



საქართველოს ეროვნული ბანკი
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MONETARY ECONOMICS

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FINANCIAL AND REAL TRANSMISSION CHANNELS OF GEOPOLITICAL SHOCKS: GLOBAL TRENDS AND THE CASE OF GEORGIA

MARIAM CHITISHVILI, MARIAM TCHANTURIA AND TAMTA SOPROMADZE

Abstract

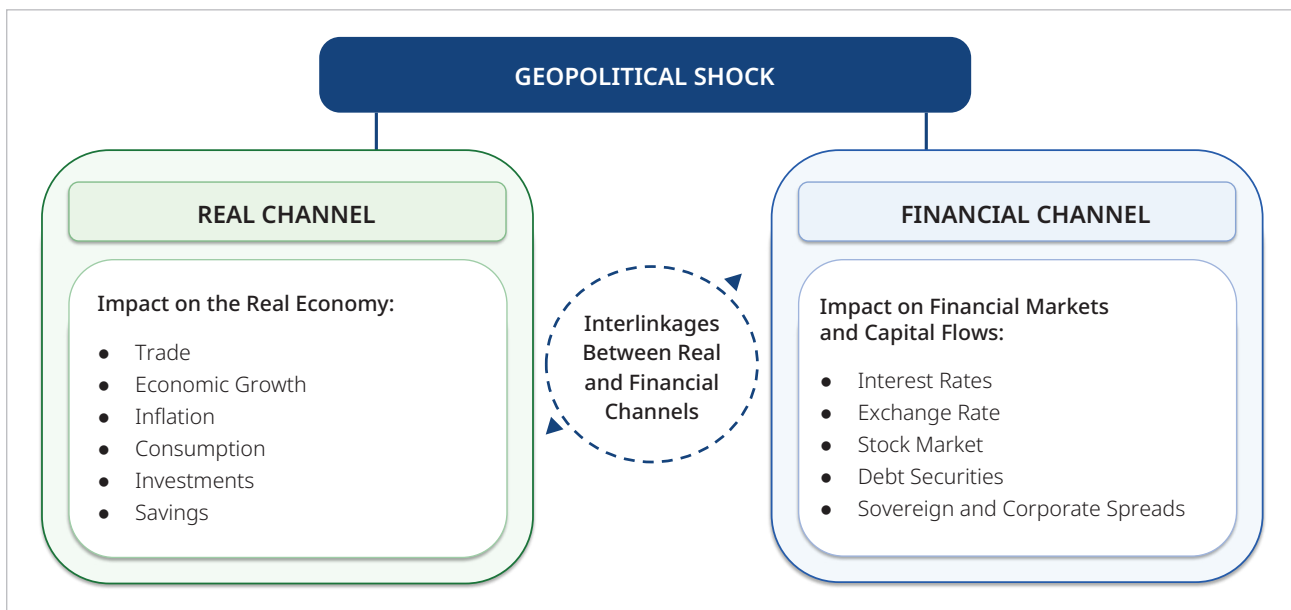
The increasing frequency of geopolitical shocks in recent years has heightened global economic uncertainty and further underscored the importance of macroeconomic resilience and external buffers. Using the international military conflicts of 2022 and 2026 as case studies, this paper examines the transmission of geopolitical shocks through financial and real-economy channels and shows that their effects have varied across countries and episodes. In particular, the traditional flight-to-safety mechanism was less pronounced across a number of emerging market economies in 2026. In the case of Georgia, against the backdrop of improved macroeconomic fundamentals and a stronger external position, the rise in geopolitical risk in 2026 did not trigger large-scale capital outflows or a significant tightening of financial conditions. At the same time, exchange rate dynamics partially mitigated inflationary pressures stemming from international commodity prices. The results of both descriptive and econometric analyses suggest that the transmission of geopolitical shocks is heterogeneous, with the macroeconomic and financial conditions prevailing at the onset of the shock playing an important role in determining both the magnitude and direction of its effects.

Keywords: Geopolitical shocks, real channel, financial channel, capital flows, inflation, monetary policy.

Introduction

The succession of shocks in recent years, many of which have been associated with armed conflicts, has significantly heightened uncertainty in the global economy. Rising geopolitical risk affects economic activity through both real and financial channels (see Figure 1). Through the real channel, disruptions to supply chains and energy markets intensify inflationary pressures, while heightened uncertainty adversely affects economic agents' expectations and sentiment, thereby weighing on private consumption and investment. Through the financial channel, elevated risk leads to a tightening of financial conditions and increases the risk of capital outflows, particularly from emerging market economies. All else equal, these developments may result in exchange rate depreciation and higher sovereign and corporate risk premiums (Caldara and Iacoviello, 2022; Rey, 2015). Moreover, given the close linkages between the real and financial sectors, financial market responses may either amplify or dampen the economic effects of the initial shock.

Figure 1. Main Transmission Channels of Geopolitical Shocks to the Economy



Source: Authors' Illustration.

However, the effects of geopolitical shocks are not uniform over time or across countries. A useful illustration is the comparison between the 2022 Russia–Ukraine war and the 2026 conflict in the Middle East. The global economy entered the 2022 shock amid elevated inflation, pent-up demand, and still relatively accommodative monetary policy. The additional supply shock triggered by the war was followed by substantial interest rate increases by major central banks, resulting in a sharp tightening of global financial conditions. By contrast, at the onset of the 2026 shock, inflation was lower than in the period preceding the 2022 war, while monetary policy was already broadly restrictive. At the same time, the rapid expansion of investment and demand related to the technology sector and artificial intelligence (AI) provided additional support to economic activity in some economies. Consequently, the initial macroeconomic and financial conditions surrounding the two geopolitical shocks differed substantially, contributing to differences in the magnitude and nature of their transmission to the real economy and financial markets.

This distinction is particularly pronounced in the financial transmission of geopolitical shocks. Heightened geopolitical risk typically induces a reallocation

of capital toward safe-haven assets (flight-to-safety), increasing the risk of capital outflows from emerging market economies and exerting upward pressure on sovereign risk premium and downward pressure on exchange rates. However, the strength of these effects depends critically on a country's macroeconomic resilience, external buffers, and financial vulnerabilities (Miranda-Agrippino and Rey, 2020; IMF, 2026). Accordingly, the financial channel may act as an amplifier of geopolitical shocks. However, under favorable macroeconomic conditions and with strong external buffers, this amplification may be attenuated, allowing the financial channel instead to serve as a shock-absorbing mechanism.

Georgia, as a small open economy, provides an interesting case of the heterogeneous transmission of geopolitical shocks. Despite the sharp increase in geopolitical risk in 2026, the shock did not trigger capital outflows or a significant increase in the sovereign risk premium. On the contrary, the yield differential between long-term Georgian and U.S. government securities narrowed. The role of the exchange rate has also evolved over time. During the COVID-19 pandemic, the depreciation of the Georgian lari amplified the initial shock through the imported inflation channel. Following the onset of

the Russia–Ukraine war in 2022, however, this role gradually changed. While the initial depreciation of the lari generated additional inflationary pressures, its subsequent appreciation, amid migration inflows and ongoing structural changes in the economy, turned the exchange rate channel into a disinflationary force. This pattern persisted in 2026: exchange rate dynamics have partially offset imported inflationary pressures stemming from higher international commodity prices, thereby dampening the pass-through of external price shocks to domestic inflation. Overall, Georgia's experience illustrates that the magnitude and direction of the transmission of global geopolitical shocks can vary substantially over time, depending on both global financial conditions and domestic macroeconomic conditions.

Drawing on an analysis of the geopolitical shocks of 2022 and 2026, this paper examines how differences in initial macroeconomic and financial conditions shape the magnitude and direction of shock transmission, with particular emphasis on the financial channel. Focusing on Georgia, the paper assesses how geopolitical shocks are transmitted through capital flows, sovereign risk premium, and the exchange rate, and explores the role of macroeconomic resilience and external buffers in determining whether the financial channel amplifies or absorbs the initial shock.

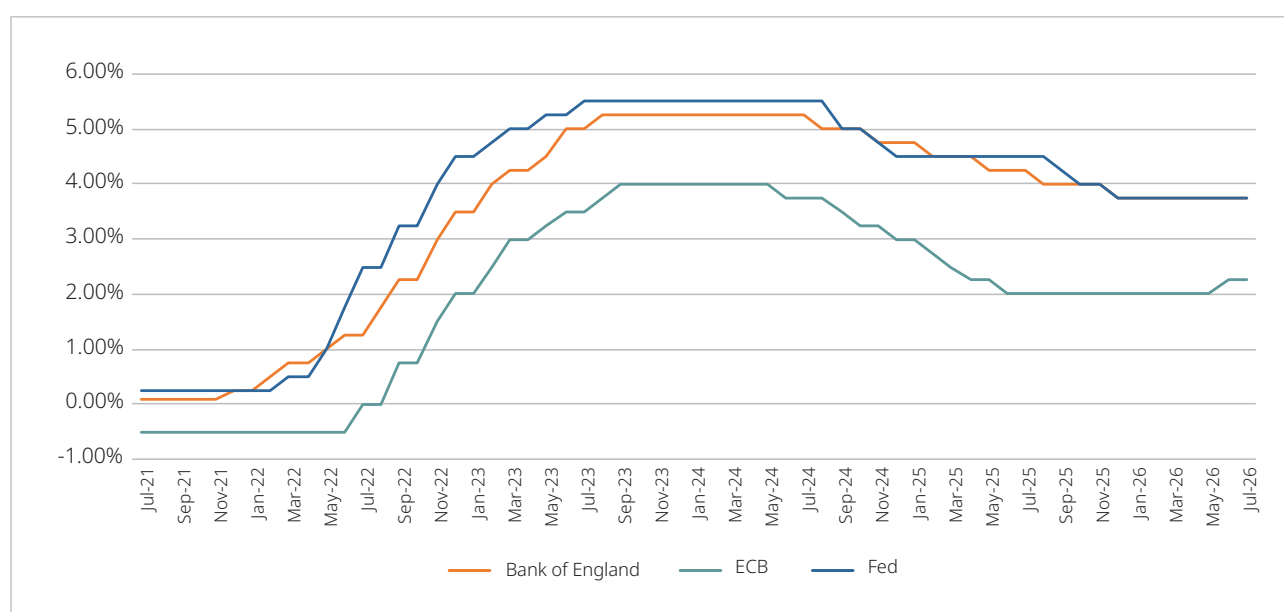
Global Effects of Geopolitical Shocks: Literature Review and Empirical Analysis

Although the global economy had successfully overcome the effects of the 2007–2009 Global Financial Crisis (GFC) well before the economic crisis triggered by COVID-19, high volatility in capital flows and the risk of rapid capital outflows toward advanced economies remained important vulnerabilities for emerging market economies. As documented by a broad range of economic studies and analyses, the first quarter of 2020 saw the largest capital outflows from emerging market economies on record, with non-resident investors withdrawing a total of approximately 83 billion USD (Batini, 2020).

At the beginning of the post-pandemic period, the

global economy entered the 2022–2023 economic crisis amid pent-up demand and constrained supply. Russia's invasion of Ukraine in February 2022 further exacerbated the existing imbalances: disruptions to global supply chains intensified, while international energy and food prices rose sharply. This created a high-inflation environment and necessitated a substantial tightening of global financial conditions. As a result, major central banks raised their monetary policy rates significantly. For example, between March 2022 and July 2023, the Federal Reserve increased the lower bound of the target range for the fed funds rate from 0% to 5.25% (Federal Reserve, 2023), while the European Central Bank (ECB) raised its deposit facility rate from 0% to 4.0% between July 2022 and September 2023 (ECB, 2023). The increase in interest rates affected not only the euro area and U.S. economies but also spilled over to other economies, contributing to a tightening of global financial conditions. This period was characterized by significant net capital outflows by non-resident investors from emerging market economies (Drehmann, Maronoti and O'Connor, 2023). At the same time, the cost of servicing U.S. dollar-denominated debt increased, while default risks intensified further in some countries, adding to financial stability risks. Thus, in addition to its inflationary effects, the 2022 geopolitical shock had a significant impact on economies through the financial channel, particularly via capital flows and financial conditions (IMF, 2022).

By contrast, by 2026, the main cycle of monetary policy tightening had already come to an end, and several countries, including major economies, had begun to gradually reduce interest rates. Nevertheless, interest rates remained significantly above their levels at the beginning of 2022. Thus, central banks entered the 2026 geopolitical shock with relatively high interest rates (see Figure 2). The conflict in the Middle East increased global uncertainty; however, thus far, it has not resulted in the kind of broad-based tightening of financial conditions for emerging market economies that was observed in 2022. At the same time, only a few months have passed since the onset of the conflict, and it remains too early to fully assess its economic and financial consequences.

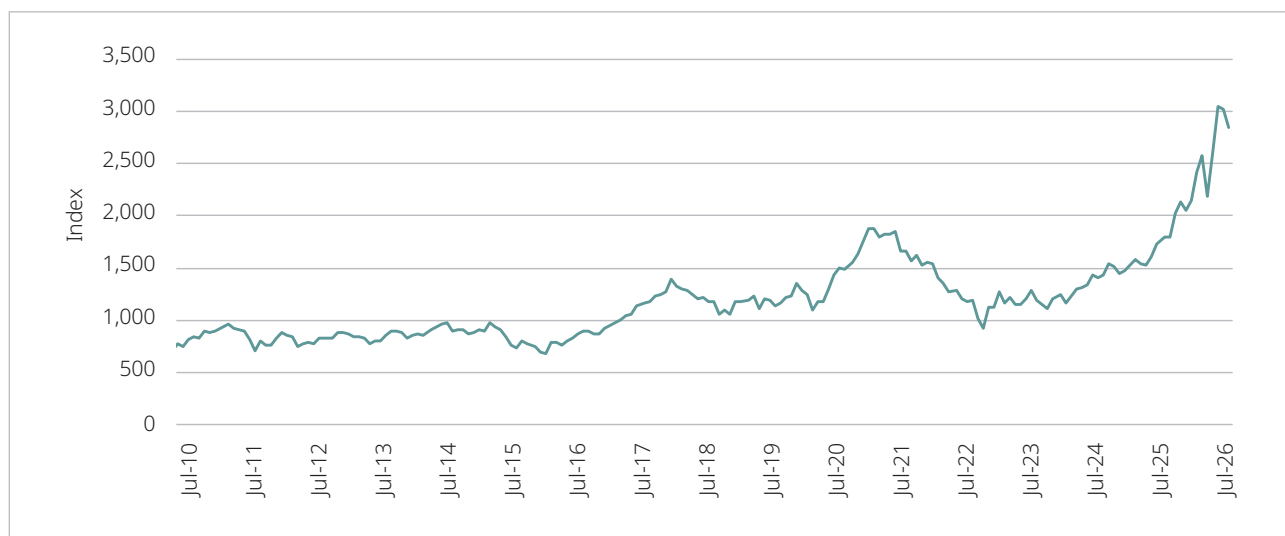
Figure 2. Monetary Policy Rates


Source: Fed; ECB; BoE.

The response of financial markets to the geopolitical shock caused by the ongoing hostilities in the Middle East has differed to some extent from the 2022–2023 episode. Despite heightened uncertainty, capital outflows have not developed into a prolonged and broad-based process during the current episode. In particular, following a temporary decline in portfolio flows in March 2026, data from the Institute of International Finance (IIF) indicate that flows recovered significantly and gradually from April onward (IIF, n.d.). However, developments have varied across countries. In particular, global investors continued to maintain positions in countries characterized by stronger macroeconomic conditions, sustainable external balances, and relatively high yields. In countries facing structural challenges, however, capital outflows remain a significant concern. As a result, during the current episode, investors' decisions have been driven largely by the macroeconomic and financial characteristics of individual economies rather than by geopolitical risk alone (IMF, 2026). Financial market indicators also reflect this pattern. For example, despite the sharp decline recorded in March 2026, the MSCI Emerging Markets Index subsequently resumed its upward trend (see Figure 3). This suggests that, at

this stage, there has been no broad-based deterioration in investors' risk perceptions toward emerging market economies.

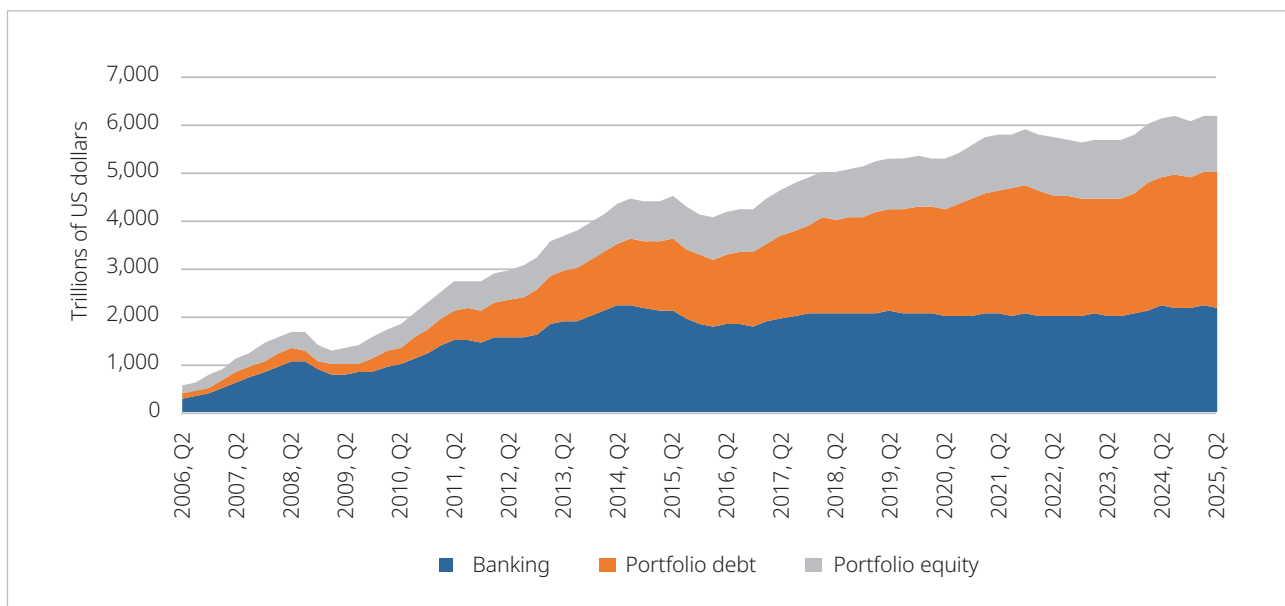
This pattern of investor behavior also reflects, to some extent, structural changes in the international financial system. While the banking sector was the main source of external financing for emerging market economies in the past, particularly before the 2008 Global Financial Crisis, the role of non-bank financial institutions (NBFIs), especially portfolio debt investors, has increased in the current period (see Figure 4). These investors are considerably more sensitive to changes in global risk. Consequently, the transmission of international shocks to the financial markets of developing countries may be stronger and faster, increasing the macroeconomic and financial vulnerability of these economies. However, during recent shocks, the behavior of this type of investor in emerging markets indicates that, despite geopolitical uncertainty, they have not only maintained but even increased their investments, further pointing to a shift in investors' perceptions of risk. Against this backdrop, according to the International Monetary Fund (IMF, 2026), investor behavior is increasingly exhibiting the character-

Figure 3. MSCI Emerging Markets Index (December 1987 = 100)

Source: MSCI.

istics of so-called "K-shaped" investment patterns. In particular, investment is being actively directed toward fixed-income instruments, while relatively higher-yielding assets remain attractive at the same time. Accordingly, investors are reallocating their

portfolios more selectively across assets and countries rather than shifting entirely toward safe-haven assets, which partly explains the relatively resilient response of financial markets during the current shock.

Figure 4. Investments by Non-Bank Investors in Emerging Markets

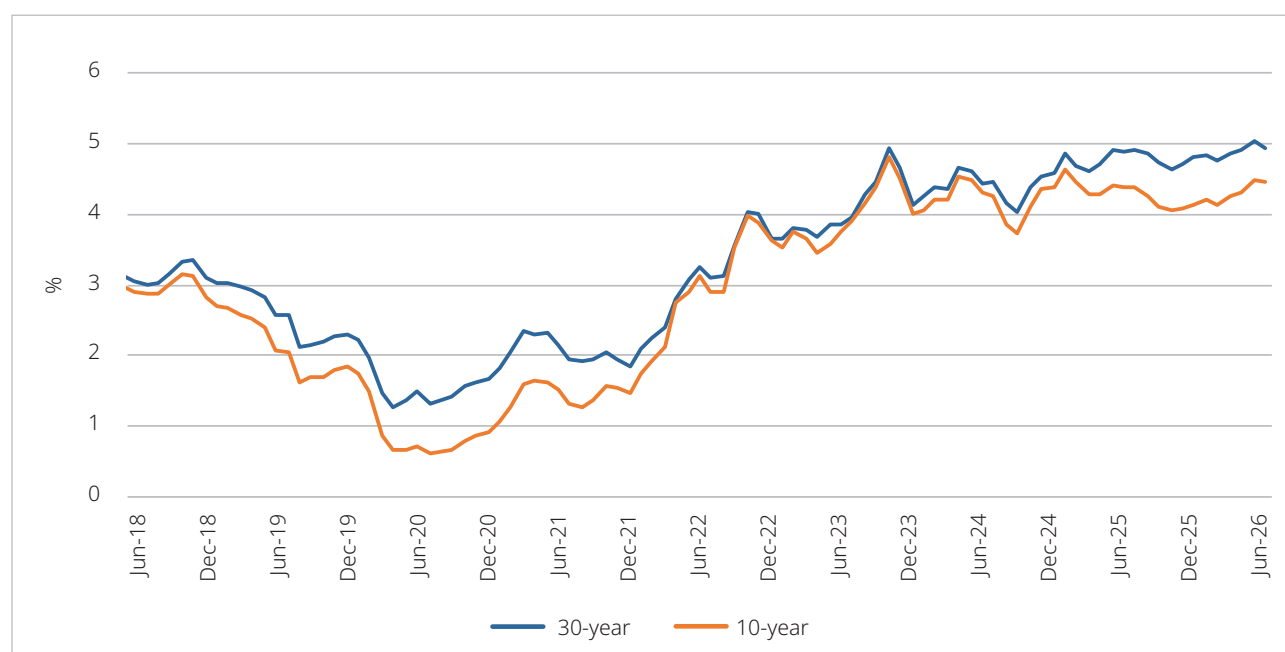
Source: IMF.

The sharp tightening of monetary policy by the U.S. Federal Reserve in response to the 2022–2023 crisis significantly increased the attractiveness of the U.S. dollar and strengthened its global position. In the subsequent period, however, growing U.S. fiscal vulnerabilities had an additional impact on investors' attitudes toward safe-haven assets. In particular, against the backdrop of rising government debt and higher interest costs associated with servicing that debt, Fitch Ratings downgraded the U.S. sovereign credit rating in 2023, followed by Moody's Ratings in 2025 (Fitch Ratings, 2023; Moody's Ratings, 2025).¹ This development is, to some extent, consistent with the Triffin dilemma (Triffin, 1978), according to which the U.S. dollar's status as the global reserve currency generates persistent global demand for U.S. assets, while at the same time potentially contributing to the accumulation of external and fiscal imbalances. The weakening of the global U.S. dollar index since 2025 has additionally reflected expectations of weaker U.S. economic growth and monetary policy easing by the Fed, as

well as uncertainty related to trade policy and increased currency-risk hedging by investors (Lindoso et al., 2026).

Against the backdrop of the Middle East crisis, financial market developments suggest that the traditional flight-to-safety mechanism has weakened to some extent. At the initial stage of the shock, the U.S. dollar appreciated only moderately,² while yields on 10-year and, particularly, 30-year U.S. government securities remained elevated (see Figure 5), and emerging market equity indices resumed their upward trend relatively quickly (see Figure 3). This differs from the dynamics typically observed during previous crises, when investors shifted on a large scale toward relatively safe assets, resulting in sharp declines in long-term government bond yields. Persistently high long-term government bond yields suggest that investors are increasingly incorporating fiscal risks, a higher term premium, and elevated long-term inflation expectations into interest rates. This is particularly evident in major

Figure 5. Yields on 10-Year and 30-Year U.S. Government Securities



Source: FRED.

1. In August 2023, Fitch Ratings downgraded the U.S. long-term credit rating from "AAA" to "AA+", while in May 2025 Moody's Ratings downgraded it from "Aaa" to "Aa1". In both cases, the main reasons cited for the decisions included rising U.S. fiscal risks, high government debt, and increased interest costs associated with servicing that debt (Fitch Ratings, 2023; Moody's Ratings, 2025).

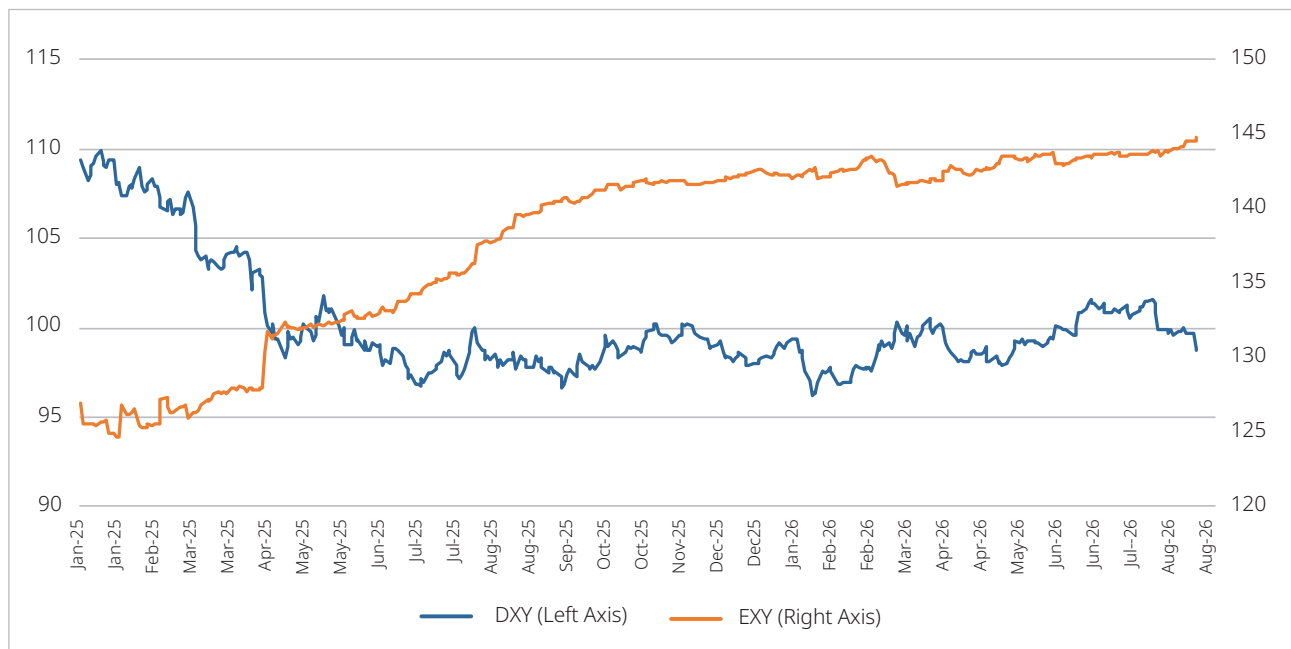
2. See: Trading Economics (2026). Available at: <https://tradingeconomics.com/united-states/currency> (Accessed: 30 September 2026).

advanced economies, where high levels of government debt and rising fiscal deficits exert additional upward pressure on long-term interest rates. As a result, even during periods of geopolitical shocks, increased demand for safe-haven assets no longer leads to declines in long-term yields of the magnitude typically observed during previous crises.

It is also noteworthy that both the use of investment strategies focused on risk diversification by private investors and the tendency toward diversification within the financial sectors of emerging market economies have strengthened. In recent years, particularly following the 2022–2023 crisis, the central

banks of a number of countries have added gold to their international reserves or increased its share. The increase in gold holdings in international reserves reflects both the objective of reserve diversification and the motivation to hedge against geopolitical risks.³ According to the IMF's 2025 Global Financial Stability Report (GFSR), another notable development has been the shift in the financing strategies of emerging market economies and the increased issuance of local-currency-denominated securities in domestic securities markets. Non-resident investors continue to play an important role; however, diversification of funding sources and the investor base increases resilience to shocks (IMF, 2025).

Figure 6. Global Indices of the U.S. Dollar and the Euro



Source: Bloomberg.

Baudino et al. (2025), in the European Central Bank's Financial Stability Review, note that the announcement of U.S. tariff policy in April 2025 was followed by a significant depreciation of the U.S. dollar, intensifying the debate over the dollar's role as a traditional safe-haven asset in financial markets. This is-

sue was particularly important for financial stability in the euro area, given the significant share of U.S. dollar-denominated assets in euro area investors' portfolios and the additional currency risks generated by sharp exchange rate movements. As shown in Figure 6 above, the recent weakening of the U.S.

3. See World Gold Council (2026), *Central Bank Gold Reserves Survey 2026*, 16 June. According to the report, central bank gold purchases averaged approximately 1,000 tonnes over the previous four years, compared with an average of 500 tonnes over the preceding decade. Notably, the majority of survey responses were received after the onset of the Middle East conflict.

dollar has been accompanied by a strengthening of the euro. This pattern is consistent with the growing tendency toward portfolio diversification among both central banks and other financial market participants.

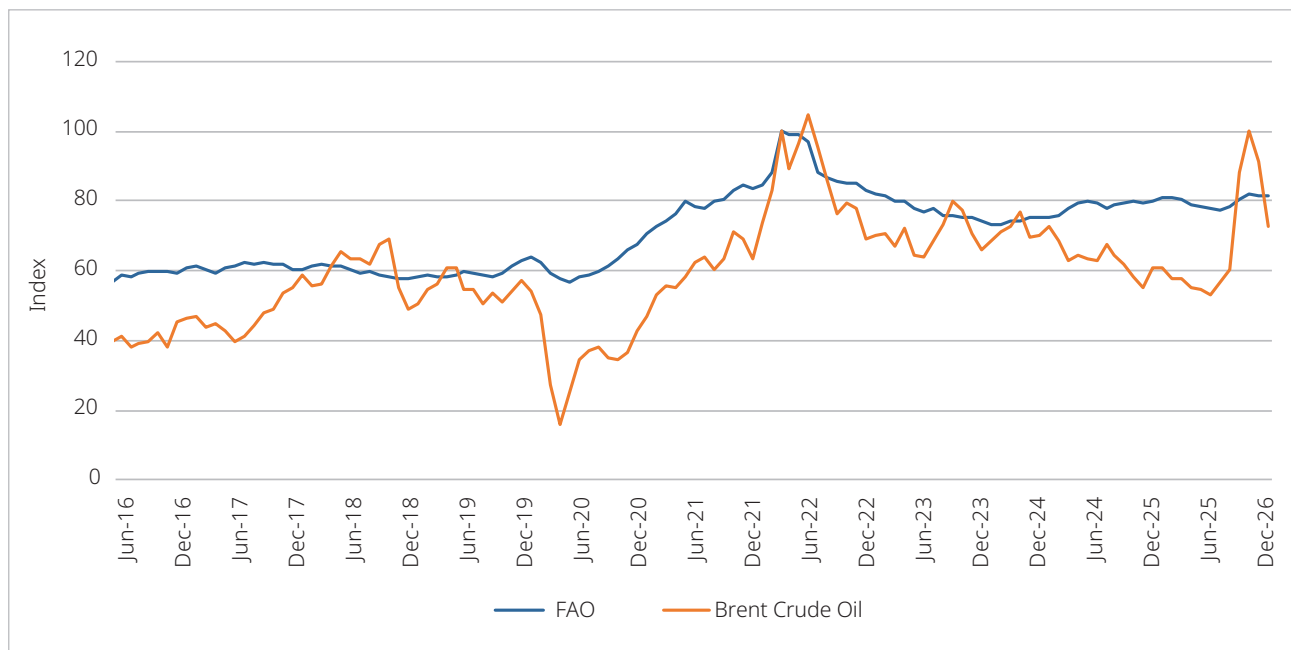
Bolhuis et al. (2025) also note that emerging market economies have demonstrated notable resilience to shocks in the post-pandemic period. While favorable external conditions have contributed to this resilience to some extent, improvements in policy frameworks and timely and appropriate policy decisions have also played an important role. Confidence in monetary policy has increased, central banks have become less susceptible to fiscal pressures, and strong macroeconomic fundamentals have supported exchange rate stability. Favorable macroeconomic conditions and improved monetary and fiscal policy frameworks contribute to greater resilience in emerging market economies, reducing the vulnerability of their financial conditions to shocks and the risk of sudden capital outflows during global crises.

As with the financial channel, it is also useful to compare the transmission of the 2022 and 2026 geopolitical shocks to the real economy. Although geopolitical tensions in both episodes resulted in sharp increases in international commodity prices, particularly oil prices, the extent of transmission to broader commodity markets and inflation differed. This difference largely reflected the different initial conditions surrounding the two shocks, including the state of global demand and supply, the structure of commodity markets, and the resilience of supply chains.

In the post-COVID period, the rapid recovery in international mobility significantly increased demand for energy. At the same time, it proved difficult to rapidly overcome the effects of reduced investment in the preceding period, supply-chain disruptions, and logistical bottlenecks. As a result, the imbalances in energy markets led to a substantial increase in energy prices and became a significant driver of global

inflation. According to the U.S. Energy Information Administration (EIA), in the first half of 2022, amid Russia's full-scale invasion of Ukraine, U.S. oil prices reached a multi-year high, exceeding approximately 133 USD per barrel (Troderman, 2023). By the end of 2022 and the beginning of 2023, the market had largely adapted to new oil trade routes. At the same time, expectations emerged that the growth in fuel demand would slow as economic growth normalized, contributing to a gradual decline in prices. Although the Middle East conflict has once again increased pressure on oil and natural gas prices and intensified the risks of supply disruptions through the Strait of Hormuz, current prices remain below the peaks recorded in 2022 (see Figure 7).

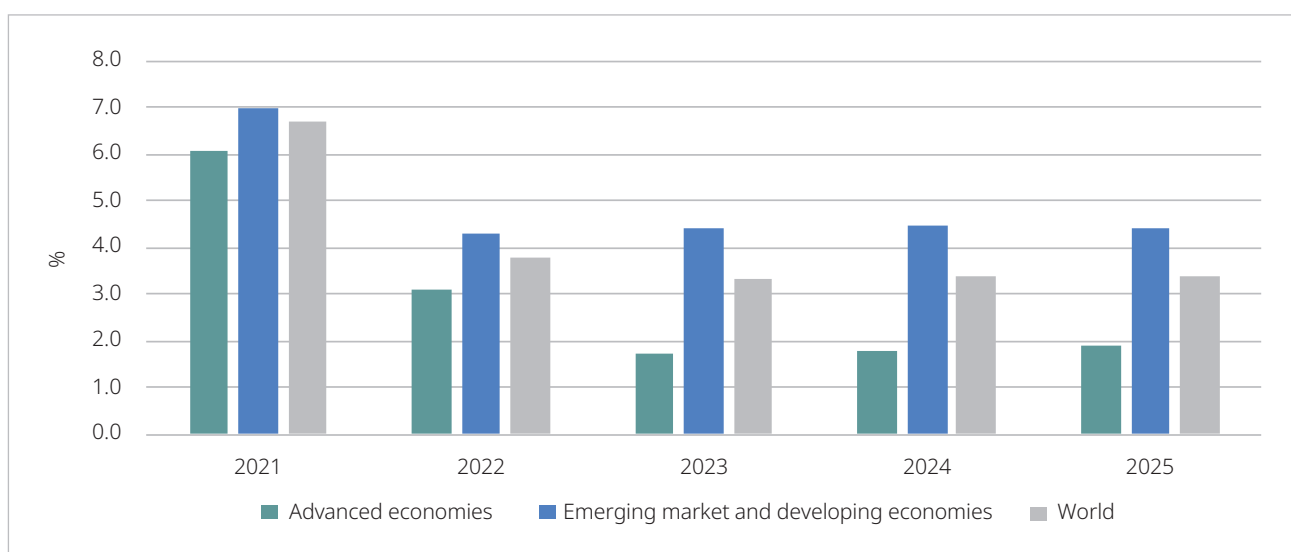
It is worth noting that the different dynamics of international food prices during the two shocks can be explained by several factors. First, Russia and Ukraine are among the world's largest suppliers of agricultural commodities, and disruptions to their exports therefore had a strong impact on food prices in 2022. At the same time, although approximately 30% of global fertilizer trade passes through the Strait of Hormuz, international fertilizer prices did not rise to their 2022 peak during the Middle East crisis. This was partly due to market adaptation (Savage, 2026) and helped mitigate pressure on food prices. Schwellnus et al. (2023) note that the COVID-19 crisis exposed significant vulnerabilities arising from the high concentration of suppliers. Prior to the pandemic, supply chains had largely been optimized with a focus on minimizing costs, whereas the pandemic increased the importance of geographical diversification, helping reduce dependence on a single country or supplier. Against the backdrop of the pandemic, the Russia-Ukraine war, and subsequent geopolitical tensions, firms actively began diversifying their supply chains. As a result, global logistics networks have become more resilient than they were during the 2022 shock, while transportation costs have increased less during the current shock. Compared with the 2022 shock, this factor reduces the adverse effects of supply shocks and, consequently, pressures on imported inflation.

Figure 7. International Food Price and Brent Crude Oil Price Indices (March, 2022 = 100)

Source: FAO; FRED.

Unlike during the 2022 crisis, the global economy entered the ongoing hostilities in the Middle East under different demand and supply conditions (see Figure 8). In particular, the excess post-pandemic demand pressures characteristic of 2022 were significantly weaker, partly offsetting the risk that high-

er energy prices would feed into inflation expectations and second-round effects. Accordingly, at the current stage, inflation risks are primarily associated with disruptions to energy supply (Adrian et al., 2026), with the shock manifesting predominantly on the supply side.

Figure 8. Economic Growth

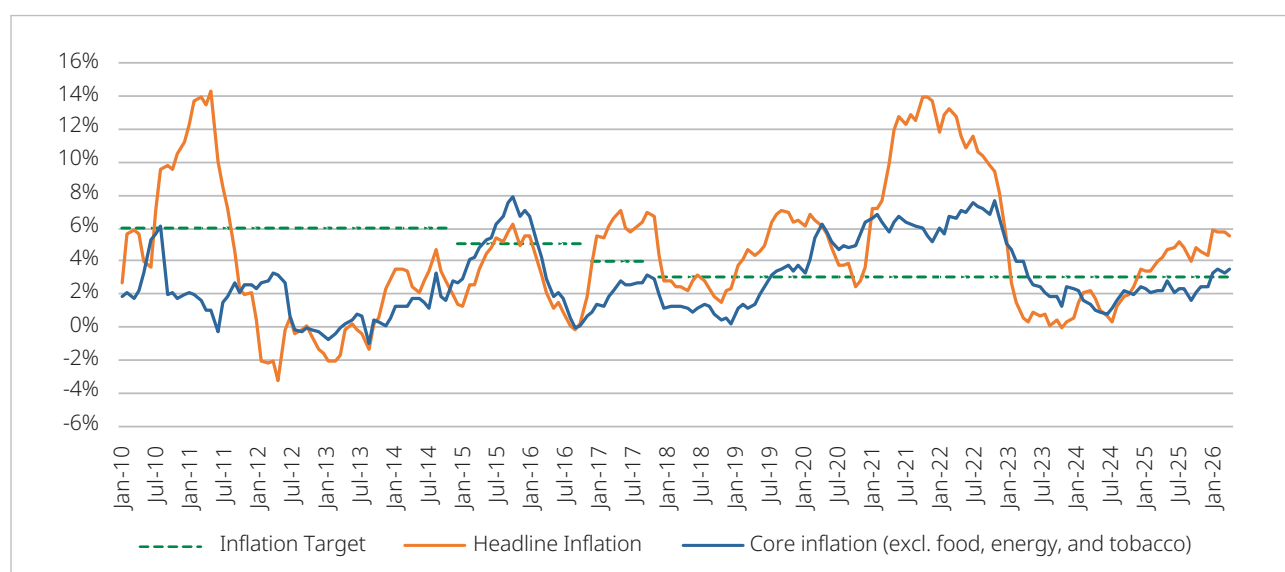
Source: WEO.

Transmission of Geopolitical Shocks to the Georgian Economy

In the post-pandemic period, the economic shock triggered by Russia's invasion of Ukraine had a heterogeneous impact on Georgia. The war was widely condemned by the international community, including Georgia, while major economies introduced extensive packages of sanctions against Russia. As discussed above, war-related supply disruptions, together with restrictions on international trade and financial linkages resulting from the sanctions, exerted additional pressure on global commodity

markets, particularly on food and energy prices. As a small open economy, Georgia is highly dependent on global economic developments. According to the forecast preceding the Russia-Ukraine war, the effects of exogenous factors were expected to gradually dissipate in 2022, with inflation projected to decline markedly after reaching a peak of 13.9% in December 2021 (see Figure 9). However, the new circumstances increased the risks of stronger and more persistent inflationary pressures, as well as higher and more persistent inflation expectations (NBG, 2022).

Figure 9. Headline and Core Inflation Measures in Georgia

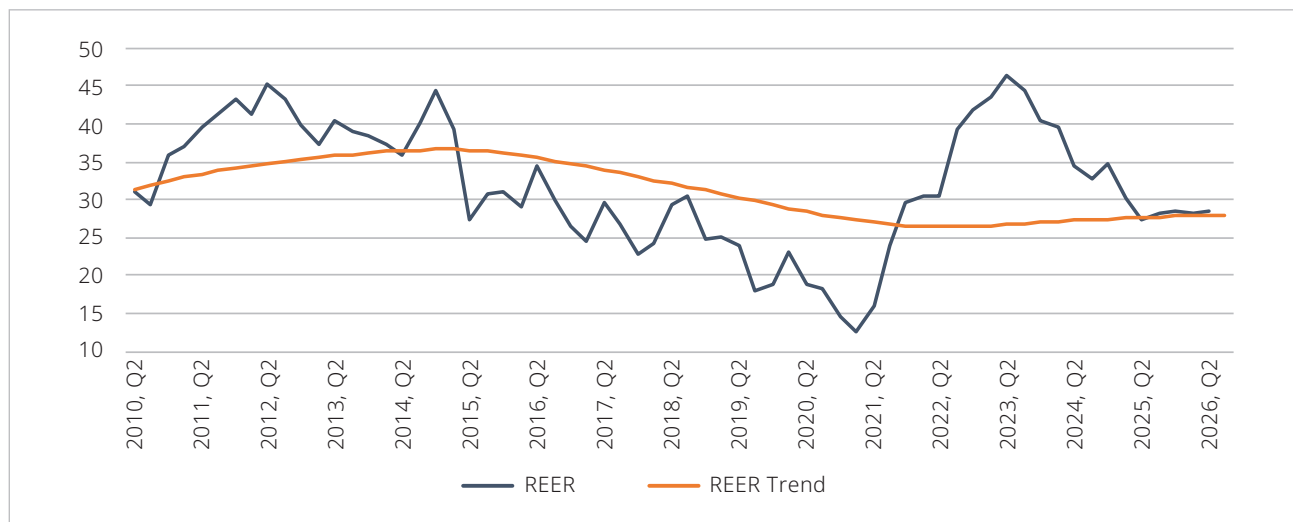


Source: GeoStat.

By contrast, Georgia entered the 2026 geopolitical shock with relatively low levels of indicators capturing long-term inflation expectations and a significantly improved external position. Since 2022, the current account balance has improved substantially amid migration-related developments and subsequent structural changes. At the same time, alongside rising productivity and incomes and the resulting gradual convergence toward more advanced economies, the medium-term equilibrium level of the real effective exchange rate has appreciated, as also reflected in the National Bank of Georgia's (NBG) estimates. The assessment of the trend in

the real effective exchange rate in recent years indicates that the positive deviation from its equilibrium level that emerged following the sharp appreciation in previous years has gradually closed (see Figure 10). Accordingly, the current level of the real effective exchange rate does not point to additional inflationary pressures through this channel. At the same time, the appreciation of the nominal effective exchange rate (NEER) acts as a disinflationary factor by reducing imported inflation. In parallel, exchange rate appreciation exerts a dampening effect on inflation through the balance sheet channel.⁴

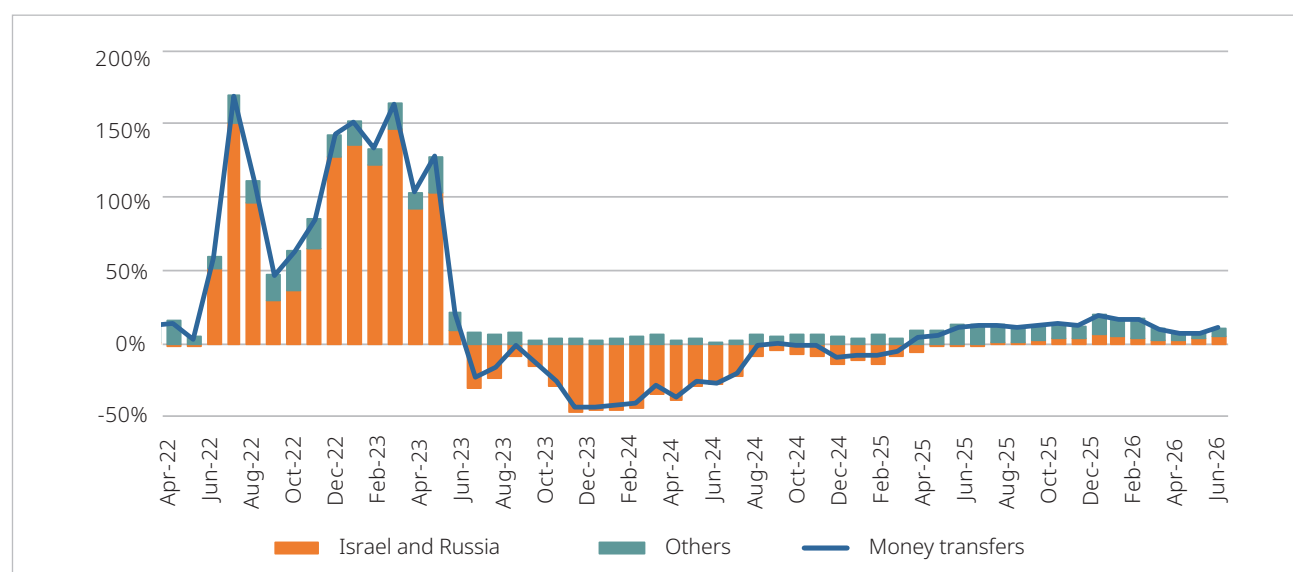
4. For borrowers with foreign-currency-denominated liabilities, the debt-servicing burden declines, easing cost pressures on firms and, consequently, reducing the need for producers to raise prices.

Figure 10. Real Effective Exchange Rate Actual and Trend Levels

Source: The National Bank of Georgia.

It is worth noting that the transmission of the Middle East conflict to Georgia's current account balance has so far been moderate, reflecting the relatively limited share of the region in Georgia's trade in goods, tourism, and money transfers. However, a higher degree of dependence may emerge in the case of individual countries or commodity groups. In this regard, money transfers dynamics are noteworthy, as they exhibited features characteristic of crisis episodes during the period of geopolitical tensions in 2026. In particular, money transfers from Israel increased significantly during the initial stage of the

conflict. A similar pattern was observed during the 2022 episode, when money transfers rose sharply in the first months of the war and subsequently stabilized gradually (see Figure 11). This may reflect the reallocation of capital and savings toward relatively safer destinations during the initial stage of a crisis, including toward Georgia. At the same time, if the conflict becomes prolonged, a weakening of economic activity in the money transfer-originating country may have the opposite effect and contribute to a decline in money transfers.

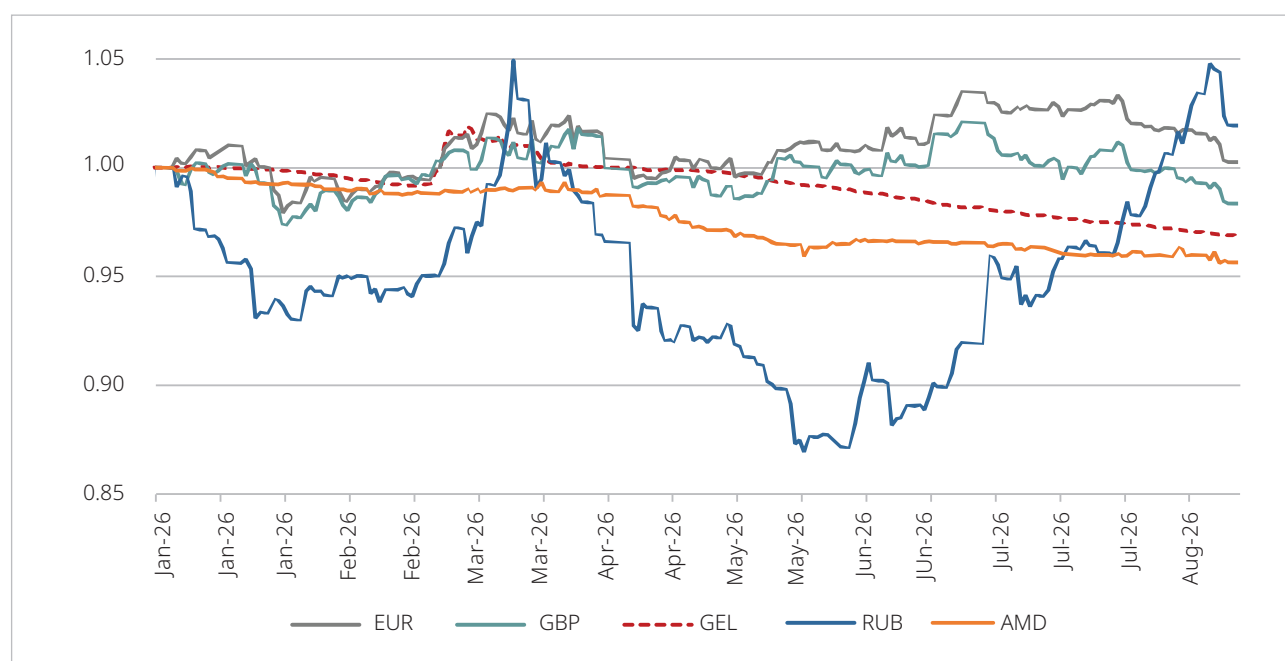
Figure 11: Money Transfers to Georgia (Decomposition of Annual Growth)

Source: The National Bank of Georgia.

Against the backdrop of relatively stable external flows, the impact of the geopolitical shock on the foreign exchange market was also limited. The immediate short-term effect of the increase in geopolitical risk was higher demand for the U.S. dollar, which was reflected in the appreciation of the global U.S. dollar index. This created one-off depreciation pressure against the U.S. dollar on both the Georgian lari and the currencies of Georgia's main

trading partners. However, this effect was small in magnitude and short-lived, and was considerably less pronounced than during the 2022 crisis, as confirmed by the econometric analysis presented below. At the same time, the initial effect of the U.S. dollar appreciation dissipated quickly, and its global index currently remains relatively weak, which, in turn, also supports the stability of the Georgian lari (see Figure 12).

Figure 12. Exchange Rate Indices against the U.S. dollar (January, 2026 = 1)



Source: The National Bank of Georgia.

Note: Data as of 24 August 2026.

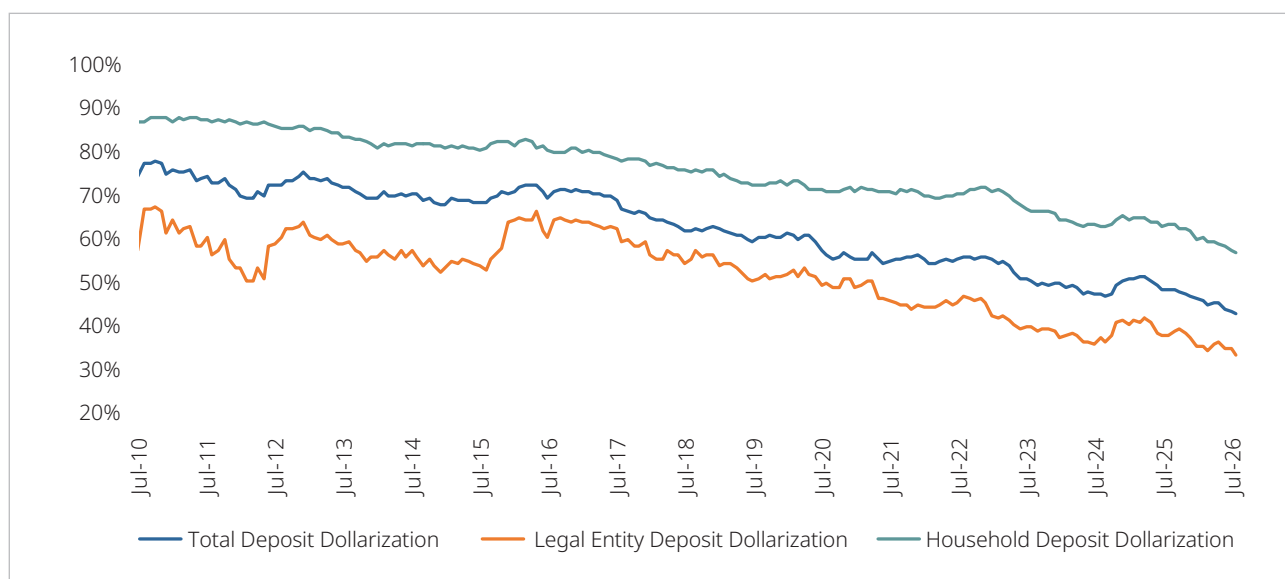
As discussed above, during the 2026 geopolitical shock, pressures on the Georgian lari were substantially weaker and more short-lived than during the 2022 episode. Against this backdrop, it is important to consider the factors that have contributed to the lari's increased resilience to external shocks in recent years. These include structural changes in the Georgian economy, in particular the relatively lower import intensity of economic growth and strong productivity growth (NBG, 2026a), which have been reflected in a significant improvement in the country's external position. The improved external balance, in turn, created more favorable condi-

tions in the foreign exchange market and reduced pressures on the lari. At the same time, favorable foreign exchange flows enabled the National Bank of Georgia to accumulate international reserves. Reserve accumulation intensified from 2025 onward, and by July 2026 gross international reserves had reached a historical high, exceeding 7.5 billion USD. The accumulation of reserves and their maintenance at an adequate level provided an additional external buffer, strengthening confidence in the foreign exchange market and resilience to external shocks (Cangul and Abel, 2026).

At the same time, among domestic macroeconomic factors, the strengthening trend of larization in recent years has also played an important role, acting as a mitigating factor in the transmission of external shocks through the exchange rate channel. The declining trend in deposit dollarization also points to increased confidence in the lari. Despite the geopolitical crises discussed above, the downward trend

in dollarization has persisted both for total deposits and for deposits of households and legal entities, reaching a historical low by June 2026 (see Figure 13). Lower dollarization, in turn, reduces the vulnerability of economic agents to exchange rate fluctuations and, consequently, weakens the transmission of external shocks to the financial sector and the real economy.

Figure 13. Deposit Dollarization (Excluding Exchange Rate Effects)



Source: The National Bank of Georgia.

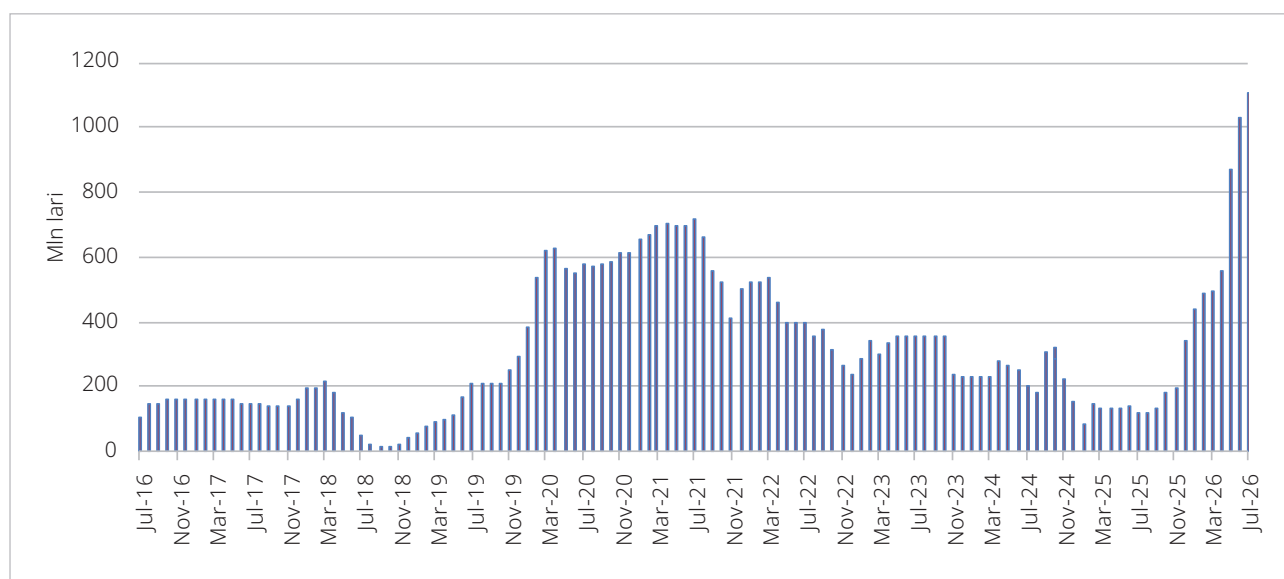
The factors discussed above: an improved external position, higher international reserves, reduced vulnerability to exchange rate fluctuations, and increased larization have also been reflected in perceptions of country risk and investors' behavior. Despite heightened geopolitical tensions in the Middle East and increased global uncertainty, Georgia's sovereign risk premium remained low (NBG, 2026b). This is consistent with both sustained investor confidence in the country and the improved assessments of Georgia's macroeconomic and financial resilience by international credit rating agencies⁵. As a result, the 2026 geopolitical shock did not trigger capital outflows from Georgia. On the contrary, amid a more differentiated allocation of capital by global investors and Georgia's improved macro-

economic fundamentals, non-resident interest in domestic government securities remains high (see Figure 14). This is consistent with the above-mentioned "K-shaped" pattern of investor behavior described by the IMF.

Thus, current inflationary pressures are primarily driven by higher energy prices and flexible-price inflation. However, against the backdrop of successive geopolitical shocks in recent years, the risks of rising long-term inflation expectations and so-called "second-round" effects remain a concern, despite the significant weakening of shock transmission through the financial channel, including through its effects on capital flows and the exchange rate.

5. On June 30, 2026, Moody's affirmed Georgia's credit rating at "Ba2" and upgraded the outlook from negative to stable. Similarly, on August 7, S&P Global affirmed Georgia's sovereign credit rating at "BB", and upgraded outlook from stable to positive. These decisions were primarily underpinned by the strong performance of the Georgian economy and its high resilience to geopolitical challenges (Moody's Ratings, 2026; S&P Global, 2026).

Figure 14. Government Securities Held by Non-Residents



Source: The National Bank of Georgia

Econometric Analysis of the Transmission of Geopolitical Shocks to Georgia

Geopolitical shocks affect the Georgian economy through both real and financial channels. However, as discussed above, none of the episodes considered was associated with a sharp and persistent deterioration in financial conditions. At the same time, the descriptive analysis suggests that the magnitude of shock transmission has varied over time, with the response through the financial channel being significantly weaker during the 2026 geopolitical shock.

To assess econometrically the patterns identified in the descriptive analysis, the analysis proceeds in two stages. First, a vector autoregressive (VAR) model is used to estimate the average response of the Georgian economy to a geopolitical risk shock over the full sample period (August 2013–June 2026). Second, the analysis assesses whether the magnitude and direction of geopolitical risk shock transmission differed between the 2022 Russia–Ukraine war and the 2026 Middle East conflict episodes. As a robustness check, the analysis additionally employs the Local Projections method (Jordà, 2005). Both approaches yield qualitatively similar results. However, given the relatively higher variability of the Local Projections estimates, the VAR model is selected as the baseline specification.

Baseline VAR:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \varepsilon_t \quad (1)$$

Where Y_t denotes the vector of endogenous variables included in the model, comprising the Geopolitical Risk Index (GPR), the Georgian lari exchange rate against the U.S. dollar, annual inflation, economic growth, the sovereign risk premium (JPM Spread), and the yield on 5-year government securities. With the exception of the GPR, all variables represent macroeconomic or financial indicators for Georgia. The GPR is the global measure of geopolitical risk developed by Caldara and Iacoviello (2022).

Several alternative model specifications were estimated, including those incorporating the monetary policy rate, dollarization, credit growth, and the nominal effective exchange rate (NEER). The baseline VAR specification was selected based on its stability, economic interpretability, and the results of diagnostic tests.

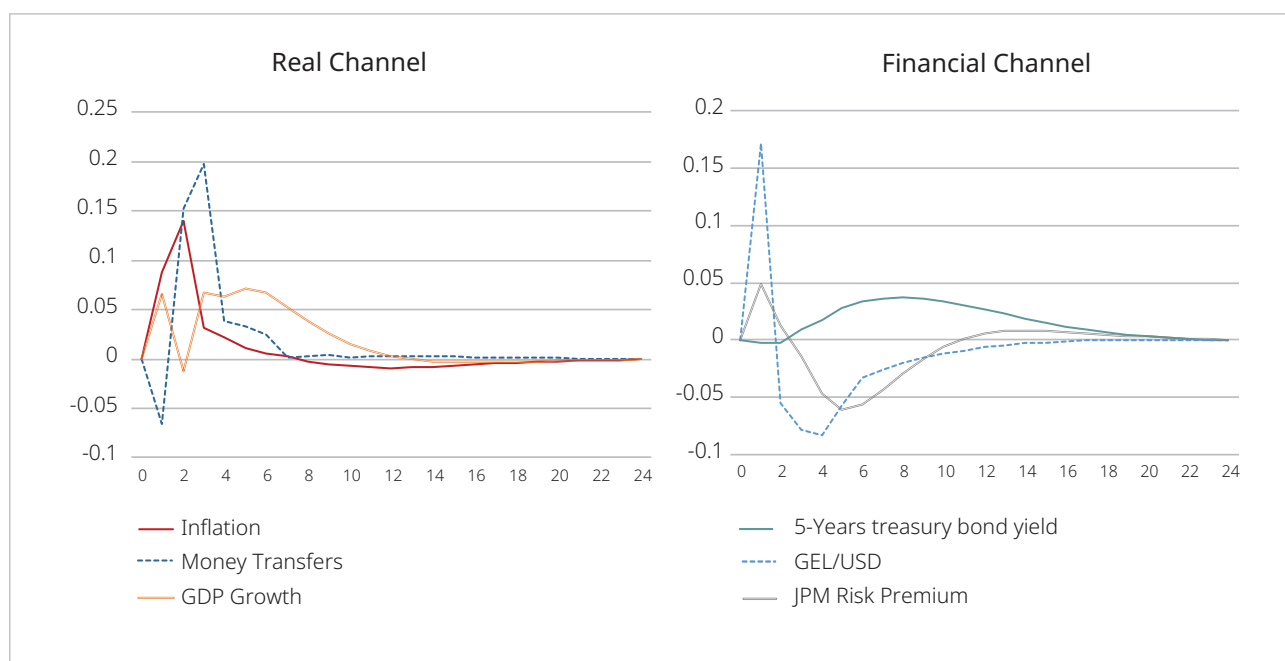
Prior to estimation, the variables were tested for stationarity and transformed where necessary. To ensure comparability, all variables were standardized using Z-scores. Accordingly, the impulse response functions show the change in each variable, measured in standard deviations, in response to a

one-standard-deviation shock to geopolitical risk. Geopolitical risk shocks are identified using a Cholesky decomposition, with the GPR index ordered first in the system. The model satisfies the stability condition, and no significant serial correlation is detected in the residuals. To account for heteroskedasticity, confidence intervals for the impulse response functions are estimated using a bootstrap procedure.

According to the baseline VAR results, the impact of a geopolitical risk shock on the real economy is reflected most rapidly in higher inflation, consist-

ent with the transmission of supply shocks through changes in energy and other international commodity prices. Economic activity initially declines, potentially reflecting increased caution among economic agents amid heightened uncertainty, but subsequently turns positive. A similar pattern is observed in money transfers, which increase sharply following an initial decline. This dynamic may partly offset the adverse effects of heightened uncertainty and is consistent with the subsequent recovery in economic activity.

Figure 15. Impulse Responses of Georgia's Economic Variables to a Geopolitical Risk Shock: Baseline VAR Model



Source: Authors' calculations.

The econometric results indicate that the response through the financial channel is relatively limited and short-lived. An increase in geopolitical risk is initially followed by a depreciation of the Georgian lari and a rise in the sovereign risk premium, consistent with the standard flight-to-safety mechanism. However, both effects dissipate rapidly and subsequently reverse: the lari appreciates, while the sovereign risk premium declines. As a result, after initially amplifying inflationary pressures, the exchange rate channel subsequently acts as a shock-absorbing factor. The response of the yield on 5-year govern-

ment securities is relatively delayed, reaching its peak after approximately eight to nine months. This delayed response may reflect expectations regarding the future path of domestic monetary policy, as well as developments in the term premium and global long-term interest rates.

Overall, the baseline results suggest that geopolitical shocks in Georgia are transmitted primarily through the real channel, while there is limited evidence of persistent amplification through the financial channel.

An Episode-Based Assessment of the 2022 and 2026 Geopolitical Shocks

In contrast to the baseline model, the episode-based analysis aims to assess whether the magnitude and direction of the transmission of geopolitical risk shocks differed between the 2022 and 2026 episodes. For this purpose, the Geopolitical Risk Index (GPR) is interacted with dummy variables corresponding to the respective episodes:

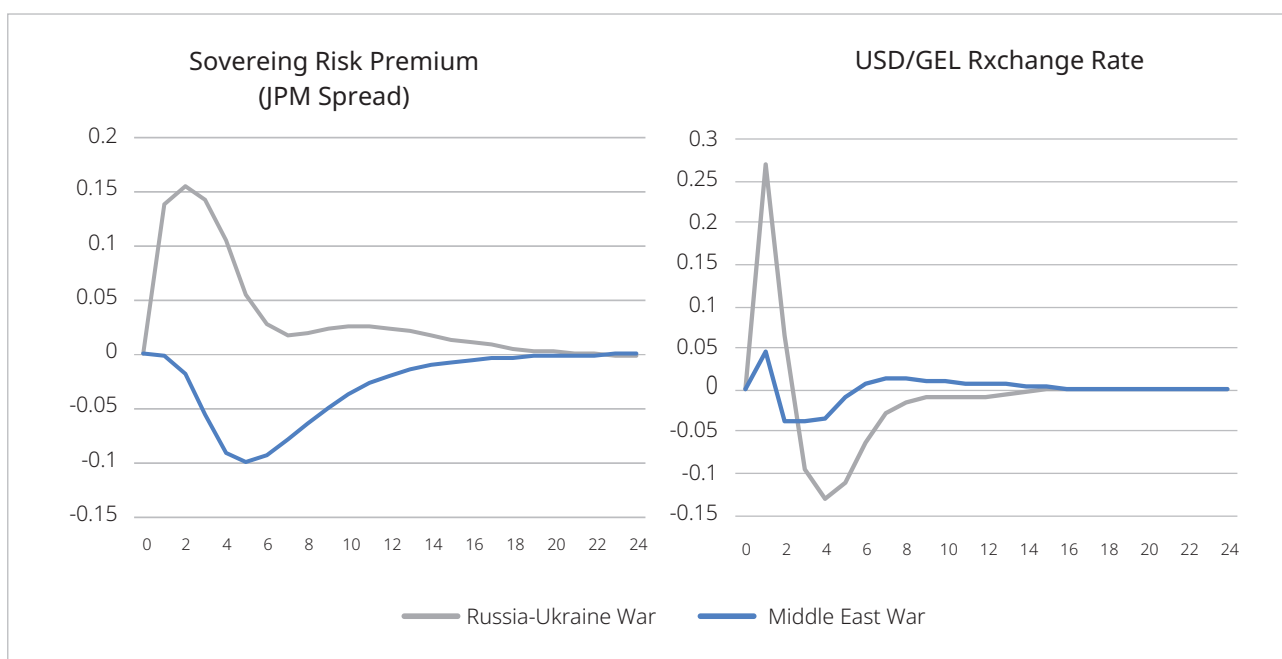
$$GPR_{2022} = GPR_{2022} * D_{2022} \quad (2)$$

$$GPR_{2026} = GPR_{2026} * D_{2026} \quad (3)$$

Where D_{2022} and D_{2026} denote the dummy variables corresponding to the 2022 Russia–Ukraine war and the 2026 Middle East conflict, respectively. This specification allows for assessing whether the transmission of GPR shocks during these episodes differed from the average response observed over the full sample.

The episode-based analysis shows that the transmission of heightened geopolitical risk through the financial channel differed markedly between the 2022 and 2026 episodes. In 2022, the increase in geopolitical risk was accompanied by relatively pronounced initial responses of the exchange rate and the sovereign risk premium, consistent with the financial transmission mechanism typically observed in emerging market economies during periods of heightened global uncertainty. However, these effects proved short-lived and reversed direction over the medium term. By contrast, the response of financial variables was considerably more muted in the 2026 episode. The initial exchange rate response was relatively small, while the sovereign risk premium declined rather than increased. These findings suggest that, despite the sharp rise in global geopolitical risk in 2026, the financial channel did not act as a significant amplifier of the initial shock in Georgia.

Figure 16. Impulse Responses of Georgia's Economic Variables to Geopolitical Risk Shocks: A Comparison of the 2022 and 2026 Episodes



Source: Authors' calculations.

The differing responses in 2022 and 2026 are consistent with the findings of the paper's descriptive analysis. The global and Georgian economies entered the 2022 shock under different initial macro-economic and financial conditions, while by 2026

Georgia's external position and financial buffers had relatively strengthened. Under these conditions, the increase in global geopolitical risk was reflected to a lesser extent in higher risk premium, capital outflows, and exchange rate depreciation in Georgia.

Conclusion

This paper examined the effects of geopolitical shocks over the 2022–2026 period on the global economy, with a particular focus on Georgia. The analysis shows that increases in geopolitical risk do not elicit a uniform response across emerging market economies and that the strength of the traditional flight-to-safety mechanism varies considerably across countries. In the case of Georgia, the financial channel has played a relatively limited role in amplifying the recent geopolitical shocks, reflecting, among other factors, the country's improved external and macroeconomic position.

These findings suggest that, in periods of heightened global risk, country-specific characteristics are becoming increasingly important for investors, making the traditional distinction between emerging and advanced economies potentially less informative for assessing the transmission of geopolitical shocks. Moreover, against the backdrop of ongoing changes in the global financial system and rising fiscal and inflation risks in advanced economies, assessing the transmission of geopolitical shocks requires looking beyond a country's classification as an emerging market economy and placing greater emphasis on its specific macroeconomic and financial position.

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THE SME FINANCING GAP: THEORETICAL FOUNDATIONS, MEASUREMENT, AND THE HIERARCHY OF STATE INTERVENTION

TORNIKE KORDZAIA

Abstract

This paper examines the theoretical nature of constraints on access to finance for small and medium enterprises (the SME financing gap) and analyzes these constraints in the case of Georgia. The paper shows that this constraint is not a temporary market failure, but a persistent equilibrium engendered by the optimal behavior of rational lenders under information asymmetry. This implies the need for triangulation in measuring constraints on SME access to finance and motivates the analysis of a normative hierarchy of state interventions (including the development of credit infrastructure, risk sharing, and subsidization). Georgian data reveal that the actual fiscal hierarchy of interventions differs in certain respects from the theoretically desirable one.

Keywords: credit rationing, information asymmetry, SME finance, additionality, credit infrastructure.

Introduction

Why does the financing of a small firm differ from that of a large corporation not only in scale but also in kind? The answer to this question constitutes one of the fundamental problems of financial economics, and one with immediate practical significance. According to the IFC, a large share of micro, small, and medium enterprises in developing countries face fully or partially constrained access to finance, and their unmet financing needs are measured in trillions of US dollars, exceeding the current volume

of lending many times over (IFC, 2017). Moreover, financial constraints weigh most heavily on the growth prospects of small firms (Beck, Demirgüç-Kunt and Maksimovic, 2005). The issue is particularly pressing for Georgia, as 99.7% of active enterprises are SMEs, accounting for 60.6% of business-sector employment and 52.3% of value added (OECD, 2026).

In public debate, the problem of limited SME access to finance is frequently reduced to the issue of “expensive credit,” with subsidization proposed as the principal remedy. The contemporary literature substantially refines this view, maintaining that credit constraints are an outcome of a market equilibrium formed under information asymmetry. Consequently, making credit cheaper addresses only the symptom rather than the underlying causes of the problem. For Georgia, the practical stakes are considerable, as, under the preferential agricultural lending program alone, interest co-financing paid by the state cumulatively amounted to GEL 1.8 billion between 2013 and 2025 (Rural Development Agency, 2026). Yet independent evaluations of the effectiveness of these interventions remain virtually non-existent.

The central proposition of this paper is as follows: the constraint on SME access to finance is an equilibrium phenomenon rather than a temporary market malfunction. The structure of the paper is built around a systematic examination of this proposi-

tion: the literature review presents its theoretical foundations; the analytical framework considers its practical implications, the methodology of measurement, and the hierarchy of intervention; and the empirical analysis, drawing on Georgian data, examines the structure of existing interventions and compares it with best practice.

Literature Review

As the literature on SME financing draws heavily on the theory of information asymmetry, it is worthwhile to briefly revisit the core tenets of this approach. According to Akerlof's classic analysis, in markets where one party possesses more information than the other, adverse selection arises, which can cause the market to contract or even collapse. Akerlof also notes that such markets themselves generate institutions that mitigate the consequences of information asymmetry, such as guarantees, brand reputation, and licensing, which serve to convey information about quality (Akerlof, 1970). The credit market is a natural manifestation of this logic: the borrower always knows more about the riskiness of their own project than the lender does. This intuition was carried further by Stiglitz and Weiss: under information asymmetry, the credit market may, in equilibrium, be characterized by credit rationing. There exist creditworthy borrowers who are willing to pay the prevailing or even a higher interest rate yet still fail to obtain a loan, because the bank deliberately refrains from raising the rate, as a higher rate would worsen the average quality of the pool of borrowers (Stiglitz and Weiss, 1981). The framework of Berger and Udell adds a practical dimension to this foundation: SME finance depends on lending technologies whose effectiveness is determined by the country's credit infrastructure. These include relationship lending, in which the bank accumulates informal (soft) information about the borrower over time, and transactions-based lending, which relies on financial statements, assets, and scoring (Berger and Udell, 1995; 2006); large banks, in turn, are able to serve the segment effectively through transactions technologies (de la Torre et al., 2010).

The Stiglitz–Weiss result rests on a deeper mechanism than the mere observation that credit is “ex-

pensive.” In this model, the bank's expected return is non-monotonic with respect to the interest rate: up to a certain threshold, an increase in the rate raises the bank's expected revenue, but beyond that threshold the deterioration of the average quality of borrowers and the shift toward riskier projects outweigh the price effect to such an extent that the expected return declines. As a result, the credit supply curve bends backward, and in equilibrium some borrowers who are identical in observable characteristics obtain loans while others do not, even if those refused are willing to pay a higher interest rate. The authors also show that tightening collateral requirements cannot automatically resolve the problem, since this too can worsen the composition of applicants (Stiglitz and Weiss, 1981). A precursor to the same logic is Akerlof's observation that markets with information asymmetry themselves give rise to counteracting institutions such as guarantees, brand reputation, and licensing (Akerlof, 1970). The key argument of this paper rests on the intersection of these two observations: if the constraint on finance is driven by information asymmetry, then overcoming it must rely primarily on informational and institutional mechanisms rather than on interventions that act through the interest rate.

Empirical studies consistently corroborate this theoretical pattern. Drawing on data from thousands of firms across 80 countries, Beck, Demirgüç-Kunt, and Maksimovic demonstrate that firm size is a significant determinant of financial constraints; the reported obstacles translate into slower firm growth, and this effect is strongest for the smallest firms. At the same time, financial and institutional development weakens this relationship, implying that small firms benefit the most from institutional reforms (Beck et al., 2005). Research into the determinants of financing obstacles refines this picture further: obstacles are most frequently faced by young, small, and domestically owned firms, while at the country level the decisive role is played by the quality of institutional development (Beck et al., 2006). Using data for Eastern Europe, Brown et al. (2011) show that among firms with a demand for credit, “discouraged” borrowers—that is, firms that never apply for credit—considerably outnumber those ac-

tually rejected; moreover, survey-based perceptions of obstacles correlate closely with actual constraints (Kuntchev et al., 2013).

In the literature on intervention, the central concept is additionality: guarantee schemes operate in many dozens of countries (Beck et al., 2010), yet convincing measurement of additionality is rare, and the political attractiveness of such schemes may exceed their economic justification (Honohan, 2010). In the Georgian context, existing studies have concentrated mainly on the transparency and administration of state programs supporting small business (Papa-va, 2013).

The part of Berger and Udell's conceptual framework that concerns the diversity of lending technologies is of particular significance here. The authors distinguish among several transactional lending technologies: financial statement lending, small business credit scoring, asset-based lending, factoring, and leasing, each of which relies on a different source of information and corresponds to firms with different degrees of opacity. Their principal conclusion is that the availability of these technologies is determined by the country's credit infrastructure: the information environment, the legal and judicial system, the bankruptcy regime, and the regulatory framework (Berger and Udell, 2006). Accordingly, the most effective route for the state to broaden SME financing is not the subsidization of individual loans but the development of infrastructure.

The empirical effect of relationship lending is assessed in an earlier study by Berger and Udell, which demonstrates that as the duration of the bank relationship increases, both the interest rate and the probability of a collateral requirement decline, confirming that "soft" information accumulated over time genuinely reduces asymmetry and makes credit cheaper (Berger and Udell, 1995). This conclusion is also instructive for the Georgian context, as alongside digital and scoring technologies, relationship-based models retain importance in segments where informally acquired information plays a decisive role.

An Analytical Framework for SME Access to Finance

The mechanism of credit rationing rests on two principal channels. The first is adverse selection: the interest rate is simultaneously a price and a mechanism for selecting borrowers. As it rises, safe projects leave the market while high-risk ones remain, because their downside is capped by limited liability. The second channel is moral hazard: a high interest rate pushes even funded borrowers toward riskier projects. Hence, even in conditions of excess demand, the bank does not raise the rate but restricts the extension of credit (Stiglitz and Weiss, 1981). The gap, therefore, may represent not a deviation from equilibrium but the equilibrium itself. In the SME segment, the preconditions for rationing are systematically acute: financial statements are incomplete, credit histories are short, the finances of the business and its owner are intertwined, and the fixed costs of monitoring are disproportionately high relative to a small loan. The distinguishing empirical mark of equilibrium rationing is that successful and rejected applicants may be identical in observable characteristics: rejection does not mean that a firm is "bad," but rather that the price mechanism fails to clear the market.

Under these conditions, collateral plays a dual role: on the one hand, it mitigates the consequences of asymmetry, while on the other, it becomes an independent barrier to access, as the selection criterion "Is the business good?" is replaced by the criterion "Does the business own real estate?" The cost dimension lends the problem an industrial organization dimension as well: the unit cost of a small loan is high, pushing banks to replace individual analysis with standardized technology. Transactional technologies require economies of scale (Berger and Udell, 2006). The development of scoring transforms the collateral barrier: the problem of access is converted into a problem of price. A borrower who has never applied is, by definition, invisible in supply-side statistics. This is precisely why the phenomenon of the "discouraged" borrower is of fundamental importance (Brown et al., 2011). Measurement therefore requires a triangulated

approach: the reconciliation of benchmarking estimates (IFC, 2017), firm-level surveys (World Bank, 2023), and supply-side indicators (OECD, 2026). For analysis, it is useful to classify firms by the degree of constraint (fully, partially, and non-constrained), since under equilibrium rationing a large part of the financing gap lies precisely in the intermediate category: the firm obtains credit, but not in the volume, maturity, or currency that corresponds to its investment needs (Kuntchev et al., 2013). According to the normative criterion, intervention is justified only where its benefits exceed its fiscal costs and side effects, particularly the distortion of price signals, the crowding out of private credit, and the erosion of incentives (Honohan, 2010). By this criterion, the hierarchy of intervention instruments is as follows: on the first tier stands credit infrastructure (information sharing, mechanisms for security interests in movable property, and an effective insolvency regime), which acts on the fundamental causes of credit rationing without fiscal expenditure; on the second tier are risk-sharing instruments, implemented on the basis of partial coverage and the assessment of their additionality (Beck et al., 2010); and on the final tier is interest-rate subsidization, which acts mainly on the symptom and distorts the signals guiding resource allocation.

The literature on the design of guarantee instruments also offers specific reference points: the majority of partial guarantee funds operating worldwide are established with state participation, and their effectiveness is determined by the coverage

ratio, the fee structure, the payout rules, and the selection criteria. A limited guarantee coverage ratio is of fundamental importance, since it preserves the bank's incentives for screening and monitoring (Beck et al., 2010). Honohan additionally notes that the fiscal risks of guarantee schemes often become apparent only later, that fees rarely reflect true risk, and that evidence on additionality is, as a rule, not verified by independent evaluation (Honohan, 2010).

The need for triangulation becomes clearer once it is recognized that each of the three methodologies carries its own distinct systematic bias. The benchmarking approach measures the gap against a hypothetical best practice and therefore tends toward overstatement (IFC, 2017); firm-level surveys, by contrast, systematically understate the scale of financing constraints, since their samples consist mainly of operating and relatively mature firms (World Bank, 2023). Supply-side indicators are precise in describing what has happened but, by their nature, cannot capture what has not happened: neither rejected nor never-submitted demand (OECD, 2026). A reliable conclusion is therefore possible only when all three lenses point to the same picture, and the analysis that follows is guided by this principle.

An Illustration of the Structure of SME Access to Finance Using Georgian Data

In Georgia, the gap in the financing of small and medium firms lies not in the volume of financing, but in its structure. The key indicators are summarized in Table 1.

Table 1. Key credit indicators of Georgia's SME sector

Indicator	Value	Period
SME loan portfolio	GEL 23.9 billion (+12.6%)	2024
Share in business loans	66%	2024
Average interest rate	10.8% (2010: 17.5%)	2024
Non-performing loans: SME sector / system-wide	5.2% / 2.5%	2024
Share of new loans in foreign currency	approx. 50%	2025
Investment financed from internal funds	68.6%	2023

Source: *The National Bank of Georgia (2025 a); OECD (2025); World Bank (2023); GBC (2025).*

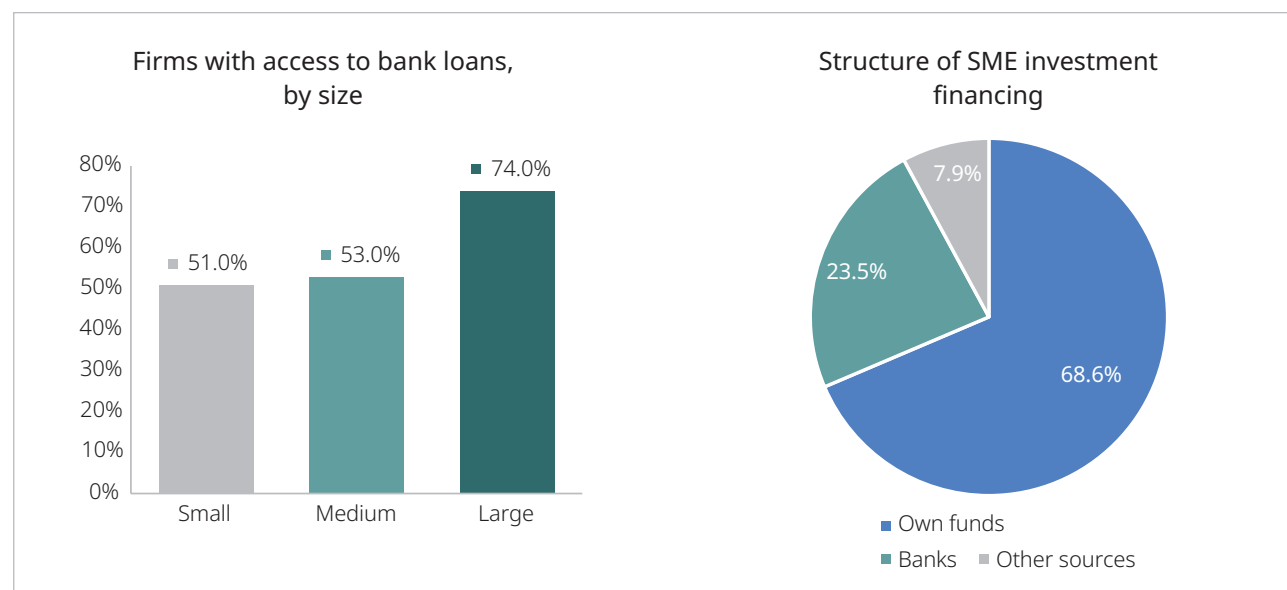
As the table shows, the quantitative indicators present an optimistic picture: the business loan portfolio is growing rapidly, its share in the total loan portfolio stands at 66% and is high by international standards, while the average interest rate has almost halved over the past fifteen years (OECD, 2026). At the same time, 98.8% of firms hold a bank account, and only 16.5% identify access to finance as their principal obstacle (World Bank, 2023).

A more detailed analysis of access to finance shows that access to bank credit rises with firm size: the indicator stands at 51% for small firms, 53% for medium-sized firms, and 74% for large firms. At the same time, 68.6% of SME investment is financed from internal funds, with banks contributing only 23.5%. This indicates that short-term working capital finance is comparatively accessible, whereas long-term investment finance remains constrained, consistent with the theoretical expectations of credit rationing (see Figure 1). Furthermore, the survey does not cover the micro-enterprise segment at all, while the regional pattern of “discouraged” bor-

rowers indicates that official loan rejection statistics cannot capture the true scale of the financing problem (Brown et al., 2011). It is also noteworthy that in the ranking of the main obstacles to SME activity, access to finance occupies only third place, preceded by political instability and a shortage of qualified workers (World Bank, 2023).

The near-halving of the average interest rate since 2010 warrants separate interpretation. This dynamic does not in itself indicate a reduction in the SME-specific risk premium. It is driven, on the one hand, by the optimization of the operating costs of lending and the reduction of information asymmetry and, on the other, by changes in the overall level of interest rates in the economy. From a theoretical perspective, the critical point is that, despite the improvement in the average rate, the dispersion of interest rates across sub-segments persists. This indicates once again that aggregate indicators alone are insufficient to identify equilibrium constraints on SME access to finance.

Figure 1. Access to loans by firm size and the structure of SME investment financing in Georgia



Source: World Bank (2023).

Note: Small firms are defined as firms with 5–19 employees, medium-sized firms as those with 20–99 employees, and large firms as those with 100 or more employees.

Thus, a large share of Georgian SMEs is formally integrated into the financial system, holds a bank account, and frequently uses bank credit, yet does not necessarily obtain financing in the volume, with the maturity, or on the terms required for funding capital investment. Accordingly, partial financial constraint, rather than complete financial exclusion, appears to be the dominant pattern, consistent with the predictions of the equilibrium model of credit rationing (Kuntchev et al., 2013).

In terms of price, the problem lies not in the average interest rate but in its dispersion. As a result of the introduction of scoring technologies, the leading banks have significantly relaxed collateral requirements on small loans; however, risk has largely been repriced through higher interest rates, whereas collateral remains a significant constraint for investment-scale financing. The comparatively high share of non-performing loans (5.2%, compared with a system-wide average of 2.5% in 2024) raises the risk premium. Although roughly three-quarters of the loan market is held by two banks, concentration has not translated into large-scale financial exclusion: 80–90% of new loans are extended through digital channels, and in both banks SME banking is organized as a distinct business line (Lion Finance Group, 2026; TBC Bank Group, 2026).

With regard to the institutional environment, it should be noted that those elements of credit infrastructure that the theoretical hierarchy places on the first tier are already well developed in Georgia or are being actively strengthened in several directions. The credit information system operates with virtually complete coverage (World Bank, 2021). Since 2021, an updated insolvency framework has been in force, increasing the predictability with which creditors' claims are satisfied. The National Bank of Georgia is introducing a unified SME reporting framework and a segment-level data dashboard. In addition, the fintech development strategy and the introduction of open banking are laying the foundations for credit scoring based on transactional data,

which directly reduces information asymmetry. The refinement of the system of security interests over movable property, however, remains a challenge; its further development would substantially broaden the range of acceptable collateral.

According to the theoretical framework, the interventions listed above are directed at the informational factors that give rise to credit rationing and, unlike interest subsidization, require no significant fiscal expenditure and do not distort price signals. This picture carries a twofold significance for the present analysis: on the one hand, it confirms that first-tier institutional development is underway in Georgia; on the other, the comparatively low visibility of these measures contrasts with the politically more conspicuous flows of subsidization.

Among the principal instruments of state support, the largest in fiscal terms is the preferential lending program for the agricultural sector, whose primary objective is to reduce the cost of borrowing through interest-rate subsidization.¹ Between 2013 and 2025, approximately GEL 7.7 billion of preferential credit was extended under the program, while state-funded interest co-financing reached GEL 1.8 billion. In certain periods and sub-components of the program, the borrower's interest burden fell to as little as 1–2% (Rural Development Agency, 2026).

In parallel with the Preferential Agro-Credit Program, the Rural Development Agency also implements the program "Plant the Future," which provides co-financing for perennial orchards, nurseries, berry crops, and irrigation systems and does not constitute an instrument of interest subsidization (Rural Development Agency, 2026).

The instrument most directly aimed at the problem of credit rationing is the credit guarantee scheme, which until 2026 was implemented by the program "Produce in Georgia" and, following its reorganization, by the newly established JSC Georgian Economic Development Corporation (GEDC). Under the

1. As of 1 July 2026, the Preferential Agro-Credit Program no longer operates in its previous format. Its main credit mechanisms have been integrated into the new State Program for Agro Co-financing, which brings together various financial instruments to support the agricultural sector.

scheme, the state shares part of the credit risk and thereby reduces the lender's potential loss, which in turn improves access to credit for enterprises lacking sufficient collateral.

The design of the state credit guarantee scheme is consistent with international practice: the guarantee covers no more than 80% of the loan principal, while for each commercial bank the limit on the guaranteed portfolio is 35%. In 2024, the volume of guaranteed loans amounted to GEL 259 million, approximately 1% of the SME loan portfolio (OECD, 2026).

The Georgian Economic Development Corporation also implements the Micro-Entrepreneurship Support Program, which combines a credit guarantee on a loan extended by a commercial bank or a microbank with technical support in the form of business diagnostics. Viewed through the hierarchy of interventions, this combination unites two distinct but complementary mechanisms: the guarantee facilitates credit risk sharing, while business diagnostics improves the quality of information available about the enterprise and thereby contributes to reducing information asymmetry. These mechanisms are particularly relevant for the micro-enterprise segment, where the scarcity of information and the limited capacity to provide collateral constitute significant drivers of credit rationing.

A significant component of the Georgian Economic Development Corporation's support is the "Business Universal" program, which provides interest co-financing for loans and leasing projects of between GEL 50 thousand and GEL 10 million, on the condition that at least 50% of the financing is allocated to capital investment. The program, moreover, brings together three forms of support within a single framework: interest co-financing, credit guarantees, and grant funding. The grant amounts to 15% of the loan-financed expenditure, rising to 20% for women entrepreneurs, with a ceiling of GEL 500 thousand (Georgian Economic Development Corporation, 2026).

The smallest program in fiscal terms is the grant program of the Georgian Innovation and Technology Agency (GITA), which targets early-stage technology firms, a segment for which bank financing is typically of limited availability (GITA, 2026).

In instrumental terms, the programs described above fall into two principal groups: price instruments, which reduce the cost of credit, and instruments of direct financial support, which finance part of the investment outlay. Both groups belong to the comparatively lower tiers of the theoretical hierarchy, since the intervention is directed at either the price of credit or the investment expenditure itself rather than at reducing information asymmetry directly.

The empirical analysis, moreover, reveals two further important circumstances. The first is the qualitative financial exclusion of the micro segment: micro businesses frequently obtain credit, but predominantly in the form of consumer products, on consumer interest terms, and outside business credit statistics—a pattern that may be described as the "consumerization" of financial relations.² The second circumstance is the persistence of interest-rate dispersion.

Discussion of Results: The Actual and the Desirable Hierarchy

In Georgia, the constraint on SME access to finance is not visible in volume indicators, yet it may be located in the structure and terms of financing. The largest share of resources is directed toward subsidies, the effectiveness of which has been questioned in the economic literature. The substantially reduced final interest rate resulting from the subsidy weakens the role of price as a signal for the efficient allocation of resources. Significantly fewer resources are allocated to risk-sharing mechanisms, as well as to instruments supporting small-scale infrastructure and early-stage development. At the same time, external evaluations of individual programs are available, including an evaluation of the Georgia National Innovation Ecosystem (GENIE) Project implemented by GITA. However, no publicly availa-

2. The migration of micro-business financing into the consumer segment.

ble counterfactual assessment of additionality has determined what proportion of the financing supported by these instruments would not have been provided in the absence of government intervention (World Bank IEG, 2024). Honohan's (2010) critique is therefore fully relevant in the Georgian context.

Subsidization is distinguished by high visibility, whereas infrastructural investments are comparatively slow and less conspicuous, reflecting the classic asymmetry of political economy. Against the argument that subsidization is justified because the price of credit for SMEs is "objectively high," equilibrium analysis advances two principal counterarguments. First, if the high interest rate is the rational reflection of high expected losses (as confirmed by the segment's non-performing loan ratio, which is twice the system average), its administrative reduction does not reduce risk; it merely transfers it to the taxpayer and weakens the market's risk-based selection mechanism. Second, a permanently operating subsidy alters the expectations of economic agents: borrowers come to perceive the subsidized rate as the "norm," which over time impedes the development of the unsubsidized credit market. At the same time, mechanisms targeting the factors that generate the market's deficit are already developing in Georgia: open banking and credit scoring based on transactional data are reducing information asymmetry in the micro segment (NBG, 2025 b).

The decisive constraints differ across segments. In the micro segment, the principal problem is information asymmetry, and the highest return therefore lies in the development of information infrastructure. For small enterprises, the central barrier is the collateralization of investment finance, a challenge addressed by an effective legal framework for security interests over movable property and credit guarantee mechanisms. For medium enterprises, the main challenge is the price of financial resources and the terms of lending, where the decisive role belongs to competition and market instruments. Accordingly, the portfolio of interventions should be differentiated so that each instrument is aimed at the constraint it is intended to overcome.

To complete the picture of the program landscape, two further important circumstances warrant attention. The first is fragmentation: instruments are distributed across different agencies, with differing criteria, limits, and reporting rules, which complicates navigation for beneficiaries and raises the state's cost of maintaining unified fiscal and outcome accounting. The second is hybridization: programs that simultaneously combine interest co-financing, a guarantee mechanism, and a grant render the assessment of additionality practically impossible, since it becomes exceedingly difficult to determine which component led to the extension of the loan and which merely constituted a transfer to a borrower who would have obtained financing even without state support. According to the theoretical framework, the multiplicity of instruments is not in itself a mark of policy quality. On the contrary, the more price and transfer components are added to the intervention portfolio without an assessment of additionality, the further the actual structure departs from the normative hierarchy.

Conclusion

The constraint on SME access to finance is an equilibrium phenomenon: under conditions of information asymmetry, it constitutes the stable outcome of the optimal behavior of rational lenders. Accordingly, the constraint must be traced to the structural factors that give rise to it, and state intervention must be directed precisely at these causes. An intervention that reduces information asymmetry or the lender's expected loss is superior, in terms of economic efficiency, to an intervention that merely lowers the price of credit. This is precisely the principle that the current hierarchy of interventions in Georgia violates.

The priorities of practical policy may be summarized as follows: (1) the strengthening of credit infrastructure, including the further development of the system of security interests over movable property, the insolvency regime, the regular publication of segment-level statistics, and open banking; (2) scaling up the credit guarantee scheme in parallel with an independent assessment of additionality; and (3) the phased reduction of interest subsidization.

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CREDIT DERIVATIVES AND SECURITIZATION: STRUCTURED FINANCE INSTRUMENTS AS AN ALTERNATIVE FUNDING CHANNEL FOR GEORGIA

LEVAN SURGULADZE

Abstract

This paper examines structured finance instruments as an effective funding channel for Georgian companies, financial institutions and public-sector entities with suitable assets or predictable cash flows. It explains how true sale, asset isolation, tranching and credit enhancement transform an underlying portfolio into securities with different risk-return profiles, thereby broadening the domestic and international investor base. Building on the portfolio credit-risk methodology developed in the author's preceding papers, the study presents an approach to the valuation of securitization tranches and analyzes funding economics, Georgia's legal framework, the 2008 JSC Auto Finance transaction and an illustrative contemporary structure based on telecommunications-service receivables. The analysis demonstrates the mechanisms through which properly structured securitization provides access to longer-term capital, broadens the investor base and lowers funding costs relative to unsecured financing priced on the basis of the company's overall risk.

Keywords: securitization, structured finance, asset-backed securities, collateralized debt obligations, collateralized loan obligations, credit-linked notes, credit enhancement, special-purpose vehicle, true sale, Monte Carlo simulation, funding, Georgia.

Introduction

Access to diversified, long-term funding is an important prerequisite for the development of capital-intensive projects. Conventional bank lending and unsecured bond issuance, however, do not always provide an efficient or sufficiently diversified funding base. The cost and availability of such financing depend directly on the credit quality of the funding recipient, while potential investors differ in their risk-return requirements, investment horizons and regulatory constraints. Structured finance offers an alternative approach that links financing more directly to the quality and cash-generating capacity of identifiable assets or portfolios (Fabozzi and Kothari, 2008).

Securitization transforms a portfolio of assets, receivables or other predictable cash flows into securities that can be offered to investors (Fabozzi and Kothari, 2008; Jobst, 2008). Through tranching, credit enhancement and the allocation of cash flows and losses specified in the transaction terms, the same underlying portfolio can support securities with substantially different risk-return profiles. Accordingly, the investor base is broadened not by seeking investors with identical preferences, but by transforming the underlying portfolio into securities tailored to different risk appetites. Senior securities may be suitable for conservative institutional inves-

tors, while higher-yielding subordinated tranches may appeal to investors willing to assume greater risk. The originator may retain the equity or first-loss tranche and the associated residual return. External guarantees and other forms of credit protection can further modify the risk profile and facilitate participation by investors that otherwise could not or would not assume the corresponding exposure (Fabozzi and Kothari, 2008).

This mechanism is potentially of particular importance to Georgia. Companies and financial institutions often hold portfolios of loan assets, leases, trade receivables or other cash-producing assets, while public-sector entities and infrastructure companies generate relatively predictable future cash flows. Transforming suitable exposures into investable securities can diversify funding sources and provide access to domestic and international portfolio capital without requiring investors to assume the originating entity's undifferentiated credit risk. Georgia's recently established securitization framework provides a solid legal basis for developing such transactions (Parliament of Georgia, 2023). The framework permits the transfer of credit risk associated with underlying assets through the transfer of those assets or other forms of risk assumption, including derivatives. It also provides for securitization through tranching (Parliament of Georgia, 2023). Practical implementation, however, requires appropriate asset selection, legal segregation, servicing, risk assessment, credit enhancement, pricing and investor protection.

The present paper completes the author's series on credit derivatives and securitization. The preceding publications examined single-name credit instruments and subsequently extended the analysis to multi-name credit instruments, correlated defaults, portfolio loss distributions, tranching and fair-spread valuation (Surguladze, 2026a, 2026b). The present study applies this analytical framework to structured finance transactions. It discusses the principal securitization instruments and structures, including traditional and synthetic forms, as well as internal and external credit-enhancement mechanisms and their role in allocating risk among orig-

inators, investors and credit-protection providers.

The paper then applies this framework to the practical structuring and economics of securitization. Particular attention is given to the mechanisms through which asset isolation, tranching and credit enhancement broaden the investor base, transform funding maturity and reduce the weighted average cost of funding. The analysis considers Georgia's current legal framework, the 2008 JSC Auto Finance transaction and an illustrative contemporary structure based on telecommunications-service receivables. It also examines tranche valuation, internal and external credit-enhancement mechanisms, rating arbitrage and the lessons of the global financial crisis. It identifies potential applications for financial institutions, private companies, infrastructure projects and public-sector enterprises.

Economic Logic and Principal Instruments of Securitization

Economic logic of securitization

The fundamental economic rationale for securitization is that the credit quality and cash-generating capacity of particular assets may differ materially from the overall credit quality and funding capacity of the entity that owns them. A company, financial institution or public-sector entity may hold loans, receivables or other assets generating predictable cash flows, while its ability to raise conventional unsecured financing remains constrained by its credit quality, balance-sheet structure, funding concentration or the risk limits of potential investors. Securitization provides a mechanism for linking financing more directly to specified assets and the cash flows they generate (Fabozzi and Kothari, 2008; Jobst, 2008).

Through the priority allocation of cash flows from the underlying portfolio and the subordination of tranches, securitization creates securities with different credit quality and risk-return profiles from the same pool of assets. Senior tranches receive payments from portfolio cash flows first. If the available cash flows are insufficient to satisfy the claims of all tranches in full, the resulting shortfall is borne initially by the equity, or first-loss, tranche and pass-

es to the mezzanine and more senior tranches only after the equity tranche has been exhausted. This enables relatively conservative, intermediate-risk and higher-return-seeking investors to participate in different parts of the same financing structure in accordance with their respective investment objectives and risk constraints. In this way, the risk of the same portfolio is offered to investors through securities with different credit quality and return characteristics.

The originator may retain the equity, or first-loss, tranche. Such retention improves the credit quality of the more senior securities, preserves the originator's economic interest in the performance of the underlying assets and may allow it to receive the residual return remaining after all contractual payments and expenses have been made and credit losses absorbed. Accordingly, securitization does not necessarily involve transferring all of the underlying credit risk. It allows the originator to determine which layers of risk to retain and which to transfer to investors.

Asset-backed securities

In a traditional securitization, a portfolio of loans, receivables or other cash-generating assets is transferred to a special-purpose vehicle (SPV), which finances the acquisition of the portfolio by issuing and selling securities to investors. Cash flows subsequently generated by the underlying assets are used to service those securities in accordance with the payment priority specified in the transaction terms (Jobst, 2008; Gorton and Souleles, 2006).

Common underlying assets include auto loans and automobile-related receivables, consumer and credit-card loans, leases and trade receivables. Mortgage-backed securities (MBS), one of the most established forms of traditional securitization, apply the same general principle to portfolios of residential or commercial mortgage loans.

An important element of such transactions is the legal separation of the securitized assets from the originator. Where the assets are transferred through a legally effective true sale, the objective is

to prevent them from becoming part of the originator's insolvency estate and from being available to satisfy the claims of its general creditors. As a result, the servicing of the issued securities depends primarily on the performance of the securitized asset portfolio rather than on the originator's overall financial condition. The combination of a bankruptcy-remote SPV and an effective true sale is intended to achieve this legal separation (Gorton and Souleles, 2006). The legal effectiveness and precise consequences of a true sale depend on the applicable jurisdiction and transaction documentation.

Collateralized debt obligations

Collateralized debt obligations (CDOs) extend the securitization principle to broad portfolios of credit exposures. A CDO's underlying portfolio may contain loans, bonds or other credit exposures. Collateralized loan obligations (CLOs) are a type of CDO whose underlying portfolio consists primarily of loans. The securities issued against the portfolio are divided into tranches with different attachment and detachment points. The economic effect of portfolio losses is borne initially by the equity tranche and passes to more senior tranches only after the equity tranche has been exhausted, whereas payments specified in the transaction terms generally follow the opposite priority, with senior claims receiving payment before subordinated claims (Fabozzi and Kothari, 2008).

The valuation of CDOs and their tranches depends not only on the credit quality of the individual underlying exposures, but also on their dependence structure and the resulting portfolio loss distribution. These issues were examined in Surguladze (2026b), where correlated times to default, portfolio losses and tranche fair spreads were modeled using a Gaussian copula and Monte Carlo simulation. The present paper uses this framework to analyze how a securitization structure can be constructed around a given asset portfolio and how the resulting tranches can be allocated among investors with different risk-return requirements.

For the valuation of CDO tranches, it is particularly important to distinguish the market spread of the

underlying instrument from the credit spread used to calibrate its probability of default. This distinction is considered within the valuation and structuring methodology below.

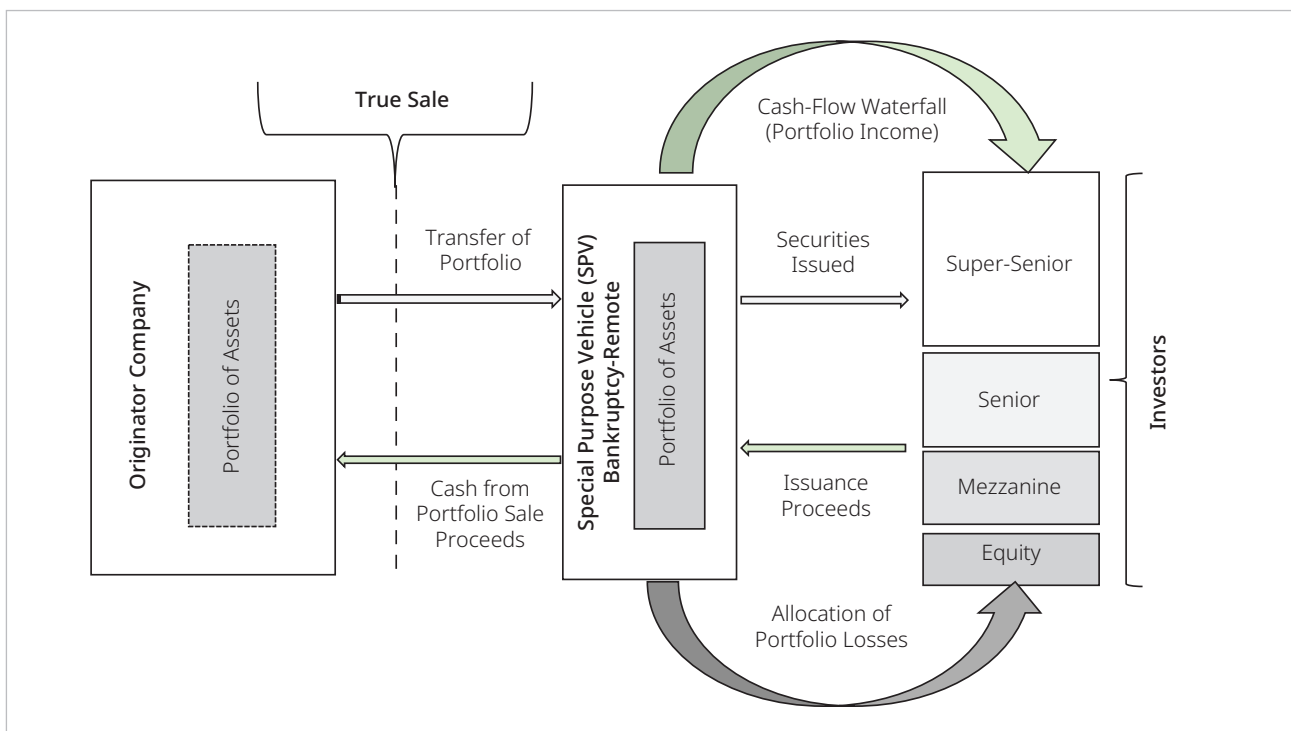
Credit-linked notes and synthetic securitization

Securitization does not always require the legal transfer of the underlying assets. In a synthetic securitization, the originator retains the assets while transferring specified credit risk through credit derivatives, guarantees or other forms of contractual protection. A credit-linked note (CLN) provides one funded mechanism for transferring such risk: payments of interest and/or principal on the note depend on the performance of a specified reference credit or portfolio. By purchasing the note, the in-

vestor pre-funds a potential credit-protection payment and, at the same time, assumes the credit risk associated with the specified reference exposure.

Traditional and synthetic structures may serve different objectives. Traditional securitization raises funding through the sale or transfer of cash-generating assets, while a synthetic structure may be used primarily to transfer selected layers of credit risk without disposing of the underlying portfolio. Hybrid structures may combine funded securities, exposures retained by the originator and external credit protection. The appropriate structure therefore depends on whether the originator seeks to raise funding, transfer credit risk, manage balance-sheet exposures, broaden the investor base or pursue some combination of these objectives.

Figure 1. General Structure of a Traditional Securitization Transaction



Source: Author's illustration.

Transaction Architecture, Cash-Flow Waterfall and Credit Enhancement

Transaction architecture

Figure 1 visually summarizes the traditional securitization mechanism described above: the originator transfers a portfolio of eligible assets to a spe-

cial-purpose vehicle (SPV) through a true sale and receives the purchase price of the portfolio, while the SPV finances the acquisition by placing securities with investors. The transaction documentation and offering terms define the functions of the participants, the rights of the different classes of investors and the priorities of payment, thereby linking

the legally segregated asset portfolio to the securities issued against it (Fabozzi and Kothari, 2008).

The SPV generally performs a narrowly defined function and does not conduct ordinary business operations. Administration and servicing of the underlying assets may remain with the originator acting as servicer or may be assigned to another entity. Depending on the transaction, additional participants may include an arranger, account bank, trustee or bondholders' representative, rating agency, hedge provider and external credit-protection provider. The respective functions and obligations of such participants are established in the transaction documentation so that the collection, allocation and distribution of cash flows can continue in accordance with the terms of the securitization throughout the life of the securities.

Cash-flow waterfall and loss allocation

The asset portfolio and the securities issued against it represent two economic sides of the securitization structure. Cash generated by the underlying assets is distributed in accordance with the cash-flow waterfall specified in the transaction terms. After transaction expenses and other senior obligations have been satisfied, interest and principal are paid according to the established priority of payments, with senior securities receiving payment before subordinated tranches. Once the required reserve allocations and payments to the debt tranches have been made, any remaining distributable cash flows accrue to the holder of the equity, or first-loss, tranche.

If the cash flows and recoveries generated by the portfolio are insufficient to satisfy all claims in full, the economic effect of the resulting shortfall is borne in accordance with the order of subordination: initially by the equity tranche, subsequently by the mezzanine and senior tranches and, in particularly severe scenarios, by the super-senior tranche. The attachment and detachment points of each tranche determine the range of cumulative portfolio losses to which that tranche is exposed, as discussed in Surguladze (2026b).

Internal credit enhancement

The subordination described above—including the originator's retention of all or part of the equity, or first-loss, position—is the principal form of internal credit enhancement. It increases the protection available to more senior securities while preserving the originator's economic interest in the performance of the securitized assets.

Other internal credit-enhancement mechanisms include overcollateralization, under which the value of the underlying asset portfolio exceeds the aggregate principal amount of the debt securities issued; reserve accounts, which provide additional resources against potential losses or temporary cash-flow shortfalls; and excess spread, representing the difference between the income generated by the underlying assets and the payments and expenses of the securitization. Additional structural protection may be provided by asset-eligibility criteria, diversification requirements, concentration limits, portfolio-performance triggers and sequential amortization rules.

These mechanisms do not eliminate the portfolio's credit risk; they increase the loss threshold beyond which a particular tranche is impaired.

External credit enhancement and risk mitigation

External credit protection may include full or partial guarantees, insurance, letters of credit, liquidity facilities and credit derivatives provided by banks, insurers, multilateral development institutions or other highly rated counterparties. Such protection need not cover the entire securitization. It may apply to a particular tranche, a specified proportion of losses or a particular category of risk.

This possibility may be especially important when attracting international investors. An investor may be willing to assume the credit risk of the underlying assets but unwilling or unable to accept country, political, transfer or convertibility risks. A properly structured guarantee or other form of protection may isolate or mitigate such risks without requiring the protection provider to guarantee the entire

transaction. Separately, interest-rate and currency hedging may reduce mismatches between the cash flows generated by the underlying asset portfolio and the payments due on the issued securities. The relevant risks may be transferred through separate guarantee, credit-protection or hedging agreements with external counterparties.

External protection should be used selectively where it materially improves the funding terms of a particular tranche or makes that tranche accessible to investors that would otherwise be unable to participate in the transaction. Its benefits must be assessed against the price of protection and the additional structural complexity involved.

Applications of Securitization and Georgia's Legal and Market Framework

Assets, claims and future cash flows

The range of assets potentially suitable for securitization extends beyond conventional bank loan portfolios. Financial institutions may securitize mortgage, consumer, SME, leasing or other credit exposures, while non-financial companies may hold trade and installment receivables or other contractual cash flows capable of supporting securities. Infrastructure and public-sector entities may also generate relatively stable revenues from electricity generation or transmission, transport services, utilities and other cash-generating activities. The economic suitability of an asset for securitization depends principally on the predictability and measurability of its cash flows, the availability of historical performance data, the legal enforceability and transferability of the corresponding rights and the ability to identify and control the associated risks (Fabozzi and Kothari, 2008).

An important distinction arises between a claim and a predictable future cash flow. An existing loan asset, receivable or payment obligation constitutes an identifiable legal claim. A future payment arising under an existing contract—for example, payments under a long-term lease or electricity-purchase agreement—may likewise constitute an identifiable

future claim. By contrast, expected future revenues from electricity sales, railway transportation or other continuing business activities may be economically predictable, even though the specific customers, contracts or claims from which those revenues will arise do not yet exist.

The Law of Georgia on Securitization (the Securitization Law) expressly recognizes claims, including future claims, as potential underlying assets and permits the acquisition of future claims where they can be identified upon arising (Parliament of Georgia, 2023). Nevertheless, a future legal claim and a predictable future cash flow are not necessarily the same concept. Greater legal and regulatory clarity regarding future-flow securitization in cases where individual claims arise only through subsequent business activity could therefore broaden the application of the framework, particularly to infrastructure, utilities and other long-lived cash-generating assets.

Where a claim cannot be transferred before it arises, alternative structures may include its transfer to an SPV immediately upon origination, the direction of related collections into designated controlled accounts, the creation of a pledge or other security interest over the relevant claims and funds held in those accounts, or other financing and risk-transfer mechanisms. The appropriate structure consequently depends not only on whether an entity generates predictable cash flows, but also on the legal nature of those cash flows and the ability to isolate, transfer or otherwise protect the corresponding rights.

Traditional and synthetic securitization under Georgian law

The Georgian framework provides the principal legal elements required for traditional securitization. Existing claims or future claims satisfying the statutory requirements may be transferred to an SPV, while applicable statutory provisions protect the transferred assets from claims by the originator's general creditors, subject to specified exceptions. The framework also provides for limited-purpose

SPVs, segregation of securitization assets, tranching and subordination, segregation of collections received by servicers, disclosure to investors and investor-protection requirements (Parliament of Georgia, 2023; NBG, 2024).

In a traditional securitization, the SPV performs a central function: it acquires the underlying assets, legally separates them from the originator and issues securities whose servicing depends primarily on the performance of the transferred portfolio. This is the structure illustrated in Figure 1. The SPV therefore provides the bridge between asset isolation and securities issuance.

In a synthetic securitization, ownership of the underlying portfolio remains with the originator, while its credit risk is transferred through credit derivatives, guarantees or other protection mechanisms. In a structure involving an SPV, the originator, acting as protection buyer, purchases portfolio credit protection from the SPV—for example, through a portfolio default swap—and pays the corresponding premium. The SPV divides the assumed credit risk into tranches with different priorities and transfers those tranches to investors or protection providers.

Protection on the tranches may be unfunded or funded. In an unfunded structure, the relevant tranches of credit risk are transferred to protection providers through credit default swaps (CDSs) or guarantees. The protection providers make no payment upfront but assume an obligation to make a protection payment if a credit loss occurs. In a funded structure, the SPV issues credit-linked notes (CLNs) to investors and invests the issuance proceeds in low-risk collateral assets. These funds secure the SPV's potential protection-payment obligations to the originator and are not used to acquire the underlying portfolio. The premium received from the originator and the income generated by the collateral assets fund the payments due on the notes, while portfolio losses are reflected through reductions in the principal amounts of the corresponding CLN tranches.

The Securitization Law adopts a broader definition of synthetic securitization and also contemplates certain credit-risk-transfer structures without an SPV (Parliament of Georgia, 2023). For analytical purposes, however, the present paper distinguishes a simple portfolio credit hedge from synthetic securitization in its narrower structured-finance sense, in which the portfolio's credit risk is divided into tranches with different priorities and transferred to investors or protection providers.

The framework additionally requires the originator—or, where applicable, the initial creditor—of the securitized portfolio to retain a material net economic interest of at least 5%, subject to the applicable regulatory requirements. This minimum risk-retention requirement should be distinguished from a structuring decision to retain a larger subordinated or equity exposure. Retaining the entire first-loss tranche, for example, may provide additional protection to external investors while allowing the originator to preserve the residual economics of a well-performing portfolio.

The 2008 precedent and the evolution of the legal framework

Georgia's experience with securitization predates the current legislation. In 2008, JSC Auto Finance, a limited-purpose issuer established by Caucasus Auto Import, LLC, issued USD 600,000 of two-year senior notes through a public offering. The notes were backed by a diversified portfolio of automobile-related receivables transferred by the originator, while subordinated exposure, a reserve fund, coverage tests and early-amortization triggers provided the principal protections associated with a modern securitization. In the absence of a dedicated statutory framework, however, asset isolation and bankruptcy remoteness relied on general corporate, securities-market and contractual mechanisms. The prospectus expressly acknowledged uncertainty regarding the consequences of insolvency proceedings involving transaction counterparties (JSC Auto Finance, 2008). By regulating these matters directly, the current framework materially strengthens legal certainty.

From legal framework to market implementation

The adoption of dedicated securitization legislation represents an important change in the institutional environment. The primary challenge is no longer whether securitization is recognized as a legally permissible mechanism, but whether economically viable transactions can be originated, structured, valued and successfully placed.

Practical implementation requires suitable pools of sufficiently homogeneous and measurable assets, reliable historical default and recovery data, appropriate servicing and collection arrangements, credible valuation and risk models, legal and accounting expertise and an investor base capable of evaluating securities with different risk-return characteristics. External credit enhancement, ratings and participation by international financial institutions may further broaden the potential investor universe, particularly where specific country or transaction risks would otherwise constrain foreign investment.

Accordingly, the existence of a legal framework is a necessary but not sufficient condition for market development. The central question is whether a particular asset portfolio can be transformed into securities whose risk, return, maturity and credit protection are attractive to different classes of investors and whose all-in funding cost justifies the additional complexity of securitization relative to conventional financing. The following sections address this question using the valuation methodology developed in the author's preceding papers (Surguladze, 2026a, 2026b), the 2008 JSC Auto Finance case and an illustrative contemporary structure based on telecommunications-service receivables.

Valuation and Structuring Methodology***Portfolio calibration and loss distribution***

The structuring of a securitization begins with the economic and credit characteristics of the underlying asset portfolio. For each exposure or sufficiently homogeneous group of exposures, the principal inputs include the outstanding notional amount, maturity, contractual or market yield, a recovery-rate

estimate and a term structure of cumulative default probabilities. Dependence among individual exposures is represented through an appropriate correlation structure. Building on the methodology developed in Surguladze (2026a, 2026b), the marginal distribution of each exposure's time to default is calibrated to its cumulative default-probability term structure, and correlated default times are then generated using a Gaussian copula and Monte Carlo simulation. Each simulated scenario produces a time path of portfolio credit losses, from which the cumulative loss distribution and its relevant statistical characteristics can be estimated.

For this purpose, it is important to distinguish the yield or total market spread generated by an underlying asset from the credit spread used to calibrate its probability of default. An observed loan or bond spread may incorporate liquidity, funding, market-technical and other non-credit risk premia. Treating the entire observed spread as compensation for default risk may therefore overstate model-implied default probabilities and distort the simulated portfolio loss distribution. Where sufficiently liquid and comparable CDS spreads are available, they provide a more direct market input for credit-risk calibration. Where they are unavailable—as may frequently be the case for Georgian exposures—credit spreads must be estimated from available market data, comparable credit exposures and default-probability information, subject to appropriate adjustments.

Tranche design and valuation

Once the portfolio loss distribution has been obtained, attachment and detachment points can be selected to divide portfolio credit risk among equity, mezzanine, senior and, where appropriate, super-senior tranches. For a tranche with attachment point a and detachment point d , cumulative tranche losses are determined from portfolio losses using the tranche-loss function developed in Surguladze (2026b).

The fair credit spread of each tranche can be determined by valuing a portfolio default swap written on that tranche. In each Monte Carlo scenario, portfo-

lio losses are allocated to the tranche according to its attachment and detachment points. The protection leg is determined by the resulting incremental tranche losses, while the premium leg depends on the outstanding tranche notional and the spread S . Following the methodology developed in Surguladze (2026b), the present value of the portfolio default swap written on the tranche is obtained by averaging the discounted protection and premium cash flows across all simulated scenarios. The fair tranche spread is the value of S for which the present value of the portfolio default swap equals zero.

The fair spread obtained from the valuation of the portfolio default swap reflects the price of the tranche's credit risk. If the SPV issues a note corresponding to that tranche, the investor's required all-in yield will generally include the benchmark interest rate and the fair credit spread and may additionally reflect liquidity and other non-credit risk premia.

The maturity of a securitization tranche need not coincide with the maturities of the individual assets in the underlying portfolio. For any specified tranche maturity T , the same simulation framework can be used to determine the portfolio and tranche losses relevant to that horizon and, consequently, the corresponding fair tranche spread. Repeating the valuation for different maturities produces a term structure of fair tranche spreads. In portfolios with heterogeneous asset maturities, exposures that mature before the tranche cease to contribute credit risk thereafter, while the treatment of longer-dated or replacement assets depends on the transaction structure, including any applicable reinvestment provisions.

Tranche boundaries are therefore not merely descriptive labels. Changing the attachment and detachment points changes the probability and potential severity of losses borne by each tranche and, consequently, its fair spread, expected loss and potential investor base. Structuring is therefore an iterative process in which the capital structure is adjusted until the resulting securities exhibit risk-return characteristics suitable for the intended investors.

Credit enhancement and investor allocation

Internal and external credit-enhancement mechanisms can be incorporated into the transaction structure on the basis of the valuation results. Subordination, overcollateralization, reserve funds and excess spread alter the protection available to particular tranches, while external guarantees or credit protection can transfer specified risks to third parties. The effect of an enhancement should be evaluated not through its formal presence alone, but through the change it produces in the tranche's loss exposure and the return required by investors.

Alternative capital structures can therefore be compared for the same underlying portfolio. For example, the originator may retain the equity tranche, a higher-return-seeking investor may purchase mezzanine exposure, conservative institutional investors may purchase senior securities, and selected external protection may, where necessary, be applied to a particular senior tranche whose placement would otherwise be constrained by specific risks.

Funding economics

An important source of the funding-cost advantage of securitization is the difference between the risk perimeter of an unsecured corporate bond and that of an asset-backed security. An unsecured corporate bond is priced on the basis of the credit risk of the issuing enterprise as a whole, including its operating performance, leverage, liquidity, refinancing needs and other corporate liabilities. By contrast, following an effective true sale to a bankruptcy-remote SPV, securitized notes are serviced primarily from the cash flows of a legally segregated asset portfolio. Investors therefore assume the risks associated with the selected portfolio and the transaction structure rather than the broader range of risks associated with the originating company.

The underlying portfolio need not be uniformly high quality. An average-quality or heterogeneous portfolio can support highly protected senior securities when tranche attachment and detachment points, the thickness of subordinated tranches and other credit-enhancement mechanisms are calibrated to

the portfolio loss distribution. Investors in such senior tranches assume a narrower and lower-risk exposure than investors in the originator's unsecured debt and consequently require less compensation. When the structure is appropriately calibrated, the lower returns required on the larger, highly protected tranches outweigh the higher returns required on the smaller subordinated tranches. Securitization therefore provides lower-cost funding for the transaction as a whole.

Beyond its direct effect on the weighted funding cost, tranching broadens the potential investor base by creating securities suited to different mandates and risk appetites. This closer matching of risk-return profiles can improve the transaction's marketability, placement capacity and flexibility and may further reduce the returns required by particular investor classes. Tranching therefore creates value not by reducing the aggregate credit risk of the portfolio, but by reallocating that risk into forms that a wider range of investors are both permitted and willing to hold.

Accordingly, the economic assessment must cover the complete capital structure, including the equity, or first-loss, position. If this position is sold, its issue price reflects the return required by the purchaser and contributes to the external funding raised. If the originator retains the position, its amount does not form part of the external funding raised, while the originator's capital remains exposed to the first portfolio losses. In return, the originator is entitled to the cash flows remaining after all more senior obligations and transaction expenses have been satisfied. The economic assessment of the retained position should therefore consider jointly the capital remaining at risk and the expected residual return.

The final structuring decision should compare the all-in economics of securitization with those of conventional unsecured financing on a consistent basis, taking into account the amount, currency, maturity and amortization profile of the funding. For securitization, the all-in funding cost includes the weighted returns required on all tranches placed with inves-

tors, together with one-time arrangement, legal, rating and placement costs and recurring servicing, custody, SPV administration, reporting and, where applicable, hedging expenses. Any retained first-loss position should be assessed separately because it reduces the amount of external funding raised while leaving capital and credit risk with the originator. The comparison should likewise include the issuance and ongoing expenses associated with conventional bond financing.

External credit-enhancement mechanisms are optional and should be used only where they address a specific pricing or placement constraint. In an arbitrage-free market, the cost of such protection should broadly reflect the reduction in credit risk that it provides; consequently, any reduction in the return required by investors should be evaluated net of the cost of protection. External protection may have particular additional value where it makes a tranche accessible to investors otherwise constrained by rating, country-risk or similar investment limits.

Transaction size is particularly important because many securitization expenses are fixed or semi-fixed, so their annualized burden per unit of funding declines as the issuance grows. Securitization therefore has a minimum efficient scale: for a given asset portfolio, the anticipated reduction in funding costs and the benefits of capital-market access must exceed the additional costs and complexity of the structure.

Rating arbitrage and lessons from the global financial crisis

Before the 2007–2009 global financial crisis, an important source of CDO profitability was rating arbitrage. Underlying loans and bonds generated market-based credit spreads, while highly rated senior and super-senior liabilities could be placed at substantially lower spreads because rating methodologies, based largely on historical default and loss experience, implied very low probabilities of impairment. The resulting difference, after expenses and realized losses, generated excess spread and

potentially high residual returns. This did not represent the elimination of credit risk; the outcome depended critically on the assumptions used to measure and allocate that risk. When joint default dynamics, loss dependence and tail risk proved materially more severe than historical experience had suggested, many highly rated structured-finance tranches were sharply downgraded (Beltran et al., 2013; U.S. Securities and Exchange Commission, 2008).

The principal lesson is that ratings cannot substitute for independent valuation and stress testing. Tranche design should be based on appropriately calibrated default probabilities, recovery-rate estimates, a properly specified dependence structure incorporating the relevant correlation parameters and severe but plausible loss scenarios. Residual returns generated primarily by the underpricing of correlation or tail risk should not be regarded as sustainable economic value.

Securitization as an Alternative Funding Channel in Georgia

Access to capital and funding-maturity transformation: the 2008 JSC Auto Finance transaction

The potential value of securitization is not limited to reducing the cost of financing that is already available. In some cases, its principal advantage is to create access to capital that the originator could not practically obtain through conventional bank lending, unsecured bond issuance or external equity. An early Georgian example is the 2008 JSC Auto Finance transaction. JSC Auto Finance, a limited-purpose entity established by Caucasus Auto Import, LLC, publicly issued USD 600,000 of two-year senior notes backed by a diversified portfolio of receivables arising from automobile sales (JSC Auto Finance, 2008). At that stage of the originator's development, financing of a comparable amount and maturity was not available through conventional channels on economically viable terms.

The transaction also provides a clear example of funding-maturity transformation. The initial port-

folio comprised 101 receivables with an aggregate nominal value of USD 638,766 and a weighted-average remaining realization period of only 3.35 weeks. Nevertheless, the structure supported securities with a contractual maturity of two years. Collections from realized receivables were reinvested in newly generated eligible receivables, thereby maintaining a revolving asset portfolio throughout most of the transaction term. Senior investors were protected by the subordinated exposure retained by the originator, a reserve fund accumulating excess spread, collateral- and interest-coverage tests and early-amortization provisions. According to the transaction records, the notes were redeemed in full at maturity. The transaction therefore demonstrated in practice how a continuous stream of short-duration receivables could provide access to substantially longer-term capital.

An illustrative contemporary application

A different question arises for a large Georgian company that already has access to international capital markets. Silknet provides a useful reference point for such a comparison. In January 2022, Silknet JSC issued USD 300 million of 8.375% notes due in 2027 (Silknet JSC, 2022a, 2022b). In 2025, Silk Road Group Holding LLC issued USD 400 million of 7.50% five-year senior unsecured notes guaranteed on a joint and several basis (Silk Road Group Holding LLC, 2025). These transactions demonstrate that conventional international funding is available to a major Georgian corporate group at substantial scale.

Consider, for illustration, a hypothetical securitization of a selected portfolio of receivables arising from services provided by a Georgian telecommunications operator of a scale comparable to Silknet. The operator transfers the portfolio through a true sale to a bankruptcy-remote SPV. Customer relationships and the underlying service contracts remain with the operator, which continues billing for services, providing customer service and collecting payments under a portfolio servicing agreement with the SPV. Collections attributable to the transferred receivables are remitted to segregated

transaction accounts held in the name of the SPV and distributed in accordance with the securitization cash-flow waterfall. During a defined revolving period, newly generated eligible receivables replace those already collected, allowing a continuously renewed portfolio of short-duration receivables to support longer-term securities.

The SPV may issue an equity, or first-loss, tranche, a mezzanine tranche and one or more senior tranches. The originator may retain all or part of the first-loss position, while the tranches intended for external placement may be offered to investor groups with different mandates and risk appetites. Asset-eligibility criteria, concentration limits, reserve requirements, coverage tests and early-amortization triggers protect the quality and integrity of the portfolio. If receivables generation or portfolio performance deteriorates, these mechanisms terminate the revolving period and cause the transaction to enter an early-amortization phase.

Provided that the selected portfolio and capital structure are appropriately designed and the

tranches are placed with investors at appropriate prices, such a securitization is expected to provide the operator with lower-cost, longer-term and more flexible funding, as well as greater placement capacity, than a single unsecured corporate bond raising the same amount of external capital. The advantage arises because investors in the securitized notes assume the risk of a legally segregated receivables portfolio rather than the operator's full enterprise-wide risk, while tranching creates securities tailored to different investment constraints and preferences. Detailed receivables data would be required to determine the precise tranche thicknesses and fair spreads and, ultimately, to quantify any resulting funding advantage. Such data are not required, however, to identify the structural mechanisms through which that advantage could arise. The methodology developed in Surguladze (2026b) provides the framework for this quantification when the necessary portfolio data are available.

The example is entirely hypothetical and does not reflect any announced plan of Silknet or any other specific company.

Table 1. Comparison of Conventional Corporate Bond Financing and Securitization

Feature	Unsecured corporate bond	Securitization
Primary risk assumed by the investor	The issuer's overall corporate risk	The risk of a specified tranche of the selected asset portfolio
Securities offered	One principal risk-return profile	Equity, mezzanine and senior risk-return profiles
Potential investors	Investors willing to assume the issuer's overall credit risk	Different investor classes according to risk appetite and mandate
Funding maturity	Corporate-bond maturity	Through portfolio replenishment, may exceed the maturity of an individual receivable
Structural flexibility	Generally uniform terms	Different tranche seniorities, amortization profiles and levels of credit quality
Pricing	Observable bond yield	Requires portfolio data and valuation of the complete capital structure

Other potential applications

The potential applications of securitization in Georgia extend across financial institutions, private companies and public-sector enterprises. Banks and other lenders may securitize portfolios of corporate and SME loans, residential and commercial

mortgages, consumer and credit-card loans, auto finance and leases. Non-financial companies may securitize trade and installment receivables; receivables arising from telecommunications, internet and pay-TV subscription services; commercial-lease and export receivables; and other recurring contractual

claims. For utilities and energy companies, potential underlying assets include customer receivables arising from electricity, natural gas, water and other services, as well as payments due under power-purchase or similar long-term agreements.

Infrastructure and state-owned enterprises may also use securitization where identifiable and transferable payment rights arise from cash-generating assets. Potential examples include revenues from railway freight transportation, airport and port charges, logistics and terminal-service fees and receivables arising from electricity generation, transmission and distribution. Contractual revenues generated by hydroelectric and other energy projects may also be securitized. Such structures allow the enterprise or public owner to retain ownership and operation of the underlying strategic asset while raising capital against a defined stream of cash flows.

The appropriate securitization structure depends on the nature of the assets. Long-term loans and mortgages may support amortizing structures; short-duration but continuously generated receivables may support revolving securitizations; and predictable revenues arising from continuing business activity may support future-flow structures where the corresponding claims can be legally identified, transferred and isolated. Asset-specific valuation may require additional modeling of prepayments, migration among delinquency categories, portfolio replenishment, concentration and other characteristics. Nevertheless, the fundamental principles of true sale, asset isolation, tranching, credit enhancement and investor matching remain unchanged.

Conclusion

Securitization provides Georgian companies, financial institutions and public-sector enterprises with an additional channel for raising domestic and international capital against suitable assets and predictable cash flows. Its principal funding advantage arises from the legal separation of a selected asset portfolio from the broader risks of the originating entity. Following an effective true sale and the use

of a bankruptcy-remote SPV, investors are exposed primarily to the performance of the transferred portfolio and the structure of the securities rather than to the full spectrum of the originator's operating, liquidity, leverage and refinancing risks. They may therefore require a lower risk premium than investors in unsecured corporate debt.

Tranching further strengthens the economic attractiveness of the funding structure by transforming the same underlying portfolio into securities with different degrees of subordination, loss exposure and expected return. It does not reduce the aggregate credit risk of the portfolio; rather, it reallocates that risk into forms suited to different investment mandates and risk appetites. This broadens the potential investor base, increases placement capacity and flexibility and can reduce the weighted average funding cost of the transaction as a whole. The underlying portfolio need not be uniformly high quality: tranche thicknesses and credit-enhancement mechanisms can be calibrated to the portfolio loss distribution so that sufficiently protected senior securities can be created even from an average-quality or heterogeneous portfolio.

The 2008 JSC Auto Finance transaction demonstrated these mechanisms in practice in Georgia before the adoption of dedicated securitization legislation. It provided access to funding that was not practically available through conventional channels and used a revolving portfolio to transform short-duration receivables into two-year securities. The illustrative contemporary structure based on telecommunications-service receivables shows how the same principles can be applied by a large company that already has access to international bond markets, with the objectives of lowering funding costs, extending maturity, increasing flexibility and reaching a wider range of investors.

Georgia's current legislation already provides a substantial part of the legal architecture required for traditional and synthetic securitization, including SPVs, asset transfer, tranching, risk retention and investor-protection mechanisms. Greater legal clarity re-

garding predictable future cash flows that have not yet been crystallized into identifiable claims could facilitate infrastructure, utility and other future-flow securitizations. Market development will additionally require reliable portfolio data, servicing capacity, independent valuation, stress testing, professional structuring and informed investors. The lessons of the global financial crisis also confirm that ratings cannot substitute for transparent risk analysis and evaluation under appropriate stress scenarios.

Securitization should therefore be viewed not as a substitute for bank lending or conventional corporate bond issuance, but as an additional funding technology capable of providing lower-cost, longer-term and more flexible financing and connecting suitable Georgian assets and cash flows with a broader spectrum of domestic and international investors.

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FACTORS SHAPING TRUST IN STABLECOINS IN GEORGIA: EMPIRICAL RESEARCH RESULTS

NINO MUSHKUDIANI

Abstract

This paper investigates the formation of trust in the digital environment and the determinants of consumer attitudes towards stablecoins.

The paper examines the development of stablecoins as an innovative product from the perspective of innovation theory. To empirically support the theoretical reasoning, a consumer survey was conducted within the framework of the study to assess awareness, knowledge, usage, security perceptions, and trust in stablecoins. Statistical methods, including Spearman's rank correlation analysis, were used for data analysis.

The results of the study show a strong, positive, and statistically significant relationship between trust and perceived safety. Strong positive correlations were also revealed between awareness and knowledge, as well as between usage experience and knowledge. Perceptions of security showed the strongest association with trust in a regulated stablecoins, whereas the relationship between trust and the perceived importance of regulation was relatively weak, although still statistically significant.

The results indicate that the adoption of stablecoins as an innovative financial product and the formation of trust in them are related to consumer knowledge, awareness, and perceived security. However, the mere existence of regulation is not sufficient to ensure a high level of trust. Therefore, for the devel-

opment of stablecoins and the expansion of their use, it is important not only to have a clear regulatory framework, but also to foster user awareness and ensure a safe digital environment.

Keywords: digital technologies, virtual assets, stablecoins, trust, security, regulation, innovation theory.

Introduction

Economic development is a dynamic process linked to innovation, wherein new products, technologies, and forms of production organization replace existing ones, driving the transformation of the economic structure (Schumpeter, 1942). Technological progress is increasingly intertwined with the creation, storage, processing, and dissemination of information. As the volume of information stored in digital formats has grown, data and the capacity to process them have become increasingly important factors in economic development.

The advent of the Internet and the World Wide Web marked a major milestone in the advancement of digital technologies, radically altering the channels for information exchange and consumption. Subsequently, the proliferation of smartphones and cloud technologies further facilitated access to digital services and created new possibilities for data processing, storage, and sharing (Mell & Grance, 2011). These developments laid the foundation for the modern digital economy, in which technological

innovations increasingly shape the evolution of the financial sector and consumer behavior.

Digital transformation has significantly altered the nature, participants, and infrastructure of financial relationships. Financial services have gradually shifted from physical branches and traditional intermediaries to digital platforms, mobile applications, and automated systems. This process has enhanced the speed, accessibility, and scalability of financial services while fostering the emergence of new financial intermediaries and business models. Furthermore, the development of blockchain and distributed ledger technologies has created new possibilities for the representation, transfer, and storage of value in digital form. In this context, stable virtual assets—hereinafter referred to as “stablecoins”—have gained particular significance, as they link the technological characteristics of digital assets with the concept of value stability. The development of stablecoins was driven by the need to create a more stable form of digital value amid the high price volatility associated with virtual assets. The first stablecoins emerged in 2014 and subsequently became widely used (Arner et al., 2020; Ferreira, 2021). In parallel, various models for backing these assets and maintaining their value stability have emerged, including models based on fiat currencies, other virtual assets, and algorithmic mechanisms (Ferreira, 2021).

Alongside the technological and financial risks, information asymmetries, and cybersecurity challenges associated with virtual assets, the establishment and maintenance of consumer trust are of particular importance. This trust depends on more than just the functioning of the technology itself; it is linked to information transparency, the credibility of service providers, asset security, risk management, and regulatory effectiveness.

The importance of trust in the digital financial environment is growing, as financial transactions often rely on technological infrastructure whose operational mechanisms are not fully transparent to the consumer (Gambetta, 1988).

The aim of this article is to examine consumer trust in stablecoins and the factors that shape it. The paper explores the key trends in the development of the virtual asset ecosystem in Georgia, including stablecoins, and reviews the theoretical foundations of trust. To empirically support the analysis, a quantitative study was conducted using an online survey to assess respondents’ awareness, knowledge, perceptions of security, and trust in stablecoins.

Literature Review

Gambetta’s (1988) approach provides one of the theoretical foundations for understanding consumer trust. According to this perspective, trust becomes particularly significant under conditions of uncertainty, where an individual depends on another party’s future actions without having full control over them. Mayer, Davis, and Schoorman (1995) define trust as one party’s willingness to be vulnerable to the actions of another, based on the expectation that the latter will fulfill their obligations. The authors identify ability, integrity, and benevolence as the key factors in the formation of trust. This approach is especially relevant in the digital economy, where consumers often make decisions in the presence of incomplete information and perceived risk. Research on trust is inherently interdisciplinary, integrating perspectives from psychology, sociology, economics, management, and information systems. Consequently, studying trust within the digital financial environment requires considering both individual perceptions and technological and institutional factors.

According to Luhmann (1979), trust is a social mechanism that reduces complexity and enables individuals to make decisions even when they cannot fully verify all possible risks or available information. In this sense, trust mitigates the impact of uncertainty and information overload that are inherent in decision-making processes.

Gambetta (1988) views trust as the subjective probability that another person or organization will, in a specific situation, take an action that is beneficial to us—or, at the very least, not harmful. Consequently,

trust entails more than mere belief; it represents an assessment of the expected reliability of the other party's behavior. These approaches are particularly relevant in the digital environment, where economic interactions increasingly take place through technological platforms, algorithms, digital identification systems, and automated processes. Under such conditions, the object of trust is no longer limited to a specific person or organization but may also encompass technological systems, platforms, data protection mechanisms, and the broader institutional environment.

McKnight, Choudhury, and Kacmar (2002) view trust in the context of e-commerce as a multidimensional phenomenon, distinguishing between institution-based trust, trusting beliefs, and trusting intentions. This approach is fully applicable to digital financial services, as consumer trust in this context may depend not only on the characteristics of a specific service provider but also on the perceived trustworthiness of the institutional environment as a whole.

Consequently, the formation of trust in a digital environment is linked not only to the trustworthiness of a specific actor but also to the security, privacy, and reliability of the technological system, as well as the resilience of the infrastructure. Lim et al. (2021) note that in the digital world, trust can be viewed as a mechanism of interaction among people, devices, and infrastructure.

Studies examining the factors that determine the adoption and use of digital technologies and services place significant emphasis on trust and perceived risk. In his technology acceptance model, Pavlou (2003) integrates trust, perceived risk, perceived usefulness, and ease of use. According to the author, the decision to conduct an online transaction does not depend solely on the technology's usefulness and ease of use; the extent to which consumers perceive the online environment as safe and reliable is also significant.

Gefen, Karahanna, and Straub (2003) reached a similar conclusion, linking trust to the technology

acceptance model. Their research suggests that when predicting consumer behavior in an online environment, trust may be just as important as perceived usefulness and ease of use.

The development of blockchain-based systems has further complicated the issue of trust. A key concept behind blockchain is the creation of systems in which participants do not require a central trusted intermediary, and trust is partially replaced by cryptography, consensus mechanisms, and software code. However, studies indicate that so-called "trustless" systems do not entirely eliminate the need for trust. Research by Saengchote, Putniņš, and Samphantharak (2023) demonstrates that even in the decentralized finance environment, trust in people and institutions—as well as in technological systems—remains important, since code and so-called smart contracts cannot eliminate every possible risk. In digital finance, the nature of trust is evolving rather than disappearing. The traditional model of "I trust the bank" is shifting toward a more complex one: "I trust the bank, the technology, the platform, data protection mechanisms, the legal system, and the regulator."

This shift is particularly evident in the case of stablecoins. The stablecoin model relies on users' belief that the asset's value will be maintained and, if necessary, it can be exchanged for the corresponding reserve asset or fiat currency. Thus, trust in a stablecoin is shaped by several interconnected factors, including confidence in the issuer, the quality and transparency of reserve assets, redemption mechanisms, regulatory oversight, and the reliability of the underlying technology. Users must believe that the issuer is competent, that the reserve assets exist and are sufficient, that their quality is acceptable, that information is disclosed transparently, and that the redemption mechanism functions effectively.

The study by Ahmed, Aldasoro, and Duley (2024) is significant in this regard; it indicates that the quality of a stablecoin's reserve assets, its transparency, and user perceptions substantially influence the stability of its value. The authors point out that in-

creased transparency does not always automatically lead to greater stability. In the case of stablecoins, what matters is not merely the volume of information, but also the perceived quality of the reserves and the feasibility of effective redemption. Thus, the impact of transparency on trust is not straightforward. Disclosing information about reserves can bolster confidence when it confirms positive expectations regarding their quality; conversely, the revelation of unfavorable information could undermine confidence. Therefore, the effect of transparency on trust depends on the nature and quality of the information disclosed about the reserves. This dual effect represents one of the paradoxes underlying trust in stablecoins.

The issue of trust in stablecoins gains particular relevance when stablecoins are considered money-like digital instruments. A 2026 BIS report highlights that stablecoins offer significant potential for tokenization and for facilitating rapid, programmable payments; however, their current design does not fully embody all the fundamental characteristics of money. In this context, the concept of the “singleness of money”—defined as the ability to exchange different forms of money at par value—is particularly important. Consequently, the widespread adoption of stablecoins raises further questions regarding trust in money, redemption mechanisms, and the stability of the monetary system.

Trust in a stablecoin differs from trust in a conventional virtual asset. In the case of Bitcoin, user trust is primarily linked to the decentralized network and its technological architecture, whereas, in the case of a stablecoin pegged to a fiat currency, a significant portion of that trust shifts to the issuer, the reserves, the redemption mechanism, and regulatory oversight. Consequently, a stablecoin can be viewed as a hybrid trust system in which technological and institutional trust are interconnected.

The development of digital finance is also altering the regulator’s role in fostering trust. If a consumer cannot independently assess an issuer’s financial health, the quality of its reserves, technological risks, or cybersecurity risks, regulatory oversight

can serve as an additional source of trust. The concept of “institution-based trust,” proposed by McKnight et al. (2002), is particularly relevant in this context. According to this concept, a consumer may not personally know a specific organization and yet still trust the legal and institutional environment in which it operates.

Existing academic research on stablecoins primarily focuses on financial stability, reserve quality, the sustainability of fiat currency pegs, redemption risks, and regulation. However, comparatively less attention has been devoted to examining how trust in the technology, the issuer, and the institutional and regulatory environment influences the intention to use stablecoins, particularly in the context of small and developing economies.

Existing research within the Georgian context primarily examines the use of digital banking services and consumer attitudes toward financial institutions. For instance, Todua and Gogitidze (2024) identify trust as a key determinant in the intention to use digital banking and demonstrate its positive impact on consumer behavior. A more recent study by the same authors (2026), based on data from 433 respondents, further confirms a statistically significant positive relationship between consumer trust and the intention to use digital banking ($\beta = 0.432$, $p < 0.01$). However, within the Georgian context, limited attention has been devoted to examining consumer trust in stablecoins and related digital financial services. This topic is of particular interest given that the development of digital financial services, virtual assets, and stablecoins in Georgia is occurring alongside the strengthening of the country’s regulatory and institutional frameworks. Consequently, it is important to assess not only whether users trust stablecoins but also the foundations of that trust—whether technology, the issuer, reserves, or the regulatory authority. From this perspective, trust in a stablecoin can be viewed not as a one-dimensional variable, but rather as the outcome of the interplay between technological, economic, and institutional forms of trust.

Conceptual Framework of the Study

Alongside the development of digital technologies, an environment has gradually emerged in Georgia in which consumer decisions are increasingly linked to the use of digital financial innovations. This trend is evidenced, among other factors, by the growing adoption of open banking services. According to data from the National Bank of Georgia (NBG), between February 2025 and February 2026, the number of instances of open banking service usage exceeded 9.3 million, while the number of transactions exceeded 915,000 (NBG, 2026). Parallel to the widespread use of digital banking services, a legal framework for virtual assets was established in 2022–2023, followed by the foundations for stablecoin regulation in 2025–2026. These developments fostered the further evolution of the digital financial ecosystem in Georgia.

Stablecoin regulation can be viewed as a mechanism for building institutional trust. When information regarding the issuer, reserve assets, risk management, and redemption terms is available to users, information asymmetry is reduced, and users are better informed when making decisions. Consequently, regulation is not merely a set of legal requirements; it is a crucial factor in building trust.

The core premise of this study is that the intention to use a stablecoin depends on users' perceptions of its usefulness and security, their level of trust, and their perception of risk. Furthermore, given the specific nature of stablecoins, trust encompasses confidence in the technology, the issuer, the reserves, and the institutional and regulatory environment.

Accordingly, the conceptual logic of the study can be formulated as follows:

- Trust in technology + trust in the issuer + trust in reserves + trust in the institutional and regulatory environment → positive association with the intention to use a stablecoin;
- Perceived risk → negative association with the intention to use a stablecoin.

Thus, the article examines trust in stablecoins as the outcome of the interplay between technological, economic, and institutional factors, while the empirical part of the study aims to assess which of these factors are most important to consumers when deciding whether to use a stablecoin.

Research Methodology

An online questionnaire was used in the empirical part of the study to assess respondents' awareness and knowledge regarding stablecoins, their usage experience, levels of trust, perceptions of security, and views on the importance of regulation.

A total of 135 respondents with diverse professional backgrounds participated in the study. The participant pool included individuals employed in the financial sector, teachers, students, and pensioners, thereby incorporating perspectives from various segments of society.

A 5-point Likert-type scale was employed in the questions designed to assess attitudes and perceptions. The initial stage of data analysis involved the use of descriptive statistics to determine response frequencies and percentage distributions, as well as measures of central tendency for the evaluative variables. Based on this analysis, general trends in respondents' attitudes and responses were identified.

Crosstabulation was employed to examine potential relationships between variables, allowing for a comparison of response distributions for one variable across the categories of another. This analysis provided a descriptive overview of the interrelationships among the variables. Specifically, it assessed whether the willingness to use stablecoins was higher among respondents with experience using or working with digital assets. However, a percentage difference between groups does not, in itself, indicate a statistically significant association. To assess statistical significance, Pearson's Chi-square (χ^2) test was used to determine the relationship between categorical variables. In instances where observed or expected frequencies in specific crosstabulation cells were low, relevant categories were merged to satisfy the conditions required for the χ^2 test.

To assess the direction and strength of the association between variables, Spearman's rank correlation coefficient (ρ) was used; this measure is appropriate for analyzing ordinal data, including Likert-type scales.

The following hypotheses were formulated for statistical testing:

- H_0 (null hypothesis): there is no statistically significant association between the variables;
- H_1 (alternative hypothesis): there is a statistically significant association between the variables.

A significance level of 0.05 ($\alpha = 0.05$) was used for statistical hypothesis testing. To satisfy the conditions required for the statistical tests, observed and expected frequencies were considered for categorical variables. When $p < 0.05$, the result is considered statistically significant, and the null hypothesis is rejected; conversely, when $p \geq 0.05$, the result is not considered statistically significant, and there is insufficient evidence to reject the null hypothesis.

Thus, crosstabulation was used to describe differences between groups and categories, the χ^2 test was used to assess the statistical significance of associations between categorical variables, and Spearman's rank correlation coefficient was used to evaluate the direction and strength of the relationship among the variables. Specifically, Spearman's correlation was applied to assess the interrelationships among variables such as knowledge of stablecoins, trust in stablecoins, perceptions of security, and the intention to use stablecoins.

The study was conducted using an online questionnaire (Google Forms), which was distributed via social networks and professional contacts. The results reflect respondents' attitudes at the time of data collection and may be influenced by shifts in market conditions, the regulatory environment, or technological developments.

Research Results and Data Analysis

One of the study's primary limitations is the use of non-probability sampling, which restricts the ability to generalize the findings to the entire population of Georgia. Furthermore, the data rely on respondents' subjective perceptions and self-assessments, and varying levels of knowledge regarding stablecoins may have influenced their responses.

The data analysis focused on examining the level of trust in stablecoins and the key factors influencing that trust.

For closed-ended questions, response frequencies and percentage distributions were calculated, while for questions using rating scales, the distribution of responses and measures of central tendency, including the mean and median, were analyzed. Comparative and associative analysis methods were employed to examine differences among respondent groups and potential relationships between variables. Specifically, cross-tabulation and the χ^2 test were used to assess statistically significant associations between categorical variables, while correlation analysis—specifically the Spearman rank correlation coefficient (Spearman's ρ)—was employed to evaluate statistical relationships among variables. In addition, binary logistic regression analysis was conducted to further assess the factors influencing trust.

According to the study results, 79.3% of respondents were aware of stablecoins, although actual usage was comparatively lower: only 34.1% of respondents had used stablecoins, while 65.9% reported no experience using them. Furthermore, 49.6% of respondents believed that stablecoins could effectively replace traditional payment methods. The findings also indicate that 80.5% of respondents considered it important for stablecoin operations to be regulated by a supervisory authority (see Table 1).

Table 1. General overview of the survey

Indicator	Result
Has heard of stablecoins	79.3%
Has used stablecoins	34.1%
Average confidence in value stability (1–5)	3.07
Considers stablecoins safe/very safe	58.1%
Recognizes the importance of regulation	80.5%
Trusts a regulated GEL-pegged stablecoin	78.2%
Believes stablecoins can replace traditional payment methods	49.6%

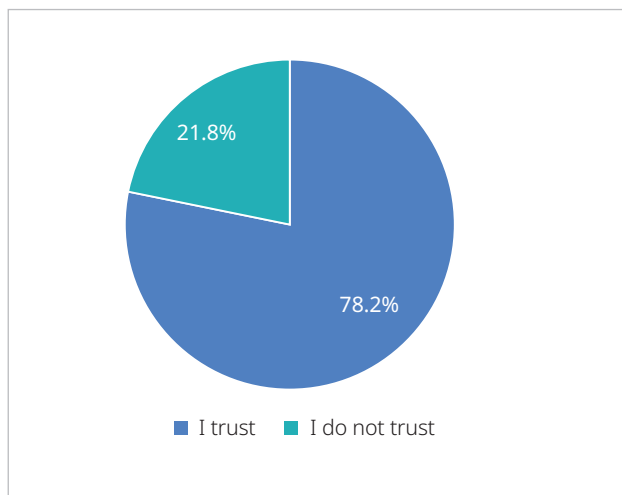
Source: Author, based on survey data.

The majority of respondents were aware of stablecoins and viewed the prospect of trusting a regulated, GEL-pegged stablecoin positively. However, confidence in the security and stability of existing stablecoins remained moderate.

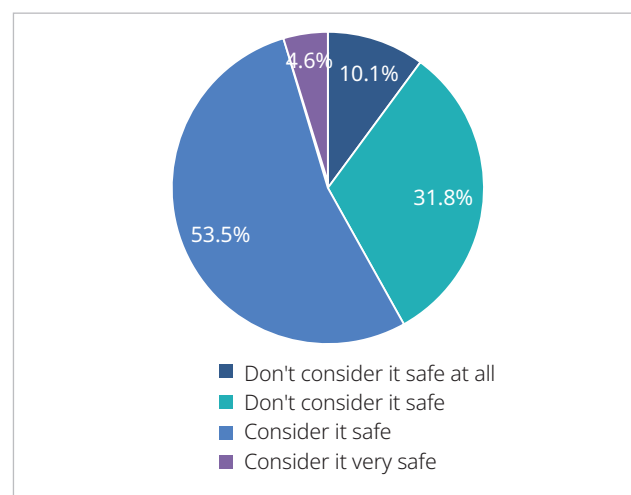
Of particular interest are the responses to Question 10—“To what extent would you trust a GEL-pegged stablecoin if it were issued in compliance with requirements established by the Georgian regulator?”— which serves as a key indicator of trust in stablecoins within the study. As shown in Figure 1, the level of respondent trust in a regulated, GEL-pegged stablecoin is relatively high. Specifically, 78.2% of respondents answered positively, indicating a willingness to trust such a stablecoin.

Another significant finding concerns respondents’ assessment of stablecoin safety: 58.1% of respondents considered stablecoins to be safe or very safe, indicating a relatively positive perception regarding their security (see Figure 2).

A clear link emerges between the perception of safety and trust. Among respondents who considered stablecoins safe, 92.8% trusted a regulated, GEL-pegged stablecoin, whereas only 15.4% of those who do not consider stablecoins safe at all expressed such trust. This disparity indicates that perceived safety is closely associated with trust in stablecoins.

Figure 1. Potential Trust in a Regulated, GEL-Pegged Stablecoin

Source: Author, based on survey data.

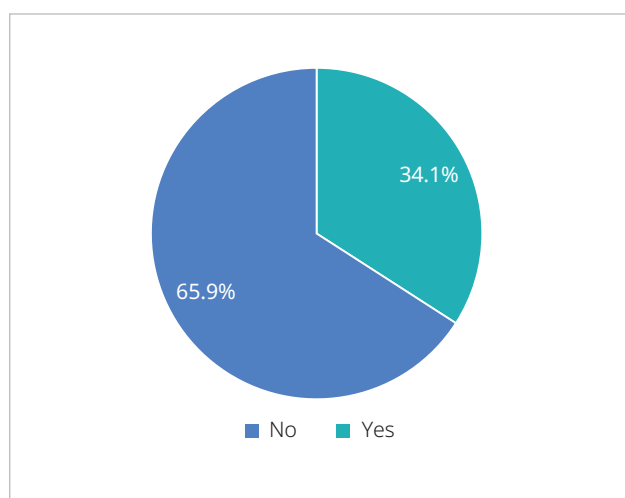
Figure 2. Perception of the Safety of a Regulated, GEL-Pegged Stablecoin

Source: Author, based on survey data.

When assessing the value stability of stablecoins, respondents gave an average rating of 3.07 on a 5-point scale, indicating a moderate level of confidence in this characteristic. At the same time, nearly 60% of respondents considered the use of stablecoins to be safe or very safe. These results indicate that respondents' attitudes toward stablecoins are not uniform: a significant proportion viewed their use as safe, whereas the assessment of their value stability was more moderate.

A significant disparity emerged between the level of awareness regarding stablecoins and actual practical experience using them. Although 79.3% of respondents had heard of stablecoins, only 34.1% had experience using them, while 65.9% had never used a stablecoin (see Figure 3). This discrepancy is noteworthy, as it demonstrates that awareness of stablecoins does not automatically translate into practical usage.

Figure 3. Experience with Stablecoin Usage



Source: Author, based on survey data.

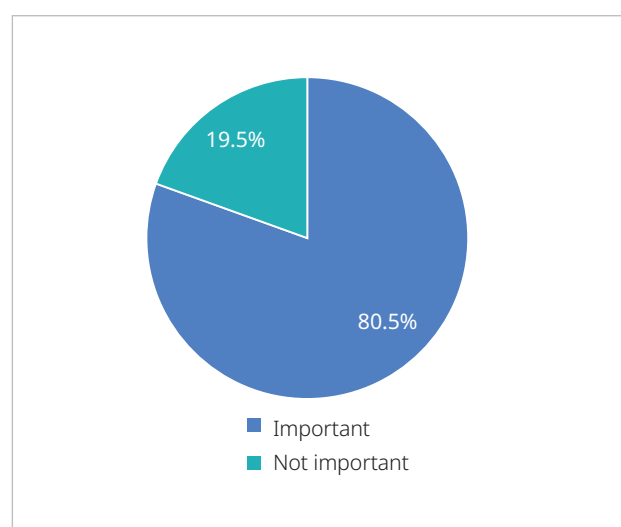
A similar trend is observed regarding knowledge of a stablecoin's functioning mechanism. The higher a respondent's self-assessed knowledge, the higher the level of trust in a regulated, GEL-pegged stablecoin. Specifically, among respondents unfamiliar

with a stablecoin's functioning mechanism, the trust rate was 59.5%, whereas among those who understood it well or very well, this figure reached 90%. These results indicate that a higher level of knowledge regarding a stablecoin's functioning mechanism is associated with a higher level of trust in it.

It should be noted that the level of trust varies according to respondents' experience using stablecoins. Trust in a regulated, GEL-pegged stablecoin is higher among stablecoin users: 42 out of 46 users (91.3%) stated that they would trust such a stablecoin, whereas among respondents who had never used a stablecoin, the corresponding figure was 28.7%. This difference indicates a statistically significant relationship between stablecoin usage experience and the level of trust.

The research findings revealed the significant role of regulation in fostering trust in stablecoins. Specifically, 80.5% of respondents indicated that it was important for the issuance and circulation of stablecoins to be regulated by an appropriate supervisory authority (see Figure 4). This result suggests that regulation may be a prerequisite for building trust in stablecoins.

Figure 4. The Importance of Regulating the Issuance and Circulation of Stablecoins



Source: Author, based on survey data.

This relationship was also clearly reflected in respondents' trust in a GEL-pegged stablecoin: if the stablecoin were issued in compliance with requirements established by the Georgian regulator, 78.2% of respondents indicated that they would trust it, while 21.8% stated that they would not. Thus, these findings indicate that regulation is not merely viewed as a formal requirement but is perceived as a significant factor influencing trust in stablecoins.

Perceptions regarding risks associated with stablecoins are also of interest. The largest group of respondents identified cybersecurity risks as the primary risk (50 respondents), followed by the absence of regulation (39 respondents), insufficient reserve backing (25 respondents), and issuer bankruptcy (18 respondents). These results suggest that trust in a stablecoin is not based solely on perceptions of value stability. For respondents, trust is also linked to technological security, the reliability of the issuer, the adequacy of reserves, and regulatory oversight.

Spearman's rank correlation analysis was employed to further statistically evaluate the trends identified through descriptive analysis, making it possible to assess the direction and strength of the relationships.

The strongest positive association was found be-

tween the perception of stablecoin security and trust ($\rho = 0.634$): the higher a respondent's assessment of stablecoin security, the higher their level of trust in it.

A positive association was also identified between knowledge about stablecoins and trust ($\rho = 0.575$). Specifically, greater knowledge regarding the functioning principles and characteristics of stablecoins is linked to higher levels of trust. However, these results reflect a statistical association between the variables and do not imply a causal relationship.

The analysis confirmed a strong positive correlation between awareness of stablecoins and the level of knowledge about them ($\rho = 0.623$). This result indicates that a higher level of awareness regarding stablecoins is generally associated with knowledge of their functioning principles and characteristics.

A positive correlation was also observed between experience using stablecoins and the level of knowledge ($\rho = 0.609$), indicating that respondents with practical experience generally rate their knowledge at a higher level.

The main results of the Spearman correlation analysis are presented in Table 2.

Table 2. Correlations Among the Main Variables of the Study

Relationship between variables	Spearman ρ	p-value	Strength of relationship
Trust ↔ Safety	0.634	<0.001	Strong Positive
Awareness ↔ Knowledge	0.623	<0.001	Strong Positive
Usage ↔ Knowledge	0.609	<0.001	Strong Positive
Knowledge ↔ Trust	0.575	<0.001	Moderate positive
Safety ↔ Trust in Regulated Stablecoins	0.504	<0.001	Moderate positive
Knowledge ↔ Safety	0.405	<0.001	Moderate positive
Awareness ↔ Trust in Regulated Stablecoins	0.367	<0.001	Moderate positive
Trust ↔ Trust in Regulated Stablecoins	0.320	<0.001	Weak/Moderate positive
Importance of Regulation ↔ Trust in Regulated Stablecoins	0.222	<0.010	Weak, yet statistically significant

Source: Author, based on research findings.

Note: ρ — Spearman correlation coefficient; p-value — indicator of statistical significance. $p < 0.05$ indicates a statistically significant relationship.

To assess the statistical significance of the relationship between variables, Pearson's χ^2 (Chi-square) test was additionally employed. The analysis revealed a statistically significant association between trust in stablecoins and both the respondents' level of awareness and their usage experience.

A statistically significant relationship was identified between stablecoin usage experience and trust in a regulated, GEL-pegged stablecoin ($\chi^2 = 7.09$, $df = 1$, $p = 0.008$). Specifically, 91.3% of stablecoin users trusted the stablecoin, whereas the trust rate among respondents who had not used stablecoins was 28.7%. Consequently, the higher level of trust observed among respondents with usage experience aligns with the statistically significant association found between usage experience and trust.

Furthermore, there is a statistically significant relationship between awareness regarding stablecoins and trust in a regulated, GEL-pegged stablecoin ($\chi^2 = 15.80$, $p < 0.001$). This result indicates that trust varies according to the respondents' level of awareness.

A statistically significant association was also identified between the assessment of the importance of state regulation and trust in stablecoins ($\chi^2 = 5.20$, $p = 0.023$). Consequently, the level of trust varies depending on how the importance of regulation is perceived.

A statistically significant association was also found between stablecoin usage experience and trust in stablecoins ($\chi^2 = 5.96$, $p = 0.015$).

Overall, the χ^2 test results indicate statistically significant associations between trust in stablecoins and respondents' levels of awareness, usage experience, and perceptions of the importance of regulation.

The hypotheses formulated within the study were evaluated based on the results of descriptive and inferential statistical analyses. The results of the χ^2 test and Spearman correlation analysis support all four hypotheses:

- H1: A higher level of awareness regarding stablecoins is positively associated with trust in stablecoins;
- H2: A higher perception of stablecoin security is positively associated with trust in stablecoins;
- H3: A higher assessment of the importance of state regulation is positively associated with trust in stablecoins;
- H4: Experience using stablecoins is positively associated with trust in stablecoins.

Regarding H1, a positive and statistically significant relationship of moderate strength was identified between awareness of stablecoins and trust in a regulated, GEL-pegged stablecoin ($p = 0.367$, $p < 0.001$).

Regarding H2, a positive and statistically significant relationship of moderate strength was identified between the perception of stablecoin security and trust in a regulated, GEL-pegged stablecoin ($p = 0.504$, $p < 0.001$).

Regarding H3, a weak yet statistically significant relationship was identified between the assessment of the importance of state regulation and trust in a regulated, GEL-pegged stablecoin ($p = 0.222$, $p < 0.010$).

Regarding H4, a statistically significant relationship was identified between experience using stablecoins and trust in them ($\chi^2 = 5.96$, $p = 0.015$).

In the subsequent stage of the study, logistic regression analysis was employed to evaluate the combined relationship between the key factors examined in the study and trust in a GEL-pegged stablecoin. The dependent variable was defined as the respondents' answers to the question of whether they trusted a stablecoin pegged to GEL. The independent variables were awareness of stablecoins, experience using them, perceptions of value stability, level of knowledge, perceptions of security, assessments of the importance of state regulation, and assessments of the potential for stablecoins to replace traditional payment methods.

Logistic regression analysis revealed that, when these factors are considered simultaneously, perceived security and the assessment of the importance of state regulation emerged as statistically significant independent determinants of trust. When individual factors—such as awareness, usage experience, knowledge, and other characteristics—are analyzed in isolation, they show a statistical association with trust. However, when the key factors are considered simultaneously, only perceived security and the assessment of the importance of state regulation remain statistically significant independent determinants of trust, given the interrelationships among the variables.

This result indicates that, when the other factors are considered simultaneously, perceived security and the assessment of the importance of state regulation exhibit the clearest association with trust in stablecoins.

Conclusion

The study results demonstrate that the formation of trust in a GEL-pegged stablecoin is a multifactorial process. Hypothesis testing confirmed a statistically significant relationship between trust in stablecoins and factors such as awareness of stablecoins, perceptions of security, the perceived importance of state regulation, and usage experience. Furthermore, logistic regression analysis revealed that when these key factors are considered simultaneously, perceived security and the importance of state regulation emerge as statistically significant independent determinants of trust.

These findings indicate that trust in a stablecoin is not determined solely by users' awareness or usage experience. Of greater importance are the users' perceptions of the stablecoin's security and their assessment of the reliability of the institutional environment in which it operates. Consequently, both

the technological and financial security of the stablecoin, as well as the associated regulatory and supervisory framework, play a crucial role in building trust.

Based on the results obtained, trust can be viewed as an assessment rooted in future expectations, whereby an individual believes there is a sufficiently high probability that a relevant party or system will act in accordance with those expectations, even though the desired outcome is not fully guaranteed. In the case of a stablecoin, this expectation is not limited to trust in the issuer alone but encompasses a broader institutional and technological environment, including the issuer, reserve assets, technological infrastructure, and regulatory and supervisory mechanisms.

Thus, trust in a stablecoin can be seen as stemming not only from confidence in a specific issuer but also from confidence in the institutional and technological system within which the stablecoin operates. It is the combination of these factors that shapes users' expectations that the stablecoin will retain its key attributes—primarily value stability and security—which, in turn, fosters its adoption and usage.

In this context, the National Bank of Georgia plays a pivotal role as the institution responsible for regulating and supervising the virtual asset service market. The existence of a clear regulatory framework in the virtual asset sector—encompassing consumer protection, market transparency, and the supervision of virtual asset service providers—establishes the institutional foundation that fosters and strengthens trust within the digital financial environment. Consequently, effective regulation should not be viewed merely as a mechanism for mitigating potential risks; it is also a crucial prerequisite for consumer confidence, market resilience, and the responsible development of the virtual asset ecosystem.

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AN INTEGRATED MODEL OF STATISTICAL PRODUCTION IN A CENTRAL BANK: THE EXPERIENCE OF THE NATIONAL BANK OF GEORGIA

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Abstract

Growing demands on central bank statistics require integrating data production processes, complying with international standards, and ensuring compatibility with macroeconomic statistics. This article discusses the National Bank of Georgia's (NBG) experience in establishing and developing an integrated model for statistical production.

It analyzes the prerequisites for transforming the traditional model of statistical production, the influence of international standards and best practices, and the alignment of data collection, processing, and dissemination processes. It pays particular attention to the role of the GSBPM, centralized data management, and modern digital technologies.

The NBG's experience shows that the efficiency of an integrated statistical production model requires the integration of methodological, organizational, and technological components into a unified system, as well as a clear understanding of the institutional role of statistics.

Keywords: 2025 SNA, GSBPM, SDMX, XBRL, BIRD, IReF, monetary and financial statistics, macroeconomic statistics, data structure definition, granular data.

Introduction

At its 56th session (4–7 March 2025), the United Nations Statistical Commission (UNSC) adopted the updated international standard for national accounts statistics. Accordingly, countries were urged to implement the new statistical standards within a relatively short timeframe, specifically by 2029–2030.

One year later, at the 57th session of the UNSC, emphasis was placed on the importance of producing artificial intelligence (AI)-compatible and user-friendly data in a rapidly evolving information environment. It was noted that, to this end, more effort should be devoted to SDMX (Statistical Data and Metadata eXchange)—an international statistical standard for data and metadata exchange—which helps improve metadata documentation practices and expand the availability of harmonized, machine-readable data (UN, 2026). Thus, over the next 4–5 years, the statistical community is likely to undergo another major phase of development.

Similar shifts have occurred in the evolution of statistics, including in central bank statistical activities. At one point, it was believed that “the Central Bank is a bank, not a study group”¹ and that statistical activities did not fall within its direct scope of re-

1. This was the Bank of England Governor's reaction in 1960 when, during a report discussion, a proposal was raised for the bank to collect and publish more statistical data (De Bonis and Piazza, 2021).

sponsibility. However, this approach subsequently changed fundamentally, with the European Central Bank's (ECB) large-scale efforts to strengthen economic statistics being described as "a silent revolution" (Solans, 2003).

For years in Georgia, as in many other countries, the standard data collection process worked as follows: whenever a new regulatory requirement, international standard, or significant economic event arose, the central bank designed a specific, aggregated reporting template with completion instructions. Commercial banks then filled out these tables manually in text or Excel files, based on their internal databases, and submitted them to the central bank. However, about 15 years ago, this approach changed radically, and the National Bank of Georgia (NBG) began creating a forward-looking, flexible architecture for its statistical system.

One of the main directions of the NBG's statistical strategy is the development of robust logic and algorithms for collecting granular, multi-purpose microdata, as well as their alignment with the Generic Statistical Business Process Model (GSBPM), which entails establishing optimized, digitally supported workflows. This direction is being implemented in full compliance with international statistical methodologies, standards, and requirements.

Overview of Central Bank Statistical Practices

Although central banks have different traditions, skills, experience, and resource capabilities in data production, modern challenges strongly favor an integrated approach to data production. This differs fundamentally from the so-called "silos approach," which is associated with decentralized statistical production, inefficient reporting processes, and an excessive reporting burden.

In central bank statistical production, an "integrated approach" implies the following (Casa et al., 2022):

- Requesting granular primary data from reporting entities once and using them multiple times.

- Utilizing a unified statistical dictionary containing methodologies, methods, definitions, and classifications used to describe reporting requirements.
- Employing a single specialized IT platform for data management and utilization.
- Organizing data management and processes in a centralized manner, ensuring data accessibility for both internal and external users of the bank.

When discussing data collection by a central bank, it is necessary—among other factors—to consider the accounting and reporting systems used by financial institutions (as respondents) for their internal operational purposes.

To ensure the accuracy, transparency, and efficiency of financial reporting, various standards and reporting frameworks are globally applied, including local Generally Accepted Accounting Principles (GAAP), International Financial Reporting Standards (IFRS), the Basel framework for banking regulation, and relevant solvency regulation standards (IRIS Business Services Limited, 2024).

In addition, two international standards play a key role in harmonizing financial and statistical reporting frameworks, ensuring financial transparency and regulatory compliance, and facilitating international data exchange: XBRL (eXtensible Business Reporting Language), an electronic communication standard for the exchange of financial and business data, and SDMX (Statistical Data and Metadata eXchange), an international standard for the exchange of statistical data and metadata.

However, the implementation of these standards, whether fully or partially, without adequate readiness and understanding may lead to significant complications in statistical business processes, unjustified costs, and a higher statistical reporting burden. National statistical offices, central banks, and international organizations—including the European Central Bank (ECB), Eurostat, the United Nations (UN), the Bank for International Settlements (BIS),

and the International Monetary Fund (IMF)—generally regard XBRL and SDMX as complementary tools for data management at both the microeconomic and macroeconomic levels (IRIS Business Services Limited, 2024).

Nevertheless, to date, no single consensus exists on which of these two international standards central banks should prioritize in practice. Available official materials indicate that central banks make this decision primarily based on their own statistical, regulatory, and prudential objectives and priorities.

At first glance, central banks that focus on financial stability, banking supervision, and the collection of detailed primary data tend to prefer XBRL. However, because of the high implementation and maintenance costs, the complexity of granular data collection, and the need for frequent software updates, XBRL has limitations (Strader, 2007).

Against this backdrop, SDMX gains particular importance by enabling the structuring, standardized exchange, and dissemination of statistical data. It can structure and aggregate statistical information derived from granular financial reporting data, contributing to a comprehensive macroeconomic picture. SDMX aims to improve the efficiency, quality, and accessibility of statistical data production and dissemination. It establishes common rules for the description, exchange, and validation of data and metadata, facilitating standardized data management and interoperability across various statistical domains.

Beyond differing traditions and approaches to data collection, processing, and use, resource capabilities also play a significant role among central banks. Consequently, despite the high demand for statistical data, corresponding practices and outcomes vary noticeably across countries.

Today, key examples of international practice include the experiences of the Central Bank of Austria (OeNB) and the Bank of Portugal (BdP). Both banks have integrated statistical methodology with the

GSBPM, albeit through different organizational and technological approaches.

The OeNB model is known for its input-oriented (raw-data-oriented) approach. Its core principle is “collect once, use multiple times.” The OeNB and commercial banks coordinate statistics through the Austrian Joint Reporting Service (AuRep). AuRep provides IT and other services and manages the Common Reporting Platform. This mechanism ensures that methodological changes are developed jointly and remain acceptable to both parties (Kie-necker et al., 2018).

Another feature of the Austrian model is the OeNB's use of so-called “Smart Cubes,” which are generated from basic cubes using predefined algorithms and transformation rules. Basic cubes are formed on the AuRep platform based on raw data received from commercial banks and contain detailed information on individual loans, deposits, and other operations (Turner, 2019). Furthermore, although the OeNB encourages banks to adopt the basic cube approach, it is not legally required (Turner et al., 2014).

In the final stage, the OeNB executes the Process phase of the Generic Statistical Business Process Model (GSBPM). If the statistical methodology changes, the central bank updates its internal algorithms, allowing it to meet new requirements without requesting additional information from commercial banks.

Unlike the OeNB, the Bank of Portugal (BdP) has notable experience in master data management and inter-agency coordination. Its model encompasses several main components:

- Centralized data repositories: The Central Credit Register and the Central Balance Sheet Database.
- Unified register of resident entities: A single register of legal entities that unifies their basic identity details in alignment with the System of National Accounts (SNA) classifications, reducing inter-agency and in-

tra-agency discrepancies—a persistent issue for many countries.

- Centralized statistical production: The GSBPM Collect phase ensures centralized collection of detailed primary data, while the GSBPM Process and Analyze phases handle the production of various statistical domains under the BdP's mandate.

Regarding XBRL/SDMX adoption, unlike the OeNB, the Bank of Portugal uses XBRL to collect standardized financial statements (including those of non-financial corporations) and to ensure compliance with European regulations (Costa e Silva and Brites Ramos, 2004). For statistical production itself, however, the BdP prefers its own, more flexible XML-based API architecture, whose data can be converted into SDMX or XBRL format as needed.

The practice of collecting granular primary statistical data using custom XML schemas and API-based channels is also present in the central banks of Spain and Italy. The Bank of France uses its own portal, “OneGate,” for granular statistical data collection and XBRL for supervisory reporting. The National Bank of Poland also uses XBRL for supervisory reporting. It should be noted that the use of a custom XML/API mechanism by central banks is justified by its speed and flexibility, unlike XBRL, which is considered a “heavyweight” technology for collecting large volumes of granular loan and deposit data (Strader, 2007).

The Bank of Italy also exhibits an interesting statistical production practice. Together with the Italian Banking Association (ABI), and similarly to the Austrian experience, it created the PUMA joint functional model, which defines standardized rules for extracting microdata from banks' internal information systems.

The Bank of Italy's institutional setup for statistics is noteworthy. For this purpose, the bank created a dedicated organizational structure, the Statistics Committee, tasked with coordinating statistical needs and making decisions on the multi-purpose use of data. The committee's strategic role is further highlighted by the fact that a member of the

bank's governing board chairs it. This arrangement demonstrates that data is treated as a strategic resource at the central bank level.

It is worth noting that for central banks with limited resources to develop their own reporting portals, the choice of data exchange and reporting standards is often driven by international requirements and the country's alignment process with the European Union. For instance, countries undergoing EU integration use XBRL, partly to comply with European supervisory reporting requirements. Central banks in India, Türkiye, Brazil, and Chile use similar approaches.

Against the backdrop of increasing demands on central bank statistics, intensive work on data harmonization and standardization is also underway at the broader European level. The experience of the ECB and the European System of Central Banks (ESCB) shows that insufficient data harmonization increases the costs of statistical activity while simultaneously heightening the risks of data errors and misinterpretation (Draghi, 2016). One cause of this issue was the practice—still present to some extent in the European banking sector—where financial institutions had the autonomy to interpret the content of data requests issued by regulators. As a result, differing interpretations of the same requirement could create heterogeneity in the data submitted to central banks.

To address this issue, the ECB and ESCB, in collaboration with the banking sector, developed the Banks' Integrated Reporting Dictionary (BIRD), which enables banks to transform information from internal databases into data that complies with central bank methodological requirements and is suitable for machine processing. At the end of 2015, the Statistics Committee (STC) of the ESCB approved the launch of the BIRD pilot project. The project initially covered Analytical Credit Datasets (AnaCredit) and Securities Holdings Statistics. Seven national central banks and 26 commercial banks participated, and the pilot phase was completed in 2017 (Kienecker et al., 2018). A subsequent milestone in BIRD's development was the launch of its website in April 2023 (ECB, 2026a).

BIRD represents an independent logical framework combining three core components:

- The Conceptual/Information Model defines economic categories, their attributes, and interrelationships, ensuring uniform definitions of relevant terms and methodological requirements.
- The Input Data Description defines the structure and content of microdata to be extracted from a bank's information systems.
- The Transformation Rules establish formalized rules and algorithms through which primary data are transformed into data required for statistical and supervisory reporting.

A key innovation of BIRD is the presentation of methodological knowledge and the statistical dictionary in a structured, machine-readable format. Under this approach, methodological requirements are directly linked to data structures and processing rules. Consequently, technology and databases are viewed not as ends in themselves, but as tools for implementing methodological knowledge in practice (ECB, 2026a).

An important objective of BIRD is to support banks in implementing the Integrated Reporting Framework (IReF). This is a unified data collection framework that will be gradually established across eurozone countries. Using BIRD will help reporting institutions meet IReF and other reporting requirements, reduce the reporting burden, and improve data quality.

Thus, while BIRD aims to establish a unified methodological and terminological framework for data production, IReF aims to harmonize and standardize the collection processes for monetary and financial statistics across the eurozone. One of its primary objectives is the maximum standardization of the GSBPM Collect phase.

Under IReF, several existing ESCB statistical reporting frameworks—including balance sheet statistics, interest rate statistics, securities statistics, and Ana-Credit—are planned for integration into a single, detailed data model. The ECB's fairly tight implementation timeline underscores the scale of this transformation.

The ECB and ESCB are working to enable the ESCB to receive standardized, harmonized statistical data from commercial banks by the first half of 2031, gradually phasing out the current practice in which banks meet reporting requirements based on their own interpretations, which reduces data-collection efficiency.

Another important issue highlighted by European statistical institutions and central banks is the clear identification of the owners of statistical business processes, a vital element of an integrated approach to statistical production. This implies that identifying and managing data needs within a central bank's mandate should not occur along isolated business lines, but through an interconnected and coordinated process. This approach helps prevent data duplication, enables the multi-purpose use of detailed data, and eases the reporting burden.

European statistical bodies and central banks closely link the integrated approach to statistical production with the organizational setup of the statistical function within a central bank (Dilip et al., 2026). A survey of central banks in countries participating in the IMF's SDDS and SDDS+ data dissemination standards (51 responses) revealed that in 61% of cases, statistical activity is led centrally by a single independent structural unit; in 21%, the statistics division is part of a larger structural unit; and in 18%, the statistical production function is distributed across different units, as is the case in the National Bank of Georgia.

The Experience of the National Bank of Georgia

Mandate and prerequisites

The period following the country's independence (1991) and the establishment of an independent central bank coincided with the development and expansion of international statistical standards. This expansion was, in turn, driven by new statistical requirements arising from the economic and financial crises of the 1990s. During the same period, Georgia joined international organizations and began building its statistical system to comply with international standards. Thus, unlike other coun-

tries where statistical systems gradually adapted to international requirements, Georgia's independent statistical system was founded implementing international standards from the outset.

The National Bank of Georgia (NBG), alongside the National Statistics Office of Georgia (GeoStat), is an official producer of statistics in the country and is responsible for macroeconomic statistical domains such as financial and external sector statistics (Parliament of Georgia, 2009a, 2009b).

Initially, data collection at the National Bank of Georgia, as in many other countries, followed standard, routine operational procedures. This process involved Excel spreadsheets, decentralized data management, and data duplication, and each new demand for statistical information typically required a new reporting form and corresponding procedures. Over time, this approach increased the complexity of the data collection and processing workflow. About 15 years ago, the central bank began changing this practice to build a forward-looking statistical system with a flexible architecture (Aslamazishvili, 2012, 2013).

The changes began in 2010, when the need emerged for a new conceptual framework to define what data the central bank should collect from commercial banks, as well as the channels and tools through which this data should be processed, analyzed, and disseminated. It was also essential to assess banks' technological capabilities, readiness, and opportunities for collaboration with the central bank.

The necessity for a new approach was driven by several factors:

- The practice of duplicative data requests and repeated quality control checks was inefficient.
- Growing data demands and the periodic introduction of new reporting requirements increasingly burdened specialists at both the central bank and commercial banks.
- Processing information obtained through traditional tools, including Excel spreadsheets, consumed significant time and labor resources.
- Changes in international statistical standards and methodologies required frequent revisions and adaptations of the existing reporting system.
- In the context of advanced information and communication technologies (ICT), modern requirements for electronic data transmission and dissemination, coupled with the growing demand for statistical information and the rapid pace of updates to international statistical methodologies, necessitated a review of traditional statistical production methods and the adoption of new approaches.

The main strategic objectives included the following:

- Establishing an integrated model for statistical production.
- Collecting granular data without duplication.
- Standardizing and digitizing statistical business processes in accordance with a modernized and optimized GSBPM.
- Basing statistical data transmission and publication on modern digital technologies.

Commercial banks supported the idea of changing the traditional model of statistical production from the outset. This was facilitated by a specific feature of the country's banking industry: 95% of banks are controlled by foreign capital. Consequently, accounting and statistical practices differed significantly among these banks, primarily reflecting the rules and requirements of the countries of origin of their founders or controlling capital. As a result, banks found it challenging to independently ensure that their available data aligned with the NBG's statistical requirements. This circumstance significantly contributed to the implementation of the SebStat project. The conceptual model and technological architecture of SebStat were developed by understanding, adapting, and integrating several fundamental international standards. The objective was to maximize the system's alignment with modern demands for statistical information.

Need for granular data collection and the solution

As is well known, monetary statistics comprise data on stocks and flows organized within two hierarchical frameworks: sectoral balance sheets and analytical surveys. Sectoral balance sheets, with their comprehensive and systematically organized structure—categorized by financial instruments, assets and liabilities, domestic and foreign currencies, res-

ident sectors and non-residents, as well as balances, transactions, and other flows—represent one of the most comprehensive international standards for producing detailed statistical information. This approach formed the basis for determining the level of detail to be employed within the framework of SebStat for collecting balance sheet data from financial institutions (Aslamazishvili, 2022).

Figure 1. Sectoral Balance Sheet Model (Fragment)

	Opening stocks	Transactions	Other flows		Closing stocks
			Valuation changes	Other changes	
Instrument					
Assets/Liabilities					
National currency					
Resident sectors					
• ...					
• ...					
• ...					
Nonresidents					
Foreign currency					
Resident sectors					
• ...					
• ...					
• ...					
Nonresidents					

Source: IMF (2016).

This model offers significant advantages:

- It can be applied with equal efficiency to both banks and other financial institutions.
- It is flexible and allows for the integration of international standards alongside national characteristics and specific analytical objectives.
- The outputs derived from it are used not only for the compilation of monetary and financial statistics, but also for a substantial portion of the financial account, balance of payments, international investment position, and external debt statistics (Aslamazishvili, 2013, 2015).

However, the most comprehensive logic for granular data collection is found in the System of National Accounts (SNA). Specifically, this refers to the

practical recommendation that the collection of detailed information on an economic phenomenon be based on a logical sequence of relevant questions. To describe the nature of the production process, the System of National Accounts proposes the following sequence of core questions: “Who does what, with whom, in exchange for what, by what means, for what purpose, with what changes in stocks?” Furthermore, it is noted that “Answering these questions for all economic flows and stocks and operators in a given economy would provide an enormous amount of information describing the complete network of economic interrelations” (UN, 2025).

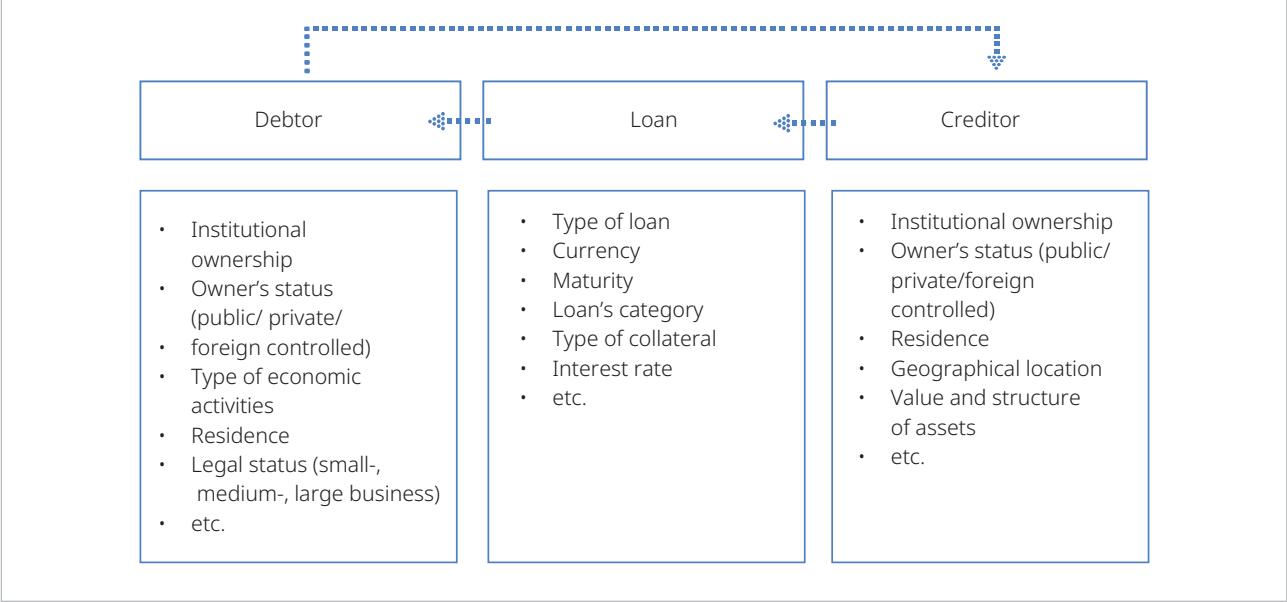
Although this approach of the System of National Accounts is not widely implemented in national practices globally, in the case of Georgia, it played a crucial role in shaping the mechanism for the

logical organization of data structures. These core questions were adapted to the specificities and data characteristics of SebStat.

The practical application of this approach can be illustrated through a concrete example. Specifically, if

the goal is to collect granular data on a loan issued by a bank to a client, a cascade of questions can be formulated to sequentially describe the bank, the client, the loan, and its key characteristics. This approach is illustrated in Figure 2.

Figure 2. Illustration of the Approach Used in SebStat to Define the Structure of Transaction Objects and Actors



Source: Author's illustration.

The logical systematization of questions in this manner during the data structure design phase (the GSBPM Design phase) allows for their further breakdown and detailing as needed, without requiring system alterations or additional IT resources.

In this regard, the Bank of Italy's statistical practice is noteworthy. While rare, the need for additional data breakdown in specific areas does occasionally arise. In such cases, the Bank of Italy typically submits additional data requests through a separate reporting form to avoid overcomplicating the existing data model. Consequently, it acknowledges that “an integrated approach to data collection is never an absolute goal” (Casa et al., 2022).

In the case of SebStat, such a need is practically excluded, and no such instance has been recorded since its launch. Thus, minimizing the risk of ad-

ditional complexity in the data model is one of its major advantages.

Another key feature of SebStat is its scope of coverage. Unlike the statistical practice of many other central banks, it does not focus solely on core financial instruments—such as loans, deposits, securities, and others—but encompasses all financial and non-financial instruments structured on a standardized basis.

Defining the structure of the required information based on these approaches does not mean that the corresponding data are always immediately available within reporting institutions. Examples include data such as residency, sectorization, and other categories defined by the fundamental concepts of the SNA. Thus, one of SebStat's vital functions is to build methodological competencies within banks and enhance their overall capabilities to ensure a proper

understanding of statistical requirements and the provision of high-quality statistical data.

To this end, the NBG's SebStat team held a series of meetings with bank representatives to explain the system's essence, goals, and practical benefits. In parallel, the team developed a comprehensive set of methodological, regulatory, instructional, and reference materials and made them accessible on the SebStat portal. This documentation provides reporting officers with essential information regarding SebStat's architecture, reporting deadlines, methodological updates, and other relevant matters.

After defining the content of detailed statistical data, the next item on the agenda was the selection of a data collection tool. As noted above, international practice utilizes both standard SDMX/XBRL formats and custom XML/API solutions. SebStat's architecture was built on the custom XML/API approach; however, when defining the data structure, it applied the concept of SDMX's Data Structure Definition (DSD). This ensured the system's flexibility and simplified the transformation of the received data into the SDMX format, facilitating SebStat's compatibility with international statistical standards. As a result, SebStat's two-tier architecture was established (see Figure 3).

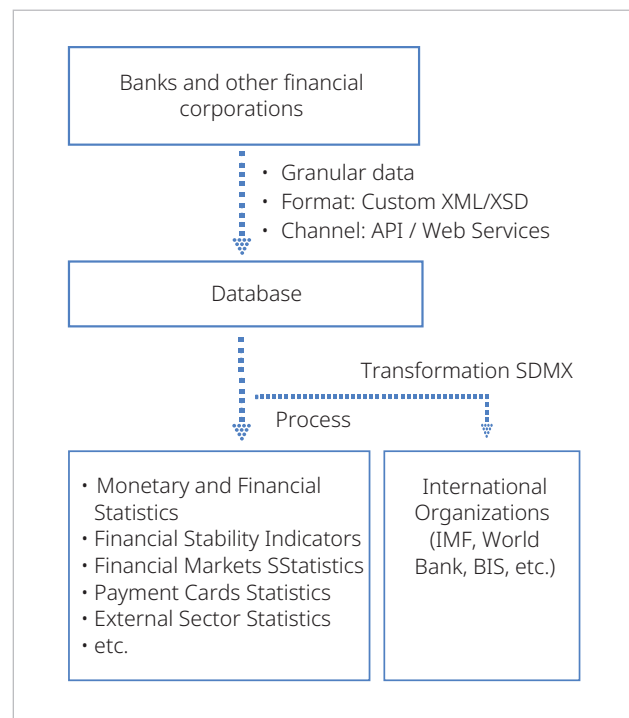
Defining the data structure

Similar to SDMX, SebStat uses two types of concepts: dimensions, which uniquely identify and describe the data, and attributes, which serve purely descriptive functions.

Because the central bank, within its mandate, collects diverse data from financial institutions for various purposes—including monetary and financial statistics, balance of payments, payment systems, and supervisory objectives—SebStat initially groups them into data families (domains) and defines a specific structure for each. A data family represents a set of homogeneous information, such as data on balance sheet accounts, the foreign exchange market, unauthorized transactions, etc.

SebStat's architecture also allows for the creation of a new data family whenever a need for new data

Figure 3. SebStat's Two-tier Architecture



Source: Author's illustration.

arises. Following established procedures (GSBPM phases: Specify Needs, Design, and Build), the new family is integrated as a separate module without altering the core architecture.

SebStat groups dimensions within each data family according to a predefined logic. The information structure is organized sequentially into a series of elements that collectively form the data key. The first three elements remain constant and are strictly ordered across all data families:

1. XXX – Data family
2. XXX – Reporting institution
3. XX – Data reporting frequency.

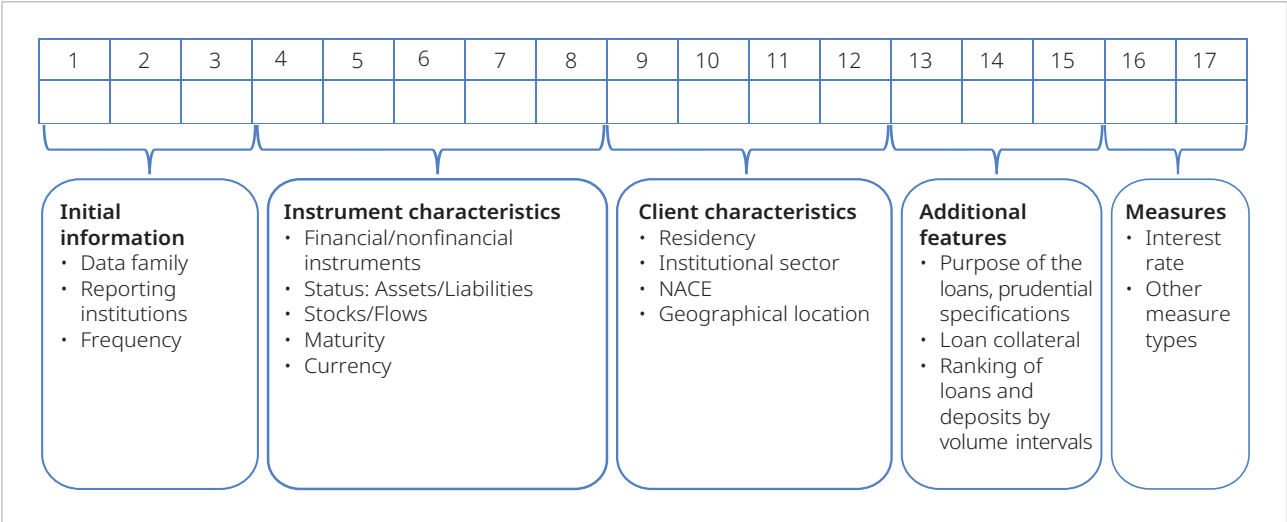
The fourth element is defined by the content of the data family itself, specifically by the economic category it describes—such as a financial instrument or a type of unauthorized transaction, etc. For commercial banks' balance sheet data, this category is the "instrument." Notably, Campa and Schnabel (2025) report the introduction of an identical statistical element, the "type of instrument," within the Eurosystem's Integrated Reporting Framework

(IReF), which is scheduled for implementation by the second quarter of 2031 (ECB, 2026a).

Beginning with the fifth element, dimensions are

grouped according to a predefined logic for each data family. For example, the structure of commercial bank balance sheet data is described through a data key with the composition presented in Figure 4.

Figure 4. SebStat: Data Model for Collecting Commercial Bank Balance Sheet Data



Source: Author's illustration.

Each element of the key is defined by a corresponding code list, which may be international (such as classifiers for countries or currencies), national, or developed specifically for SebStat purposes. A significant portion of the classifiers used is aligned with the System of National Accounts, including those for institutional sectors and subsectors of the economy, financial instruments, and other classifications. Furthermore, depending on the content of a specific data family, these classifiers are common across all relevant data families (see Figure 5).

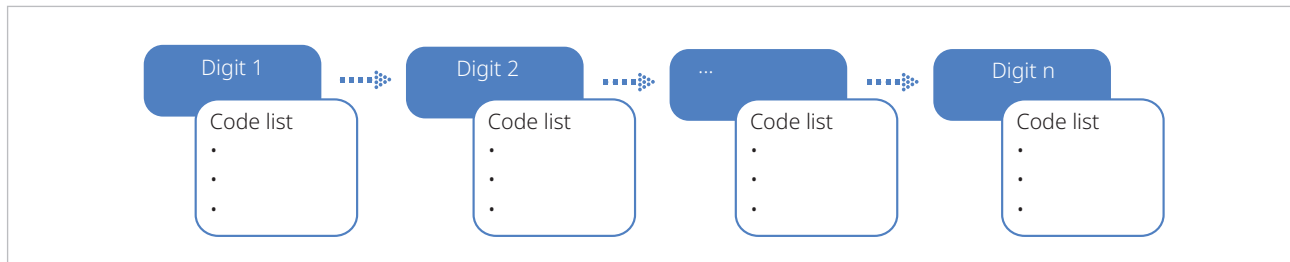
Each subsequent data family follows a similar logic, and SebStat strictly standardizes this procedure (GSBPM phases: Design and Build).

An important feature of this data collection model is that it is not tailored to satisfy the specific information needs of individual users. Rather, it serves both the current and potential data requirements of macroeconomic statistics and supervisory activities. Consequently, the model not only meets existing demands, but also provides a foundation for further

data analysis and the development of new analytical capabilities.

Unlike the European practices discussed above, where data collection typically begins with a core set of data and gradually expands as new requirements emerge, the National Bank of Georgia began with an approach aimed at collecting the broadest possible range of information. Consequently, SebStat's conceptual and technological architecture was designed in accordance with this principle from the outset.

Commercial banks provided significant support at the initial stage of implementing this approach. After consultations, they recognized that implementing the project would require substantial work from both the central bank and commercial banks, but that it would largely be a one-time effort. In return, the subsequent reporting process would be significantly simplified—a benefit that has been proven in practice.

Figure 5. General Scheme for Describing Data Structures in SebStat

Source: Author's illustration.

An advantage of this approach is its flexibility in adapting to methodological change. For example, under the 2025 SNA, classifiers for institutional sectors, economic assets, and other categories were expanded. Incorporating these changes into SebStat requires no modifications to the underlying IT architecture and is carried out directly by the system administrator. Moreover, the administrator has extensive knowledge of macroeconomic statistics and implements updates in accordance with SebStat's strategic direction.

Formulation of NBG requirements

The NBG's requirements for reporting institutions are formulated as keys rather than numerous tabular formats. Within a single data family, more than one statistical requirement, and therefore more than one key, may exist.

Figure 6 provides an example illustrating the data structure definition and the corresponding key for a specific financial instrument—in this case, a loan, based on balance sheet data from a specific commercial bank within the SebStat system.

Figure 6. Data Structure Definition (DSD): Example of a Specific Bank

N	Structure	Description
1	FAMILY	Data family (FIM)
2	SOURCE	Reporting institution (BBG)
3	FREQ	Monthly (MM)
4	INS	Instrument (loan) (L04000)
5	STA	Status of instrument (Asset/Liabilities) (AS)
6	STFL	Stock/Flow (FL)
7	MAT	Initial maturity (T365)
8	CUR	Currency (GEL)
9	RES	Residence of counterparty (GE)
10	SEC	Institutional sector (Private HH) (S14100)
11	NAC	Type of economic activity (NACE; not applicable) (XX)
12	REG	Regional allocation of counterparty (Tbilisi) (R01)
13	LOP	Additional info (Consumer loan) (0111101)
14	LOC	Loan's collateral (with deposits) (LC7)
15	RNG	Ranking of amount by intervals (0.01 - 1,000.00)(D1)
16	IR	Interest rate (013.70)
17	MTYPE	Measure (Market value) (BV)
	<PERIODLASTDAY>2026-06-30T00:00:00</PERIODLASTDAY>	
	< DATAVALUE>600</DATAVALUE>	

Key: FIM.BBG.M.L04000.AS.FI.T365.GEL.GE.S14100.XX.R11.0111101.LC7.D1.013.70.BV

After formulating statistical requirements, or in parallel with them, SebStat develops data validation algorithms. For this purpose, SebStat incorporates a specialized feature that enables the definition and system integration of a comprehensive set of guidelines and algorithms. This mechanism ensures that statistical data submitted by commercial banks are semantically compatible, accurate, and structurally sound before being uploaded to the SebStat system.

When a commercial bank uploads a prepared XML file to SebStat, each file undergoes structural, format, code, duplicate, and logical checks, including verification of totals and, where necessary, paired consistency checks.

To enable banks to generate data compliant with international standards directly from their internal operational systems, SebStat applies an approach similar to that of the European Central Bank's BIRD. For example, while the central banks of Austria and Portugal use specialized algorithms to classify data that banks already provide, SebStat provides banks with detailed guidance on how to process and classify their internal data to ensure full compliance with the methodological requirements of the National Bank of Georgia. Once all validation checks have been successfully completed, the prepared data are loaded into the SebStat database (GSBPM phase: Collect).

Notably, while SebStat's underlying logic parallels the BIRD and IReF frameworks, it was established much earlier, between 2010 and 2015, with its methodological foundations being developed in the early 2000s, well before BIRD was initiated in 2015. When European banks had to self-classify data to meet ECB and other regulatory demands, the NBG, even under an Excel-based reporting regime, developed clear guidelines and so-called "bridge tables." These tools enabled commercial banks to align their internal operational data with the NBG's statistical requirements.

This established practice provided a major advantage during the implementation of SebStat, as reporting institutions already possessed the nec-

essary experience and technical skills for data classification and transformation.

Thus, SebStat's fundamental basis as an information system consists of a standardized, unified data model anchored in a common methodology (referred to in European practice as a Single Statistical Dictionary) and a robust IT architecture that ensures both the logical and physical integrity of data. Together, these two components form the technological and methodological foundation needed to achieve key operational goals: automating data processing, reducing the time and cost of statistical production, seamlessly integrating new reports, eliminating data duplication, reducing the reporting burden, and enabling data reusability.

Data processing and dissemination

Although SebStat includes built-in data processing functionality (GSBPM phase: Process), which was actively used during the initial launch stage, the primary responsibility for data processing and dissemination (GSBPM phase: Dissemination) has now been migrated to a Business Intelligence (BI) platform. This platform allows users to interactively engage with published visual data and retrieve customized information tailored to their analytical needs. Designed for a broad audience, it holds significant potential for further functional expansion, particularly as new national accounting standards are adopted.

System governance: methodological, organizational, and IT support

Although SebStat, as a statistical information system, aligns with the European integrated data production model through its conceptual and organizational architecture, statistical production at the NBG still relies on a semi-centralized, collaborative approach due to the specific features of the central bank's organizational structure. Furthermore, while SebStat is flexible enough to collect both statistical and supervisory data, the Excel format is still partially used for supervisory reporting.

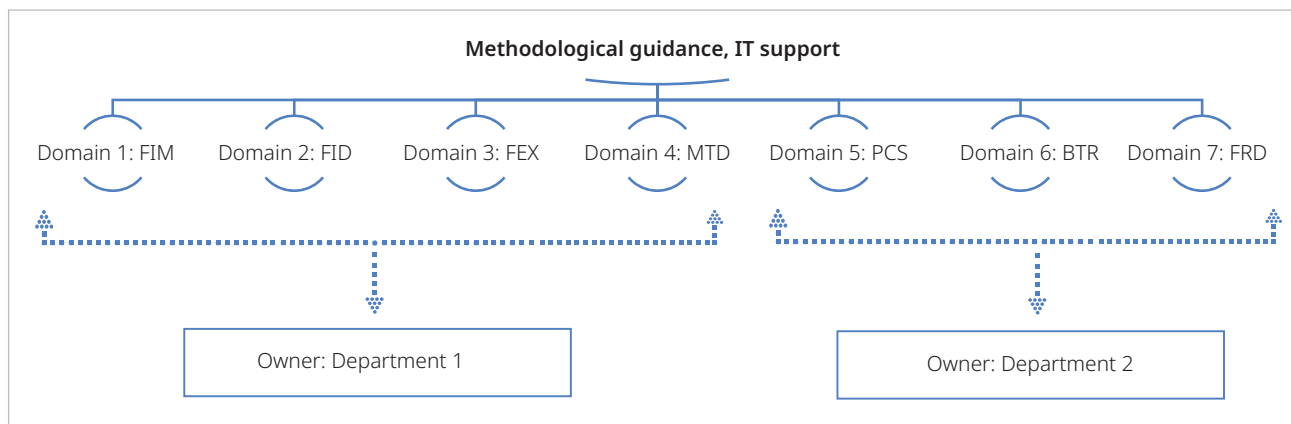
Methodological support and alignment with international statistical standards are maintained through

the ongoing SebStat project framework. System ownership across statistical domains (data families) is divided between two units: the Macroeconomics and Statistics Department and the Payment Systems Department. The NBG's Information Technology Department provides overall IT support.

The business process for producing each domain is defined by formal procedures approved by the

NBG's Centralized Risk Management Department, and compliance is mandatory throughout the statistical production lifecycle. A dedicated monitoring interface enables the SebStat project manager and system administrator to track procedural execution, including deadlines for data uploads and file validation (approval or rejection) by designated users across both the central bank and commercial banks (see Figure 7).

Figure 7. SebStat: Methodological Guidance, IT, and Organizational Support



Source: Author's illustration.

In cases of deadline non-compliance, designated NBG users and the SebStat administrator can identify the reasons for the delay and, if necessary, help the bank resolve the issue by providing guidance, operational instructions, and recommendations.

Workflow organization: GSBPM and its application

After discussing SebStat's conceptual aspects, the organization of statistical production workflows becomes equally essential. For this purpose, the NBG utilizes the Generic Statistical Business Process Model (GSBPM) (UNECE, 2025), which has been optimized to an extent: certain sub-processes have been moved between phases, and new sub-processes have been introduced. These modifications align with SebStat's workflow characteristics and the overall goals of standardizing and digitizing the entire business process.

As is widely recognized, the standard GSBPM model at the theoretical level was primarily oriented toward traditional national statistical offices and survey-based statistical production processes. In the modern context of central banks, where the volume of incoming granular data is exceptionally large and data ingestion and processing are virtually impossible without automation, adapting and modernizing the classic eight-phase GSBPM chain becomes imperative. This approach was also successfully implemented at the NBG.

Although a detailed breakdown of the adjustments made to GSBPM falls beyond the scope of this paper, the NBG's adapted version of the model is presented below (see Figure 8).

Figure 8. Generic Statistical Business Process Model (modified version)

Overarching Activities							
Specify Needs	Design	Build	Collect	Process	Analyze	Disseminate	Evaluate
1.1 Identify needs	2.1 Design outputs and dissemination	3.1 Reuse or build collection Instruments	4.1 Set up collection	5.1 Integrate data	6.1 Interpret and explain outputs	7.1 Update output systems	8.1 Gather evaluation inputs
1.2 Establish output objectives	2.2 Design variables, classify and code	3.2 Reuse or build processing and analysis components	4.2 Run collection	5.2 Derive new variables and units	6.2 Apply disclosure control	7.2 Release dissemination products	8.2 Conduct evaluation
1.3 Consult and confirm needs	2.3 Design collection	3.3 Reuse or build dissemination components	4.3 Review and validate	5.3 Calculate weights	6.3 Finalise output	7.3 Promote dissemination products	8.3 Gather evaluation inputs regarding upcoming IT innovations
1.4 Identify concepts	2.4 Design frame and sample	3.4 Configure workflows	4.4 Edit and impute	5.4 Calculate aggregates		7.4 Provide user support	8.4 Agree an action plan
1.5 Check data availability	2.5 Design processes and analysis	3.5 Test production system	4.5 Monitor collection	5.5 Finalise data files			
1.6 Check the willingness of data providers to cooperate in the project	2.6 Design production systems and workflows	3.6 Test statistical business process	4.6 Finalise collection				
1.7 Prepare and submit business case	2.7 Design Software Requirements Specifications (SRS)	3.7 Finalise production systems					
	2.8 Design training program for data providers and users	3.8 Transfer a production system from test mode to real mode					

Source: UNECE (2025), modified by the author.

Note: Darkened cells indicate new and/or relocated sub-processes.

Another major advantage of SebStat is the near-complete digitization of GSBPM phases 2 through 6 (except sub-processes 2.7 and 2.8). Meanwhile, phases 1 and 8, as well as the aforementioned sub-processes, represent stages in the statistical business process that require human intervention, including planning, design, and decision-making.

Thus, implementing a custom XML/API architecture in the NBG's practice enabled the transformation of the core GSBPM phases into automated workflows.

Communication

The National Bank of Georgia continuously strives to enhance data quality and pays special attention to transparent communication with data providers. To this end, the SebStat platform makes legal and methodological documents related to reporting, XML file creation instructions, practical guidelines, video lectures, and other supporting materials accessible.

Data quality verification procedures are integrated into the system in a strictly defined sequence and

are communicated interactively to the provider immediately upon data upload. If the system detects an error, the upload process stops automatically, and the provider receives information about the error and instructions for resolution. Once corrected, the file upload process is reinitiated. At the same time, an NBG officer responsible for the relevant domain can monitor the process. Upon a successful upload, both the provider and the responsible officer receive a confirmation notification.

Despite automated system controls, the responsible NBG employee conducts an additional review of the uploaded data. If the officer notices suspicious figures or unusual trends, they use built-in communication tools to request data verification from the provider. The provider either confirms the accuracy of the data or corrects the identified error; if necessary, re-uploading the file is allowed with appropriate authorization. Such occurrences are rare, and the GSBPM Collect phase typically proceeds seamlessly.

Development prospects

The release of the 2025 SNA further validated SebStat's strong potential for future development. The integration of updates introduced by the new national accounting standards that fall within the central bank's mandate is proceeding as part of regular operational activities. This includes expansion of classifiers covering institutional sectors, assets, types of economic activity, and other categories.

Currently, SebStat covers commercial banks, microbanks, and microfinance organizations, while insurance corporations, pension funds, and other financial institutions still use traditional reporting formats. This prioritization reflects the fact that banks account for 92% of total financial sector assets in Georgia. Nevertheless, the gradual integration of other financial sector participants into SebStat is planned in line with their growing economic role.

Advantages of SebStat

Along with the features outlined above, a key advantage of SebStat is its transparent, intuitive model, which does not require complex IT infrastructure. Built on open statistical logic, this universal framework can be adapted and implemented by central

banks and national statistical offices in other countries, particularly within developing and transition economies.

Statistical production within SebStat is guided by several core principles (Aslamazishvili, 2017):

- Transparency: Clear and structured presentation of data.
- Single Entry: One-time recording of each financial instrument.
- Strict Consistency: Execution of the statistical business process according to clearly defined procedures.
- Mutual Benefit: Organization of the system in a way that creates value for both data providers and the central bank.

Together, these principles make SebStat a practical and adaptable model for other statistical systems.

Key Lessons, Conclusions and Recommendations

In light of broad public access to statistical information and international commitments, the National Bank of Georgia publishes data in accordance with international standards within its mandate and statistical operations.

The National Summary Data Page (NSDP), managed in Georgia by the National Bank of Georgia, serves as a platform for countries participating in the IMF's Data Dissemination Standards (SDDS, SDDS Plus, e-GDDS) and provides online access to data and metadata. The deployment of SDMX on the NSDP is a prominent example of the central bank's data dissemination framework (NBG, n.d.a). Notably, among the 49 SDDS-subscribing countries, only five, including Georgia, publish data in SDMX format.

SebStat generates the statistical outputs available on the NBG website according to an advance release calendar (ARC). A dedicated BI platform enables users to interactively query, process, and visualize data of interest (NBG, n.d.b). In response to the growing demand for statistical information, the NBG continuously expands the spectrum of published data. Alongside standard releases covering

monetary and financial statistics, the external sector, and financial markets, recent additions include:

- A specialized analytical platform (NBG, n.d.c) that aggregates the NBG’s interactive reports and provides economic data visualization and analytical tools. Currently, the platform features an economic data portal and a CPI inflation analytical report, with new thematic reports planned for future integration.
- Payment systems statistics (NBG, n.d.b), incorporating card transaction data to reflect dynamics within the payment card market.
- A platform for comparing payment service tariffs and deposit rates (NBG, n.d.d), allowing users to compare standard tariffs, current and historical exchange rates, and effective interest rates on deposits, thereby enhancing market transparency and supporting informed decision-making.
- Statistics on corporate bonds issued in international markets (NBG, n.d.b), covering bonds issued internationally by Georgian companies and their parent entities. The data can be analyzed by currency, maturity, institutional sector, and other parameters, thereby serving capital market participants and other interested users.

The final phase (Evaluate) of the GSBPM, the core framework for the NBG’s statistical business process, involves evaluating all work performed, from defining statistical reporting needs to data pub-

lication. Consequently, continuous improvement throughout the statistical production lifecycle requires analyzing results, identifying bottlenecks, and determining future actions.

Key lessons learned during the implementation of SebStat lead to the following conclusions and recommendations:

- Methodological Soundness and Professional Vision: Prior to launching a statistical project, a comprehensive assessment of its efficiency, viability, and long-term development prospects is essential.
- Overcoming a Narrow Professional Scope: Statistical projects must be viewed within a broad macroeconomic context to ensure a clearer understanding of their objectives, operational functions, and outcomes.
- Systematic Analysis of International Practice: Continuous analysis of international practices and relevant standards helps prevent potential errors and guides sound decision-making.
- Understanding the Institutional Role of Statistics: Proper recognition of the scale and significance of statistical production can provide the foundation for transitioning from a collaborative model toward more centralized governance, thereby facilitating streamlined processes, reduced reporting burdens, and improved management of organizational risks.

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