

NBG Working Papers

WP 01/2024

Core Inflation Requiem: *Paving the Way for a Dual-Component CPI in FPAS Central Banks*

By Shalva Mkhattrishvili, Douglas Laxton, Tamta Sopromadze, Mariam Tchanturia, Ana Nizharadze, Sergo Gadelia, Giorgi Gigineishvili, Jared Laxton

The National Bank of Georgia's (NBG) Working Papers are published to elicit comments and encourage debate on ongoing research. Working Paper Series aims to present original research contributions relevant to central banks. The views expressed here are those of the author(s) and do not necessarily represent the views of the NBG. No responsibility for them should be attributed to the NBG.



საქართველოს ეროვნული ბანკი
National Bank of Georgia

Core Inflation Requiem: Paving the Way for a Dual-Component CPI in FPAS Central Banks

Shalva Mkhatriashvili[‡], Douglas Laxton[⊗], Tamta Sopromadze[‡], Mariam Tchanturia^{‡1} Ana Nizharadze[‡], Sergo Gadelia[‡], Giorgi Gigineishvili[‡] and Jared Laxton [†]

April 2024

Abstract

We advocate for a novel approach to decomposing the Consumer Price Index, critiquing the traditional core inflation distinction (which omits volatile items like food and energy) for lacking a solid economic basis. Our proposed method, inspired by practices in economies like the United States, New Zealand and Armenia, categorizes prices into "flexible," which adjust quickly and are influenced by external factors, and "sticky" non-tradables², which adjust more slowly, offering a clearer view of medium-term inflation expectations. This approach underscores the importance of economic analysis over simplistic statistical methods that exclude volatile CPI components. It emphasizes the need for economists to understand the dynamics driving both sticky and flexible price inflation, with the latter often signifying initial signs of excess demand pressures. Recognizing the impact of dollarization, where exchange rate depreciations quickly affect nontraded sticky prices, becomes crucial. This understanding is vital for formulating monetary policies that prevent long-term inflation expectations from escalating, highlighting the significance of studying the interplay between exchange rate movements and domestic price dynamics in dollarized economies.

JEL Codes: E10, E31, E52, E58

Keywords: Non-tradable sticky prices; Monetary policy credibility; Core inflation

The National Bank of Georgia's (NBG) Working Papers describe research in progress by the author(s) and are published to elicit comments and encourage debate on ongoing research. Working Paper Series aim to present original research contributions relevant to central banks. The views expressed here are those of the author(s) and do not necessarily represent the views of the NBG. No responsibility for them should be attributed to the NBG. The working papers have not been peer-reviewed.

[‡] Macroeconomics and Statistics Department; National Bank of Georgia.

[⊗] Director of Saddle Point Research and The Better Policy Project; Advisor to CBA and NBG.

[†] Economist at Advanced Macro Policy Modelling (AMPM)

¹ Corresponding Author: Mariam Tchanturia (e-mail: Mariam.Tchanturia@nbg.gov.ge); All errors and omissions remain with the authors.

² Interactive charts of Non-Tradable Sticky Price and Flexible Price inflations can be found on NBG website (please visit following link <https://analytics.nbg.gov.ge/views/NTSPI-EN/NTSPI>) updated on a monthly basis.

Table of Contents

I. Introduction	2
II. Inadequacy of Traditional Measures of Underlying Inflation	4
III. Monetary Policy Relevant Inflation Measures: Dual-Component CPI Framework	5
A. Non-Traded Sticky Price Inflation: A Critical Tool for Modern Monetary Policy	6
B. Exchange Rate Dynamics and Monetary Policy Transmission in Dollarized Economies.....	7
IV. Methodology for estimating NTSPI for Georgia	8
A. The Atlanta Fed’s Methodology as a Benchmark.....	8
B. NTSPI Methodology for Georgia	9
C. Monetary Policy Credibility Measure Based on NTSPI.....	12
V. Results for Georgia: Historical Narrative Approach	14
VI. Conclusion	19

I. Introduction

The objective of the National Bank of Georgia (NBG) is to anchor the economy to 3% inflation. We use the term “anchor” because like a boat anchored in the ocean, waves may come and push the boat in different directions but so long as the boat is anchored it will not be lost. How do we anchor the economy? By using our monetary policy instruments. But under an inflation-targeting regime, monetary policy is much more than simply setting the policy rate at each decision day. Instead, each decision is an opportunity for the NBG to describe an outlook for the policy rate that is consistent with achieving its 3% inflation target in a timely manner. What is a timely manner? This will depend on the types and size of shocks or “waves” (demand or supply) that may hit the economy. Sometimes the NBG will think the path to 3% inflation will be shorter or longer but what matters most is the NBG’s outlook of the economy is consistent with the outlook of the policy rate.

For analyzing an appropriate policy outlook, it is essential to understand the underlying driving forces behind price dynamics and respond accordingly. Almost all forward-looking Inflation Targeting central banks that implement a Forecasting and Policy Analysis System (FPAS) follow a measure of underlying inflation that looks at a subset of the consumer basket, providing different insights for policymakers. The NBG, similar to other central banks, also uses the headline CPI and core CPI (CPI excluding food and energy prices) dichotomy. However, the major challenge of core CPI arises from eliminating some volatile items without deeply considering the economic rationale behind categorizing items into different groups for analytical clarity.

Hence, our objective here is to develop an inflation measure that does consider the economic rationale and is tailored to address challenges specific to small open economies especially prone to external shocks, such as Georgia. Our new measure provides a better sense of slower-moving and, hence, forward-looking prices. The measure could provide a crucial advantage in communicating the central bank’s commitment to its price-stability objective in the face of significant uncertainty as seen during the COVID-19 pandemic. However, while a systematic examination of various underlying inflation measures contributes to establishing a comprehensive analytical framework, the NBG should also focus on identifying early warning signals that inflation could become de-anchored from its target. To also address this key policy issue, our new inflation measure has flexible prices component as well. Hence, the measure we propose for Georgia categorizes prices into rapidly and slowly adjusting categories, with the former providing early warning signals and the latter better reflecting the underlying long-term driving forces of inflation and inflation expectations.

The 'overshooting sticky-price Dornbusch model' provides a conceptual framework for differentiating these price groups that also considers the two key elements of the monetary policy transmission mechanism: the expected short-term interest rate path and the exchange rate channel. While influenced by monetary policy, the exchange rate is not a direct target of the central bank. It is the outcome of diverse economic factors, including policy rate decisions and market expectations. Yet, in open economies with excessive financial dollarization, like Georgia, the exchange rate plays an important role in the transmission of monetary policy. Hence, when determining the most

appropriate decomposition for price measures, particular emphasis should be placed on exchange rate-sensitive prices. We refer to this part of the CPI decomposition as the Flexible Price Index (FPI) because these prices tend to be adjusted frequently by producers, respond to current market conditions, and serve as early warning signals of inflationary trends. The FPI primarily comprises of internationally traded goods directly influenced by the exchange rate, along with some non-traded goods.

The other part of the decomposition is referred to as the Non-traded Sticky Price Index (NTSPI), which primarily includes non-traded items, since they are less exposed to external shocks and exchange rates, mainly services. However, in small open economies, which are highly dollarized such as Georgia, some non-tradable prices (like rent) are set in US dollars. Hence, fluctuations will still occur in this measure of inflation due to exchange rate movements. Therefore, the NTSPI we derive may still exhibit exchange rate movement impact on relatively sticky prices. Moreover, in general, the NTSPI we derive will be a smaller percentage of the overall CPI basket than would typically be observed in other countries. In any case, the NTSPI should still have forward-looking qualities that incorporate medium-term inflation expectations because they are set less frequently and therefore offer a unique insight to the policymakers and how they should think about the policy outlook and its risks.

How would this distinction in prices look in practice? Let's say flexible prices begin to rise from higher oil prices and supply-chain disruptions due to the ongoing conflict in the Middle East. This would be a warning signal asking for a cautions mode. If policymakers fail to adequately respond to the early warning signals from flexible price inflation, especially when there are generalized excess demand conditions, there is a risk that this inflationary pressure will spread to stickier prices, like wages and service inflation. This could necessitate a much more aggressive policy adjustment down the road to disinflate the economy, causing unnecessary harm to the real economy. Whether this risk is materializing that would call for a tighter policy even now, in turn, can be gauged by looking at NTSPI that reflects long-term inflation expectations. Thus, this dual distinction is beneficial as it allows policymakers to identify underlying inflationary pressures behind price dynamics and ultimately, adjust policy more effectively.

In conclusion, the FPI and NTSPI measures should be a valuable tool in navigating economic challenges for Georgia and making more informed decisions. The measures provide a more accurate reflection of the different driving forces behind price dynamics. In particular, the NTSPI should help us understand more fundamental forces connected to inflation expectations and therefore help calibrate policy more effectively, while FPI provides early warning signals and calls for caution, especially when combined with estimates of the economy's cyclical position. Clearly communicating the monetary policy reactions based on these different insights should also help improve the credibility of the NBG's commitment to anchoring the economy to its 3% target.

II. Inadequacy of Traditional Measures of Underlying Inflation

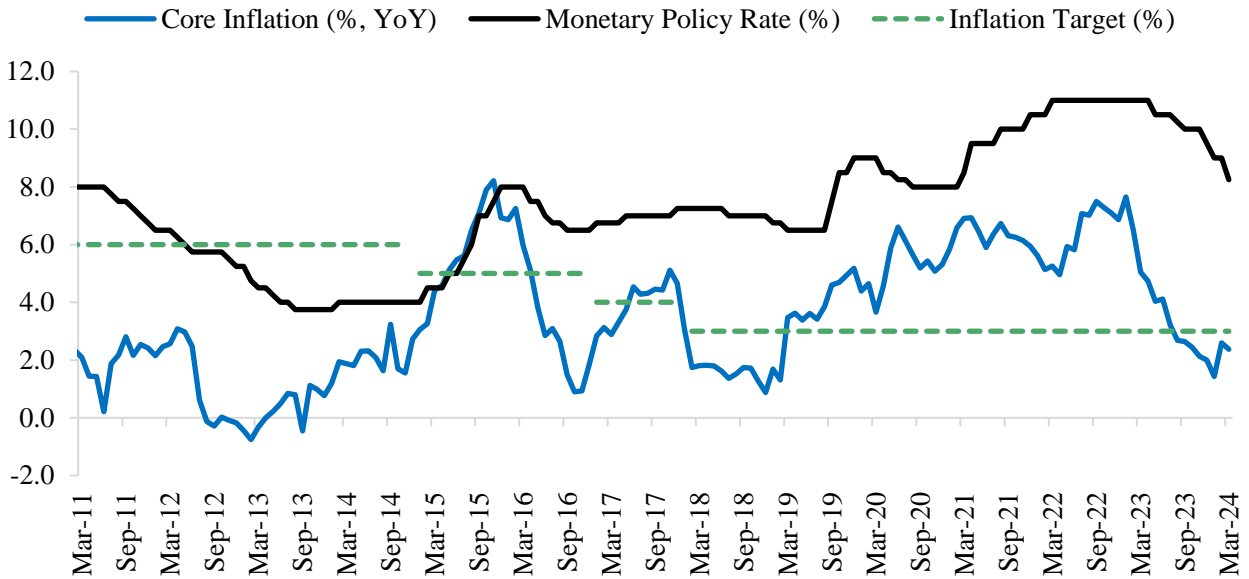
Traditional core inflation measures, by excluding volatile CPI components, fail to capture the comprehensive economic dynamics influencing inflation. These measures often neglect the critical information provided by both flexible and sticky prices, as well as the influence of monetary policy on exchange rates and traded goods prices. This simplistic approach may undermine the depth of economic analysis necessary for effective monetary policy.

The objective of central banks is to anchor the inflation and inflation expectations. How do we anchor the economy? As we mentioned above, under an inflation-targeting regime, each decision is all about the central bank adjusting an outlook for its policy rate so that it is consistent with achieving the inflation target in the medium term. To analyze an appropriate policy outlook, it is essential to understand the underlying inflation pressures, which is frequently measured using core CPI.

However, the core inflation measures simply eliminate some volatile items without deeply considering the economic rationale. Additionally, despite the core inflation addressing certain issues associated with seasonal movements (particularly related to food prices), it still incorporates a significant share of goods and services, vulnerable to frequent price changes as well as external shocks, which may not be directly related to monetary policy, which makes it very difficult to tell an economic narrative that policy can be based on.

This issue is clearly visible if one looks at the core inflation measure in Georgia and the NBG's monetary policy decisions over time (see Figure 1). Inconsistencies between these two is well visible during times of big shocks, exactly when the underlying inflation measure matters the most. For instance, in 2011 the NBG tightened its monetary policy to fight high inflation, but at that time core inflation was remaining very low, in big part due to strong exchange rate. Second example is the onset of COVID-19, when core inflation remained elevated as the exchange rate depreciated sharply, leading to an increase in traded prices, but monetary policy rate was actually reduced. The reasoning was that this inflation was primarily driven by a strictly exogenous shock induced by unprecedented events in the health sector and it was widely anticipated that this shock would be temporary, given the short-term imposition of virus containment measures. Consequently, long-run inflation expectations remained anchored, prompting the NBG to slightly loosen its monetary policy stance to support economic activity. This episode also highlights the fact that excluding highly volatile components from consumer prices does not always give us a clear vision on underlying inflationary pressures, especially during big shocks, as it still includes components that are strongly impacted by exogenous factors.

Figure 1 – Core Inflation and Monetary Policy Rate in Georgia



Source: NBG, GeoStat

Still another example is 2023, when core inflation was sharply declining and running below the target, yet the NBG opted for maintaining its tight policy stance, even with modest rate cuts after the policy rate hit an all-time high. The NBG explained its decision to maintain a tight policy stance because of still elevated underlying inflation after two years of double digit headline numbers.

III. Monetary Policy Relevant Inflation Measures: Dual-Component CPI Framework

With this motivation, we propose a new framework for Georgia that categorizes prices into slowly adjusting non-traded and rapidly adjusted categories. With this the paper emphasizes the necessity for a more informed and economic-driven approach in monetary policy analysis, rather than relying solely on purely statistical and oversimplified core inflation measures. Throwing out highly volatile categories, like core inflation does, limits the depth of economic narrative behind price movements. Indeed, even that volatile part includes economically relevant information which may have spillover effects on underlying drivers of inflation. Thus, relying on a core inflation measure primarily grounded in statistical methodologies rather than economics may lead to shortcomings in adjusting monetary policy sufficiently aggressively to maintain price stability, or it could create false perceptions of rising inflation expectations after adverse external shocks involving exchange rates. As a result, there is a growing recognition among economists and policymakers of the need for a more comprehensive and nuanced approach. The Fed Chair Jerome Powell has also emphasized

recently that the traditional way of looking at inflation may be flawed (Powell, 2023) and we may need to look at the full picture, which may call for policy restraint even during supply shocks. According to Powell (2023), “Policy restraint in this case is also good risk management. Supply shocks that drive inflation high enough for long enough can affect the longer-term inflation expectations of households and businesses. Monetary policy must forthrightly address any risks of a potential de-anchoring of inflation expectations”.

A. Non-Traded Sticky Price Inflation: A Critical Tool for Modern Monetary Policy

By decomposing the CPI into non-traded sticky and remaining flexible components, we develop a comprehensive and economically focused narrative of price movements. One component of the CPI developed in this paper is Flexible Price Index (FPI), which encompass both traded and non-traded goods’ prices that are set frequently by producers, while Non-Traded Sticky Price Index (NTSPI) covers those non-traded goods’ prices that are set infrequently and, hence, incorporates price-setters’ inflation expectations.

Flexible prices rapidly adjust to new market conditions, providing insight into the impact of current supply and demand interactions on prices. However, flexible prices may contain various volatile terms and may be affected by shocks beyond the scope of monetary policy impact. Yet, they encompass significant economic information that could contribute to long-run inflationary pressures. For example, commodity prices, highly volatile and beyond the scope of monetary policy, are integral to the production process and may have spillover effects on other parts of the economy that monetary policy should address. Whenever flexible inflation is left unaddressed, particularly when it is impacted by generalized excess demand shocks, this may lead to a de-anchoring of inflation expectations, causing policymakers to miss their primary objective of adjusting monetary policy sufficiently aggressively to anchor inflation expectations. Hence, flexible price category can be used by the policymaker as an early warning signal that may push us into a cautious mode. On the other hand, if these flexible prices do raise long-term inflation expectations, then this development will indeed be reflected in the non-tradable sticky price inflation measure and this may now push us into a tightening mode. A simple reason why NTSPI captures long-term inflation expectations better is that when price setters perceive frequent price changes as costly, they adjust prices only infrequently and in anticipation of future inflation, so that their currently set price will be consistent with market conditions in the future as well even if they’re not able to re-adjust prices too quickly. Thus, NTSPI provides a more accurate reflection of inflation expectations and the long-term forces influencing inflation, thereby enhancing the effectiveness of policy monitoring and adjustment.

The richness of economic storytelling through FPI and NTSPI measures becomes quite evident when telling an economic story of the COVID-19 and post-pandemic era inflation. At the onset of the COVID-19-induced economic crisis, demand and supply shocks occurred simultaneously. The sharpest reduction in economic activity was coupled with significant disruptions on the supply side. Consequently, the disinflationary pressure globally was not as pronounced as one would have

expected after such a dramatic reduction in aggregate demand. The prolonged pandemic with national lockdowns was later followed by an increase in commodity prices, pressures from a pent-up demand, alongside the remaining virus containment measures that continued to disrupt supply chains. This pushed flexible inflation up, creating early warnings for underlying inflation pressures. Finally, in a post-pandemic era it was followed by increasing prices in stickier sectors like services and wages. Nevertheless, this strong underlying inflation measure was and remains hidden in headline and core inflations as commodity prices reversed and are pushing down both traditional measures of inflation. But even with this, the NBS still kept its policy at a historically tightest position, judging underlying inflation to still be a key concern. It would have been difficult for the NBS to explain this to the public if it were to only use headline or even core inflation measures. That's why the NBS introduced domestic and services inflation into the public communication, both being relatively closer to the NTSPI measure, with the latter having the same usefulness but being more economically and analytically-sound. If underlying inflation measures were kept unaddressed by monetary policymakers this would ultimately have been followed by de-anchoring of long-run inflation expectations, which has not happened. Based on international experience, it is evident that central banks lacking robust analytical tools often fail to understand underlying inflationary pressures, resulting in prolonged higher inflation in sectors like services.

B. Exchange Rate Dynamics and Monetary Policy Transmission in Dollarized Economies

NTSPI is further valuable for differentiating between traded and non-traded sticky prices, enabling central banks to focus more accurately on the economic dynamics and the role of exchange rates in the monetary policy transmission mechanism. Effective monetary policy requires a comprehensive and well-communicated understanding of exchange rate dynamics and their impact on various components of the economy.

In a well-anchored economic system, prices of non-traded goods are expected to reflect the forces of demand and supply, current as well as future expected, within that specific economy, unaffected by factors like the exchange rate. However, in cases of excessive dollarization, some prices of non-traded goods may still respond to changes in the exchange rate. Small, open economies with high financial dollarization tend to be very sensitive to global financial conditions and external shocks. Financial dollarization affects the extent of the exchange rate pass-through to inflation due to producers' dollarized liabilities. Dollarized balance sheets create additional supply-side pressures on prices. In particular, dollarization of producers' loans implies that a currency depreciation increases their debt service burden and squeezes their profit margins. In response, producers increase prices. While exchange rate relative to trading partners affects inflation mainly through tradable flexible prices, exchange rate relative to the US dollar affects inflation mainly through domestic producers' loans dollarization and shows up in nontraded sticky price inflation.

Hence, fluctuations in stickier category of prices will still occur due to exchange rate movements. Therefore, the NTSPI we derive below for Georgia will be a smaller percentage of the overall CPI basket than would typically be observed in other countries. The aim is to have the NTSPI measure

that has forward-looking qualities and incorporates medium- and long-term inflation expectations, so that it gives us an idea of how well the central bank is providing a nominal anchor to the system.

IV. Methodology for estimating NTSPI for Georgia

As explained above we have to impose a certain degree of judgment in creating the NTSPI measure for Georgia due to considerations like dollarization, but we still base our calculations on a benchmark, as developed by the Federal Reserve Bank of Atlanta (Atlanta Fed).

A. The Atlanta Fed's Methodology as a Benchmark

To construct an indicator for non-tradable sticky price inflation, a benchmark paradigm becomes essential. In pursuit of this goal, the Atlanta Fed's sticky Consumer Price Index serves as an illustrative starting point. The rationale behind the Atlanta Fed's sticky price inflation measure is grounded in the observation that specific goods and services experience less frequent adjustments in their pricing compared to their counterparts. The methodology employed by the Atlanta Fed involved a thorough micro-level examination of all items within the CPI basket, categorizing them into two groups based on their frequency of price changes. Items with more frequent adjustments, constituting 30% of the CPI basket, predominantly including food and energy commodities but not only, were designated as flexible prices (see Table 1). In contrast, those with less frequent changes, averaging approximately 4.3 months between adjustments, were classified as sticky prices, forming 70% of the CPI basket.

Table 1 – U.S. Flexible and Sticky Prices Decomposed by Atlanta Fed

Flexible-price items	Frequency of adjustment ^a	Relative importance	Sticky-price items	Frequency of adjustment ^a	Relative importance
Motor fuel	0.7	3.2	Infants' and toddlers' apparel	5.3	0.2
Car and truck rental	1.2	0.1	Household furnishings and operations	5.3	4.8
Fresh fruits and vegetables	1.3	0.9	Motor vehicle maintenance and repair	5.8	1.2
Fuel oil and other fuels	1.5	0.3	Motor vehicle insurance	5.9	2.0
Gas (piped) and electricity	1.6	4.2	Medical care commodities	6.2	1.6
Meats, poultry, fish, and eggs	1.9	1.9	Personal care products	6.7	0.7
Used cars and trucks ^b	2.0	1.6	Alcoholic beverages	7.3	1.1
Leased cars and trucks ^b	2.0	0.6	Recreation	7.9	5.7
New vehicles	2.0	4.5	Miscellaneous personal goods	8.1	0.2
Women's and girls' apparel	2.3	1.5	Communication	8.4	3.2
Dairy and related products	2.6	0.9	Public transportation	9.4	1.1
Nonalcoholic beverages and beverage materials	2.7	1.0	Tenants' and household insurance	10.1	0.3
Lodging away from home	3.1	2.5	Food away from home	10.7	6.5
Processed fruits and vegetables	3.2	0.3	Rent of primary residence ^b	11.0	6.0
Men's and boys' apparel	3.2	0.9	OER, Northeast ^b	11.0	5.3
Cereals and bakery products	3.3	1.2	OER, Midwest ^b	11.0	4.5
Footwear	3.4	0.7	OER, South ^b	11.0	7.7
Other food at home	3.6	2.0	OER, West ^b	11.0	6.9
Jewelry and watches	3.9	0.4	Education	11.1	3.1
Motor vehicle parts and equipment	4.1	0.4	Medical care services	14.0	4.8
Tobacco and smoking products	4.2	0.8	Water, sewer, and trash collection services	14.3	1.0
Total, flexible-price items		29.8	Motor vehicle fees	16.4	0.5
Total, core flexible-price items		14.0	Personal care services	23.7	0.6
			Miscellaneous personal services	25.9	1.1
			Total, sticky-price items		70.1
			Total, core sticky-price items		63.6
			Total, non-OER sticky-price items		45.7

a. In months.
b. These items were not investigated in Bils and Klenow (2004). The only housing component in the Bils and Klenow dataset is "housing at school excluding board," and we report that estimate for the housing categories in this work. While there may be only a weak correspondence between housing at school, rental housing, and owners' equivalent rent, rents used by the Bureau of Labor Statistics to construct the CPI are computed over six-month horizons, making these data, by construction, sticky-price goods.
Sources: Bureau of Labor Statistics; Bils and Klenow (2004); authors' calculations.

Source: Atlanta Fed

B. NTSPI Methodology for Georgia

In the case of Georgia, the development of the measure for infrequently adjusted prices, referred to as non-tradable sticky price inflation (NTSPI), prompted a thoughtful reconsideration of our basket decomposition grounded in specific economic reasoning. Departing from strict adherence to the Atlanta Fed's approach, we adjusted our methodology to account for the characteristics of Georgia as an emerging country with excessive dollarization, where exchange rate movements profoundly influence not only flexible but also sticky price inflation³. Furthermore, during the basket decomposition, a customized approach was employed to assess the stickiness of individual products within the economic context of Georgia. Thus, two additional criteria were considered in this regard:

- Items characterized by high labor intensity are considered to be sticky, wherein wages play a pivotal role in price setting.
- Products with high price elasticity of demand signal limited flexibility for producers to reset prices frequently.

³ Hence, for our decomposition it matters whether prices in Georgia are sticky in Georgian lari or in US dollar.

Moreover, to categorize the basket into tradable and non-tradable items, it was necessary to determine the classification of goods and services within each domain. While goods are generally categorized as tradable and services as non-tradable, our comprehensive analysis acknowledged potential exceptions. Accordingly, we classified the consumer basket into two groups based on assessments of tradable and non-tradable items and identified specific types of products within the latter category with less frequent price adjustments. Consequently, we obtained a non-tradable basket with sticky price items, attributing all other variations to the flexible price items basket.

To be specific, our NTSP basket primarily comprises a blend of the service sector and specific goods that exhibit less frequent price adjustments (see Table 2). Notably, the price of wheat bread, a key component in our CPI basket, is regulated and undergoes repricing less frequently, earning it a separate category within our NTSP basket named 'regulated food prices (wheat bread).' Additionally, diverse services falling under unspecified 'other' categories in our CPI play a crucial role in NTSP. Along with this 'other' service category, we have added non-bottled wine, creating a combination of 'miscellaneous services and goods.' Furthermore, within the NTSP basket, 'housing, water, electricity, gas, and other fuels'—predominantly service-oriented—incorporate service-products from 'furnishings, household equipment, and maintenance.'

Specific categories within our CPI basket cover both goods with higher flexibility in price adjustments and services known for their stickiness in prices. This phenomenon is exemplified in the health category, encompassing both services and goods such as medicines. In Table 2, for categories that span both the NTSPI and FPI (meaning all other than NTSP) groups, we specified in parentheses where the services within that category are directed and where the goods are allocated.

Table 2 – Georgian CPI Decomposed into Non-Tradable Sticky Price (NTSP) and Flexible Price (all other than NTSP) Items

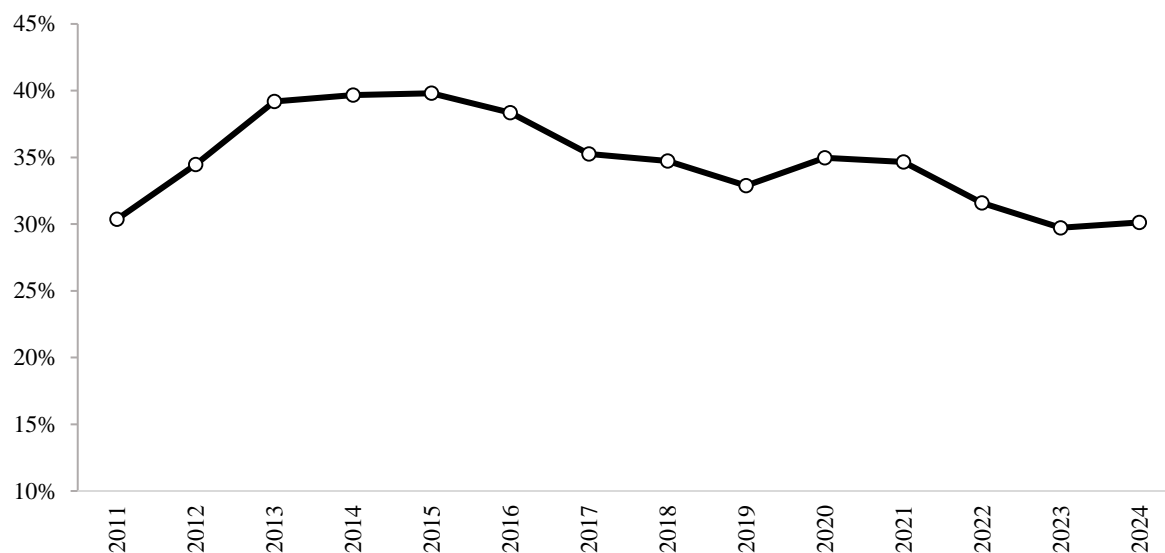
<i>FPI Items by Categories</i>	<i>Weight in CPI Basket (2024)</i>	<i>NTSPI Items by Categories</i>	<i>Weight in CPI Basket (2024)</i>
Food	26.4%	Education, recreation and culture (Service)	5.5%
Health (Goods)	6.1%	Regulated food prices (Wheat bread)	3.9%
Alcoholic beverages and tobacco	5.9%	Communication (Service)	3.7%
Fuel oil and other fuels	5.8%	Transport (Service)	3.4%

Furnishings, household equipment and maintenance	5.6%	Restaurants and hotels	3.3%
Housing, water, electricity, gas and other fuels	5.2%	Health (Service)	3.3%
Clothing and Footwear	3.9%	Housing (rent, repair, etc.), water, electricity, gas and other fuels	3.2%
Nonalcoholic beverages	3.1%	Insurance and financial service	2.0%
Transport	2.9%	Miscellaneous services and goods	1.8%
Miscellaneous goods	2.6%		
Recreation and culture (Goods)	1.7%		
Communication (Goods)	0.7%		
Total FPI Share to CPI	69.9%	Total NTSPI Share to CPI	30.1%

Source: GeoStat, Authors' Calculations

Notably, in 2024, 30.1% of the Georgian consumer basket comprised non-tradable sticky prices, with the remaining 69.9% covering all other categories. This demonstrates an opposite situation, in terms of shares, compared to the U.S. basket, which appears logical. In terms of historical perspectives, the share of non-tradable sticky items in the total CPI basket has historically varied between 30% and 40% (see Figure 2).

Figure 2 – Non-Traded Sticky Price Goods and Services Share in the Georgian CPI Basket



Source: GeoStat, Authors' Calculations

Regarding the technical underpinnings of the measure, we utilize the detailed consumer price index and weights on a monthly basis from 2011 to 2024, as provided by the National Statistics Office of Georgia.

C. Monetary Policy Credibility Measure Based on NTSPI

In discussing non-tradable sticky price inflation, we emphasize its significance as arguably the most relevant measure for monetary policymakers, as it depicts their ability to anchor long-term inflation expectations. To do this below we provide a historical narrative that is better told using NTSPI as well as show that a measure of the central bank's credibility makes the most sense when calculated based on NTSPI. Indeed, the formation of inflation expectations is inextricably tied to the credibility of monetary policy and the extent to which the market and the public follow the central bank's communications. The credibility of monetary policy, in this context, serves as a slowly accumulating stock of the central bank's performance in terms of the inflation objective. This naturally requires a measure of inflation that is best compared to the inflation target. We argue that NTSPI is such a measure.

To measure central bank performance and monetary policy credibility, which will be fed our NTSPI measure, we adopt a methodology presented by Laxton and Kostanyan (2022). Specifically, central bank performance is defined under two regimes: low and high inflation ones, when measured by NTSPI. On the one hand, when NTSPI is anticipated to fairly quickly converge to the 2%

benchmark⁴, it is considered a low inflation regime; on the other hand, when NTSPI is expected to remain high and persistently so, it is considered a high inflation regime. Considering the historical context of Georgia, an approach of considering 10% as a high inflation threshold for NTSPI aligns well with the insights drawn from Georgian historical narratives. With this, we define the two regimes as follows:

Low Inflation Regime ($NTSPI_t^{low}$):

$$NTSPI_t^{low} = NTSPI_t - (\rho_l NTSPI_{t-1} + (1-\rho_l) NTSPI^*)$$

$$(\rho_l = 0.6, NTSPI^* = 2\%)$$

where $NTSPI_t^{low}$ measures the proximity of actual underlying inflation (NTSPI) to a low inflation regime. Hence, an improvement of the central bank performance will be posted as $NTSPI_t^{low}$ approaches zero.

High Inflation Regime ($NTSPI_t^{high}$):

$$NTSPI_t^{high} = NTSPI_t - (\rho_h NTSPI_{t-1} + (1-\rho_h) NTSPI^{high})$$

$$(\rho_h = 0.9, NTSPI^{high} = 10\%)$$

We observe a distinction between the two regimes in the expected non-tradable sticky price inflation. Specifically, in the first regime, NTSPI is expected to rapidly converge towards the 2% threshold, while in the second regime, NTSPI exhibits more persistence, ultimately displaying a gradual increase to double-digit levels (10%).

We employ these two hypothetical measures of inflation regimes to formulate a central bank performance indicator ($CBPI_t^{NTSPI}$):

$$CBPI_t^{NTSPI} = \frac{(NTSPI_t^{high})^2}{(NTSPI_t^{high})^2 + (NTSPI_t^{low})^2}$$

This indicator is between 0 and 1, being close to 1 when NTSPI is closer to the low inflation regime, while it will inch down to 0 as NTSPI gets closer to the high inflation regime. The index measuring the credibility of the monetary policy, denoted as CRED (monetary policy credibility stock), follows

⁴ Note that while the NBG's target is 3% when measured by headline CPI, our measure of underlying inflation (NTSPI) actually historically hovered around 2% since the NBG switched to inflation targeting.

a conventional process of stock accumulation. The credibility is influenced by both its past value and the recent performance of the monetary policymakers:

$$CRED_t = \rho_c CRED_{t-1} + (1 - \rho_c) CBPI_t^{NTSPI}$$

$$(\rho_c = 0.9)$$

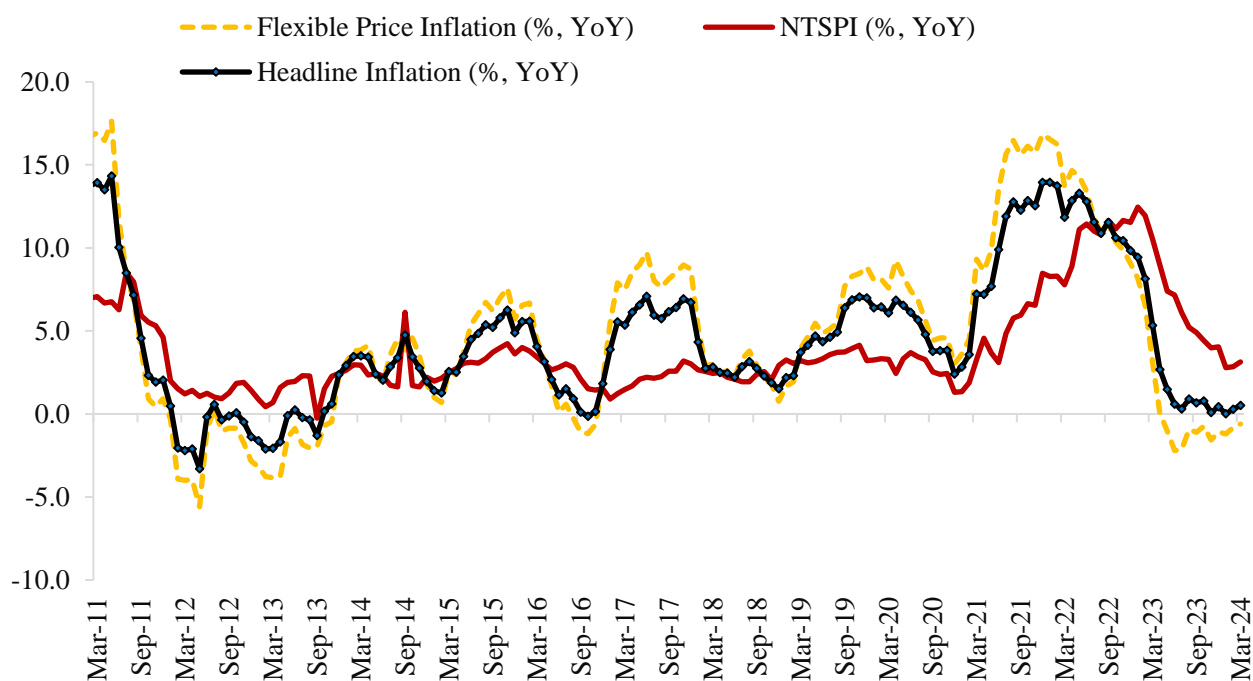
In addition to the aforementioned methodology, our credibility measure is tailored to the unique characteristics of Georgia. Specifically, when examined through historical perspectives, particularly in the aftermath of frequent high inflationary episodes, credibility demonstrates asymmetric responses to inflationary and deflationary pressures. Anchoring inflation expectations poses distinct challenges, particularly when the NTSPI exceeds the 2% threshold. Conversely, a resilient public confidence in the central bank endures even when the NTSPI falls below the benchmark level, signaling still good performance. To illustrate this asymmetry, the Central Bank Performance Indicator (CBPI) is assigned a value of 1 when the NTSPI descends below 2%. However, the CBPI adopts a regime-based approach once the NTSPI surpasses the 2% benchmark. This approach captures the dynamics of the central bank's performance under varying inflationary conditions, contributing to a comprehensive understanding of the monetary policy credibility dynamics.

The aim is to calculate the central bank's credibility based on this approach and hopefully show how well this indicator captures actual policy decisions in the historical context. This will be shown at the end of the following section.

V. Results for Georgia: Historical Narrative Approach

Over the past decade, Georgia went through some noteworthy inflationary periods, triggered by different types of shocks. In specific instances, these periods resulted in mere fluctuations in flexible prices, while in others, they translated into heightened underlying inflationary pressures. In this section, we highlight some important inflationary episodes and explore the implications of non-tradable sticky price inflation for Georgia, offering an economic narrative associated with their implications. Simultaneously, we calculate a measure of credibility of monetary policy based on non-tradable sticky price inflation and illustrate its usefulness. Namely, it is clearly visible that this straightforward credibility measure presented here serves as a convenient means to consolidate diverse information into a singular numerical metric.

Figure 3 – Non-Traded Sticky Price Inflation for Georgia



Source: GeoStat, Authors' Calculations

Figure 3 shows the NTSPI (year-on-year change) calculated for Georgia as well as headline inflation and Flexible Price Inflation. Based on this, which makes the explanation easier, we provide the historical narrative on inflation in Georgia.

Episode 1: Global USD strengthening (2014-2015)

In 2014-2015 Georgia faced major external shocks. After the taper tantrum of 2013, the US dollar started to significantly strengthen globally and Georgian lari sharply depreciated and remained at a depreciated level against the USD. Meanwhile, escalating regional tensions in Georgia's main trading partners coupled with an oil price shock deteriorated external demand, which led to a depreciation of Georgian lari's nominal and real effective exchange rates. Small, open economies with high financial dollarization tend to be very sensitive to global financial conditions and, particularly, to US interest rates. Financial dollarization affects the extent of the exchange rate pass-through to inflation due to producers' dollarized liabilities. While exchange rate relative to trading partners affects inflation mainly through flexible prices, exchange rate relative to the US dollar affects inflation mainly through domestic producers' loan dollarization and shows up in non-traded prices. At the beginning of the crisis, exchange rate depreciation against partner countries pushed flexible prices up. However, during the second half of 2015 and in early 2016 effective exchange rate appreciated and returned to its pre-2014 level which moderated flexible traded inflation. Nevertheless, exchange rate against the US dollar continued moderate depreciation trend and pushed non-traded sticky inflation up.

Accordingly, during 2014-2016 monetary policy rate was raised gradually by 4 percentage points, even when headline inflation remained below or close to the target. When the NBG somehow took early warning signals (proxied by our flexible prices) into account and tightened policy it made sure these didn't spill over to NTSPI which remained stable, even if with a slight uptick. As a result of the NBG's monetary policy decisions inflation rate was maintained around the target level after the shock, while the exchange rate floated freely to adjust to new fundamentals. Given the NBG's successful and sufficient policy response inflation moved to relatively low inflation environment again.

Episode 2: Russia's flight ban to and from Georgia (2019)

In the latter half of 2019, the country faced a noteworthy disruption by heightening of country risk premium, which led to the exchange rate depreciation. To be specific, geopolitical tensions between Russia and Georgia resulted in Russia imposing a ban on flights to and from Georgia. As Russia is one of the key trading partners for Georgia and a key tourism destination for Russians, this ban promptly led to significant depreciation of the nominal effective exchange rate of lari, manifesting in elevated flexible prices. Concurrently, economic activity did not reveal substantial weakness during this period. The relatively robust demand thus failed to counterbalance the higher-than-expected depreciation, reflecting the risk of exacerbated inflation expectations. In response to this, again taking early warning signs into account, monetary policy has been tightened progressively, to make sure the underlying inflation would remain stable. Overall, the policy rate experienced a cumulative increase of 2.5 percentage points from the third quarter of 2019 until the end of the year. This deliberate policy adjustment sought to preemptively mitigate the amplification of underlying inflationary pressures, thereby ensuring the containment of non-tradable sticky price inflation within the benchmark 2% level.

Again, by virtue of proactive monetary policy actions, even with just 2.5 pp hikes cumulatively, the NBG succeeded in avoiding a surge in non-tradable sticky price inflation and, thus, preventing a substantial deterioration of the monetary policy credibility, which would have posed considerable challenges for anchoring inflationary expectations over the medium and long term. As a result, even headline inflation, once this shock's impact passed, went back close to the target.

Episode 3: COVID-19 pandemic and Russia-Ukraine war (2020-2023)

Shortly after the previous inflation episode, the pandemic hit. The COVID-19-induced recession was more complex than any other economic crises in decades since supply and demand shocks were intertwined. On one hand, a sharp reduction of domestic demand should have created strong disinflationary pressures. However, this effect was outweighed by supply-side shocks. COVID-19 created unprecedented global supply side disruptions. This coupled with strong exchange rate depreciation further pushed flexible inflation up. Meanwhile, national quarantines and virus containment measures increased production costs, especially in the service sector where social distancing were essential.

However, at the onset of the crisis National Bank of Georgia slightly and gradually reduced monetary policy rate to support economic activity as the economy was suffering from sharp and steep reduction in growth rates. Still, the NBG remained vigilant about the potential escalation of inflation expectations, given Georgia met this crisis with high flexible inflation, an early warning signal. Prolonged period of higher than targeted inflation created risks of increasing long-run inflation expectation and the NBG opted for a cautious approach. Consequently, the policy rate was only slightly reduced, cumulatively by 1 percentage point. Throughout the year 2020, the overall monetary policy stance was maintained as tight, reflecting the central bank's commitment to managing inflation expectations and ensuring macroeconomic stability.

In the latter half of 2020, inflation began to exhibit signs of normalization as both flexible traded and non-traded sticky inflation rates declined. Despite this positive trend, economic turbulence persisted into 2021. Quick recovery of economic activity, fueled by pent-up demand, along with elevated commodity prices and high international shipping costs, notably contributed to another increase in flexible inflation. This surge in inflation posed significant challenges, and the associated risks of de-anchoring long-run inflation expectations became apparent. Subsequent inflationary shocks and high flexible prices spread into stickier segments of the economy and wages and non-traded sticky prices started to increase significantly.

This surge in NTSPI, unlike previous episodes, was already a red flag which resulted in arguably historically tightest policy the NBG had pursued (even relative to periods when headline inflation was higher still), at least since switching to an inflation targeting regime in 2009. In order to address these strong inflationary pressures, the NBG acted in a relatively proactive manner and started to tighten monetary policy well before the central banks of advanced economies, demonstrating a commitment to addressing and managing the inflationary risks. During 2021 and early 2022 monetary policy rate increased cumulatively by 3 pp, up to 11%, even when it was already considered as tight stance before those hikes. Nevertheless, the efficacy of monetary policy transmission was limited by high dollarization, a challenge that became more pronounced with an increased spread between the domestic currency and USD interest rates. Individuals and businesses started to shift towards taking foreign exchange (FX) loans, contributing to making aggregate credit growth visibly unresponsive to NBG's monetary policy. In response to this trend, the NBG implemented additional macroprudential measures to tighten and contain the overall credit expansion and support price stability.

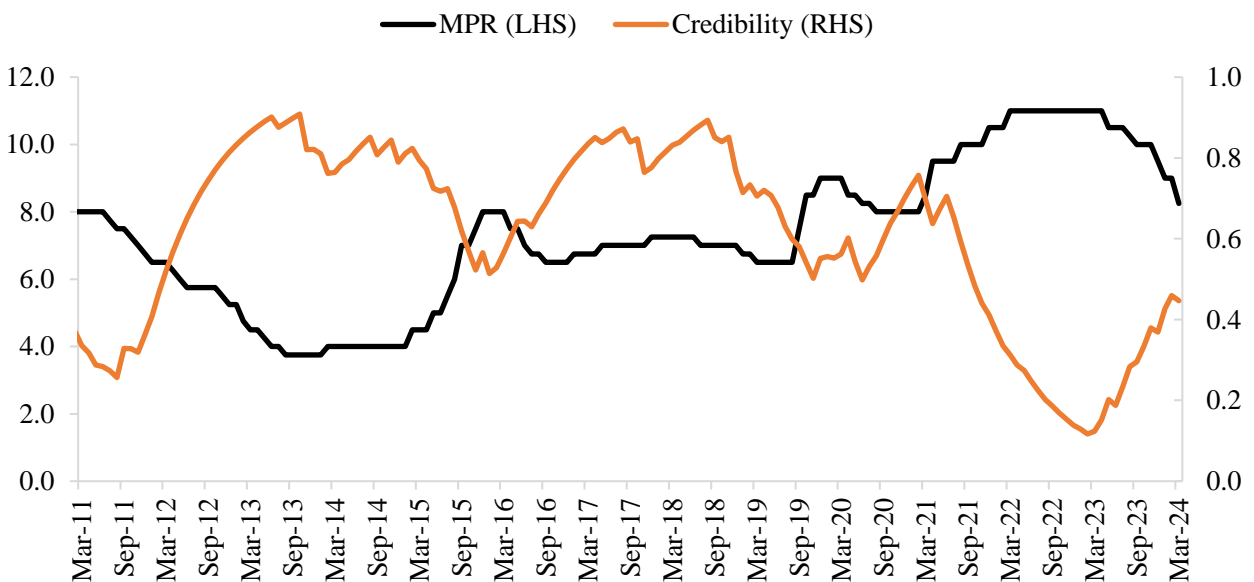
However, when the economy was expected to begin normalization then there was a subsequent global shock which the world experienced, including Georgia. Specifically, following the Russian invasion in Ukraine, international commodity prices experienced a resurgence, reaching unprecedented peaks. Elevated inflationary pressures on international commodity markets were transmitted to tradable prices since Georgia is an importer of these products. Meanwhile, the war exerted unpredictable influence on Georgia's economy due to the substantial increase in migration flows from Russia, Ukraine, and Belarus. The latter led to Georgia's aggregate demand rising above its potential, exacerbating further inflationary pressures. Previous supply-side shocks, coupled with

strong demand pressures, kept flexible prices elevated, ultimately amplifying inflation expectations and resulting in upsurge of non-tradable sticky prices.

Starting in the latter half of 2022, the combination of an appreciating exchange rate and a reduction in commodity prices played a pivotal role in aligning headline inflation as they moderated flexible inflation. Since March 2023 CPI inflation is well below the target of 3%. Nevertheless, non-tradable sticky inflation only gradually moderates, which reflects still existing underlying pressures in inflation. In response, the NBG was cautious and monetary policy rate reduction was much slower than one would have expected given below target headline (and even core) inflation. The monetary policy stance is still tight, even with current rate cuts, to minimize future welfare loss by preventing a de-anchoring of inflation expectations. Hence, NTSPI also captures well the policy setting over the last year that may have been difficult to explain even with the core inflation measure (which is also below the target).

The next step in validating our measure of underlying inflation (NTSPI) is in terms of comparing the calculated credibility of monetary policy based on NTSPI to actual policy rate decisions. As Figure 4 shows, there indeed is a clear linkage: when our simple measure of credibility was low policy rate was kept high and vice versa. The correlation is quite high. This means that the credibility variable, that can very easily be calculated using our NTSPI, has captured pretty well all the diverse information and judgment going into Monetary Policy Committee meeting decisions which are preceded by a month of analytical work. Hence, NTSPI and the credibility measure based on it provide a very good simple benchmark against which policy decisions can be judged.

Figure 4 – Monetary Policy Rate and Proxy for Monetary Policy Credibility in Georgia



Source: NBG, Authors' Calculations

VI. Conclusion

The NBG's objective is to anchor the economy to 3% inflation, just like its physical analogue keeps a boat anchored in the ocean, even if waves push it back and forth. The NBG achieves this by managing the market's outlook for the policy rate that is consistent with achieving its 3% inflation target in the medium term. To analyze an appropriate policy rate outlook, it is essential to have a measure for the underlying inflation. The NBG, similar to other central banks, has been using core CPI inflation measure for this purpose for quite some time. However, core inflation simply focuses on eliminating some statistically volatile items without deeply considering the economic rationale behind it. This can potentially lead to erroneous policy implications.

In this paper we propose a new underlying inflation measure for Georgia that categorizes prices into rapidly and slowly adjusting categories, with the former providing early warning signals and the latter better reflecting the long-term inflation expectations. The 'overshooting sticky-price Dornbusch model' is at the heart of our conceptual framework. While our derived Flexible Price Inflation quickly responds to current market conditions, serving as an early warning indicator of inflationary trends, the Non-Traded Sticky Price Inflation better captures firms' and households' longer-term inflation expectations. FPI and NTSPI measures, grounded on a firm economic rationale, should be a valuable tool in navigating economic turbulence for Georgia. These measures should also make it easier for the NBG to communicate its monetary policy decisions aimed at anchoring the economy to its 3% target.

Bibliography

- Adrian, T., D. Laxton, and M. Obstfeld. 2018. *Advancing the Frontiers of Monetary Policy*. International Monetary Fund
- Angeloni I., Coenen G. and Smets F., "Persistence, the transmission mechanism and robust monetary policy," *Scottish Journal of Political Economy*, vol 50, no 5, 2003, pp 527–49
- Argov, E. N. Epstein, P. Karam, D. Laxton, and D. Rose, 2007, "Endogenous Monetary Policy Credibility in a Small Macro Model of Israel," IMF Working Paper 07/207 (Washington: International Monetary Fund).
- Arezki, R., Z. Jakab, D. Laxton, A. Matsumoto, A. Nurbekyan, H. Wang, and J. Yao, 2017, "Oil Prices and the Global Economy," IMF Working Paper No. 17/15.
- Batini, N., K. Kuttner, and D. Laxton, 2005, "Does Inflation Targeting Work in Emerging Markets?" Chapter 4 (September 2005) *World Economic Outlook*, International Monetary Fund, available at www.imf.org.
- Batini, N. and D. Laxton, 2007, "Under What Conditions Can Inflation Targeting Be Adopted? The Experience of Emerging Markets," in *Monetary Policy Under Inflation Targeting*, ed. by F. S. Mishkin and K. Schmidt-Hebbel (Chile: Banco Central de Chile), pp. 467-506.
- Bryan, M. & B. Meyer, 2010, "Are some prices in the CPI more forward looking than others? We think so," *Economic Commentary*, Federal Reserve Bank of Cleveland, vol. 2010(02), pages 1-6, May.
- Carriere-Swallow, Y., B. Gruss, N. Magud, and F. Valencia, 2016, "Monetary Policy Credibility and Exchange Rate Pass-Through," IMF Working Paper 2016/240 (Washington: International Monetary Fund).
- Clinton, K. C. Freedman, M. Juillard, O. Kamenik, D. Laxton, and H. Wang, 2015, "Inflation-Forecast Targeting: Applying the Principle of Transparency," IMF Working Papers 2015/132, International Monetary Fund.
- Clinton, K., T. Hlédik, T. Holub, D. Laxton, and H. Wang. 2017. "Czech Magic: Implementing Inflation-Forecast Targeting at the CNB." IMF Working Paper 17/21, International Monetary Fund, Washington, DC.
- Dixon, H., D. Griffiths, and L. Lawson, 2004, "Exploring Tradable and Non-Tradable Inflation in Consumer Prices," *Statistics New Zealand*, 2004.
- Dornbusch, R., 1976, "Expectations and Exchange Rate Dynamics," *Journal of Political Economy* 84, no. 6 (1976): 1161–76.
- Dwyer, J., 1992, "The Tradeable Non-tradeable Dichotomy: A Practical Approach," *Australian Economic Papers*, Wiley Blackwell, vol. 31(59), pages 443-459, December.

- Evans G., 1985, "Bottlenecks and the Phillips Curve: A Disaggregated Keynesian Model of Inflation, Output, and Unemployment," *Economic Journal*, Royal Economic Society, vol. 95 (378), pp. 345-357.
- Fornero J., A. Kostanyan and Douglas Laxton, 2020, "Constructing a Transparency Index for the Central Bank of Chile," Central Bank of Chile, article in "Inflation Dynamics and Determinants in Chile. December 2020."
- Freedman, C., and D. Laxton, 2009, "Why Inflation Targeting?", IMF Working Paper 09/S6 (Washington: International Monetary Fund).
- Goretti, M. and D. Laxton, 2005, "Long-Term Inflation Expectations and Credibility," Box 4.2 in Chapter 4 (September 2005), *World Economic Outlook*, International Monetary Fund, available at www.imf.org.
- Haworth C., A. Kostanyan and D. Laxton, 2020, "History of Inflation Targeting in New Zealand." London School of Economics and Political Science.
- Johnson, N., 2017, "Tradable and Nontradable Inflation Indexes: Replicating New Zealand's Tradable Indexes with BLS CPI Data," *Monthly Labor Review*.
- Knight, G. and L. Johnson, 1997, "Developing Output and Price Measures for Australia's Tradable and Non-tradable Sectors," Australian Bureau of Statistics (ABS) Working Paper No. 97/1.
- Kostanyan A. and D. Laxton, 2020, "Time to Change the Bank of Canada's Mandate," London School of Economics and Political Science.
- Kostanyan A., A. Matinyan, A. Papikyan, V. Avagyan, H. Avetisyan, M. Galstyan, M. Gevorgyan, E. Hovhannisyanyan, H. Igityan, J. Gilbert, H. Karapetyan, D. Laxton, J. Laxton, A. Nurbekyan, and N. Yeritsyan, 2022, "Getting FIT with Imperfect Policy Credibility. DYNARE/JULIA Workshops with an Application for the US Economy," Forthcoming CBA Working Paper, October 2022.
- Laxton, D., and P. Pesenti, 2003, "Monetary Policy Rules for Small, Open, Emerging Economies," *Journal of Monetary Economics*, Vol. 50 (July), pp. 1109.
- Laxton, D., 2008, "Getting to Know the Global Economy Model and its Philosophy," IMF Staff Papers 55/2 (Washington: International Monetary Fund).
- Laxton D., A. Kostanyan, A. Liqokeli, G. Minasyan, A. Nurbekyan and T. Sopromadze, 2019, "Mind the Gaps! Financial-Cycle Output Gaps and Monetary-Policy-Relevant Output Gaps," London School of Economics and Political Science.
- Masson, P., M. Savastano, and S. Sharma, 1997, "The Scope for Inflation Targeting in Developing Countries," IMF Working Paper 97/130 (Washington: International Monetary Fund).

- Mishkin F., 2007, "Inflation Dynamics," Annual Macro Conference, Federal Reserve Bank of San Francisco, (March), http://www.federalreserve.gov/news_events/speech/mishkin20070323a.htm
- Obstfeld, M. and K. Rogoff, 1994, "Exchange Rate Dynamics Redux," NBER Working Papers 4693, National Bureau of Economic Research, Inc.
- Obstfeld, M. and K. Rogoff, 2000 "New Directions for Stochastic Open Economy Models," NBER Working Papers 7313, National Bureau of Economic Research, Inc.
- Papikyan, A., H. Avetisyan and D. Laxton, December 2023, "Non-Tradeable Sticky Price Inflation: Developing Better Concepts for Monetary Policy Analysis", CBA Working Paper 2023/19.
- Powell, J., 2023, "Opening Remarks", At "Monetary Policy Challenges in a Global Economy," a policy panel at the 24th Jacques Polak Annual Research Conference, hosted by the International Monetary Fund, Washington, D.C.
- Taylor, John B., 1993, "Discretion versus Policy Rules in Practice," Carnegie-Rochester Conference Series on Public Policy 39. North-Holland, 1993.

