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CONTENT

ON THE MAIN DIRECTIONS OF THE MONETARY AND FOREIGN EXCHANGE POLICY OF GEORGIA FOR 2026–2028[1]

NATIA TURNAVA

The main directions of monetary and foreign exchange policy of Georgia for the next three years, as presented to Parliament, outline the inflation target, the principal monetary policy instruments employed to achieve it, and the prevailing macroeconomic environment and associated risks.

To ensure price stability, the National Bank of Georgia (NBG) implements monetary policy under an inflation-targeting regime, which involves setting a predetermined inflation target and conducting policy to keep inflation as close as possible to this target in the medium term. In the short term, deviations from the target may occur due to exogenous (monetary policy–independent), one-off factors.

According to the NBG, at the current stage of development, the optimal inflation target for the country is set at 3%. This level is sufficiently low to avoid adversely affecting the decision-making of economic agents, while not so low as to hinder economic growth.

The determination of the inflation target depends on a range of long-term economic factors and the structural characteristics of the economy. Central banks generally adopt a positive inflation rate as their target, since deflation increases the risk of recession and leads to losses in economic welfare. In advanced economies, inflation targets typically range between 1–2%, whereas in emerging economies they generally fall within the 2–4% range.

Under the inflation-targeting regime, the inflation objective is achieved primarily through adjustments to the central bank's main policy instrument – the monetary policy rate (refinancing rate). Decisions regarding changes in the refinancing rate and its future path are based on an assessment of the macroeconomic environment, inflation forecasts, developments in financial markets, the evaluation of macroeconomic risks affecting inflation, and inflation expectations.

It is essential that changes in the policy rate are effectively transmitted to market interest rates. Accordingly, the efficient steering of market interest rates poses the National Bank's main operational focus. To this end, the NBG has a monetary policy operational framework comprising monetary policy instruments.

Within this framework, the National Bank of Georgia employs instruments for both liquidity provision and liquidity absorption. The primary instrument for liquidity provision is refinancing loans. In addition, the NBG supplies the financial sector with relative-

1. Excerpt from the speech delivered by Natia Turnava, Governor of the National Bank of Georgia, at the plenary session of the Parliament of Georgia on 25 November 2025.

ly longer-term liquidity through one-month open market instruments To guide short-term interest rates more effectively, the NBG also uses standing facilities, namely overnight lending and overnight deposit facilities. For the purpose of liquidity absorption, the NBG issues certificates of deposit. Through the coordinated use of these instruments, the NBG balances liquidity supply and demand in the financial system, thereby ensuring that market interest rates remain close to the policy rate and strengthening the monetary policy transmission mechanism.

Successive policy actions undertaken through the main operational instrument – the refinancing rate – both during the tightening phase and throughout the normalization process, are aimed at ensuring price stability. In 2024, inflation remained below the 3% target, averaging 1.1%. During January–November 2025, average inflation increased moderately to 3.9%, slightly above the target, partly reflecting base effects and exogenous factors. Indicators of long-term inflation expectations suggest that expectations have remained stable. Inflation measures excluding food prices, as well as indicators of relatively sticky prices that better capture long-term inflation dynamics, have remained close to the target. In particular, as of November, core inflation excluding highly volatile food, energy, and tobacco prices – stood at 2.3%, while services inflation remained near the target at 2.6%.

Nevertheless, the prolonged period of elevated inflation in relatively flexible-price components, particularly food prices, continues to pose upside risks to inflation expectations. In October, the NBG updated its macroeconomic forecast. Under the baseline scenario, inflation is expected to remain temporarily above the 3% target. Over the medium term, however, inflation is projected to converge toward the target, supported by a tight monetary policy stance, the normalization of aggregate demand, and the gradual dissipation of inflationary pressures stemming from food prices.

Given that current risks largely originate from supply-side factors, and those central banks typically respond to such risks only when they begin to affect inflation expectations, the National Bank of Georgia has continued to pursue a cautious policy approach. In particular, taking into account global risks and domestic macroeconomic developments, the NBG has maintained the policy rate unchanged at 8.0% since May 2024.

It is also important to note that the current high level of economic activity is largely driven by structural changes in the economy. Improvements in productive capacity have partially offset the price effects of strong aggregate demand. Preliminary data indicate that average economic growth over the first ten months of 2025 reached 7.6%, while the National Bank's baseline forecast projects economic growth of 7.4% for 2025 as a whole. In the following years, the growth rate of real economic activity is expected to gradually converge toward its long-term pace.

Within the inflation-targeting framework, decisions regarding the policy rate and its future path are based on forecasts. Heightened uncertainty in recent years has increased the risks associated with forecast deviations. In response, from early 2025 the NBG introduced a new scenario-based approach to monetary policy communication, aimed at enhancing transparency in decision-making and strengthening the link between risk management and the systematic analysis of alternative macroeconomic scenarios. In the implementation of monetary policy, the National Bank of Georgia responds in a manner that seeks to minimize economic losses should identified risks materialize.

Amid heightened geopolitical tensions, economic uncertainty remains elevated and the situation continues to evolve rapidly. Accordingly, risks to inflation – both upside and downside – are significant. These risks include potential fluctuations in energy and food prices, changes in transportation costs

and regulated prices, as well as the effects of global economic fragmentation, among other factors. Mitigating these risks necessitates a cautious approach to monetary policy easing.

Under the current baseline forecast, which incorporates prevailing macroeconomic risks, the NBG continues the normalization of the policy rate through only moderate, gradual adjustments. Over the medium term, while containing the risk of rising inflation expectations, the policy rate is expected to stabilize around its neutral level, currently estimated at approximately 7%. The projected path of the policy rate remains highly dependent on global economic and geopolitical developments.

International reserves play a central role in supporting macroeconomic stability and investor confidence. Accordingly, the National Bank's foreign exchange policy prioritizes the accumulation and prudent management of international reserves. In this respect, 2025 was a notable year. Against a backdrop of favorable market conditions, the National Bank actively replenished reserves from the beginning of the year. Net foreign exchange purchases during January–October 2025 amounted to USD 1.8 billion, and by November 2025 international reserves exceeded a historic high of USD 5.8 billion. Effective management of reserve assets is equally important. In this context, the inclusion of monetary gold in the reserve portfolio represents a strategic decision, reflecting global inflation risks and the objective of preserving the purchasing power of reserves. Owing to the increase in global gold prices, reserve assets rose by USD 461.8 million from the date of purchase through October 2025.

To strengthen monetary policy transmission and promote financial stability, the NBG continues to advance the "larization" of the financial system. As of October 2025, 58% of the total loan portfolio is denominated in Georgian lari. Notably, lari-denominated loans to households remain high, with 76.9% of household loans issued in the local currency. The National Bank continuously monitors trends in dollarization and, when necessary, implements measures to mitigate both individual borrower currency and credit risks, while supporting sustainable long-term economic growth.

Maintaining price stability reinforces confidence in the lari, as reflected in the rising share of lari deposits in the banking sector. As of October 2025, 51.2% of total deposits were held in local currency.

The National Bank considers that the outlined monetary and exchange rate policies will ensure price stability over the medium term. In doing so, they will enhance the resilience of Georgia's economy to potential shocks and support stable, long-term economic growth.

OPTIMAL MONETARY POLICY AMID SUPPLY SHOCKS

MARIAM TANIASHVILI, AKAKI MOSAKHLISHVILI, MARIAM TCHANTURIA

Abstract

Communication by inflation-targeting central banks is typically centered on preserving the stability of inflation expectations. While monetary policy is most effective at mitigating demand-driven inflationary pressures, in recent periods the predominant sources of inflation have increasingly stemmed from supply-side factors that are exogenous to monetary policy. In the presence of supply shocks, the central bank's primary challenge is to respond in a way that prevents these shocks from becoming embedded in inflation expectations. Although inflation expectations were long viewed as predominantly rational, developments over recent decades indicate that expectations are at least partially adaptive, implying that any shock heightens the risk of expectations drifting upward. Against this backdrop, monetary policy must maintain a cautious and prudent stance.

Drawing on Georgia's experience, this paper outlines optimal responses to both supply and demand shocks and illustrates the welfare losses that may arise if the monetary policy response is delayed or insufficient. The findings underscore the importance of a risk-minimization approach, advocating for prudent monetary policy in an environment where shocks are frequent and inevitable.

Keywords: Monetary policy, inflation targeting, inflation, supply-side shocks, sticky and flexible prices.

Introduction

Global economic developments in recent years demonstrate that inflation dynamics in both advanced and emerging economies have been largely driven by supply shocks. Supply chain disruptions resulting from the pandemic and geopolitical tensions, sharp increases in international commodity prices, and structural issues in the labor market have significantly intensified inflationary pressures. These circumstances have necessitated a reassessment of existing monetary policy strategies among central banks. Prior to the pandemic, supply shocks, particularly in advanced economies, were viewed as carrying lower risks; given high policy credibility, the impact of such shocks on inflation would typically dissipate quickly, with inflation returning to target levels. However, recent experience has shown that supply shocks have become more frequent, prolonged, and persistent. Consequently, a passive response is no longer sufficient to ensure the stability of inflation expectations.

Typically, under an inflation-targeting regime, monetary policy reacts to inflationary pressures caused by demand shocks, whereas responding to temporary supply shocks induces additional volatility in the economy. Within the updated monetary strategies, central banks are considering more flexible and proactive measures in response to shocks of any nature to ensure price stability.

In general, major crises often serve as a driver for the evolution of the monetary policy framework. Within this process, monetary policy communication has acquired particular significance. Over the past decades, such communication has become more explicit, longer-term in focus, and increasingly geared toward anchoring inflation expectations. A retrospective analysis is crucial for evaluating the development of current frameworks and the effectiveness of monetary policy, particularly in the context of supply shocks. For instance, during the 1970s, the sharp rise in oil prices resulting from the OPEC embargo and subsequent supply disruptions triggered a severe inflationary shock for many countries, including advanced economies. At that time, central banks maintained a less aggressive policy stance to support output and employment (Clarida et al., 2000). A major turning point in monetary policy occurred in the early 1980s under the leadership of Federal Reserve (Fed) Chairman Paul Volcker. In response to the high and persistent inflation prevailing amid the oil shock, he implemented a more proactive and expectations-oriented monetary policy. Although these measures precipitated a recession in the early 1980s, they facilitated the reduction of inflation and the management of inflation expectations. Consequently, the Fed's credibility increased, laying the foundation for the period known as the 'Great Moderation,' characterized by reduced inflation volatility and stabilized expectations (Clarida et al., 2000).

During the 1990s and 2000s, many central banks officially adopted an inflation-targeting regime, the core principle of which is the anchoring inflation expectations. Under this regime, the initial prevailing view was that central banks should not react to supply-side shocks, as responding to them was considered counterproductive and a cause of high economic volatility. This conclusion was premised on the notion that supply shocks are typically temporary and short-term, whereas the transmission of monetary policy to the real economy operates with a time lag. Consequently, by the time the impact of monetary policy peaks, the price shock has typically already dissipated; thus, a policy response introduces additional volatility into the economy, dampening economic growth and causing inflation to fall below the target level (undershooting). Under such conditions, it is considered optimal for monetary policy to maintain a passive response to such shocks, to 'look through' them. However, when a supply shock is of such duration or magnitude that it triggers so-called 'second-round' effects and feeds into inflation expectations, a monetary policy response becomes necessary to ensure that medium-term price stability is not compromised.

In recent years, throughout the pandemic and post-pandemic periods, anchoring inflation has become significantly more complex amidst frequent and large-scale shocks. In particular, the relatively delayed monetary policy response to supply-related shocks (‘falling behind the curve’) especially in advanced economies, contributed to the emergence of 'second-round' effects. Consequently, measures of sticky inflation, which serve as robust indicators of long-term inflation expectations, remain above the 2% target level to current period. As for emerging economies, including Georgia, the monetary policy response to inflationary pressures was relatively prompt even during the pandemic. This was driven, in part, by the fact that countries with such economies are more vulnerable to supply shocks. However, despite rapid responsive measures, inflationary pressures proved strong in emerging economies as well, due to the sheer magnitude of external shocks (World Economic Outlook, 2025). At the same time, various structural frictions, including high dollarization and the faster pass-through of external shocks, constrained the effectiveness of monetary policy.

In general, the pass-through of supply shocks to long-term inflation expectations depends on various factors, including the prevailing inflationary environment, labor market tightness, the economy’s cyclical position, and the nature of the shock itself. Specifically, under tight labor market conditions where demand for labor is high, employees possess greater bargaining power to negotiate

wage increases. In addition, if aggregate demand exceeds its potential level in such an environment, firms are able to maintain profit margins and pass on increased production costs to final prices. Consequently, the combination of supply and demand shocks amplifies inflationary pressures, making monetary policy tightening necessary as the risks of a wage-price spiral intensify (Blanchard and Galí, 2007).

Furthermore, the likelihood of emerging second-round effects is particularly high in a high-inflation environment, where flexibility of prices increases. Notably, this increase is observed even in sectors with relatively sticky prices, as leaving prices unchanged for extended periods becomes more costly for firms. Flexibility of prices, however, is typically asymmetric - prices adjust upward more rapidly than they adjust downward. Under such conditions, risks to the stability of inflation expectations and the credibility of monetary policy are heightened (Benigno and Rossi, 2021).

The vulnerability of inflation expectations to adverse supply shocks is also shaped significantly by the structure of the consumer basket. When the basket has a high share of flexible-price items for which demand is relatively inelastic (such as food and energy), any shock that alters the prices of these goods has a pronounced effect on headline inflation and, consequently, on the formation of inflation expectations. Hence, during such shocks, the dynamics of both headline inflation and relative prices exhibit greater volatility, which further exacerbates the risk of rising inflation expectations (Bluashvili, 2015). The latter necessitates the maintenance of a more cautious stance by monetary policymakers.

At the same time, the nature of the supply shock plays a critical role in shaping the appropriate monetary policy response. When the shock originates from structural labor-market pressures, a passive policy stance heightens the risk of a wage–price spiral. Moreover, in the presence of structural shocks, the likelihood of hysteresis effects in inflation expectations increases, making their anchoring considerably more challenging (Maechler, 2024). These considerations underscore the need for a more proactive and timely monetary policy response.

The pass-through of supply shocks to inflation expectations also depends on central bank credibility, which is assessed by its historical track record on inflation. When credibility is high, households and firms are more forward-looking, associating future inflation to the target level. Under these conditions, the risks of negative supply shocks passing through to inflation expectations are minimized, and it is justifiable for policymakers to maintain the same policy stance ('look through') during short-term pressures. However, in emerging economies, where the share of flexible prices is high and inflation is characterized by relatively high volatility, expectations are formed, in part, by past experience (Pariès and Moyen, 2009). In such situations, a negative supply shock increases the risks associated with managing inflation expectations. Against this background, a need arises for moderate tightening or maintaining the policy rate at a restrictive level; if supply shocks become more frequent and prolonged, a delayed response would necessitate a much sharper tightening in the future. Ultimately, this would significantly increase welfare losses, manifested in deviations of inflation from the target, reduced economic activity, interest rate volatility, and a significant rise in the price level.

The arguments presented above demonstrate that determining the optimal monetary policy response to supply shocks is a complex task for policymakers. Its effective implementation requires a comprehensive analysis of the macroeconomic environment, including the adequate assessment of unobservable variables. Under conditions of high uncertainty, where the environment changes rapidly and shocks are inevitable, monetary policy must be oriented toward minimizing welfare losses, which requires the systematic monitoring of various risk scenarios. To make optimal decisions, counterfactual analysis and the assessment of historical experience are particularly important.

This study presents a literature review of the monetary policy under supply shocks, followed by a brief overview of Georgia's inflation experience and the historical narrative of its monetary policy responses. Subsequently, using the Georgian economy as a case study within a New Keynesian framework, the paper evaluates the adequate monetary policy response to various types of shocks. This analysis takes into account the country's structural economic characteristics and historical context. Finally, an econometric analysis based on Georgian data is presented, examining the monetary policy response in the context of sticky and flexible prices.

Literature Review

Determining the optimal central bank response to an adverse supply shock (during which inflation rises and output falls) represents a complex and persistent dilemma for monetary policy. Unlike demand shocks, which affect inflation and economic activity in the same direction, supply shocks create a trade-off for the central bank between stabilizing prices and stabilizing output. The economic literature suggests that the monetary policy response to such shocks depends not only on the characteristics of the shock, wage-price dynamics (Blanchard and Galı́, 2007), and the central bank's institutional credibility (Reis, 2022; Gáti, 2023), but also on prevailing economic conditions (Erceg et al., 2024; Maechler, 2024; Bandera et al., 2023).

For decades prior to the sharp post-pandemic surge in inflation, the prevailing principle in advanced economies was that monetary policy should generally not react to - or should 'look through' -inflationary pressures stemming from supply shocks. According to Maechler (2024), this consensus was grounded in the experience of the 'Great Moderation' and relied on three main arguments supporting a strategy of 'passive response':

1. The temporary nature of shocks: Supply shocks, such as changes in commodity prices, were typically characterized by a short-term, transitory nature. Consequently, their impact on the price level was only temporary and did not induce a sustained rise in inflation. Since the full transmission of monetary policy to the economy takes considerable time (on average, 12-18 months), a tight policy response to a temporary shock carried the risk that its effects would materialize late–impacting inflation only after price pressures had already begun to dissipate on their own. This would result in an unnecessary contraction of output.
2. The dilemma facing policymakers: An adverse supply shock exerts upward pressure on prices and downward pressure on output. If the central bank were to tighten policy to curb inflation, output would decline further, potentially giving rise to recession risks. Therefore, the standard approach dictated that the response to supply shocks should be less aggressive than that to demand shocks. This implied that, to avoid an excessive constriction of output, the central bank would allow inflation to temporarily rise above the target level.
3. Well-anchored inflation expectations: The stability of expectations served as a precondition for central banks, ensuring that there was no need for a sharp reaction to temporary supply shocks and preventing these shocks from evolving into persistent 'second-round' effects. As Reis (2022) notes, a policy of non-response to a shock is the correct decision only when expectations are anchored. Furthermore, this approach was supported by the widely held empirical view that in the pre-pandemic period, when inflation remained persistently low, the Phillips curve was flat; consequently, inflation responded only weakly to the business cycle (Del Negro et al., 2020; Hazell et al., 2021).

Recent developments have called the validity of this approach into question. For instance, Werning, Lorenzoni, and Guerrieri (2025) explain that protectionist measures such as the imposition of tariffs act on the economy similarly to supply shocks, and in such cases, a policy of non-response may be suboptimal. While global inflation in previous decades

was primarily driven by demand factors, with most supply shocks having only a temporary, localized impact (Clarida et al.,1999), the situation today is different. Geopolitical tensions, economic fragmentation, climate dynamics, and demographic aging point to fundamental changes: supply factors are increasingly emerging as the drivers of inflation. Consequently, a better understanding of the nature and characteristics[1] of supply shocks has become crucial, as indicated by numerous studies (Bandera et al., 2023; Bušs and Traficante, 2025; Erceg et al., 2024; Maechler, 2024).

A central bank's choice of whether to react to a supply shock, or react to what extent, depends on the emergence of second-round effects, where the increased cost of intermediate inputs may be reflected in rising wages and core inflation. Such effects fundamentally alter the trade-offs facing policymakers. A critical factor by which a central bank can justify a response to a supply shock is the risk of a sharp shift in inflation expectations. Gáti (2023) studied the impact of short-term shocks on expectations and concluded that when inflation expectations are unanchored, even a relatively small supply shock significantly alters the public's view on future inflation. Consequently, policymakers face the necessity to intervene to anchor expectations.

The risk of a shift in inflation expectations may materialize abruptly, which is consistent with the 'two-regime' view of inflation. According to this view, the economy can rapidly transition from a low-inflation, self-stabilizing regime to a high-inflation regime (Maechler, 2024). In a high-inflation environment, households and firms pay closer attention to price changes; consequently, both wages and prices are more sensitive to supply shocks, and the Phillips curve is characterized by a steeper slope. Maechler (2024) also notes that the change in slope is determined by economic characteristics: specifically, the Phillips curve is more affected by shocks the higher the labor market tightness or price flexibility.

Inflation dynamics are significantly influenced by central bank credibility and reputation, which shape public perception regarding how aggressively the policymaker will counter persistent inflationary pressure. According to Bocola et al. (2025), a central bank ought to respond more aggressively to a negative supply shock in order to establish or reinforce its reputation as a 'tough institution.' Although the economy suffers losses in the short run as a result, long-term expectations remain more anchored, representing a 'reputational dividend'.

The literature offers a clear recommendation to policymakers: when 'second-round' effects emerge following a supply shock, a policy of non-response is no longer optimal. Conversely, moderate tightening can facilitate the deceleration of inflation and its return to target in the medium term, particularly in an environment where the current inflationary background has a strong influence on the formation of expectations (Bandera et al., 2023). Post-pandemic experience reveals that one of the main challenges for policymakers in decision-making is limited information regarding the persistence of the supply shock. It was precisely this uncertainty that drove the approximately six-quarter inaction of leading central banks, even as inflation surged following the pandemic (Maechler, 2024).

A perspective distinct from the passive response policy is offered by Erceg et al. (2024), who argue that such an approach is justified only in the case of small and short-lived shocks. In their view, uncertainty regarding the size and persistence of the shock may lead the public to believe that the shock is persistent, causing a sharp rise in inflation. Under conditions of incomplete information, expectations regarding the future become critically important.

1. This refers to the origin and characteristics of the supply shock. For example, shocks stemming from the oil market may have a different impact on the economy than supply chain disruptions, fragmentation, or disruptions caused by natural catastrophes. Furthermore, the nature of the shock is also important, as is the assessment of whether the shock is one-off or recurring, sectoral or broad-based, temporary or persistent (Central Bank of Malaysia, 2024).

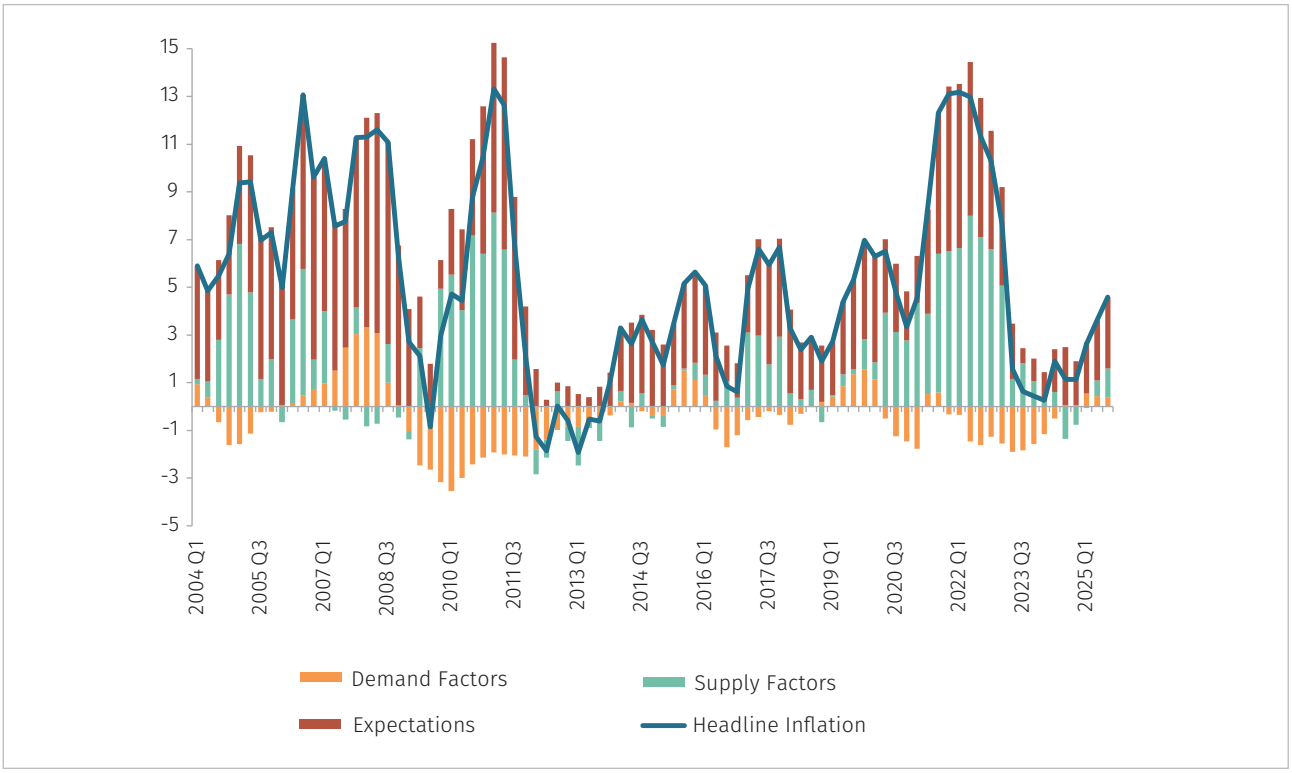
Consequently, the 'wait-and-see' approach, which is appropriate when full information is available, must give way to a more proactive policy. As noted, the optimal central bank response also depends significantly on the slope of the Phillips curve: the steeper the curve, the more responsive inflation is to shocks, and the more prudent early intervention becomes.

Overall, the view is gaining credence that due to geopolitical fragmentation, climate change, energy transition processes, and demographic shifts, future supply shocks will be more frequent, potent, persistent, and inflationary (Maechler, 2024). Obviously, monetary policy cannot fully neutralize the effects stemming from supply shocks; however, a timely and correct response will help reduce volatility, manage expectations through effective communication, and mitigate inflationary pressures. This, in turn, requires the central bank to take into account both the prevailing inflationary environment and the nature and characteristics of the supply shock, which will aid in assessing the shock's potential impact.

Dynamics of Inflation in Georgia: Historical Narrative

As a small open economy with high exposure to external shocks, Georgia has a history of facing various adverse supply and external demand shocks (see Figure 1). The economy's vulnerability to adverse supply shocks is significantly determined by the composition of the consumer basket. When the weight of items with flexible prices (such as food and energy resources) in the basket is high, any shock significantly impacts both the prices of these products and headline inflation. This situation is particularly pronounced in emerging economies, including Georgia, where the share of relatively flexible prices in the consumer basket varies between approximately 60% and 70%. Consequently, the dynamics of both headline inflation and relative prices exhibit greater volatility, which amplifies the risk of rising inflation expectations. The latter necessitates the maintenance of a more cautious stance by monetary policymakers.

Figure 1. Contribution of Supply and Demand Factors in Headline Inflation (pp)



Source: Geostat, NBG, Authors' Calculations.

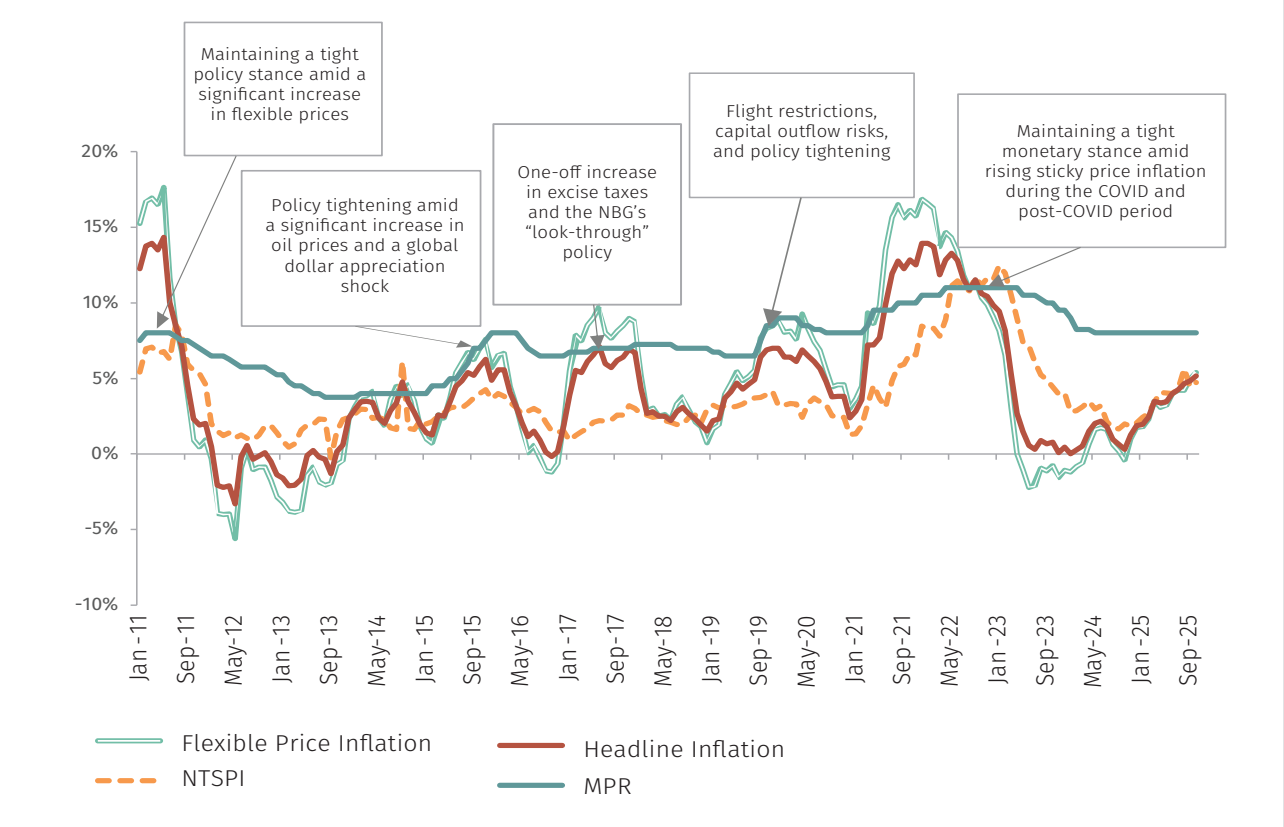
Following the implementation of the inflation-targeting regime, Georgia's experience with supply shocks can be categorized into three categories:

- Adverse supply shocks that caused only a one-off increase in inflation without generating 'second-round' effects: During these periods, the National Bank of Georgia (NBG) pursued a 'passive (Look Through)' policy and left monetary policy unchanged;
- Adverse supply shocks that required a response from the NBG: Due to the magnitude of these shocks, the risks of rising inflation expectations intensified;
- Positive shocks: These exerted downward pressure on prices.

The first category includes, for example, the increase in the excise tax on tobacco in 2017 (see Figure 2). Although this change was reflected in higher inflation, the NBG maintained a neutral stance, viewing the shock as one-off and short-term. Effective communication also contributed to managing inflation expectations during this period. Consequently, once the base effect dissipated, inflation returned to the target rate.

Regarding the second category of adverse shocks, their severity created risks of 'second-round' effects, thereby necessitating a monetary policy response to neutralize them. Examples include the rise in international commodity prices in 2011; the oil price shock and global strengthening of the dollar in 2014-2015; the depreciation of the Lari in 2019 following the flight ban from Russia amid an external demand shock; and the pandemic and supply chain disruptions in 2020-2021, which manifested in sharp increases in international commodity prices and shipping costs. During the pandemic period, the adverse supply shock was compounded by inflationary pressure stemming from pent-up demand and a tight labor market. It is noteworthy that in the initial phase of the pandemic, despite the negative demand shock, monetary policy was eased by only 1 percentage point (to 8%), a decision conditioned by the high-inflation environment of the preceding period. Later, against the backdrop of succesive supply and demand shocks, monetary policy was significantly tightened. Specifically, in 2022, the Russia-Ukraine war generated additional supply shocks, which further increased flexible prices, with inflationary pressures subsequently passing through to relatively sticky prices. To stabilize inflation expectations, monetary policy was tightened by a total of 3 percentage points to 11%, and this tight stance was maintained for an extended period, ensuring the reduction of sticky-price inflation.

Figure 2. Sticky and Flexible Price Inflation in Georgia and the Monetary Policy Response to the Various External Shock



Source: Geostat, NBG.

It is noteworthy that starting from 2023, as a result of a positive supply shock, structural changes occurred in the economy; the improvement in productivity had a disinflationary effect not only through the demand channel but also through the exchange rate channel. During the same period, a gradual normalization of monetary policy began, although, considering existing domestic and external risks, it remained at a moderately restrictive level. The latter, in turn, ensured the maintenance of a low-inflation environment for an extended period. In 2025, due to the low base effect of previous years and one-off supply-side factors, inflation picked up slightly (see Figures 1 and 2). Nevertheless, current macroeconomic characteristics such as labor market conditions, the cyclical position of the economy, and the relatively low-inflation environment of the preceding period mitigate the risks of a sharp rise in inflation expectations. However, against the backdrop of high uncertainty, this also highlights the necessity of maintaining a tight monetary policy stance for an extended period.

From a general perspective, the optimal monetary policy response to supply and demand shocks is discussed within the context of a New Keynesian framework and is presented in detail in the following chapter.

Theoretical Framework and Applied Methodology

This chapter presents the theoretical and methodological framework used to assess the optimal monetary policy response to various types of macroeconomic shocks. The methodology is based on the New Keynesian (NK) approach. According to this framework, under an inflation-targeting regime and in the presence of nominal rigidities, the primary instrument of monetary policy (the policy rate, or short-term refinancing rate) is viewed as an effec-

tive tool for influencing the economy's cyclical position - the so-called output gap, thereby ensuring price stability (Bernanke et al., 1999).

Thus, the study employs a New Keynesian, semi-structural, quarterly dynamic stochastic general equilibrium model (a semi-structural QPM) calibrated to the Georgian economy (so-called GEMO). Central banks with inflation-targeting regimes frequently use such models for forecasting and policy analysis. The use of this model is appropriate as it accurately captures monetary policy transmission mechanisms while remaining flexible enough for the analysis of various types of shocks. Essentially, it represents a so-called 'gap model', and its fundamental equations describe:

- The inflation formation process, defined by the Phillips curve specification, which constitutes the primary equation in the context of this study;
- The formation of the cyclical component of aggregate demand, i.e., the Investment-Savings (IS) curve equation;
- The Uncovered Interest Parity (UIP) condition, which ensures the absence of arbitrage between domestic and foreign assets;
- And finally, the monetary policy reaction function.

These equations and the dynamics of the variables within them represent endogenous processes; consequently, changes in one variable are reflected in the others. Furthermore, the coefficients are largely calibrated, with their stability verified through robustness checks using Bayesian and Structural Vector Autoregression (SVAR) models.

The specification of the Phillips curve is presented in the following equation:

$$\boldsymbol{\pi_t = \beta_1(\beta_2\pi_t^m + (1-\beta_2)[\beta_3\pi_{t-1} + (1-\beta_3)\pi_t^e]) + (1-\beta_1)\left(\beta_4\pi_t^{oil} + (1-\beta_4)\pi_t^{food}\right)}$$
$$\boldsymbol{+\beta_5\hat{y}_t - \beta_6\hat{Z}_t + \beta_7\hat{s}_t^{\frac{GEL}{USD}} + \varepsilon_t^{\pi} + u_t^{\pi} + \rho l * u_{t-1}^{\pi}} \quad (1)$$

where π_t epresents quarterly annualized headline inflation, determined by imported inflation (π_t^m), lagged headline inflation (π_{t-1}), inflation expectations (π_t^e), and oil (π_t^{oil}) and food price inflation (π_t^{food}), the parameters of which are calibrated such that their variation amplifies inflation dynamics particularly when inflationary processes evolve into 'second-round' effects. One of the equation's key variables is the output gap ($\hat{y}_t$), which reflects inflationary pressure stemming from the demand side and represents the slope of the Phillips curve; the real effective exchange rate gap (Z_t), is also key to the equation, describing the price effect of imported intermediate goods; and the US Dollar exchange rate gap ($\hat{S}_t^{\frac{GEL}{USD}}$) which captures the debt service burden for firms that are financially dollarized[2]. The final components reflect the effects of shocks stemming from the supply side: specifically, the standard supply shock, the so-called cost-push shock (ε_t^{π}) and high-frequency supply shocks, which are, in turn, autoregressive processes *($u_t^{\pi} + pl * u_{t-1}^{\pi}$)*.

The slope of the Phillips curve determines both the pass-through of real demand to prices and the effectiveness of monetary policy − specifically, the magnitude of the 'sacrifice ratio' when influencing prices through policy tightening or easing. At the same time, this specification of the Phillips curve directly models the transmission of monetary policy not only through the interest rate channel but also through the exchange rate and expectations channels. The latter is particularly important for a central bank under inflation targeting, as achieving price stability is possible precisely through the effective management of expectations. The formation of inflation expectations, in turn, depends on various factors and is represented in the model as follows:

2. This is also referred to as the balance sheet effect.

$$\pi_t^e = \delta E_t\{\pi_{t+1}\} + (1-\delta)\pi_{t-1} + \varepsilon_t^{\pi^e} \quad (2)$$

Expectations (π_t^e) are formed by both past inflation (π_{t-1}), and rational inflation expectations ($E_t\{\pi_{t+1}\}$), to which a shock to expectations ($\boldsymbol{\varepsilon_t^{\pi^e}}$) s added. In this equation, the coefficient $\delta \in [0,1]$ reflects the effectiveness and credibility of monetary policy. Specifically, its proximity to one indicates that economic agents – firms and households - are more rational and form their inflation expectations in accordance with target rate (acting as forward-looking agents). However, if it is close to zero, economic agents forecast future inflation based on past inflation experience (acting as backward-looking agents). In other words, in this case, inflation expectations are more adaptive, which, in turn, points to limitations in the credibility and effectiveness of monetary policy.

Appropriately calibrating the coefficients of this equation is critically important for analyzing the optimal monetary policy response to various types of shocks. Their values determine how aggressive the measures required from the policymaker must be to achieve price stability during a specific shock. If, hypothetically, the coefficient δ is close to one, the central bank has the opportunity to pursue a so-called 'passive (Look Through)' policy during a temporary supply shock, because rational agents will consider the target level as the proxy for future inflation when making decisions. This implies that after the shock dissipates, ceteris paribus, inflation will stabilize at its target level in the medium term without a policy response. In advanced economies, monetary policy decisions in response to supply shocks have long been based on precisely this assumption. In turn, it should be noted that the coefficient δ may vary over time and be determined by past deviations of inflation from the target level. Consequently, assessing inflation history is crucial when calibrating it. In this study, the coefficient δ for Georgia stands at 0.8, while the coefficient β_3 in the Phillips curve, which also represents a relative measure of the rationality and adaptiveness of inflation expectations, is 0.4, indicating that expectations are predominantly rational.

As noted, under conditions of fully rational expectations and high central bank credibility, standard supply shocks (ε_t^{π}) do not cause an additional rise in inflation expectations and do not transform into a so-called shock component ($\boldsymbol{\varepsilon_t^{\pi^e}}$) in the expectations formation equation. However, if supply shocks prove so large and potent that they generate an inflation expectations shock and, through this channel, significantly increase actual inflation, they may heighten the risk of so-called expectation hysteresis, which exacerbates the risks of deanchoring. This underscores the importance of carefully assessing both the nature and origin of supply shocks.

In general, a supply shock can be either positive or negative: a positive shock typically exerts downward pressure on inflation, while a negative shock exerts upward pressure. If the source of the supply shock ($\boldsymbol{\varepsilon_t^{\pi}}$) is, for instance, structural problem within the economy, its effect may prove to be more prolonged and substantial. For example, if the natural rate of unemployment has risen due to structural issues in the labor market, while the cyclical component of the economy remains positive, supply-side constraints may evolve into a wage-price spiral. This, ultimately, feeds into the formation of inflation expectations. Conversely, when the source of the shock is a disruption in supply chains, it may have broader sectoral effects, leading to a more widespread increase in the prices of goods and services within the consumer basket. However, if the shock originates, for example, from a rise in international food prices, the supply shock initially affects only a specific component of the consumer basket. The risk of this evolving into an inflation expectations shock depends on various characteristics of the macroeconomic environment, including the relative weight of food in the basket.

In turn, the oil and food price inflation terms presented in the Phillips curve used in this study have their own determining equations:

$$\pi_t^{oil} = \beta_8 * \pi_{t-1}^{oil} + (1 - \beta_8) * (\pi_t^{oil_{international}} + \Delta S_t^{\frac{GEL}{USD}} + \Delta Z_t) + \varepsilon_t^{\pi\_oil} \quad (3)$$

$$\pi_t^{food} = \beta_9 * \pi_{t-1}^{food} + (1 - \beta_9) * (\pi_t^{food_{international}} + \Delta S_t^{\frac{GEL}{USD}} + \Delta Z_t) + \varepsilon_t^{\pi\_food} \quad (4)$$

Specifically, Equation 3 captures the dynamics of oil price inflation, whereas Equation 4 represents the dynamics of food inflation. The specifications for both are similar, depending on international prices, exchange rate dynamics ($\Delta S_t^{\frac{GEL}{USD}} + \Delta Z_t$) and shocks.

The specifications of the equations described above demonstrate that the magnitude of a supply shock's impact depends on various factors. However, unlike demand shocks, where the so-called 'Divine Coincidence' holds, monetary policy faces a certain short-term trade-off when responding to supply shocks. Consequently, monetary policy is more effective at mitigating inflationary or deflationary pressures stemming from aggregate demand. It should be noted that monetary policy transmission to the real economy operates with a certain lag, with the full effect typically materializing after 4-6 quarters. The speed and effectiveness of transmission depend on various fundamental macroeconomic factors as well as on the monetary policy operational framework and the level of financial market development. It is important to clarify that the existence of the transmission lag is also driven by the inertia of habit formation among firms and households, the adjustment of which requires time. For this reason, the demand equation is presented in the following form:

$$\hat{y}_t = \alpha_1 \hat{y}_{t-1} + \alpha_2 E_t\{\hat{y}_{t+1}\} - \alpha_3 \left(\hat{r}_{t-1}^{eff} + \widehat{prem}_{t-1}\right) - \alpha_5 \hat{Z}_{t-1} + \alpha_6 \hat{y}_t^* + \alpha_7 \hat{g}_t - \alpha_8 \hat{s}_t^{\frac{GEL}{USD}} + \alpha_9 \widehat{cr}_t + \varepsilon_t^{\hat{y}} \quad (5)$$

The cyclical component of aggregate demand, or the output gap ($\hat{y}$), is determined by its past value ($\hat{y}_{t-1}$), which reflects aggregate demand inertia and habit formation; by the expected real income gap ($E_t\{\hat{y}_{t+1}\}$); by the lag of real effective interest rate gap ($\hat{r}_{t-1}^{eff}$), which represents the weighted average of domestic and foreign interest rates and reflects the impact of the monetary policy interest rate channel; and by the lag of the country risk premium gap ($\widehat{prem}_{t-1}$). Additionally, the output gap is determined by the past value of the real effective exchange rate ($\hat{Z}_{t-1}$), which captures the effect of external demand. In turn, this effect is determined by the output gap in trading partner countries ($\hat{y}^*_t$). The structural government budget deficit gap ($\hat{g}_t$). also influences aggregate demand. Furthermore, considering the high level of financial dollarization in Georgia, the balance sheet channel is also represented in the demand equation. Aggregate demand is further influenced by the credit gap ($\widehat{cr}_t$), which reflects the credit channel of monetary policy. $\varepsilon_t^{\hat{y}}$ represents the demand shock.

When the output gap differs from zero and consequently affects prices, an appropriate monetary policy response, ceteris paribus, gradually eliminates it. As a result, the economy returns to its long-run equilibrium growth trajectory, which is determined by fundamental supply-side factors, including the total factor productivity and quantity of production resources. In turn, these factors are influenced by technological progress, demographic conditions, and other structural characteristics of the economy. The influence of monetary policy on these factors is naturally limited; however, the dynamics of these factors affect the formulation of optimal monetary

policy, as they determine the long-run equilibrium interest rate to which the monetary policy rate must normalize in the long run. Consequently, the monetary policy reaction function is presented in the following form:

$$\boldsymbol{i_t = \gamma_1 i_{t-1} + (1-\gamma_1)\left[i_t^N + \gamma_2 E_t\left(\pi_{4,t+4} - \pi_{t+4}^{tar}\right) + \gamma_3 \hat{y}_t\right] + \varepsilon_t^i - \gamma_4 \varepsilon_t^T} \quad (6)$$

In period t, the monetary policy rate (i_t) responds to the deviation of expected inflation four quarters ahead from the target $E_t(\pi_{4,t+4} - \pi_{t+4}^{tar})$. The calibration of the parameter γ_2 is consistent with a Taylor-type rule, meaning it exceeds 1 (the Taylor Principle). At the same time, monetary policy responds to the output gap; however, given the price stability mandate, γ_3 is calibrated in such a way that monetary policy reacts more weakly to the standalone output gap. It is important to note that the magnitude of the monetary policy response is determined by the factors driving the deviation of inflation from the target. Specifically, If inflation has risen mainly due to demand factors, both changes in the output gap and the inflation gap lead to a stronger policy response. However, if inflation deviates from the target while the cyclical component of the economy is zero or negative, the response is weaker. It is precisely this specification of the policy reaction function that captures the short-term dilemma (trade-off) faced by the policymaker between output and inflation during supply shocks. However, for central banks with inflation targeting, the priority of price stability is reflected in the relative calibration of the γ_2 and γ_3 coefficients. Specifically, the γ_2 coefficient significantly exceeds γ_3. Besides, γ_1 coefficient is important, which reflects the degree of smoothing (inertia) in monetary policy changes. Finally, the reaction function includes the neutral monetary policy rate i_t^N, which serves as the benchmark for determining the tightness of the monetary policy stance.

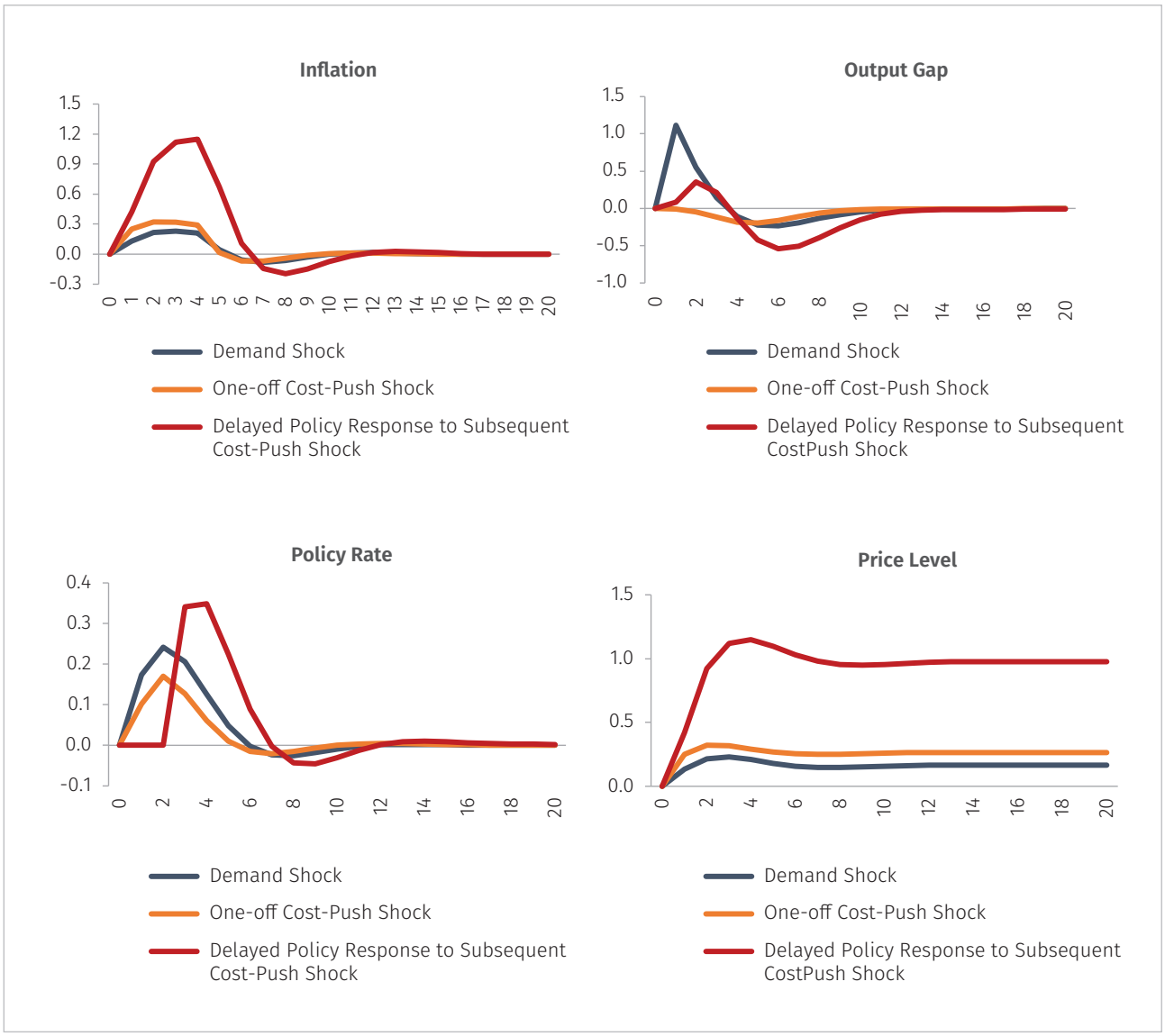
Monetary Policy Response to the Shocks: Scenario Analysis

Based on the theoretical and methodological framework described above, this study examines three scenarios, evaluating the optimal monetary policy response in each case.

The first scenario envisages a short-term adverse supply shock (ε_t^{π}). Since expectations are not fully rational and past inflation plays a role in their formation, tightening monetary policy is optimal even amidst the short-term trade-off between price stability and output, despite the short-term nature of the shock (see Figure 3). Specifically, under this scenario, a temporary supply-side shock of 1 percentage point (pp), assuming an adequate policy response, raises annual inflation by 0.3 pp in the short run. This outcome incorporates an endogenous policy rate increase of 0.17 pp. The increase in the policy rate reduces output by approximately 0.2 pp, which exerts an additional disinflationary effect. In the event of this type of supply shock, inflation returns to its target level after 4 quarters.

The second scenario examines a demand shock. Specifically, as a result of an output gap shock, $\boldsymbol{\varepsilon_t^{\hat{y}}}$ increases by 1 pp. Since monetary policy under an inflation-targeting regime responds immediately to the rise in inflation caused by demand shocks as reflected by the corresponding specification of the reaction function, price stability is maintained in the medium term. Specifically, in this scenario, the monetary policy response is tighter, with the rate increasing by approximately 0.25 pp. Consequently, the pass-through effect of excess demand to prices is weaker. However, it is noteworthy that the increase in the monetary policy rate transmits to output and subsequently to inflation not only through the interest rate channel but also through the exchange rate and expectations channels. Specifically, the rate hike leads to exchange rate appreciation and the neutralization of excess demand by restraining the external demand component; ultimately, this facilitates the rapid closure of the economy's cyclical position. As a result, under the presented specification of the Phillips curve, the demand shock increases inflation by only 0.2 pp over the short-term horizon.

Figure 3. Impulse Response Functions for Georgia



Source: Authors' calculations.

As for the third scenario, its realization represents the least favorable outcome for the central bank. Specifically, this scenario envisages a two-quarter delay in the monetary policy response amidst successive supply shocks. The analysis demonstrates that, given the delayed response, successive supply shocks increase headline inflation by 1.2 percentage points. In response, a cumulative policy tightening of 1 percentage point becomes necessary, which leads to a significant cumulative reduction in the real GDP gap. However, another critical downside of such a scenario, against the backdrop of successive shocks, is a significant elevation in the price level. Generally, the inflation-targeting regime is grounded in the principle that the current rate of inflation is paramount rather than the price level: i.e., 'bygones are bygones.' Nevertheless, despite this principle, the substantial rise in the price level resulting from a delayed response complicates the management of inflation expectations. Ultimately, this scenario significantly amplifies risks to macroeconomic stability and reduces social welfare.

Estimating Social Welfare Loss under Different Shocks

To compare the outcomes of the aforementioned scenarios, it is crucial to estimate the welfare loss in each case. In general, for central banks operating under an inflation-targeting regime, welfare loss is standardly assessed based on two main variables: the deviation of inflation from the target and the output gap. In the context of monetary policy, the component of inflation deviation from the target is typically considered to carry higher risk; consequently, its deviation is viewed as more undesirable. On the other hand, the stability of other macroeconomic parameters is also taken into account when assessing welfare loss. Among these, high volatility in the monetary policy rate is significant, representing a major source of welfare loss through both direct and indirect channels. Specifically, frequent and abrupt changes in the short-term refinancing rate generate additional volatility in the real economy and undermine the credibility of forward guidance on the path of monetary policy; ultimately, this limits its policy effectiveness and heightens risks to price stability.

Furthermore, considering the logic outlined above, particularly in emerging economies, maintaining the price level at an elevated point for an extended period amplifies the risk of hysteresis. This implies that the impact of the shock may become permanent, with the price level dynamics failing to return to the pre-shock trend. Ultimately, this increases the total economic loss, as it leads to the inefficient allocation of resources in the long run. Therefore, although inflation is the primary anchor under an inflation-targeting regime, in this study, the change in the price level is included as one of the components in the welfare loss function. Finally, the welfare loss function (L) is presented in the following form:

$$L_{t+i} = 0.7 * (\pi 4_{t+i} - \pi^*)^2 + 0.1 * \hat{y}_{t+i}^{\,2} + 0.1 * (i_{t+i} - i_{t+i-1})^2 + 0.1 * (p_{t+i} - p^*_{t+i})^2 \quad (7)$$

where:

$\pi 4_{t+i} - \pi*$ – Deviation of inflation from the target level;

Y_{t+i} – Output gap;

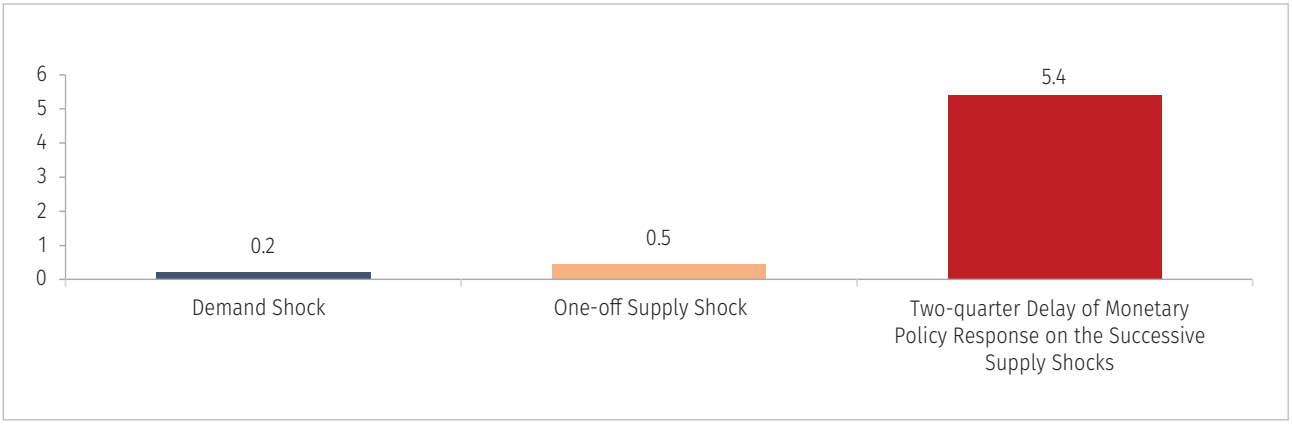
$i_{t+1} - i_{t+i-1}$ – Volatility of the monetary policy rate;

$p_{t+i} - p_{t+1}$ – Deviation of the price level from its optimal level.

In the case of the Georgian economy, the weight assigned to the deviation of inflation from the target is the highest compared to other components, reflecting both the structure of shocks facing the country and the priorities of monetary policy.

A comparative analysis of the welfare losses for the scenarios presented above, based on this function, shows that compared to the effects driven by demand shocks, the loss caused by one-off supply shocks, even with a relevant policy response, is approximately twice as large (see Figure 4). This confirms the fact that monetary policy responds most effectively to shocks stemming from the demand side. A delayed monetary policy response to successive supply shocks significantly increases the total welfare loss. Consequently, an insufficiently rapid response to such shocks represents the least desirable scenario for the central bank in the long run.

Figure 4. Estimation of Welfare Loss under Various Shocks for the Georgian economy



Source: Authors' Calculations.

Econometric Analysis

Based on the theoretical and methodological framework used in this study, it has been confirmed that under conditions where inflation expectations are partially formed by the inertia of past inflation, a passive response to supply shocks is often suboptimal. The frequency of supply shocks keeps inflation at a persistently high level, thereby amplifying the risks of rising inflation expectations.

Additional robustness checks of the aforementioned results, along with an analysis of data on monetary policy responses to shocks, showed that when a supply shock generated risks of rising inflation expectations, the National Bank of Georgia (NBG) responded adequately. An optimal monetary policy response can be manifested both by maintaining a relatively high, restrictive policy stance (tighter than neutral) for an extended period and/or by an additional increase in the policy rate.

In Georgia's case, the nature of supply shocks has largely been manifested by increases in flexible prices, such as those for food and energy carriers. The high share of flexible prices in the consumer basket means that frequent shocks to these prices heighten the risk of increases in relatively sticky prices. For instance, this risk materialized during the pandemic. Analysis of not only Georgian but also global economic processes demonstrates that a prolonged and large-scale increase in relatively flexible prices, ceteris paribus, serves as a leading indicator for increases in sticky prices. And if sticky-price inflation rises, it requires a tighter response from monetary policy.

To further evaluate the historical response of monetary policy to shocks in the Georgian context, alongside the analysis presented above, we conducted an econometric analysis, the results of which are consistent with one another. However, this specific analysis was conducted primarily in the context of sticky versus flexible prices. Specifically, we assessed the NBG's response to measures of sticky and flexible inflation. In this case, due to the availability of a longer historical time series, core inflation is taken as the measure for sticky prices, while non-core inflation, which largely includes food, energy, and tobacco components is taken as the measure for flexible prices. For the empirical econometric analysis, a Structural Vector Autoregression (SVAR) model was used, which is presented in the following form:

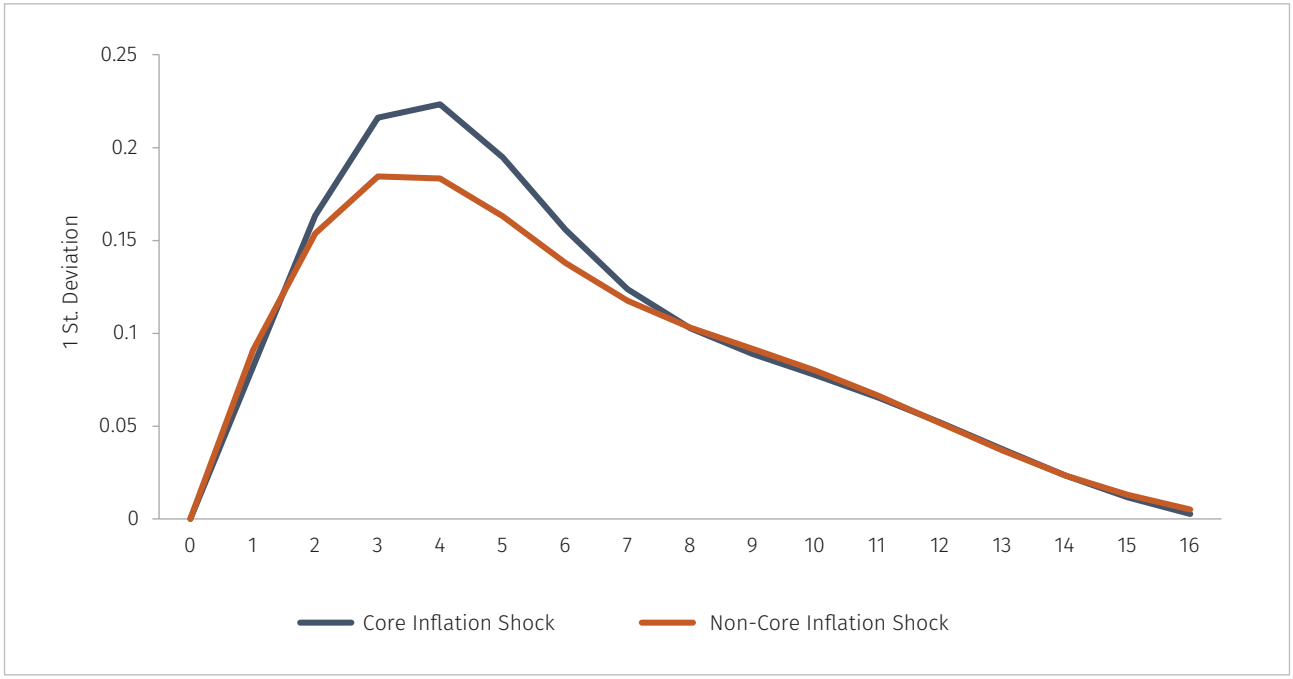
$$Y_t = A_1 * Y_{t-1} + \cdots A_p * Y_{t-p} + B * Dummies + \varepsilon_t \quad (8)$$

The vector Y_t includes the endogenous variables: the output gap, the change in the nominal effective exchange rate, the monetary policy rate, as well as core and non-core inflation (modeled separately). Dummies contains dummy variables reflecting significant events, such as the pandemic and the Russia-Ukraine war, which had a substantial impact on the aforementioned variables. ε_t represents structural shocks.

The SVAR model is estimated using quarterly data. The optimal number of lags was selected using the Schwarz Information Criterion (SIC), which indicates the optimality of two lags. Following the estimation, standard diagnostic tests were conducted. The dynamic stability condition of the system is satisfied.

Based on this specification, we analyzed the monetary policy response to core (sticky) and non-core (flexible) inflation shocks. It should be noted that all variables are standardized so that the shocks are normalized and comparable with one another. Consequently, the shock is interpreted as a one-standard-deviation shock, while the endogenous response is presented in standard deviations of the variable. This allows us to assess to which type of shock the monetary policy response was stronger. At the same time, the orthogonalization of shocks was performed using the Cholesky decomposition to ensure that each shock was independent of the others, which ensures a better assessment of the impulse response functions. It is noteworthy that the results presented in Figure 5 are consistent with the implications of the GEMO model. Specifically, the monetary policy response was more active to sticky price shocks; however, the NBG also partially responded to flexible price shocks in order to neutralize the risks of rising inflation expectations caused by their high frequency, which ultimately ensured price stability.

Figure 5: Monetary Policy Response to 1 Standard Deviation Shocks in Core (Sticky) and Non-Core (Flexible) Prices



Source: Authors' Calculations.

Conclusion

To summarize, the monetary policy response to supply shocks differs from that to demand-driven shocks. While responding to supply shocks can generate additional economic volatility, a delayed reaction may lead to larger welfare losses and necessitate more aggressive tightening in the future.

In the case of an adverse supply shock, which raises prices and lowers output, a more cautious response is generally warranted compared to demand shocks. Nevertheless, in an environment of high uncertainty, where shocks are inevitable and their nature unpredictable, maintaining a restrictive stance over the medium to long term is essential to minimize risks. This allows policymakers to mitigate the effects of uncertainty and avoid the need for sharp adjustments later, thereby bolstering the credibility of monetary policy and supporting the anchoring of medium-term inflation expectations.

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DEBATES REGARDING GROSS DOMESTIC PRODUCT (GDP) AND THE UPDATED SYSTEM OF NATIONAL ACCOUNTS (2025 SNA)

NANA ASLAMAZISHVILI

Abstract

This article examines ongoing debates surrounding the shortcomings of GDP as a primary economic indicator. It reviews common criticisms, particularly the argument that GDP fails to adequately capture well-being and sustainable development. The paper demonstrates that, in contrast to alternative indicators that can be heavily shaped by subjective judgements, the calculation of GDP is based on the universal System of National Accounts, which is capable of adapting to a wide range of challenges, including economic, social, and environmental ones. To illustrate this, the article outlines the key changes introduced in the updated 2025 version of the System of National Accounts (2025 SNA).

Keywords: GDP, well-being, System of National Accounts, 2025 SNA, macroeconomic statistical systems, composite indicators, statistical literacy.

Introduction

Researchers generally categorize the long history of the evolution of Gross Domestic Product (GDP) as a primary macroeconomic indicator, and the development of the System of National Accounts in general, into three main periods: the period of early estimates (1660–1930), the revolutionary period (1930–1950), and the era of international guidelines (1950 to present) (Bos, 2017). However, considering the intense discussions held around GDP over the last two decades, it can be rightfully argued that the current period (2009 to present) should be considered a fourth era – one characterized by academic debates between the proponents and opponents of GDP.

This article concerns precisely this fourth ongoing stage. The relevance of this subject lies not only in the fact that consensus on a number of controversial issues has not yet been reached, but also in the following considerations:

- Despite the abundance of the debates, there are very few publications that view the problem comprehensively from both a theoretical and practical perspective.
- The historical perspective of GDP is generally ignored or forgotten.
- Discussions tend to be limited solely to the merits and demerits of GDP, while the systemic context of macroeconomic statistics is rarely taken into account.

GDP statistics have a direct impact on many economic and political decisions, yet there is rarely interest in their genesis. In several of his works, Frits Bos (2009; 2013), a renowned scientist-researcher, analyst, and practitioner of national accounts, unreservedly names "the widespread illiteracy" in the field of national accounts as the reason for this lack

of interest. According to his assessment, the current situation differs radically from trends of the previous period, a time that saw three economists working in this field – Simon Kuznets, Wassily Leontief, and Richard Stone – awarded the Nobel Prize, alongside numerous other Nobel laureate economists (Hicks, Meade, Frisch, Tinbergen, Klein, and others) who had linked their works to the System of National Accounts (Bos, 2013). This was a period when "economic experts of all sorts" became "essential players in public debate and, more often than not, … [were] viewed as the holders of some type of canonical truth" (Fioramonti, 2013).

As discussions around GDP intensify, the list of proposed alternative indicators has grown accordingly; however, it is clear that none have gained widespread traction or international recognition (Felice, 2015). The notion that GDP can be easily replaced is an illusion because, unlike the alternative indicators proposed to date, its calculation is based on the universal System of National Accounts. It is a unique system characterized by many factors, including the fact that it possesses the ability to adapt to various challenges. However, it should be recognized that the speed of this adaptation depends on the extent to which it is supported by high-level governing bodies.

The intense criticism directed at GDP does not arise from any characteristic conceptual inconsistency. Rather, its over-fetishization has played a distinctly negative role – not because of the measure's underlying principles or methodology, but because of its political dimension and the image of it being the sole measure of progress that the creators of "GDP-thinking" cultivated over time.[1] International organizations have played a notable role in advancing this trend (Stiglitz, 2020). As current endeavors to undermine this indicator appear to be proceeding with a zeal comparable to that which sustained its earlier fetishization, these circumstances warrant careful consideration from both the producers and users of GDP.

However, the development and adoption of the 2025 version of the System of National Accounts (2025 SNA)[2] is expected to quell the almost 20-year fervor that has surrounded GDP. These updates are quite extensive and largely address the issues raised by critics and the challenges facing the modern global economy. Greater focus is now required for the implementation of the updated system and the facilitation of this process.

Criticism of GDP and the Search for Alternative Indicators: A Literature Review

What, precisely, are the grievances that have accumulated over the decades against this "mighty" GDP indicator? A preliminary answer to this question can be captured by a simple maxim formulated by Alcoforado (2019): "…there are many things that are good for the economy and that are not good for society". Examples of such things include wars, environmental pollution, tobacco consumption, and transport accidents – events that, although being contrary to well-being, force the government and individuals to spend money and thereby increase GDP. It is precisely GDP's relationship to such dilemmas that has become the basis for its criticism.

Simon Kuznets, the founder of GDP's predecessor – Gross National Income – did not view GDP as an indicator reflecting well-being. As early as 1934, Kuznets warned the U.S. Senate that national income statistics measure a country's production and consumption capacities, not its well-being (Kuznets, 1934). In subsequent years, he emphasized that "Distinctions must be kept in mind between quantity and quality of growth, between its costs and return, and between the short and the long term" (Kuznets, 1954). In his view, it became important that "goals for more growth should specify more growth of what and for what" (Kuznets, 1962).

1. The term "GDP-thinking" was introduced by the 2001 Nobel Prize laureate Joseph Stiglitz to reflect the erroneous view that establishes GDP as the sole indicator of progress.
2. The 2025 version of the System of National Accounts was adopted at the 56th session of the United Nations Statistical Commission as the international standard for the production of national accounts statistics.

It was precisely for the purpose of measuring countries' production and consumption capacities that the System of National Accounts was created. GDP, as its central indicator, was intended for evaluating production, not for measuring welfare. Despite this, the System of National Accounts framework allows for a broad range of issues to be studied, something that is clearly outlined in one of its provisions (para. 1.84):

Welfare is a wide-ranging concept with many different facets. Some of these may be captured reasonably well by one or more of the key aggregates of the SNA. Others may be captured by using the basic structure of the SNA and expanding it in certain directions, perhaps by including unpaid services and the effects of environmental damage, for example. Yet other aspects are likely to remain forever outside the reach of a system not designed with the measurement of welfare as a prime consideration. It would be foolish to deny this, just as it is unrealistic to expect a system of economic accounts to necessarily and automatically yield a wholly satisfactory measure of welfare (UN, 2009).

For nearly three decades following the end of World War II, GDP became the primary indicator for evaluating economic growth in the West. This period was the "Golden Age" of capitalism in the U.S., it saw the "Economic Miracle" in Germany (Wirtschaftswunder) and Italy (Miracolo economico), and the "Glorious Thirty" (Les Trente Glorieuses) in France. GDP was the indicator that made it possible to measure the progress attained by countries in the post-war period.

In 1978, Irving B. Kravis, Alan V. Heston, and Robert Summers published the first estimates of real GDP per capita for more than 100 countries in the British Economic Journal (Kravis et al., 1978), which international organizations subsequently began to actively use as an indicator reflecting welfare. The 2008 methodological document of the System of National Accounts (2008 SNA) explicitly notes that "the International Comparison Program (ICP) makes estimates of absolute levels of GDP and GDP per capita across countries to try to establish a relative level of prosperity" (UN, 2009). From the second half of the 20th century onward, the political narrative that "growth is good" became firmly entrenched. As a result, GDP secured a dominant position within both domestic and international policy frameworks. It became the benchmark for securing government loans, distributing aid, and making international comparisons, among other purposes (Cressida, 2023).

The fact that GDP does not reflect the level of societal welfare within a nation was a main argument behind the critical sentiment directed toward this indicator. As early as the beginning of 1968, even before the second version of the System of National Accounts was published, Senator Robert Kennedy, in a speech delivered to students at the University of Kansas, expressed his negative attitude toward GDP:

> ...the gross national product does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate, or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country; it measures everything in short, except that which makes life worthwhile. And it can tell us everything about America except why we are proud that we are Americans (Kennedy, 1968).

For a long time, this topic remained relevant among research economists. Consequently, the idea of introducing alternative indicators to GDP matured, and through the efforts of both individual economists and international organizations, quite a few such indicators were created.

According to van den Bergh (2008), the alternative indicators of GDP that have been created to date can be divided into four broad types based on their content:

1. Indicators that adjust GDP using a pragmatic approach by subtracting/adding certain components from/to it (for example, the Index of Sustainable Economic Welfare (ISEW), the Sustainable Net Benefit Index (SNBI), or the Genuine Progress Indicator (GPI)).
2. Indicators that rely on GDP but focus on environmental factors and natural resource depletion (for example, the Sustainable National Income (SNI)).
3. The genuine savings (or investment) indicator, which focuses on wealth maintenance and growth and is defined as the sum of economic, human, and natural capital (Genuine Savings (GS)).
4. Composite indices reflecting social welfare, which combine a number of social indicators (for example, the Human Development Index (HDI), the Inequality-adjusted Human Development Index (IHDI), the Gender Inequality Index (GII), the Multidimensional Poverty Index (MPI), or the Happy Planet Index (HPI)).

A common characteristic shared by these and other alternative composite indices is that, in order to obtain multidimensional assessments, they use both pre-computation multidimensional and post-computation sensitivity analysis methods, employing complex computer calculations (Felice, 2015). Consequently, such indicators are characterized by absolute opacity, which can bring no less harm to economic and social policy than the "imperfect GDP".

Diane Coyle, one of the active supporters of such indicators, has written about the difficulties related to measuring alternative indicators. She notes that well-being depends on many aspects of an individual's life circumstances, and measuring it often involves surveying people's life satisfaction or anxiety levels[3]. In such a regard, alternative indicators have limitations: "For example, whereas the links between well-being and factors identified by econometric analysis – such as being employed or in good mental health – are intuitive, the causal connections are not well understood"; moreover, "A depressed person may benefit from therapy, as well-being advocates often urge, but decent housing might be even more effective" (Coyle, 2021). Given such reasoning, she concludes that "public policy based on well-being thus still lacks a theoretical underpinning" (Coyle, 2021).

Based on such assessments, the future of alternative composite indicators of GDP does not appear promising. As Hirata (2014) correctly notes, judging how well a society is doing by adding up anything at all, overlooking the incommensurate multidimensionality of well-being as well as the separate dimension of justice, is an utterly unconvincing ethical stance. On the other hand, due to the ambiguity of the methodologies for calculating such indicators, their "blind" and uncritical application renders the research and analysis itself meaningless; this creates a basis for an incorrect and subjective interpretation of reality, which is extremely risky.

The Global Financial Crisis of 2007–2009 and the New Wave of GDP Criticism

A new wave of criticism regarding GDP is associated with the global financial crisis of 2007–2009. In February 2008, in a speech assessing the country's economic condition, French President Nicolas Sarkozy questioned the reliability of Gross Domestic Product as an indicator for reflecting the final results of a country's economic activity, and he persistently urged leaders of other states to intensify their criticism of this indicator. Moreover, he asked Nobel laureates Joseph Stiglitz and Amartya Sen, as well as French economist Jean-Paul Fitoussi, to head a special commission to develop recommendations on new methods for measuring economic and social progress.

On 14 September 2009, the French government published a 292-page document, the Report by the Commission on the Measurement of Economic Per-

3. For example, for this purpose, the UK Office for National Statistics monitored people's anxiety and depression during the COVID-19 pandemic.

formance and Social Progress, better known as the "Stiglitz Report", in which Stiglitz calls for an end to "GDP fetishism" (Stiglitz et al., 2009). The criticisms in the report were mainly directed at the fact that GDP:

- Does not measure well-being: its purpose was never to measure social well-being; its goal was to assess market activities. It fails to reflect important aspects related to the quality of life, such as healthcare, education, leisure, and social connections.
- Disregards inequality: since GDP per capita is an average indicator, it conceals inequality in the population's income.
- Does not reflect non-market activities: for example, unpaid labor (such as care for children and the elderly, and housework) and volunteer work, which diminishes the contribution of women to GDP.
- Does not account for sustainability: for instance, the depletion of natural resources (deforestation or overfishing) and environmental damage (pollution or the impact on climate change) are considered positive economic activities (for example, while logging increases GDP, the loss of forest cover does not decrease it). In other words, it does not distinguish between beneficial and destructive economic activities from a long-term perspective. Thus, GDP growth is often achieved at the expense of depleting natural resources and polluting the environment – factors not accounted for in the System of National Accounts – thus, in the long run, a country may be growing poorer due to the reduction of its natural capital.
- Considers "bad" to be "good": expenditures incurred due to negative events (for example, recovery activities after natural disasters, healthcare costs due to pollution-induced diseases, or security costs due to crime) raise GDP, even though they do not reflect improved well-being.
- Focuses on flows rather than stocks: GDP measures the flow of goods and services in a given period but does not take into account the state of a country's assets, including natural capital, human capital, and infrastructure.

The publication of the Stiglitz Report was followed by a new wave of GDP criticism from other renowned economists (see, for example, Pilling, 2018; Coyle, 2014; Cassiers and Thiry, 2014; and Hoekstra, 2019). These subsequent arguments were directed at the following:

- GDP is a relic of the manufacturing era: it does not reflect the growing importance of the digital economy, where value determination is more difficult (for example, free online services such as Wikipedia).
- GDP does not measure quality: GDP growth may simply mean that there is more of something and not necessarily that it is of better quality (for example, a plane crash that leads to an order for a replacement aircraft would increase GDP).
- GDP per capita conceals acute inequality and does not reflect the life experience of the majority of people.
- GDP distorts priorities: the relentless pursuit of GDP growth may sacrifice environmental interests, public services, and social justice.
- GDP excludes the digital economy and intangible assets: in the modern economy, many valuable activities (for example, creating open-source software or online interactions) are not reflected.
- GDP does not account for capital depreciation: similar to the sustainability argument, GDP does not fully account for the wear of physical infrastructure or the depletion of natural capital.
- Unpaid work: GDP does not reflect unpaid labor and provides an incomplete picture of economic activity.
- Social aspirations are expanding, which is a trend that economic growth fails to address.
- The divergence between economic growth and subjective assessments of life satisfaction is becoming increasingly palpable.
- Complex and urgent ecological problems are increasingly alarming, but GDP fails to address them.

The Stiglitz Report undoubtedly attracted significant attention among economists, policymakers, and statisticians. However, even before the creation of the French commission in the immediate wake of the Global Financial Crisis, a consensus had formed that measuring economic growth alone is insufficient and that agreement was needed on considering additional indicators reflecting well-being and sustainable development.

In 2004, under the leadership of Enrico Giovannini, Chief Statistician of the Organization for Economic Co-operation and Development (OECD), the first OECD World Forum on Statistics, Knowledge and Policy was held. It aimed to share international research and experience regarding how progress is measured and what needs to be done in the direction of measuring well-being (Eurostat, 2010).

Three years later, at a similar world forum attended by approximately 1,200 representatives from 130 countries, on the initiative of the OECD, the foundations were laid for the "Global Project on Measuring the Progress of Societies". Within this framework, key economic, social, and environmental indicators were defined to create a comprehensive picture of the development of societal well-being (Eurostat, 2010).

In November 2007, the European Commission, the European Parliament, the Club of Rome, the OECD, and the World-Wide Fund for Nature (WWF) hosted a high-level conference titled "Beyond GDP", the goal of which was to discuss issues regarding the development of economic, social, and environmental indicators. As a result, in August 2009, just one month before the publication of the Stiglitz Report, the European Union policy document "GDP and Beyond: Measuring Progress in a Changing World" was published (Commission of the European Communities, 2009).

Both the European Union report and the Stiglitz Report served as a powerful impetus for developing an international standard for measuring societal sustainability and well-being.

The question thus became: what could serve as an alternative to GDP? A large proportion of authors share the recommendation presented in the Stiglitz Report for the creation of a dashboard (Eurostat, 2010). The core idea behind this is that well-being and sustainable development should be assessed not by a single indicator, but through a specific set of indicators. Considering the complexity, lack of transparency, subjectivity of weighting, and other shortcomings associated with calculating composite indicators, the authors of the report favored utilizing a small-sized dashboard (Stiglitz et al., 2009).

The dashboard model designed for sustainability and well-being is based on several principles:

- A focus on well-being rather than just economic activity: GDP measures production, but not well-being. The dashboard focuses on quality of life, including health, education, environmental protection, and social security.
- Multidimensionality: well-being is multifaceted, and it is thus impossible to reduce social progress to a single indicator.
- Sustainability: indicators must reflect long-term sustainability – i.e., the maintenance of the current level of well-being in the future (encompassing economic, social, and ecological dimensions).
- Inclusivity and fairness: assessing the distribution of well-being across regions and social groups.
- Statistical reliability and transparency: indicators must be credible, measurable, and comparable, while methods and sources must be transparent.
- Policy relevance: indicators should inform policy and highlight problem areas, which should ultimately contribute to the improvement of political decisions.

Although the dashboard, as a tool for measuring well-being and sustainable development, does not yet constitute an international standard, its princi-

ples are already quite widely used at both international and national levels.

A good example of the realization of the information dashboard idea at the international level is the OECD's Better Life Index,[4] which was created in 2011 and is based on the interactive well-being dashboard[5] also developed by the OECD. The latter encompasses 11 dimensions (including housing, income, workplace, education, environment, governance, health and others). Each dimension consists of 1 to 4 indicators, which are evaluated by a score ranging from 0 to 1. Averaging these indicators within the scope of each dimension allows for their assessment. The weights of the dimensions in the index are equal; consequently, the index is calculated by averaging the dimension scores. However, this equal weighting of dimensions is considered a drawback of the Better Life Index, as high correlation among dimensions may create a risk of double counting.

Another example of using an information dashboard at the international level is Eurostat's Quality of Life Indicators (QoL Dashboard).[6] This is a system of indicators that has been published since 2013-2016[7] and covers nine dimensions of well-being. One of which, Overall Experience of Life, reflects subjective well-being, while the remaining eight dimensions reflect both objective and subjective assessments of functional capabilities (including material living conditions, productive and other activities, health, leisure and social interactions, and economic and physical safety) (Eurostat, no date). Unlike the OECD index, Eurostat does not calculate a single unified index. However, both of these indices share the similarity of subjective assessments playing a major role in their formation, which complicates comparisons between countries.

The idea of an information dashboard has been actively adopted at national levels as well. For example, the French statistical agency, INSEE, publishes Wealth Indicators (Indicateurs de richesse) that include 10 indicators (including employment, R&D expenditure (as a % of GDP), private and public debt, life expectancy, life satisfaction, income inequality, and the poverty rate) grouped into three dimensions (economy, social well-being, and environment/sustainability). This is a multidimensional and combined system that uses both objective statistical data and subjective assessments (mainly for aspects related to social well-being and satisfaction). However, the final result is not a single index, but rather a dashboard consisting of several components. Similar information dashboards are used in other countries as well; for example, the National Wellbeing Indicators in the United Kingdom)[8] or the Living Standards Framework in New Zealand (see, for example, The Treasury, 2018; 2021; 2022).

A somewhat different model of an information dashboard operates in Canada, where the Canadian Index of Wellbeing has been published since 2021, covering 64 indicators grouped into eight domains.[9] A unified index is determined by their aggregation. In addition, three other indicators are used in Canada:

- The Community Well-Being (CWB) Index, which reflects the well-being of the Aboriginal and non-Aboriginal populations of this country.
- The Life Satisfaction Indicator, which reflects subjective well-being.
- The Happy Planet Index (HPI), in which life expec-

4. OECD (no date) *OECD Well-being Data Monitor*. Available at: https://www.oecd.org/en/data/tools/well-being-data-monitor.html (Accessed: 25 November 2025).
5. OECD (no date) *OECD Better Life Index*. Available at: https://www.oecd.org/en/data/tools/oecd-better-life-index.html (Accessed: 20 November 2025).
6. Eurostat (no date) *Quality of life indicators*. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Quality_of_life_indicators (Accessed: 20 November January 2025).
7. While the publication of this dashboard started in 2013, the current framework (using the "8+1 dimensions" structure) was not officially finalized until October 2016.
8. The National Archives (no date) *Office for National Statistics: well-being guidance*. Archived at: https://webarchive.nationalarchives.gov.uk/ukgwa/20160105160711/ (Accessed: 20 November 2025).
9. University of Waterloo (no date) *Well-being in Canada*. Available at: https://uwaterloo.ca/canadian-index-wellbeing/about-canadian-index-wellbeing/wellbeing-canada (Accessed: 21 November 2025).
10. The carbon footprint refers to the amount of carbon dioxide generated as a result of energy consumed by humans or organizations.

tancy, subjective well-being, and the so-called carbon footprint[10] are aggregated.

The Canadian government is well aware that non-economic indicators (for example, those related to social, cultural, or environmental factors) are not regularly available and are not as formalized as GDP and the other indicators of the System of National Accounts. As gathering data for some of these indicators can take years (for example, census data), Canadians acknowledge that GDP remains the primary measure of the economy. According to one study, every second citizen of Canada (53%) considers that the strong growth of Canada's GDP is important for their daily life. However, significantly more (82%) believe that beyond economic growth lie such fundamental components of life as health and safety, education, access to clean water, leisure, and life satisfaction. Accordingly, nearly three-quarters of respondents (71%) believe that government decision-making should take into account not only traditional economic indicators, but also go "beyond GDP" to consider other factors such as health, safety, and the environment (Department of Finance Canada, 2021).

Thus, even those countries that support the "beyond GDP" approach are objectively loyal to GDP and acknowledge the advisability of using it alongside additional indicators. As a result of the aforementioned arguments, several circumstances must be highlighted:

First, the need to use additional statistical indicators alongside GDP to evaluate social progress does not diminish the role of GDP at all. Soon after the creation of GDP and the System of National Accounts, three other macroeconomic statistical systems were formed (Balance of Payments and International Investment Position Statistics, Monetary and Financial Statistics, and Government Finance Statistics), the creation of which were objectively conditioned by the institutional arrangement of national economies, the peculiarities of sectoral activities, and the necessity for their complex analysis. Therefore, it is indisputable that for the detailed study of a multifaceted, constantly dynamic economy, relying on a single specific indicator is not sufficient.

Second, the System of National Accounts itself provides for the production of satellite accounts offering deeper insight into economic and social aspects. As Eurostat (no date) explains, "Satellite accounts provide a framework linked to the central (national or regional) accounts, allowing attention to be focused on a certain field or aspect of economic and social life in the context of national accounts; common examples are satellite accounts for the environment, or tourism, or unpaid household work". One gets the impression that the insufficient use of these capabilities that form part of the System of National Accounts is one of the reasons for the criticism of GDP. Some well-known international experts and analysts have acknowledged that a whole range of indicators available in the System of National Accounts are "less visible" and that "existing data sources need to be analysed and information linked and reused. Data from national accounts and social surveys could be combined to give new insights into social and economic inequalities" (Eurostat, 2010).

Third, the production process of traditional economic measures (GDP and its components) is strictly formalized and consistent in terms of concepts, procedures, coverage, periodicity, and timeliness. The same cannot be said for additional social or other composite indicators. This reduces the advisability of using them independently to measure societal progress, and even more so rules out considering them as an alternative to GDP.

Fourth, those composite indicators considered as alternatives to GDP are not suitable for international comparisons. Specifically, some of the indicators that are included within them are based on subjective judgments that are conditioned by many factors (religious, cultural, historical, natural-climatic, psychological, etc.). Due to the peculiarities of some such indicators, weighting is required to calculate

the aggregated index, but this is a further subjective practice that reinforces mistrust toward composite indicators. Furthermore, the complexity of their calculation harms the transparency of the indicators and makes them uncomfortable and unreliable to use, since "it is impossible to understand statistical figures without understanding how they have been compiled" (Schumpeter, 1954).

Fifth, the strength of GDP lies in the fact that it is based on the System of National Accounts. The latter is not merely a mechanism for calculating GDP; it is, in a certain sense, a system for formalizing economic thought and a macroeconomic statistical model of a given country. Through its conceptual framework, it has "marked a fundamental turning point in the evolution of economic thinking and its relationship with policymaking" (Fioramonti, 2013). National accounting is the science of the quantitative study of the national economy, and without a deep understanding of its principles, issuing a "verdict" on it – as seen in some publications[11] – poses a risk to informed and objective economic decision-making.

Accordingly, within the scope of existing statistics, the idea of informational dashboards is relatively easy to implement. However, when discussing such dashboards, Stiglitz (2020) explicitly notes that "each nation should select a 'dashboard' – a limited set of metrics that would help steer it toward the future its citizens desired". On the contrary, such a dashboard should be based on the generalized indicators of macroeconomic statistical systems, as these indicators themselves constitute an interconnected set of metrics that allow for an in-depth observation of developments. In addition, existing social indicators (such as household income and expenditure, employment, and health), which are less directly linked to national accounts and the broader macroeconomic statistical systems, should also be utilized.

And, finally, as was noted at a 2015 conference dedicated to the development of national accounts[12], criticism of the System of National Accounts is mainly driven by the fact that people do not understand what the system measures and what it does not, and what it covers beyond GDP. At the conference, the opinion was expressed that a brief (no more than 50 pages) description addressing the scope of the system is needed so as to avoid often unfair criticism. Such a document could explain the national accounting framework, its strengths and weaknesses, and how the main indicators of national accounts relate to economic theory and the target variables of economic policy. More generally, national accountants were urged to emphasize communication related to their products, not only with the public at large, but also, and perhaps more importantly, with the research community and policy makers (van de Ven et al., 2017). However, a further limitation is that "national accountants often do not speak their own language fluently: many have problems in understanding the logic, merits and limitations of their own concepts" (Bos, 2009). Regrettably, this also applies to Georgia, where academic debates, professional discussions, and knowledge transfer regarding national accounts and GDP have long ceased to be considered a priority or even topical.

Updated System of National Accounts – 2025 SNA

As Diane Coyle, one of the critics of GDP, writes, Britain's highest mountain, Ben Nevis, located in Scotland, was recently remeasured and was found to be 1 metre higher than it was in 1949. Improvements in technology and in the use of GPS have allowed scientists to determine the precise height of the mountain more accurately (Coyle, 2016). Coyle links this story to the decades-long practice of using GDP to evaluate economies and attempts to use it to bolster her argument regarding the necessity of changing GDP. However, this example demon-

11. The categorical assertions made by certain authors regarding the uselessness of GDP, which refer to its "numbered days" (Coyle, 2021), imminent "dethroning" (Stiglitz, 2020), or similar claims (Oulton, 2018), appear less than convincing.
12. Conference on the Future of National Accounts: "W(H)ither the SNA?" (Paris, 16–17 April 2015).

strates something else: scientists did not abandon measuring the mountain's height; rather, they refined their measurement methods. In other words, Coyle's interpretation of this story does not support the idea of rejecting GDP.

In March 2025, at its 56th session, the UN Statistical Commission adopted the System of National Accounts 2025 (2025 SNA) as the international standard for national accounts statistics. This revision retains the core theoretical framework of the 2008 version (2008 SNA) yet includes significant changes and clarifications.

For the first time, the 2025 SNA includes sections addressing well-being and sustainability. This expansion aims to better capture economic, environmental, and social dimensions and integrate them within the framework of the updated system. In so doing, it does not replace GDP as the headline indicator but offers additional thematic and extended accounts and tables that provide more comprehensive information regarding these aspects.

To better evaluate social progress, the following changes were made:

- Greater emphasis is placed on measuring net income – for example, the change in the volume of Net Domestic Product (NDP) – as a conceptually preferred measure of economic growth to be used alongside GDP in order to better assess the sustainability of economic growth.
- Increased attention is paid to household income, consumption, and wealth, as well as the recording of pension entitlements, which more accurately reflects the real financial condition of households.
- Guidance is expanded for the better compilation of income and wealth distribution statistics, facilitating the recording of how GDP and other macro-aggregates are distributed among households and the assessment of inequality levels.
- Provisions are made for the production of thematic and/or extended tables based on dimensions reflecting well-being (such as unpaid work, education, healthcare, and human capital).

In the context of sustainability, one of the most significant changes proposed by the 2025 SNA relates to reflecting the depletion of natural resources (such as oil, gas, and minerals) in national accounts. Specifically, the depletion of natural resources is treated as a cost of production, similar to the consumption of fixed capital (depreciation), which corresponds more accurately to the dimension of economic sustainability. This change will affect the magnitude of Net Domestic Product (NDP), Net National Income (NNI), etc., and will better reveal the degree of fragility of economic sustainability in the long-term perspective. The 2025 SNA also strengthens the link with the System of Environmental-Economic Accounting (SEEA), which represents the standard for assessing the relationship between the environment and the economy, enabling the inclusion of environmental aspects in macroeconomic statistics.

One significant update in the 2025 SNA is the special focus placed on the conceptual, accounting, and analytical challenges related to globalization. This is envisaged to improve the recording of multinational enterprise operations, "factoryless" production, and merchanting activities in national accounts, aiming to better assess the impact of global value chains on national economies. There is a refinement in the recording of activities where product design, marketing, and sales take place in one country, while physical production occurs in another. This ensures that national accounts avoid the misattribution of GDP to countries where only the assembly of the final product takes place and where the majority of value added is not generated. The in-depth study of globalization is also served by the objectives of extending Supply and Use Tables in the updated System of National Accounts.

Considering the growing scale of the digital economy, the updated 2025 SNA offers improved methodologies for recording changes in digital services, intangible assets, and artificial intelligence, ensuring

a more accurate and complete picture of the digital sector's contribution to economic activity:

- A guide for compiling Digital Supply and Use Tables is proposed, the implementation of which will make the anatomy of the digital economy visible.
- The 2025 SNA recognizes databases (electronic data collected and used in production) as produced assets, which implies estimating their value and including them in GDP. Recognizing data as an asset and refining the recording of digital services (including free services) allows for a more accurate measurement of economic activity in the digital age.
- The methodology for recording digital services (for example, online platforms, social media, and apps) is refined, including those provided to consumers for free (via advertising).
- A methodology for recording crypto assets is introduced.
- Instructions are proposed for processing artificial intelligence, cloud technologies, and digital intermediary platforms.

The 2025 SNA introduces a refined methodology for measuring central bank output. Under the new framework, Financial Intermediation Services Indirectly Measured (FISIM) will no longer be applied. All central bank output will be classified as non-market output, while payments made by banks and other financial corporations in relation to regulatory services will be recorded as current transfers rather than as payments for services. The updated system also includes a dedicated chapter addressing the accounting treatment of Islamic finance.

The updated System of National Accounts contains additional guidance for reflecting and estimating the informal economy, based on the latest relevant resolutions adopted by the International Conference of Labour Statisticians (ICLS).

To avoid overburdening the integrated framework of national accounts while enabling the detailed study of a wide spectrum of economic operations, the 2025 SNA places special emphasis on the production of thematic and extended accounts (known as satellite accounts in previous versions of the SNA). This approach significantly strengthens the flexibility of national accounts. Most thematic accounts cover core activities that have high economic importance or are of special interest for policy development or other purposes. A thematic account can also analyze the main aggregates within the integrated framework of national accounts in greater detail through additional breakdowns. For example, a thematic account of the digital economy can provide information on producers who use digital intermediary platforms to sell their products. Extended accounts serve to provide a broader view of standard national accounts indicators – for instance, in terms of well-being or sustainability – by expanding the data of the integrated framework with additional data from supplementary sources.

The 2025 SNA strengthens harmonization with the International Monetary Fund's (IMF) updated Balance of Payments and International Investment Position Manual (BPM7), ensuring consistency between national accounts and external sector statistics. The same goal is served by incorporating updates to the International Standard Industrial Classification of All Economic Activities (ISIC) and the Central Product Classification (CPC) into the updated System of National Accounts.

To facilitate the national implementation of these innovations, various international organizations (the IMF, World Bank, OECD, and Eurostat) plan to carry out a range of methodological and practical activities according to established priorities.

Thus, even this basic list of innovations included in the 2025 SNA (there are many more in detail) indicates that national accounts are not just GDP, but form a coherent system capable of reflecting challenges arising over time. It is incomprehensible to declare information dashboards as a panacea when national accounts contain indicators not merely as a

list – as proposed by dashboards – but as a system of interconnected indicators, which is a significant advantage. The scope for revealing interrelationships between events is even broader if they are viewed not only in the context of national accounts but also within other macroeconomic statistical systems.

Conclusion

Decades ago, when the history of using GDP as a measure of the size and production scale of national economies first began, the System of National Accounts defined the concept and boundaries of the national economy clearly and distinctly (Karabell, 2014; Aslamazishvili, 2024). However, calls are increasingly heard from a not insignificant number of economists to abandon GDP and introduce a well-being-oriented indicator or indicators. However, a clear and unequivocal definition of what constitutes well-being is not merely vague, it is non-existent. This is a noteworthy argument for the ongoing debates on GDP and well-being to acquire a more professional substance.

Several critical issues have been identified in discussions regarding GDP, the neglect of which can undermine both theoretical advancements in national accounting and hinder real assessments of economic progress. These points include:

- Ignoring the historical context of GDP.
- A deepening of the gap between GDP theory and practice and the disregard for statistical literacy.
- Fetishizing GDP and turning it into an ideological abstraction.
- The fascination with alternative composite indicators for GDP, which lack objectivity due to inherent subjective components.

Equally pressing are practical aspects related to the compilation of national accounts and GDP, which, with a few notable exceptions (Bos, 2009; 2013; Coyle, 2014; van de Ven et al., 2017; Stiglitz, 2020), tend to receive little attention in the debates mentioned above. Relying solely on the dry reporting of GDP dynamics contributes to the demotivation of national accountants. In their work, they devote little attention to analyzing GDP components, which undermines the quality and objectivity of the data. As Stiglitz (2020) observed, "the shallowness of GDP thinking had already become evident in the 2000s", and this problem persists today.

GDP is too important an indicator to be solely reliant on the professional and technical skills of a small group of specialists. And yet, unfortunately, in many developing countries – including Georgia – this is precisely the approach that is taken.

Implementing the updated version of the national accounts should be treated as a government priority and be carried out within the shortest possible timeframe. Given its national significance, the project should receive dedicated state funding – similar to that allocated for the population census every ten years – and the necessary professional staff should be mobilized. This would help Georgia avoid a repetition of the past, when it took GeoStat more than a decade to implement the 2008 SNA (GeoStat, 2019).

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ESTIMATING FORMAL AND INFORMAL INCOME OF HOUSEHOLDS IN GEORGIA

DAVIT UTIASHVILI

Abstract

Informal economic activities constitute a significant part of total household income, but they pose serious challenges to labor rights and social protection, facilitating tax evasion and unfair competition. In addition, the shadow economy is often characterized by low productivity, which negatively affects long-term economic growth. The cornerstone of developing effective measures to respond to these challenges is the measurement of the informal economy. The literature offers well-established methodologies and ready-made results, but it turned out that the assessment for Georgia varies significantly depending on the approaches used.

This paper presents an alternative methodology for a more accurate assessment of shadow income in Georgia. It enables, based on the processing of unique data, the direct estimating of both formal and informal incomes of households using a representative sample of households. According to the research results, the share of informal income in the country is approximately 30%, which is consistent with the picture obtained using other supporting indicators. It is noteworthy that this level is much lower than similar estimates published by some authoritative international organizations.

Keywords: Informal income, informal employment, Shadow economy, household income.

Introduction

The informal economy, often referred to as the shadow economy, is a complex phenomenon of economic life that extends beyond the traditional boundaries of formal employment and business (Hart, 1973). It encompasses a wide range of economic activities that are unregulated, untaxed, and often characterized by a lack of labor rights and social protection (Schneider and Enste, 2002).

The informal economy is a significant and integral component of the global economic landscape. Despite its impressive size, it is largely inaccessible to official economic statistics and is often hidden and ignored in public policy debates. However, informal economic activities, whether street trading, unregistered businesses, household work, or others, contribute significantly to the livelihoods of billions of people around the world (Hart, 1973).

In most countries, the informal sector is a significant contributor to gross domestic product (GDP) and is the main source of income for a significant proportion of households (Schneider and Enste, 2002). This sector is particularly critical for those with limited access to formal employment opportunities. Therefore, studying and addressing informal income is critical for the sustainability of labor markets and poverty reduction efforts.

The assessment of the scale of informal activity has a long history. A wide range of methods are available and relevant data are regularly published, but their reliability is often questioned. For example, while the National Statistics Office of Georgia estimates that the size of the unobserved economy in the country is 12.5% (Geostat, 2024), the World Bank publishes estimates that the informal economy in Georgia is 61.8% (World Bank, 2024). Such contrasting estimates are less reliable. According to the same World Bank statistics, informality below 15% is observed only in a limited number of highly developed economies, to which Georgia does not belong. On the other hand, observability above 60% is extremely high in the economy. Such an indicator is observed in countries such as Afghanistan and Zimbabwe. Considering that Georgia occupies a much more advanced position compared to the mentioned countries in terms of development, rule of law, well-being, or even GDP per capita, we can assume that this indicator is exaggerated. Given the importance of the issue and its impact on public policy, it is necessary to use alternative methods to obtain more accurate estimates of informal income. It should be noted that informality exists both at the company and household levels. Company informality refers to the operation of an enterprise outside the legal and regulatory framework – typically without registration, without taxation, and without compliance with labor or business regulations. Informality at the household level includes individuals employed without a formal contract or access to social protection, including "undocumented" workers in both formal and informal firms, as well as individuals who own shares in a company and share profits in the form of informal income.

This paper examines informality at both the employment and company levels, in the sense that the beneficial owner of the firm receives the final income. The assessment includes resident economic agents who are considered to be fully informal (i.e., unregistered individuals), as well as those who have a partially formal source of income while simultaneously using the so-called "black accounting".

Causes of the Informal Economy

The informal economy is a multifaceted phenomenon, and understanding its causes is crucial for developing effective policies to address it. Several factors contribute to the existence and expansion of the informal economy.

Unemployment is a significant driver of informal employment (Schneider & Enste, 2002). Individuals turn to informal activities when formal job opportunities are scarce. High levels of unemployment can create a surplus of labor willing to engage in informal work. Due to competition, individuals may afford the potential benefits of being in the formal sector, while employers will have more leverage to negotiate unfavorable terms.

Poverty is closely linked to informality (Hart, 1973). In many cases, those living in poverty are compelled to participate in the informal economy as a means of survival. The lack of formal job opportunities and the need to secure basic necessities drive individuals to seek informal work. Also, being poor makes people more sensitive to even a small burden of formality costs. For the society as a whole, it makes little sense to enforce formality due to these additional costs.

Income Inequality can also contribute to the growth of the informal economy (Charmes, 2000). When income inequality is pronounced, individuals who are marginalized from the formal economy may turn to informal work in search of income and economic stability. Similar poverty argument, here as well higher-income-earing part of the society may not strictly object to low earners staying informal, as they don't compete directly.

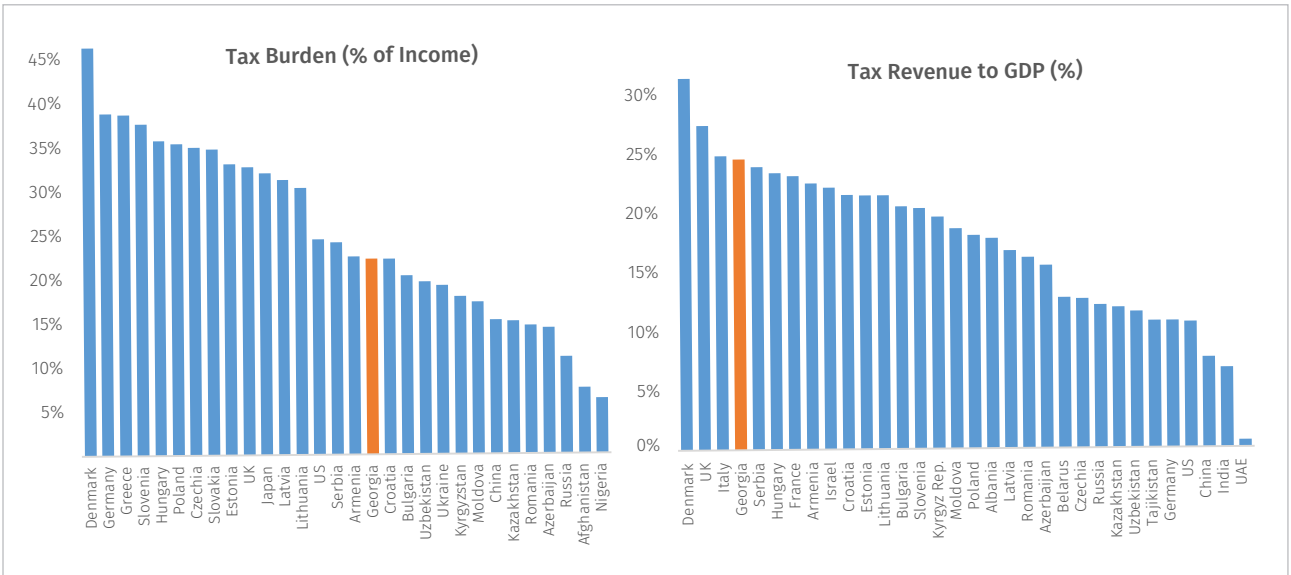
Traditions and Social Networks play a significant role in perpetuating informality (Hart, 1973). In many cultures, certain informal activities are deeply ingrained in tradition. Additionally, social networks can facilitate access to informal work opportunities.

Family Structures can influence informality, particularly in the case of family businesses and domestic work (Günther and Launov, 2012). Families often rely on the flexibility of the informal arrangements to manage their households and generate income.

Level of education. In some cases, it could be even lack of understanding why formalization is necessary at all. Or, people simply may not know how to formalize business arrangements (Günther and Launov, 2012).

Tax Burden is often cited as a reason for engaging in informal economic activities (Schneider and Enste, 2002). High taxes and complex tax systems can discourage formalization and incentivize businesses to operate informally to avoid taxation. Interesting to note that in practice, generally tax rates (including personal income tax) are relatively low in Georgia, while tax revenue is high, suggesting a lower tax burden and efficient tax collection.

Figure 1. Tax Burden and tax Revenue for Selected Countries (2023)



Source: WiseVoter.com[1].

Source: World Bank.

State subsidies. Most countries have some type of social support programs, which target the poor and unemployed. The procedure to qualify includes checks of employment. Correspondingly, being formally employed increases the chances of losing social benefits, so individuals may prefer to stay informal (Charmes, 2000). On the other hand, formal employment normally leads to better benefits during retirement, so that may serve as a mitigating factor.

Labor Market Regulations can be a significant driver of informality. Stringent labor regulations may push employers and employees into the informal sector to avoid compliance costs and bureaucratic hurdles (Dallago, 1990). This is especially true for small and micro enterprises, where each unit of labor is of crucial importance.

Bureaucracy and the administrative burden associated with formalization can deter individuals and businesses from entering the formal economy (Schneider and Enste, 2002). Complex registration and compliance processes can be a barrier to entry even

1. Heritage Foundation has its own estimate of "Tax Burden". The methodology is different, but the outcome in terms of country ranking is similar.

for those who would like to be in the formal sector.
Enforcement practices. Low institutional quality and lack of capacity and tools of the tax authority, weak market regulators, rule of law or court system deficiencies create a favorable environment for economic agents to stay informal. Bank account is an important aspect as example, like in Georgia, an individual may work informally and actually still receive a salary and pay bills with a bank account remaining unnoticed.

The Digital Economy has introduced new dimensions to informality. Online platforms and the gig economy have created opportunities for informal work, such as freelance services and app-based jobs. The digital economy blurs the lines between formal and informal work, posing challenges for regulation and taxation (IMF, 2020). Another area is international work and trade, economic openness in general, where identifying where the services or value added have been created is certainly complex. Accurate measurement of informality is therefore crucial for policymakers to design effective strategies in areas such as taxation, labor rights, poverty reduction, and social protection. Moreover, given its role in globalization and global supply chains, understanding the informal economy is key to improving international labor standards and fostering more inclusive and equitable economic growth.

Traditional Methods for Measuring the Informal Economy and Their Results

Consumption or Expenditure Data (Schneider and Enste, 2002): This method focuses on analyzing household consumption or expenditure patterns to identify informal economic activities. Researchers examine the sources of income and types of expenses that do not align with formal employment or business income. For example, expenses related to unregistered businesses or under-the-table payments can indicate informal economic activity. By comparing reported income and expenses, analysts can estimate the size of the informal economy.

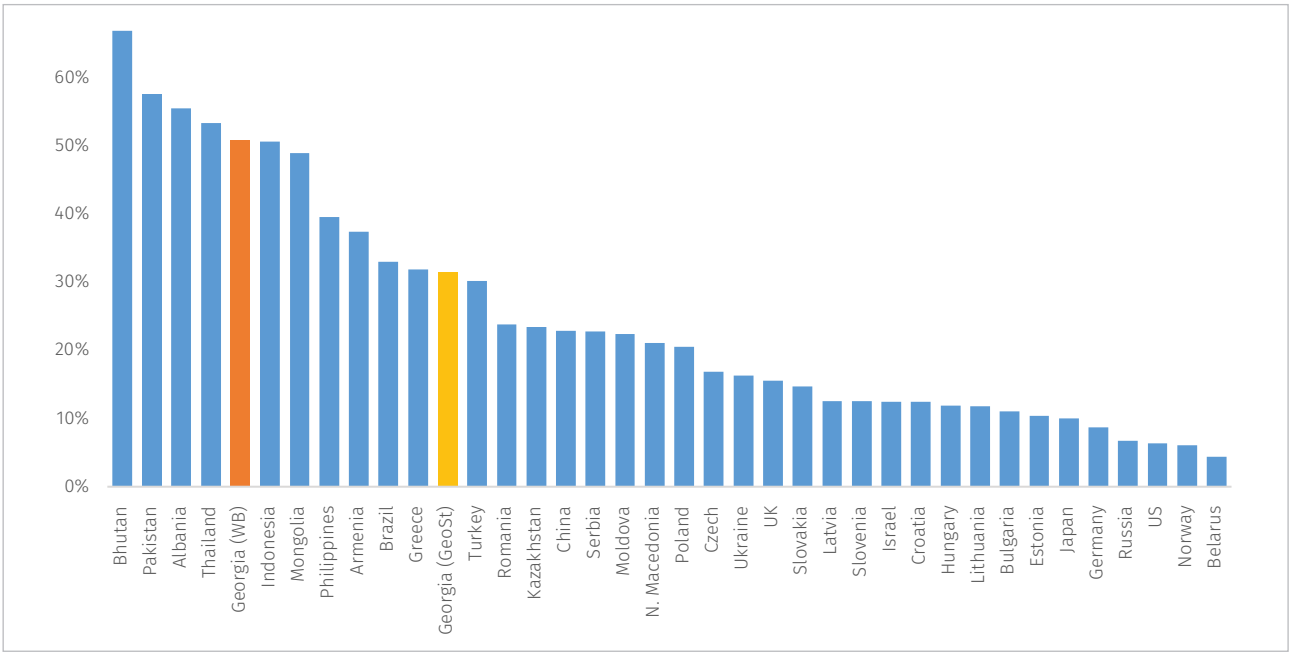
Typically, detailed micro-level research is conducted in selected sectors, and the resulting estimates are subsequently extrapolated to the broader economy. Using this approach, Geostat examined several sectors and, based on a comprehensive analytical framework, estimated the share of non-observed activities in total value added at 12.5% (Geostat, 2024). Notably, the same studies indicate that this share reaches approximately 50% in the hospitality sector[2].

Labor Force Participation (IMF, 2020): Labor force participation rates serve as a valuable indicator of informality. High levels of informal employment, such as self-employment or unpaid family work, can signify the prevalence of the informal economy. Researchers assess the composition of the labor force, categorizing workers as formal or informal based on their employment arrangements. This approach is particularly useful for understanding the extent of informal employment in a given region or sector.

The high prevalence of self-employment in Georgia may serve as an indicator of the extent of informality in the economy. As illustrated in the chart below, the share of self-employed individuals in Georgia is estimated at nearly 50% according to World Bank data, whereas Geostat reports a considerably lower figure of approximately 30%. This discrepancy can be attributed to methodological differences. In particular, since 2020 Georgia has adopted the updated ILO standards, under which individuals engaged in subsistence agricultural production for own consumption and not oriented toward market activity are no longer classified as self-employed. Similar methodological inconsistencies may be observed in the labor statistics of other countries; therefore, World Bank data are generally more appropriate for international comparisons.

2. *Interview with the Executive Director of Geostat* (Facebook video). Available at: https://www.facebook.com/watch/?v=812032234545120 (Accessed: 30 November 2025).

Figure 2. Self-Employment as % of Total Employment (2023)



Source: World Bank, Geostat.

Furthermore, according to the Geostat estimate, which they get from the Labor Force Survey by asking employees whether the activities they contribute are registered or not, informal employment account for quite a large scale in Georgia. It can be said that such types of informal activities have been established in the country, such as construction and repair work, working as housekeepers, educators, small handicrafts, tutoring, medical services, street vending, and others. Unlike other countries, official information about informal employment[3] in Georgia has been appearing since 2017, and as of 2022, the level stands at 29.1% for non-agricultural employment.

Table 1: Share of Informally Employed as % of Non-Agricultural Employment in Georgia

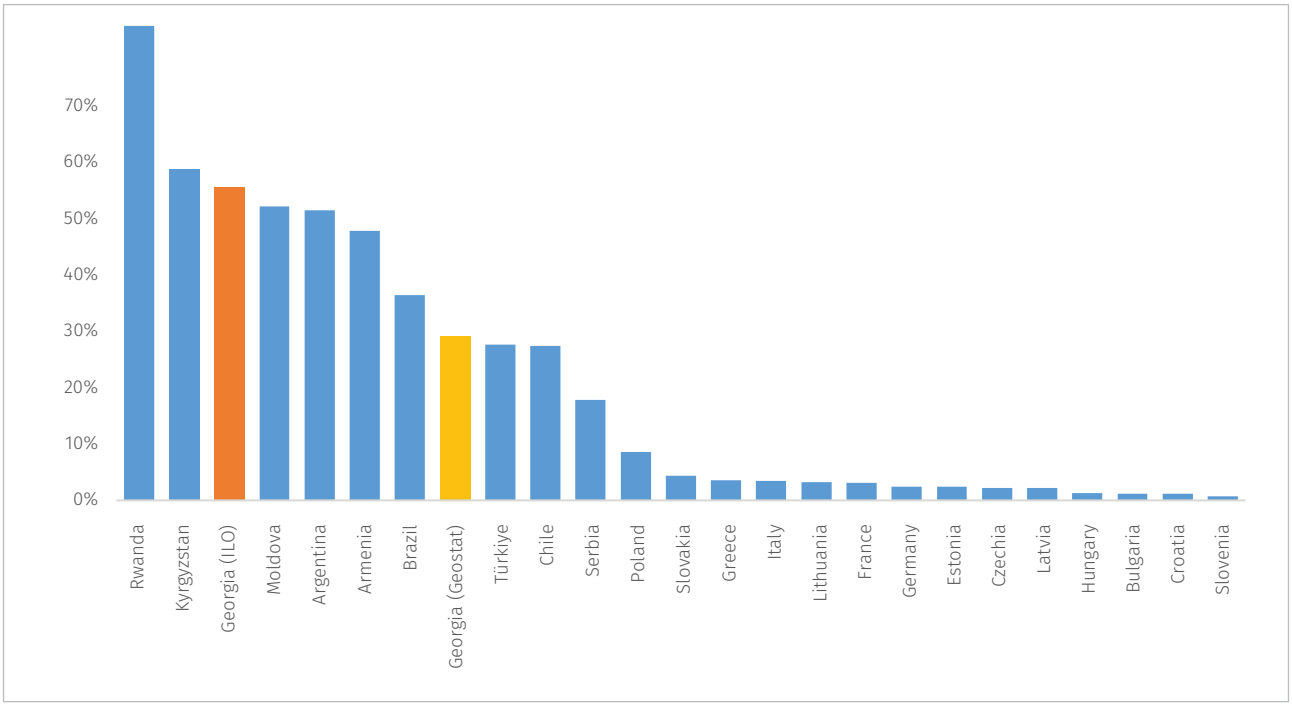
	2020	2021	2022	2023	2024
Total	31.7	28.8	28.4	27.6	29.1
Woman	26.2	22.5	22.5	21.7	23.3
Man	36.4	34.2	33.4	32.6	34.2
Urban	30.2	26.8	27.0	25.4	26.8
Rural	35.6	33.7	31.6	32.7	34.4

Source: Geostat

3. According to GeoStat's Labour Force Survey, informal employment includes employees in the non-agricultural sector who are either not covered or only partially covered by formal employment arrangements. This includes workers who do not pay income tax on wages and/or are not entitled to paid annual leave and/or paid sick leave, and/or whose employers do not make contributions to a pension fund. In addition, informal employment encompasses individuals who identify their employment status as unpaid family workers in a family enterprise or farm, as well as those working in unregistered enterprises.

In terms of international comparison, International Labour Organization collects and publishes data based on their universal methodology, which in principle also relies on labor force surveys. Among other countries, Georgia ranks one of the highest. However, if we take Geostat number, which take informal employment in non-agricultural sector only, then the indicator still remains high on global scale but relatively modest compared to regional peers.

Figure 3. Proportion of Informal Employment in Total Employment (2022)

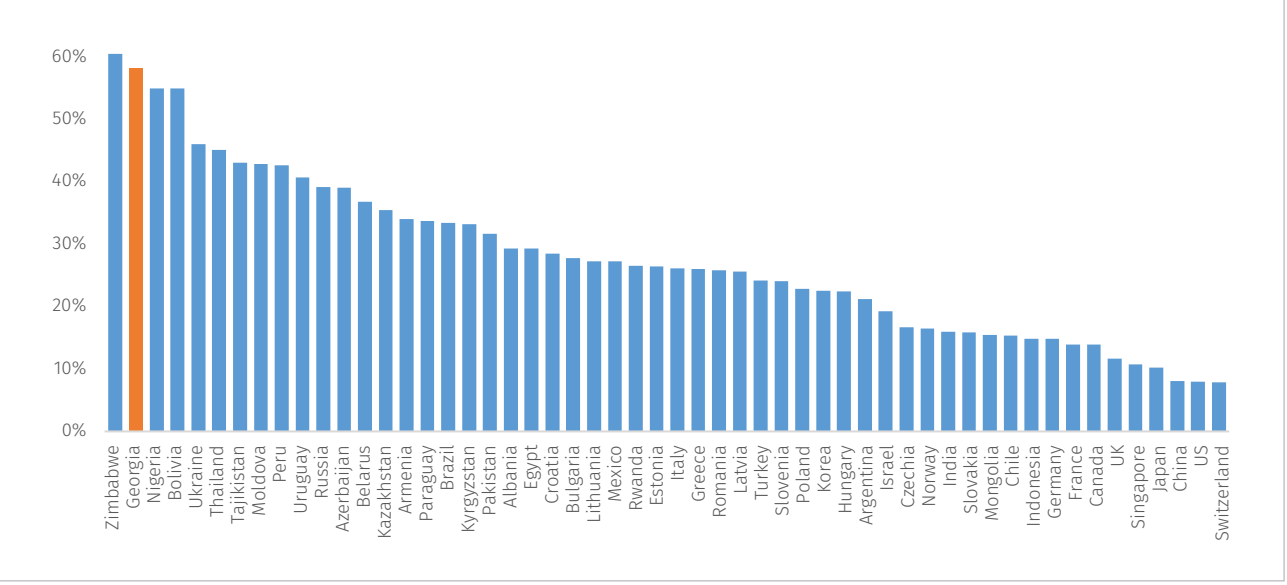


Source: ILO, Geostat.

When survey-based measures on informal output is not accessible or estimation is unreliable, an indirect, model-based measures on informal output could be employed. Usually, they stand on a solid economic reasoning but are founded on strong assumptions (e.g. Medina and Schneider 2018). To estimate the size of output in the informal economy, academic research generally favors two types of indirect model-based approaches: dynamic equilibrium models and structural equation models.

A Dynamic General Equilibrium (DGE) model. The DGE model is a way of looking at how economic agents decide to work in regular jobs or informal jobs over time. Some researchers use this model to study different countries and years, and it's helpful because it makes sense economically and can be used to test out different policy experiments. However, the DGE model requires a range of strong assumptions, sometimes resulting in significant deviation from the real-world cases. Also, it heavily relies on other studies to figure out the size of the informal economy and is mainly useful for just illustrating stylized facts. Furthermore, the data availability is always a concern, especially for developing countries.

Figure 4. DGE Model Estimates of Informal Output as % of Official GDP (2020)

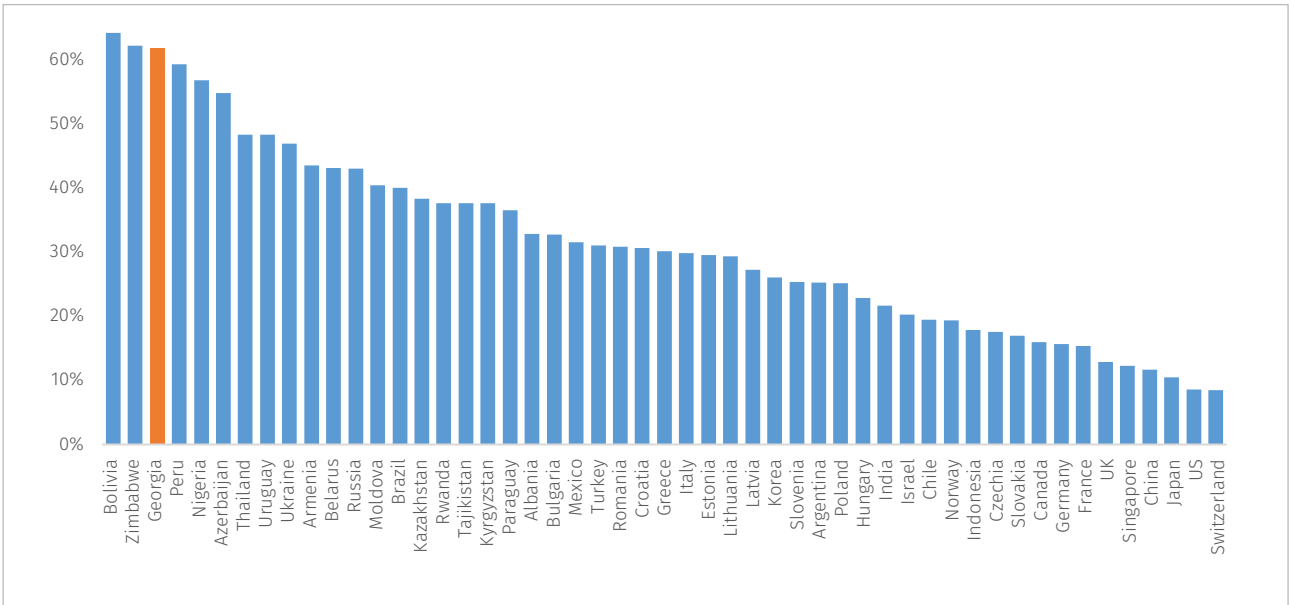


Source: World Bank Informal Economy Database.

The multiple indicators multiple causes model (MIMIC). This type of model is particularly useful to estimate the size of the informal economy, because it allows for joint application of all the factors causing informality and at the same time jointly capture all the indicator of informal activity. This is a very practical and intuitive approach considering the complexity of the problem. In addition, the model is easily expandable on the country panel or in terms of time dimension. Data requirement is relatively relaxed compared to the DGE model, as key macro variables are readily available globally (Elgin et al., 2021).

In terms of model deficiencies, it should be mentioned that statistical outcomes do excessively vary based on model specification and data coverage, limiting the reliability and allowing room for manipulation. For example, according to the specification of Medina and Schneider, the share of the shadow economy in Georgia is 51% for the year 2017, while the estimate published by the WorldBank for 2018 is 61% (World Bank, 2024). In addition to this limitation, frequent model specifications need data from external independent sources (e.g., Heritage Foundation indices). Also, MIMIC models estimate relative changes in informality over time, but the absolute level must be anchored using external data – typically from other studies. Some criticism is applied to the fact that GDP is used as both a cause and an indicator variable at the same time. Some authors (Medina and Schneider, 2018) have successfully used Night Lights Intensity as a proxy for the real economic growth achieved by countries.

Figure 5. MIMIC Model Estimates of Informal Output as % of Official GDP (2020)



World Bank Informal Economy Database.

Abovementioned data sources also allow for reconstructing time series statistics for Georgia and help to see one of the known limitations of the MIMIC model - persistence of the estimate over time. In particular, it is obvious that the Georgian economy has gone a massive transformation during the last 25 year in each aspect of economic life, and naturally level of informality should have changed more significantly. This suggests the need of in more depth analyses with some alternative approach, to identify whether such an extremely high level of informality really exists in Georgia, by exploring the household income.

Traditional methods for estimating informal employment have been widely used by researchers and policymakers to gain insights into the size and characteristics of the informal labor market. These methods, while valuable, come with their strengths and limitations. Here's a review of some traditional methods for estimating informal employment and challenges associated with them:

Labor Force Surveys (LFS): Many countries conduct LFS to gather data on employment and labor force characteristics. These surveys typically classify individuals as employed or unemployed based on their self-reported employment status. Informal employment is often identified by specific characteristics, such as lack of employment contracts, social security contributions, or compliance with labor regulations. Strengths: LFS provides nationally representative data, making it suitable for cross-country and regional comparisons. It captures a wide range of labor market characteristics, including informal employment. Limitations: The accuracy of self-reported data can be compromised due to underreporting of informal employment. People may not disclose their informal work, leading to underestimations. Additionally, LFS may not capture the full diversity of informal employment arrangements.

Economic Activity Surveys: Some countries conduct specialized surveys focused on economic activities. These surveys may gather information on informal enterprises, self-employment, and informal labor market participation. Strengths: Economic activity surveys can provide detailed insights into the informal sector, including information about informal businesses and their characteristics. Limitations: These surveys may not cover all aspects of informal employment, such as informal labor activities within formal enterprises or hidden informal work. The data may be less comprehensive than LFS data.

ILO Guidelines: The International Labour Organization (ILO) provides guidelines for estimating informal employment, which involve classifying workers into different categories based on their employment status, social security coverage, and compliance with labor laws. The ILO guidelines aim to create a standardized approach for measuring informal employment. Strengths: The ILO guidelines promote consistency and comparability across countries in estimating informal employment. They provide a framework for defining and categorizing informal workers. Limitations: The guidelines rely on self-reported data and may still be subject to underreporting. The classification of workers into specific categories can be challenging in practice, and there may be variations in implementation across countries.

Labor Market Surveys: These surveys focus specifically on labor market dynamics and may include questions about informal employment arrangements. Researchers use this data to estimate the prevalence of informal employment and analyze trends over time. Strengths: Labor market surveys can provide insights into the dynamics and characteristics of the informal labor market, helping to identify trends and changes. Limitations: The scope of labor market surveys may not cover all aspects of informal employment comprehensively. The data may be subject to sampling biases, and there may be limitations in sample size and frequency of data collection.

Administrative Data: Some countries use administrative data sources, such as tax records or social security contributions, to identify formal employment. Informal employment is then estimated as the complement to formal employment. This method is based on the assumption that all employment is either formal or informal. Strengths: Administrative data can provide accurate information on formal employment, making it possible to estimate informal employment by deduction. Limitations: This method may not capture all aspects of informal employment, especially activities that are completely unregistered or off-the-books. It relies heavily on the accuracy and completeness of administrative records.

In summary, traditional methods for estimating informal employment provide valuable insights into the informal income market. However, they often rely on self-reported data, which can lead to underreporting of informal employment due to stigma or lack of awareness. These methods may not capture all aspects of informality, such as hidden or off-the-books work. Combining multiple data sources and methodologies can help improve the accuracy and comprehensiveness of estimates of informal employment, but still the gaps remain. Hence, an exploring the alternative methods and approaches is desirable.

Estimating Informal Household Income in Georgia Using Household Microdata

The central problem of economic analysis is always data availability and reliability. Thanks for the circumstances that the same data is collected and used for other purposes, the author gained access to unprecedentedly unique data, internationally. In particular, the database comprises approximately 2 million individuals, for many of whom both the amount and the type of income are documented.

In particular, from the credit information bureau of Georgia, data is available on 2.4 million individuals who have a credit history. Naturally, some of the borrowers are in overdue or might not even be alive, so out of the pool in year 2024, around 2 million individuals had an active loan and were servicing the debt. That means they have some type of income to repay the debt. Also, in 2019 NBG has implemented a responsible lending regulation, which mandated every formal sector lender to check the borrowers' creditworthiness before issuing a loan[4]. There are particular thresholds of the requirement:

4. One exclusion applies to non-recourse loans, such as those obtained from pawnshops. However, the number of individuals relying exclusively on pawnshop loans is limited, and these borrowers do service their debt; therefore, this exclusion does not materially affect the results.

- If the income of the borrowers was less than 1,500 Lari, monthly payment on the loan should not exceed 20%-25% of the borrower's income, depending on the loan currency and hedging status[5].
- If the income of the borrowers was more than 1,500 Lari, monthly payment on the loan should not exceed 30%-50% of the borrower's income, depending on the loan currency and hedging status.

That means that not only does the borrower have some money to pay for the debt, but also a stable income source exceeding the monthly debt repayment amount by 2 or even 4 times. Correspondingly, for those borrowers with active debt in the credit bureau database as of the end 2024, one can assume them to have a regular income. In addition, it should be considered that it is a financial market where financial data quality is normally highest. Also, the market is heavily regulated and supervised, further ensuring accuracy.

Obviously, data gaps and limitations exist. In particular, sometimes household takes a loan in the name of one member while servicing it with joint income, or it could be the case that the borrower lost income during 2024 and continues to service the debt with savings, or they could be just borrowing from friends or other informal sources to repay the credit and may not have actual income in 2024. Nevertheless, considering the size of the data, which covers 2/3 of the adult population of Georgia (around 3 million individuals[6]), those limitations should not be material.

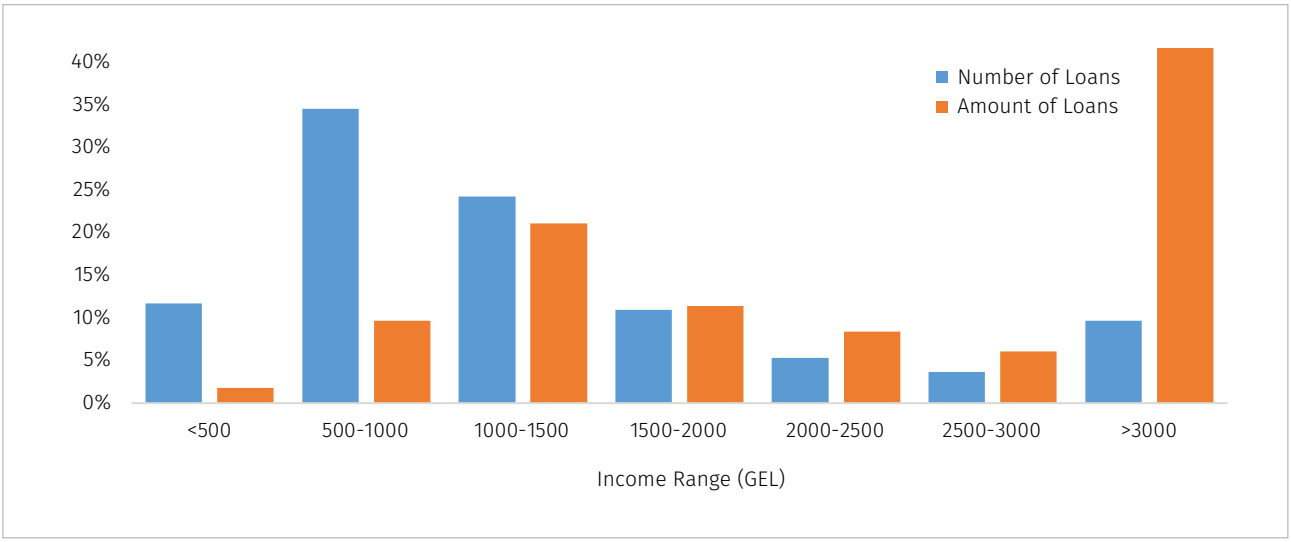
Another data point is the actual estimated incomes for retail borrowers in 2024. Cleaning for relatively lower quality and incomplete data set leaves us with 345 thousand individuals for which the bank income estimate is known. For those individuals, it is known both the amount of actual income and the major source of that income.

The income check itself during the loan disbursement process is a quite complex procedure. Initially, the borrower declares her/his monthly salary. Bank asks for a formal contract with the employer and also checks the account statement to ensure that a stream exists for the last several (normally, 6 months) periods. If factual documents are missing, then the lender visits the place of employment to ensure that it physically exists. Being on-site, informal accounting documents are assessed, and the credit officer estimates the income based on them. In addition, there are pre-defined scorecard for major professions how much they earn based on location and type.

One aspect, in term of the precision of this data, is that borrower always has incentives to prove their income to be higher. That allows one to qualify for a loan and to take it with better terms. The credit officer might as well have some incentive to overstate the paycheck, in case the borrowers is close to the threshold minimum, and the officer is desperately motivate to expand her or his credit portfolio. However, based on NBG's supervisory monitoring, overall assessment practices give very accurate results on income. Also, in practice, default rates of such loans in normal times are less than 1%[7], further emphasizing quality. Besides, similar to the high income inequality in the overall economy, one will observe a great disparity among borrowers as well. A large number of loans go to borrowers with small income and a limited number of households with decent income range borrow the largest fraction of the total portfolio. Considering that higher income and larger debt level borrowers are assessed under greater scrutiny, the extrapolated quality of the overall assessment should be even higher.

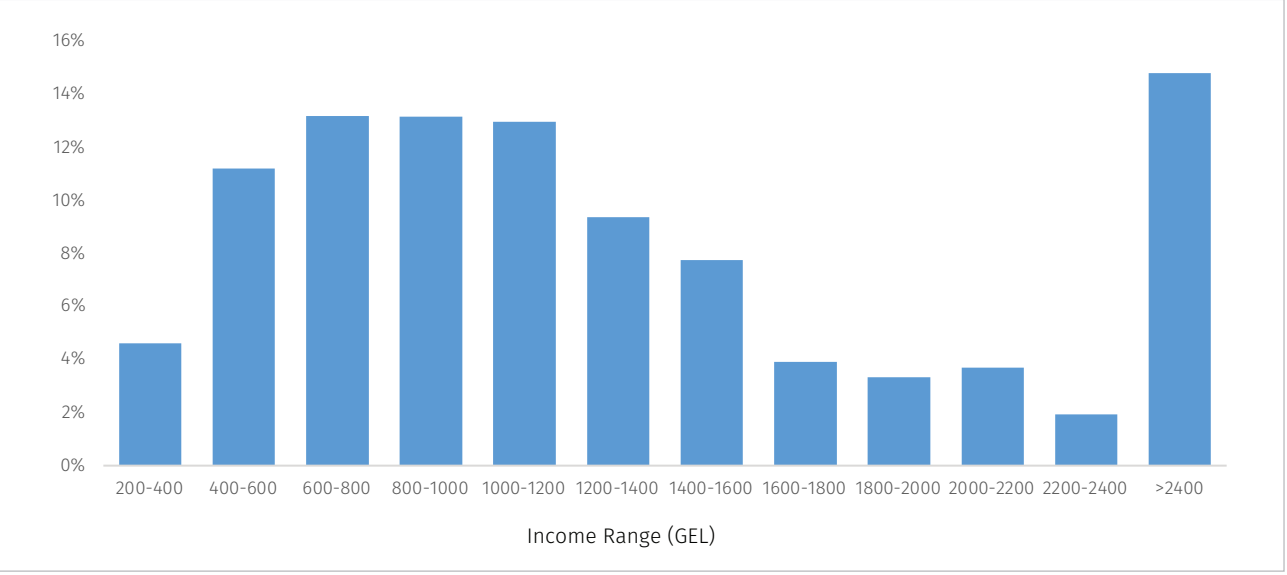
5. Borrowers are considered hedged against foreign exchange risk if their income is denominated in the same currency as the originated loan.
6. The population aged 18–64, constituting the active labour force, comprises approximately 2.3 million individuals. However, some studies suggest that a portion of this population is regularly working and residing abroad and therefore operates outside the Georgian labour and financial markets.
7. Considering the existence of a natural default rate—where a borrower fails to repay due to unwillingness rather than inability –1% is relatively low.

Figure 6. Number and Amount of Retail Loans by Borrowers' Income Range



Source: NBG.

Figure 7. Distribution of Income in Lari Declared by Retail Borrowers to Banks[8]



Source: NBG.

Yet one other data source is the tax authority of Georgia, the Revenue Service under the Ministry of Finance. They have income tax data on every individual in Georgia. Those are normally filled by employers when they declare and pay the income tax of their staff and dividends to shareholders, while sole proprietors submit declarations by themselves. Since 2019, when the Pillar II pension system was introduced, the quality of this data has not been a concern, because pension contribution is tied to it and individuals themselves monitor the declarations through the Pension Agency. Also, part of

8. Interestingly, the median income in Georgia appears to range between 800 and 1200 lari.

population, especially those who pay property tax, are registered with the Revenue Service as well, and they can check income data there.

As for the Revenue Service income data, understandably, some employers and employees have an incentive to declare a lower amount or not to declare anything. That way they could relief the tax burden.

Further, the peculiarity of the Georgian lending market is related to two other factors. The first is high reliance on remittance income. A significant number of households in Georgia have a member working abroad, regularly sending transfers. This type of income is then used by the family to leverage a bank loan taken for relatively large expenses, such as housing renovation. Correspondent data on remittance are now collected by the credit information bureau in a consistent manner. For the previous years, data was collected from the 7 large financial institutions that cash the transfers, covering around 95% of the market. And the second feature is relatively high credit activity in pension age. Most of those borrowers are retired and their only income is a government pension. Correspondingly, they don't have a formal income in terms of one declared to tax authorities, but their income is technically formal. So it was necessary to collect that data as well. Fortunately, all the state social benefits are channeled through a bank, which makes data gathering possible.

Unsurprisingly, household income data is a very sensitive part of privacy and strictly confidential. All the above-mentioned databases were collected at the NBG data warehouse and automatically encrypted and depersonalized. Consequently, it was possible to match data point across the databases, but neither possible nor needed to identify individuals by identity. It allowed for the creation of this unique data while maintaining privacy concerns, which was a major obstacle for the previous research.

Once the proper data is collected, a careful filtering was made to separate borrowers' income sources. In those cases (e.g., for mortgage borrowers) where the income sources is also identified by banks, distinction is not needed. However, for the rest of the retail borrowers, it is only known that income exists. For those borrowers, initially, they are matched with RS data, and if they have declarations, one can assume they are at least partially formal. Next, if the borrower is receiving pension income and a "Pension Loan", they are separately identified. And finally, from the rest of the pool, a bulk of borrowers receiving remittances are segregated. After this operation, whoever is left is receiving an income completely out of formal sources.

One drawback here is the income from agricultural production. However, according to the latest definition of ILO and also implemented by Geostat, such income could only be considered if income is received from the agro production for sale, not for own consumption. Anecdotal evidence suggests that not to be a significant part of the economy, so it could be neglected. Another area is income directly received from abroad, like sailors in Batumi who work on international ships. Their classification for formality is quite complex, but again, it does not represent an important part of the employment.

Finally, for this assessment, data is about borrowers; information about non-borrowers is not available. Theoretically, that may cause a selection bias, as those who borrow at a bank, have an active bank account and prove their income to the bank are more likely to be in the formal sector. However, considering the size of the sample, it covers a significant part of the working age population, so one can say findings for borrowers should hold for the rest of the population as well. Nevertheless, when concluding, we will keep in mind the potential impact of selection bias and that the finding may underestimate the real share of informal employment.

Empirical Analysis and Findings for Georgia

Once the databases are joined and matched and consistency is ensured, the analytical part is relatively straightforward. As discussed, 345 thousand borrowers have been analyzed. Out of this pool, around 50 thousand (14.2%) have no current records at the Revenue Service, so they are fully informal.

Moreover, having an RS income does not guarantee that the person does not have a sizable informal income. Table 2 summarizes how much more income the clients declare to banks compared to the tax authority, if any. The corresponding formula is as follows:

$$\text{Real Income Overstatement Ratio} = \frac{\text{Income Declared to Bank}}{\text{Income Declared to Tax Authority}}$$

Where Real Income is considered whatever the borrower proved at bank to take a loan. Income Declared to Tax Authority means the income declared to Revenue Service by the formal employer.

Table 2. Ratio of Borrowers' Income Estimated by Bank Divided by the Income Declared to Revenue Service, Distribution

Bank Income/RS Income	Share
<50%	4.0%
<150%	58.1%
150%-200%	7.7%
>200% (Largely Informal)	16.1%
Fully Informal	14.2%
Total	100%

Source: NBG, RS data, author's calculations.

According to the table, out of the total sample, we have 4.0% of borrowers whose RS income exceeds bank income, while around 58.1% declares roughly the same income to both. In addition, when applying for credit, 7.7% show 150%-250% more income to banks compared to RS, however, this still could be caused by inaccuracies in estimation, by seasonality or by mismatch of income reporting over time. So, most probably, formal income is their main source of income for the categories above. Oppositely, for 16.1% of individuals, real income exceeds formal income by more than 2 times. That means, creditors on average rely on informal income. And finally, again, 14.2% have sufficient income to qualify and service the debt, but did not declare anything to RS. To sum up, 14.2% of borrowers are fully informal and 16.1% are largely informal, so in total 30.3% can be assumed in informal sector. There are an additional 11.6% of borrowers, who receive a significant part of their income informally. So, 30.3% could be even assumed as a minimum.

One additional analysis that can be done is to replicate the assessment for different income brackets (see Table 3.). As it shows, households that receive less than the average income (2,000 Lari) are, on average, employed more in the shadow economy (informal income twice exceeds the formal one).

Table 3. Share of Largely Informal Income Receiver Borrowers by Income Range

Income Range	Share of Largely Informal
<2,000 Lari	27.3%
>2,000 Lari	11.4%
Total	16.1%

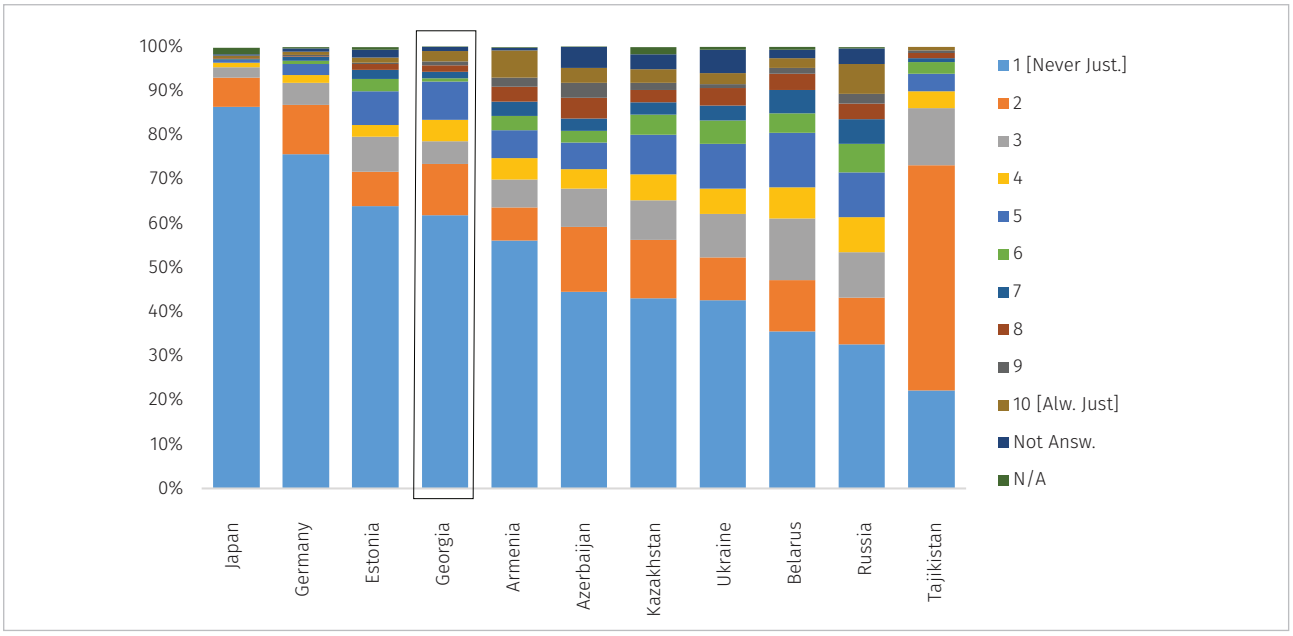
Source: Authors Calculations.

To conclude, using a microdata gives a unique chance to accurately evaluate the share of informal employment. The estimated 30.3% is very close to Geostat finding of 29.1% and significantly lower than estimate published by ILO (56%).

Related Statistics Emphasizing the Severity of Informality

To cross-check whether findings suggest a reasonable level of shadow activity, several additional statistics could be analyzed. In particular, there are a couple of surveys which measure the perception of informality. The first one is done by The World Value Survey, asking whether respondents can justify cheating on taxes, with responses ranging from 1 (never justifiable) to 10 (always justifiable). The average responses at the country-year level are used as a measure for attitudes towards informality (or tax morality). A higher average at the country level implies that people find cheating on taxes more justifiable. Interestingly, the results for Georgia (Figure 8) compares more to developed countries, with lower a shadow economy.

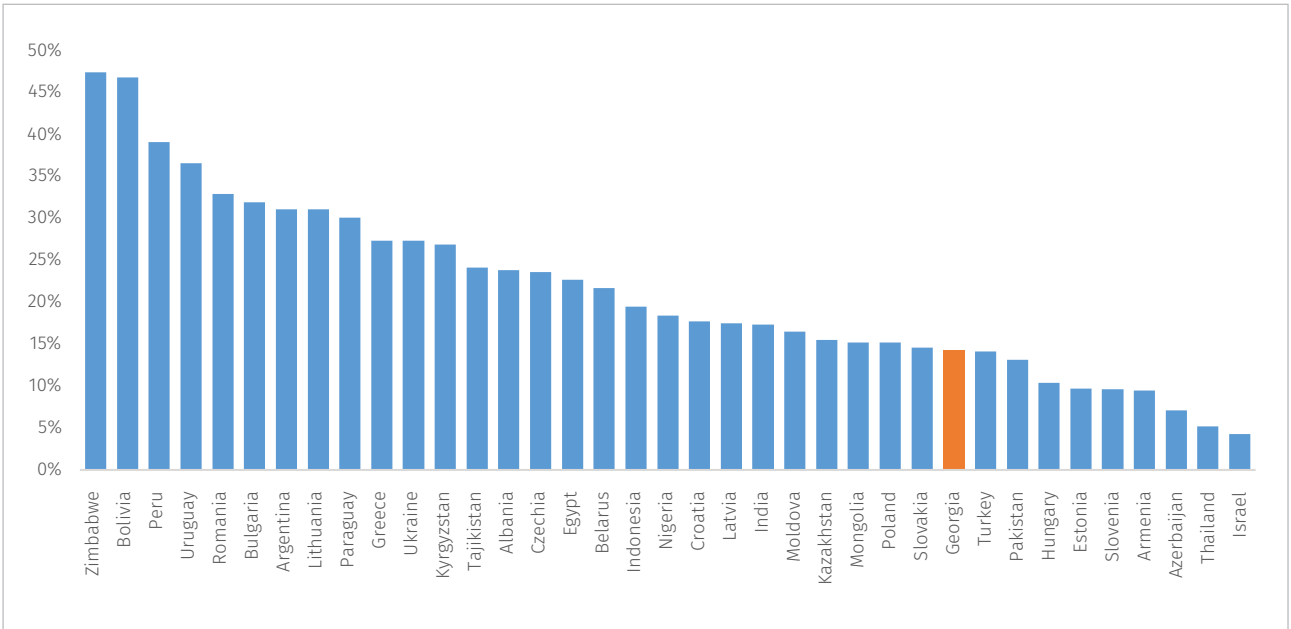
Figure 8. Survey Results: Can Tax Evasion Be Justified?



Source: World Value Survey.

The second survey is conducted by the WorldBank for small and medium enterprises, asking firms whether informal competitors represent constraints for their business operations. Again, for Georgia, the percentage of such firms amounts to 14%, indicating that small businesses are not concerned with informality in the market, suggesting a potentially lower level of shadow economy compared to the average in peers.

Figure 9. Percent of Firms Identifying Practices of Competitors in the Informal Sector as a Constraint



Source: World Bank Enterprise Surveys.

Conclusion

Despite the long history of studying the shadow economy and well-established methodologies, the high level of estimates of informal economic activities in Georgia raises questions.

As a result of the analysis of unique microdata on actual and formal household income using an alternative method, it was found that approximately 30% of household income in Georgia is generated informally. This gives us grounds to conclude that the extremely high share of the shadow economy in Georgia published by respected international organizations and authors is largely exaggerated.

Additionally, more complex research is needed to assess the overall size of the informal economy; however, the results obtained indicate that Georgia is likely to be closer to developed countries by this indicator.

Nevertheless, the current level of informality remains a challenge. Reducing shadow activities will contribute to sustainable economic development and prosperity. However, reducing informal activity will only improve welfare if it is effectively transferred to the formal economy. Restricting informal income alone may only reduce overall incomes and ultimately prove counterproductive.

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REGULATORY "BOTTOM-UP" STRESS TEST, A TOOL TO ANALYZE RESILIENCE OF BANKING SECTOR AGAINST SHOCKS

ELENE GHVINIASHVILI, ALEKSANDRE ERGESHIDZE

Abstract

This article discusses one of the tools of the National Bank of Georgia's financial stability framework – the supervisory "bottom-up" stress test. This tool allows for the timely identification and assessment of risks for both a specific bank and the financial sector as a whole, which contributes to the future oriented nature of macroprudential policy and provides the opportunity for preventive action. The results of the 2025 stress test show that the Georgian banking system is overall stable and resilient to severe, albeit low-probability stresses. The article shows that if the stress test scenario is realized, the Georgian banking system will be able to operate stably, without severe lending restrictions.

Keywords: National Bank of Georgia, stress test, stress test buffer, European central banks, banks of England, Federal Reserve bank, financial stability, credit risk, interest rate risk.

Introduction

One of the key determinants of the resilience of the banking system is adequate capital buffers, which allow the banking sector to withstand economic shocks without severe restrictions on lending (Schroth, 2019). Empirical analysis shows that in the case of a sound banking system, the depth and severity of an economic crisis are relatively less, especially in a type of financial system where the banking sector is a major player (Boissay, 2016).

It should be noted that a stable banking system is largely the result of forward-looking macroprudential policies. Anticipating risks and developing appropriate policies to mitigate them makes the sector more stable and resilient to shocks (Ampudia, 2021). It is in this context that we should discuss the supervisory "bottom-up" stress test, which involves the central bank offering the same macroeconomic scenario to each commercial bank, according to which the banks themselves, taking into account the characteristics of their borrowers, assess the impact of the development of events in this scenario on the bank's sustainability and share the results with the regulator. This allows both the regulator and the bank itself to identify key challenges in the banking system and seek possible ways to mitigate them (ECB, 2025). Therefore, identifying banks which are vulnerable to low probability but severe stress scenarios and imposing additional capital buffers for them, if necessary, will make the banking system more stable overall.

The National Bank of Georgia has been conducting a supervisory stress test exercise since 2018. Its methodology and assumptions are refined and updated annually to keep pace with current challenges. If the analysis of the final results of the stress test exercise reveals that the financial condition of any commercial bank is deteriorating sharply, capital requirements may be increased individually. The

amount of this additional capital is determined in such a way that, in the event of the realization of the scenarios and risk factors specified in the supervisory stress test, regardless of the occurrence of losses, it ensures the protection of the bank from supervisory default and the uninterrupted delivery of financial services.

In addition to the "bottom-up" method, a "top-down" approach is also used in stress testing, which is based on a framework developed by the National Bank, a model of the relationship between macroeconomic and bank financial variables. It is important to note that, unlike a "bottom-up" stress test, a "top-down" test allows for the assessment of systemic vulnerabilities and potential risks with secondary effects, which makes it easier for the central bank and market participants to see the whole picture. A "bottom-up" stress test allows for the system analysis to take into account, to some extent, the specificity of banks. It can be said that these two exercises are complementary (Bisio and Fiori, 2019).

In line with international best practice, the National Bank of Georgia conducts a "top-down" stress test exercise in addition to the "bottom-up" stress test. Using this tool, it is possible to assess the ability of banks to cope with large shocks. The results of the stress tests are published on the National Bank's website, and through an interactive platform, interested parties will be able to select a hypothetical stress scenario for each macroeconomic variable and monitor the dynamics of the capital ratio of a commercial bank.

Overview of best practice

"Bottom-up" stress testing, as a supervisory policy tool, is widely used by central banks. The methodology and approaches for conducting stress tests depend on the specifics of the country and its financial system. Below, we discuss the approaches of several central banks.

The European Central Bank (ECB), together with the European Banking Authority (EBA), uses the so-called "constrained bottom-up" approach. In particular, commercial banks assess the impact of stress on their financial position using their own internal models, however, to avoid overly optimistic results and to increase comparability between banks, the exercise is completed using scenarios, assumptions and detailed methodological guidance provided by the ECB. The quality of the work performed is strictly checked by the ECB and the European Banking Authority. The stress test covers market, operational and sovereign risks (European Central Bank, 2019). In addition, the ECB uses a static balance sheet assumption, which means that the size, composition and risk profile of a bank's balance sheet do not change over the three-year projection period of the stress test. The banks participating in the stress test are selected in such a way that this process covers at least 75 percent of the total assets of the EU banking sector.

It is important to note that the ECB uses the results of stress tests in its Supervisory Review and Evaluation Process (SREP). The quantitative results inform the definition of Pillar 2 Guidance (P2G)[1], which is not a mandatory capital requirement and is advisory in nature. The qualitative results (data quality and risk management) may influence the mandatory Pillar 2 requirement (P2R)[2]. Stress tests also provide a common standard for comparing the resilience of banks, strengthen market discipline and support the planning and implementation of other supervisory activities.

1. The Pillar 2 guidance is a recommendation that indicates the level of capital the ECB expects banks to maintain in addition to their binding capital requirements.
2. The Pillar 2 requirement (P2R) is a requirement for additional own funds that is set out in the Supervisory Review and Evaluation Process (SREP). It is a bank-specific capital requirement which applies in addition to the minimum capital requirements.

Similar to the European Central Bank, the Bank of England also conducts "bottom-up" stress tests for systemic banks. However, compared to the ECB, this stress test assumes a more severe and prolonged economic recession, both domestically and globally. Like the ECB, the Bank of England uses the results of the stress tests to assess the resilience of the British banking system and to make decisions about the definition of capital buffers – both for the entire system and for individual banks. Based on the stress test results, the Financial Policy Committee (FPC) and the Prudential Regulation Authority (PRA) assess whether capital buffers are sufficient to withstand a stress scenario and whether they need to be tightened or loosened. In particular, the results are used to determine system-wide instruments, such as the countercyclical capital buffer, and bank-specific buffers, such as the PRA buffer. In this way, stress tests play an important role in shaping macroprudential policy (Bank of England, 2024-25).

The Federal Reserve, unlike the ECB and the Bank of England, uses a standardized approach to its bottom-up stress tests. This means that for all banks participating in the exercise, the stress test results for credit, net interest, market, and operational risks are assessed using a single model developed by the Federal Reserve System (FED). In general, the standardized approach ensures comparability across banks and allows for the aggregation of the impact of stress on the system (Orlov, Zryumov and Skrzypacz, 2023). However, bank specificities are less taken into account. In addition, it is important to note that, like the Bank of England, the FED conducts stress tests for large, systemically important banks. And those banks whose financial condition deteriorates sharply as a result of this exercise are initially subject to additional capital requirements in the form of a stress test buffer. In addition, capital distribution may be restricted. In addition, both the central banks listed above and the FED conduct a "top-down" stress test exercise to obtain a broader and more aggregated picture of the challenges facing the financial system.

Methodology

As mentioned above, the National Bank uses a standardized approach to the stress test exercise. Accordingly, banks are given a certain period of time to fill in and submit to the National Bank standard Excel forms shared with them with their financial and borrower data (NBG 2019).

The assessment of credit risks in the stress test exercise consists of two main stages. The first stage involves the division of the credit portfolio into five categories (corporate portfolio, small/medium business portfolio, micro business portfolio, retail portfolio and gold pawn portfolio). One part of the corporate and small/medium business portfolio, which includes groups of borrowers with liabilities exceeding 1% of regulatory capital, is fully stressed, and the second part is selectively stressed. The results of the selectively assessed portfolio are applied to the entire qualifying portfolio.

In the first stage, the reserve rate for expected credit loss for loans in categories one, two and three is determined. The reserve rate is the maximum rate between the expected credit loss rate for the same portfolio and the corresponding credit risk adjustment buffer (CRA) rate.

In the second stage, the banks' portfolios are recalculated taking into account longer maturity, impairment, utilization of the unutilized part of credit and stresses directed at the portfolio. As a result, new expected credit losses and the corresponding provision rate are calculated. The difference between the provision rates obtained in the first and second stages represents the net effect of the stress. The volume of new provision due to stress is calculated by multiplying the above-mentioned provision rate by the volume of loans after the stress.

As for interest rate risk, the profit/loss resulting from an increase in interest rates over a one-year horizon is calculated from the revaluation of the interest rate gap. In addition, based on the assumption of a static balance sheet, increased interest income and

expense are calculated for both floating-rate and fixed-rate assets and liabilities that mature within that one-year period but are replaced by assets and liabilities of the same type.

Additionally, based on actual profit and loss data, a one-year forecast is made, taking into account stress effect adjustments. The latter include, on the one hand, the effect of credit and interest rate risk, and, on the other hand, adjustments to exchange rate depreciation, non-interest income and expenses, as well as the effect of a decrease in real estate prices.

At the final stage, the impact of all the above-mentioned risk effects on regulatory capital is assessed. If the impact of a given strict but possible stress test on a commercial bank is so severe that its financial condition deteriorates sharply, the bank may be subject to additional capital requirements in the form of a stress test buffer.

The methodology for conducting the stress test does not change radically from year to year, although it is being refined and the shortcomings identified during the previous exercise are being eliminated. It should be noted that a significant change was made to the 2025 supervisory stress test exercise. In particular, the stress test exercise model was redesigned to be consistent with the International Financial Reporting Standard (IFRS 9)[3].

Supervisory stress test scenario and assumptions

In 2025, commercial banks presented the results of another stress test, which showed that at the system level, the banking sector has sufficient capital buffers to withstand economic shocks and continue lending activity in the downward phase of the business cycle, and that the sustainability of the system is not threatened.

According to the scenario, due to macroeconomic and financial shocks, global economic activity slows down and countries in our region enter recession. At the same time, the Georgian lari depreciates and interest rates increase due to the increase in risk premium. The main assumptions of the stress test are:

- 40 percent depreciation of the domestic currency against the currencies of major trading partners;
- 30 percent decrease in real estate prices in US dollars and 2 percent in domestic currency;
- From 1.5 to 2 percent increase in the spread between assets and liabilities;
- 3 percentage points increase in interest rates on domestic currency assets and 5 percentage points increase in interest rates on liabilities;
- 2 and 4 percentage points increase in interest rates on foreign currency assets and liabilities, respectively;
- 5 percentage points decrease in non-interest income and expenses;
- The number of employees and incomes are decreasing by 5-5 percent.

Unlike the previous stress test exercise, which had only one scenario, the 2025 stress tests sectoral rotations vary across three scenarios: baseline, light, and heavy, taking into account the cyclicality of the sectors (see Table 1). It is worth noting that the final result is obtained by weighting all three scenarios. Specifically, 50% is assigned to the baseline stress scenario, and 25% each to the light and heavy stress scenarios (see Table B.1).

3. An international financial accounting standard that regulates the classification, measurement and impairment of financial instruments.

Table 1. Stress Test Scenarios

Table N 1	Reduction in Turnover		
Sectors	**Baseline Scenario**	**Mild Scenario**	**Severe Scenario**
Government Organizations	5.0%	2.5%	10.0%
Financial Institutions	10.0%	5.0%	20.0%
Lombard Loans (Gold Price Stress 20%)	20.0%	15.0%	25.0%
Real Estate Development	40.0%	20.0%	60.0%
Real Estate Management	30.0%	20.0%	40.0%
Construction Companies (Non-developers)	25.0%	15.0%	35.0%
Extraction, Production, and Trade of Construction Materials	25.0%	15.0%	35.0%
Trade in Consumer Goods	5.0%	2.5%	10.0%
Production of Consumer Goods	5.0%	2.5%	10.0%
Production and Trade of Durable Consumer Goods	35.0%	25.0%	45.0%
Production and Trade of Footwear, Clothing, and Textiles	5.0%	2.5%	10.0%
Trade (Other)	5.0%	2.5%	10.0%
Manufacturing (Other)	10.0%	5.0%	20.0%
Hotels and Tourism	30.0%	20.0%	40.0%
Restaurants, Bars, Cafés, and Fast Food Outlets	15.0%	7.5%	30.0%
Heavy Industry	5.0%	2.5%	10.0%
Loans Issued to Gas Stations and Fuel Importers	5.0%	2.5%	10.0%
Energy Sector	5.0%	2.5%	10.0%
Car Dealers	35.0%	25.0%	45.0%
Healthcare	5.0%	2.5%	10.0%
Pharmaceuticals	5.0%	2.5%	10.0%
Telecommunications	5.0%	2.5%	10.0%
Services	5.0%	2.5%	10.0%
Agriculture Sector	5.0%	2.5%	10.0%
Other (Including Scrap Business)	5.0%	2.5%	10.0%
Stress Testing of Developers' Accounts Receivable	30.0%	20.0%	40.0%

Source: NBG.

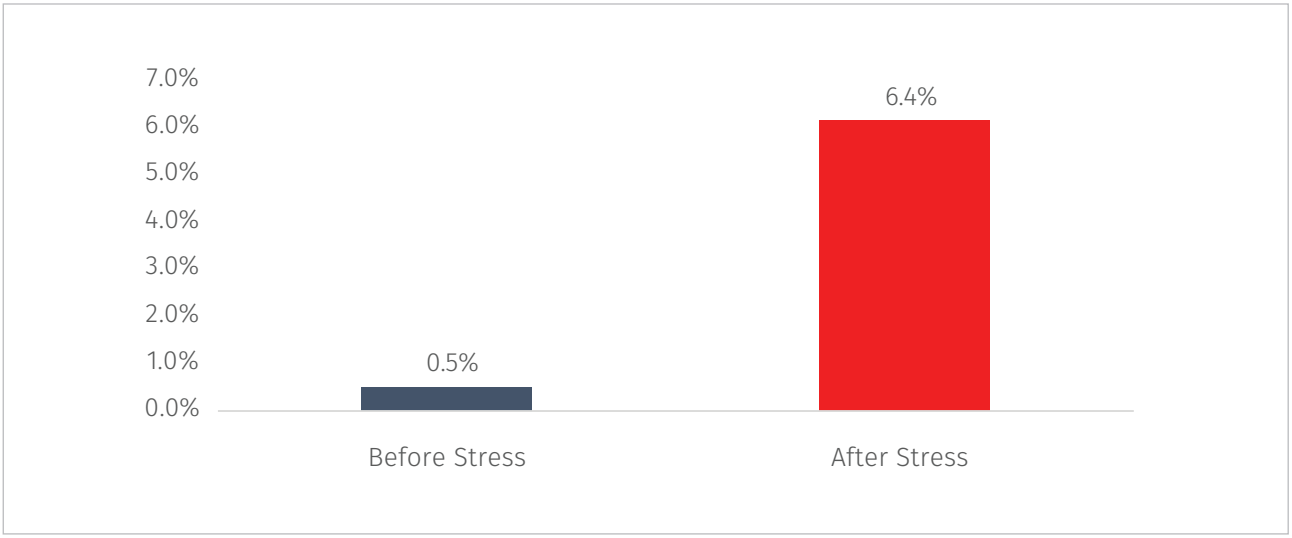
Results

According to the results, the stress on the credit risk component has had a significant effect. In particular, as a result, the losses for the system in terms of possible loan losses increase from 298 million to 4.7 billion GEL, while the share of possible loan losses in the total portfolio increases from 0.5 percent to 6.4 percent (see Figure 1).

In addition, various types of effects based on scenario assumptions are reflected in the additional profit/loss:

- Based on the assumption of exchange rate depreciation, banks' foreign exchange positions are being revalued. As of the stress test date, the banking system was operating with a small short position, as a result, a 40 percent exchange rate depreciation resulted in losses of up to GEL 8.0 million;
- The assumption of a deterioration of the interest margin by 2 percentage points has a significant effect. Assuming increased interest rates, the profit/loss was calculated from the revaluation of the interest gap over a one-year horizon. Increased interest income and expenses were recalculated for both floating and fixed rate assets and liabilities. The effect of hedging on the part of the interest gap affected by the stress was taken into account. As a result, the banking sector received a total loss of GEL 1.1 billion from this component;
- Non-interest income and expenses change in accordance with the 5 percent decrease assumed in the scenario. In addition, the stress of the decline in real estate prices, which is reflected in the decline in the value of real estate and acquired property owned by the bank, has an additional impact.

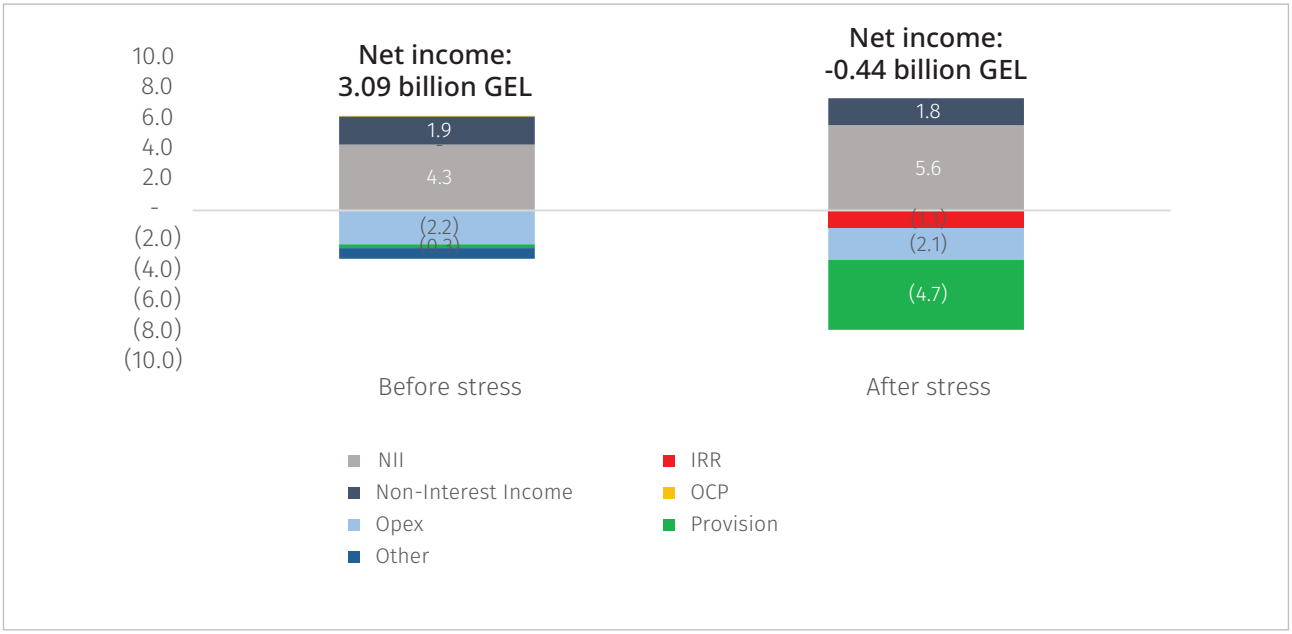
Figure 1. Share of Possible Loan Losses in the Portfolio



Source: NBG.

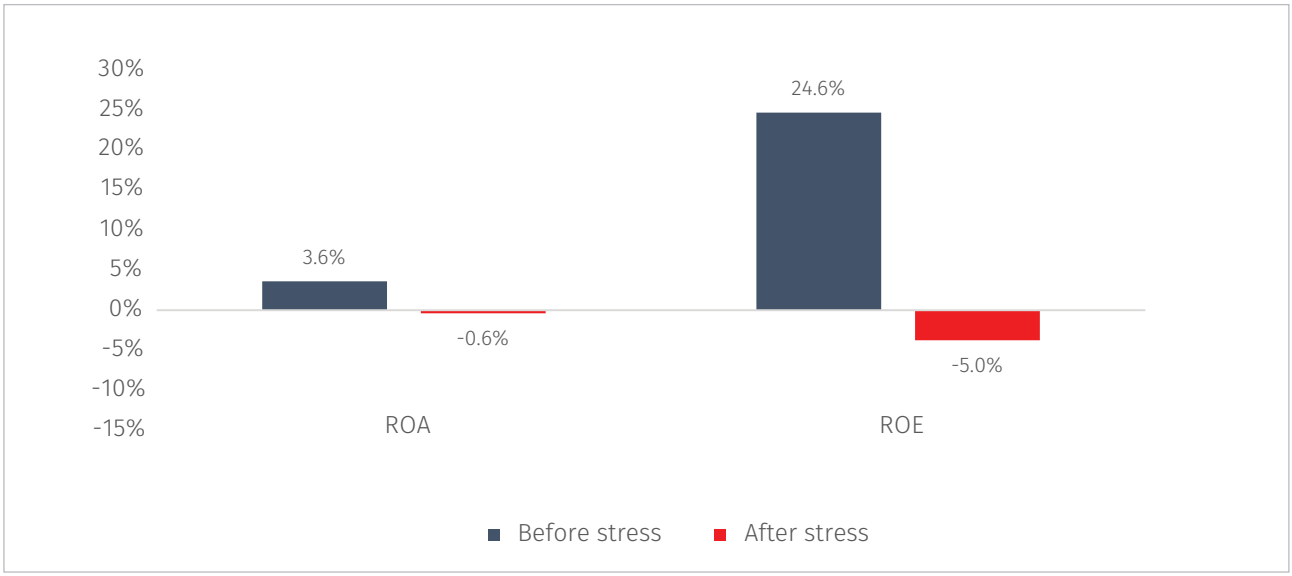
As a result of the summation of all losses, the profitability of the banking system in the post-stress scenario significantly decreases. The system's losses in the reporting year after the stress reach 0.6 billion GEL, while before the stress the system operated with a net profit of 3.1 billion GEL. After the stress, the net interest margin also decreases from 5.0 to 4.1 percent.

Figure 2. Profit Decomposition



Source: NBG.

Figure 3. Profitability Indicators



Note: ROE - net profit relative to the average equity capital for the year, and ROA - net profit relative to the average assets for the year.

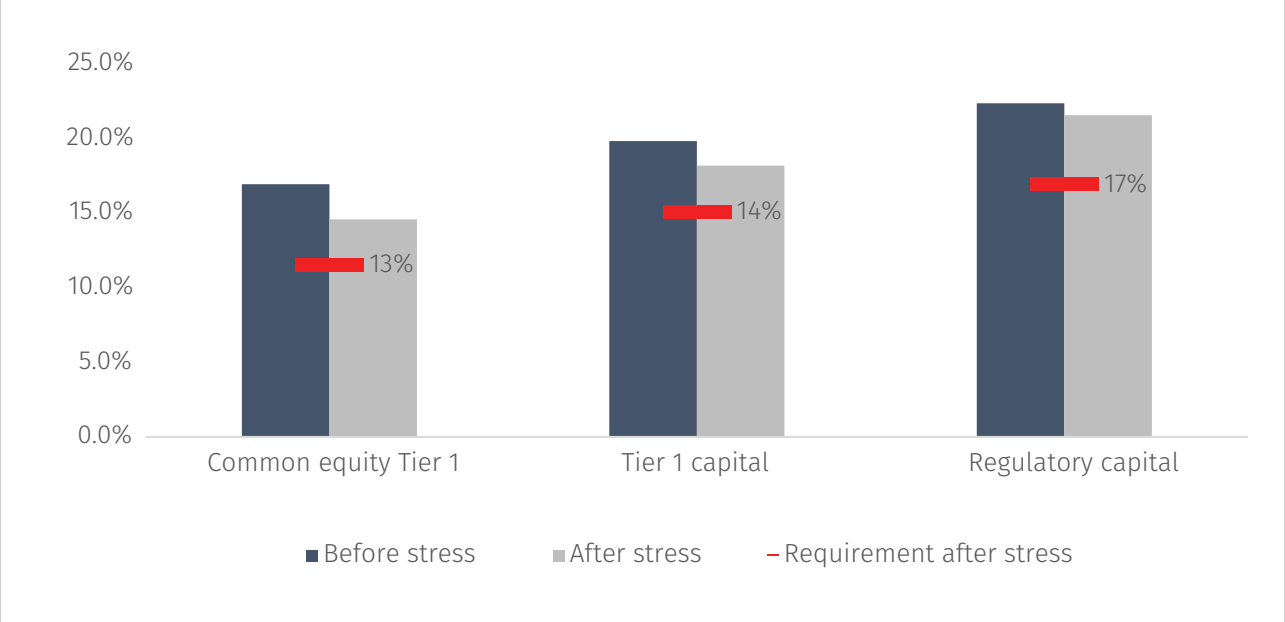
Source: NBG.

The assessment of the impact of stress tests on bank capital aims to ensure that the banking sector is fully prepared to face low-probability, but severe, stress without violating capital adequacy requirements. The main purpose of capital conservation and countercyclical buffers is to ensure that the banking system has sufficient capital to help banks absorb systemic losses under stress conditions. In addition, the unhedged foreign exchange credit risk buffer helps the banking system reduce systemic risk caused by dollarization.

Accordingly, the capital that a bank needs to cope with stress is already partly taken into account by the capital countercyclical, conservation and unhedged foreign currency credit risk buffers. In order to avoid double capital requirements, the capital required under stressed conditions is reduced by the countercyclical, conservation and one third of the unhedged foreign currency credit risk buffer when calculating the net stress test buffer.

Under stress scenario, the Common Equity Tier 1 capital ratio for the whole system significantly decreases from 16.9 percent to 14.2 percent, and some of individual banks are constrained in their ability to lend (see Figure 4). However, as of the stress test date, the system as a whole would operate with sufficient capital buffers, meaning that the buffers available to the system and the conservation and countercyclical buffers potentially released in times of stress, as well as one-third of the unhedged foreign currency credit risk buffer, would be sufficient to absorb losses[4] resulting from the stress. Accordingly, hypothetical capital losses would not pose a threat to the stability and sustainability of the system.

Figure 4. Capital Ratios



Note: Conservation, countercyclical and one third of the unhedged currency credit risk buffers are deducted

Source: NBG.

4. These calculations are based on common equity tier one data.

Conclusion

A stable financial system is the cornerstone of economic prosperity. One of the main tasks of the Central Bank, as a regulator, is to identify risks in a timely manner and prevent them. For this, it is necessary to assess the vulnerabilities in the financial system both at the level of an individual bank and, in aggregate, at the level of the entire system. The "bottom-up" stress test exercise, together with the "top-down" stress test, allows assessing the risks in the system at both the micro and macro levels. According to the conducted "bottom-up" stress test, the Georgian banking system is stable and resilient to unlikely, but severe economic scenarios.

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INFORMATION FOR AUTHORS

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6. Conclusion

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Journal of Environmental Studies, 45(3), pp. 215–230.

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