systems, thermodynamic efficiency and control strategies determine the cost base of a common borrower class (Sunday *et al*., 2019), corrosion protection affects asset life and therefore collateral value (Atta *et al*., 2018), and hydrogen as a secondary energy carrier illustrates the transition risk that longer dated exposures in this sector carry (Shittu *et al*., 2019). In telecommunications, deployment quality and network performance determine the revenue reliability of a sector that absorbs substantial emerging market corporate debt (Amayo & Popoola, 2017b).

Two observations follow. In each setting the variable determining credit outcomes is operational rather than financial, documented in a technical literature credit analysis rarely reads. And the same governance constructs recur throughout: independent assurance, documented risk assessment, defined escalation, and evidence that controls were in force.

4. A Conceptual Model of Decisioning and Governance Complementarity

The synthesis supports a model with three constructs and one moderating condition. Decisioning capability is the capacity to discriminate credit quality and to price and structure accordingly, observable in the structure of risk evaluation, the analytical methods applied, the reliability of reporting consumed, and the cost of verifying an asset. Governance capability is the capacity to constrain, validate and review those decisions, observable in the independence of assurance, the specification of decision rights, control of identity and access, and the ability to evidence controls in force. Sustainable portfolio growth is the outcome, defined as growth whose realised losses remain within intended tolerance.

The relationship is complementarity rather than substitution. Decisioning capability sets the attainable reach of the portfolio; governance capability determines what proportion of that reach is realised without unintended loss. Three failure modes follow. High decisioning with weak governance produces rapid accumulation of exposures individually assessed but collectively unmanaged, the pattern contractor governance describes when capability is distributed without a corresponding control structure (Arumosoye & Obriki, 2020). Weak decisioning with strong governance produces a

small, safe portfolio that fails the access objective (Michael & Ogunsola, 2019a). Weakness in both produces stagnation punctuated by idiosyncratic loss.

Measurement and access integrity is the moderating condition. Where reporting cannot be reconciled and exposure cannot be aggregated reliably, improvements in decisioning do not translate into improved outcomes, because the dominant loss driver is an exposure the institution cannot see accurately (Dogbatsey *et al*., 2019). Where identity and access are not controlled, the analytical output can be altered by the parties it is meant to constrain (Mbonu *et al*., 2020; Akeju *et al*., 2018).

Exhibit 1: Constructs, observable indicators and predicted relationships

Construct	Observable indicators	Predicted relationship
Decisioning capability	Structure and documentation of risk evaluation; analytical methods applied; reliability of source reporting; cost of verifying an asset or condition.	Sets attainable reach of the portfolio. Positive effect on growth; effect on realised loss is conditional on governance capability.
Governance capability	Independence of assurance; specification of decision rights and escalation; identity and access control; ability to evidence controls in force.	Constrains realised loss. Weak direct effect on growth; strong moderating effect on the loss consequences of decisioning capability.
Measurement and access integrity	Reconciliation and reporting reliability; exposure aggregation across entities; control over who may alter a rating or release a limit.	Moderates the whole relationship. Where weak, decisioning improvements do not reduce portfolio loss.
Sustainable portfolio growth	Growth in exposure; realised loss relative to intended tolerance; stability of both under stress.	Outcome construct. Attained only where decisioning and governance capability advance together.

Four propositions follow. First, the marginal return to governance investment increases with the automation already present in decisioning, because automated processes remove incidental checks without announcing it. Second, exception and override behaviour is the most economical observable signal of the balance between model and judgement, on the reasoning that makes near miss data a leading indicator (Arumosoye & Obriki, 2019). Third, aggregation and reconciliation capability binds: decision level improvements do not reduce portfolio loss where exposure cannot be aggregated (Dogbatsey & Ebhojie, 2018). Fourth, supervisory intensity operates through coverage and frequency rather than the formal stringency of the standard, as the safety walkthrough literature reports (Obriki & Arumosoye, 2019).

Three boundary conditions limit the model. It assumes the institution intends a loss tolerance and can articulate it, which fails where lending is directed by policy, ownership or relationship obligation. It assumes governance failure manifests as loss rather than capture, whereas connected lending produces exposures governed in form and unconstrained in substance. And it treats both capabilities as institution level properties when they vary between product lines, so a single institution may exhibit all three failure modes at once.

5. Discussion

Read across the corpus, the two capabilities advanced through different mechanisms. Decisioning advances were adopted where they produced an attributable commercial return, which in practice meant origination, pricing and, increasingly, verification of physical assets whose inspection cost had fallen (Dagodzo & Ahiaeke Patrick, 2020; Atta *et al*., 2020). Governance advances were adopted where they were externally required or where a loss event had already occurred, which meant regulated sectors and institutions under intensive supervision (Adeyelu, 2019; Badmus *et al*., 2019b). The two adoption logics point in different directions.

The most striking finding is a convergence the finance literature does not acknowledge. Industrial safety governance and financial risk governance arrive independently at the same four requirements: assurance independent of the activity assured, documented risk assessment before authorisation, defined escalation with named accountability, and retrievable evidence that controls were in force. The safety literature states them more precisely and tests them more directly, because its outcome variable is observable within a short horizon whereas credit loss emerges over years (Obogo *et al*., 2019b; Obriki & Arumosoye, 2020). That asymmetry in feedback speed itself helps explain the slower diffusion of governance practice in credit.

The asymmetry between the two capabilities also has a measurement dimension that the corpus makes visible. Much of what a lender needs to know about an emerging market corporate borrower is operational, and the literature that models it sits in engineering, procurement and public health rather than in finance (Okonkwo *et al*., 2018b; Ilodigwe & Adesemoye, 2019a). Decisioning advances that draw on this material, such as asset verification by remote inspection or condition based assessment of collateral, are therefore available to institutions willing to look outside their own field (Dagodzo, 2018a; Adaramola *et al*., 2018). Governance advances require no comparable search but are harder to implement, because they redistribute authority rather than add capability.

Two further observations qualify the account. And the compliance perimeter widened faster than the capability to operate within it, particularly for cross border groups reconciling divergent regulatory regimes after consolidation (Ominyi, 2020; Ominyi & Anichukwueze, 2020), so that a growing share of governance effort was absorbed by the perimeter rather than by the credit process itself.

There is also a temporal asymmetry. Decisioning capability can be acquired: a model bought, a tool licensed, an inspection capability commissioned, with the improvement visible within a planning cycle. Governance capability must be built, since it consists of relationships, reporting lines, independence and accumulated evidence.

A related reading does not depend on negligence. Analytical improvements are legible to those who fund them, since a model that improves discrimination can be demonstrated on historical data within weeks. Control improvements are legible only counterfactually, since the value of independent challenge is the loss that did not occur. The safety literature confronted this measurement asymmetry and resolved it partly through leading indicators, which convert a

counterfactual into an observable (Arumosoye & Obriki, 2019; Obriki & Arumosoye, 2019). Credit governance has no equivalent convention.

6. Implications for Practice and Policy

For lending institutions, three implications follow. Governance investment should be sequenced against process automation rather than against portfolio size, because it is automation that removes the incidental checks manual handling provided. Exception and override behaviour should be captured as a managed dataset rather than an exception log, on the model of near miss reporting in industrial settings, where leading indicator data is collected systematically and acted on before loss occurs (Arumosoye & Obriki, 2019). And reconciliation and aggregation should be treated as credit controls rather than as reporting projects, since limits that cannot be aggregated cannot be enforced (Dogbatsey *et al*., 2019).

For supervisors, the review suggests that coverage and frequency of contact may matter more than the formal stringency of the standard applied, an inference drawn from the safety walkthrough evidence and untested in prudential settings (Obriki & Arumosoye, 2019). It also suggests that routinely collected, low cost data can support predictive oversight, as complaint data has been used to detect systemic safety risk in aviation, which points toward supervisory use of transaction and complaint records rather than reliance on periodic examination alone (Adeyelu, 2018). Proportionality deserves more attention than it receives: adaptive implementation of demanding standards in capability constrained contexts is a developed practice in other regulated sectors and has direct application to emerging market banking supervision (Adeyelu, 2019).

For policymakers, the evidence points to constraints on credit access that sit outside the financial system. Legal barriers to trade participation exclude firms from the transactions that would make them bankable (Jones & Ominyi, 2020), the strength of public financial reporting determines the quality of information available on public and quasi public counterparties (Dogbatsey & Ebhojie, 2018), and health financing structures determine the revenue predictability of an entire sector of borrowers (Ilodigwe & Adesemoye, 2019a). Interventions in these areas may do more for corporate credit access than measures directed at lenders.

For borrowers, particularly smaller firms, the implication is that the binding constraint has shifted from collateral toward verifiable information and demonstrable operational control. Entrepreneurial and managerial capability affects credit access directly (Michael & Ogunsola, 2019b), governance alignment among partners determines whether a joint structure is financeable (Eyetsemitan *et al*., 2020), and documented operational control of the kind the safety and quality literatures describe is increasingly what a lender is assessing, whether or not it says so (Obogo *et al*., 2020a).

For researchers and for institutions building analytical teams, a practical implication follows from the multidisciplinary character of the corpus. The material most useful for assessing emerging market corporate borrowers is published in engineering, public health, procurement and safety journals rather than in finance, and is largely invisible to conventional literature search within the discipline. Institutions that build a deliberate capability to read across these fields acquire an assessment advantage that requires no proprietary data, since the material is public. The convergence between industrial and financial risk governance documented in Section 5 suggests the same is true on the control side, where the more developed and more directly tested practice sits outside finance (Obogo *et al*., 2019b; Arumosoye & Obriki, 2020).

7. Limitations

Four limitations qualify the conclusions. The first concerns the evidence base: the corpus is weighted toward conceptual contributions rather than estimative studies, so the review can establish what was proposed and how practice moved, but not the magnitude of any effect. The claim that decisioning advanced faster than governance is inferred from the composition of the literature rather than measured, and the alternative explanation, that governance is simply written about less, cannot be excluded.

The second concerns the temporal restriction. Confining the corpus to 2020 is appropriate for a review of that period but excludes the retrospective assessments through which it is now usually understood, and leaves no evaluation of how the practices described performed subsequently. It also interacts with publication lag, since practices in use during 2019 and 2020 may have been documented only later.

The third concerns coverage. The corpus is concentrated in Sub Saharan African settings and English language sources, and emerging markets differ in financial structure, supervisory intensity and legal tradition. Much of the governance material comes from industrial safety and regulated manufacturing rather than banking, and transferring constructs across those domains is an analytical judgement that could be contested.

The fourth concerns procedure. Thematic coding is interpretive, was carried out by a single coder without a reliability check, and a different coding scheme applied to the same corpus could foreground different constructs.

8. Directions for Future Research

Five directions follow from what the corpus does not contain. The first is estimative work on whether governance adoption changes credit outcomes. The mechanisms are asserted throughout the literature reviewed and tested nowhere in it, largely because validation quality and control effectiveness are unobservable to outside researchers. Internal supervisory data would make the question tractable and has not been used for it.

The second is the transfer of leading indicator method from industrial safety to credit. Near miss reporting rests on a developed body of practice concerning what to collect, how to protect reporters and how to convert observations into action (Arumosoye & Obriki, 2019; Obogo, Uduokhai, & Ozobu, 2019). Credit exception and override data has the same structure and almost none of the accompanying method, and the transfer is a direct and testable research programme.

The third is the supervisory intensity question. The relationship between contact frequency, coverage and outcomes has been framed explicitly in the safety literature (Obriki & Arumosoye, 2019) and only implicitly in prudential supervision. Whether examination frequency or examination depth matters more for emerging market banking outcomes is answerable with existing supervisory records.

The fourth concerns verification economics. The fall in the cost of observing dispersed physical assets through remote inspection is documented on the engineering side (Dagodzo,

2018b; Dagodzo & Ahiaeke Patrick, 2020) but its consequences for secured lending, collateral valuation and loan pricing in emerging markets are unexamined. The same applies to condition based assessment of industrial collateral (Atta *et al*., 2020; Gideon *et al*., 2019).

The fifth concerns the operational determinants of credit outcomes. The technical literatures on procurement reliability, plant uptime, facility delivery and service revenue predictability model variables that plainly drive default in the sectors concerned (Okonkwo *et al*., 2018a; Aminu-Ibrahim *et al*., 2019; Ilodigwe & Adesemoye, 2020), but no work in the corpus connects these operational measures to realised credit performance.

9. Conclusion

The period to 2020 saw emerging market corporate credit decisioning become substantially more structured. Risk evaluation moved toward documented models built for the data conditions these markets present, financial analytics supplied a forward looking apparatus, predictive methods entered from marketing, operations and technology, reporting infrastructure improved the reliability of the underlying numbers, and the cost of verifying physical assets fell sharply. Together these made a wider population of firms assessable than a decade earlier.

Governance advanced too, but unevenly, and much of the most developed practice comes from outside finance. That convergence is the strongest single result of this review.

The two capabilities are complements. Decisioning determines how far a portfolio can reach; governance determines how much of that reach is realised without unintended loss; and measurement and access integrity determines whether either matters. Institutions that treat them as a single programme, and supervisors that examine them jointly, are better placed than those that pursue analytical sophistication and control discipline as separate agendas.

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