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METHODOLOGICAL APPROACHES TO THE ECONOMETRIC ASSESSMENT OF LOCAL BUDGET REVENUE GROWTH THROUGH THE LEGALIZATION OF THE SHADOW ECONOMY

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ABSTRACT

This article develops a methodological framework for measuring how the legalization of informal economic activity affects the growth of local budget revenues in Uzbekistan under rapidly changing digital, tax, and payment institutions. The study combines recent national reforms affecting individual entrepreneurs, self-employed persons, platform-based transactions, and non-cash payments with an econometric logic that links formalization intensity, turnover visibility, and tax mobilization at the territorial level. It is argued that legalization produces not only a direct tax effect through newly declared turnover, but also a secondary fiscal effect through improved payment traceability, lower compliance costs, wider administrative observability, and stronger alignment between economic circulation and local revenue collection.

Keywords: shadow economy; legalization; local budget revenues; econometric assessment; self-employed persons; individual entrepreneurs; non-cash payments; digital platforms; fiscal formalization; tax administration

INTRODUCTION

Discussions on local budget sustainability increasingly show that the decisive issue is not only the statutory tax rate, but the degree to which real economic turnover becomes visible to the fiscal system. In many developing and transition economies, substantial production, trade, and service activity remains partially or fully outside formal recording channels, which weakens local revenue predictability and distorts territorial planning. The problem is especially important where district and city administrations must finance expanding service obligations while depending on revenue streams that are highly sensitive to concealment, cash use, and fragmented reporting. In Uzbekistan, this challenge has become more analytically urgent because digitalization has started to reveal large segments of previously unobserved transactions, especially in trade, services, and platform-mediated activity. The policy environment has therefore shifted from a purely punitive understanding of informality toward a more differentiated view in which legalization is treated as a fiscal, developmental, and administrative modernization process. Such a shift requires methodological tools that can quantify how legalization changes local revenue capacity rather than merely describing institutional intentions. [1]

A second motivation for the present article arises from the redesign of special tax arrangements for individual entrepreneurs and self-employed persons. The Presidential Resolution PQ-247 introduced a new architecture that aims to make formal participation cheaper, more predictable, and more compatible with digital platforms, while setting the turnover tax for eligible categories at one percent and strengthening QR-based transactional visibility. That reform matters for local budgets because the legalization of small-scale activity usually occurs through thousands of marginal decisions by households, traders, service providers, and micro-entrepreneurs rather than through a few large taxpayers. When the cost of compliance falls and the convenience of digital settlement rises, the boundary between informal and formal turnover becomes more permeable. Yet without a clear econometric approach, policymakers may still underestimate the cumulative fiscal value of those marginal transitions. The article therefore treats legalization not as an abstract

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governance slogan, but as a measurable source of incremental and territorially distributed budget growth. [2]

A third reason for re-examining the topic concerns the broader 2026 policy narrative articulated in the Presidential Address, where the authorities reported that the share of the non-observed economy had already been reduced from roughly forty-five to fifty percent to twenty-eight percent, while also declaring the ambition to push non-cash payments in trade and services above seventy-five percent over the next stage of reform. These statements are methodologically significant because they imply that formalization should be assessed jointly through payment behavior, registration dynamics, administrative observability, and resulting tax flows. The question is no longer whether legalization matters, but how strongly it matters, through which channels, in what sequence, and with what territorial asymmetry. This article addresses that question by proposing an econometric logic suitable for local budget analysis, using official payment statistics, legal reforms, and territorial fiscal reasoning as its empirical foundation. The study also seeks to avoid the frequent weakness of prior discussions, where shadow economy reduction was praised normatively without translating the process into operational revenue coefficients. [3]

MAIN PART

At the conceptual level, legalization should be understood as the transition of income-generating activity from low-visibility circulation into verifiable fiscal space. That transition may occur through registration, digital payment adoption, platform intermediation, invoice issuance, simplified reporting, or the consolidation of previously fragmented occupations into recognized tax categories. What matters for local budgets is that legalization expands the observable tax base even before all hidden activity fully disappears. Once turnover becomes visible, tax liabilities can be assessed more consistently, compliance behavior can be profiled more accurately, and territorial forecasts can be built on broader information sets. In that sense, formalization is not only an institutional event but also a data event that changes the quality of public finance management. The econometric assessment proposed here begins from that wider understanding. [4]

Earlier analyses often relied on aggregate estimates of the shadow economy and then assumed that any reduction would proportionally raise budget revenues. Such an assumption is too mechanical for local public finance because different segments of informality have unequal tax elasticity, distinct payment patterns, and varying probabilities of administrative detection. A market vendor using cash, a self-employed digital service provider, and a small workshop with mixed household and business accounts do not contribute to legalization through the same pathway. Consequently, the empirical model must differentiate between turnover visibility, registration intensity, payment traceability, and compliance conversion. It should also recognize that some legalized units contribute quickly through simplified taxes, while others initially generate modest direct revenue but substantially enlarge future enforcement capacity. For that reason, a multi-channel specification is preferable to a single-ratio approach. [5]

The rapid expansion of bank card usage in Uzbekistan provides one of the most important observable proxies for formalization intensity. Central Bank reporting shows that funds received to bank cards rose from 299.6 trillion UZS in 2021 to 789.5 trillion UZS in 2023, while total payments made through bank cards increased from 297.4 trillion UZS to 784.7 trillion UZS over the same period. The corresponding share of non-cash payments in total card spending reached seventy-six percent in 2023 and then rose further to 78.1 percent in 2024, indicating that digital circulation is becoming a progressively richer source of fiscal traceability. For legalization analysis, these variables matter because concealed activity usually shrinks when commercial settlement becomes easier to

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document than to hide. A model that excludes payment digitalization would therefore miss one of the strongest transmission channels between formalization policy and local budget performance. [6]

Equally relevant is the behavior of small business and quasi-household entrepreneurship. National statistics show that the number of active individual entrepreneurs exceeded 270 thousand by mid-2025 and rose above 281 thousand by the first of October, confirming both the scale and the territorial dispersion of this segment. Although not every entrepreneur contributes equally to local taxes, the group is fiscally strategic because it occupies the very zone where simplified taxation, service-sector expansion, and platform-mediated work intersect. Legalization within this segment can generate cumulative budget effects that are modest at the unit level but very large in aggregate. Moreover, a rise in officially active entrepreneurs improves the comparability of territorial revenue performance because differences between regions become less clouded by unregistered activity. The article therefore incorporates small-scale formal participation as a central explanatory dimension. [7]

International research on hidden economies also suggests that the relationship between legalization and public revenue is nonlinear rather than constant. Medina and Schneider showed that shadow activity responds to institutional quality, regulatory design, and enforcement structure, but its fiscal consequences depend on how formalization mechanisms interact with actual reporting and payment systems. This observation is highly relevant for Uzbekistan because recent reforms reduce compliance frictions while simultaneously increasing digital observability. Under such conditions, a one-percentage-point decline in informality may yield stronger revenue gains than in jurisdictions where registration remains cumbersome or enforcement remains largely manual. Hence, the model should allow for changing coefficients over time rather than assuming that legalization has the same fiscal productivity in 2021 as in 2025. That temporal sensitivity is one of the methodological principles developed in the present study. [8]

A useful starting specification is a panel-type relationship where local budget revenue growth is explained by changes in legalized turnover, non-cash payment share, registration intensity of self-employed and individual entrepreneurs, and lagged tax collection efficiency. In simplified notation, the dependent variable may be expressed as the growth rate of territorial local tax revenues, while the key explanatory block captures incremental formalization. The core intuition is straightforward: as previously hidden transactions become digitally visible and legally reported, the tax base widens, collection costs per unit of revenue decline, and fiscal planning errors narrow. At the same time, the model should include regional fixed effects or structural controls because border trade districts, tourism centers, agricultural territories, and metropolitan service hubs do not legalize at the same speed. Without such controls, estimated coefficients would overstate the role of formalization by absorbing unrelated territorial advantages. The econometric design must therefore combine transparency with institutional realism. [9]

There is also a strong argument for introducing lag structures into the assessment. Many legalization measures do not transform revenue immediately because registration may precede stable reporting, and digital payments may initially substitute for cash only in part of total turnover. A newly formalized service provider, for example, may register today, start using digital settlement next month, and become fully compliant in the following quarter once reporting routines stabilize. Local budget effects are therefore often distributed across short lags rather than concentrated in the same month or quarter as the reform. The article accordingly recommends estimating contemporaneous and lagged coefficients for legalization indicators, especially where territorial planning depends on quarterly revenue execution. This dynamic perspective produces more credible fiscal interpretation than static before-and-after comparison. [10]

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Before presenting the first table, it is important to clarify the empirical logic behind the selected indicators. The goal is not to claim that bank card statistics alone measure informality, but to demonstrate that they provide a powerful and officially verifiable proxy for the increasing observability of household and small-business transactions. When combined with policy changes affecting the self-employed and individual entrepreneurs, payment statistics become particularly informative because they illuminate whether economic circulation is migrating from concealed cash channels into traceable digital circuits. The selected period from 2021 to 2025 is especially valuable because it captures the transition from post-pandemic normalization to accelerated platform, QR, and simplified-tax reforms. This makes it possible to distinguish structural modernization from one-off cyclical effects. The indicators below should therefore be read as a formalization context matrix for econometric modeling rather than as isolated descriptive numbers.

Another methodological issue concerns the 2025 row itself. For some variables, official year-end statistical disclosures are already available only in partial or policy-summary form, while other dimensions are reported as reform benchmarks and administrative milestones rather than consolidated annual datasets. Instead of forcing artificial precision, the table transparently distinguishes between officially observed 2021–2024 payment dynamics and the 2025 institutional benchmark environment established by reforms and publicly announced policy targets. That treatment is consistent with econometric practice because explanatory variables may include both observed series and policy-dummy structures representing altered incentives. In this article, 2025 therefore serves as a transition point where actual structural trends are combined with clearly identified reform conditions. This approach preserves empirical honesty without weakening analytical usefulness.

Table 1. Formalization-Relevant Dynamics of Digital Payments and Small Entrepreneurship in Uzbekistan, 2021–2025

Source: Compiled by the author from Central Bank annual reports, Statistical Committee releases, and 2025 reform documents.

Year	Funds credited to bank cards (trln UZS)	Payments by bank cards (trln UZS)	Cashless share of card spending (%)	Active individual entrepreneurs (thousand)	Interpretive note for formalization
2021	299.6	297.4	67.9*	n/a	Baseline year of post-pandemic normalization; digital visibility still uneven.
2022	553.6	549.8	72.8	n/a	Rapid broadening of card-based circulation strengthened transactional observability.
2023	789.5	784.7	75.9–76.0	n/a	Traceability deepened as digital settlement became dominant in card spending.
2024	1,034.2	1,029.8	78.1	n/a	Non-cash behavior became the prevailing spending

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Year	Funds credited to bank cards (trln UZS)	Payments by bank cards (trln UZS)	Cashless share of card spending (%)	Active individual entrepreneurs (thousand)	Interpretive note for formalization
					pattern in bank-card circulation.
2025	policy-transition year	policy-transition year	Target: above 75 in trade and services	281.9 (as of Oct. 1)	Benchmark year for one-percent turnover tax, QR expansion, and platform-based legalization.

The pattern displayed in Table 1 supports the central thesis that legalization prospects strengthened materially over the observed period. The jump in card-based turnover cannot be equated one-to-one with the disappearance of shadow activity, yet it clearly indicates that a growing share of market exchange is leaving anonymous cash channels and entering auditable payment ecosystems. For local budget analysis, this matters because digitally mediated turnover is easier to match with registration, easier to profile by territory, and easier to connect with tax declarations or simplified presumptive liabilities. The 2025 benchmark row further indicates that the institutional environment is no longer neutral; it has been deliberately redesigned to make formality cheaper and concealment more inconvenient. Therefore, the econometric effect of legalization should be expected to strengthen at the end of the period rather than remain constant. [11]

One should also observe that the informational value of payment data rises when paired with reforms in tax administration. Digital circulation alone may increase for reasons unrelated to compliance, such as consumer convenience or financial inclusion. However, once the legal framework enables easier registration, clearer tax treatment for micro-activity, and stronger QR-based verification, the same payment data begin to reflect tax-relevant behavioral changes. This is exactly why the article proposes a combined variable strategy, where payment indicators are interpreted jointly with formalization policy dummies and small-business registration proxies. By doing so, the econometric model avoids both over-attribution and under-attribution of revenue change to legalization. It treats digitalization as a channel whose fiscal productivity depends on institutional design. [12]

The next analytical step is to translate the descriptive context into a revenue model. For this purpose, the article defines legalized turnover as the portion of economic activity that becomes newly observable, newly reportable, or newly taxable because of changes in registration, reporting simplicity, or payment traceability. The coefficient of legalized turnover is not assumed; it is derived from territorial revenue responsiveness and supported by scenario analysis. In practical terms, the model asks how many additional local-budget sums are generated when one additional unit of previously hidden turnover moves into the formal sphere under contemporary Uzbek tax conditions. That question is particularly useful for regional policy because it allows the state to compare alternative formalization instruments by fiscal payoff rather than administrative rhetoric alone.

At this stage, an econometric specification can be formulated in semi-logarithmic form. Local budget revenue growth may be regressed on legalized turnover growth, the share of non-cash payments, the change in active entrepreneurial registrations, and a vector of territorial control variables capturing population density, service-sector concentration, and trade intensity. A lagged

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dependent variable can be added to account for fiscal inertia, since local revenue performance is partly shaped by prior-period compliance and collection routines. Where high-frequency district data are unavailable, quarterly regional panels may serve as a practical compromise without sacrificing interpretive power. The objective is not to maximize mathematical complexity, but to preserve causal clarity in an environment where administrative and behavioral variables evolve together. Such a model remains policy-usable while still rigorous enough for academic discussion.

A crucial identification problem concerns reverse causality. Stronger local budgets may themselves finance better administration, improve service delivery, and thus attract more formal activity, which means revenue growth can influence formalization just as formalization influences revenue growth. To address this issue, the article recommends using institutional shocks as quasi-exogenous anchors, especially the 2025 reform package affecting micro-entrepreneurship and digital reporting incentives. Interaction terms between reform timing and pre-existing regional payment intensity can further strengthen identification, because regions with higher digital readiness should react more strongly to simplification measures. Difference-in-differences logic may also be applied where territorial heterogeneity in baseline formality is observable. These strategies do not eliminate all endogeneity concerns, but they significantly improve the credibility of fiscal interpretation. The proposed methodology therefore emphasizes practical identification rather than purely descriptive correlation.

Another layer of refinement involves decomposing the fiscal effect into direct, indirect, and induced components. The direct component captures taxes paid by newly legalized individuals and micro-businesses once turnover becomes reportable. The indirect component reflects better matching of suppliers, customers, and counterparties in the tax information system, which raises collection from already registered entities interacting with newly visible partners. The induced component arises when legalization improves access to finance, supplier contracts, or digital marketplaces, thereby expanding taxable turnover beyond the initial formalization event. Local budgets benefit from all three channels, although the timing and magnitude differ across sectors. A robust model should therefore avoid the common mistake of measuring only the first-round tax intake from new registrants.

Sectoral differentiation is equally important. Informality in retail trade typically responds faster to payment digitalization and QR-based controls because point-of-sale interactions are frequent and relatively standardized. Service activities, by contrast, may formalize through platform registration, electronic booking, app-based payment, and lower compliance costs for self-employed professionals. Small-scale manufacturing and artisanal workshops may react more slowly, since part of their informality is embedded in procurement chains, household labor, or mixed personal-business accounting. This means that the coefficient linking legalization to local revenue should be expected to vary across economic structures. In tourism-heavy cities, for instance, digital service payments may produce rapid revenue gains, whereas agricultural territories may experience a longer but broader transition. The methodological framework should thus remain open to sector-weighted estimation.

Regional asymmetry further complicates the revenue effect. Metropolitan areas often have deeper banking penetration, stronger mobile payment habits, and denser digital-platform participation, so legalization there can convert quickly into visible turnover. Peripheral districts may show lower initial digital readiness, but they can still generate high marginal fiscal returns if simplified regimes reduce the cost of entering the formal sector. Consequently, the same reform instrument may produce different short-term elasticities across territories even when long-term convergence is plausible. This is one reason the article favors territorially differentiated econometric

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interpretation instead of a single national coefficient. Local budget strategy should be based on where each formalization measure is likely to yield the greatest fiscal increment per administrative effort.

Behavioral economics also deserves attention in this discussion. Legalization is more sustainable when taxpayers perceive the transition to formality as manageable, legitimate, and proportionate to the expected benefits of participation. If registration is easy, tax rules are simple, and payment technologies are familiar, the psychological barrier to formal entry declines. Conversely, when formalization is associated only with punishment, hidden turnover often reappears in new forms even after temporary registration campaigns. The new Uzbek approach, which blends simplified taxation with enhanced digital observability, is therefore analytically important because it modifies incentives as well as enforcement. Econometric models that ignore such behavioral channels risk understating the durability of revenue gains.

The role of digital platforms warrants separate treatment because they compress information asymmetry in ways traditional administration could not. Platform-mediated work, delivery services, ride-related transactions, online retail, and app-based professional services generate digital traces that can support registration, tax agent functions, or at least basic turnover visibility. When legislation clarifies the treatment of such income and links payment organizations to reporting responsibilities, hidden economic activity faces narrower room for concealment. This does not imply that all platform income becomes fully transparent overnight, but it does mean that the cost of remaining informal rises sharply. For local budgets, this matters because platform-mediated legalization tends to be scalable, low-cost, and geographically diffuse. The methodology proposed in this article treats platform circulation as one of the most promising accelerators of future local revenue growth.

To illustrate how policy-sensitive coefficients may operate, the second table presents an authorial scenario matrix rather than an official administrative dataset. The table converts formalization intensity into estimated local-budget effects by combining turnover visibility, presumed taxability under simplified regimes, and compliance conversion rates. Such a scenario approach is useful because policy evaluation often needs forward-looking fiscal estimates before complete annual data are published. Provided that assumptions are transparent and anchored in official legal and payment trends, scenario results can still guide territorial planning. They help administrators compare conservative, baseline, and accelerated legalization outcomes without pretending that uncertain parameters are already observed facts. In applied public finance, that transparency is often more valuable than spurious exactness.

Equally significant is the distinction between tax-base expansion and revenue mobilization timing. Some legalized turnover enters the fiscal system immediately through turnover tax or related liabilities, while other segments first improve data quality and only later raise collection through better audits, more precise risk scoring, or broader third-party verification. A district that newly captures digital traces from service providers may not see the full revenue effect in the same quarter, but its subsequent forecasts, compliance interventions, and policy calibration become more accurate. Therefore, the local-budget benefit of legalization should be measured both as realized tax growth and as a reduction in fiscal uncertainty. That dual perspective aligns the econometric approach with the actual needs of regional budget management. The following table operationalizes this logic through staged scenario assumptions.

Table 2. Authorial Scenario Matrix for Econometric Estimation of Revenue Gains from the Legalization of Informal Turnover

Source: Author’s scenario calculations built on official reform parameters, payment trends, and local tax-response assumptions.

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Scenario	Newly visible turnover (bln UZS)	Estimated taxable share (%)	Effective fiscal conversion (%)	Potential local-budget gain (bln UZS)	Interpretation
Very conservative	5,000	35	0.8	14.0	Minimal transition where registration expands faster than actual declaration.
Conservative	10,000	40	1.0	40.0	Incremental legalization supported mainly by simplified turnover taxation.
Baseline	20,000	45	1.2	108.0	Moderate conversion under wider QR use and rising non-cash traceability.
Accelerated	35,000	50	1.4	245.0	Strong digital formalization with broad participation of micro-entrepreneurs.
High-compliance	50,000	55	1.6	440.0	Combined effect of registration, platform reporting, and stable declaration culture.

Table 2 shows that even relatively cautious assumptions can generate meaningful local-budget increments once hidden turnover starts passing through formal reporting and payment channels. The baseline scenario does not presume full compliance, nor does it attribute all newly visible turnover to immediate taxation; instead, it applies moderate taxable-share and fiscal-conversion ratios consistent with transitional formalization. Even under that restrained logic, the potential gain becomes large enough to influence territorial fiscal planning, especially when aggregated across multiple districts and service segments. This demonstrates why legalization should be incorporated into local budget forecasts as a quantifiable reserve rather than treated as a peripheral anti-shadow objective. The exercise also reveals that the fiscal payoff of simplification reforms may exceed expectations when coupled with digital observability.

The scenario matrix further suggests that the most valuable policy variable may not be the nominal tax rate, but the effective fiscal conversion ratio. When simplified regimes already keep statutory burdens low, additional budget gains are more likely to come from higher declaration stability, broader payment visibility, and better integration of platform and tax data. In other words, the decisive question becomes how much of newly visible turnover can be converted into regular, low-friction compliance. This interpretation shifts the focus of territorial policy from episodic enforcement campaigns toward service-oriented administration and risk-based digital follow-up.

Such a shift is consistent with the broader modernization logic now visible in Uzbek fiscal governance. It also gives empirical content to the idea that legalization and administration quality are mutually reinforcing.

From a forecasting perspective, the proposed methodology can improve both optimism and discipline in local budgeting. It improves optimism because it identifies a realistic reserve that may be mobilized without raising general tax burdens. It improves discipline because it forces authorities to state the assumptions behind expected revenue gains, including the size of newly visible turnover, the share likely to become taxable, and the pace of conversion into stable payments. This reduces the tendency to overstate anti-shadow effects in strategic documents while still recognizing the large fiscal opportunities embedded in formalization. In turn, local governments can design differentiated action plans based on measured rather than rhetorical potential. That is one of the main practical contributions of the article.

Several limitations should nevertheless be acknowledged. Reliable district-level microdata on platform turnover, self-employed reporting quality, and sector-specific formalization timing may still be incomplete or unevenly disclosed. For this reason, the proposed model should initially be implemented as a flexible framework that can absorb better administrative series as they become available. Sensitivity analysis is also essential, particularly in separating the effects of macroeconomic expansion from the effects of genuine legalization. Despite these constraints, the methodological architecture remains robust because it is built around variables that are observable, policy-relevant, and directly connected with the mechanisms through which local revenue is actually formed. The framework is therefore suitable both for immediate applied use and for later refinement in higher-frequency empirical research.

CONCLUSION

The article demonstrates that the legalization of shadow economic activity can be translated into a coherent econometric framework for assessing local budget revenue growth, provided that formalization is measured through several interacting channels rather than a single aggregate indicator. The most important of these channels are newly visible turnover, expansion of non-cash payments, simplified registration of self-employed and individual entrepreneurs, and the institutional redesign of micro-taxation. Taken together, these variables explain why recent reforms in Uzbekistan are fiscally significant not merely as legal innovations, but as mechanisms that convert hidden circulation into measurable local revenue capacity. The central conclusion is that legalization should be treated as an operational budget reserve whose magnitude can be estimated, compared, and forecasted. Such treatment allows public finance management to move from general anti-shadow rhetoric toward evidence-based territorial planning.

A second conclusion concerns timing and territorial differentiation. Revenue gains from legalization do not arise uniformly across sectors or regions, and they often unfold through short lags as registration, digital payments, and stable declaration practices gradually reinforce one another. Accordingly, local governments should avoid both underestimating and instantly overcapitalizing expected gains; instead, they should integrate conservative, baseline, and accelerated scenarios into forecast design. The article also confirms that the fiscal productivity of formalization is likely to rise when digital observability and administrative simplicity advance together. Therefore, the refinement of tax administration for local budgets should prioritize measurable conversion of visible turnover into regular compliance rather than reliance on isolated enforcement episodes alone.

Key Findings

• Legalization affects local budget revenues through direct, indirect, and induced fiscal channels rather than through a single proportional relationship.

• The growth of non-cash and platform-mediated transactions substantially increases the observability of previously hidden turnover and strengthens revenue modeling.

• Recent reforms for individual entrepreneurs and self-employed persons create a lower-cost entry route into formality, making fiscal conversion more scalable.

• Scenario-based econometric estimation provides a practical instrument for territorial budget planning under partial but improving administrative data.

Recommendations

• Introduce a territorial legalization dashboard that jointly tracks card-based turnover visibility, new registrations, declaration continuity, and local tax receipts by sector.

• Estimate district-level lag structures so that budget planners can distinguish immediate revenue effects from delayed compliance-conversion effects after formalization measures.

• Integrate platform transaction data, QR-based payment records, and simplified-tax declarations into a single analytical environment for micro-level fiscal forecasting.

• Use scenario-based revenue modeling in annual local budget preparation so that anti-shadow initiatives are linked to quantified fiscal reserves rather than generic expectations.

• Prioritize sectors where digital observability is already high but tax conversion remains incomplete, since these segments offer the fastest marginal return for local budgets.

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