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Digitalization of finance and its socio-economic impact in post-soviet countries: An econometric analysis

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Abstract

This study investigates the impact of financial digitalization and demographic factors on population welfare in post-Soviet countries. Using panel data from eight former Soviet republics (2011–2021), we develop an econometric model to assess how digital financial inclusion (proxied by account ownership), population growth, and urbanization influence the income share of the poorest 20%. A fixed-effects regression with robust standard errors is employed to control for country-specific heterogeneity. The results indicate that higher GDP per capita is significantly associated with a larger income share for the bottom quintile, supporting the notion of pro-poor growth. In contrast, demographic variables such as urbanization and population growth do not show statistically significant direct effects, suggesting their influence may be more indirect or long-term. Surprisingly, digital financial inclusion alone does not lead to measurable welfare improvements for the poorest; the coefficient on account ownership is statistically insignificant and slightly negative. Country-level fixed effects reveal substantial heterogeneity, highlighting the role of institutional and historical contexts. Overall, the findings suggest that while digital finance holds potential, it is not sufficient by itself to enhance inclusive welfare.

Keywords: Demographic factors, Digital finance, Financial inclusion, Panel Data analysis, Post-Soviet countries, Poverty alleviation.

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1. Introduction

In today's world, the digitalization of the financial sector is one of the key drivers of economic development. The rapid deployment of financial technology and digital financial services has expanded public access to financial products, improved the efficiency of transactions, and reduced costs. According to estimates by McKinsey Global Institute [1] the widespread adoption of digital finance could increase the combined annual GDP of developing economies by about \$3.7 trillion by 2025, roughly a 6% increase over baseline projections, and create as many as 95 million new jobs. Digital finance also tends to improve transparency and reduce corruption while broadening financial inclusion and economic

opportunities for the population. The COVID-19 pandemic provided additional impetus to this process: in many countries, the pandemic accelerated the shift toward cashless payments and online banking across all social groups. World Bank survey data show that the global share of adults with an account at a financial institution or mobile money provider reached 76% in 2021, up from 51% in 2011, and about 40% of adults in developing economies made their first-ever digital payment after the start of the pandemic [2]. These facts underscore the timeliness of studying the digitalization of financial services and its socio-economic effects.

This topic is especially salient for the post-Soviet countries. On one hand, these states exhibit significant differences in population size and levels of economic development; on the other hand, they share common historical legacies and transitional economies. In several former Soviet republics, there has been explosive growth in digital financial services and fintech adoption. For example, Russia today is considered among the world leaders in the digital transformation of the financial industry: around 82% of Russians already use FinTech services, and about 87% of bank customers conduct transactions through digital channels. Russia ranks among the top countries globally in the penetration of digital technologies in finance, and it placed fourth worldwide in the pace of transition to cashless payments during the COVID-19 pandemic [3]. Kazakhstan demonstrates a similar trend: as of 2021, eight out of ten transactions in Kazakhstan were conducted in non-cash form. The country's largest fintech platform, Kaspi.kz, handled about 60% of all government social assistance payments during the pandemic via its app, vividly demonstrating the advantages of digital payments for quickly delivering funds to citizens. In Uzbekistan, although the level of financial digitalization still lags, recent growth has been rapid: the share of people using mobile or internet banking was only 15.4% in 2019, but in 2020–2021, the number of users of digital banking services surged [4]. These examples indicate substantial shifts in financial behavior in post-Soviet societies under the influence of digital transformation.

Another critical factor influencing economic development is demography. The countries of the former USSR display divergent population dynamics: from depopulation and aging (as observed in Russia and Belarus) to sustained growth and relative youthfulness of the population (as seen in Central Asian states like Uzbekistan, Tajikistan, and Kyrgyzstan). Demographic trends largely determine the size of the domestic market, the structure of the labor force, and consumer demand. The relevance of examining the interplay between financial digitalization and demographic factors lies in the notion that the combination of technological and demographic conditions shapes the potential for economic growth and social development. On one hand, a large market and a young workforce can accelerate the spread of digital innovations; on the other hand, population aging and the shrinking of the working-age cohort may slow the adoption of new technologies and diminish their returns. In the long run, several post-Soviet countries face the threat of depopulation. For example, in Russia, the recent population decline and aging could lead to serious economic problems, such as widening regional imbalances, labor shortages, and slower growth [5]. According to the World Bank [6], the shrinking of the working-age population will be one of Russia's main demographic challenges in the coming decades. Conversely, the Central Asian states are experiencing a so-called "demographic dividend" – a high proportion of youth and a growing population, which, with sound economic policies, can become a source of accelerated growth and an expanding market for digital services. For instance, Uzbekistan's population has exceeded 35 million and continues to rise quickly, supplying an influx of young users of digital technologies and fueling demand for new financial services.

Despite growing global interest in the digital economy and financial inclusion, there is a lack of comprehensive research focusing specifically on the post-Soviet space and accounting for its demographic particularities. The scientific novelty of this study is its integrated econometric analysis of the interrelationship between financial services digitalization, demographic indicators (primarily population size and age structure), and population welfare. This work brings together three key components: the level of financial sector digitalization, demographic factors, and welfare indicators in a single analytical model. We attempt to quantitatively assess how the growth of digital financial services under different demographic conditions is reflected in such indicators as population welfare, poverty rates, and per capita economic growth. In the context of former USSR countries, this analysis allows us to identify which factors hinder or amplify the impact of digitalization on the economy: for example, whether insufficient financial inclusion of certain groups (such as rural residents) is a bottleneck, whether the size of a country and its population affects the scalability of digital solutions, and whether digitalization leads to tangible improvements in household welfare.

Research goal: The aim of this study is to determine and empirically quantify the impact of financial services digitalization and demographic factors (in particular, population size and structure) on the level of population welfare in the countries of the former Soviet Union. To achieve this goal, we pursued several specific objectives: (1) to conduct a multifaceted literature review on the economic effects of financial services digitalization; the role of population size in economic development and digital transformation; the impact of financial inclusion and digital finance on welfare; and econometric methods for analyzing the digitalization–demography nexus; (2) to develop a conceptual econometric model describing the relationship between financial sector digitalization indicators, demographic metrics, and welfare outcomes; (3) to collect and systematize relevant statistical data for selected countries in recent years, including indicators of digitalization (e.g., share of cashless transactions, account ownership rates, digital development indices), demography (population counts, growth rates, age structure, urbanization), and welfare (GDP per capita, income of the poorest quintile, poverty rate, human development index, etc.); (4) to estimate the proposed model using panel data and modern econometric techniques (fixed-effects regression, random-effects model, and model diagnostics); (5) to analyze the results, interpret the relationships between digitalization, demography, and welfare, and identify significant patterns; and (6) to formulate practical recommendations for governments and financial institutions in the region to enhance the positive effect of financial digitalization such as measures to develop digital payment infrastructure, improve financial literacy among

different population groups, and account for demographic risks (aging, urbanization) in strategies for digital economic transformation.

In summary, this work seeks to fill a gap in the literature by uniting the issues of digital financial transformation and demographic change in the context of the post-Soviet space. The findings are expected to be useful both from a scientific perspective (for understanding the specific ways FinTech affects the economy under different demographic conditions) and from a practical perspective (for designing policies aimed at sustainable growth and improved welfare based on the digital economy).

2. Methods

Data and sample: The empirical analysis is based on panel data for eight post-Soviet countries (Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, and Ukraine) over the period 2011–2021. These countries were selected based on data availability; other former Soviet states were excluded due to fragmentary data or shorter time series. The final dataset constitutes a balanced panel with 8 countries and observations at roughly three-year intervals (2011, 2014, 2017, 2021), yielding a total of 31 country-year observations. The data were drawn primarily from World Bank databases (such as World Development Indicators and the Global Financial Inclusion (FinIndex) database), ensuring consistency and comparability across countries. By spanning the decade of the 2010s into 2021, the data captures both the steady advance of digital financial services and the shock of the COVID-19 pandemic, which accelerated digital uptake.

Variables and measures: We constructed an econometric model to explain population welfare as a function of financial digitalization and demographic factors, along with appropriate controls. The main variables included in the model and their definitions are as follows:

- **Welfare indicator (dependent variable):** We use the income share of the poorest 20% of the population as the dependent variable. Specifically, the variable is the share of national income (or consumption) accruing to the bottom quintile of the income distribution. This metric reflects the economic welfare of the least well-off segment of society and serves as an inverse proxy for income inequality (a higher share for the poorest 20% implies lower inequality). Focusing on the poorest quintile's income share aligns with the concept of "inclusive growth" or "pro-poor growth" and is sensitive to changes in poverty and low-end welfare. An increase in this share can be interpreted as an improvement in the relative welfare of the poor.
- **Financial digitalization/inclusion:** As a proxy for the level of digital financial inclusion in each country-year, we use the account ownership rate, the percentage of respondents (age 15+) who report having an account at a bank or other financial institution, or a mobile money service. This indicator captures access to basic financial services and is widely used as a measure of financial inclusion. It reflects digital financial inclusion insofar as, in the past decade, many accounts have been accessed via digital means (mobile banking, fintech apps), and it includes those using mobile money. We expect broader financial inclusion (higher account ownership) to correlate with better welfare outcomes for the poor, since access to financial services can facilitate saving, borrowing, and risk management for disadvantaged groups. Thus, the anticipated sign of this variable's coefficient is positive (greater inclusion leading to a higher income share for the poorest); however, effective use of financial services may depend on complementary factors such as financial literacy, so the relationship is an empirical question.
- **Economic development level:** We include GDP per capita (logarithm) as a key control for the overall level of economic development. This is measured as the natural log of GDP per capita in constant international dollars (PPP-adjusted). The log form is used to smooth distributional skewness and interpret coefficients as semi-elasticities. A higher GDP per capita generally indicates higher average incomes; importantly, we are interested in whether economic growth translates into proportionate benefits for the poorest quintile (growth that lifts all boats). Based on prior evidence of pro-poor growth in many countries, we expect the coefficient on log GDP per capita to be positive, meaning that economic growth tends to increase the income share of the poorest segment (i.e., growth that is not associated with rising inequality at the low end).
- **Urbanization:** We include the urban population share (percent of the total population living in urban areas) as an indicator of demographic and structural context. Urbanization often correlates with greater access to infrastructure, education, and services (including financial services). More urbanized economies typically have lower extreme poverty, though they may also exhibit higher inequality. We anticipate a negative relationship between urbanization and poverty, implying a positive expected sign for urbanization's effect on the income share of the poor (more urbanized countries may have better welfare outcomes for low-income groups, perhaps due to better access to employment and services). However, the effect is ambiguous a priori, as rapid urbanization can also coincide with the growth of urban poverty (e.g., in slums). Thus, the sign will be determined empirically.
- **Population growth:** We include the annual population growth rate (%) to capture demographic pressure or dividend effects. A high population growth rate in developing/transitional economies can dilute economic growth on a per capita basis and strain resources (a concept akin to a Malthusian effect), potentially hindering improvements in per-person welfare. On the other hand, population growth can be associated with a growing labor force and market size, which might foster economic dynamism if jobs and opportunities keep pace. Economic theory (e.g., Solow growth model) often suggests that very rapid population growth can impede per capita income growth, so we tentatively expect a higher population growth rate to correlate with a lower income share for the poor (i.e., a negative coefficient), if the "strain" effect dominates. However, this relationship could be non-linear or insignificant, so it is treated as an empirical matter.

In addition to these main independent variables, the model includes country fixed effects and year effects as detailed below.

Econometric model specification: Given the panel structure of the data, we specify a regression model with country-specific intercepts to control for time-invariant differences between countries. The general form of the model is:

$$\text{PoorShare}_{i,t} = \alpha_i + \beta_1 \times \ln(\text{BBP}_{i,t}) + \beta_2 \times \text{Urbanization}_{i,t} + \beta_3 \times \text{PopGrowth}_{i,t} + \beta_4 \times \text{AccountOwnership}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}$$

where i indexes country and t indexes time (year). Here, PoorShare is the percentage of national income held by the bottom 20% (welfare indicator) for country i in year t ; α_i is the country fixed effect (a dummy-variable intercept for each country, capturing country i 's inherent characteristics that do not change over time); λ_t is a time fixed effect for year t (to capture global shocks or trends affecting all countries, such as the global economic environment or pandemic); and $\varepsilon_{i,t}$ is the error term. The coefficients β_1 ... β_4 corresponds to the explanatory variables discussed: log GDP per capita, urbanization %, population growth %, and account ownership %.

The inclusion of country fixed effects is crucial in this context because there are considerable unobservable differences among the former Soviet countries in institutions, history, culture, etc. that could affect both the extent of financial inclusion and the level of inequality. By using a fixed-effects (FE) model, we control for all time-invariant country-specific factors, thereby reducing omitted variable bias. The fixed effects essentially allow each country to have its own baseline level of the dependent variable. We treat Armenia as the reference category (its fixed effect absorbed into the intercept) so that the estimated coefficients for other countries can be interpreted relative to Armenia.

We also estimated an alternative random-effects (RE) model, which assumes that the country effects are uncorrelated with the regressors, for comparison and conducted a formal Hausman test to decide between FE and RE. The Hausman test strongly favored the fixed-effects (FE) model (as reported in the Results section), indicating that the country-specific effects are likely correlated with the regressors. A plausible scenario here (for example, countries with higher financial inclusion might systematically differ in institutional ways that also affect income distribution). Therefore, we focus on the FE results as the main findings.

Estimation technique and diagnostics: The model was estimated using ordinary least squares (OLS) with dummy variables for countries (LSDV estimator for fixed effects). Given the relatively small sample size and the possibility of heteroskedasticity (e.g., variance differences across countries) or autocorrelation in the panel residuals, we applied robust standard errors (specifically, White–Huber heteroskedasticity-consistent standard errors) to ensure reliable inference. This means the reported standard errors (and p-values) are robust to arbitrary heteroskedasticity. We also checked for autocorrelation; the Durbin–Watson statistic was near 2 in our main model, suggesting no serious serial correlation in residuals (which is plausible given the data are not annual but spaced by a few years).

We examined multicollinearity among the independent variables by calculating variance inflation factors (VIFs). The VIF values for the main regressors (log GDP, urbanization, population growth, account ownership) were all moderate (ranging from approximately 1.2 to 3.3), indicating no significant multicollinearity. The only high VIF was associated with the intercept when fixed effects were included (which is expected due to the dummy variable trap issue), but this does not affect the explanatory variables of the model. Therefore, multicollinearity is unlikely to distort the results.

In summary, our methodology employs a panel data regression approach to isolate the effects of financial digitalization and demographic variables on a welfare outcome, controlling for country-specific traits and global year shocks. This approach helps address potential endogeneity concerns: by using fixed effects, we mitigate omitted variable bias from unobserved country characteristics, and by using lagged or contemporaneous macro-level data (and checking robustness with alternative estimators like RE or dynamic specifications in additional tests), we cautiously interpret the direction of influence. While a fully dynamic or instrumental-variable approach (such as system GMM) could further address endogeneity [7, 8] the scope of our data (limited time periods) leads us to focus on the fixed-effects framework as the primary analysis, with the understanding that results show associations consistent with theoretical expectations. All analyses were conducted using standard statistical software, and results are presented with significance levels indicated by conventional asterisks (** for 5% and * for 10%).

3. Results

Table 1 below presents the estimated coefficients from the fixed-effects (FE) panel model. The dependent variable is the income share of the poorest 20% of the population. As described, Armenia is treated as the baseline country for the fixed effects (hence no coefficient for Armenia is shown, and all country effects are relative to Armenia).

Table 1.

Fixed-Effects Regression Results for Welfare (Income Share of Bottom Quintile).

Variable	Coefficient	Std. Error	t-statistic	p-value	Signif.
Intercept (baseline = Armenia)	-30.6790	11.146	-2.752	0.013	**
Belarus (country FE)	-3.4031	1.455	-2.339	0.030	**
Georgia (country FE)	-1.6667	0.728	-2.288	0.034	**
Kazakhstan (country FE)	0.2830	1.162	0.243	0.810	(n.s.)
Kyrgyzstan (country FE)	9.1192	3.264	2.793	0.012	**
Moldova (country FE)	4.7574	2.317	2.053	0.054	*
Russia (country FE)	-6.9264	1.345	-5.151	0.000	**
Ukraine (country FE)	-0.3151	0.636	-0.594	0.626	(n.s.)
Log GDP per capita	2.9218	0.946	3.088	0.006	**
Urbanization (% population)	0.1908	0.113	1.689	0.108	(n.s.)
Population growth (% per year)	-0.2296	0.178	-1.291	0.212	(n.s.)
Account ownership (% age 15+)	-0.0111	0.007	-1.519	0.145	(n.s.)
R-squared	0.971				
Adjusted R-squared	0.954				
F-statistic	57.78				$p < 0.001$
Prob (F-statistic)	3.25e-12				
Durbin–Watson stat.	2.154				

Note: ** $p < 0.05$ (significant at 5% level); * $p < 0.10$ (significant at 10% level); (n.s.) indicates not statistically significant at 10% level. Country fixed effects are dummy variables (coefficients interpreted relative to Armenia).

Several important findings emerge from the fixed-effects regression results in Table 1:

- Economic growth and “pro-poor” effect: The coefficient on log GDP per capita is positive and statistically significant at the 1% level ($\beta_1 \approx 2.92$, $p = 0.006$). This implies that, holding other factors constant, higher GDP per capita is associated with a higher income share for the poorest quintile. Substantively, the estimate suggests that a 1% increase in GDP per capita corresponds to approximately a 0.029 percentage-point increase in the bottom 20%’s income share. In other words, as economies grow wealthier, the poorest segment tends to gain a relatively larger share of the pie, indicating a pro-poor growth pattern in these countries. This finding aligns with the idea of “inclusive growth” – economic growth that benefits low-income groups and echoes earlier research linking financial development and inclusion with poverty alleviation [9, 10]. It confirms that robust macroeconomic growth is a fundamental prerequisite for improving the lot of the poor in the post-Soviet context.
- Demographic variables: The urbanization rate has a positive coefficient (0.1908) as expected, but it is not statistically significant at conventional levels ($p = 0.108$, just above the 10% threshold). Similarly, the population growth rate carries a negative coefficient (-0.2296, suggesting that faster population growth might reduce the poor’s income share, but this effect is also not statistically significant ($p = 0.212$). These results indicate that in our panel data, once we control for country fixed effects and overall development level, the direct impact of these demographic metrics on short-term welfare distribution is muted or inconclusive. This does not necessarily mean demography is unimportant; rather, its influence may be indirect (for instance, affecting growth, which in turn affects poverty) or may manifest over longer time horizons than captured here. The lack of significance could also be due to limited variability or the sample size. Nonetheless, the signs are in the expected directions: more urbanized societies tend to have slightly better outcomes for the poor (perhaps reflecting better access to services and jobs), and very high population growth tends to correlate with a somewhat smaller share for the poor (consistent with the idea that rapid population increases can strain per capita resources and dilute the gains from growth, a scenario analogous to a Malthusian trap in extreme cases).
- Financial digitalization (financial inclusion): The coefficient on account ownership – our proxy for digital financial inclusion – is negative (-0.0111) and not statistically significant ($p = 0.145$). This is an intriguing result, as one might expect greater financial inclusion to help the poor. The negative sign (albeit not significant) suggests that simply having a larger share of the population with bank or mobile money accounts does not automatically translate into a higher income share for the poorest quintile, at least in the short term or without complementary conditions. In fact, the point estimate (though not reliably different from zero) would imply that higher account penetration might coincide with a *slightly lower* share for the poor. This counterintuitive direction could reflect several possibilities: (a) financial services may currently be used more by better-off groups (the poor might have accounts but not use them actively or not derive benefits from them yet); (b) there may be a lag between inclusion and tangible welfare outcomes; or (c) other barriers such as low financial literacy, lack of trust in institutions, or products not suited for low-income users prevent the poor from benefiting from financial access. The result resonates with cautionary notes in the literature that expanding access alone is not enough: the effectiveness of financial inclusion depends on usage and on the ecosystem [11]. For example, if newly banked individuals fall prey to predatory lending or fees, or do not receive credit that boosts income, mere account ownership will not improve poverty metrics. Our findings underscore that policymakers should not assume digital inclusion automatically results in poverty reduction; targeted

measures such as education, consumer protection, and pro-poor financial products are necessary to ensure fintech benefits the poor.

- Country fixed effects and heterogeneity: Several of the country dummy coefficients are significant, highlighting substantial heterogeneity across countries in the baseline level of the welfare metric (after controlling for the included variables). Belarus, Georgia, and Russia have significantly negative fixed effects relative to Armenia ($p < 0.05$), implying that, all else equal, the poorest 20% in those countries receive a smaller share of national income than in Armenia. Specifically, the coefficients indicate that the bottom quintile's income share is on average approximately 3.4 percentage points lower in Belarus, approximately 1.7 points lower in Georgia, and approximately 6.9 points lower in Russia, compared to Armenia's baseline (*ceteris paribus*). These differences likely reflect structural or policy differences that persistently affect inequality (for instance, Russia's high inequality stemming from oil wealth concentration, etc.). Kyrgyzstan, conversely, shows a large positive fixed effect (+9.12, $p = 0.012$), meaning the poorest quintile in Kyrgyzstan has about 9 percentage points more of the national income than in Armenia, after accounting for the other variables. This suggests Kyrgyzstan has an unusually equal income distribution in favor of the poor relative to what its GDP, inclusion, etc., would predict – possibly due to remittance flows or social policies that benefit low-income households. Moldova's fixed effect is positive and marginally significant (+4.76, $p \sim 0.054$ at 10% level), hinting that Moldova also tends toward a more equal distribution (higher poor's share) than the baseline. Kazakhstan and Ukraine's fixed effects are not significantly different from Armenia's, indicating their baseline inequality (in terms of the poor's share) is roughly on par with Armenia after controlling for the model variables. Overall, the significance of many country effects, and their range (from -6.9 for Russia to +9.1 for Kyrgyzstan), underscores that unobserved country-specific factors (history, institutions, social structures) play a major role in determining how much of each country's income goes to the poorest segment. This justifies our use of a fixed-effects model. It also means that the impact of digitalization on welfare can be very different depending on the country context, a point we will return to in the discussion.
- Model fit and significance: The model explains a very high proportion of the variance in the dependent variable ($R^2 = 0.971$, Adjusted $R^2 = 0.954$). Even accounting for the many parameters (country dummies), the adjusted R^2 of 0.954 indicates that about 95% of the variation in the poorest quintile's income share across countries and time is captured by the model. This suggests strong explanatory power, although caution is advised since in small panels, fixed effects can inflate R^2 by absorbing variance. The F-statistic for the model is 57.78 with a p-value far below 0.001, indicating that the model is statistically significant (i.e., the regressors jointly have predictive power). Additionally, the Durbin–Watson statistic of 2.154 is close to the ideal value of 2, providing evidence that there is no serious autocorrelation in the residuals, which is reasonable given the data structure.
- Robustness checks: We also estimated a random-effects model for comparison. The RE model (not shown in the table) yielded a positive and significant coefficient for log GDP (though somewhat smaller in magnitude than in FE), and it found all other regressors to be statistically insignificant. In fact, the coefficients on urbanization, population growth, and account ownership in the RE model were very close to zero. The overall R^2 was much lower for RE, and importantly, the Hausman test decisively rejected the random effects in favor of fixed effects (χ^2 test statistic ≈ 49.13 , $df = 5$, $p < 0.0001$). This indicates that the random-effects estimates are biased (due to correlation between country effects and regressors), and that the fixed-effects model is the preferred specification for these data. We also checked for heteroskedasticity using a Breusch–Pagan test; mild heteroskedasticity was indicated in the FE model (BP test $p \sim 0.07$). Therefore, we relied on robust (White–Huber) standard errors for inference in the FE results reported above, which should account for any heteroskedasticity. The significance of key coefficients (like log GDP) remained strong under robust errors, although a few marginal cases (like the urbanization variable) became less significant, which is expected when using robust SE if heteroskedasticity was present. In sum, the main findings are robust: economic growth shows a pro-poor effect, and we do not find evidence of a direct positive effect of financial inclusion on the poor's income share in this dataset.

To summarize the empirical findings more intuitively, the analysis yields several key takeaways:

1. Economic growth benefits the poor: Higher GDP per capita is associated with a higher share of income for the poorest 20%, suggesting that in post-Soviet countries, general economic growth has had an inequality-reducing effect (at least at the lower end of the distribution). This confirms the importance of broad-based economic growth for poverty reduction (the “growth is good for the poor” argument).
2. Demographic factors show no immediate impact: Variables such as urbanization and population growth did not demonstrate statistically significant effects on the welfare of the poor in the short-run panel analysis. The expected directions were observed (urbanization tending to help, rapid population growth tending to hurt the poor's share), but these effects were not strong enough to be conclusive. This implies that demographic context alone does not straightforwardly translate to changes in income distribution within a decade; its influence might be indirect or require longer-term observation.
3. Digital financial inclusion alone is not a panacea: Merely increasing the fraction of the population with bank or mobile accounts has not (yet) led to measurable improvements in the poorest quintile's income share. The lack of a positive impact (and potential slight negative trend) indicates that without the right conditions such as ensuring that the newly included can effectively use financial services to improve their livelihoods digital inclusion might not automatically reduce poverty or inequality. This finding points to the need for complementary policies alongside fintech expansion.

4. Significant cross-country heterogeneity exists: The fixed effects reveal that country-specific characteristics heavily influence welfare outcomes. Some countries, like Kyrgyzstan, have much more favorable income distribution for the poor than others like Russia, even after accounting for growth, inclusion, and demographics. These differences highlight that factors such as social policies, institutional quality, and historical trajectories (e.g., inequality inherited from the 1990s transition period) condition the outcomes of digital and economic development. Anyone-size-fits-all conclusion would be misleading; understanding each country's context is vital.

Overall, the results emphasize that while promoting digital finance and inclusion is important, it must be coupled with growth-oriented and pro-poor policies to truly enhance welfare. Simply put, financial digitalization has the potential to support inclusive welfare, but its positive effects are realized only in conjunction with healthy economic growth and supportive institutional contexts. We delve deeper into the implications of these findings in the following discussion section.

4. Discussion

The empirical findings of this study provide new insights into how financial digitalization and demographic factors interact to influence social welfare in post-Soviet countries. Several key themes emerge. First, overall economic growth remains the most robust engine for improving the lot of the poor. Second, demographic trends (such as urbanization, population growth, and age-structure) do not show strong direct effects in the short-run regressions, but they shape the context in which digital finance operates for example, by influencing labor markets, migration, and technology uptake. Third, simply having widespread account ownership (our proxy for digital financial inclusion) has not automatically translated into higher incomes for the poorest. By contrast, the benefits of digital finance for the bottom quintile appear to depend critically on complementary conditions: education, trust, regulation, and usage patterns. Finally, we see substantial cross-country heterogeneity. Institutional quality, governance, and policy settings from social safety nets to anti-corruption efforts mediate how digitalization and growth are translated into poverty reduction. In short, our results reinforce that while digital finance holds promise, its impact is conditional on broader economic and social factors.

Economic growth as a pro-poor driver: This finding also resonates with cross-country evidence: for decades, economists have documented that economic growth is the most powerful force for poverty reduction [12]. In the developing-world context, studies show that countries with faster growth tend to reduce poverty more rapidly [13]. It implies that when the overall economic pie grows, the poorest segments have been seeing their slices grow relatively faster, reducing inequality from the bottom up. This result aligns with the theory of inclusive growth and corroborates earlier findings that emphasize the fundamental importance of broad economic development for poverty reduction [9]. Our results suggest that the post-Soviet region is no exception: macroeconomic expansions (often enabled by commodity exports, remittances, or industrialization) have had disproportionately large payoffs for poorer households. For instance, the fixed-effects regression implies that a 1% increase in GDP per capita yields about a 0.03 percentage-point rise in the poor's income share. While that seems small each year, it compounds over time into meaningful gains. In policy terms, it means that maintaining macro stability and growth is a cornerstone of poverty reduction. Digital finance can support this, for example, by easing payments and investments (as noted by IMF analyses showing digital financial inclusion boosts GDP growth), [8], but the benefits for the poor will still ride on the back of the overall economic engine.

To illustrate, consider Kazakhstan during the COVID-19 period. The country's advanced fintech ecosystem (e.g., the Kaspi.kz platform) allowed government transfers to be disbursed rapidly; over 60% of social assistance was delivered via Kaspi's digital channels during the pandemic, which helped smooth incomes during a downturn. However, it was also the country's relatively large public transfers and pension increases (funded by earlier oil-fuelled growth) that prevented a surge in poverty. Similarly, in Uzbekistan, strong employment and wage growth (7.2% real wage growth in 2023) contributed to a marginal further decline in poverty in 2023 [14]. These examples highlight that, while the mechanism may involve digital transfers or banking, the driver is the economy growing and governments having the fiscal space to invest in people.

In sum, our findings reaffirm a fundamental policy message: broad-based economic development must remain a priority. Growth that filters down through employment, public jobs programs, or remittances has proven effective for poverty reduction. Digital finance should be leveraged not as an end, but as a facilitator of growth-friendly activities (business credit, entrepreneurship, efficient payments) that create opportunities for the poor. But absent growth or when an economy stalls, even perfect fintech won't substitute for the gains from genuine income-earning activities [9, 10].

Demography's complex role: Our regression found that urbanization rates and population growth had coefficients of the expected sign (urbanization slightly positive for the poor's share, population growth slightly negative), but these were not statistically significant in the short term. This does not mean that demographic factors are irrelevant; rather, their effects are more subtle and likely indirect. Demography shapes the backdrop: a very young population or rapid urbanization can set the stage for different growth paths and inequality patterns, but these forces often operate over longer horizons than our ten-year panel captures. The literature on demography and growth indeed suggests that very high population growth can impede per capita income gains (the dilution effect), whereas urbanization often correlates with productivity gains [15]. Some studies on developing countries find that a rapidly growing population can hinder poverty reduction, consistent with our negative (though insignificant) coefficient for population growth [16].

For example, many Central Asian countries (Uzbekistan, Kyrgyzstan, Tajikistan) have youthful populations with fertility rates well above replacement. In theory, this creates a potential demographic dividend a rising share of working-age adults that can boost growth. However, unless job creation and education keep up, a large youth cohort can also raise

youth unemployment or underemployment, which can offset poverty gains. Indeed, if population grows faster than GDP, per-capita gains dilute; this “Malthusian” effect is well-known in development studies. In our data, countries with higher population growth tended (insignificantly) to have slower increases in the poor’s income share, suggesting some dilution. In practice, Tajikistan (population +2.4% annually) has seen persistent poverty partly because additional births and migration happen faster than formal sector jobs. Conversely, demographic decline and aging (as in Russia and Belarus) place strain on pension systems and shrink the domestic market, potentially slowing growth and redirecting resources to elderly support. While these long-term demographic headwinds are real, our panel may not fully capture them; in the short run, the rapid growth episodes have dominated across many countries.

Urbanization is another significant factor. Moving to cities often increases incomes on average due to better job opportunities and education. However, it also presents challenges such as urban poverty and slums if infrastructure does not keep pace. Our analysis indicates that the positive coefficient on urbanization suggests the trend of more people in cities mildly favors the poor’s share, but the effect was not statistically significant. One interpretation is that urbanization facilitates greater access to financial services (banks, internet, ATMs) and non-farm jobs, which over time should aid in poverty reduction. For example, digital finance thrives in urban areas where network connectivity and smartphone use are high. Global evidence demonstrates that expanding digital financial services to rural areas can reduce inequality: in China, a recent study finds that a 1% increase in a digital finance index narrows the rural–urban income gap by approximately 0.34% [17]. This implies that when digital platforms reach rural consumers and farmers, they can facilitate credit, remittances, and payments that uplift remote households.

The converse is also true: if digital finance advances mainly in cities, the initial “digital divide” may widen urban–rural inequality. In the CIS context, infrastructure gaps persist. For example, a World Bank survey in Kyrgyzstan showed that even banked households in rural areas prefer cash: about 62% of remittance recipients (who have formal accounts) still opt to withdraw cash rather than use mobile payments [18]. Many rural users cited a lack of familiarity or unreliable connections as reasons. This indicates that expanding account penetration alone does not instantly translate into rural inclusion; complementary investments in literacy, agent networks, and trust are needed.

We also note that demographic factors can influence indirect channels such as migration and remittances. The significant labor migration from Tajikistan, Kyrgyzstan, and Armenia to Russia and Kazakhstan has provided a consistent income source to households, often the rural poor. These remittances are increasingly transferred digitally via mobile apps and remittance kiosks, representing a form of digital finance that benefits the bottom quintile. However, our model’s variables (GDP growth, population growth) likely absorbed much of the variation from migration during 2011–2021, so we did not explicitly measure remittance shares. Other research suggests that in countries where remittances are well-utilized, they can substantially reduce poverty and inequality. For instance, prior to COVID-19, remittances averaged 25% of GDP in Tajikistan, Uzbekistan, and Kyrgyzstan (World Bank Migration Data), acting as a buffer for poor households. Our results for Kyrgyzstan (country fixed effect) indeed show a higher poor share than expected, indicating that migrant income flows may be supporting the low-income share.

In summary, demographic trends exert influence largely through their impact on growth and social structure, rather than as independent drivers in our short-run regression. Policymakers should monitor these trends: in youthful societies, the imperative is to create jobs and train the workforce so that large youth cohorts become productive contributors. In aging societies, the focus shifts to raising productivity and reforming pensions and healthcare to avoid burdening the poor elderly. Furthermore, as countries urbanize, governments should ensure that digital infrastructure (broadband, rural banking agents, mobile coverage) keeps pace so that rural populations are not left out of the cashless economy.

Why hasn’t digital financial inclusion boosted the poor’s welfare yet? One of the most intriguing findings is that greater account ownership, our chosen measure of digital financial inclusion, did not translate into a higher income share for the poorest. This result aligns with a cautious strand in the literature: while many studies and reports laud the potential of fintech and digital finance to include the unbanked and reduce poverty [1], empirical evidence on immediate distributional outcomes is mixed. In fact, the coefficient on account ownership was slightly negative (albeit statistically insignificant). This is consistent with a growing caution in the literature: having an account is only a first step, and without active, meaningful use, it does not automatically boost welfare [8, 11].

Why might this be so? A key reason is the gap between access and use. A person might open a bank or mobile-money account (especially if incentivized by policy) but then rarely use it. For example, global surveys suggest that a substantial share of formal accounts remain dormant in some countries [19]. In many post-Soviet states during 2020–21, governments rapidly pushed cashless disbursements (e.g., digital delivery of pensions or subsidies). This often led to mass account openings, but once the one-off payments were received, many low-income users had no savings and few transactions. As our Kyrgyzstan remittance example shows, even “banked” poor people may withdraw immediately and not engage further [18].

A second factor is the sequencing and context of inclusion. Financial inclusion efforts often accelerate as countries grow wealthier. In the early stages of transition, a country like Armenia or Uzbekistan might have relatively low inequality and low inclusion. By the time they develop more sophisticated financial systems, GDP is higher, and inequality may have widened somewhat. If we simply correlate account ownership with the poor’s share, this could produce a spurious negative relationship: countries with very low inequality (e.g., Kyrgyzstan in our sample) happen to have less formal financial infrastructure, whereas wealthier/equity-higher countries (like Russia or Ukraine) also have high inclusion. Our fixed-effects model attempts to control for these shifts (through country dummies and GDP per capita), but some residual effects

could remain. In short, causality is complex – countries that already had greater inequality may have invested more in inclusion programs to address it, which could bias the cross-sectional association.

Third, digital literacy and trust are crucial. Even if accounts are available, poor or older users may not know how to use them effectively. Post-Soviet societies carry historical legacies of financial mistrust from the chaotic 1990s. Many older rural residents still prefer cash under the mattress to banks or mobile money. Without literacy programs, accounts by themselves do not teach people how to save or borrow. Moreover, if existing financial products are not tailored to the poor (for instance, requiring high minimum balances or formal IDs), then the mere existence of an account does not help. This point is echoed by the World Bank: “active usage of a broader range of financial services” is the next frontier after account opening [19]. Indeed, developing economies struggle to narrow the gap between cashless access and actual use of credit or savings only about 25% of adults in emerging markets save in formal accounts [19] and even fewer borrow from institutions. In our sample, the poorest quintile may hold accounts to receive wages or pensions, but if they cannot convert those accounts into business loans or even reliable day-to-day payments, their income share will not increase.

Recent studies further support this nuanced view. For example, an IMF analysis finds that the poverty-reducing impact of financial inclusion depends heavily on the broader environment [20]. In economies with a strong rule of law and good governance, inclusion is more likely to reach the needy. In weaker institutional settings, new accounts may mainly serve urban elites or simply act as repositories for state transfers without stimulating entrepreneurship. Likewise, micro-level research in some countries has found that, while mobile banking can raise consumption or help households manage shocks, it often takes years for these benefits to translate into measurable welfare improvements [21, 22].

In practice, several country examples illustrate the gap between inclusion and impact. Uzbekistan dramatically expanded digital payments: as of 2021, its account ownership nearly doubled over a decade, and surveys show small businesses adopting cards reported revenue gains [23]. Yet even there, access remains uneven: much of the rural population still deals in cash, and inequality remains significant. Kazakhstan likewise has one of the highest account penetrations in Central Asia, largely due to systems like Kaspi.kz. However, here again, the poor’s income share remains relatively low, suggesting that digital payments have not yet addressed structural factors such as oil-wealth distribution and wage dynamics that drive inequality.

In summary, account ownership alone is insufficient. The results caution policymakers not to equate inclusion benchmarks (e.g., 80% account penetration) with poverty reduction. Without concurrent increases in financial capability, usage of diverse products (savings, microcredit, insurance), and supportive regulations, new accounts may sit idle or be used in ways that do not lift incomes. As one commentary puts it, “aiming for financial health (savings, resilience) would better serve the needs of consumers than aiming for inclusion alone” [24]. Our findings echo those of recent research that find ambiguous effects of financial inclusion on inequality. Some have found that while inclusion lowers poverty, it might not immediately reduce inequality and can even widen it if higher-income groups leverage financial services more effectively [25]. For the poorest, the digital finance revolution must be accompanied by education, consumer protection, and targeted product design.

Country-specific factors and the importance of context: Our fixed-effects regressions reveal that country-specific factors matter greatly. The large, statistically significant country dummies indicate that even after accounting for GDP, inclusion, and demography, countries differ markedly in how much of the income pie flows to the poor. This underscores that institutional and policy contexts shape outcomes. For instance, consider two illustrative contrasts:

- Russia vs. Kyrgyzstan. In our model, Russia’s dummy was strongly negative and significant, while Kyrgyzstan’s was strongly positive (both relative to Armenia as the baseline). Russia, with its much higher GDP per capita, still ends up with a smaller share of income going to the bottom quintile than Kyrgyzstan or Armenia. This likely reflects Russia’s economic structure (dominance of oil and oligarchic rents) and weaker redistribution. Russia’s social safety net (pensions, transfers) is not very progressive, and regional inequalities remain large. In effect, the gains from growth have been unevenly distributed – a point noted by others [26]. Meanwhile, Kyrgyzstan’s more equitable income distribution, despite its significantly lower GDP, can be partly attributed to its agrarian economy and the role of remittances. Migrant remittances in Kyrgyzstan are unusually high (25–30% of GDP) and often go directly to rural households, effectively transferring income to the bottom quintile. Additionally, informal community support networks (extended families, village savings groups) may play a larger role in cushioning the poor. Kyrgyzstan also has a relatively large share of its population engaged in subsistence farming; when price levels rise, even poor farmers can see some income gains. In our estimates, Kyrgyzstan’s country effect adds roughly 9 percentage points to the poor’s share relative to Armenia (Table 1).
- Institutional quality. Although we did not include formal governance indicators in the regressions, the variation across countries hints at the role of institutions. Other research has found that the poverty-reducing effects of inclusion and growth are stronger when the rule of law is higher [20]. Some CIS countries (Georgia, Kazakhstan) have used technology to fight corruption for example, digital tax filing, e-procurement, and e-health programs are quite advanced in Georgia, which may help ensure that digital finance reaches bona fide needs. In contrast, in countries where bureaucratic hurdles and rent-seeking remain endemic (e.g., Tajikistan or Azerbaijan), poor people may distrust banks or be discouraged by hidden fees. In Russia, for instance, many low-income pensioners rely on cash payments through post offices because of distrust in banks; despite widespread internet use, the elderly often avoid online banking. Belarus, with its state-controlled economy and tight capital controls, has limited fintech innovation; its country effect was not significantly different from Armenia’s, suggesting moderate inequality.

- Social policies. Differences in tax and transfer systems also matter. Some post-Soviet states have been more aggressive in social assistance. For example, in 2023, Uzbekistan substantially increased its benefit levels and coverage under its state-supported poverty-alleviation programs, which helped contain poverty even amid price shocks [14]. In contrast, countries with weaker targeting may see growth bypass the needy. The World Bank [14] report on Uzbekistan notes that despite real wage gains in 2023, poverty only fell slightly because much of the income growth was captured by higher-income urban earners. This implies that in Uzbekistan, the inclusive effect of growth was somewhat dampened by uneven policy targeting.

These examples illustrate that digital financialization cannot be divorced from the broader socioeconomic fabric. Digital banking or mobile payments interact with governance and culture. For instance, Ethiopia's recent embrace of mobile finance has not yet alleviated poverty because many farmers lack IDs or network access [27]. Similarly, our region needs a conducive environment: sufficient human capital to use new tools, sound regulations to protect customers, and trust in banks. The fact that the country dummy variables in our regressions are significant and correlated with inclusion levels (Hausman test) implies that factors like governance and initial inequality do influence outcomes. As one study on financial inclusion emphasizes, "higher financial inclusion is associated with lower poverty only when combined with high income and strong institutions" [20].

In summary, the stark cross-country differences indicate that "one size fits all" policies will not be effective. A key implication is that strategies to leverage fintech for poverty reduction must be tailored to each country. In digitally advanced Kyrgyzstan or Uzbekistan, for example, promoting innovative mobile wallets or peer-to-peer lending could quickly empower entrepreneurs. Conversely, in aging Russia, the focus might be on digital services for pensioners or rural branches for the digitally illiterate. Importantly, all countries must invest in strengthening fundamental institutions rule of law, contract enforcement, and anti-corruption if they want their digital financial sector to serve as a genuine ladder for the poor rather than a vehicle for the already well-off.

New trends and illustrative cases (2022–2025). To provide more up-to-date context, we briefly highlight some recent developments. Digital currencies and payment systems are advancing rapidly. Kazakhstan piloted its "Digital Tenge" (CBDC) in late 2023 to increase payment accessibility [28], reflecting the government's strategic build-out of fintech infrastructure. Similarly, Russia conducted a multi-bank digital ruble experiment in 2023 (13 banks tested retail CBDC operations) and plans to expand it nationwide by 2025 [29]. These central bank digital currencies (CBDCs) aim to facilitate transactions and cross-border settlements outside traditional rails, which could eventually benefit consumers, for instance, by lowering transaction costs or enabling state payments directly. However, early skeptics point out that CBDCs alone do not eliminate trust issues; indeed, an IMF-commissioned study notes that Russians remain wary of state-imposed digital currency, highlighting that adoption requires public confidence [29].

In Central Asia, fintech "super-apps" are emerging. For example, as of 2023, over 80% of Kazakh small businesses were using digital payment platforms (Kaspi, Halyk) for transactions [30]. Uzbekistan has experienced a surge in both state and private initiatives: the proportion of adults with digital accounts has nearly doubled over ten years, and surveys indicate that small merchants who transitioned to card payments report tangible revenue gains [23]. Nevertheless, even in these success stories, surveys show that digital access coexists with cash usage: Visa's study in Uzbekistan warns of a "fragmented society" where some segments leap forward while others (often the poor or rural) remain in cash. Central banks in the region are also developing real-time payment systems and open banking, which will further transform financial inclusion.

In the context of COVID-19 and recent shocks, digital finance has played a relief role. During the pandemic, many governments used mobile platforms to distribute stimulus or social benefits, as noted above for Kazakhstan. However, the longer-term effect on poverty depends on resilience policies. The International Monetary Fund [31] found that remittances and fiscal measures helped cushion most CIS countries in 2020–21, but warned that inflation and the Ukraine war could again raise poverty (especially for those not online to receive aid).

Taken together, these examples from 2022–2025 reinforce our core message: digital finance is expanding rapidly across the region, but translating that into social welfare gains requires attention to who is using these tools and why.

Practical implications and recommendations: Building on the above interpretations, several recommendations emerge for governments and stakeholders in post-Soviet economies seeking to maximize the positive impact of financial digitalization on societal welfare.

- Anchor digital inclusion efforts in pro-poor growth policies: The finding that economic growth remains fundamental suggests that digital finance should be part of a broader development agenda. Policymakers should ensure that fintech innovations contribute to economic expansion (e.g., by boosting entrepreneurship, efficiency, and investment), which in turn creates jobs and incomes for the poor. Maintaining macroeconomic stability and a favorable business climate is essential so that the benefits of fintech can materialize in real economic opportunities for disadvantaged groups.
- Pair financial inclusion with financial literacy and consumer protection: The weak direct impact of account ownership on the poor's welfare highlights the need for complementary programs. Governments and NGOs should invest in financial literacy education, particularly targeting rural populations, women, and the elderly – groups that might have access to accounts now but lack the knowledge or confidence to use them effectively. Improved financial literacy can help people save, borrow wisely, and use digital tools to their advantage. Additionally, strong consumer protection frameworks are necessary to prevent predatory lending and fraud in the digital finance space; if vulnerable populations fall victim to scams or high-interest digital loans, financial inclusion could backfire. Ensuring

that fintech platforms have transparent fees and that users' rights are protected will build trust and safeguard the poor.

- **Develop pro-poor digital financial products:** Simply opening the door to financial services is not enough; what's inside the door matters. Banks and fintech companies, possibly with regulatory encouragement, should design products tailored to low-income and previously excluded groups. This could include micro-savings accounts with no minimum balance, micro-insurance products for farmers, easy-to-use remittance services with low fees, and small-scale credit for microentrepreneurs. If digital finance is to benefit the poor, it must meet their needs (small transaction sizes, irregular incomes, etc.). For instance, some countries have had success with mobile microcredit or savings groups using digital platforms but care must be taken that these don't become debt traps.
- **Leverage the demographic context:** Policymakers should align digitalization strategies with their country's demographic realities. In countries with young, growing populations (Central Asia), there is a demographic window of opportunity to rapidly expand digital finance: younger people are quick to adopt new technologies. Governments should capitalize on this by investing in widespread mobile internet coverage, encouraging fintech startups, and integrating digital finance education into school curricula. In contrast, in countries with aging or declining populations (Russia, Belarus), digital finance initiatives should ensure the inclusivity of the elderly. This might involve simplifying user interfaces of banking apps, providing assisted digital banking services, and combining online services with offline support. The goal should be that no demographic group is left behind in the fintech revolution; otherwise, inequality could worsen between, say, urban youth and rural elderly.
- **Strengthen institutions and governance:** Although not measured directly in our model, the importance of country-specific effects implies that better governance can amplify the positive impacts of digitalization. For example, when governments use digital platforms to deliver social transfers, it can improve efficiency and reach. Post-Soviet countries should continue to develop e-government and digital ID systems, which complement financial inclusion. Reducing corruption and improving trust in institutions will also encourage people to embrace formal financial services – a significant issue in some transition economies where cash is still king, partly due to mistrust of banks or tax authorities.

Contribution to literature: This study's novelty lies in quantitatively demonstrating that the welfare effects of fintech adoption are heterogeneous and contingent on demographic and country factors in transition economies. Prior studies have separately examined financial inclusion's impact on growth or poverty [7, 25] and the challenges of demographic change [11] but few have integrated these dimensions for the post-Soviet region. Our findings highlight that one-size-fits-all conclusions about "fintech reduces poverty" do not hold universally; instead, fintech's impact is conditional. For academics, this underscores the need to explore interaction effects – e.g., does financial inclusion reduce poverty more in countries with younger populations or better governance? The evidence here suggests that context (historical and demographic) modifies outcomes, an area ripe for further research.

Limitations and further research: Naturally, our study has limitations that open avenues for future inquiry. First, the time span and frequency of our data are limited to essentially four points per country over a decade. This constrains our ability to apply more sophisticated dynamic panel methods (like the Arellano–Bond GMM approach) to fully address endogeneity. A next step would be to extend the dataset as more years become available and possibly include more countries (e.g., additional Eurasian nations as data improves) to verify if the results hold and to examine longer-term effects (since fintech transformations might manifest more over 15–20 years). Second, we focused on a macro-level measure of welfare distribution. Future research could employ micro-level data (household surveys) to directly assess how access to digital finance changes household income, consumption, or poverty status. Such micro studies could reveal mechanisms (for instance, do households with mobile money access invest more in education or business?). Third, incorporating institutional quality variables (such as corruption indices, governance effectiveness) into the model could help explain the country fixed effects and show how much institutions mediate the fintech-welfare linkage. We suspect that strong institutions complement digital finance in reducing poverty (as they ensure broad access and trust), a hypothesis that can be tested. Fourth, exploring the different components of digital finance separately might be illuminating for example, breaking down digitalization into mobile payments, digital credit, crowdfunding, cryptocurrency usage, etc. It's possible that some aspects of fintech (like payments) have more immediate welfare benefits than others (like digital credit, which could even be harmful if not managed). A more granular analysis could inform which digital financial innovations are most pro-poor and under what conditions.

In summary, our research indicates that while digital financial inclusion holds promise for advancing social welfare, its success in the post-Soviet context is tightly interwoven with economic, demographic, and institutional fabrics. We have laid a foundation for understanding these relationships; however, much remains to be explored regarding the nuanced pathways through which the digital transformation of finance can uplift the most vulnerable in society.

5. Conclusion

In this article, we conducted a comprehensive econometric analysis of the impact of financial sector digitalization and demographic factors on the welfare of populations in post-Soviet countries. Using panel data from 2011 to 2021 and applying both fixed-effects and random-effects models (along with appropriate statistical diagnostics), we tested several hypotheses about how fintech adoption and demographic conditions relate to the income share of the poorest quintile.

Our key findings can be summarized as follows: First, financial digitalization by itself is not a "silver bullet" for improving population welfare. Its positive effect appears to manifest only under favorable economic conditions and

supportive environments. Specifically, we found no significant direct uplift in the poorest quintile's income share attributable to higher rates of account ownership (financial inclusion) alone. This suggests that without parallel efforts to enhance financial literacy, trust, and the availability of pro-poor financial services, simply expanding digital access will not automatically translate into poverty reduction or reduced inequality. Second, demographic factors modify the impact of fintech but do so in complex, indirect ways. We observed that demographic variables (like urbanization and population growth) did not show direct significant effects in the aggregate data; however, the very different demographic contexts across post-Soviet states likely influence how digital transformation plays out. For instance, a young, growing population may be quicker to embrace fintech, whereas aging societies might see slower adoption and require different approaches. Our results imply that demographic context should be considered when designing and implementing digital finance initiatives. A strategy that works in one demographic setting may need adjustment in another. Third, each country in the post-Soviet region has its unique characteristics ("local context") that critically shape outcomes. We found substantial country-specific effects, indicating that historical, institutional, and cultural factors endemic to each nation condition the relationship between digitalization and welfare. This underscores the importance of localized strategies and the avoidance of one-size-fits-all policies.

The scientific contribution of this work lies in the quantitative confirmation of these interrelationships in the context of transitional economies of the former USSR, a context that has been underrepresented in comprehensive fintech-and-demography studies. Previous research had not holistically examined how technology-driven financial inclusion and demographic realities together influence welfare in this unique region that shares a Soviet legacy yet has diverged markedly in recent decades. By filling this gap, our study sets the stage for further scholarly discussions and investigations at the intersection of the digital economy, demography, and social policy.

The findings carry practical significance for policy: they suggest that promoting digital finance should go hand in hand with efforts to improve financial capability among citizens, to tailor digital services to the needs of various demographic groups, and to strengthen institutional frameworks. Only with such a multi-pronged approach can the transformation of the financial sector truly contribute to reducing poverty and inequality. Policymakers in the region are advised to pursue digital financial innovation in tandem with measures that enhance its effectiveness, such as education, infrastructure, and inclusive regulation and to remain mindful of demographic trends (like youth bulges or aging populations) when rolling out digital initiatives.

In conclusion, this research has laid a foundation for understanding how financial digitalization and demographic dynamics jointly affect social welfare in post-Soviet countries. The journey toward harnessing fintech for inclusive prosperity is just beginning in many of these economies. Our study suggests that while digital finance offers powerful new tools, its ultimate impact on societal welfare depends on the human and institutional context into which it is introduced. We hope that this work spurs further inquiry and informs practical strategies so that digital innovation in finance becomes a force for equitable development across diverse demographic landscapes.

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