Inverse Fintech — Research Prospectus, Version 1.1

Nov 8, 2026 · @Jesper Nymand-Andersen

Physical Asset Depreciation, Information Appreciation and Institutional Value Creation

A proposed interdisciplinary investigation of economic elasticity and productive-asset financing in seven African economies

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DOI: https://doi.org/10.5281/zenodo.24063432

Status: Open research proposal — an invitation to academic collaboration and methodological development. **Licence:** Creative Commons Attribution 4.0 International (CC BY 4.0), proposed. **Foundational publication:** Nymand-Andersen, J. (2026). *Inverse Fintech: A New Perspective on the Creation of Economic Value.* Zenodo. https://doi.org/10.5281/zenodo.24046147

Companion explanatory paper: Zenodo, https://doi.org/10.5281/zenodo.24056786

Changes from Version 1.0: each of the eight research objectives now states a testable hypothesis, core indicators, an identification strategy, a falsification criterion and its anchor in existing literature. A minimum viable core for the 300-household pilot is defined in Section 6.

Abstract

Golden point

The physical asset depreciates. Verified knowledge appreciates. Institutional adoption multiplies its value. These are hypotheses to be tested, not outcomes already demonstrated.

Inverse Fintech is a proposed financial-economic framework in which access to productive physical assets comes before the economic and financial information on which credit assessment normally depends. While the asset loses value over time, the information generated by its productive use may gain economic and institutional value.

The framework identifies three interconnected layers of value:

1. **Household transformation** — productive assets create opportunities for income, expenditure savings, education, resilience and eventual ownership.
2. **Verified knowledge appreciation** — accumulated economic, technical and behavioural observations may become increasingly valuable financial intelligence and research evidence.
3. **Institutional value multiplication** — independently validated knowledge may gain wider usefulness when applied in research, financial products, regulation and development policy.

The proposed programme comprises eight ranked research objectives: information-capital appreciation, productive-asset effects, credit-information value, instalment-price elasticity, income responsiveness, repayment resilience, energy substitution and upfront-payment elasticity.

WeSail.Green's planned 300-household pilot in Kenya offers a first opportunity for prospective longitudinal study. The wider ambition extends to Uganda, Tanzania, Rwanda, Burundi, South Africa and Nigeria. Lund University, the University of Copenhagen and Makerere University are proposed as initial collaborators, together with the University of Nairobi as lead Kenyan partner and Strathmore University as technical partner.

The long-term aim is to establish whether Inverse Fintech is an empirically distinguishable framework, and whether its mechanisms can improve household economic opportunity and make financial systems more inclusive.

Keywords: Inverse Fintech; elasticity; information economics; asset depreciation; productive capital; development economics; financial inclusion; longitudinal data; alternative credit scoring; university–industry collaboration.

1. Introduction: the intellectual starting point

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An absence of documented creditworthiness is not an absence of productive potential. Inverse Fintech begins with the asset, and lets the information follow.

Conventional finance asks for evidence of creditworthiness first: income records, collateral, banking history and repayment performance. Households without formal financial histories are excluded by design, a problem long recognised in the theory of credit rationing under imperfect information.

Yet such a household may have skills, opportunities and the willingness to undertake productive work. What it lacks is the asset to realise them, and the records to borrow for it.

Inverse Fintech investigates the opposite point of departure. The household gains access to the productive asset first. Through its use, the household generates both economic activity and information about that activity, from which better financial assessments and products may later be built.

This is not a restatement of hire-purchase or Pay-As-You-Go. Periodic instalments are a contractual payment mechanism; they do not define the economic architecture. Inverse Fintech seeks to explain how productive capital, economic activity, verified information and future financial opportunity interact over time.

The purpose of this research is to determine whether that relationship can be demonstrated empirically, and whether it explains anything that established financing models do not.

2. Historical development of the proposition

Golden point

The problem was visible in Uganda in 1997–2006. What is new is that inexpensive digital measurement now makes it researchable.

The proposition originates in the author's experience of asset-based hire-purchase in Uganda through Visit Africa Ltd between 1997 and 2006. Computers and other equipment offered customers educational and productive opportunities, although their formal financial records were often incomplete.

The financial relationship was documented through contracts, payments, asset recovery and administration. That record served conventional credit management, but revealed little about what the asset actually did for the household.

This experience does not establish that the earlier arrangements were effective. Its relevance is that it identified a practical problem which contemporary measurement may now allow researchers to study properly.

Since then, inexpensive sensors, mobile applications, digital transactions, distributed information systems and statistical modelling have transformed what can be observed. The WeSail.Green model brings these together: it deploys productive assets alongside a longitudinal information system that measures selected aspects of their economic use.

The research opportunity is to examine how a physical financing relationship can become a source of verifiable economic knowledge.

3. Three interconnected layers of economic value

3.1 First layer: household economic transformation

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> Household outcomes must be measured, never inferred from asset ownership or electricity generated.

The immediate purpose of asset access is to improve household economic opportunity. WeSail.Green's proposed package combines solar electricity, energy storage, electric cooking, a refurbished laptop, and access to digital information and support.

These components are intended to enable productive activity, reduce certain expenditures, free up time and open educational opportunities. Their effect will depend on household circumstances, markets, skills, complementary infrastructure and the affordability of the financing.

Welfare may improve through higher income, lower expenditure, time savings, greater resilience or education. Which channels matter most is an empirical question.

3.2 Second layer: appreciation of verified knowledge

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> More data is not more value. Information appreciation must be shown through measurable gains in prediction, decisions or research use, net of its costs.

Physical assets depreciate through use, age and obsolescence. Some WeSail.Green assets will already be substantially depreciated when they begin a second productive life; others will be new. Either kind generates information throughout its use.

The research will examine verified observations of electricity production, productive utilisation, energy consumption, expenditure substitution, payments, service events and household circumstances. Observations gathered over successive months may reveal patterns that single observations cannot.

The research must also account for diminishing informational returns, measurement error, redundancy, selection bias and the cost of secure collection and processing. The proposition is therefore conditional: a depreciating asset *may* generate an information resource whose independently measurable usefulness rises over time.

3.3 Third layer: institutional value multiplication

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> Institutional value is not inherent in data. It exists only where validated knowledge changes an identifiable decision.

Information may become more valuable when independent institutions validate its meaning and apply it:

- **Universities** — to study economic behaviour and development outcomes using properly governed datasets.
- **Financial institutions and credit bureaus** — to test whether lawful, verified information improves risk assessment.
- **Public agencies** — to inform financial inclusion, productive-asset programmes and consumer protection.
- **Development-finance institutions** — to compare intervention costs, household benefits and long-term outcomes.

Adoption may also fail. A finding may be technically sound yet economically unimportant, administratively impractical or unsuited to financial decisions. This third layer is therefore itself a research subject, including the question of how its benefits are distributed between households, institutions and the wider economy.

4. The central scientific problem

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> Can depreciating productive assets generate progressively more valuable economic information — and does that information measurably improve household welfare, financial decisions and institutional development?

The question contains six unresolved problems:

1. **Causality** — does productive-asset access cause measurable improvement in household economic circumstances?
2. **Separation of value** — how can the value of the asset, the value of its productive contribution and the independent value of the information it generates be distinguished?
3. **Alternative explanations** — is apparent information appreciation more than the effect of additional observations, changing economic conditions or better measurement technology?
4. **Comparison** — how does the arrangement perform against conventional credit and asset-financing alternatives?
5. **Distribution** — does verified information benefit households themselves, or principally the institutions that collect and analyse it?
6. **Institutional evidence** — can institutional value be shown through identifiable applications and outcomes, rather than assumed from publications or partnerships?

These six problems define the foundation of the research programme.

5. Eight ranked research objectives

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> Each objective now states a testable hypothesis, the indicators that measure it, how cause is to be identified, and the result that would count against it. The ranking is the author's proposal and is open to revision.

Version 1.1 adds one cross-cutting idea. Objectives 4, 5, 6 and 8 create behavioural variation in price, income, shocks and deposits. That variation is precisely the information whose value Objectives 1 and 3 measure. The programme is therefore one connected design, not eight separate studies.

Objective 1 — Information-capital appreciation

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> The decisive empirical signature of Inverse Fintech: the point at which the measured value of accumulated information exceeds the residual value of the physical asset.

Research question. Does verified information from productive-asset use gain measurable economic usefulness as observations accumulate?

Hypothesis. The marginal decision value of each additional month of verified observations remains positive beyond the first months of the contract, and cumulative information value net of collection cost rises while the asset's residual value falls.

Core indicators. Out-of-sample predictive accuracy of repayment and welfare outcomes (for example AUC and Brier score); reduction in expected decision loss for a defined lending decision; cost per verified observation; redundancy between data streams; the rate at which older observations lose relevance.

Identification. Rolling-origin learning curves: models re-estimated with 1, 3, 6, 12 and 24 months of data and tested on households not used in estimation. Ablation tests remove one data stream at a time to separate quality from quantity. Both curves — information value and asset residual value — are expressed on a common monetary scale.

What would count against it. A learning curve that flattens within the first three to six months, or information value that never exceeds its cost of collection. Either would mean information value is front-loaded rather than appreciating.

Literature anchor. The pricing and value of information (Bergemann, Bonatti & Smolin, 2018; Bergemann, Bonatti & Gan, 2022).

Why ranked first. It tests the central theoretical distinction between depreciating physical capital and appreciating information.

Objective 2 — Productive-asset economic effects

Golden point
A phased rollout makes it possible to measure cause, not correlation — without ever withholding the asset from any participating household.

Research question. To what extent does asset access change household income, expenditure, productivity, time allocation and welfare?

Hypothesis. Households receiving the asset package show higher net income and lower energy expenditure, and reallocate time towards income-generating work and education, relative to households not yet served.

Core indicators. Net household and enterprise income; expenditure by category; time-use diaries, disaggregated by gender and age; children's study hours; asset utilisation recorded by the devices.

Identification. Randomised order of delivery among eligible households (a stepped-wedge design), so that later recipients serve as comparison households until served. If power allows, coaching is cross-randomised to separate its effect from the asset's.

What would count against it. No detectable difference in income or time use between served and not-yet-served households after a pre-specified period.

Literature anchor. Lasting gains from multifaceted programmes (Banerjee et al., 2015); modest short-run returns to rural electrification in Kenya (Lee, Miguel & Wolfram, 2020), which is a reason for caution, not confidence.

Strengthening point. Households that gain little or nothing are identified explicitly. Knowing for whom the model does not work is as valuable as knowing for whom it does.

Objective 3 — Credit-information value

Golden point

The test is inclusion, not sophistication: does verified productive-use data qualify creditworthy households that conventional scoring would reject?

Research question. Does verified productive-use information predict credit outcomes better than conventional demographic, repayment and financial-history information?

Hypothesis. Adding productive-use observations to a conventional baseline model improves out-of-sample prediction and reduces the share of reliable payers who would have been wrongly rejected.

Core indicators. Predictive gain over the baseline model; false-rejection rate among households that in fact repay; error rates compared across gender, location and income groups.

Identification. A pre-registered comparison between a conventional baseline model and an augmented model, tested on held-out households. Where feasible, an ex-post waiver design separates selection effects from repayment incentives (Karlan & Zinman, 2009).

What would count against it. No predictive gain beyond conventional data, or gains concentrated in groups already well served.

Literature anchor. Mobile-phone behaviour as a predictor of repayment (Björkegren & Grissen, 2020).

Strengthening point. Every data stream used for scoring requires informed consent and a lawful basis, and the household must be able to see and contest what is recorded about it.

Objective 4 — Instalment-price elasticity

> Golden point
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> The price that maximises receipts is rarely the price that maximises completion and welfare. The research must find both, and the distance between them.

Research question. How do participation, demand, repayment and completion respond to changes in instalment level and financing terms?

Hypothesis. Demand and completion respond to instalment level, and the response differs between household groups; instalment frequency and contract length have effects separate from price.

Core indicators. Take-up; arrears and completion rates; total paid; welfare outcomes from Objective 2, by instalment level.

Identification. Random assignment of eligible households to a small number of pre-approved instalment plans, all within an ethically and commercially acceptable range. Frequency (weekly or monthly) and term length are varied separately from the instalment amount.

What would count against it. Flat response to price within the tested range, which would make affordability a smaller barrier than assumed.

Literature anchor. Credit elasticities in microfinance (Karlan & Zinman, 2008); in Nairobi, a loan more than doubled households' willingness to pay for an energy-efficient stove (Berkouwer & Dean, 2022).

Objective 5 — Income responsiveness

> Golden point
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> The asset may change the very income that is used to judge whether the household can pay for it. The research must separate the two directions.

Research question. How do income levels and income fluctuations affect demand for the assets, their productive use and the ability to sustain contractual payments?

Hypothesis. Seasonal and unexpected income falls raise arrears risk, but the productive asset itself increases the household's capacity to meet later obligations.

Core indicators. High-frequency income and expenditure data from short mobile surveys and, with consent, mobile-money flows; seasonal calendars of harvest and school fees; device utilisation over the same periods.

Identification. Baseline income measured before delivery; external shocks such as rainfall used as sources of variation that the asset cannot have caused; comparison with not-yet-served households under the Objective 2 design.

What would count against it. Payment capacity that tracks pre-existing income only, with no measurable contribution from the asset.

Literature anchor. Mobile money and long-run household resilience in Kenya (Suri & Jack, 2016).

Objective 6 — Repayment and economic resilience

Golden point

Well-designed relief should protect both the household and the portfolio. The research must show whether it does — and must learn to tell temporary hardship from lasting inability to pay.

Research question. How do households respond to shocks, and can contractual flexibility improve resilience and completion?

Hypothesis. Pre-agreed relief provisions — temporary instalment reductions and scheduled grace periods — raise completion and reduce distress sales of assets, without materially weakening long-term repayment.

Core indicators. Completion; recovery from arrears; consumption smoothing after shocks; distress sales of livestock or other assets; repossession rates.

Identification. Where ethically acceptable, random assignment between a pre-agreed relief rule and case-by-case discretion. Device and payment data are tested as early-warning signals of hardship, linking this objective directly to Objective 1.

What would count against it. Relief that delays rather than prevents default, or that is used mostly by households not facing a shock.

Literature anchor. Repayment flexibility and risk-taking in credit contracts (Battaglia, Gulesci & Madestam, 2024); low repossession under asset-collateralised loans in Kenya (Jack et al., 2023).

Objective 7 — Energy-substitution responsiveness

Golden point

Engineering estimates are a starting point, not evidence. Savings count only when measured in the household, including any fuels it continues to use alongside solar.

Research question. How does the solar system change energy consumption, spending on alternative fuels and productive energy use?

Hypothesis. Households substitute solar electricity and electric cooking for kerosene, charcoal and firewood, but continue to use some traditional fuels alongside; observed savings are therefore smaller than engineering estimates.

Core indicators. Metered electricity production and use by appliance; fuel quantities and spending from repeated surveys; cooking time; battery and solar capacity limits; continued use of traditional fuels alongside solar.

Identification. Metered data compared with surveyed fuel use before and after delivery, against not-yet-served households under the Objective 2 design.

What would count against it. Little measured fall in fuel spending, which would mean that capacity limits or cooking practices block substitution.

Literature anchor. A randomised study of 1,000 Nairobi households found charcoal savings from an efficient stove matched engineering estimates, while credit constraints held back adoption (Berkouwer & Dean, 2022).

Strengthening point. Verified fuel substitution may later support emission-reduction claims. Any such use must follow a recognised measurement methodology and be independently verified.

Objective 8 — Upfront-payment elasticity

Golden point

A deposit may screen out risk — or simply screen out the poor. The research must find out which.

Research question. How does the initial contribution affect participation, which households join, affordability and later repayment?

Hypothesis. Lower upfront contributions substantially raise take-up, with only small effects on repayment quality.

Core indicators. Take-up by deposit level; characteristics of households that join; arrears and completion; welfare outcomes from Objective 2.

Identification. Random assignment of deposit levels among eligible households. A waiver of part of the deposit after acceptance separates the screening effect (who joins) from the incentive effect (how joiners behave).

What would count against it. Lower deposits that attract households with markedly worse completion, so that the deposit proves to be an effective screen.

Literature anchor. In Kenya, replacing high deposits with loans collateralised by the asset itself raised take-up from 2.4% to 41.9%, with only small selection effects (Jack et al., 2023, and the 2016 working-paper version); cost-sharing reduced uptake of health products without improving targeting (Cohen & Dupas, 2010).

6. Proposed common scientific methodology

Golden point

A 300-household pilot cannot answer eight questions with equal confidence. It should measure reliably, test a few things well, and prepare the ground for larger studies.

Version 1.1 proposes a common longitudinal framework, not a final methodology. That task belongs to the participating institutions. Six principles are proposed:

1. **Prospective measurement** — baseline characteristics and predefined outcomes are collected before the intervention wherever practical.
2. **Independent causal identification** — comparison groups, phased implementation, randomised variation where ethical and feasible, or other credible methods separate effects from correlation.
3. **Comparable longitudinal information** — consistent definitions allow analysis across households and, later, across countries.
4. **Independent validation** — material findings are examined externally. WeSail.Green's operational data is not automatically treated as independently verified evidence.
5. **Scientific openness** — protocols, methods, hypotheses and non-sensitive findings are open to criticism and replication wherever law and ethics permit.

6. **Pre-registration** — hypotheses, primary outcomes and analysis plans are registered publicly before data collection, for example in the AEA RCT Registry. *(New in Version 1.1.)*

A proposed minimum viable core for the Kenyan pilot

Objective	Proposed role in the 300-household pilot	Principal design
1. Information-capital appreciation	Core	Learning curves on held-out households
2. Productive-asset effects	Core	Randomised order of delivery
7. Energy substitution	Core	Metered and surveyed energy data
3. Credit-information value	Exploratory	Baseline versus augmented prediction model
4. Instalment-price elasticity	Small test of two plans	Random assignment of plans
8. Upfront-payment elasticity	Small test of two deposit levels	Random assignment of deposits
5. Income responsiveness	Observational	High-frequency surveys and external shocks
6. Repayment resilience	Observational	Shock records and relief use

This allocation is a proposal for discussion. Formal power calculations by the participating researchers should decide which tests the pilot can carry, and which require the larger samples of later country studies.

A natural next step: a jointly designed household survey

Golden point

WeSail.Green's 500-household survey has not yet been drafted. It is offered as the first joint instrument of the collaboration, open to research questions that serve purposes beyond the project itself.

WeSail.Green is preparing a survey of 500 households in the Kenyan pilot area. Its operational purpose is to establish interest in the solar asset bundle, test preliminary price levels and map current household fuel use.

Because the instrument is still to be written, a natural next step would be to design it together with the participating universities. A shared WeSail.Green core could sit alongside research modules contributed by the partners, including questions that serve purposes beyond the project itself.

Developed jointly, the survey could be reviewed under one protocol by the Kenyan partner's accredited ethics committee. It could also carry consent for each stated purpose, and serve as the baseline from which the pilot follows households over time. Because the survey is larger than the 300-household pilot, it could also provide the pool from which pilot households are drawn, with surveyed households not yet served offering a natural comparison group.

7. Proposed geographic scope

Golden point

Seven countries are proposed to test whether the relationships hold under different conditions, not simply to expand geographically.

The ambition covers Kenya, Uganda, Tanzania, Rwanda, Burundi, South Africa and Nigeria. Kenya is the initial setting, because WeSail.Green's first household intervention is being developed there. Uganda is relevant through the author's earlier asset-financing work and Makerere University. The remaining five are prospective settings for later study.

Comparing countries tests whether the proposed relationships vary with household income, energy markets, financing conditions, regulation and institutional capacity. Common measurement standards should allow comparison while permitting local adaptation.

No field studies, university partnerships or research funding have yet been secured in any of these countries.

8. An open university collaboration

Golden point
Eight clearly formulated starting points — not eight finished studies. Researchers are free to refine, combine, reduce or replace them.

Five institutional partners in four countries are proposed initially:

Institution	Potential contribution
Lund University, Sweden	Information economics, development economics, econometrics, longitudinal analysis
University of Copenhagen, Denmark	Microeconomic theory, price elasticity, financial economics, research design and causal identification
Makerere University, Uganda	Household development economics, African financial markets, field research, regional interpretation
University of Nairobi, Kenya — proposed lead Kenyan partner	Leadership of the Kenyan empirical study, local research governance and ethics review, design of the household survey, development economics; builds on established research collaboration with the University of Copenhagen
Strathmore University, Kenya (Strathmore Energy Research Centre) — proposed technical partner	Solar energy systems, efficient electric cooking, energy measurement and household energy substitution (Objective 7)

These are proposed areas of collaboration, not agreed responsibilities or confirmed commitments.

The programme is designed to accommodate master's students, doctoral candidates, postdoctoral researchers and established academics. The eight objectives can become distinct but connected projects. Supervisors retain responsibility for scientific quality, and all contributors are acknowledged or credited as authors according to their actual contributions.

9. Research governance and academic independence

Golden point

WeSail.Green proposes the concept and implements the pilot. Its commercial interests must never decide what researchers conclude or publish.

This dual role offers direct observation, but also a potential conflict of interest. The programme should therefore establish governance in which:

- researchers retain the right to report negative, mixed or inconclusive findings;
- protocols declare financial interests, data access, analytical responsibilities, publication arrangements and independent review;
- household participation follows ethical approval and applicable data-protection law;
- data is classified as individual, restricted research, anonymised statistical or public academic output;
- household information is never collected or commercially repurposed merely because it might later have value.

One further question belongs to the research itself: when information generated by households acquires institutional value, how should the benefits be shared with those households?

10. Economic elasticity as an operational research instrument

Golden point

The same evidence that tests the theory can improve the financing. Only the commercial benefit may never decide which results are published.

The findings could inform practical decisions within WeSail.Green:

- **Price elasticity** — which financing structures reach the most suitable households without undermining sustainability.
- **Income responsiveness** — which households face the greatest constraints, and when relief matters most.
- **Productive use** — the selection and sizing of assets.

- **Energy substitution** — more accurate estimates of household savings.
- **Repayment resilience** — distinguishing temporary hardship from lasting inability to complete a contract.
- **Information value** — which observations carry real financial intelligence, and which merely add collection cost.

The programme thus serves two complementary purposes: testing the general proposition, and providing evidence for better financing decisions.

11. Potential institutional and scientific outcomes

> Golden point
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> Institutional value must be demonstrated by identifiable decisions and measurable improvements — never inferred from the volume of data or the number of partners.

The programme may eventually serve academic institutions researching productive capital, credit constraints, information economics and development policy; financial institutions assessing the incremental value of verified productive-use data; public agencies considering asset access, affordability and resilience; and development organisations comparing productive-asset interventions and financing mechanisms. These applications constitute the third value layer of Inverse Fintech.

12. Funding the scientific investigation

> Golden point
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> Operational financing and research financing are kept separate, with clear accountability for each. No funding is assumed or represented as secured.

The operational pilot requires capital to deploy and service the assets. The scientific investigation requires resources for research design, field surveys, ethical review, data validation, longitudinal analysis, student participation and publication.

The participation of recognised research institutions may open access to university research funding, development-research grants and interdisciplinary collaboration schemes. The first step is a credible research protocol, a realistic scope of work and a

transparent budget. Funding proposals should then specify outputs, institutional responsibilities, beneficiaries and independent oversight.

13. What Version 1.1 invites the academic community to contribute

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> Critical responses are as welcome as collaboration. A proposition that cannot be challenged cannot be credible.

Interested researchers are invited to consider:

1. Are the eight objectives sufficiently distinct and scientifically meaningful, and should their ranking change?
2. Are the hypotheses and falsification criteria stated in Section 5 the right ones?
3. Can a common econometric and longitudinal methodology serve several objectives without compromising validity?
4. Which theoretical frameworks best explain the relationship between physical capital, information accumulation, credit constraints and productive activity?
5. How should the economic value of information be distinguished from its statistical quantity?
6. Which research design would most convincingly distinguish Inverse Fintech from conventional asset financing?
7. How should the third layer of institutional value be measured?
8. Is the proposed minimum viable core for the Kenyan pilot realistic?
9. Which questions suit master’s projects, doctoral research or larger institutional programmes?
10. Which data-governance arrangements would protect households while permitting useful independent research?
11. How should the programme be organised and financed without compromising academic independence?

The author welcomes critical responses, methodological alternatives, proposed additions and institutional participation.

14. Conclusion

Golden point

The physical asset depreciates. Verified knowledge appreciates. Institutional adoption multiplies its value. Version 1.1 is an invitation to find out whether — and under which conditions — this is true.

Inverse Fintech does not deny asset depreciation. It proposes that the declining residual value of physical capital can coexist with an information resource whose usefulness may grow through observation, validation and independent application.

Its scientific significance lies in investigating how these processes interact, whether they create measurable additional value, and whether the benefits make financial opportunity more inclusive. Economic elasticity offers a direct means of studying how households respond to prices, financing terms, income constraints and productive opportunity.

The eight strengthened objectives form the initial foundation. The proposed collaboration is intended to turn that foundation into a rigorous programme capable of producing independent findings over time.

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Document status and attribution

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