

Proxying the Invisible: Estimating Transnistria's Shadow Economy and Its Threats to Regional Economic Security

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Abstract: This paper explores the shadow economy in Transnistria and its implications for Moldova's economic security. As an unrecognized and semi-autonomous region, Transnistria operates largely outside Moldova's formal regulatory and fiscal systems, fostering informal and semi-legal economic practices. Conventional estimation methods, such as the Currency Demand Approach (CDA), cannot be applied due to the lack of reliable monetary and macroeconomic data. To address this limitation, a population-intensity proxy model is used, drawing on Moldova's national shadow economy estimates (42.8 % of GDP in 2020; 37.1 % in 2025) and adjusting for Transnistria's population share and higher informal intensity. Results suggest that informal activity may range from 1.7 % to 3.4 % of Moldova's GDP in 2020 and 1.5 % to 3.0 % in 2025. The analysis indicates that informal practices are concentrated in fuel, metals, alcohol, and tobacco trade, and are partly facilitated by Russian patronage reflecting the structural embedding of informality in governance arrangements, highlighting the intersection of contested sovereignty, institutional fragility, and external influence. By integrating proxy estimation with qualitative insights, this research illuminates how shadow economies in unrecognized territories reshape governance, distort trade, and pose systemic economic security risks.

Keywords: shadow economy; illegal markets; economic security; proxy estimation; post-Soviet informality

1. Introduction

The shadow economy, commonly defined as all economic activities that are deliberately concealed from public authorities to avoid taxation, social security contributions, or regulatory compliance

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represents a persistent structural challenge for transition economies. In the Republic of Moldova, the scale of informal economic activity is particularly significant. Recent estimates suggest that the shadow economy accounts for approximately 37.1 percent of Moldova's GDP, ranking the country among those with the highest levels of informality in Europe (RegTrends, 2025). Such a large informal sector undermines fiscal capacity, weakens state institutions, distorts labor markets, and constrains long-term economic development.

Beyond its macroeconomic implications, the shadow economy poses a serious threat to economic security, understood as the state's ability to ensure stable economic functioning, protect critical infrastructure, maintain fiscal sovereignty, and reduce vulnerability to external shocks. While the shadow economy has been widely examined in relation to taxation, labor informality, and growth (Schneider, Buehn & Montenegro, 2010; Williams & Schneider, 2016), its security dimension—particularly in politically contested territories, remains under-researched. This gap is especially evident in post-Soviet states where unresolved conflicts and weak governance structures facilitate informal and illicit economic practices.

The case of Transnistria, a de facto separatist region within Moldova's internationally recognized borders, provides a compelling example of how shadow economic structures intersect with issues of sovereignty, security, and geopolitical influence. Following the dissolution of the Soviet Union, Transnistria declared independence in 1990, leading to an armed conflict with Moldova in 1992. Since then, the region has operated outside Chişinău's effective control, developing parallel political, legal, and economic systems (Grokopedia, *Foreign Relations of Transnistria*). This prolonged lack of international recognition has incentivized the growth of informal and semi-legal economic activities, including unregulated trade, tax evasion, and cross-border smuggling. A central factor shaping Transnistria's shadow economy has been Russian patronage. For decades, Russia supplied natural gas to the region without payment, allowing Transnistrian industries, particularly energy-intensive sectors such as metallurgy and electricity generation, to operate at artificially low costs (Grokopedia, *Economy of Moldova*). These subsidies not only sustained the region's economic viability but also reinforced its political autonomy, simultaneously weakening Moldova's economic security by creating dependency on external energy flows and limiting the state's ability to exercise fiscal and regulatory oversight.

The implications for Moldova's economic security are profound. The Cuciurgan (Moldavskaya GRES, 2024) power plant, located in Transnistria, has historically supplied a substantial share of Moldova's electricity. This structural dependency became acutely visible during the 2025 energy crisis, when Russia's Gazprom halted gas supplies following the expiration of transit agreements through Ukraine, triggering severe disruptions across Moldova's energy system (Moldovan Energy Crisis, 2025). The crisis underscored how shadow economic arrangements and unresolved territorial conflicts translate into national-level security vulnerabilities.

Recent developments further highlight the fragility of Transnistria's economic model. As Russia has begun to restrict direct subsidies, the region has experienced a sharp economic contraction, with industrial output reportedly declining by more than 40 percent in early 2025 (Intellinews, 2025). Paradoxically, while political allegiance to Moscow remains strong, Transnistria's trade has become increasingly oriented toward the European Union, which now absorbs the majority of its exports (European Interest, 2025). This contradiction illustrates the adaptive nature of shadow economies, which can realign economically while remaining politically opaque. Despite its significance, reliable data on the shadow economy in Transnistria are extremely limited. Informal activities are inherently difficult to measure, and the region's unrecognized status excludes it from standardized international

statistical frameworks. Official data published by de facto authorities lack transparency and methodological consistency, while Moldovan and international institutions rely largely on indirect estimates or fragmented reporting (Schneider et al., 2010). This data scarcity itself constitutes a security risk, as it hampers evidence-based policymaking and obscures the true scale of fiscal losses and economic vulnerabilities.

Against this backdrop, this research addresses a critical gap by examining how the shadow economy in Transnistria affects Moldova's economic security, focusing on issues of state control, data availability, external patronage, and energy dependence. By situating the Transnistrian case within broader debates on informality, post-conflict economies, and geopolitical influence, the study contributes to a deeper understanding of why economic security remains difficult to ensure in contested territories and why conventional policy tools often fail to address these challenges effectively.

2. Literature Review

Informality and the shadow economy are pervasive phenomena in many transitional and post-Soviet contexts, but scholars debate their nature, causes, and consequences. At its core, the “shadow economy” encompasses unregistered economic activities that evade taxation, regulation, and official oversight (Schneider, Buehn & Montenegro, 2010). This includes both employment outside formal labor markets and unreported trade, unregistered production, and illicit market participation. Unlike mere micro-enterprise informality, the shadow economy often intersects with illegal economic activity, making it a security concern for states dependent on tax revenues and formal regulatory control (Schneider, 2011; Nuriyev & Hajiyeva, 2025).

Alena Ledeneva's work on “*blat*” and informal networks in the Soviet Union provides a foundation for understanding enduring informality in post-Soviet states. Ledeneva shows how personal networks and informal exchanges were central to navigating shortages and bureaucratic obstacles in the Soviet economy, creating social norms that persisted after formal economic liberalization (Ledeneva, 1998). Rather than disappearing with market reforms, these networks adapted, shaping how individuals and firms engage with state institutions and markets in post-Soviet societies. Informality matters not merely as an economic statistic but as a structural feature affecting governance, fiscal capacity, and social legitimacy. Schneider et al. (2010) estimate that in numerous transitional economies, the shadow economy constitutes a substantial proportion of GDP, undermining tax bases and complicating economic policy. In such contexts, state capacity is weakened because informal activity erodes the fiscal resources necessary for public goods, infrastructure, and social services, which in turn can fuel political discontent and instability.

From a sociological and economic sociology perspective, Jens Beckert's work on illegal markets emphasizes that market activities do not vanish when formal institutions fail to provide order; instead, they are embedded in social, cultural, and institutional contexts (Beckert & Dewey, 2017). Beckert argues that the “social embeddedness” of economic action means that informal and illegal markets are shaped by trust, networks, and reputational mechanisms that can rival formal regulatory systems. In post-Soviet states, where formal institutions were dismantled or reconfigured rapidly, this embeddedness helped informal markets proliferate. The security implications of informality extend beyond revenue loss. Shadow economies can facilitate corruption, money laundering, and cross-border illicit flows that undermine state sovereignty and economic resilience. (Schneider, 2011; Ledeneva, 1998).

2.1. Post-Soviet Informality and the “Transition” Paradigm

Early theories of post-communist transition posited that liberalization and institutional reform would reduce informality as markets matured and regulations took hold. However, empirical evidence has shown that informality often persists or even expands in the absence of strong institutions. In the post-Soviet space, state infrastructures were often weak, regulatory frameworks incomplete, and legal enforcement uneven, creating environments in which formal and informal economies coexisted uneasily (Schneider, 2011). This persistence reflects both path dependence and institutional voids. Ledeneva’s ethnographic insights suggest that relationships cultivated in the Soviet era, networks of reciprocity and exchange, evolved into post-Soviet informal economies of connection, where access to resources depended on personal ties rather than formal contracts. In transitional settings where courts are weak and property rights insecure, such informal mechanisms fill gaps but also undermine the legitimacy and predictability of formal systems (Ledeneva, 1998). Moldova exemplifies these dynamics. According to international estimates, the Moldovan shadow economy has been large relative to official GDP, complicating fiscal policy and governance (Schneider, Buehn & Montenegro, 2010). The persistence of informality in Moldova spans labor markets, unregistered business activity, and cross-border trade. The *Transnistrian region* illustrates how political fragmentation can exacerbate these patterns, with semi-autonomous authorities and weak oversight creating opportunities for unregulated economic activity that undermines central state control (RegTrends, 2025; Moldovalive.md, 2025). In conflict-affected and unrecognized territories, formal institutions are often parallel or absent, leaving space for shadow economies to flourish. Beckert’s emphasis on the social foundations of illicit markets suggests that in such contexts, informal governance structures including networked groups, patron–client relationships, and extralegal norms—can regulate transactions that formal institutions fail to control. This contributes not only to economic insecurity but also to political and legal fragmentation, complicating efforts to integrate these regions into national economic frameworks. Comparative research indicates that while informality is widespread across developing and transitional contexts, its causes and effects vary based on institutional capacity, historical legacies, and geopolitical conditions. For example, in some Central Asian and Caucasus states, informal networks developed as survival strategies during early transitions but later adapted to serve as parallel economic systems that co-opted regulatory functions where weak institutions could not (Schneider, 2011). Policy responses that focus exclusively on enforcement may fail if they do not address underlying institutional deficits. Strengthening formal legal and economic institutions such as transparent customs, independent courts, and accountable tax systems can reduce the incentives for informality. Additionally, addressing social norms and trust in public institutions, as emphasized by Ledeneva, is crucial for transitioning informal networks into formal economic participation.

3. Shadow Economy Estimation in Transnistria: Proxy Approach

Estimating the shadow economy in **Transnistria**, an unrecognized and frozen conflict zone, presents considerable methodological challenges due to the absence of reliable monetary and macroeconomic data. A widely used method for quantifying informal economic activity is the **Currency Demand Approach (CDA)**, which infers unreported transactions from observed currency in circulation relative to expected formal demand (Schneider & Enste, 2000; Schneider, Buehn & Montenegro, 2010). CDA requires detailed data on cash in circulation, broad monetary aggregates, and independently audited GDP estimates to identify the excess currency demand attributable to informal activity. For Transnistria, however, such data are unavailable. Monetary statistics are not separately reported to

international organizations such as the IMF or World Bank, and GDP estimates are not independently audited. Consequently, direct application of the CDA to Transnistria for 2020 or 2025 is not feasible. **Since direct data for Transnistria are not available and recent years lack reliable macroeconomic and monetary statistics**, any quantitative estimation of the shadow economy would be speculative. **For this reason, the authors employ a proxy estimation approach**, using Moldova's shadow economy figures adjusted by population share and informal intensity to provide a plausible approximation.

To overcome this limitation, the study employs a **proxy estimation approach using a simple population-intensity model**, drawing on broader Moldovan shadow economy data as a contextual reference. Moldova's shadow economy was estimated at **42.8 % of GDP in 2020** using discrepancy-based growth estimation methods (The Global Economy, 2025). The model assumes that informal activity in Transnistria can be approximated as a **function of Moldova's shadow economy, the population share of the region, and an intensity multiplier reflecting higher informality due to unrecognized status and Russian patronage**. Formally, the model can be expressed conceptually as:

$$SE_{Transnistria} \approx SE_{Moldova} \times Pop_{Share} \times Intensity_{Multiplier}$$

where $SE_{Transnistria}$ represents the estimated shadow economy of Transnistria as a share of Moldova's GDP, $SE_{Moldova}$ is Moldova's shadow economy, Pop_{Share} is Transnistria's population relative to Moldova (~4 %), and $Intensity_{Multiplier}$ reflects higher informal activity relative to the national average (1–2×).

Applying this model, the lower bound of Transnistria's shadow economy in 2020, assuming intensity equal to Moldova's average (multiplier = 1), is approximately $42.8\% \times 0.04 \approx 1.7\%$ of Moldova's GDP. The upper bound, assuming twice the intensity of the national average (multiplier = 2), yields $42.8\% \times 2 \times 0.04 \approx 3.4\%$ of Moldova's GDP. These estimates are contextual proxies, indicating informal economic activity relative to Moldova's GDP rather than representing an absolute share of Transnistria's own GDP. Extending the same modeling approach to 2025, when Moldova's shadow economy is projected at 37.1 % of GDP (RegTrends, 2025), the lower bound for Transnistria (multiplier = 1) is $37.1\% \times 0.04 \approx 1.5\%$ of Moldova's GDP, while the upper bound (multiplier = 2) is $37.1\% \times 2 \times 0.04 \approx 3.0\%$ of Moldova's GDP. These ranges provide plausible contextual estimates for informal economic activity under Russian patronage and the structural conditions of unrecognized status, compensating for the absence of precise CDA data.

Even with these proxy estimates, Transnistria's informal economy is economically significant relative to its size, concentrated in sectors such as fuel, metals, alcohol, and tobacco trade, as well as informal financial operations. These unregulated activities pose systemic risks to economic security, trade regulation, and fiscal oversight. By integrating the population-intensity proxy model with qualitative insights from governance analyses, trade reports, and expert interviews, this study illustrates the mechanisms through which informal activity undermines economic security, distorts trade flows, and perpetuates governance challenges. Importantly, this modeling approach demonstrates why traditional regulatory and monitoring instruments are largely ineffective in frozen conflict zones such as Transnistria, where political non-recognition, institutional weakness, and Russian influence create conditions conducive to persistent shadow economic activity.

4. Transnistria's Trade Dynamics

Transnistria represents a unique case of a semi-autonomous economic region within the internationally recognized borders of Moldova, where formal and informal trade activities coexist and interact. The region's shadow economy, defined as economic activities deliberately concealed from authorities to evade taxation, regulatory oversight, or reporting, has long been a defining feature of its economic landscape. Shadow trade in Transnistria includes unregistered cross-border exchanges, smuggling of commodities, and the informal circulation of energy resources, all of which undermine fiscal governance, distort markets, and reduce Moldova's economic security (RegTrends, 2025; Schneider, Buehn & Montenegro, 2010). The lack of transparency in these informal flows is compounded by the region's unrecognized political status, which limits the enforcement capacity of Chişinău and prevents inclusion in standardized international economic reporting frameworks (Groklopedia, *Foreign Relations of Transnistria*).

Historically, Transnistria's formal and shadow economic structures were shaped by Russian patronage, particularly through energy subsidies. Gazprom supplied natural gas at below-market rates or without payment, enabling energy-intensive industries, such as metallurgy and electricity generation, to operate at artificially low costs. These conditions facilitated both formal exports and informal economic activities, including cross-border arbitrage and unrecorded trade flows (Groklopedia, *Economy of Moldova*). Even as the region increasingly directs its formal trade toward the European Union, the persistence of shadow trade continues to complicate Moldova's economic planning and fiscal security (Gov.md, Moldovalive.md).

The formal trade dynamics of Transnistria demonstrate both continuity and change in recent years. Exports to the European Union have risen substantially, accounting for ~83% of total exports by 2023, with Romania, Poland, and Italy as the largest recipients, while imports from the EU represented ~54% in the same period (IPN, 2023; Gov.md, 2024). By 2024–2025, EU shares of exports and imports remained high, with ~80% of exports and ~48–53% of imports directed to or sourced from EU countries (Moldovalive.md, 2025; Gov.md, 2025). These trends indicate a gradual shift toward EU-oriented trade while maintaining a legacy of informal or shadow economic practices. (See below, Fig 1.)

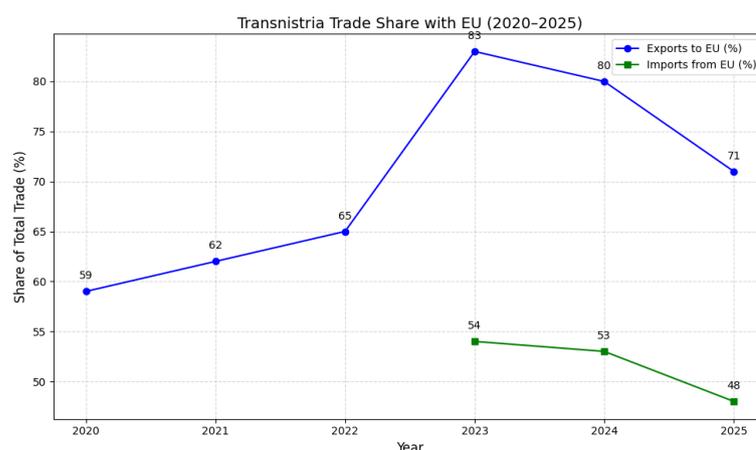


Figure 1. Transnistria Trade Share with EU (2020-2025)

Source: Moldovan Bureau for Reintegration; Government of Moldova press releases; IPN reporting; Moldovalive.md. Trade share estimates are based on available published data for exports and imports to the EU, 2020–2025.

In contrast, trade with Russia has declined sharply, reflecting both political and economic changes. Official exports to Russia fell from €252.9 million in 2008 to €21.1 million in 2024, representing a decline of over 90%, and by 2025 Russia accounted for only ~7% of Transnistrian exports (IPN.md, 2024; Moldovalive.md, 2025). While these figures pertain to formal, registered trade, they highlight the continued role of shadow trade channels, which may support informal flows of goods and energy beyond official records. Imports from Russia, particularly energy products, have also fallen significantly over the same period, exacerbating the region's economic vulnerability and dependence on external sources (Moldovalive.md, 2025).

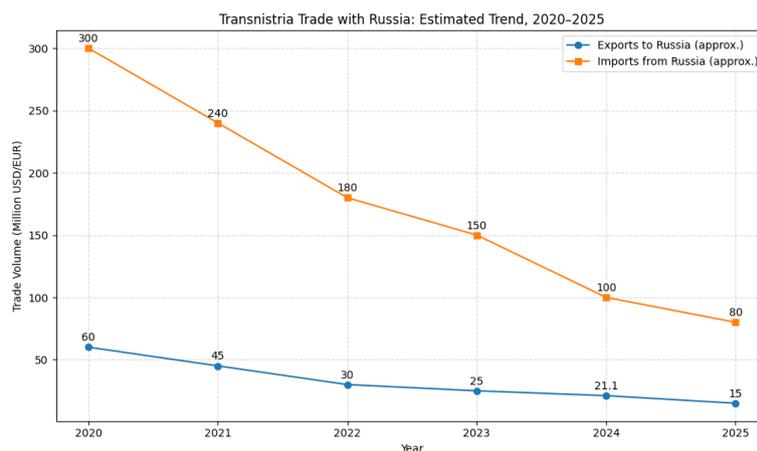


Figure 2. Transnistria Trade with Russia: Estimated Trend, 2020-2025

Source: IPN reporting on Transnistrian exports to Russia (e.g., €21.1 million in 2024); Moldovalive.md on Russia's share in 2025 (~7% of exports). Trade volumes are trend estimates due to limited publicly available annual data for 2020–2025.

The consequences of this dual formal–informal trade system for Moldova's economic security are profound. Shadow trade undermines fiscal revenue by diverting economic activity from formal channels, weakens regulatory control, and complicates monitoring of critical sectors such as energy. The 2025 energy crisis exemplified these vulnerabilities: disruptions in Russian gas deliveries, which had previously flowed via Transnistria under semi-formal arrangements, triggered significant shortages and highlighted the national-level risk posed by opaque, shadow economic networks (Wikipedia, 2025 *Moldovan Energy Crisis*; Moldovalive.md, 2025). Furthermore, the lack of comprehensive statistical reporting for the region prevents accurate estimation of both shadow and formal trade volumes, making it difficult to quantify losses or implement effective policy interventions (Schneider et al., 2010).

In sum, Transnistria's economic landscape illustrates the complex interplay between shadow trade, formal exports and imports, and geopolitical influences. While the region increasingly engages in EU-oriented formal trade, the shadow economy persists, supported by historical patronage and unregulated economic networks. These factors together erode Moldova's economic security by reducing fiscal capacity, limiting control over strategic sectors, and maintaining vulnerabilities to external shocks. The available data on formal trade, exports and imports provide only a partial picture; the shadow economy remains largely invisible to conventional statistics, necessitating careful estimation and qualitative assessment in any analysis of the region's economic stability (RegTrends, 2025; IPN.md, 2024; Moldovalive.md, 2025; Gov.md, 2025). The Fig 3. below illustrates the structure of Transnistria's trade and shadow economy under Russian patronage. Russia provides **political and energy support**, including subsidized gas, which enables both formal and informal economic activity.

Transnistria, labeled as an **unrecognized / frozen conflict zone**, operates with limited external oversight, creating fertile conditions for the **shadow economy**.

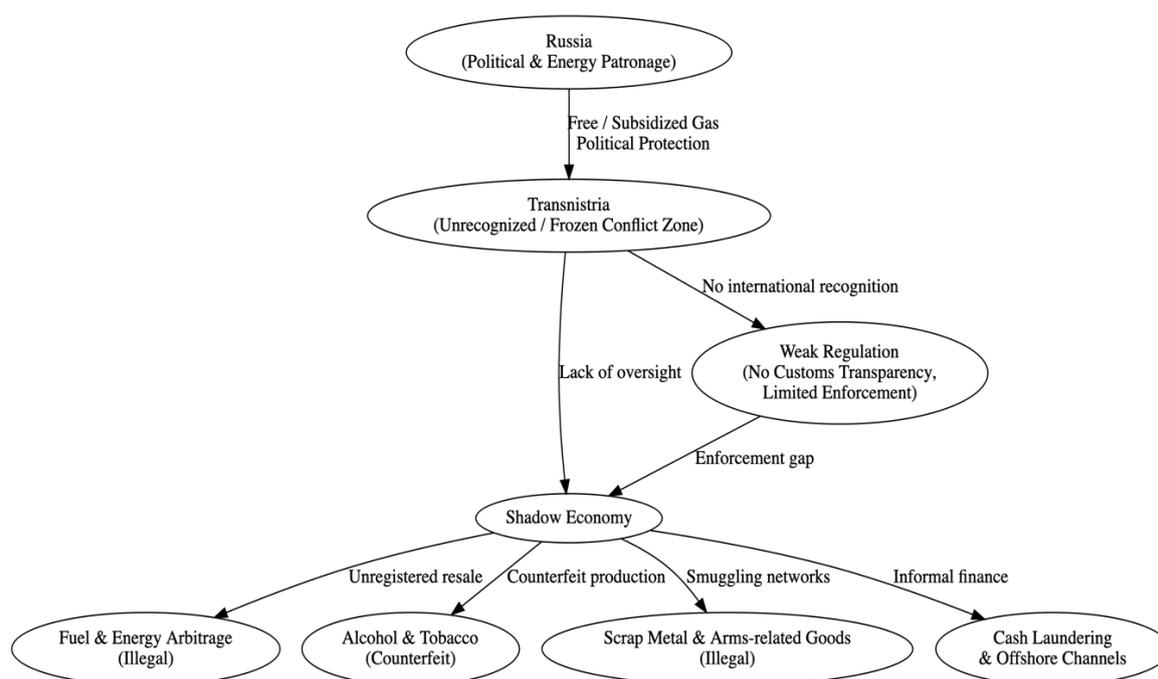


Fig 3. Transnistria's trade and shadow economy

Source: Moldovan Bureau for Reintegration; Government of Moldova press releases; IPN reporting; Moldovalive.md. Trained in ML by authors.

The shadow economy encompasses **illegal and semi-legal activities**, including:

- **Fuel and energy arbitrage,**
- **Counterfeit alcohol and tobacco production,**
- **Scrap metal and arms-related goods smuggling,**
- **Cash laundering and informal offshore channels.**

Regulatory mechanisms are weak due to the **lack of international recognition and limited enforcement capacity**, leaving these flows largely unmonitored. The chart highlights the **structural reasons why economic control is difficult**, showing how Russian patronage indirectly sustains informal and illegal trade while Moldova's authorities cannot fully regulate these activities. Transnistria's shadow economy persists due to structural and geopolitical constraints. As an **unrecognized / frozen conflict zone**, it lies outside the jurisdiction of Moldova and international regulatory frameworks, preventing enforcement of formal trade and customs rules (Schneider, Buehn & Montenegro, 2010; RegTrends, 2025). Local authorities, aligned with the unrecognized administration, have limited capacity or incentive to regulate informal activity, while Russian patronage including subsidized energy and political support sustains economic incentives for unregistered trade (IPN.md, 2024; Grokipedia, *Economy of Moldova*). Key sectors of the shadow economy, such as **fuel and energy arbitrage, counterfeit alcohol and tobacco, scrap metal**

smuggling, and informal financial channels, operate in opaque networks that are difficult to monitor or control.

5. Discussion(s)

The analysis of Transnistria's shadow economy reveals more than the existence of informal market activity: it exposes how political authority, economic regulation, and illicit practices co-constitute economic life in unrecognized territories, with profound implications for economic security. Traditional models of informal sector estimation such as the Currency Demand Approach (CDA) are built on the assumption that monetary and national income data are reliably observable and reported. For Transnistria, however, these conditions do not hold. As an unrecognized entity, the region does not publish independent money supply data, broad monetary aggregates, or audited GDP series in any internationally standardized dataset (e.g., IMF or World Bank), making CDA inapplicable in practice and indicative of the institutional voids that characterize frozen conflict zones where governance legitimacy is contested and fragmented.

Faced with this limitation, this study adopts a population-intensity proxy model that anchors its estimates in Moldova's broader shadow economy, which was around 42.8 % of official GDP in 2020 according to DGE model estimates (The Global Economy, 2025) and 37.1 % in 2025 based on regional analytics (RegTrends, 2025). By weighting these national estimates with Transnistria's population share (approximately 4 %) and allowing for a plausible intensity multiplier, one to two times the national informal intensity to reflect the region's unregulated trade and patronage dynamics, our proxy suggests that Transnistria's informal economy plausibly ranged from 1.7 % to 3.4 % of Moldova's GDP in 2020 and 1.5 % to 3.0 % in 2025. These figures, while speculative due to data constraints, emerge from a model that makes transparent its assumptions, bounds, and the underlying political-economic context of informality in a data-scarce environment.

This proxy estimation yields two key insights. First, even a modest informal share relative to Moldova's GDP translates into economically meaningful activity when concentrated in strategic sectors such as fuel and energy arbitrage, metals and scrap trade, alcohol and tobacco production, and informal financial flows. These sectors are not peripheral; they intersect with critical nodes of consumption, taxation, and cross-border exchange, thereby amplifying the shadow economy's impact on regulation and fiscal capacity. Second, and more fundamentally, reliance on a proxy model itself highlights institutional fragmentation in Transnistria: shadow economic activity is embedded in governance arrangements that are neither governed by Chişinău's formal institutions nor fully integrated into Russian state structures, but are instead tolerated, shaped, and in some respects legitimized by a constellation of informal authorities. Understanding why this institutional embedding occurs requires moving beyond standard economic models of informality as a residual category of unregulated work or tax evasion. In the post-Soviet space, informality often reflects enduring social and institutional legacies. Alena V. Ledeneva's foundational work on informal networks (or *blat*) illustrates how market participants respond to institutional voids not merely by concealing activity from the state, but by developing alternative governance mechanisms that mediate trust, enforce contracts, and allocate access to scarce resources, mechanisms that transition into post-Soviet informal practices in the absence of effective formal governance (Ledeneva, 1998).

In Transnistria, these alternative mechanisms have been repurposed under conditions of geopolitical tension. The region's unrecognized status creates both a vacuum of formal authority and an

opportunity for informal authorities - local elites, patronage networks, and external actors to shape economic transactions outside the reach of formal regulation. Russian influence is central to this dynamic. Russian patronage does not operate merely as a background factor; it actively shapes the institutional architecture within which informality is embedded. By subsidizing energy inputs and fostering informal economic linkages, Russian elites effectively create conditions in which certain types of informal trade are functionally tolerated and instrumentally valuable. From an institutional economics perspective, this pattern resembles broader arguments that economic institutions and political power are deeply interdependent in contexts where formal enforcement is weak, political actors can sustain informal systems that serve strategic interests. The result is an economic space where illegality is not only pervasive but structurally sanctioned not fully regulated, but not fully chaotic either buffered by patronage and informal authority. From the perspective of economic law, this presents a paradox. Formal legal infrastructures such as property rights, contract enforcement, and customs regulation are either absent or selectively enforced. In such a vacuum, informal systems become de facto regulators of economic activity. This resonates with broader empirical literature showing that informal networks often fill gaps left by underdeveloped legal frameworks, but the Transnistrian case goes further: illegality is constitutive of the regional political economy, shaping incentives and deterring formal compliance at multiple layers of governance. The implications for economic security are profound. Shadow economic activity in Transnistria does not merely reduce tax revenue or complicate statistical measurement; it restructures power relations, distorts trade flows, and creates leverage points that can be exploited by external patrons or internal elites.

Even when proxy estimates suggest informal activity at only a few percent of Moldova's GDP, the strategic concentration of this activity in key sectors and cross-border dependencies implies outsized effects on governance and economic stability. This observation reveals a critical gap in existing scholarship: studies of shadow economies often emphasize macroeconomic distortions or labor market effects, but do not adequately address how informality interacts with geopolitical structures and contested sovereignty to influence economic security. By adopting a proxy estimation framework that is both transparent in its assumptions and grounded in contextual realities, this study contributes a methodological innovation for research on shadow economies in data-scarce environments. It demonstrates that rigorous analysis is possible even when direct measurement is infeasible, provided that models are clearly specified and supported by institutional and political context. Moreover, it suggests a broader research agenda: comparative study of shadow economies in other unrecognized or partially recognized polities could illuminate how variations in political patronage, external support, and institutional fragmentation shape informal economic structures and their implications for economic security.

6. Conclusion

The analysis of Transnistria's shadow economy demonstrates that informal and semi-legal economic activity is not merely a residual byproduct of weak regulation but a structurally embedded feature of the region's political economy. By employing a proxy estimation anchored in Moldova's broader shadow economy, this study highlights that even a modest share of informal activity ranging between 1.7% and 3.4% of Moldova's GDP in 2020 and 1.5% to 3.0% in 2025 translates into significant economic influence when concentrated in strategic sectors such as energy, metals, and alcohol/tobacco trade. The entanglement of these activities with Russian patronage underscores the broader

geopolitical dimension of informality, illustrating how external actors can shape regional governance and indirectly sustain economic networks beyond formal oversight.

From a policy perspective, this suggests that conventional regulatory and fiscal measures alone are insufficient to address the shadow economy in unrecognized territories. Future strategies should combine efforts to strengthen Moldova's institutional reach, improve transparency and reporting in border regions, and engage in multilateral monitoring of strategic trade and energy flows. Legal reforms to reinforce property rights, contract enforcement, and customs regulation must be complemented by targeted interventions that address the incentives driving informal participation, including the socio-political legitimacy of informal networks and the reliance on external subsidies.

Looking forward, monitoring Transnistria's shadow economy is crucial for anticipating systemic risks to Moldova's economic security. A combination of proxy estimation, qualitative governance analysis, and international cooperation offers the most realistic approach for understanding and mitigating vulnerabilities. By recognizing informality as both a structural and geopolitical phenomenon, policymakers can design nuanced regulatory frameworks that balance enforcement with incentives for formalization, reducing long-term economic and security risks in contested territories.

Conflict of Interest

The authors declare no conflict of interests.

Author Contributions

Conceptualization, M.N.; methodology, N.H.; proxy estimation and formal analysis, N.H.; data curation, Z.B.; investigation, Z.B.; writing—original draft preparation, M.N. and N.H.; writing—review and editing, M.N., N.H., Z.B.; visualization, Z.B. All authors have read and agreed to the published version of the manuscript.

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