CASH USAGE, FINANCIAL INCLUSION, AND UNEVEN DEVELOPMENT IN TRANSITION ECONOMIES: EVIDENCE FROM ROMANIA AND THE EUROPEAN UNION

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ABSTRACT: *The rapid digitalisation of financial services has transformed payment behaviour across the European Union, but the transition towards cashless transactions remains uneven. This paper examines the relationship between cash usage, financial inclusion and uneven development, with particular emphasis on Romania in comparison with the European Union. The study asks whether persistent cash use should be interpreted only as delayed financial modernisation or also as a response to structural inequalities in income, financial accessibility, digital capabilities and territorial development. The analytical framework combines evidence from the European Central Bank, Eurostat, the World Bank Global Findex and the National Bank of Romania with an extensive review of recent peer-reviewed research. Descriptive benchmarking shows that cash remains relevant even in advanced European payment systems: in the euro area it accounted for 52% of point-of-sale transactions in 2024. Romania combines rapid macroeconomic convergence with important inclusion gaps. In 2024, 69.9% of Romanian adults had a financial or mobile-money account, compared with 86.3% in Poland, 88.2% in Portugal and 99.3% in the Netherlands. Only 28% of Romanians aged 16–74 had at least basic digital skills in 2023, compared with 56% in the EU. Romania's GDP per capita nevertheless reached about 78% of the EU average in 2024. The findings support the concept of asymmetric financial modernisation: technological and income convergence can advance more rapidly than convergence in the capabilities and infrastructure required for universal participation in digital finance. The paper concludes that inclusive payment policy should combine digital innovation with financial and digital education, territorial accessibility and continued access to cash for groups at risk of exclusion.*

Keywords: *Cash Usage; Financial Inclusion; Digital Payments; Uneven Development; Financial Accessibility; Payment Behaviour; Romania; European Union*

JEL Classification*: E42; G21; G28; O16; O52; R11*

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1. INTRODUCTION

Digital transformation has changed the architecture of retail payments. Payment cards, contactless technologies, mobile banking, instant transfers and digital wallets have reduced transaction costs and expanded the range of instruments available to households and firms. Nevertheless, the diffusion of digital payments has not eliminated cash. Instead, European payment systems increasingly display a mixed structure in which digital instruments expand while cash continues to perform transactional, budgeting, precautionary and resilience functions.

The persistence of cash raises an analytical question that is particularly important for transition economies. If digital payment technology is widely available, continued cash use may reflect consumer preference, transaction size or privacy considerations. However, it may also reveal unequal access to formal accounts, banking infrastructure, broadband connectivity, digital skills or affordable financial services. Cash dependence can therefore be associated with incomplete modernisation, while cash accessibility can simultaneously protect inclusion for consumers who are not able to use digital alternatives effectively.

This distinction is central to Romania. Since EU accession, the country has recorded substantial income convergence and rapid diffusion of modern payment technologies. The European Commission reports that GDP per capita rose from 44% of the EU average in 2007 to about 78% in 2024. Yet major regional and social disparities remain, while digital capabilities and financial inclusion continue to lag behind leading EU economies. The coexistence of macroeconomic convergence and persistent inclusion gaps makes Romania a useful case for analysing what this paper terms asymmetric financial modernisation.

The relevance of cash is not confined to less digitalised economies. The European Central Bank's 2024 SPACE study shows that cash remained the most frequently used payment method at the point of sale in the euro area, accounting for 52% of transactions, although its share fell from 59% in 2022 and 72% in 2019. Moreover, 62% of consumers considered it important to retain cash as a payment option. These results indicate that payment-system development is better understood as changing coexistence among instruments than as a simple linear replacement of cash.

The main objective of this paper is to examine the relationship between cash usage, financial inclusion and uneven development in Romania and the EU. Five questions guide the analysis: how Romania differs from European payment patterns; whether cash dependence is associated with incomplete financial inclusion; whether income, digitalisation and territorial disparities help explain payment behaviour; whether Romania is converging towards European digital-payment patterns; and whether continued cash accessibility can reduce exclusion during the transition.

The paper contributes by integrating three literatures that are often treated separately: consumer payment choice, digital financial inclusion and uneven territorial development. The central proposition is that cash use should not be interpreted as a one-dimensional indicator of technological backwardness. It can reflect voluntary preferences, structural constraints and demand for a resilient fallback instrument. The policy implication is correspondingly nuanced: digitalisation should be accelerated where it lowers costs and expands access, but payment modernisation should not remove effective access before alternative forms of inclusion are genuinely available.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Research on payment behaviour shows that digital innovation changes the composition of transactions without necessarily eliminating currency demand. Brown et al. (2022)

demonstrate that the convenience of electronic payments affects consumer cash demand, while Trütsch (2020) finds that contactless technology reduces cash use during early diffusion. At the macro level, Pietrucha (2021) describes a "cash paradox": transactional use can fall while currency demand remains resilient. Liñares-Zegarra and Willesson (2021) further show that monetary and financial conditions influence cash usage across EU countries.

European evidence confirms substantial heterogeneity. Titova et al. (2021) identify common and region-specific determinants of cash use in the EU and show that technological progress, consumer confidence, inequality and economic development operate differently across country groups. The ECB (2024) similarly reports persistent cross-country differences in payment preferences and actual behaviour. These findings support a structural approach in which cash dependence is explained jointly by economic resources, infrastructure, capabilities and institutional conditions rather than by technology alone.

Payment choice also reflects transaction-level considerations. Kajol et al. (2022) identify perceived usefulness, ease of use, trust, security and risk as major determinants of digital financial transactions. Shree et al. (2021) show that consumer experience influences digital-payment adoption, while Brown et al. (2022) emphasise cash-on-hand and payment convenience. Together, these studies explain why apparently similar consumers may choose different instruments even within the same payment environment.

Financial inclusion is no longer defined solely by account ownership. Ozili (2021) reviews the global literature and emphasises that meaningful inclusion involves access, usage, affordability and welfare effects. Tay et al. (2022) similarly conceptualise digital financial inclusion as a gateway to sustainable development, but stress persistent differences across income, gender and location. The World Bank's Global Findex framework extends this approach by combining account ownership with payments, savings, borrowing, resilience and digital connectivity.

The economic effects of inclusion can be substantial. Geng and He (2021) associate digital financial inclusion with sustainable employment, while Liu et al. (2021) find that digital financial inclusion can support economic growth. Ofoeda et al. (2024) show that institutions and financial regulation condition the inclusion-growth relationship. Kling et al. (2022) and Demir et al. (2022) demonstrate that financial inclusion and FinTech can influence income inequality, although effects differ across the distribution and depend on the form of access being expanded.

These findings imply that an account is a necessary but insufficient condition for digital financial participation. A consumer may be formally banked but lack a payment card, reliable internet connection, digital skills or confidence in electronic authentication. Consequently, empirical analysis should distinguish formal inclusion from effective use.

Digitalisation can lower geographic and transaction-cost barriers, but it can also create functional exclusion. Aziz and Naima (2021) show that digital financial services do not automatically produce inclusion when users lack connectivity, devices, literacy or trust. Kanungo and Gupta (2021) likewise argue that the digitalisation of financial services must be evaluated through its effects on well-being rather than technology adoption alone. Ong et al. (2023) find positive inclusion effects in lower-middle-income ASEAN economies but emphasise the conditioning role of infrastructure.

Digital and financial literacy are complementary forms of human capital. Kass-Hanna et al. (2022) find that financial and digital literacy jointly strengthen financial resilience, particularly for vulnerable households. Al-Shami et al. (2024) and Amnas et al. (2024) similarly identify digital financial literacy as a mechanism connecting technology use with effective inclusion. This is especially relevant for Romania, where the digital-skills gap remains among the largest in the EU.

The broader digital divide is socially and spatially embedded. Lamberti et al. (2023) show that internet appropriation in the EU depends on socio-economic characteristics and security concerns. Kolotouchkina et al. (2022) demonstrate that digitalised urban environments can reproduce accessibility gaps for people with disabilities. These studies caution against interpreting infrastructure availability as equivalent to universal capability.

A key distinction is between cash dependence and cash accessibility. Dependence occurs when users rely on cash because alternatives are unavailable, unaffordable or difficult to use. Accessibility refers to the ability to obtain and use cash within a plural payment ecosystem. The former may signal incomplete inclusion; the latter can protect consumers during technological transition.

Kotkowski and Polasik (2021) show that the COVID-19 pandemic widened the divide between cash-oriented and cashless consumers in Europe. Alvarez et al. (2022) demonstrate that restrictions on cash can produce welfare costs for cash-intensive users even when such restrictions may have other policy benefits. More recent work by Alvarez, Argente and Van Patten (2026) adds a resilience dimension, showing that payment composition can shift toward cash after disruptions. Payment diversity therefore has value because cash and electronic instruments depend on different infrastructures.

The ECB's policy stance reflects this duality: digital payments are expanding, yet access to and acceptance of cash remain relevant to consumer choice and resilience. The National Bank of Romania (BNR, 2024) similarly treats cash and payment infrastructure as part of the broader stability and accessibility of the financial system.

Uneven development provides a spatial mechanism connecting socio-economic inequality with payment behaviour. Financial infrastructure is more profitable in dense, higher-income markets, while rural or peripheral areas can face weaker branch, ATM and merchant-acceptance networks. Digital finance can compensate for physical distance, but only where connectivity and user capability are sufficient.

Zhang et al. (2022) show that mobile payments can increase rural household consumption by relaxing financial-access constraints. However, Aziz and Naima (2021) show why this mechanism weakens when connectivity and literacy are limited. At the macro level, Suhrab et al. (2024) associate digital financial inclusion and technological infrastructure with lower inequality, while Adugna (2024) identifies improved accessibility and efficiency as channels through which FinTech may reduce income disparities.

Romania's strong regional disparities make this mechanism especially relevant. Eurostat reported that the national at-risk-of-poverty-or-social-exclusion rate was 32.0% in 2023, compared with 12.3% in București-Ilfov. Such differences suggest that national averages can conceal very different effective payment environments.

Transition economies are characterised by rapid institutional and technological convergence combined with slower convergence in income, infrastructure and capabilities. Titova et al. (2021) provide direct evidence that determinants of cash use differ between CEE and more advanced EU economies. The implication is that a common regulatory and technological environment does not automatically generate common payment outcomes.

The concept of asymmetric financial modernisation captures this mismatch. Payment technology and macroeconomic indicators may converge rapidly, while effective financial inclusion, digital skills and territorial accessibility converge more slowly. The Romanian case is therefore analytically useful not because it is an isolated outlier, but because it reveals how different dimensions of modernisation can move at different speeds.

This interpretation is compatible with Ofoeda et al. (2024), Ong et al. (2023) and Liu et al. (2021), all of whom emphasise that institutional and developmental conditions shape the benefits of financial digitalisation. It also explains why cash can remain important even as electronic-payment capacity expands.

Three gaps emerge from the literature. First, payment-choice studies often focus on transaction-level determinants without linking them explicitly to territorial inequality. Second, financial-inclusion research frequently treats cash as a residual pre-digital instrument rather than as a potential inclusion and resilience mechanism. Third, Romania has received limited attention within an integrated EU comparative framework connecting cash, financial inclusion, digital skills and uneven development.

The paper therefore tests five theory-informed expectations descriptively and proposes them for future panel estimation. H1: higher economic development is associated with lower cash dependence. H2: greater financial inclusion is associated with higher adoption of electronic payments. H3: higher connectivity and digital skills are associated with lower cash dependence. H4: stronger socio-economic and territorial disparities are associated with greater cash dependence where financial and digital infrastructure are weaker. H5: where digital and financial inclusion remain incomplete, continued cash accessibility reduces payment-exclusion risk.

3. DATA AND METHODOLOGY

The study adopts a comparative descriptive design complemented by a proposed EU panel framework. The descriptive component uses the latest harmonised observations available from the ECB, Eurostat, the World Bank Global Findex and the European Commission. The empirical architecture is designed for EU Member States over approximately 2014–2024, subject to series availability. Survey indicators such as Findex account ownership are not mechanically interpolated; they are used for benchmark comparisons or separate survey-wave models.

Table 1. Variables and operationalization

Dimension	Indicator	Unit	Expected relation with cash dependence
Cash dependence	ATM withdrawals per capita / card-to-cash ratio	number or ratio	Dependent variable
Digital payments	Card payments per capita	number per inhabitant	Negative
Financial inclusion	Adults with an account	% age 15+	Negative
Digital finance	Internet banking use	% individuals	Negative
Digitalisation	At least basic digital skills	% age 16–74	Negative
Development	GDP per capita in PPS	EU=100	Negative
Vulnerability	At risk of poverty or social exclusion	% population	Positive
Inequality	Gini coefficient	index	Positive
Territorial structure	Urbanisation	% population	Negative

Source: Author's synthesis based on ECB, Eurostat, World Bank Global Findex and European Commission databases.

Note: Expected signs are theoretical expectations, not imposed restrictions. ATM accessibility may be ambiguous because it can both facilitate cash use and indicate a more developed financial system.

Table 1 operationalises the conceptual framework through four linked dimensions: payment behaviour, formal and effective financial inclusion, digital capability, and uneven development. The preferred annual panel should rely primarily on harmonised ECB and Eurostat series, while Findex variables should be included only for available survey waves. This avoids artificial precision from interpolation.

A baseline fixed-effects specification for future estimation is:

$$CashDependence_{it} = \alpha + \beta_1 FinancialInclusion_{it} + \beta_2 GDPpc_{it} + \beta_3 Digitalisation_{it} + \beta_4 Urbanisation_{it} + \beta_5 Inequality_{it} + \mu_i + \lambda_t + \varepsilon_{it}.$$

In this specification, i denotes country and t denotes year. CashDependence is the dependent variable, FinancialInclusion is the main explanatory variable, and GDP per capita, digitalisation, urbanisation and inequality are controls. Country fixed effects (μi) absorb time-invariant national characteristics, while year fixed effects (λt) capture shocks common to all countries. The error term (εit) represents unobserved country-year influences.

The specification is presented as a framework for subsequent econometric testing rather than as an estimated model in the present study. If implemented on a harmonised EU panel, country-clustered standard errors would be appropriate, and coefficients should initially be interpreted as conditional associations because reverse causality between financial inclusion, payment infrastructure and payment behaviour remains plausible.

4. DESCRIPTIVE AND COMPARATIVE RESULTS

4.1. Cash remains relevant in a digitalising European payment system

The analysis of cash dependence in Romania should first be placed within the broader transformation of European payment behaviour. Digitalisation has progressively changed the composition of retail payments across Europe, but the available evidence does not indicate a uniform or complete substitution of cash by electronic instruments. Instead, cash and digital payments continue to coexist, although their relative importance has changed over time. Examining recent euro-area trends therefore provides a relevant benchmark for assessing whether persistent cash usage should be interpreted as an exceptional feature of less digitally advanced economies or as part of a broader European payment pattern.

Table 2. Euro-area point-of-sale payment structure

Indicator	2019	2022	2024	Change 2019–2024
Cash share, number of POS transactions	72%	59%	52%	-20 pp
Card share, number of POS transactions	—	34%	39%	+5 pp (2022–24)
Cash share, value of POS transactions	—	42%	39%	-3 pp (2022–24)
Card share, value of POS transactions	—	46%	45%	-1 pp (2022–24)
Consumers considering cash option important	—	60%	62%	+2 pp

Source**:** European Central Bank (2024), Study on the Payment Attitudes of Consumers in the Euro Area (SPACE).

Note: SPACE covers the euro area rather than all EU Member States. Percentage-point changes are author calculations from ECB values.

Table 2 demonstrates that digitalisation is substantial but incomplete. Cash lost 20 percentage points of its transaction share between 2019 and 2024, yet it still accounted for more than half of physical point-of-sale transactions. Cards dominated in value rather than number, indicating that cash remains especially important for smaller purchases. The increase from 60% to 62% in the share of consumers who consider a cash option important also suggests that

declining use does not imply declining perceived value. This is consistent with the coexistence model developed by Brown et al. (2022), Pietrucha (2021) and Titova et al. (2021).

4.2. Romania's financial-inclusion gap

To assess the relationship between cash dependence and financial modernisation, it is necessary to consider the extent to which individuals have access to formal financial services. Account ownership represents a fundamental, although not sufficient, condition for participation in digital payment systems, as access to cards, internet banking and most mobile-payment solutions generally depends on an established relationship with a financial institution or mobile-money provider. Romania's position is therefore compared with selected European economies representing different levels and trajectories of financial and digital development. Poland provides a relevant Central and Eastern European benchmark, Portugal offers a useful comparison with a Southern European economy that has experienced substantial financial modernisation, while the Netherlands represents a highly financially included and digitalised EU economy. Table 3 uses 2024 Global Findex data to quantify Romania's account-ownership gap relative to these benchmarks and to evaluate the extent to which formal financial inclusion may constrain the transition towards digital payments.

Table 3. Account ownership: Romania and selected European benchmarks, 2024

Country	Adults with account (%)	Gap vs Romania (pp)	Romania relative to country
Romania	69.9	—	100.0%
Poland	86.3	16.4	81.0%
Portugal	88.2	18.3	79.3%
Netherlands	99.3	29.4	70.4%

Source: World Bank (2025), Global Findex Database 2025, 2024 country observations.

Note: Account ownership refers to an account at a financial institution or with a mobile-money-service provider among adults aged 15+. Relative ratios are author calculations.

Table 3 reveals a substantial formal-inclusion gap. In 2024, 69.9% of Romanian adults had an account, leaving roughly three in ten adults outside this basic measure of financial inclusion. The difference is not limited to comparison with a highly digitalised economy such as the Netherlands. Romania also trails Poland by 16.4 percentage points and Portugal by 18.3 points. This supports the argument that aggregate growth in electronic payments cannot be equated with universal participation in formal finance.

The implication for payment behaviour is direct. Consumers without accounts cannot fully access card payments, internet banking or most digital wallets. Even among account holders, effective use may be limited by cost, confidence, connectivity or skills. Ozili (2021) and Tay et al. (2022) therefore provide a useful distinction between formal access and meaningful use.

4.3. Digital capability as a structural constraint

Digital capability represents a critical link between formal financial inclusion and the effective use of digital financial services. Access to a bank account or digital-payment infrastructure does not automatically translate into active participation when individuals lack the skills required to navigate online platforms, authenticate transactions, evaluate security risks or use digital financial applications confidently. Digital skills should therefore be treated as a structural component of financial modernisation rather than merely as an indicator of

technology adoption. This dimension is particularly relevant for Romania, where progress in digital infrastructure has not been matched by comparable improvements in population-level digital competencies. To assess the magnitude of this capability gap, Table 4 compares Romania with the EU average and with the Digital Decade 2030 target, providing an indication of the extent to which limited digital skills may constrain effective financial inclusion and the transition from cash to digital payment instruments.

Table 4. Basic digital skills in Romania and the EU, 2023

Indicator	Romania	EU	Gap (pp)	Romania/EU
People aged 16–74 with at least basic overall digital skills	28%	56%	-28	50.0%
Digital Decade 2030 target	80%	80%	-52 vs target	35.0% of target

Source: Eurostat (2023/2024 release), dataset isoc_sk_dskl_i21.

Note**:** At least basic overall digital skills require minimum competence across information/data literacy, communication/collaboration, digital-content creation, safety and problem-solving.

Table 4 identifies one of the clearest constraints on digital financial inclusion. Romania's 28% share was exactly half the EU average in 2023 and only 35% of the EU's 2030 Digital Decade target. Because mobile banking, electronic authentication, online fraud prevention and digital wallets require more than basic device access, this capability gap can translate into a payment-access gap. The result is consistent with Kass-Hanna et al. (2022), Amnas et al. (2024) and Al-Shami et al. (2024), who show that digital financial literacy mediates effective inclusion.

Regional evidence reinforces the point. Eurostat reports that in 2024 fewer than one in three people used internet banking in every Romanian region except București-Ilfov, whereas the EU-wide share was 67.2%. The Romanian digital-finance divide is therefore not simply national but territorial.

4.4. Income convergence without full capability convergence

To assess whether Romania's economic catch-up has been accompanied by a comparable improvement in the conditions that enable broad participation in an increasingly digital economy, it is necessary to look beyond aggregate income measures. Table 5 therefore compares Romania with the EU benchmark across a selected set of structural indicators capturing economic development, digital capabilities, socio-economic vulnerability and engagement with digital financial services. Taken together, these indicators provide a broader perspective on the extent to which income convergence has translated into capability and social convergence, while also highlighting structural constraints that may continue to shape payment behaviour and access to digital financial services.

Table 5. Selected structural indicators: Romania and EU benchmark

Indicator	Romania	EU benchmark	Year	Romania relative to EU
GDP per capita (EU=100)	78	100	2024	78.0%
At least basic digital skills	28%	56%	2023	50.0%
At risk of poverty or social exclusion	27.9%	21.0%	2024	132.9%

Indicator	Romania	EU benchmark	Year	Romania relative to EU
Internet banking use	<33% in most RO regions	67.2% EU population	2024	Substantial gap

Source: European Commission (2026) and Eurostat (2023–2025 releases).

Note**:** Internet-banking evidence is regional for Romania: all Romanian regions except București-Ilfov were below 33% in 2024. The EU value refers to the population using internet banking.

Table 5 illustrates asymmetric convergence. Romania's GDP per capita reached about 78% of the EU average in 2024, a major increase from 44% at EU accession. Yet digital skills reached only half the EU benchmark, and the at-risk-of-poverty-or-social-exclusion rate remained 6.9 percentage points above the EU average. Income convergence has therefore proceeded faster than convergence in some of the capabilities and social conditions needed for universal digital participation.

This divergence matters because payment behaviour is embedded in household resources. Lower-income or vulnerable households may face stronger fixed costs of financial participation, greater sensitivity to fees, lower access to devices and a stronger preference for the budgeting visibility of cash. These mechanisms do not imply that poverty mechanically causes cash use, but they justify treating socio-economic vulnerability as a structural correlate rather than a purely individual preference.

4.5. Territorial inequality and payment accessibility

To understand how structural inequalities translate into differences in payment accessibility, the national perspective needs to be complemented by a territorial one. Romania displays substantial regional disparities in socio-economic vulnerability and engagement with digital financial services, with București-Ilfov differing markedly from much of the rest of the country. Table 6 brings together selected indicators that illustrate this spatial heterogeneity and provide a basis for assessing how place-specific economic and digital conditions may shape access to, and effective use of, different payment instruments.

Table 6. Selected evidence of territorial inequality in Romania

Indicator	Romania / region	Benchmark	Year	Interpretation
AROPE, national	32.0%	EU 21.4%	2023	High national vulnerability
AROPE, București-Ilfov	12.3%	Romania 32.0%	2023	Large capital/non-capital divide
At-risk-of-poverty, București-Ilfov	2.1%	Among lowest EU regions	2023	Strong regional asymmetry
Internet banking	<33% in all RO regions except capital	EU 67.2%	2024	Territorial digital-finance gap

Source: Eurostat regional statistics and news releases (2024–2025).

Note**:** Indicators use different concepts and should not be compared as if they measured the same phenomenon; they jointly illustrate the scale of Romania's territorial heterogeneity.

Table 6 shows why a national average is insufficient for interpreting Romanian payment behaviour. The 2023 AROPE rate was 32.0% nationally but only 12.3% in București-Ilfov. The capital region also had an exceptionally low at-risk-of-poverty rate. Meanwhile, internet-banking use remained below one third in almost all Romanian regions outside the

capital. The evidence supports H4 at a descriptive level: socio-economic and digital inequalities are spatially concentrated and are likely to create heterogeneous feasible sets of payment instruments.

The relevant policy concept is therefore accessibility rather than simple adoption. A resident of a dense metropolitan area with multiple bank branches, reliable broadband and high merchant acceptance faces a different payment environment from a resident of a sparsely populated locality with weaker transport, connectivity and financial infrastructure. Digitalisation can reduce distance, as Zhang et al. (2022) show, but only when the prerequisites for use are present.

4.6. Assessment of the research hypotheses

Having examined the economic, financial, digital and territorial dimensions associated with payment behaviour, the analysis can now be consolidated in relation to the research hypotheses formulated in Section 2. Table 7 synthesises the evidence presented in the preceding sections and evaluates the extent to which each hypothesis is supported by the Romanian evidence and the relevant literature. Given the descriptive nature of the analysis and the limitations of harmonised data on cash dependence, the assessments distinguish between descriptive, conceptual and structural support rather than implying causal confirmation.

Table 7. Assessment of research hypotheses

Hypothesis	Evidence from the analysis	Assessment
H1 Development → lower cash dependence	EU literature and Romania's convergence are consistent, but direct Romanian cash-share series are limited	Conceptually/descriptively supported
H2 Inclusion → digital adoption	Romania's 69.9% account ownership remains below selected EU benchmarks	Supported descriptively
H3 Digitalisation → lower cash dependence	Romania has only 28% basic digital skills and low regional internet-banking use	Supported descriptively
H4 Uneven development → stronger cash dependence	Large poverty and digital gaps between capital and other regions	Supported as structural interpretation
H5 Cash access protects inclusion	ECB preference evidence and resilience literature support continued access during transition	Supported conceptually

Source: Author's assessment based on Tables 2–6 and the literature reviewed in Section 2.

Note: No causal claim is made. H1–H4 require harmonised panel estimation for econometric confirmation; H5 is principally an inclusion and resilience proposition.

The evidence provides coherent support for the theoretical framework but does not establish causality. H2 and H3 receive the strongest descriptive support because Romania's financial-inclusion and digital-skills gaps are directly observable. H4 is reinforced by unusually large regional socio-economic differences. H1 remains plausible but requires a harmonised

cross-country cash-dependence measure. H5 is supported by consumer-preference evidence and by research on outages and welfare costs, but it should not be interpreted as an argument for maintaining high cash dependence. The policy objective is payment choice under conditions of genuine inclusion.

5. DISCUSSIONS

The results support a multidimensional interpretation of cash persistence. The decline in euro-area cash use is clear, but the continuing predominance of cash by transaction number demonstrates that digitalisation is not equivalent to disappearance. At the same time, Romania's account-ownership, digital-skills and poverty indicators show why the pace of payment digitalisation cannot be evaluated independently of structural inclusion.

The Romanian pattern is best described as asymmetric financial modernisation. Macroeconomic convergence has been rapid, and modern payment technologies are increasingly visible, but effective participation remains constrained for a non-negligible part of the population. This asymmetry is consistent with Titova et al. (2021), who identify distinctive CEE determinants of cash use, and with the digital-inclusion literature, which emphasises infrastructure, literacy and trust.

The distinction between voluntary cash preference and involuntary cash dependence is particularly important. Consumers may prefer cash because it is simple, private or useful for budgeting. Such preferences should not be conflated with exclusion. The policy problem arises when cash is used because alternatives are inaccessible or when cash itself becomes difficult to obtain before digital inclusion is complete.

Territorial inequality adds a further layer. The sharp contrast between București-Ilfov and other Romanian regions in poverty and internet-banking indicators suggests that national payment statistics can conceal structurally different local ecosystems. A uniform policy may therefore have unequal effects. Policies that are efficient in Bucharest may generate exclusion risks in rural or peripheral areas.

Finally, resilience strengthens the case for a diversified payment system. Digital payments offer speed, traceability and convenience but depend on electricity, telecommunications and complex financial infrastructure. Cash can provide continuity during some disruptions. The optimal policy is therefore not technological neutrality in the sense of avoiding innovation, but functional redundancy combined with broad digital capability.

Taken together, the evidence suggests that the Romanian case cannot be described adequately by a simple linear transition from cash to digital payments. The more relevant pattern is a sequencing problem among different dimensions of modernisation. Income convergence and the diffusion of payment technologies have advanced relatively quickly, whereas account ownership, digital capability and effective territorial access have converged more slowly. This mismatch is the core of what this paper defines as asymmetric financial modernisation. It explains why improvements in aggregate economic and technological indicators may coexist with persistent reliance on cash among particular social groups and regions.

The distinction is analytically important because payment behaviour reflects both preferences and feasible choices. A household that has an account, reliable connectivity, adequate digital skills and nearby payment acceptance can choose between cash and electronic instruments on the basis of convenience, privacy or budgeting preferences. By contrast, a household facing weak connectivity, limited financial literacy, high service costs or restricted access to formal financial services has a narrower choice set. In the latter case, cash use may be less a preference than an adaptation to structural constraints. Aggregate payment statistics

cannot fully separate these mechanisms, which is why the descriptive findings should be interpreted jointly with the evidence on inclusion, skills and territorial inequality.

This interpretation also clarifies the relationship between financial inclusion and digitalisation. Formal account ownership is a necessary gateway to many electronic payment instruments, but it does not guarantee effective participation. Digital financial inclusion requires a chain of complementary conditions: access to an account and payment instrument, affordable connectivity, sufficient digital and financial literacy, trust in authentication and fraud-prevention mechanisms, and an acceptance network that makes digital payment practical in everyday transactions. A weakness at any point in this chain can slow the substitution of cash even when the underlying technology is available.

The territorial dimension strengthens the asymmetric-modernisation argument. The contrast between București-Ilfov and most other Romanian regions indicates that national averages conceal substantially different local payment ecosystems. Metropolitan areas combine higher incomes, denser banking infrastructure, stronger connectivity and greater exposure to digital services, whereas peripheral and rural areas may face several disadvantages simultaneously. These cumulative constraints imply that a uniform national transition towards digital payments may produce uneven welfare effects. The relevant policy benchmark is therefore not the maximum possible rate of cash displacement, but the expansion of genuine payment choice across territories and socio-economic groups.

The findings further suggest that cash dependence and cash accessibility should remain conceptually distinct. A high level of involuntary cash dependence may signal incomplete inclusion and should decline as financial and digital capabilities improve. Cash accessibility, however, can retain value even in a highly digital system by supporting consumers who are temporarily or persistently unable to use electronic alternatives and by providing functional redundancy during disruptions. This distinction avoids framing policy as a binary choice between cash and digitalisation. A more coherent objective is a resilient multi-instrument payment system in which digital adoption expands because it becomes accessible and useful, rather than because cash options disappear prematurely.

From a research perspective, the present evidence supports the proposed conceptual framework but does not identify causal effects. The observed gaps are consistent with the hypotheses that financial inclusion, digital capability and territorial development shape cash dependence, yet harmonised annual measures of point-of-sale cash use are not available for all EU Member States over the full study period. This limitation is substantive rather than merely technical: different proxies capture different aspects of cash behaviour. ATM withdrawals measure cash acquisition, for example, whereas payment diaries measure transaction use. Future econometric work should therefore test the framework with multiple cash proxies and explicitly assess the robustness of results to alternative operationalisations.

A further implication concerns the interpretation of convergence itself. GDP per capita is an important indicator of the resources available to households and the economy, but it cannot serve as a sufficient proxy for financial modernisation. Payment-system participation depends on distributive and capability variables that may respond more slowly than aggregate income. The Romanian evidence illustrates this distinction: a country can close a substantial part of its macroeconomic income gap while still displaying much larger gaps in basic digital skills and formal account ownership. Consequently, assessments based only on GDP convergence risk overstating the degree to which households have acquired the practical capabilities required to participate in increasingly digital financial markets.

The same reasoning applies to the interpretation of technological diffusion. The presence of contactless cards, mobile applications, instant payments or online banking does not reveal how evenly these technologies are used. Supply-side innovation may progress rapidly because financial institutions have incentives to adopt scalable digital technologies, while

demand-side adaptation depends on education, age, income, trust, perceived security and previous experience. This creates a potential gap between technological availability and effective adoption. In transition economies, where demographic ageing, rurality and uneven household resources may overlap, that gap can be particularly persistent. The concept of asymmetric financial modernisation therefore links technological change to the social conditions that determine who can convert innovation into everyday financial capability.

The evidence also helps reconcile two apparently conflicting policy narratives. One narrative treats declining cash use as evidence of efficiency, innovation and lower transaction costs; another emphasises the exclusion risks created when payment services become predominantly digital. The results suggest that both mechanisms can operate simultaneously. Digital payments can increase convenience and reduce geographic barriers for connected users, while the same transition can increase functional distance from the financial system for users with weak skills, limited connectivity or low trust. The appropriate policy response is therefore conditional rather than ideological: accelerate digitalisation where it broadens feasible choices, but preserve accessible alternatives where the prerequisites for effective digital participation remain incomplete.

This conditional approach is particularly relevant to the European integration context. EU-wide regulatory and technological initiatives can harmonise standards and reduce cross-border frictions, yet common rules do not eliminate national and regional differences in household capability. The Romanian case indicates that convergence in payment infrastructure may precede convergence in usage conditions. For Central and Eastern European economies, this raises a broader research question about whether identical digital innovations generate different behavioural responses depending on the initial levels of inclusion, inequality, urbanisation and digital literacy. The proposed panel framework is useful precisely because it can test whether these structural conditions systematically modify the association between digitalisation and cash dependence.

6. POLICY IMPLICATIONS

First, Romania should accelerate financial inclusion by reducing barriers to basic accounts and payment instruments. Account ownership below 70% is a material constraint on the universality of digital payments. Low-cost accounts, transparent fees and accessible onboarding can expand the formal base of participation.

Then digital financial inclusion should be integrated with digital-skills policy. The 28% basic-skills rate indicates that infrastructure investment alone is insufficient. Financial education should include practical digital competencies: authentication, fraud recognition, mobile banking, privacy and safe online payments.

Territorial accessibility should be monitored explicitly. Bank branches, ATMs, cash-in/cash-out points, broadband and merchant acceptance should be mapped against population vulnerability. Where commercial provision is weak, shared infrastructure, postal networks or other access models may be necessary.

Continued access to cash should be treated as a transitional inclusion and resilience objective rather than as opposition to digitalisation. The goal is to prevent vulnerable users from losing a usable payment instrument before digital alternatives become genuinely accessible.

Statistical monitoring should improve. Romania would benefit from regular payment diaries or survey modules that measure cash and digital use by age, income, education, settlement type and region. Such microdata would allow the distinction between preference and constraint to be tested directly and would support more precise policy targeting.

These measures should be sequenced according to local constraints rather than applied uniformly. In areas where account ownership is the main barrier, basic-account access and transparent pricing should receive priority. Where formal access exists but digital use remains weak, practical skills, fraud prevention and assisted digital services are more relevant. In localities with weak physical and digital infrastructure, inclusion policy should address connectivity and cash access together. Such differentiation would align intervention with the mechanisms identified in the analysis and reduce the risk that national averages conceal pockets of exclusion.

Monitoring should also distinguish access, adoption and dependence. Account ownership measures access to formal finance; internet-banking and card-use indicators capture aspects of adoption; and cash withdrawals or payment-diary data provide information about cash behaviour. Treating these measures as interchangeable can produce misleading policy conclusions. A national monitoring framework should therefore combine financial, digital and territorial indicators and report them by age, income, education and settlement type whenever data permit. This would make it possible to identify whether declining cash use reflects expanded choice or merely changing availability.

Finally, payment resilience should be incorporated into inclusion policy. Electronic systems are highly efficient under normal operating conditions but depend on electricity, telecommunications, authentication systems and intermediary networks. Maintaining proportionate cash access and acceptance can provide redundancy without slowing digital innovation. The policy objective should not be to preserve a predetermined cash share, but to ensure that households retain a workable means of payment during both the social transition to digital finance and temporary infrastructure disruptions.

7. CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

This paper examined cash usage, financial inclusion and uneven development in Romania within a European comparative framework. The central finding is that payment digitalisation is real but structurally uneven. Cash still represented 52% of euro-area point-of-sale transactions in 2024, while Romania combined substantial GDP convergence with weaker financial inclusion and digital capability.

Romania's 69.9% account-ownership rate in 2024 was well below selected European benchmarks, and only 28% of people aged 16–74 possessed at least basic digital skills in 2023. At the same time, GDP per capita had reached about 78% of the EU average by 2024. These indicators illustrate asymmetric financial modernisation: income and technological convergence can move faster than convergence in the capabilities and infrastructure required for universal digital participation.

The study therefore rejects a simplistic interpretation of persistent cash use as technological backwardness. Cash dependence may indicate structural constraints, but cash accessibility can also protect inclusion and resilience. An inclusive payment strategy should expand digital options while preserving effective choice for consumers who remain outside or at the margins of digital finance.

The principal limitation is the absence of a harmonised annual direct measure of cash point-of-sale usage for all EU Member States over 2014–2024. The current results are therefore descriptive and comparative and should not be interpreted as causal estimates. Future research should implement the proposed EU panel using the longest harmonised ECB and Eurostat series available, while using Global Findex account-ownership indicators only for observed survey waves rather than interpolating missing years. Alternative measures such as ATM withdrawals per capita, withdrawal values, card payments per capita and card-to-cash ratios should be used as robustness checks because each captures a different dimension of payment

behaviour. A two-way fixed-effects specification with country-clustered standard errors could distinguish persistent country characteristics from common time shocks. Further extensions could examine whether the relationship between digitalisation and cash dependence differs systematically between Central and Eastern European economies and more advanced EU payment systems. Regional or household microdata for Romania would be especially valuable for distinguishing voluntary cash preference from infrastructural constraint and socio-economic exclusion.

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