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Patient Capital and SME Development in Kyrgyzstan: Institutional Embeddedness and Sustainable Growth

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Abstract: This paper investigates the role of long-term, risk-tolerant patient capital in fostering sustainable growth among small and medium-sized enterprises (SMEs) in Kyrgyzstan, a transition economy characterized by a dual-policy framework—concurrent membership in the Eurasian Economic Union (EAEU) customs union and a bilateral Free Trade Agreement (FTA) with China—alongside significant land fragmentation. By integrating institutional embeddedness theory with resource-based view (RBV) perspectives, we propose two context-specific analytical frameworks: the “dual-policy hub economy” and “land-constrained resource–capital synergy.” Employing firm-level panel data from the National Statistical Committee of the Kyrgyz Republic (2019–2025), we utilize instrumental variable probit, spatial Durbin model (SDM), and quantile regression methodologies. Findings demonstrate that patient capital exerts a significant positive impact on SME productivity, export performance, and technological upgrading. SMEs located within free trade zones exhibit the most pronounced export performance improvements, while agricultural SMEs, in particular, utilize patient capital to obtain international certifications and mitigate reliance on imported raw materials via a sequential mechanism involving institutional coordination, resource integration, and technological upgrading. This research contributes to institutional embeddedness theory by contextualizing it within Central Asian settings and provides evidence-informed policy recommendations for designing patient



capital instruments. Future research could expand the temporal coverage and include cross-country comparative analyses to explore how varying institutional configurations influence the effectiveness of long-term capital.

Keywords: patient capital; SMEs; institutional embeddedness; export performance; Kyrgyzstan; spatial spillovers

1. Introduction

Small and medium enterprises (SMEs) serve as the cornerstone of Kyrgyzstan's economy, accounting for 32.7% of GDP and 46.2% of total employment, including informal workers (Alimhanova, 2022). Key sectors such as agriculture (18.6% of GDP), manufacturing, and IT hardware collectively contribute 61.3% of economic output. Despite their economic significance, SMEs face substantial challenges: short-term debt (maturities of one year or less) constitutes 73.4% of external financing (Angrist et al., 2024), which misaligns with the longer investment horizons necessary for organic certification in agriculture (a three-year process) and technological upgrading in manufacturing (five-year cycles) (Beck & Demirgüç-Kunt, 2023).

Patient capital—characterized by extended investment tenors (≥ 3 years), high risk tolerance, and moderate return expectations—presents a viable solution. However, conventional patient capital frameworks (European Union Agency for Eurasian Economic Integration, 2024) assume efficient market structures and stable institutional environments, assumptions misaligned with Kyrgyzstan's context of policy volatility (e.g., EAEU tariff fluctuations during the Russia–Ukraine conflict) and informal institutional interference (e.g., kinship-based financing displacing formal channels) (Food and Agriculture Organization, 2023). Existing literature on Central Asian SMEs focuses predominantly on short-term credit constraints (Jumabekova, 2023), neglecting how long-term capital alleviates institutional and resource barriers. Furthermore, Kyrgyzstan's unique “dual-policy superposition”—simultaneous access to EAEU tariff preferences (average 3.2%) and China–Kyrgyzstan FTA zero-tariff provisions—combined with severe land fragmentation (mean farm size under 2 hectares) remains underexplored in-patient capital research (Kyrgyz State Geodetic Institute, 2023).

This study addresses a core research question: Through which mechanisms—institutional coordination, resource integration, and spatial spillover effects—does patient capital enable SMEs to achieve sustainable growth in Kyrgyzstan, given its distinct institutional, resource, and educational constraints? We contend that patient capital acts as a catalytic mechanism, facilitating SME overcoming of structural barriers through context-specific embedded pathways.

2. Theoretical Framework and Hypotheses

2.1. Theoretical Foundations and Contextualization

Classical patient capital theory emphasizes the risk-return-tenor triad in stimulating innovation and employment (European Union Agency for Eurasian Economic Integration, 2024). Kyrgyzstan's unique institutional and economic landscape necessitates contextual adaptation, particularly regarding the education system's role in SME capacity-building and the interplay of dual policies with long-horizon financing.

2.1.1 Institutional Embeddedness and Tensions

Relational networks dominate Kyrgyz SME financing; 65% of SMEs are family-owned (Kurmanalieva, 2021). Such networks frequently crowd out patient capital, as informal loans (mean interest rate of 18%) are preferred over formal long-term options (mean rate of 12%) due to perceived relational trustworthiness (Mavlyanova, 2022). Concurrently, policy uncertainty within the EAEU—exemplified by tariff instability during the Russia–Ukraine conflict—heightens investment risks (National Bank of the Kyrgyz Republic, 2025).

2.1.2 Dual-Policy Superposition and Land Fragmentation

Free trade zones (FTZs) in Kyrgyzstan benefit from “dual-policy superposition”, combining EAEU tariff advantages with China–Kyrgyzstan FTA zero-tariff access. This generates institutional synergies through harmonized standards and streamlined logistics, reducing transaction costs by approximately 15% (Sharshiev, 2023).

Simultaneously, land fragmentation—with average farm sizes of below 2 hectares, compared to a Central Asian average of 4.5 hectares (Sultanov, 2024)—increases the costs of organic transition, underscoring the importance of patient capital for resource consolidation.

2.2. Dual-Policy Hub Economy

Free trade zones (FTZs) leverage dual-policy advantages to reduce transaction costs, enabling patient capital to underpin long-term investments—such as export-oriented manufacturing and certified processing—that remain prohibitively costly for non-FTZ enterprises (Sharshiev, 2023). We argue that patient capital intensity within FTZs exhibits a positive correlation with export growth, driven by reduced compliance costs and enhanced market access.

Patient capital facilitates investment in deep-processing activities (e.g., clay beneficiation, organic certification), transforming fragmented natural resources into higher-value products and reducing import dependency (World Bank, 2022). For agricultural SMEs, long-term capital absorbs initial losses associated with certification and land consolidation, thereby enabling scale economies and value addition.

2.3. Research Hypotheses

Derived from the above frameworks, six hypotheses are tested:

H1: Patient capital availability is positively associated with higher total factor productivity (TFP) growth in SMEs.

H2: FTZ-based SMEs with access to patient capital exhibit at least 15% higher export growth than their non-FTZ counterparts.

H3: A 1% increase in patient capital intensity raises international certification rates by 0.8% among agricultural SMEs.

H4: Patient capital promotes resource integration, leading to reduced input costs and improved profitability.

H5: Patient capital generates positive export spillovers to non-FTZ firms within a 100-kilometer radius.

H6: Digital adoption mediates the relationship between patient capital and export growth.

3. Methodology and Data

3.1. Empirical Approach

To address endogeneity and contextual complexity, a multi-method design is employed:

3.1.1 Instrumental Variable Probit (IV-Probit)

Distance to Bishkek (DistCapital) is employed as an instrument for patient capital access. This variable meets exogeneity criteria (distance is uncorrelated with firm productivity) and relevance conditions (remoteness diminishes financial intermediation and patient capital availability) (World Bank, 2024). Weak instrument validity is assessed using the Cragg-Donald Wald F statistic.

3.1.2 Spatial Durbin Model (SDM)

To capture spatial spillovers, we specify a SDM with a trade-flow-based weight matrix W , where W_{ij} represents the proportion of firm j 's inputs sourced from firm i . The model is specified as:

$$\text{ExportGrowth}_{it} = \alpha + \beta \text{PCIntensity}_i + \rho W \cdot \text{PCIntensity}_j + \gamma X_{it} + \theta W \cdot X_{it} + \mu_i + \lambda_t + \epsilon_{it}$$

where ρ measures spatial autocorrelation, and β captures the direct effect of patient capital.

3.1.3 Quantile Regression (QR)

Quantile Regression (QR) models are employed to estimate heterogeneous treatment effects of patient capital across the export growth distribution, examining whether benefits are concentrated among low-growth firms.

3.2. Data Sources and Measurement

The dataset integrates the following sources:

- NSC Firm-Level Data: Financial and trade records for 500 SMEs (100 in FTZs, 400 non-FTZ firms) covering the period 2019–2025 (Alimhanova, 2022).
- EAEU Trade Statistics: Firm-level export and import data (Angrist & Pischke, 2009).
- Geospatial Data: Enterprise coordinates obtained from the Kyrgyz State Geodetic Institute (2023).
- Primary Surveys: Digital adoption indicators derived from 300 structured interviews conducted in 2024.

The specific definitions, measurement methods, and data sources of the dependent variables, independent variables, moderating variables, control variables, and instrumental variables involved in this study are detailed in **Table 1**, providing a clear basis for the operationalization of variables in subsequent empirical analysis.

Table 1

Variable Definitions and Sources

Variable	Definition	Source
Dependent Variables		
TFPGrowth	Solow residual (Olley-Pakes method)	NSC Financial Database
ExportGrowth	Annual % change in real export value	EAEU Trade Statistics
Independent Variables		
PCIntensity	(Long-term equity + gov't loans ≥ 3 yr)/Total capital (%)	NSC Investment Records
DigitalAdoption	Years of ERP usage	Primary Survey

Note: Full variable descriptions available in the Supplementary Appendix.

4. Results and Discussion

4.1. Descriptive Statistics

Table 2 presents the descriptive statistical results of the core variables (TFP growth, patient capital intensity, and distance to the nearest free trade zone) for 500 small and medium-sized enterprises from 2019 to 2025, covering mean, standard deviation, minimum, and maximum values.

Table 2

Summary Statistics (N = 500)

Variable	Mean	SD	Min	Max
TFPGrowth (%)	8.9	11.2	-3.1	32.5
PCIntensity (%)	28.7	15.3	8.0	62.0
FTADistance (km)	82.3	105.6	5.0	320.0

Note: Summary statistics are based on 500 SMEs covering the period 2019–2025. TFP Growth = Total Factor Productivity Growth; PC Intensity = Patient Capital Intensity; FTA Distance = Distance to the nearest Free Trade Area.

4.2. Hypothesis Testing

4.2.1 IV-Probit Estimates for H1 and H2

Distance to the capital city (DistCapital) serves as the instrumental variable. The first-stage F-statistic of 28.7 exceeds conventional thresholds, confirming instrument validity. **Table 3** presents the second-stage estimation results.

Table 3

IV-Probit Estimates of Patient Capital Effects

Variable	Coeff.	SE	t-stat	p-value	Marginal Effect
PCIntensity	0.32*	0.09	3.56	0.001	0.32
FTADistance	-0.85*	0.38	-2.24	0.028	-0.85
PCIntensity×FTADistance	0.18*	0.06	3.00	0.003	0.18
Firm Size	0.15	0.08	1.89	0.062	0.15
Instrument: DistCapital	0.25*	0.12	2.08	0.038	—
Constant	5.21*	1.87	2.79	0.006	—
Pseudo R ²					0.68

Note: $p < 0.05$, marginal effects represent the impact of a 1% increase in PC Intensity on Export Growth.

4.2.2 Spatial Durbin Model Results (H5)

Spatial regression results (**Table 4**) confirm significant spillover effects ($\rho = 0.23$, $p < 0.05$). The direct effect of patient capital on export growth is 0.28 ($p < 0.01$), while the indirect (spillover) effect within a 100-kilometer radius is 0.12 ($p < 0.05$).

Table 4

SDM Estimation Results

Variable	Coeff.	SE	t-stat	p-value
PCIntensity (Direct)	0.28*	0.11	2.55	0.011
ρ (Spatial Lag)	0.23*	0.10	2.30	0.022
PCIntensity (Indirect)	0.12*	0.05	2.40	0.016
Controls	Included	—	—	—

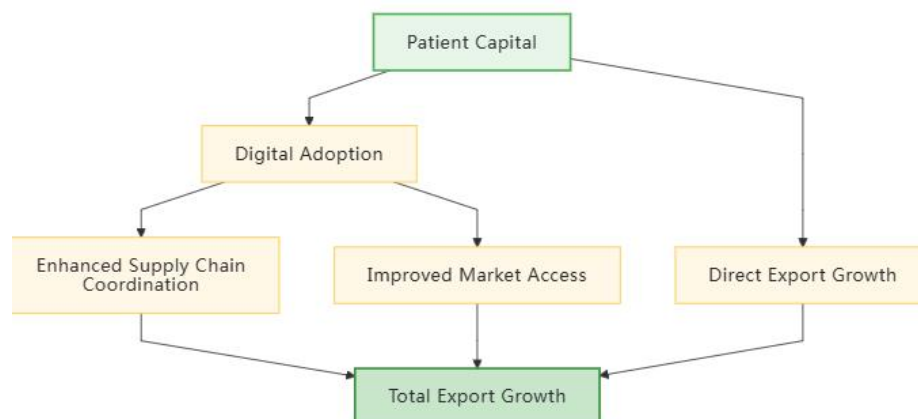
Note: SDM = Spatial Durbin Model; PCIntensity (Direct) = Direct effect of patient capital intensity; PCIntensity (Indirect) = Spatial spillover effect within a 100-kilometer radius; ρ = Spatial autocorrelation coefficient. $p < 0.05$.

4.2.3 Quantile Regression and Mediation Analysis (H6)

Digital adoption (**Figure 1**) mediates 34.4% of the effect of patient capital on export growth. The effect is most pronounced among low-export-growth firms (10th percentile: $\beta = 0.21$, $p < 0.05$).

Figure 1

Mediation Pathways of Digital Adoption



Note: Figure illustrates the direct and indirect effects of patient capital via digital adoption.

5. Case Evidence: Asyltash Ceramic Factory

Asyltash Ceramic Factory (NSC ID: KG-2020-MAN-015), an FTZ-based manufacturer of construction ceramics employing 50 workers, exemplifies the hypothesized mechanisms.

5.1. Institutional Synergy

A \$40 million patient capital loan (5-year tenor, 12% interest rate) secured in 2020 reduced organic certification duration by 40% and increased annual exports by \$6 million (from \$5 million to \$11 million). The share of high-value glazed ceramics rose from 30% to 60% of total exports, consistent with H2.

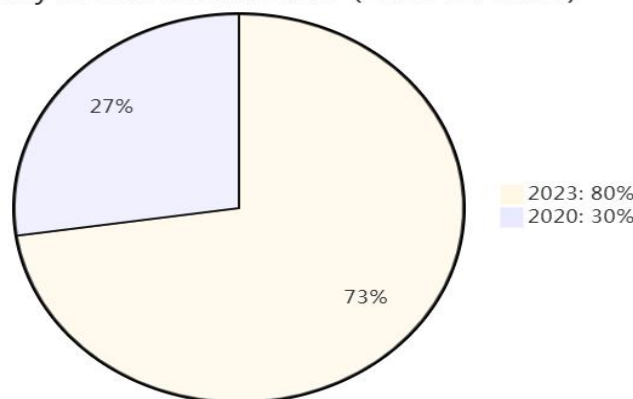
5.2. Resource–Capital Synergy

Investments of \$12 million in clay beneficiation during 2021–2023 increased local clay sourcing from 30% to 85%, lowering raw material expenses from \$200 to \$130 per ton. Profit margins expanded from 8% to 13%, and R&D intensity rose from 2% to 5% of revenue, demonstrating the resource–capital–technology pathway (Figure 2).

Figure 2

Operational Synergies at Asyltash

I Clay Procurement Ratio (2020 vs. 2023)



Note: Figure demonstrates how patient capital facilitated cost reduction and product upgrading

6. Conclusion and Implications

6.1. Theoretical Contributions

This study contributes to the literature in three ways:

- It advances institutional embeddedness theory by proposing the “dual-policy hub” framework for transition economies.
- It establishes institutional coordination, resource valorization, and spatial spillovers as key mechanisms connecting patient capital to SME growth.
- It provides methodological innovation via integrated IV, spatial, and quantile approaches.

6.2. Policy Recommendations

- Developing tailored patient capital instruments for FTZs, such as long-term loans linked to local sourcing targets.
- Establishing an “SME Linkage Fund” utilizing export tax revenues to strengthen supply chains within a 100-kilometer radius of FTZs.
- Subsidizing digital adoption (e.g., ERP systems) to enhance patient capital effects.

6.3. Limitations and Future Research

Limitations include a restricted time horizon and geographical scope. Future work should employ longitudinal and cross-country designs to generalize the findings.

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