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Beyond Deterrence: A Behavioral Model of Firm Informality and Tax Compliance in Transition Economies

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Abstract

The classical economic model of tax compliance treats the decision to operate informally as a rational cost-benefit calculation in which a risk-neutral firm weighs the tax and regulatory burden of formal status against the expected cost of detection and punishment (Allingham & Sandmo, 1972). This framework, while analytically elegant, systematically under-predicts observed levels of both compliance and informality: many firms comply even when detection probability is negligible, while others remain informal even when the expected penalty for evasion exceeds the tax saved. Behavioral economics offers a partial explanation for this gap, yet existing behavioral accounts of tax compliance remain fragmented, addressing tax morale, social norms, and psychological framing as separate research streams rather than as jointly operating mechanisms in a single decision process. This paper develops an integrated conceptual model in which four behavioral antecedents present bias, perceived social norms of peer informality, institutional trust in fiscal exchange, and regulatory complexity, jointly shape a firm owner's *perceived net benefit of formalization*, which in turn drives the observed *formalization decision*. Enforcement intensity and firm growth orientation are theorized as moderators of the benefit-compliance link, and informal-sector size is proposed as a boundary condition. Six theoretical propositions render the model empirically testable. The paper contributes to tax compliance theory by integrating the deterrence tradition with behavioral insights into a single testable framework, and it contributes to development economics by embedding that framework in the specific institutional conditions of transition economies such as Uzbekistan, where informality remains a substantial share of economic activity. Implications for tax administration design, formalization policy, and future empirical research are discussed.

Keywords

tax compliance; informal economy; behavioral economics; tax morale; institutional trust; transition economies; firm formalization

Introduction

Walk through almost any bazaar in Tashkent, Bishkek, or Almaty and the puzzle at the heart of this paper becomes visible within minutes. Some traders issue receipts, register sales through a cash register connected to the tax authority's server, and pay value-added tax on every transaction. Others, selling near-identical goods a few stalls away, keep no such records at all. Both groups face roughly the same probability of inspection and, in many jurisdictions, penalties for evasion that would make informality a losing bet under a purely rational calculation. Yet the two groups persist side by side, sometimes for years, sometimes for the life of the business. Something other than expected-cost arithmetic is doing the sorting.

The classical economic model of tax compliance, dating to Allingham and Sandmo (1972), treats this sorting as a straightforward expected-utility problem: a risk-neutral firm weighs the tax and regulatory burden of formal status against the probability of detection multiplied by the penalty for evasion, and chooses accordingly. The model is elegant, tractable, and, on its own terms, wrong often enough to be interesting. Compliance rates observed in the field routinely exceed what the model predicts given real-world audit probabilities, which in most tax administrations sit well below five percent (Alm & Torgler, 2011). At the same time, a large share of small and medium enterprises across the developing and transition world remain informal even where the discounted expected penalty for staying informal is smaller than the tax bill they would face by registering (La Porta & Shleifer, 2008). Too much compliance in one direction, too much informality in the other – the deterrence model cannot easily accommodate both anomalies at once.

Behavioral economics has spent the past two decades accumulating pieces of an alternative explanation, but the pieces have mostly stayed in separate boxes. Tax morale researchers have shown that willingness to comply tracks perceived fairness and trust in government, largely independent of audit risk (Torgler, 2007; Luttmer & Singhal, 2014).

Kirchler, Hoelzl, and Wahl's (2008) slippery slope framework captures the resulting trade-off between coercive power and voluntary trust as two distinct routes to the same outcome. A separate literature on intertemporal choice shows that decision-makers with present-biased preferences systematically overweight costs that arrive today against benefits that arrive later (O'Donoghue & Rabin, 1999; Laibson, 1997) – a pattern that maps almost too neatly onto formalization, where the paperwork and the tax bill land immediately and the payoff, if it comes at all, arrives months or years down the line in the form of a bank loan or an enforceable contract. And a fourth literature, on regulatory burden, shows that the sheer procedural difficulty of registering a business deters formalization on its own, quite apart from what registration would eventually cost (Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2002).

Each of these four literatures is well developed on its own terms. What is missing is an account of how they combine inside a single decision – the choice a shopkeeper actually faces about whether to register this year, next year, or never. This paper builds that account. It proposes that present bias, perceived social norms about how many peers are already informal, trust in the fairness of the fiscal exchange, and the felt complexity of the registration process do not operate as four separate levers on compliance; they operate on a single subjective judgment, the *perceived net benefit of formalization*, and it is that judgment – not the underlying objective arithmetic, which drives the observed decision to formalize or stay informal. Enforcement intensity and a firm's own growth ambitions then determine how readily a given perceived benefit actually gets acted upon. The model is built with transition economies specifically in mind: places where tax administrations are still young, where a large existing informal sector keeps unfavorable norms alive, and where the institutional trust that sustains voluntary compliance elsewhere cannot simply be assumed to exist.

The remainder of the paper proceeds as follows. Section 2 reviews the deterrence tradition and the four behavioral literatures that extend it. Section 3 sharpens the specific gap the model is built to fill, including a brief engagement with an obvious objection. Section 4 lays out the model itself, its constructs, six testable propositions, and a worked illustration of how the model plays out for a stylized firm. Section 5 discusses how the

model's parts interact when they pull in different directions. Section 6 turns to theoretical contributions, Section 7 to policy implications, Section 8 to limitations, and Section 9 concludes.

Theoretical Background

Before turning to specific mechanisms, it is worth being clear about the scale of what needs explaining. Schneider and Enste (2000), in the study that launched much of the modern shadow-economy literature, estimated that unrecorded activity accounted for well over a third of GDP in many developing and transition economies during the 1990s – figures later work has revised in detail but not in general magnitude. A phenomenon of that size is not a rounding error in the deterrence model; it is evidence that the model is missing something structural, not just calibrated slightly off.

The Deterrence Tradition

Allingham and Sandmo's (1972) model remains the analytical benchmark against which subsequent tax compliance research is measured. In its canonical form, a taxpayer chooses how much income to report by maximizing expected utility over two states of the world: audited, in which underreported income is discovered and penalized, and not audited, in which underreporting goes undetected. The model's central comparative-static prediction – that compliance rises with the probability of detection and with the penalty rate – has received support in laboratory settings but weaker and more inconsistent support in field data (Alm & Torgler, 2011). Slemrod (2019) reviews this literature and concludes that classical deterrence variables explain only a modest share of the cross-sectional and time-series variation in observed compliance, leaving substantial room for non-deterrence explanations.

Tax Morale, Trust, and the Slippery Slope

Tax morale refers to the intrinsic motivation to comply with tax obligations, independent of the expected material consequences of non-compliance (Torgler, 2007). Empirical work across a wide range of countries finds that tax morale correlates with perceived fairness of the tax system, satisfaction with public-good provision, and trust in government institutions (Alm & Torgler, 2006; Luttmer & Singhal, 2014). Kirchler, Hoelzl, and Wahl's (2008) slippery slope framework formalizes the resulting policy

trade-off: compliance can be secured either through coercive power (audits and penalties) or through trust (a perceived fiscal exchange in which taxes are seen as a fair price for public goods), and reliance on power alone can crowd out the voluntary compliance that trust would otherwise sustain (Feld & Frey, 2007). This crowding-out logic is directly relevant to transition economies, where tax administrations inherited from centrally planned systems often emphasized enforcement over service, potentially undermining the trust channel before it could develop.

Present Bias and the Timing of Formalization Costs and Benefits

Formalization imposes costs that are concentrated at the point of registration and ongoing thereafter – registration fees, accounting requirements, and tax liabilities, while its principal benefits, such as access to formal credit, enforceable contracts, and eligibility for government procurement, accrue with a lag and depend on the firm successfully building a formal track record. This temporal structure maps closely onto the present-bias literature in behavioral economics. O'Donoghue and Rabin (1999) and Laibson (1997) show that individuals with hyperbolic (as opposed to exponential) discount functions systematically overweight immediate costs relative to delayed benefits, even when they would prefer, from an earlier vantage point, to make the opposite trade-off. Applied to the formalization decision, present-biased firm owners are predicted to defer formalization repeatedly, not because the long-run net present value of formalizing is negative, but because the immediate cost is always weighted more heavily than whatever benefit lies beyond the present period.

Social Norms and the Perceived Prevalence of Informality

A substantial literature in behavioral economics documents that individuals calibrate their own behavior partly against a perceived descriptive norm – what they believe others in their reference group actually do – rather than against an injunctive norm of what they believe others think they should do (Kahneman, Knetsch, & Thaler, 1986). In the tax compliance context, if a firm owner perceives that most competitors and peers operate informally, the perceived cost of remaining informal falls, both because detection risk is diffused across a larger informal population and because the reputational or moral cost of non-compliance is attenuated by its apparent normality.

Williams and Horodnic (2015), studying the Baltic states, find that the perceived prevalence of informal employment among peers is one of the strongest correlates of an individual's own participation in undeclared work, a finding with direct relevance to other post-socialist and transition economies.

Regulatory Complexity and Bounded Rationality

Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2002) document wide cross-country variation in the number of procedures, time, and cost required to register a new business, and show that heavier regulatory burdens are associated with larger informal sectors. From a behavioral perspective, this relationship need not operate solely through the objective cost of compliance; bounded rationality implies that firm owners facing a complex, opaque registration process may simply default to the status quo of remaining informal, particularly where the firm lacks the administrative capacity to navigate multi-step bureaucratic procedures (Simon, 1955; Thaler & Sunstein, 2008). In this sense, regulatory complexity operates as a behavioral antecedent in its own right, distinct from its role as a component of the objective cost calculus in the classical deterrence model.

Research Gap and Positioning of the Proposed Model

Three gaps motivate the model developed in Section 4. The literatures reviewed above have developed largely in parallel: tax morale researchers, present-bias researchers, and regulatory-burden researchers rarely engage each other's constructs within a single empirical or theoretical framework, even though all four mechanisms plausibly act on the same firm owner's formalization decision at the same time. Where integration has been attempted, as in the slippery slope framework, the focus has remained on the power-versus-trust distinction in individual tax compliance rather than on the discrete formalization decision facing an informal firm, which brings in additional considerations – regulatory complexity and the time-lagged nature of formalization benefits – that framework was not built to capture. And existing models have been developed and tested predominantly in advanced-economy contexts with mature tax administrations; whether they travel well to transition economies, where enforcement capacity, institutional trust, and the sheer scale of informality all differ systematically, remains an open question rather than a settled one.

A skeptical reader might object that this is simply relabeling: call the four antecedents "behavioral factors," fold them into a single mediator, and the exercise risks becoming definitional rather than explanatory. The objection has some force, and it is worth taking seriously rather than waving away. What justifies treating perceived net benefit as a genuine mediator, rather than a post-hoc label for whatever combination of factors happens to predict compliance, is the specific claim that follows in Section 4: that classical deterrence variables (audit probability, penalties) do not enter this construct directly but instead moderate the link between it and observed behavior. That is a substantive, falsifiable claim – it implies, for instance, that raising enforcement where perceived benefit is already strongly negative should do comparatively little, a prediction the pure deterrence model does not make and would need field data, not just definitional maneuvering, to overturn.

With that objection addressed, the model proposed below sets out to close the three gaps identified above by integrating four behavioral antecedents through a single mediating construct, by extending the trust-versus-power logic of the slippery slope framework specifically to the formalization decision, and by situating the resulting model in the institutional conditions of transition economies rather than assuming those conditions away.

The Proposed Conceptual Model

Model Overview

Figure 1 presents the proposed model. Four behavioral antecedents – present bias, perceived social norms of peer informality, institutional trust in fiscal exchange, and regulatory complexity – are modeled as joint predictors of a single mediating construct, the perceived net benefit of formalization. This perceived benefit, in turn, is modeled as the proximate driver of the firm's formalization decision, understood along a continuum from full informality through partial compliance to full formal registration and tax payment. Two moderators – enforcement intensity and firm growth orientation – are positioned on the benefit–compliance link, reflecting the claim that classical deterrence variables and firm-level growth ambitions condition how strongly a given perceived benefit translates into an actual formalization decision, rather than acting as independent

direct predictors of compliance. Informal-sector size is positioned as a boundary condition on the same link, capturing the idea that where informality is already pervasive, the behavioral pathway to formalization operates differently than where it is a marginal phenomenon.

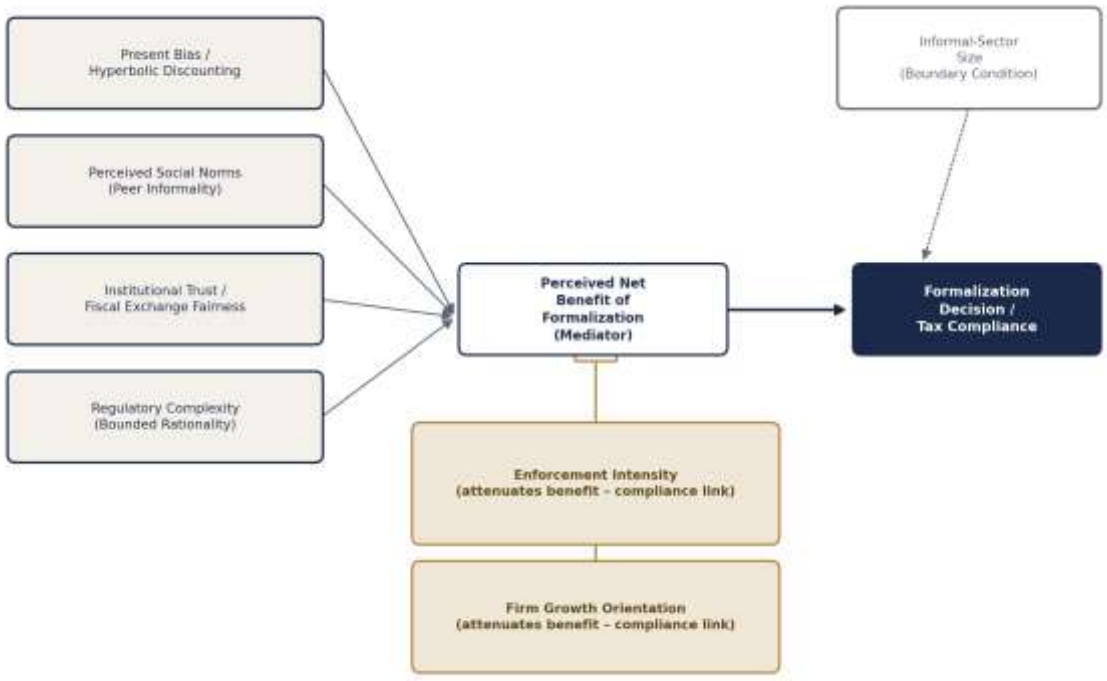


Figure 1. A Behavioral Model of Firm Informality and Tax Compliance in Transition Economies.

Source: developed by the author.

Core Constructs

Perceived net benefit of formalization is defined as a firm owner's subjective assessment of the overall advantage of registering and complying with tax and regulatory requirements, relative to remaining informal, as distinct from the objective net present value that a fully rational, unbiased calculation would yield (Allingham & Sandmo, 1972; O'Donoghue & Rabin, 1999). The model treats this construct as the pathway through which all four behavioral antecedents exert their influence: present bias deflates the perceived weight of delayed formalization benefits, unfavorable social norms and low institutional trust lower the perceived benefit directly, and regulatory complexity raises the perceived cost side of the same subjective calculus.

Formalization decision is defined as the firm's observed position along the informality-formality continuum: full informality, partial compliance (for example,

registering but underreporting revenue or employment), or full formal status. The model positions this as the outcome variable, distinct from the perceived benefit that drives it, preserving the standard behavioral-economics distinction between a subjective evaluation and its behavioral expression.

Theoretical Propositions

The following six propositions render the model in Figure 1 empirically testable, each accompanied by a brief theoretical justification.

P1. Present bias is negatively associated with the perceived net benefit of formalization, such that more present-biased firm owners perceive formalization as less advantageous.

Justification: *This follows directly from the hyperbolic-discounting literature: immediate registration and compliance costs are weighted more heavily than delayed benefits such as credit access (O'Donoghue & Rabin, 1999; Laibson, 1997).*

P2. Perceived social norms of peer informality are negatively associated with the perceived net benefit of formalization.

Justification: *Where informality is perceived as the descriptive norm among peers, both the reputational cost of remaining informal and the relative competitive disadvantage of formalizing are attenuated (Williams & Horodnic, 2015).*

P3. Institutional trust in fiscal exchange is positively associated with the perceived net benefit of formalization.

Justification: *Consistent with the slippery slope framework, firm owners who trust that tax revenue is used fairly and effectively perceive formalization as a fair exchange rather than a pure cost (Kirchler, Hoelzl, & Wahl, 2008; Feld & Frey, 2007).*

P4. Regulatory complexity is negatively associated with the perceived net benefit of formalization.

Justification: *Complex, opaque registration procedures raise the perceived (and often actual) cost side of the formalization calculus independently of the tax burden itself (Djankov et al., 2002).*

P5. Enforcement intensity positively moderates the relationship between perceived net benefit and the formalization decision, such that this relationship is stronger where detection probability is higher.

Justification: *This proposition preserves a role for the classical deterrence mechanism, but repositions it as a moderator of a behavioral pathway rather than as the sole driver of compliance (Allingham & Sandmo, 1972; Alm & Torgler, 2011).*

P6. Firm growth orientation positively moderates the relationship between perceived net benefit and the formalization decision, such that growth-oriented firms are more likely to act on a given perceived benefit than firms with no growth ambition.

Justification: *Firms seeking to expand have more to gain from formal credit access and contract enforceability, and are therefore more likely to translate a given perceived benefit into an actual formalization decision.*

Table 1. Behavioral Antecedents, Their Mechanism, and Hypothesized Effect on Perceived Net Benefit of Formalization

Antecedent	**Behavioral Mechanism**	**Effect on Perceived Benefit**	**Key Source**
Present bias	Hyperbolic discounting of delayed benefits	Negative	*O'Donoghue & Rabin, 1999*
Social norms	Calibration against perceived peer behavior	Negative	*Williams & Horodnic, 2015*
Institutional trust	Perceived fairness of fiscal exchange	Positive	*Kirchler et al., 2008*
Regulatory complexity	Bounded rationality; status-quo default	Negative	*Djankov et al., 2002*

Source: developed by the author.

An Illustrative Application

It may help to see the model applied to a stylized case before turning to its formal contributions. Consider a small textile workshop owner in a regional Uzbek city,

employing six workers, all currently paid in cash and off the books. She has heard that a neighboring workshop was fined last year for exactly this arrangement, so detection risk is not zero in her mind. On a narrow expected-cost calculation, formalizing looks attractive: the fine she risks, multiplied by even a modest detection probability, exceeds what she would pay in taxes if she registered. A classical model predicts she should register.

She does not, and the model developed here suggests why. She discounts heavily: the tax bill starts next month, while the credit access that formal status would eventually unlock is, in her mind, a distant and uncertain prospect – present bias lowers her perceived benefit before she has weighed anything else. She also knows that most workshops on her street operate exactly as she does, which both lowers the reputational cost of staying informal and raises the competitive cost of being the one shop that raises its prices to cover new tax obligations – unfavorable social norms compound the discounting. She has, moreover, read enough about how tax revenue is spent locally to doubt that formal status buys her anything beyond a bill – low institutional trust strips away what should have been the strongest argument for formalizing, the sense of a fair exchange. And when she asked a former employee, now working in local government, what registration actually involves, the answer ran to several pages of required documents and three separate offices regulatory complexity turns what should be a simple decision into one she keeps deferring, not out of defiance but out of the ordinary human tendency to avoid a complicated bureaucratic afternoon.

None of this means enforcement is irrelevant. If the probability of detection in her district rose sharply P5 in Section 4.3 – the calculus would shift even without any change in trust or norms. And if she began actively courting a large retail buyer who insisted on invoiced, traceable supply the kind of growth ambition captured by P6 – the same perceived benefit that currently sits too low to act on might suddenly be enough. The point of the illustration is not that any single factor determines her decision, but that all four operate on the same underlying judgment before enforcement or ambition ever gets a chance to matter.

Discussion: How the Model's Parts Interact

The six propositions in Section 4.3 are stated one at a time, which is necessary for testability but slightly misleading about how the model is meant to work. In practice, the four antecedents rarely point in the same direction with equal force, and much of the model's explanatory leverage comes from what happens when they pull against each other rather than when they align.

Consider a case that inverts the workshop illustration in Section 4.4: a firm owner with high institutional trust, she believes tax revenue funds real public services and that the system is basically fair, but who faces genuinely onerous registration procedures. P3 predicts trust should raise her perceived benefit; P4 predicts complexity should lower it. The model does not resolve this tension by assumption, and that is deliberate. Whether trust is strong enough to carry her through a frustrating registration process, or whether complexity overwhelms an otherwise favorable disposition, is an empirical question the model is built to pose rather than to answer in advance. This is, in fact, a reasonably common real-world configuration: reform-minded transition economies often improve fiscal transparency and public communication faster than they simplify the underlying bureaucracy, producing exactly this kind of mixed signal for firm owners.

A second interaction worth flagging runs through the moderators rather than the antecedents. P5 and P6 both operate on the same benefit–compliance link, but they need not move together. A firm with strong growth ambitions (high P6 relevance) operating in a district with weak enforcement (low P5 relevance) presents a case where the model predicts formalization should still occur, driven by the firm's own commercial incentives rather than by fear of the tax authority – a pattern that would look, to an observer focused only on deterrence, like compliance without an obvious cause. Conversely, a firm with no growth ambition operating under intense enforcement may formalize reluctantly and minimally, satisfying the letter of registration while continuing to underreport wherever the audit trail is thin. The model’s outcome variable, recall, is defined along a continuum rather than as a binary, precisely to accommodate this second pattern.

Read together, these interactions suggest a broader point about sequencing that Section 7 develops into policy terms: because enforcement and growth orientation only amplify a perceived benefit that already exists, pushing harder on either lever while

perceived benefit itself remains negative is unlikely to be effective, and may simply produce the reluctant, minimal compliance described above rather than genuine formalization. The model's practical value lies less in any single proposition than in this systemic implication – that the order in which policy instruments are deployed matters as much as which instruments are deployed at all.

Theoretical Contributions

The model's first contribution is largely one of consolidation: present bias, social norms, institutional trust, and regulatory complexity have each accumulated a respectable body of evidence on their own, but rarely inside a shared framework, and routing all four through a single mediating judgment offers a more parsimonious account than treating them as independent, competing predictors. A second contribution is less obvious and, arguably, more consequential: repositioning enforcement intensity as a moderator rather than the primary driver of compliance does not merely add a variable to the deterrence model – it changes what the deterrence model is doing in the larger explanation. Audits and penalties stop being the whole story and become, instead, the mechanism that determines how much of an already-formed perception gets translated into action, which is a materially different empirical claim from the one Allingham and Sandmo (1972) originally proposed. The third contribution follows from extending the analysis beyond individual tax compliance to the discrete question an informal firm actually faces whether to formalize at all – a decision that existing frameworks, built mainly with already-formal taxpayers in mind, were not designed to address, and one that carries first-order importance for transition economies precisely because so much economic activity there sits on the informal side of that line.

Practical and Policy Implications

Implications for Tax Administration Design

If supported empirically, the model implies that tax administrations should not rely on enforcement intensity alone to drive formalization. Because enforcement is modeled as a moderator rather than a direct driver, its effectiveness depends on there being a positive perceived benefit for it to amplify; raising audit rates where perceived benefit is strongly negative for instance, where institutional trust is very low, may yield limited

returns and risks further eroding voluntary compliance, consistent with the crowding-out logic of the slippery slope framework (Feld & Frey, 2007).

Implications for Formalization Policy

Because present bias and regulatory complexity are modeled as independent antecedents, formalization policy has at least two distinct levers. Simplifying registration procedures directly targets the complexity antecedent, consistent with the well-documented cross-country association between procedural burden and informal-sector size (Djankov et al., 2002). Separately, restructuring the timing of formalization costs and benefits – for example, through temporary tax holidays for newly formalized firms, or through immediate, tangible benefits such as expedited access to credit upon registration directly addresses the present-bias antecedent by bringing forward benefits that would otherwise be discounted heavily.

Implications for Uzbekistan and Similar Transition Economies

Uzbekistan and comparable transition economies combine three conditions that the model identifies as jointly unfavorable to formalization: a historically enforcement-oriented tax administration inherited from the centrally planned period, a large pre-existing informal sector that sustains unfavorable peer norms, and continuing reform of business registration procedures. The model suggests that policy sequencing matters: absent parallel investment in institutional trust and regulatory simplification, increases in enforcement intensity alone are unlikely to shift the underlying perceived benefit that the model identifies as the proximate driver of the formalization decision.

Limitations and Future Research

As a conceptual contribution, the propositions developed here have not been empirically tested, and the paper does not claim to establish the relative magnitude of the four antecedents' effects. Future research should operationalize perceived net benefit of formalization through validated survey instruments administered to informal and newly formalized firm owners, ideally using natural experiments created by staged regulatory reforms to identify causal effects. The model treats the four antecedents as exerting parallel, independent effects; future theoretical work might examine interactions among them, for instance whether high institutional trust attenuates the

negative effect of regulatory complexity by sustaining the belief that difficulties are transitional rather than permanent. Finally, the boundary condition proposed here, informal-sector size, is deliberately general; comparative research across transition economies with varying informal-sector shares could usefully test whether the model's predictions hold uniformly or vary with this contextual factor.

Conclusion

This paper set out from an observation that any visitor to a Central Asian bazaar can make in an afternoon: firms facing near-identical incentives under the classical deterrence model nonetheless sort themselves into formal and informal camps that persist for years. The explanation developed here is that four behavioral antecedents present bias, perceived social norms about peer informality, institutional trust in the fiscal exchange, and the felt complexity of registration, do not act as separate nudges on separate margins of behavior. They converge on a single subjective judgment, the perceived net benefit of formalization, and it is that judgment, rather than the underlying objective arithmetic, that the classical model was never built to capture.

The model does not ask policymakers to abandon enforcement, nor does it claim that audits and penalties are irrelevant; Proposition 5 assigns enforcement a real, if more circumscribed, role as an amplifier of a perceived benefit that must already exist for enforcement to have much to amplify. What the model does ask is that enforcement stop being asked to do the whole job. Where trust is low, norms unfavorable, and registration genuinely burdensome, tightening audits is likely to buy less compliance than the same investment directed at fiscal transparency or procedural simplification – not because enforcement does not work, but because it is operating on a perceived benefit that has already been driven deeply negative by other forces.

For Uzbekistan and comparable transition economies, where a large informal sector, a historically enforcement-oriented tax administration, and an ongoing simplification of business registration all coexist at once, this reframing carries immediate relevance. The six propositions developed in Section 4, and the interactions among them traced in Section 5, are offered in that spirit: not as settled findings, since none of them has yet been tested against data, but as a specific enough set of claims that

testing them is now a matter of survey design and fieldwork rather than further theorizing. That, in the end, is what a conceptual paper owes the literature it hopes to move forward - not a conclusion, but a clearly stated place to start.

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