Value-Added Tax Expenditure Evaluation in Agriculture

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Preface

This document represents the first tax expenditure evaluation by the Ministry of Finance of Georgia. It explores the potential effects of tax expenditures in the agricultural sector and in general, overall country's economy. The necessity for creating such a document is outlined in the government's medium-term strategy (Vision 2030), emphasizing the importance of annually preparing at least one tax expenditure impact evaluation document to enhance the quality of public finances.

The preparation of this document involved collaboration with the Technical Assistance Mission of the International Monetary Fund (IMF). This collaboration encompassed joint efforts on both theoretical and practical aspects, focusing on capacity building within the framework of the IMF's Technical Assistance Mission.

The data in this report is used the available data for January 2024 and the tax expenditures estimated in 2022.

Abbreviations

CBA	Cost-benefit analysis
COICOP	Classification of individual consumption by purpose
DFM	Dynamic factor model
DSGE	Dynamic Stochastic General Equilibrium
GEOSTAT	National Statistics Office of Georgia
GFM	Georgian Fiscal Model
HIES	Households Incomes and Expenditures Survey
HTM	Hand to mouth households
IMF	International Monetary Fund
MEPA	Ministry of Environmental Protection and Agriculture of Georgia
MoF	Ministry of Finance
MSM	Microsimulation model
NACE	Nomenclature of Economic Activities
OLG	Overlapping generation
ROT	Rule-of-thumb
STAMP	Structural Analysis of Macroeconomic Policies
TANK	Two-Agent New Keynesian
TEA	Tax Expenditure Assessment
TEE	Tax Expenditure Evaluation
TER	Tax Expenditure Report
TFP	Total factor productivity
VAT	Value-Added Tax
VATE	Value-Added Tax Expenditure

Executive Summary

The paper explores the impacts of zero-rating value-added taxation (VAT) on agricultural products on the agricultural sector and other economic indicators. The net benefit of the Tax Expenditure (TE) from the zero-rating agricultural products for the entire economy is estimated using a general equilibrium framework. Specifically, a Dynamic Stochastic General Equilibrium (DSGE) model is applied, modeling the behavior and interactions of most sectors and economic agents in the economy. To estimate the overall effects on the economy, only the change in GDP is calculated by simulating the introduction of a zero VAT rate on agricultural products, relative to a counterfactual scenario of not adopting the zero VAT rate.

As a result of the quantitative analysis of the data, it was revealed that the direct and indirect positive effects of arising from the zero-rating of agricultural sector are as follows:

- **Reduction in prices** for domestically produced products;
- **Import substitution in the agricultural sector.** The price effect and increased competitiveness is reflected into to higher domestic production and decreased in volume of imports;
- The impact of abovementioned on the economy, includes **improved current account balance**, which can be accompanied by the *exchange rate appreciation;*
- An appreciation of the exchange rate will have a positive effect on the debt service and the principal of debt. Accordingly, it has a **favorable impact on the budget expenditure reduction and the debt-to-GDP ratio;**
- **An increase in the ratio of agriculture to GDP**. The statistically significant impact of the tax benefit shows an acceleration in production growth in the sector.

Over the modeled 20-year period, the impact of tax benefits on the agricultural sector remains consistently positive. However, these benefits can have adverse effects on the rest of the economy through various channels when compared to the baseline scenario (no tax benefits). These effects include: Reallocation of the labor force and hence, **a decrease in productivity** due to artificial intervention in inter-sectoral price changes; Import substitution positively impacts the appreciation of the exchange rate, which partially **dampens export growth**, though the overall net effect remains positive; Based on the model's assumptions, despite a decrease in budget revenues, the budget balance remains unchanged. This results in a proportional reduction in capital expenditures, leading to a **decrease in aggregate demand** and **a decline in government efficiency**.

According to the results of the joint analysis of both positive and negative factors (using the general equilibrium approach), the introduction of a zero-rating VAT on agricultural products has a net positive effect on the economy during the first two years, implying a favorable impact on the country's GDP. While the positive effect on agriculture increases over the analysis period, the adverse impact on other sectors from the third year onward causes the net effect to turn negative. By year 10, the net impact of the selected tax expenditures on real GDP is negative 0.33 percent, and by year 20, it is 0.28 percent.

In addition, the distributional effects of the results obtained with zero-rating taxation if the agricultural sector indicate that the households with relatively high incomes benefit more, in nominal terms, highlighting weak targeting of the tax benefits.

Introduction

Tax expenditure evaluation (TEE) assesses the net impacts caused by the tax incentives, which includes not only costs but also benefits. This document evaluates such effects and aims to evaluate the impact of tax expenditures (TEs) on economic performance indicators and whether TEs meet their objectives and other policy effectiveness criteria.

This report assesses the impact of existing TEs in Georgia's agricultural sector (NACE-2 code 01). Specifically, the report focuses on the Value-Added Tax Expenditure (VATE) arising from the zero-rating of agricultural products. VATE costs can be defined as the forgone revenues that could have been collected by the government, absent VAT zero-rating. VATEs in the agricultural sector include the following provisions: 52 and 55 (Tax Code references 172.4 (u) and 172.4 (t)), which are related to the supply of agricultural products (see Ministry of Finance of Georgia [2022] Table 2 and Table 4). These TEs were introduced in 2012 with the objective of promoting Georgian agriculture and benefiting farmers. The initial benefit was the exemption of the primary supply of agricultural products. In 2013, this exemption was expanded to include the supply of agricultural products until the change of the commodity code. For the analysis in this document, the reference year is taken as 2012.

This TEE is based on different research methodologies and approaches, consisting of several steps. First, available data on the Georgian agricultural sector is gathered to analyze trends in key performance indicators of the sector around the time of the introduction of zero-rating of agricultural products under the VAT. Specifically, this report applies a Dynamic Factor Model (DFM) to conduct trend analyses while holding constant other aspects of the Georgian economy. A microsimulation modeling exercise, emphasis on the distributional impacts of the VATE, complements the above.

Next, the net benefit of the TE from the zero-rating of agricultural products for the whole economy is estimated via through general equilibrium analysis framework, applying a Dynamic Stochastic General Equilibrium (DSGE) model incorporating shocks to the VAT rate, Total Factor Productivity (TFP), import substitution, and public investment.

Within the framework of the DSGE analysis, the net impact of the VATE in question is measured as changes in GDP relative to a baseline that assumes no new (or tightening of existing) policies. This impact is calculated by simulating the introduction of a zero VAT rate on agricultural products (relative to the counterfactual of not adopting the zero VAT rate) in the DSGE model. To calculate (calibrate) the effect of reducing the VAT rate for agricultural products , the model considers the 2019 size (in percent of GDP) of the VATE (calculated in Ministry of Finance of Georgia [2022]), together with its relations to various macroeconomic variables (e.g., consumption, employment, wages, and prices). In the DSGE model, the following four shocks are assumed: (i) first type of shocks resulting directly from changes in tax policy: a) VAT rate change, b) domestic relative price change, and c) price changes for local and imported agricultural products; (ii) The negative shock to capital expenditures, which is included to account for second order impacts of forgone government revenues due to the VATE analyzed in this report.

The main results of the report are as follows. The net effect of the zero-rating of agricultural products on the economy is positive in terms of GDP change during the first two years of policy implementation. However, from the third year onwards, even though some market agents (especially in the agricultural sector) experience a positive impact, the negative effect on GDP for the remaining sectors is strong

enough, such that the net impact of the VATE becomes (and remains) negative. In the 10th year, the net impact of the VATE amounts to -0.33 percent of GDP (relative to the counterfactual of no VATE adoption), which is equivalent to a net loss of GEL 198 million in nominal terms. This finding could also be interpreted as the agricultural sector benefiting by only GEL 121 million from a tax benefit of about GEL 300 million, while the rest of the economy loses GEL 319 million. By the 20th year, this effect decreases to -0.28 percent of GDP or GEL 401 million in nominal terms (i.e., the benefit to the agricultural sector is equal to GEL 293 million, while the rest of the economy loses GEL 694 million).

From a distributional perspective, the VATE in question is characterized by poor targeting, benefiting intended as well as unintended beneficiaries. Specifically, incidence analysis shows that higher-income households receive more benefits from the VATE in nominal terms relative to lower-income households. In other words, more redistribution could have been achieved had the revenues forgone from the VATE been used in the form of targeted cash transfers (or similar compensation mechanisms).

Overall, this report finds that the VATE from the zero-rating of agricultural products entails (i) overall negative net benefits (or net losses) as captured by its simulated impact on GDP via a DSGE framework; and (ii) relatively weak redistribution, due to poor targeting.

This report is structured as follows. Chapter I presents an overview of the zero-rating of agricultural products under the VAT, other support programs in the sector, and the main reasons of selecting the agricultural sector for TEE. Chapter II defines possible policy alternatives such as spending policies in lieu of the VATE. Chapter III provides descriptive statistics of key agricultural sector variables and the DFM analysis. Chapter IV presents the distributional analysis of the VATE. Chapter V includes the calculation of the net benefits of the VATE, for which a DSGE model is applied.

Box 1. Tax Expenditures and their Impacts

A Tax Expenditure can be defined as the unearned government revenue arising from certain incentives, tax credits, exemptions, and special tax regimes, among others. Tax expenditure is the result of government policy, which may be intended to support business or achieve a social outcome. In other words, a TE is a cost paid indirectly by society, favoring those who enjoy certain tax benefits, given that it is associated with a decrease in tax revenues.

After conducting a tax expenditure costing exercise, a crucial next step is to evaluate tax expenditures. This Tax Expenditure Evaluation (TEE) allows for the examination of the economic and social implications of TEs. Furthermore, it enables us to assess the significance and relevance of these benefits in achieving specific macroeconomic or socio-economic goals.

In terms of Tax Expenditure Assessment (TEA), which focuses on costing, an initial estimation of the fiscal cost of existing TEs in Georgia was carried out for the period 2018-2021. According to the Georgian Tax Expenditure Report (TER) published in November 2022, a total of 55 tax expenditures related to profit and income taxes, as well as 66 tax expenditures associated with the Value-Added Tax (VAT), were identified. The total fiscal cost of TEs amounted to GEL 2,464 million in 2021, equivalent to 4.1 percent of the GDP.

TE Objectives

The impact of TEs on the economy is not solely measured by quantitative factors but also influenced by the original intent and purpose behind specific tax incentives or exemptions. For instance, the Georgian TER provides a breakdown of Value-Added Tax Expenditures (VATEs). It reveals that certain tax benefits were introduced with the aim of fostering business growth, while others were designed to address social objectives. Additionally, there are tax benefits directed towards supporting family farming, businesses, or healthcare, all of which result in associated TEs. Hence, to properly evaluate the impact of TEs, it is crucial to consider the initial objectives set when implementing said TEs as well as whether (and to what extent) these objectives have been achieved.

Social Impact

When considering the social impact of TEs, it is important to assess the distribution of any TE benefits among potential beneficiaries.

Ministry of Finance of Georgia (2022).

TEs are often introduced with the belief that every major instrument in the tax system should exhibit progressivity on its own. In most cases, beyond assessing the progressivity of the TE itself, a more relevant standard would be to compare it to the progressivity of the expenditure system, including transfers to households that could be extended with the revenues forgone from the TE. At the same time, it is well accepted that the VAT (which is discussed in this report) is often a poorly targeted instrument to deliver social benefits to households and to achieve economic goals.

Policies often have different effects on different income groups. Perhaps more worrisome, policies such as zero rating of agricultural products and foodstuffs will often deliver modest absolute benefits to low-income households but larger absolute benefits to medium- and high-income households. This is an example of benefit spillovers to unintended beneficiaries[3]. Another unintended benefit arises when producers do not pass the full value of the VAT reduction to consumers. In practice, income taxes and direct (as opposed to tax) expenditure programs present better-targeted and more cost-effective instruments to achieve such goals[3].

[3] For a thorough discussion of VAT zero rating in an environment characterized by a higher incidence of poverty and income inequality than Georgia, see Davis Tax Committee (2018) and Independent Panel of Experts (2018).

[4] These show the share of the VATE benefit of a given upper part (quantile) of the income distribution (e.g., households in the 90th percentile) in that of a given lower part (quantile) of the income distribution (e.g., households in the 10th percentile). For examples, see Swistak & al. (2020), chapter III, and Swistak & al. (2022), chapter V.

Chapter I. Tax Expenditures in the Agricultural Sector

The objective of this Tax Expenditure Evaluation (TEE) report is to assess the benefits and costs of TEs in Georgia's agricultural sector (NACE-2 code 01). Box 1 summarizes the methodological framework for this evaluation. Specifically, this report will focus on the TEE of the Value-Added Tax Expenditure (VATE) from the zero-rating of agricultural products. VATE costs can be defined as the forgone revenues that could have been collected by the government if there had been no zero-rating in the above-mentioned sector. The VATEs in the agricultural sector include the following provisions: 52 and 55 (Tax Code references 172.4 (u) and 172.4 (t)), which are related to the supply of agricultural products (see Ministry of Finance of Georgia [2022] Table 2 and Table 4).

I.a Selection Criteria for TEE and Provisions Evaluated in the Agricultural Sector

The TER[1] is the starting point of TE selection for the purposes of conducting a TEE. The TER includes critically important inputs for TE selection: comprehensive inventory, description of stated objectives,

[1] Ministry of Finance of Georgia (2022).

identification of intended beneficiaries, and cost in terms of revenue forgone. The TER alone does not provide a sufficient basis to select or prioritize TEs for the purpose of conducting TEE, even though the TE inventory gives extensive information.

The first menu of TE selection criteria includes easily assessable characteristics of the TEs themselves. Examples include duration, cost, duplication, or redundancy, and so on. Table 1 lists and describes these characteristics.

Table 1. Criteria for Selection for TEE based on TE Characteristics

Characteristic	Relevance
Age	A TE implemented a long time ago is a good candidate for evaluation. Moreover, an old TE may no longer be effective if its impacts have been baked in the market or other parts of the tax/expenditure system contribute to achieving similar objectives.
Added layers of amendments over time	A sign that the TE may not have been perceived as effective, thereby necessitating a broadening in scope.
Cost	An important criterion based on a reliable source (the TER), but by no means a necessary or sufficient condition for selection.
Expected growth in cost	Related to cost but with a further compelling argument for selection to understand why the cost is expected to grow (e.g., changes in population of claimants, increase in take-up rate, etc.
Low cost	Problematic as it may signal a TE that is ineffective in achieving its objective, or that the underlying incentive is too weak or poorly designed. This illustrates why high cost is not a sufficient condition for selection.
Duplication or redundancy	The existence of other supports in the form of TE or direct expenditures aimed at similar or the same objectives. This calls into question the need for an additional TE targeting the same beneficiary or beneficiaries, and for a relative cost-effectiveness assessment
Evidence of significant economic distortions, undesired side-effects, or excessive benefit leakage	Issues can be observed from a preliminary assessment or revealed by beneficiaries, program audits or evaluations, civil society organization, or media
Thematically related groupings	It may make sense to select groups of similar TEs to achieve economies of scale in analysis, e.g., a group of similar VATEs such as exemptions of different goods or zero ratings or different goods.
Substantiated doubts about net benefits	Obvious criterion if elimination cannot be entertained without TEE support.

The TE policy retained for evaluation in this TEE is the zero-rating of agricultural products under the VAT. The two tables below provide a description of the TE as well as its intended impact.

Table 2. Inventory of zero-rating of agricultural products

Ref.	Type	Measure	Tax Code Ref.	Policy
52	Z	Supply of (agricultural) products obtained from goods fully made in Georgia and indicated in National Commodity Nomenclature of Foreign Economic Activities Codes 0201, 0203 11 – 0203 19, 0204 10 000 00 – 0204 23 000 00, 0204 50 110 00 – 0204 50 390 00 (including, chopped/minced meat (forcemeat)), as well as supply of cheese made as a result of industrial processing of products obtained from animals living in Georgia and also supply of goods (shell-less nuts) indicated in National Commodity Nomenclature of Foreign Economic Activities Code 0802 22 000 00	172.4(u)	TE
55	Z	Supply of agricultural produce produced in Georgia (other than the goods (eggs) indicated in National Commodity Nomenclature of Foreign Economic Activities Codes 0407 00 190 00 ,0407 00 300 00 and the goods under subheading 0207 11(gallus domesticus, uncut, fresh or frozen)), before their industrial processing (change of commodity code)	172.4(t)	TE

Source: Ministry of Finance (2022).

Table 3. Inventory Descriptions of zero rating of agricultural products

Reference number: 52

Description: Zero rating of the supply of (agricultural) products obtained from goods fully made in Georgia and indicated in National Commodity Nomenclature of Foreign Economic Activities Codes 0201, 0203 11 – 0203 19, 0204 10 000 00 – 0204 23 000 00, 0204 50 110 00 – 0204 50 390 00 (including, chopped/minced meat (forcemeat)), as well as supply of cheese made as a result of industrial processing of products obtained from animals living in Georgia and also supply of goods (shell-less nuts) indicated in National Commodity Nomenclature of Foreign Economic Activities Code 0802 22 000 00

Date of enactment: [19.03.2012]

Objective: Promote agriculture, increase domestic production and reduce reliance on imported products

Beneficiaries: Farmers

Reference number: 55

Description: Zero rating of the supply of agricultural produce produced in Georgia (other than the goods (eggs) indicated in National Commodity Nomenclature of Foreign Economic Activities Codes 0407 00 190 00 ,0407 00 300 00 and the goods under subheading 0207 11(gallus domesticus, uncut, fresh or frozen)), before their industrial processing (change of commodity code)

Date of enactment: [19.03.2012]

Objective: Promote Georgian agriculture, increase domestic production and reduce reliance on imported products

Beneficiaries: Farmers

Source: Ministry of Finance (2022).

Tax Expenditure Description

The cost of this VATE amounted to 0.58, 0.66, 0.56, and 0.52 percent of GDP in the years 2018, 2019, 2020, and 2021 respectively (see TER), with an average of 0.58 percent of GDP. The policy has been in place since approximately the end of March 2012.

The Ministry of Finance selected the zero-rating of agricultural products based on three main criteria: (i) its cost – it is the largest single-good or service TE item in terms of revenues forgone, (ii) the importance of employment in Georgian agriculture (e.g., as a share of total employment), and (iii) awareness that areas for improvement exist for this policy. In addition, this VATE was introduced in 2012, which allows for enough data to conduct the TEE. Table 4 below shows the TEs and employment levels in different sectors in 2021, with agriculture having the highest share in total employment.

Table 4. Importance of different sectors in overall TE cost and employment, 2021

NACE-2	Tax Treatment in Current Law | Year	Tax Expenditures 2021		Employments 2021	
		GEL mln	% of GDP	Thsnd	% of total employment
01	Agriculture	310	0,52%	229	18,8%
21	Drugs and pharmaceuticals	241	0,40%	1	0,1%
29	Motor vehicles	57	0,09%	0	0,0%
85	Educational services	295	0,49%	146	12,0%
86	Health services and medical devices and supplies	305	0,51%	64	5,3%
88	Child care services	35	0,06%	1	0,0%
92	Gambling, lotteries and games of chance	30	0,05%	5	0,4%
	Other	1192	1,99%		
	Total	2464	4,11%	1217	

Source: Ministry of Finance calculations based on GEOSTAT and Ministry of Finance (2022) data.

I.b Agricultural Industry Support Programs Funded from the Budget

The agricultural sector is an important economic sector in Georgia. This sector contributes approximately 7.4 percent to the GDP of the country (reference year: 2019). Domestic agriculture also provides a food safety net for the rural population, considering that approximately 40 percent of the country's population lives in rural areas (reference year: 2022). In 2019, the share of agricultural (in total) employment amounted to 38 percent. To add to the above, Georgia features a wide variety of ecological and climatic zones favorable for the growth of different crops, including cereals, vegetables, and fruits. This is reflected in the gross output of the agriculture, forestry and fisheries sector of GEL 5.2 billion (reference year: 2019). The annual average growth rate of gross agricultural output during the period 2015-2019 was about 4.2 percent.

In 2019, the accrual state's budget for the Ministry of Environmental Protection and Agriculture of Georgia (MEPA) was at GEL 358 million. The budget provides support to the sector in three areas: (i) competitive agricultural and non-agricultural sectors; (ii) sustainable use of natural resources and adaptation to climate change; and (iii) effective systems of food/feed safety, veterinary and plant protection. The government of Georgia offers several subsidies and additional measures such as support for agricultural mechanization, subsidies for agricultural insurance, and measures to develop private and land ownership.

The 2021-2027 Rural Development Strategy of Georgia presents three main priority areas, namely economy and competitiveness, social conditions and living standards, as well as environmental protection, and sustainable management of natural resources. The state budget supports these priority areas (see Table 5 below for support amounts in million GEL).

In 2019, MEPA envisaged 15 activities for implementation. That year, the total budget spending amounted to approximately GEL 163 million. The largest public agricultural programs include the following: referential Agro-credit (GEL 71.3 million), Construction and Rehabilitation of Amelioration Systems (GEL 22.8 million), and Plant the Future (GEL 15.6 million).

- The program "*Preferential Agro-credit*" has been implemented since 2013. The project's primary goal is to promote agricultural and processing production, storage, and product realization by increasing easy and affordable access to funds and financing for agro-entrepreneurs.
- The state program "*Plant the Future"* focuses on the promotion of exports and local raw materials production by co-financing components of anti-hail systems, perennial gardens, nursery gardens and damaged seedlings.
- The program "*Young Entrepreneur"* aims to stimulate the development of young entrepreneurs in rural areas and their involvement in business to strengthen economic growth and private sector development in selected regions as well as to invest in the chain of production and sale of agricultural products.
- The goal of the "*Agro-insurance*" program is to develop the insurance market in the agricultural sector, promote agricultural activities, maintain the incomes of those engaged in agricultural activities, and reduce income-related risks.
- The "*Co-financing Project for Processing and Storage Enterprises"* program has two components: (i) co-financing of processing enterprises; and (ii) co-financing of storage enterprises.

For year 2019, the detailed state programs' budgets can be seen in Table 5 below. Table 5 reflects all state program spending at the country level. Total state expenditures in the agricultural sector amounted to about GEL 163 million.

Table 5: Georgia: State Agricultural Programs Budget, 2019

Activity / Program	Budget Actual Expenditure, 2019 (mln GEL)
Priority Area 1: Economy and Competitiveness	
Preferencial Agro-credit	71,3
Construction and Rehabilitation of AmeliorationSystems	22,8
Plant the Future	15,6
Co-financing of Storage and Processing Enterprises	10,7
Agricultural Modernization, Market Access and Sustainability	10,7
Improving Irrigation and Drainage Systems	7,6
Youth Enterpreneurship	4,0
Supporting Production of Georgian Tea	0,5
Development of Infrastructure of Agricultural Cooperatives	0,2
Implementation of International Standards and Support Agricultural Production in Cooperatives	0,008
Support for Beekeeping Agricultural Cooperatives	0,003
Priority Area 3: Environmental Protection and Sustainable Management of Natural Resources	
Sustainable Use of Forestry	10,4
Agricultural Insurance Measures	5,9
Rehibilitation of Forestry	1,2
Others	1,8
Total Budget	**162,7**
Total Budget, % of GDP	**0,3**

Source: Ministry of Environmental Protection and Agriculture of Georgia.

I.c Tax Policy

Global practice indicates that the agricultural sector generally experiences relatively light taxation on value added. In Georgia, tax policy for the agricultural sector incorporates a range of incentives designed to foster its growth and development.

Tax incentives in relation to income and profit TEs include:

- Until January 1, 2026, dividends received by a member of an agricultural cooperative from the cooperative (prior to January 1, 2026) shall not be taxed at source and shall not be included in gross income.

- Exemption of income from the supply of agricultural produce made in Georgia as a result of agricultural activity between an agricultural cooperative and its members, and/or services, until January 1, 2026.

- Incentives in terms of VATEs:

    - Import under the National Commodity Nomenclature of Foreign Economic Activities Codes 0102 21, 0103 10 000 00, 0104 10 100 00, 0104 20 100 00, 0105 11, 0511 10 000 00, 0602 10, 2503 00, 2803 00, 3101 00 000, 3103–3105 (except mechanical mixture), 3808 91, 3808 92 and 3808 93. In National Commodity Nomenclature of Foreign Economic Activities Codes 8701 90 110 00 – 8701 90 500 Intended for tractors mentioned in above codes, National Commodity Nomenclature of Foreign Economic Activities Codes 8706 00 190 00, 8706 00 990 00, 8707 90 100 00, 8707 90 900 00, 8708 10 900 00, 8708 29 100 00 – 8708 40 900 00, 8708 50 900 00 – 8708 70 100 00, 8708 80, 8708 91, 8708 92, 8708 93, 8708 94 and 8708 99 chassis, body, parts and devices mentioned in the codes, also National Commodity Nomenclature of Foreign Economic Activities Codes 8432 90 000 00 and 8433 90 000 00. Import of goods stipulated by those codes.

    - Import of agricultural pesticides and agrochemicals, seeds and planting materials of agricultural crops according to the list approved by resolution of the Government of Georgia.

    - Zero-rating of the supply of (agricultural) products obtained from goods fully made in Georgia and indicated in National Commodity Nomenclature of Foreign Economic Activities Codes 0201, 0203 11 – 0203 19, 0204 10 000 00 – 0204 23 000 00, 0204 50 110 00 – 0204 50 390 00 (including, chopped/minced meat (forcemeat)), as well as supply of cheese made as a result of industrial processing of products obtained from animals living in Georgia and also supply of goods (shell-less nuts) indicated in National Commodity Nomenclature of Foreign Economic Activities Code 0802 22 000 00.

- Zero-rating of the supply of agricultural produce produced in Georgia (other than the goods (eggs) indicated in National Commodity Nomenclature of Foreign Economic Activities Codes 0407 00 190 00, 0407 00 300 00 and the goods under subheading 0207 11 (gallus domesticus, uncut, fresh or frozen), before their industrial processing (change of commodity code).

Based on the description of these benefits, it can be concluded that the agricultural sector enjoys various tax incentives, encompassing both the production and distribution of agricultural products, as well as the import of necessary inputs for agricultural production.

I.c.1 VAT Impact Assessment and Scenario-Making

The selected TEE consisting of the zero-rating of agricultural products will be subject to an *ex-post* evaluation since the policy is already in place and has been for over a decade. The *ex-post* evaluation, as opposed to an *ex ante* evaluation, offers an advantage to the analyst: establishing the impacts will rely on data that were generated by the existence of the policy itself, as opposed to hypothetical data.

Scenarios must be established to correctly interpret the direction of the impact of the policy. In the language of cost-benefit analysis (CBA), the *project* scenario is the policy in place, i.e., the zero-rating of agricultural products under the VAT. The alternative scenario, formally called *counterfactual* scenario, represents the scenario against which the project scenario will be evaluated. In this case, when the 18 percent VAT rate is in place. Conceptually, this report will seek to establish the incremental impact of the project over the counterfactual scenario. Impacts are a general concept and may include quantified and monetized benefits and costs when the data allow it.

The counterfactual scenario is a vitally important building block in the CBA framework. Conceptually, different counterfactual scenarios are possible. In practice, however, the most reasonable and most likely counterfactual scenario would be the standard rating of agricultural products, just like all other goods and services that are taxed at the standard rate of 18 percent. This report will, in part, seek to uncover the impact of moving from full taxation to zero-rating of agricultural products, holding other policy variables in the tax system constant.

Chapter II. Policy Alternatives

The state budget already incorporates significant support for the agricultural sector. The fact that the budget subsidizes the agricultural sector while bearing the fiscal cost of the zero-rating TEs on agricultural products is very important because these two channels work differently in supporting intended beneficiaries. The budget programs directly assist the farmers that are the potential beneficiaries of the

TEs. The budget programs are easily measurable and quite flexible, as there is a way for them to be revised if any one program appears to be ineffective or inefficient. As for the VATE, macroeconomic models are used to quantitatively evaluate the policy. Moreover, a distributional analysis of the VATE from the zero-rating of agricultural products (see below[2]) shows that the benefits of the TE are distributed to unintended beneficiaries and/or provide larger absolute benefits to higher-income households. The budget programs and VATE may, additionally, entail regulatory (compliance) and administrative costs, which should also be considered. In particular, the cost-benefit analysis (CBA) can be extended to assess which types of policies provide benefits at the lowest social (fiscal, socioeconomic, administrative) cost[3].

It should be noted here that it would be relevant to evaluate not only the possible effects of the VATE on the economy, but also the outcomes and effectiveness of (alternative) spending policies. This will be an important step for comparing and optimizing policy options in the agricultural sector going forward but will not be explored in detail in the context of this report.

II.a Tax Incentives vs Spending Policies

The discussion of poor targeting above can be recast as the choice of an instrument to deliver a particular benefit to identified beneficiaries. It is helpful to reconsider the objective and beneficiaries of the VAT zero-rating of agricultural products: to promote Georgian agriculture and benefit farmers[4]. Given the above discussion of the direct benefits of the policy under evaluation, it is likely that the policy will benefit farmers to the extent that they self-supply agricultural products for household consumption purposes. Beyond that, the policy will benefit non-farming households. This reinforces the earlier point that the VAT is a poorly targeted tool, and that targeted cash transfers could be considered as its alternative.

These alternatives were frequently discussed by the Davis Tax Committee[5]. The recommendations included retaining significant zero rating of necessities because it was easier to reach remote populations that way, compared to using direct expenditure programs. This argument may have merit in the case of South Africa, a large, decentralized country characterized by significant poverty and inequality of income. It is much less relevant in the case of Georgia, especially given its socio-economic make-up and its already existing direct support programs for the agricultural sector.

Concerning the use of spending programs as an alternative to the VATE, it is possible to rely on both current and capital spending. The analysis in this report as well as international experience show that achieving socioeconomic goals is more efficient through spending policies.

[2] See also Swistak & al. (2020), chapter III.
[3] See IMF Staff (2015).
[4] Ministry of Finance (2022), Appendix 4, pg. 56.
[5] Davis Tax Committee (2018) and Independent Council (2018).

Chapter III. Analysis of Variables Related to the Agricultural Sector

This Chapter will focus on analyzing trends of different macroeconomic indicators around the time of the adoption of the VATE related to the zero-rating of agricultural products (March 2012). Specifically, the analysis will focus on the following indicators:

- Employment in the agricultural sector and its gender composition;
- Monthly earnings in the agricultural sector;
- The share of the agricultural sector in GDP;
- Exports and imports of agricultural products;
- Share of total household consumption in GDP.

All data is sourced from the National Statistics Office of Georgia (GEOSTAT).

The focus of the descriptive analysis below is to look at the summary statistics of the above-mentioned variables and observe their behavior around the period of VATE implementation. For this purpose, the headline results will be presented before and after 2012 because VAT zero-rating in the agricultural sector was introduced in March 2012. For robustness, different time horizons around the introduction of the VATE were selected (e.g., 2, 3 and 5 years before and after year 2012). when computing descriptive statistics of the variables of interest. Where these different periods generate mostly similar results, only results from 2 years before and after are reported.

III.a. Descriptive Statistics

One of the observed variables is the employment level in the agricultural sector in percent of total employment. In 2012, the agricultural employment rate was 47.1 percent of the country's total employment. The average employment in the above-mentioned sector as a percent of total employment was at 48 and 47 percent during the periods 2009-2011 (2 years before the VATE) and 2013-2015 (2 years after the VATE) respectively (Panel 1, figure 1.A).

The declining trend of the share of employment in the agricultural sector in total employment is mainly capturing the demographic shifts taking place in the country. However, there is a difference between the trend of employment in agriculture in percent of total male and female employment (Panel 1, figures 1.B and 1.C). Employment in agriculture in percent of female employment shows a reduction after 2012, while it remains the same in percent of male employment.

In addition, the average monthly real earnings (in GEL) of employees in the agricultural sector is among the observed variables. In 2012, this indicator was at GEL 429. The average monthly real earnings of employees in the agricultural sector were at GEL 311 and GEL 492 during the periods 2009-2011 (2 years

before the VATE) and 2013-2015 (2 years after the VATE) respectively (Panel 2, figure 2.A). As the trend is overall increasing, it can be considered that it is likely capturing economic growth, which may be associated with an increase in average agricultural sector wages.

As for the average agricultural wage in percent of GDP per capita, it also exhibits an increasing trend, which may capture economic growth in the sector, irrespective of the impact of the VATE (Panel 2, figure 2.B). This share amounted to 64 percent in the 2 years before VATE adoption, while exactly in 2012 it was at 70 percent, while after 2 years the average share was 75 percent of GDP per capita.

Moreover, value added in the sector of agriculture, forestry and fishing was observed as a percent of the country's GDP. In 2012, this macroeconomic variable was 8.2 percent. The average value added of the above-mentioned sector as a percent of GDP was at 8.8 percent and 8.6 percent during the periods 2009-2011 (2 years before VATE adoption) and 2013-2015 (2 years after VATE adoption), respectively (Panel 2, figure 2.C). This shows that value-added had a declining trend 2 years before VATE adoption, while it increased after that time. However, when considering its average level 5 years before and after VATE adoption, the effect washes off and the trend is still declining (Panel 2, figure 2.D). The average value-added of agriculture was equal to 8.8 percent of GDP 5 years before 2012, while it amounted to 7.7 percent of GDP 5 years after 2012. This may reflect the short-run impact on that indicator.

Figure 2.E shows GDP (value added) of agriculture, forestry and fishing in nominal terms (in GEL millions), which is observed with an increasing trend. However, this indicator increased by relatively more 2 years after VATE adoption.

Output of the agricultural sector is also observed to be increasing, though it increased by more after VATE adoption. On average, output of the agricultural sector was at GEL 2,974 million 2 years before 2012, GEL 3,138 million in 2012 and GEL 3,684 million 2 years after 2012 (Panel 2, figure 2.F).

Panel 1. Georgia: [Descriptive statistics of selected variables] around VATE implementation

(2 Years Before vs. 2 Years after VATE Implementation)

Figure 1.A.

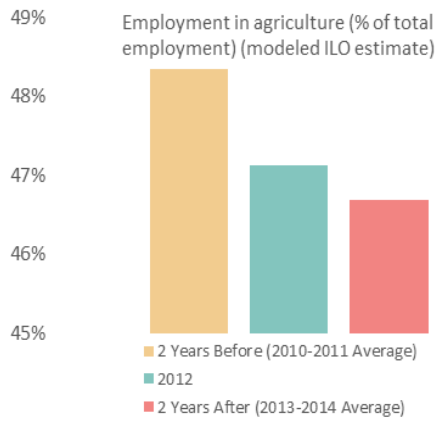
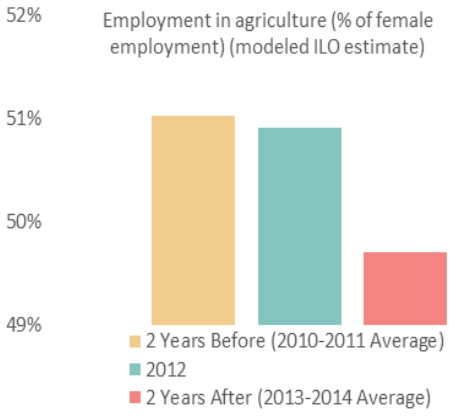


Figure 1.B.

Figure 1.C.



Source: Statistics Office of Georgia.

Note: The VATE implementation year is set to 2012.

Panel 2.Georgia: [Descriptive statistics of selected variables] around VATE implementation

(2 Years Before vs. 2 Years after VATE Implementation)

Figure 2.A.

Figure 2.B.

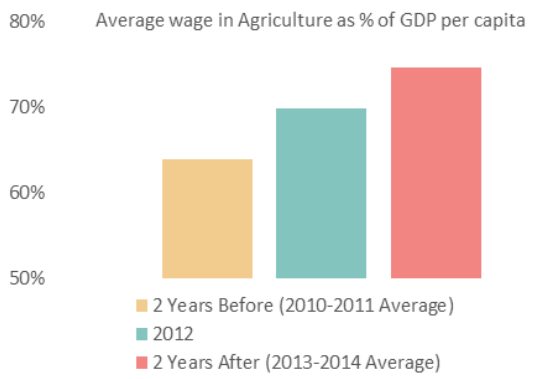


Figure 2.C.

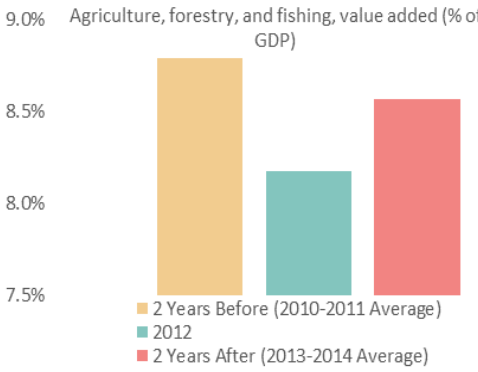


Figure 2.D.

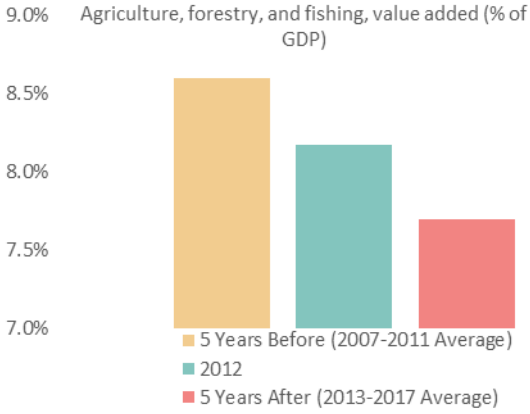


Figure 2.E

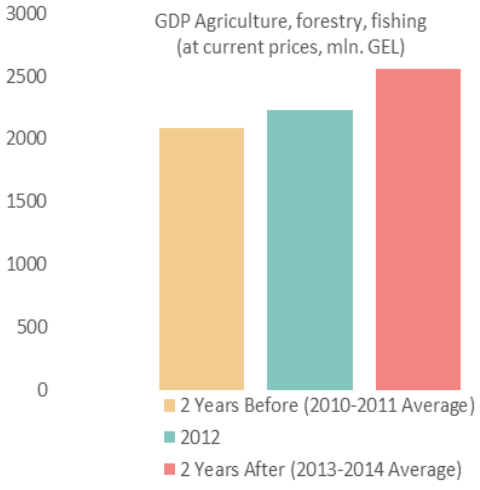
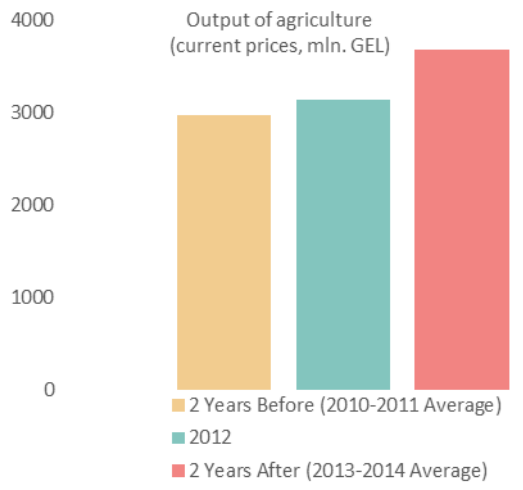


Figure 2.F.



Source: Statistics Office of Georgia.

Note: The VATE implementation year is set to 2012.

Exports of the agricultural sector were observed as a percent of GDP at 0.9 percent. The average volume of exports as a percent of GDP was at 1.0 percent and 1.4 percent during the periods 2010-2011 (2 years before VATE adoption) and 2013-2014 (2 years after VATE adoption) respectively (Panel 3, figure 3.A). However, it is less possible that this upward trend was due to the VATE, considering that export was already exempted from the VAT and this dynamic is mainly due to other factors.

Likewise, imports of the agricultural sector in percent of GDP were at 2.0 percent in 2012. The average imports in percent of GDP were at 1.9 and 1.6 percent during the periods 2010-2011 (2 years before VATE adoption) and 2013-2014 (2 years after VATE adoption), respectively (Panel 3, figure 3.B). Overall, the agricultural import share in GDP increased slightly in 2012 and declined post-VATE adoption. This could suggest with high probability the import substitution of agricultural products.

Another indicator considered here is total household consumption in percent of GDP, which was also observed around the VATE implementation period. This indicator varies between 70 and 90 percent during the period 2000-2022. Average total household consumption was at around 79 percent, 82 percent and 75 percent of GDP during the periods 2000-2022, 2000-2011, and 2013-2022, respectively. In general, this variable is characterized by a downward trend.

In 2012 (when the zero-rating VATE was introduced in the agricultural sector), total household consumption was at 79.4 percent of GDP. The average total household consumption as a percent of GDP was at around 81.8 percent and 75.1 percent during the time periods 2000-2011 and 2013-2022, respectively (i.e., the time before and after VATE adoption). This shows the decreasing trend of total household consumption over time. As for the analysis of 2 years before and after 2012, average total household consumption in percent of GDP was at around 81.7 percent and 77.2 percent during the periods 2010-2011 and 2013-2014, respectively (Panel 3, figure 3.C). However, the reasons for this reduction may come from a general pattern in which, as a country develops and experiences economic growth, the share of primary consumption in total consumption decreases. Consequently, it is impossible to isolate the impact of policy changes in this indicator.

Panel 3. Georgia: Descriptive statistics of selected variables around VATE implementation
(2 Years Before vs. 2 Years after VATE Implementation)

Figure 3.A.

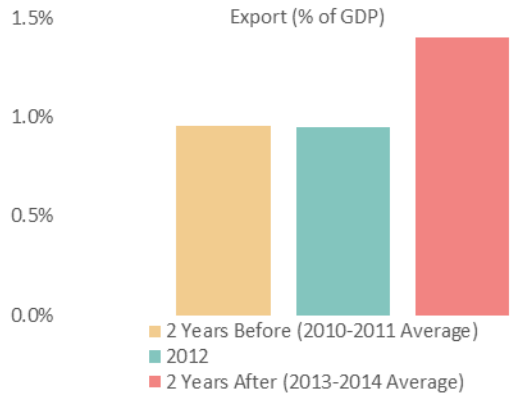


Figure 3.B.

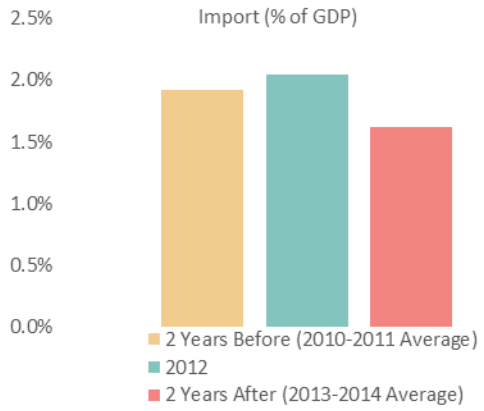
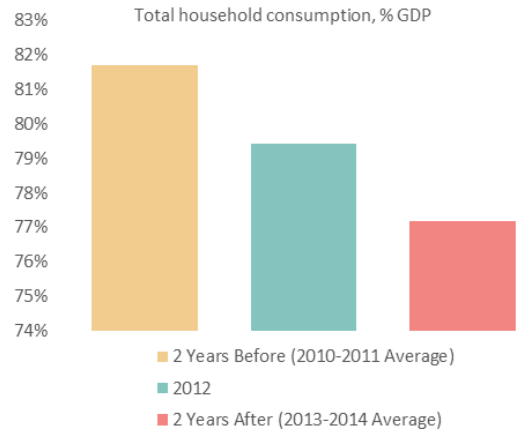


Figure 3.C.



Source: Statistics Office of Georgia.
Note: The VATE implementation year is set to 2012.

It is worth mentioning that the results from the descriptive analysis cannot be interpreted as causal effects of the VATE on the different variables. Specifically, the Figures in Panels 1-3 solely provide suggestive evidence on the changes of different variables around the VATE implementation period. However, there may be other factors (i.e., factors unrelated to the VATE), which might affect and have implications on the variables considered in this Chapter. With the above in mind, the descriptive analysis of this report suggests that there were very few (if any at all) structural breaks in the different variable time series at (or around) the implementation period of the VATE. This could potentially signify a limited aggregate impact of the VAT on the different indicators considered in this Chapter.

III.b Dynamic Factor Model (DFM) Analysis

In order to evaluate and analyze the potential effects of the introduction of the zero-rating of agricultural products, this report applied a dynamic factor model (DFM) using a dummy variable with value 0 until year 2012 (pre-VATE period) and value of 1 from year 2012 onwards (post-VATE period). Estimation under the DFM methodology is done in two steps. First, factor loadings are obtained. Second, given the factor loadings, new factors are estimated and the process continues until convergence.

When a model produces an effect estimate with a dummy variable, it is necessary to control for other contemporaneous processes that may have a potential effect on the variable of interest. For example, if the research question is how much agricultural output changed after zero-rating of agricultural products was introduced, it is impossible to obtain reliable results by including a dummy variable only to the analysis. This is because, after the introduction of zero-rating, other processes in the economy may have had a significant impact on agricultural output. For example, a decline in aggregate demand due to the COVID-19 crisis, or an increase in the competitiveness of imported products as a result of the appreciation of the exchange rate may have affected the dynamics of agricultural output. By including all these variables in the model, their effects will (to an extent) be isolated, after which the dummy variable could potentially explain the remaining factors, which, under the conditions of correct identification, will determine the effect of the VATE. One drawback of this approach is that as more variables are introduced to control for other effects, the reliability of the results tends to decrease, primarily due to a reduction in degrees of freedom.

The DFM methodology helps address this issue, in order to isolate the effects of the accompanying economic processes and evaluate the policy impact through the dummy variable, without compromising model reliability. With the DFM methodology, it is possible to find, from a set of variables, a group (except for the dummy variable related to the VATE, the effect of which is of interest to this report) that may (statistically) be related to the variable of interest. After this, the few factors (which could also be unobserved [synthetic] variables) which define the whole set of variables in the group are deducted from this group.

For this analysis, a group of potential explanatory variables, containing 46 variables (Box 2) was created. Through DFM, three factors were obtained from this group. The three factors together have the explanatory power of 88 percent of the entire group. Therefore, instead of 46 variables, three variables are used to explain the underlying processes in the equation, which carry almost the same information as the initial 46 variables. As a result, the degrees of freedom of the model and, hence, the reliability of the results is improved. Quarterly data are used for DFM. In the event that a dependent variable with a quarterly frequency is not available, the factors of the quarterly frequency obtained by DFM are annualized. This approach is applied on a variety of outcome variables (Table 6).

Box 2. List of Potential Explanatory Variables

Prices	Monetary	Real Sector	External Sector
1. CPI	14. Loans to Agriculture (Individuals)	32. Productivity	41. FDI
2. Foreign effective CPI	15. Loans to Agriculture (Legan entities)	33. Real Capital Formation	42. FDI to Agriculture
3. Export Prices	16. Total loans to legal entities	34. Nominal Agiculture Output	43. Foreign Effective GDP
4. Import Prices	17. Total loans to legal entities	35. Real Agiculture Output	44. Total Exports (in USD)
5. PPI	18. M0	36. Nominal GDP	45. Total Imports (in USD)
6. GDP Deflator	19. M1	37. Real GDP	46. Remittances
7. Agriculture Prices	20. M2	38. Total Labor	
8. FAO Food Price	21. M3	39. Nominal Private Consumption	
9. Food Oil Price	22. REER	40. Real Private Consumption	
10. Sugar price	23. NEER		
11. Meat Price	24. EUR/GEL		
12. Dairy prices	25. RUB/GEL		
13. Cereal Prices	26. TRY/GEL		
	27. USD/GEL		
	28. RER EUR/GEL		
	29. RER RUB/GEL		
	30. RER TRY/GEL		
	31. RER USD/GEL		

The three DFM-derived factors were used in the following Ordinary Least Squares (OLS) regression:

$$Y_t = \beta_0 + \beta_1 F_t^1 + \beta_2 F_t^2 + \beta_3 F_t^3 + \beta_4 Dummy_t + \varepsilon_t$$

Synthetic variables (factors) (F_t^1,F_t^2, F_t^3) are used as explanatory variables, which control for possible changes in outcome variables due to economic factors other than the VATE in question. In the same regression, a dummy variable ($Dummy_t$), which is equal to 0 until year 2013 and 1 from year 2013 onwards (the zero-rating VATE for agricultural products was introduced in March 2012) is also included and aims at capturing the impact of VATE implementation on given outcome variables. ε_t is an idiosyncratic shock with a zero mean. Under this analysis, the effect of the transition to zero-rating taxation of agricultural products was evaluated for eight sector-related variables. For some variables (employment, wages) only annual data is available. Quarterly data are used for the remaining variables.

Table 6. Dummy Variable Coefficients for Different Outcome Variables from DFM Analysis

Variable / Year	2013 (b4)	p-value	Expected impact	Comment
Employment in agricultures sector (% of total employment)	1,35	0,34	Positive	Result is positive, but statistically nonsignificant
Employment in agricultures sector (% of male employment)	1,54	0,31	Positive	Result is positive, but statistically nonsignificant
Employment in agricultures sector (% of female employment)	1,23	0,48	Positive	Result is positive, but statistically nonsignificant
Monthly earnings in agriculture (per capita, % of GDP)	3,26	0,68	Positive	Result is positive, but statistically nonsignificant
The share of agriculture sector (% of GDP)	2,17	0,01	Positive	Result is positive and statistically significant
Export (% of GDP)	0,32	0,01	Neutral	Result is positive and statistically significant. Might be caused byother economic factors or reforms
Import (% of GDP)	-0,34	0,01	Negative	Result is negative and statistically significant
Share of household total consumption (% of GDP)	-3,86	0,24	Positive	Result is positive, but statistically nonsignificant

The following conclusions emerge from this analysis. The zero-rating of agricultural products was positively associated with employment in the agricultural sector, but results are statistically insignificant (at standard significance levels). One of the reasons for this could be the lack of statistical power (since variables are only available at the annual level). There is also a positive but statistically insignificant association of the VATE with the average monthly nominal income of workers in the agricultural sector. The association is positive and statistically significant in the case of agriculture sector output. Also, following VATE implementation, agricultural exports increased, and agricultural product imports decreased. As mentioned above, the growth in exports is driven by other factors. It should be noted that a key shortcoming of this analysis is the fact that, during the period of VATE implementation, there were also various other agricultural assistance programs in place, which may confound the coefficient on the dummy indicating the adoption of the zero-rating of agricultural products under the VAT.

Chapter IV. Microsimulation Modeling of the Tax Expenditure

While the descriptive analysis and DFM above give us an understanding of the aggregate effect of the VATE (based on actual macroeconomic data for Georgia), the microsimulation model (MSM) applied in this section focuses on estimating the benefits from this VATE for households as well as their distribution across household income groups.

VATEs, in the form of exemptions and zero ratings, are commonly used to mitigate the regressive nature of the VAT. However, these measures are not very effective as targeting mechanisms to benefit the poor. VATEs often apply to food and non-food (e.g., energy) staples, the intuition being that these constitute a larger share of low-income households' budgets. However, higher-income households tend to spend more in absolute terms on these items, leading to them benefiting more indirectly. These results create an opportunity to use the money collected from the VAT to fully compensate vulnerable groups by strengthening existing social benefit programs that have a greater potential for redistribution, such as conditional cash transfers. In places where there is a weak social safety net, any decisions to lower VAT

rates or provide exemptions need to be carefully considered because they could result in limiting fiscal space without necessarily improving redistribution (IMF Policy Paper, December 2019).

The adverse impact of the VAT on economy-wide progressivity (inequality) is often exaggerated. It is important for a fair fiscal policy to consider progressivity in the broader context of the tax and benefit system, ensuring that it effectively targets lower-income segments of the population. In most cases, VAT has been found to be proportional or even slightly progressive (Thomas, 2020), especially when informal consumption is taken into account (Bachas et al., 2020). However, the degree of VAT regressivity depends on specific factors like households' spending habits, the overall income distribution, and households' propensity to consume.

To analyze the distributional impact and estimate the benefits of VATEs in Georgia, this report relies on specific data sources. These include the 2019 vintage of the Households Incomes and Expenditures Survey (HIES). The HIES is conducted annually by GEOSTAT and collects information on monthly expenditures for over 100 consumption items categorized according to COICOP 4-digit codes. It encompasses a nationally representative sample of around 14,000 households.

It is important to assess how VATEs affect different groups of beneficiaries, in order to maintain a balance between targeting specific groups and generating revenue through the VAT system. By accurately estimating the impact of VATEs on different income levels and population segments, policymakers can gain valuable information about how specific VATEs contribute to redistributing benefits, especially in terms of their pre-determined socioeconomic objectives.

The primary focus of this part of the analysis is to examine how the benefits of the zero-rating VATE applying to agricultural products is distributed among different household income groups. These benefits can be seen as the current advantages resulting from the existence of this specific VATE. Essentially, the estimates represent the gains in consumption that households experience due to reduced tax liabilities resulting from VATEs. Additionally, the estimates can be seen as a way of quantifying the potential future burden of removing the VATE. In other words, it gives the information about the impact on households, should agricultural products be taxed at the statutory VAT rate of 18 percent.

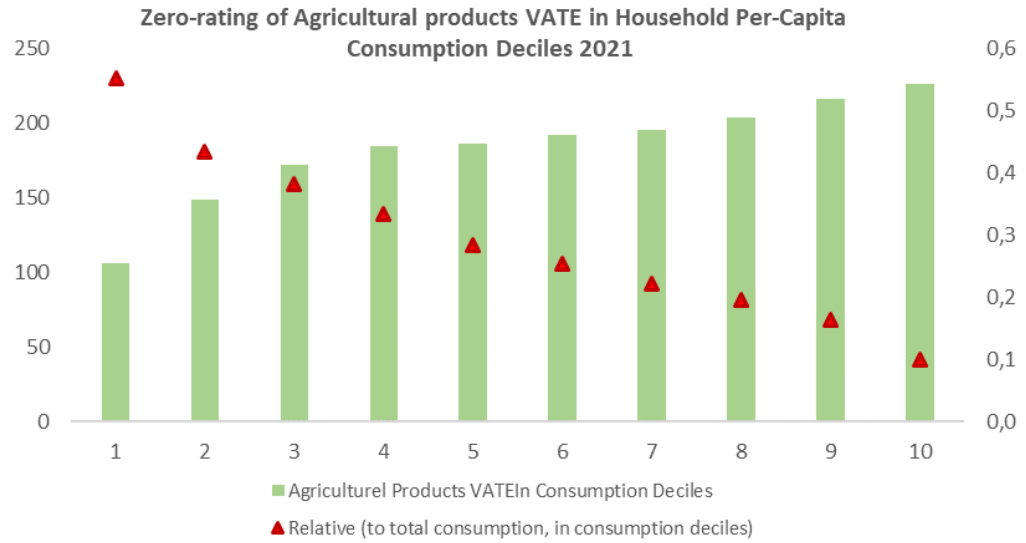
The VATE benefits are estimated by the MSM at the individual household level using 2019 HIES microdata. For the zero-rated items (i.e., the VATE evaluated in this report), the model (i) multiplies consumption expenditure for COICOP items related to NACE-2 code 01 by its zero-rated proportion (i.e., 100 percent, in this case), which determines the amount of consumption subject to a zero VAT rate; (ii) infers the (hypothetical) pre-tax level of said consumption amount under the standard VAT rate of 18 percent; and (iii) assesses the benefit from zero-rating by finding the difference between the initial (or gross) and net amounts of the consumption expenditure that is zero-rated. To minimize aggregation bias to the extent possible, all calculations are performed at the individual household level, ensuring that the estimates are more granular and representative of individual circumstances.

The results are reported in percent of total household consumption on an annual basis for the year 2019 by household consumption decile. This approach considers consumption as a better proxy of lifetime nominal income, since the former is less subject to misreporting and/or mismeasurement within the framework of household budget surveys. The gap between total consumption resulting from responses to the HIES and the corresponding figure in Georgian National Accounts are reconciled at the individual household level by scaling all households' consumption uniformly. This discrepancy is, in part, due to

individuals at the top of the income distribution not being captured as respondents to the HIES. The survey amounts are, therefore, scaled up proportionately to match their total to aggregate household consumption expenditure in National Accounts.

All in all, the VATE from the zero-rating of agricultural products is distributed regressively in absolute (i.e., GEL) terms. Figure 1 below shows the VATE benefits from the VATE in question by household consumption decile. It shows that absolute VATE benefits are higher (GEL 226) for the top decile and lower (GEL 106) for the bottom. This means that households with the highest incomes enjoy almost twice the consumption benefits compared to households with the lowest incomes. It should be noted that in relative (to consumption) terms, VATE benefits are distributed progressively, which means that in percent of total decile consumption, the benefits are higher for low-income households, than for high income households. This last point often motivates use of the VAT as a redistributive instrument, but largely ignores the presence of unintended recipients (e.g., households in deciles 8-10) as well as the overall burden on the economy introduced by the fiscal cost of the VATE (see also discussion below).

Figure 1. Zero-rating VATEs in agriculture per household consumption decile, 2021



The above suggests that the agricultural products zero-rating VATE is not an effective targeting scheme, given proportionately large spillovers of VATE benefits to unintended beneficiaries (e.g., high-income households). Alternatives forgone, like the use of the revenues that would have been collected had the VATE not been in place in the form of targeted cash transfers or the extension of existing social safety nets (e.g., unemployment benefits), might have larger impacts in terms of redistribution (given that they would almost always reach lower-income segments of the Georgian population).

IV.a Kuznets Ratios

The analysis above shows the distribution of VATE benefits by decile and its regressivity in absolute terms. Distributional outcomes in this section are presented through Kuznets ratios for the overall, urban and rural household samples. Kuznets ratios show the ratio of a quantity (income, consumption, or output) of a given upper part (quantile) of the income distribution (e.g., households in the 90th percentile) over that of a given lower part (quantile) of the income distribution (e.g., households in the 10th percentile).

Here, HIES microdata for all available years was used to calculate Kuznets ratios around the year of VATE adoption (2012), in order to explore whether the VATE may have affected the distribution of total consumption and consumption of agricultural goods. Specifically, Kuznets ratios were calculated for two variables: total household consumption and agricultural products consumption. In terms of quantile specifications, four types of Kuznets ratios were considered for each variable. These were: “decile 10 relative to decile 1”, “deciles 9-10 relative to deciles 1-2”, “deciles 6-10 relative to deciles 1-5”, and “deciles 7-10 relative to deciles 1-6”. For instance, the “deciles 7-10 relative to deciles 1-6” Kuznets ratio was calculated by the dividing the sum of the mean consumption of deciles 7, 8, 9 and 10 by the sum of the mean consumption of deciles 1, 2, 3, 4, 5 and 6. The findings presented below are in terms of the Kuznets ratios of “decile 10 relative to decile 1” and “deciles 6-10 relative to deciles 1-5”.

In terms of total consumption, all Kuznets ratios exhibited a downward trend during the period 2010-2021 (across all household samples). This suggests that the relative overall consumption of lower-income households relative to that of higher-income households has increased over time.

Panel 4. Overall consumption distributed by specification and sub-sample (Kuznets Ratio)

Figure 4.A.

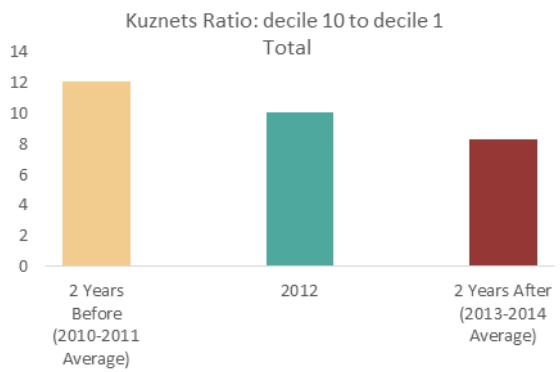


Figure 4.B.

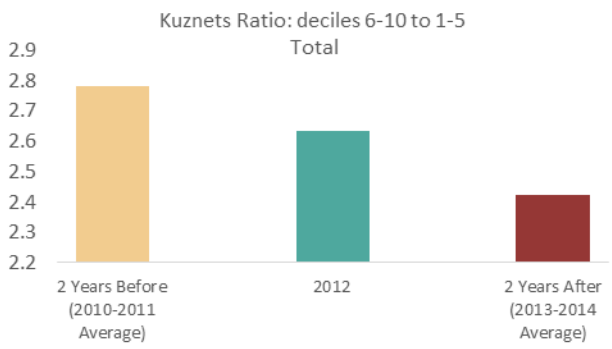


Figure 4.C.

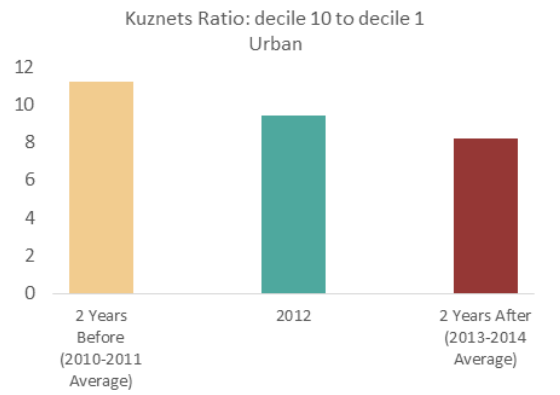


Figure 4.D.

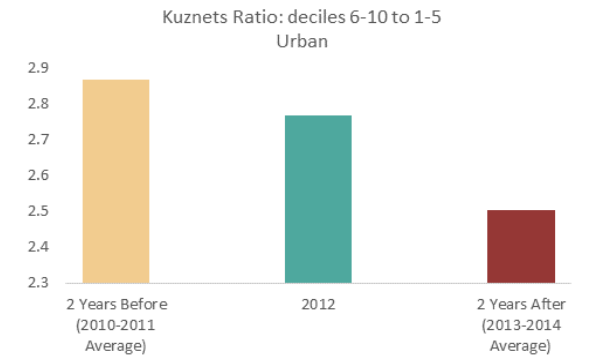


Figure 4.E.

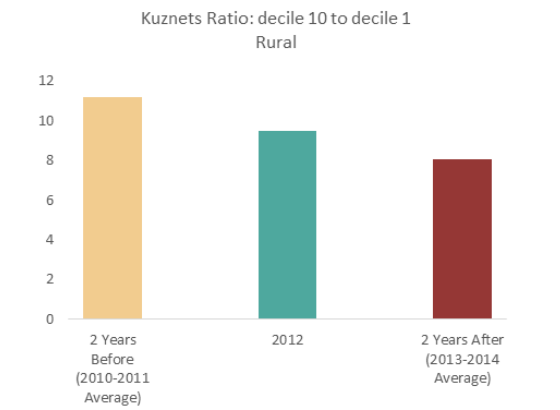
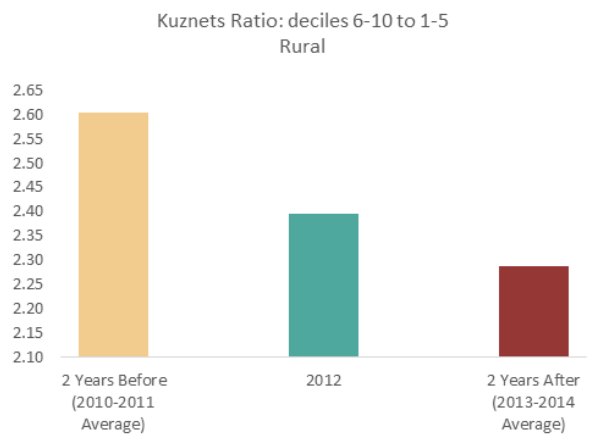


Figure 4.F.



Source: Statistics Office of Georgia, MOF calculations.

In 2012 (when the VATE in question was introduced), the Kuznets ratio of decile 10 to decile 1 was 10.0 for the whole economy, meaning that the highest-earning households consumed 10 times more relative to the lowest-earning ones on average. The ratio was at 12.1 and 8.3 during the 2010-2011 (2 years before

VATE adoption) and 2013-2014 periods (2 years after VATE adoption) respectively. It is also relevant to note that the above-mentioned Kuznets ratio exhibited a decreasing trend during the analysis period (Panel 4, figure 4.A).

The Kuznets ratio of decile 10 relative to decile 1 in the urban sample was approximately 9.4 in 2012 (when the VATE in question was introduced). In contrast, this indicator was at 11.2 and 8.2 during the 2010-2011 (2 years before VATE adoption) and 2013-2014 periods (2 years after VATE adoption) respectively (Panel 4, figure 4.C).

In 2012 (when the VATE in question was introduced), the Kuznets ratio of decile 10 relative to decile 1 for the rural sample was at 9.5. This indicator was at 11.2 and 8.1 during the 2010-2011 (2 years before VATE adoption) and 2013-2014 periods (2 years after VATE adoption) respectively (Panel 4, figure 4.E). It is also relevant to note that the above-mentioned Kuznets ratio exhibited a decreasing trend during the analysis period.

Table 7. Kuznets ratios of deciles 6-10 relative to deciles 1-5 (overall consumption)

decile 6-10 / decile 1-5	2 years before	2012	2 years after
Total, within the country	2.8	2.6	2.4
Urban	2.9	2.8	2.5
Rural	2.6	2.4	2.3

Kuznets ratios of deciles 6-10 relative to deciles 1-5 follow the same pattern as above (Table 7).

Panel 5. Agricultural Products Consumption in distributed by specification and sub-sample (Kuznets Ratio)

Figure 5.A.

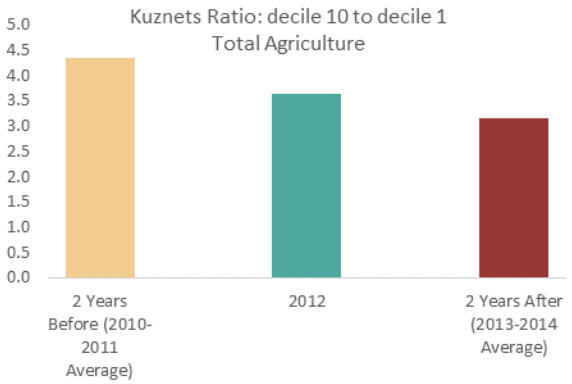


Figure 5.B.

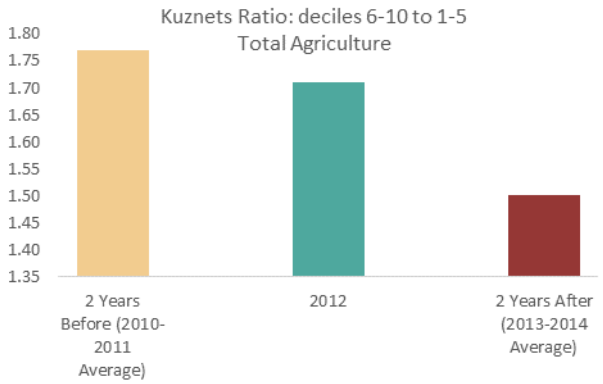


Figure 5.C.

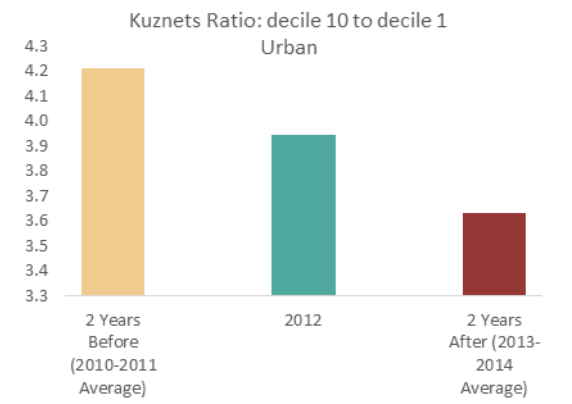


Figure 5.D.

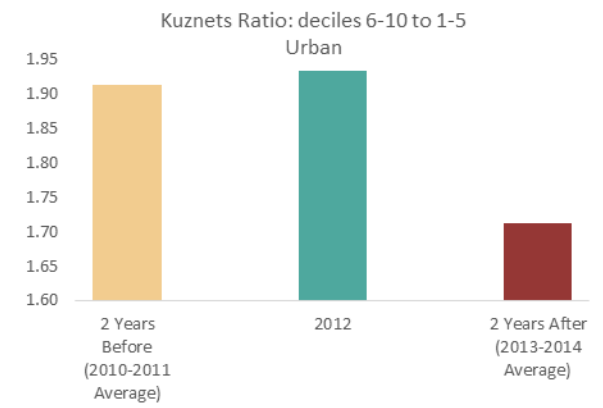


Figure 5.E.

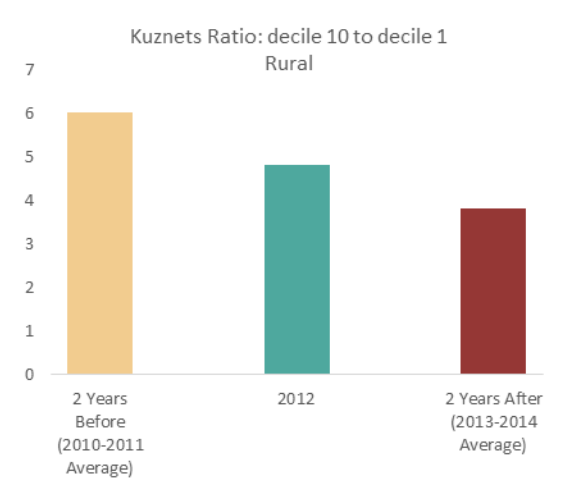
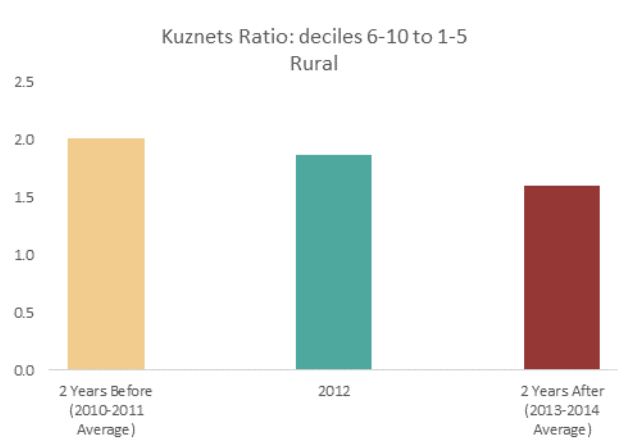


Figure 5.F.



Source: Statistics Office of Georgia, MOF calculations.

The Kuznets ratio for agricultural products consumption of decile 10 relative to decile 1 was approximately at 3.6 in 2012 (when the VATE in question was introduced), meaning that the highest-earning households consumed almost 4 times more agricultural products than the lowest-earning ones on average. This indicator was at 4.3 and 3.1 during the 2010-2011 (2 years before VATE adoption) and 2013-2014 periods (2 years after VATE adoption) respectively (Panel 5, figure 5.A).

A similar pattern holds for the urban and rural samples (Panel 5, figures 5.C and 5.E)

Table 8: Kuznets ratios of deciles 6-10 relative to deciles 1-5 (agricultural products consumption)

decile 6-10 / decile 1-5	2 years before	2012	2 years after
Total, within the country	1.8	1.7	1.5
Urban	1.9	1.9	1.7
Rural	2.0	1.9	1.6

Kuznets ratios for agricultural products consumption of deciles 6-10 relative to deciles 1-5 also follow the same pattern (Table 8).

According to the Kuznets ratios calculated above, the ratio of consumption between the rich and poor households has declined slightly, which suggests some progressive impact from the policy under evaluation. However, we have noted above that high-income households received a higher absolute share of the TEs, highlighting the poor targeting of the policy on low-income households.

Chapter V. Evaluation of Quantitative Effects of the Tax Expenditure

When evaluating the impacts of the VATE, it is important to take into consideration not only its direct (first-order) but also its indirect (second order) effects in terms of both accounting and economic (opportunity) costs and benefits. For a comprehensive analysis, it is crucial to monetize all of these aspects (to the extent possible) to allow for intuitive comparisons.

For this type of analysis, the Georgian Fiscal Model (GFM, see Annex 2) of the Ministry of Finance of Georgia was used. The GFM is based on a canonical DSGE model - the Structural Analysis of Macroeconomic Policies (STAMP) model. The GFM captures several characteristics of the Georgian economy, as well as the MOF's fiscal framework and views about the impact of fiscal policy on the economy. It is a small open economy model with limited integration to international capital markets. It

has New Keynesian features in the form of sticky prices (and wages) a` la Calvo[6], which is consistent with empirical evidence for Georgia on nominal and real price rigidities. It also features fiscal rules that are intended to ensure macroeconomic stability and debt sustainability.

The model consists of the following agents: Households, Firms, Importers, Government, Central Bank and Rest of the World (see Annex 2 and accompanying text for a more detailed description of the model).

After analyzing potential theoretical transmission channels of the VATE from the zero-rating of agricultural products on the economy (see next Section), several shocks were identified. To calibrate these shocks, together with available statistical information, several satellite models were developed, in which by solving optimization problems for firms and households, it is possible to derive the scale of the VATE shock, which is, subsequently, used in the larger DSGE model.

V.a. Potential Transmission Channels of the Tax Expenditure

Introducing a zero VAT rate in the agricultural sector can have different macroeconomic implications. It would affect the private and public sectors, with mixed outcomes (both qualitatively and quantitatively).

The direction of the effects can be mapped with a diagram (Diagram 1), which shows how changes in tax policy would be transmitted. During the quantitative analysis, identification of transmission channels will enable determination of a cluster of shocks, which define the final outcome in terms of tax policy, in addition to allowing for consistency in interpreting results.

[6] Calvo, Guillermo A., 1983. "Staggered prices in a utility-maximizing framework," Journal of Monetary Economics, Elsevier, vol. 12(3), pages 383-398, September.

Diagram 1. Transmission channels of tax policy

As per Diagram 1, taxing the agricultural sector with a zero VAT rate can have two main outcomes. First, it would reduce the tax burden for economic agents in the agricultural sector, but *ceteris paribus*, would also change the relative prices of agricultural products compared to products of other sectors.

Reducing the tax burden can result in either wealth or substitution effects. Due to the wealth effect, aggregate demand increases, which has a positive effect on the overall economy. At the same time, this will also increase demand for foreign goods, deteriorating the trade balance. On the contrary, due to the substitution effect, the part of the increase in income due to the reduction in the tax burden will be allocated to savings, hence having a positive effect on economic growth. Also, under the substitution effect, it would, in turn, be possible to achieve the same level of income (as before the reduction in the tax burden) with less effort, which could theoretically reduce incentives for work (and, hence, labor supply), thus compromising economic activity. Due to country-specific characteristics and general macroeconomic conditions, different channels might affect the same variable in different ways, which underscores the importance of careful modeling in this respect.

The introduction of the VATE has a direct effect on the public sector, since it reduces tax revenues. Due to this reduction in tax revenues, fiscal policy has two options. First, it could keep expenditures at their pre-VATE level, which will increase the fiscal deficit. Second, it could decrease government spending by an amount equal to the revenues forgone from the VATE, keeping the deficit constant.

In the case of Georgia, the ceiling for the fiscal deficit is regulated by the Economic Liberty Act (ELA) (i.e., the Organic Law of Georgia), which states that increasing the deficit above 3 percent of GDP is only

allowed in extreme cases [7]. Based on this, the logical fiscal policy outcome would be a reduction in government expenditure.

Government expenditure reductions can come from either current or capital expenditure decreases. Since current spending is more politically sensitive (given its socioeconomic orientation), capital expenditures are more likely to be cut.

The reduction in capital expenditures (government investment) will have negative effects on aggregate demand, with potential long-term effects on productivity as well.

V.b. Calibration of Shocks in the DSGE model

When calibrating the shocks, the specification of the DSGE model was taken into consideration. Calibration took place for each shock separately prior to its incorporation into the model, using different methods (see discussion below).

Shock 1. The direct shock of zero-rating under the VAT is parametrized in the model as a reduction in the effective VAT rate (consistent with the fiscal cost of the tax expenditure).

To estimate the effects of the introduction of a zero VAT rate on agricultural products within a DSGE framework, it is important to calibrate the shock correctly, both quantitatively as well as theoretically. To achieve this, the effective VAT rate must be defined as a weighted average of the VAT rates applicable to all products, where the weights are based on a given product's share in total supply. Based on this, it is straightforward to calibrate the shock. Since the VAT rate would be reduced from 18 to zero percent, it would decrease the effective VAT rate by the share of agricultural output in total output.

For the simulation, it is necessary to select a specific year, according to which the share of agricultural output in total output will be determined. For the simulation, data from year 2021 is used, when agricultural products accounted for 7.4 percent of total output. In this year, the estimated tax expenditure in the agricultural sector amounted to GEL 310 million, and nominal GDP was at GEL 60,003 million. Using this information, the calculated decrease in the effective VAT rate is used as a shock in the DSGE model to simulate the effects of this specific tax policy change on the economy.

Shock 2. The scale of the total factor productivity shock is estimated using a different model, where the impact on efficiency is taken into account and caused by resource (mis-)allocation due to changes in inter-sectoral relative prices.

VAT tax relief directly affects the price of a product. The amount of investments and saving increases in the sector accordingly, profit margin increases compared to the normal situation, and thus, relative price distortion takes place, compared to relative prices in a situation where there are no VAT reliefs. Changes

[7] https://matsne.gov.ge/ka/document/view/1405264?publication=3

in relative prices will affect the profits of producers of that product and, thus, those producers will change their demand for production factors. This results in a classic case of inefficiency, due to misallocation of recourses. This phenomenon is widely used to model the inefficient allocation of resources from increased dispersion of relative prices due to rigid prices (Yun, 2005)[8]. This issue is addressed with the following model.

According to this model, the economy produces two types of goods – one that is exempt from VAT (y_E) and another good (y_B) which is taxed under the benchmark system. Production of each type of good uses two types of labor - (L_U) is labor which has a comparative advantage in producing goods taxed under the benchmark rate. Thus, the second type of labor (L_R) has a comparative advantage in producing VAT-exempted goods. Both types of labor participate in the production of both types of goods, but their share in each type of good depends on their comparative advantages in a way that satisfies the optimal distribution of labor. These two labor forces differ in their production of each type of good (based on comparative advantage), but other types of differences are not included in the model. Also, it is assumed that the elasticity of substitution of these two types of labor does not depend on the type of good produced.

Both types of labor have similar utility functions that take the following form:

$$u_j = \frac{C_j^{1-\sigma_C}}{1-\sigma_C} - \xi \frac{L_j^{1+\sigma_L}}{1+\sigma_L}$$

where u_j is utility, C_j is consumption of each household and L_j is labor supply. ξ is a parameter, which defines the preferences between consumption and leisure, σ_C is the intertemporal substitution elasticity and σ_L is the inverse Frisch elasticity. The $j = \{U, R\}$ index defines households with different comparative advantages.

Households face the following simple budget constraint:

$$w_j L_j + T_j = C_j \tag{1-2}$$

where w_j is the real wage and T_j are transfers from the government to each type of household.

After solving for the utility function and budget constraint, aggregate demand is derived as follows:

$$C = C_U + C_R$$

Aggregate demand creates demand for individual products. Aggregate real consumption is described by the following constant elasticity of substitution (CES) function of individual products:

$$C = \left[\alpha^{\frac{1}{\eta}} y_E^{\frac{\eta-1}{\eta}} + (1-\alpha)^{\frac{1}{\eta}} y_B^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$$

[8] Yun, Tack. 2005. "Optimal Monetary Policy with Relative Price Distortions." American Economic Review, 95 (1): 89-109.

where α is a preference parameter, which defines the share of each good and η is the elasticity of substitution. Typical consumers based on aggregate demand face the following cost minimization problem:

$$p_E y_E + p_B y_B + \phi \left\{ C - \left[\alpha^{\frac{1}{\eta}} y_E^{\frac{\eta-1}{\eta}} + (1-\alpha)^{\frac{1}{\eta}} y_B^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} \right\} \to \min$$

Via transformations and simplifications of these equations, it is possible to determine the level of aggregated prices. Without loss of generality, we assume that it equals 1. Therefore, calculation results do not depend on this assumption.

Also, since both types of labor are used for the production of both goods, their production functions can also be written. At the same time, the problem of minimization of costs from the producer's side will be solved by such a combination of production factors (in our case, two types of labor), when the costs are minimal.

The cost minimization problem takes the following form:

$$\pi_i = \sum_{j=\{U,R\}} w_j L_j + p_i \left\{ y_i - A_i \left[\{\epsilon,\beta\}(L_U)^{\frac{\mu-1}{\mu}} + (1-\{\epsilon,\beta\})(L_R)^{\frac{\mu-1}{\mu}} \right]^{\frac{\mu}{\mu-1}} \right\}$$

where p_i is the real marginal cost of production, i.e., the relative price. Its first-order conditions give us the demand functions for production factors. Taking those factor demand functions into production functions will yield functions for the real marginal cost, i.e., functions that determine the price. In addition, using factor demand functions for each type of labor gives labor supply proportions for each type of good.

The model equilibrium is disrupted after introducing a zero VAT rate for agricultural products, which distorts the incentives of different types of workers and causes the economy to become inefficient[9]. Inefficiency is defined in the model as a (negative) percent change in total factor productivity (TFP), which is incorporated into the DSGE model as a productivity shock[10].

It should be noted that this analysis reflects only one aspect of the inefficiency of resource allocation, namely the violation of the optimal allocation of the two types of labor with comparative advantages. The real effect also includes the distribution of the labor force in other ways, as well as the change in the distribution of capital, etc.

According to model simulations, TFP falls by 0.32 percent due to the implemented VATE. This amount is used as a gradual formation of the shock in the DSGE simulation.

[9] In the model, the different absolute or relative parameters of the two types of labor are calibrated according to GEOSTAT data on rural and urban employees.

[10] See detailed information about the model in Annex 1.

Shock 3. The import substitution effect of agriculture is also estimated using a separate model.

Establishing tax incentives for agriculture could, in turn, incentivize a reduction in the prices of domestic agricultural production. A decrease in the prices of domestic agricultural products would make them more competitive vis-a-vis imported products, which may lead to a decrease in imports of these products (import substitution effect). This should improve the trade balance, which would represent a positive shock to the economy.

The results of the dynamic factor model described in Chapter III above also hinted at this channel.

In the model, overall prices are divided into agricultural and other (non-agricultural) prices. Agricultural prices, in turn, are written as a composition of domestic and import prices. Total consumption is also broken down into consumption of agricultural and other (non-agricultural) products. The consumption of agricultural products is disrupted by the consumption of domestic and imported products.

For each product, the demand equation is written as a function of the corresponding relative price and consumption.

For the calibration of the model, both the macroeconomic parameters of Georgia and the features of the composition of the consumer price basket from GEOSTAT are used. The parameters of the model are estimated by employing a Kalman filter and Bayesian estimation techniques, from which the target parameter – elasticity of demand for agricultural products, with respect to the relative prices of domestic and imported agricultural products, is estimated. From the estimation results, the parameter is $\eta_A = 1{,}0678$.

The estimated coefficient is, then, transformed via model properties/other macroeconomic ratios (imported agricultural products share in total agricultural consumption and agriculture's share in total output) and used in the DSGE model as an import substitution shock.

In the DSGE model, the demand for imported goods is given by the following equation:

$$C_M = z\left(\frac{p_M}{p}\right)^{-\eta_C} C$$

where, C is aggregated demand on consumption, C_M is import consumption, p_M and p are the corresponding prices, η_C is the elasticity of substitution between domestic and imported goods (this parameter is calibrated for the aggregated product, and specifically the elasticity of substitution for agricultural goods – η_A, is calibrated from the above-mentioned model), while z is a preference parameter.

Imposing a VATE for domestic products affects their relative price $\frac{p_M}{p}$ by the factor of $\frac{1+\tau}{\alpha(1+\tau)+(1-\alpha)}$, where τ is the tax rate and α is the share of imports in agricultural consumption. Therefore, this change will have a permanent effect on C_M by $\left(1-\left(\frac{1+\tau}{\alpha(1+\tau)+(1-\alpha)}\right)^{-\eta_A}\right)\gamma = 0.94$ percent, where γ is the share of agricultural products in the overall consumption basket. Since this reduction is not affected by changes in p_M and p, the shock was applied to the z parameter within the DSGE simulation.

Shock 4. To reflect the government investment shock in the DSGE model, the fiscal deficit-to-GDP ratio is left unchanged and the reduction in tax revenues is compensated by the government investment shock. This approach allows for the estimation of the necessary government spending adjustment to achieve the deficit target.

As described in Chapter II above, for a complete analysis it is important to take into account the net effect of the policy, which includes the opportunity costs that accompany the money, which was "left" in the private sector. In this case, the opportunity cost represents the possible benefit that this money would have brought to the budget or the economy as a whole, if the mentioned amount had not been deducted from tax revenues and had been used by the government.

V.c Shock Propagation through the Model

The shock to the VAT (consumption tax) will propagate through the DSGE model in both direct and indirect ways.

The direct impact of the shock will be felt in equations that directly involve the VAT rate, such as equations related to consumption or government revenue. For example, a decrease in the VAT rate may lead to an increase in consumption, which in turn may lead to an increase in output and employment. Similarly, a decrease in the VAT rate may lead to a decrease in government revenue, which may require adjustments in government spending or borrowing.

The indirect impact of the shock will be felt through the general equilibrium effects of the model. The initial shock may lead to changes in relative prices, wages, and interest rates, which may then affect other equations in the model. For example, a decrease in the VAT rate may lead to an increase in the demand for certain goods, which may lead to an increase in their relative prices and wages. This may then affect other equations in the model, such as investment or labor supply. All these changes affect the other variables again and so on.

The shock will propagate through the model until it converges to a new steady state. In the case of a permanent shock, the model will converge to a new long-run equilibrium with a new steady-state value for the variables in the model. In the case of a temporary shock, the model will eventually converge back to its initial steady-state value after a period of adjustment.

In the model, the consumption tax has direct effects on tax revenues, on the consumption rate of the OLG (overlapping generation) and HTM (hand to mouth) households (see Annex 2), the marginal propensity to consume (it increases when the tax rate decreases), the cost of holding money, money velocity (both OLG and HTM) and transaction costs.

As described in Annex 2, HTM households do not have access to financial markets and, thus, cannot save. Therefore, every additional increase in their income translates into an increase in consumption. OLG households, on the other hand, can save their additional income, but when a consumption tax rate cut

takes place, it also affects their marginal propensity to consume (it increases), which diminishes the effect on savings.

Even though the rise in consumption leads to a rise in imports and the country's exports are primarily driven by foreign demand, the consumption tax rate shock has a marginal impact on exchange rates (appreciation) and causes the import substitution partially (see Table 6). As a result, total exports decline (due to the currency appreciation) together with imports. Even though the negative impact on imports is less pronounced during the first 3-4 years, the current account balance deteriorates during this period. After that, when the shock on preferences is fully realized, the impact on import substitution is higher than the impact on the reduction in exports, which slightly improves the current account. It should be noted that the reduction in government capital spending also triggers the reduction in imports, as capital spending has a higher import component compared to other spending instruments. However, the impact of capital spending in the long run is more important. Despite an increase in tax revenues from higher consumption due to the reduction in the consumption tax, which partially offsets the negative revenue effects, tax revenue remains below its initial value. Consequently, the deficit increases, leading to an expansion in debt, further weakening the government's finances, though this will be compensated by the relevant reduction in government investment (final quantitative results are presented below).

A total factor productivity shock has an impact on the potential capacity of the economy. All other things being equal, the economy allocates its resources inefficiently, and accordingly, the goods and services produced fall short of their potential. A contraction in the economy leads to a reduction in consumption, but it also reduces the demand for imports, which partially offsets the negative effects on the economy.

As already mentioned, in the model, the total factor productivity shock is caused by the distortion of relative prices, which causes inefficient use of production factors. Since the effect can appear gradually (because it takes time to respond to stimuli), in the model, the effect will be partially reflected on the economy during the first 2 years, and will be fully revealed from the third year onwards (Panel 7, graph 7.D).

Import substitution, caused by changes in domestic agricultural production and import prices, has effects on the economy through several channels. It improves the trade balance, which has a positive effect on economic activity (increases GDP). It has a positive effect on the current account balance, which, in turn, leads to expectations of the appreciation of the exchange rate. Accordingly, this will lead to exchange rate appreciation in the current period. Taking into account that, in the end, the policy has an insignificant effect on the price level, it will also lead to the strengthening of the real exchange rate.

The appreciation of the exchange rate, on the other hand, has a negative effect on the growth of total exports, and on the contrary, a positive effect on total imports. All this has a negative effect on the trade balance and, in turn, on GDP.

At the same time, the strengthening of the exchange rate will have a positive impact on both the service and principal part of government debt. As a result, it will have a positive effect on the reduction of fiscal spending and the ratio of debt to GDP.

The reduction of public investments has a direct effect on the reduction in GDP. Capital spending creates public infrastructure, which also defines total factor productivity. Moreover, taking into account the multiplier effect, the effect increases even more in the medium term and hinders economic growth. In turn, it includes all possible effects associated with a reduction in economic activity and/or aggregate demand described so far. Among the effects of the capital spending reduction in the short-run, the impact on the reduction in imports is dominant, while in the long run, the effect related to the reduction in productivity surpasses the one related to the reduction in imports.

As evident from the previously outlined directions of shock propagation, the model's shocks exert varying impacts on economic variables during different stages of time.

The DSGE model adapted to the reality of Georgia allows for the interaction of all variables to be solved jointly and to show the final ("net") effects of the VATE on economic parameters.

V.d. DSGE Modelling Results and Net Effects of the Tax Expenditure

The final results of this TEE are expressed in terms of net (macroeconomic) effects, which involves the assessment of both direct (first-order) and indirect (second order) impacts, consideration of alternative costs and their overall combined effect on the Georgian economy.

To proxy for the above, this TEE relies on the overall impact on GDP produced by the DSGE model. This is because the GDP impact would combine all of the above-mentioned interactions triggered by the VATE and allow for the evaluation of the policy through a single indicator, rendering the TEE exercise more practical.

As the final results of the quantitative assessment show (Panel 6, figures 6.A and 6.B), in the first 2 years following the introduction of the VATE, its net impact on both nominal GDP and real GDP is positive. From the third year onwards, both effects become increasingly negative. The main reason for the difference between the short- and medium-/long-term effects is the lagged impact of the reduced government capital spending on the economy which, in turn, reduces TFP (considering that a shock in productivity would not be reflected immediately on the economy).

This means that within 2 years, the positive effects of the VATE (increase in private consumption, import substitution, etc.) outweigh the negative effects (budget loss, decrease in net exports, inefficiency caused by the decrease in productivity, etc.). From the third year onwards, all of the above-mentioned negative effects (particularly the total factor productivity shock) start to outweigh the positive ones (Panel 7, figure 7.D).

As described above, budget losses are permanently compensated by the reduction in government capital spending. Specifically, government capital spending becomes negative throughout the analysis period, while also decreasing in relation to GDP. This is caused by several factors. One of them is the fact that the severity of the tax revenue loss caused by the consumption tax rate cut in the first year is completely reflected in a decrease in capital expenditures. However, in the following year, in parallel with the increase

in savings and the increase in wages (wages increase more in the tax-exempt sector), tax revenues from direct taxes increase slightly. However, in real terms, wages are quite rigid (which is also taken into account in the DSGE model) and it is difficult to change them (especially downwards). Because of this, any changes in direct tax revenues could never compensate the tax revenue losses from indirect taxes (due to the VATE). Consequently, a decrease in government capital investment is constantly needed to maintain the deficit stable.

As mentioned above, the expected positive effect of the policy should have been mirrored in an increase in private savings, the concomitant effect of which is the corresponding increase in investment. This effect can be seen in figure 6.D. According to this, due to the income effect, the private sector (this mainly affected the agricultural sector) will decide to increase savings and therefore investment. This effect is visible in the initial period, after which it gradually decreases (but remains positive). The decrease in market interest rates, which was observed in response to lower inflation, also had a slight positive impact on investment.

Due to the indirect effect of exchange rate appreciation (figure 7.B) and the potential price reduction of agricultural products because of the policy itself, the model shows that the headline price level also decreased slightly, which was followed by a slight decrease in interest rates from the central bank, and market interest rates also decreased slightly.

Panel 6. Georgia: DSGE Modeling Results, Net Impact (Deviation from the Baseline Scenario)

Figure 6.A.

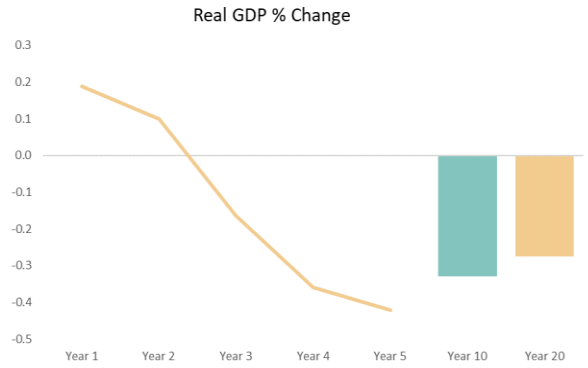


Figure 6.B.

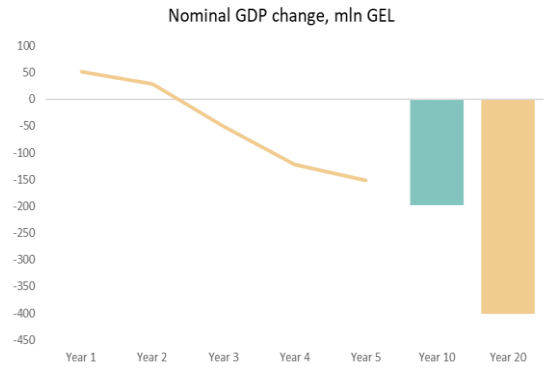


Figure 6.C.

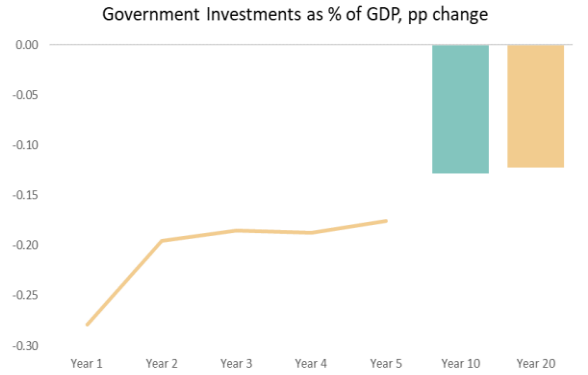
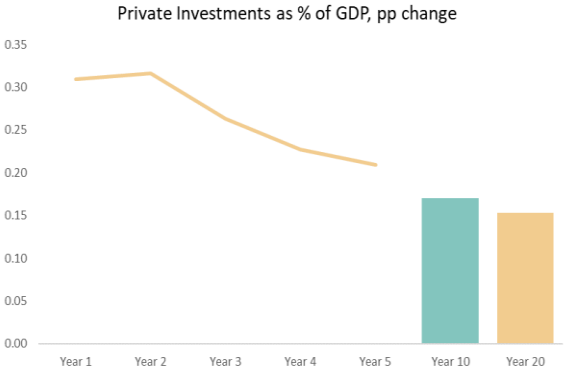


Figure 6.D.



Source: MOF calculations

Despite the fact that there is a slight appreciation of the real exchange rate, which should have slightly worsened the trade balance, the effect caused by the change in relative prices turned out to be stronger and, except for the second period, there was only a very slight improvement in the trade balance (figure 7.A).

Panel 7. Georgia: DSGE Modeling Results, Net Impact
(Deviation from the Baseline Scenario)

Figure 7.A.

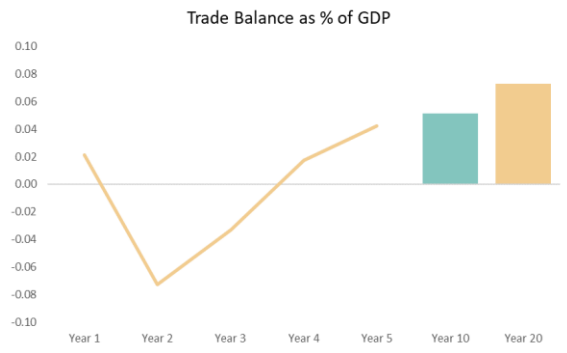


Figure 7.B.

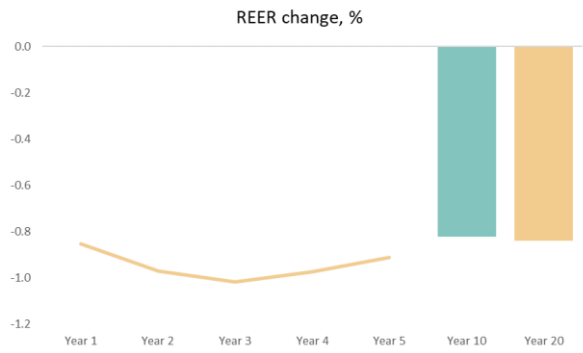


Figure 7.C.

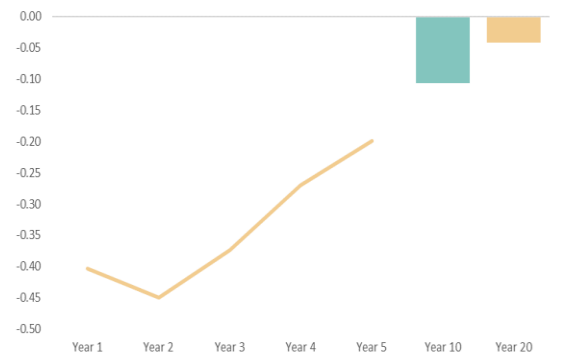
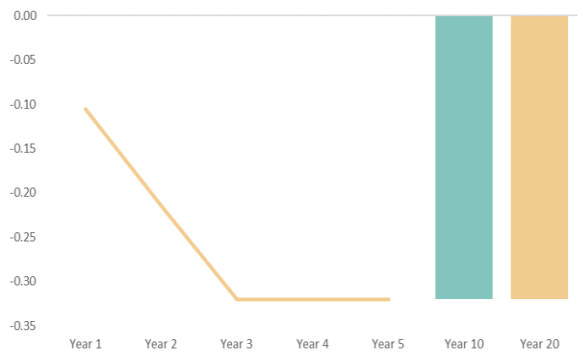


Figure 7.D.

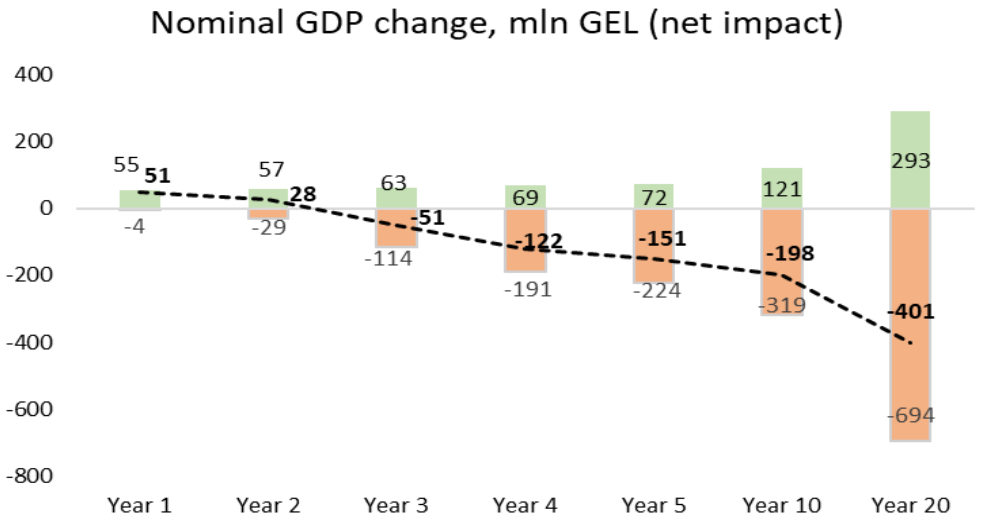


Source: MOF calculations.

As expected, due to appreciation of the real exchange rate (in the case of Georgia, the share of foreign debt is 75 percent of total government debt), the ratio of debt to GDP decreased, which was impacted positively (but insignificantly) by the reduction in interest rates.

In conclusion, the net effect of the introduction of the zero-rating VATE on agricultural products in the first two years was positive (Figure 2). However, from the third year onwards, although some actors (especially in the agricultural sector) still experienced a positive impact, the negative effect was so high for the rest of the economy that the net effect of the policy became (and remainder) permanently negative. It should be noted that Figure 2 shows the net effect of the VATE on nominal GDP, decomposed into the constituent positive and negative effects, while Figure 6.B only shows the net (overall) effect on GDP during the same period.

Figure 2. Georgia: Decomposition of the Net Impact of the VATE on Nominal GDP (Deviation from the Baseline Scenario)



Source: MOF calculations.

The green (positive) bars show the positive impact of the VATE from the zero-rating of agricultural products, which is mainly concentrated in the agricultural sector itself. On the other hand, the orange (negative) bars show the negative impact of the VATE (due to reductions in tax revenue, public spending on infrastructure, etc.). The black-dotted line is the net effect on the whole economy relative to the baseline (calculated as the sum of the aforementioned positive and negative impacts).

Conclusion

In conclusion, this Tax Expenditure Evaluation (TEE) report analyzed the impact of the zero-rating of agricultural products under the VAT introduced in 2012 on Georgia's economy. The report used different methods to quantify this impact (net benefit) in monetary terms, considering both the estimated benefits and costs of the VATE. It also examined whether the VATE in question meets its objectives and policy effectiveness criteria.

This TEE used a variety of research approaches and methods to analyze relevant macro-economic and micro-economic data related to the VATE from the zero-rating of agricultural products. This VATE was selected for TEE on account of three main reasons: (i) its cost – it is the largest single good or service TE item in terms of revenues forgone, (ii) the importance of employment in Georgian agriculture (e.g., as a share of total employment), and (iii) awareness that areas for improvement exist for this policy.

First, the report conducted a descriptive analysis of trends in key macroeconomic indicators around the implementation period of the VATE. These indicators included: employment in the agricultural sector, monthly earnings from the agricultural sector, the share of the agricultural sector in GDP, exports, and imports of agricultural products, and share of total household consumption in GDP.

In order to evaluate and analyze the potential effects of the introduction of the zero-rating of agricultural products under the VAT on the aforementioned macroeconomic indicators, this report also applied a Dynamic Factor Model (DFM), which explicitly introduced the VATE as a shock, while controlling for other contemporaneous processes that may have a potential effect on the outcome variable(s) of interest.

On the distributional effect of the VATE, a microsimulation model (MSM) was used to show that the VATE is characterized by poor targeting, in that it does not only reach its intended beneficiaries. Specifically, the MSM analysis shows that higher-income households receive more benefits in relative to low-income households, reflecting the poor targeting of the policy.

The net (of benefits and costs) impact of the VATE from the zero-rating of agricultural products is estimated through a DSGE model relative to a baseline that assumes no new (or tightening of existing) policies. Said net impact is positive in terms of GDP during the first two years of the policy. However, from the third year onwards, even though some market agents (especially in the agricultural sector) experience a positive impact, the negative effect on GDP for the remaining sectors is strong enough, such that the net impact of the VATE becomes (and remains) negative. In the 10th year, the net impact of the VATE amounts to -0.33 percent of GDP (relative to the counterfactual of no VATE adoption), which is equivalent to a net loss of GEL 198 million in nominal terms. This finding could also be interpreted as the agricultural sector benefiting by only GEL 121 million from a tax benefit of about GEL 300 million, while the rest of the economy loses GEL 319 million. By the 20th year, this effect decreases to -0.28 percent of GDP or GEL 401 million in nominal terms (i.e., the benefit to the agricultural sector is equal to GEL 293 million, while the rest of the economy loses GEL 694 million).

Annex 1. Modelling Relative Price Distortion and its Effect on Total Factor Productivity

VAT tax relief directly affects the price of a product. Thus, relative price distortion takes place, compared to relative prices in cases where there are no tax reliefs. Changes in relative prices will affect the profits of producers of that product and thus those producers will change their demand for production factors. This leads to a classic case of inefficiency, which is a result of the inefficient allocation of recourses. This phenomenon is widely used to model the inefficient allocation of resources by increased dispersion of relative prices due to rigid prices (see Yun [2005])[11]. This issue is addressed with the following model.

Model description

Assume that the economy produces two types of goods – one that is exempt from VAT (y_E) and another good (y_B) which is taxed under the benchmark policy (or VAT rate). Production of each type of good uses two types of labor. (L_U) is labor, which has comparative advantage in producing goods taxed under the benchmark rate. Thus, the second type of labor (L_R)[12] has comparative advantage in producing VAT-exempted goods. Both types of labor participate in producing both types of goods, but their share in each type of good depends on their comparative advantage in a way that satisfies optimal distribution of labor. The two labor forces differ in the production of each type of good with comparative advantage, but other types of differences are not included in the model. Also, it is assumed that the elasticity of substitution of these two types of labor forces does not depend on the type of good they produce.

Both types of labor have a similar utility function that takes the following form:

$$u_j = \frac{C_j^{1-\sigma_C}}{1-\sigma_C} - \xi \frac{L_j^{1+\sigma_L}}{1+\sigma_L}$$

where u_j is utility, C_j is consumption of each household and L_j is labor supply. ξ is a parameter, which defines the preference between consumption and leisure, σ_C is an intertemporal substitution parameter and σ_L is the inverse Frisch elasticity. The $j = \{U, R\}$ index defines households with different comparative advantages.

Households face the following simple budget constraint:

$$w_j L_j + T_j = C_j \qquad (1\text{-}2)$$

Where w_j is the real wage and T_j are transfers from the government to each type of household.

[11] Yun, Tack. 2005. "Optimal Monetary Policy with Relative Price Distortions." American Economic Review, 95 (1): 89-109.

[12] In the model, L_U and L_R are calibrated based on rural and urban employment data.

$$\sum_{i=\{e,b\}} y_i p_i \tau_i = T \tag{2-3}$$

$$T_R = \mathcal{t} T \tag{4}$$

$$T_U = T - T_R \tag{5}$$

where, p_i is the relative price of the corresponding product to the aggregate price level, τ_i is the VAT rate on the corresponding product, and transfers are distributed with the parameter $\mathcal{t}$. However, it is not necessary to satisfy the condition $\in [0; 1]$, since this parameter also reflects other types of cash flows between households and is calibrated to ensure compliance with the statistical ratios between consumption levels.

The Lagrange function for the household problem can be written as follows:

$$\mathcal{L}_j = \frac{C_j^{1-\sigma_C}}{1-\sigma_C} - \xi \frac{L_j^{1+\sigma_L}}{1+\sigma_L} + \lambda_j \left(w_j L_j + T_j - C_j \right)$$

where λ_j is the Lagrange multiplier.

First-order conditions take the following form:

$$\frac{\partial \mathcal{L}_j}{\partial C_j} = C_j^{-\sigma_C} - \lambda_j = 0$$

$$\frac{\partial \mathcal{L}_j}{\partial L_j} = -\xi L_j^{\sigma_L} + \lambda_j w_j = 0$$

where:

$$L_j^{\sigma_L} = \frac{w_j}{\xi C_j^{\sigma_C}} \tag{6-7}$$

equations (6-7) form aggregate demand:

$$C = C_U + C_R \tag{8}$$

Aggregate demand creates demand for individual products. Aggregate real consumption is described by the following constant elasticity of substitution (CES) function of individual products:

$$C = \left[\alpha^{\frac{1}{\eta}} y_E^{\frac{\eta-1}{\eta}} + (1-\alpha)^{\frac{1}{\eta}} y_B^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$$

where α is a preference parameter, which defines the share of each good and η is the elasticity of substitution. A typical consumer (based on aggregate demand) faces the following cost minimization problem:

$$p_E y_E + p_B y_B + \phi \left\{ C - \left[\alpha^{\frac{1}{\eta}} y_E^{\frac{\eta-1}{\eta}} + (1-\alpha)^{\frac{1}{\eta}} y_B^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} \right\} \to \min$$

Here, the Lagrange multiplier ϕ is the marginal cost of aggregate consumption, that is, the aggregate price of a consumer product. Since we are considering a static model, the observation of nominal prices is devoid of content, therefore, without limitation of generality, we assume that $P \equiv \phi = 1$. Given this, all variables in the model are real, and p_i prices are relative prices.

With the first-order conditions, we derive Marshallian demand functions for individual products:

$$y_E = \alpha[(1+\tau_E)p_E]^{-\eta}C \tag{9}$$

$$y_B = (1-\alpha)[(1+\tau_B)p_B]^{-\eta}C \tag{10}$$

By inserting equations (9-10) into a CES function and applying simple transformations, we derive the aggregate price equation:

$$1 = \alpha[(1+\tau_E)p_E]^{1-\eta} + (1-\alpha)[(1+\tau_B)p_B]^{1-\eta} \tag{11}$$

where, in accordance with the above-mentioned assumption, the aggregate price level is equal to 1.

Both types of labor are used to produce each product. The production technology is described by the following constant elasticity of substitution function:

$$y_E = A_E\left[\epsilon(L_U^E)^{\frac{\mu-1}{\mu}} + (1-\epsilon)(L_R^E)^{\frac{\mu-1}{\mu}}\right]^{\frac{\mu}{\mu-1}} \tag{12}$$

$$y_B = A_B\left[\beta(L_U^B)^{\frac{\mu-1}{\mu}} + (1-\beta)(L_R^B)^{\frac{\mu-1}{\mu}}\right]^{\frac{\mu}{\mu-1}} \tag{13}$$

where, A_i is the overall total factor productivity indicator for each product, ϵ and β are the regulatory parameters of the proportions of the labor resource used in the production of tax-exempt and taxable products under the benchmark system, and μ is the elasticity of resource substitution, which, according to the assumption above, does not depend on the production technology.

L_j^i is the part of labor force of type L_j that is used in the production of the ith product. So, the following equations hold:

$$L_j = \sum_{i=\{E,B\}} L_j^i \tag{14-15}$$

The producer chooses the combination of factors in such a way that the production costs are minimal. The cost minimization problem is as follows:

$$\pi_i = \sum_{j=\{U,R\}} w_j L_j + p_i \left\{ y_i - A_i \left[\{\epsilon,\beta\}(L_U)^{\frac{\mu-1}{\mu}} + (1-\{\epsilon,\beta\})(L_R)^{\frac{\mu-1}{\mu}} \right]^{\frac{\mu}{\mu-1}} \right\}$$

where p_i is the real marginal cost of production, i.e., the relative price. Its first-order conditions determine demand for factors:

$$L_U^E = \epsilon^\mu A_E^{\mu-1} \left(\frac{w_U}{p_E}\right)^{-\mu} y_E$$

$$L_R^E = (1-\epsilon)^\mu A_E^{\mu-1} \left(\frac{w_R}{p_E}\right)^{-\mu} y_E$$

$$L_U^B = \beta^\mu A_B^{\mu-1} \left(\frac{w_U}{p_B}\right)^{-\mu} y_B$$

$$L_R^B = (1-\beta)^\mu A_B^{\mu-1} \left(\frac{w_R}{p_B}\right)^{-\mu} y_B$$

Substituting the factor demand functions into the production function gives us the functions determining the real marginal cost, i.e., the price of the product:

$$p_i = \frac{1}{A_i} \left[\{\epsilon,\beta\}^\mu w_U^{1-\mu} + (1-\{\epsilon,\beta\})^\mu w_R^{1-\mu} \right]^{\frac{1}{1-\mu}} \tag{16-17}$$

Demand functions for each type of labor force give us the proportions of labor supply in individual products:

$$\frac{L_U^E}{L_U^B} = \left(\frac{\epsilon}{\beta}\right)^\mu \left(\frac{A_E}{A_B}\right)^{\mu-1} \left(\frac{p_E}{p_B}\right)^\mu \frac{y_E}{y_B} \tag{18}$$

$$\frac{L_R^e}{L_R^b} = \left(\frac{1-\epsilon}{1-\beta}\right)^\mu \left(\frac{A_E}{A_B}\right)^{\mu-1} \left(\frac{p_E}{p_B}\right)^\mu \frac{y_E}{y_B} \tag{19}$$

Calibration

In the model, the parameters of the equations are calibrated to ensure the steady states of the model are in compliance with Georgian data[13]. Since the model is in static form, its purpose is to observe how changes in relative prices will affect the model's steady states. First, it is necessary to define the general macroeconomic or fiscal ratios that characterize the economy of Georgia. For example, in order to more accurately determine what is the steady state value of the VAT-exempted sector (agricultural output in our case), we can introduce an additional equation that describes the share of agriculture in total output:

$$y_E^{rat} = \frac{y_E p_E (1+\tau_E)}{GDP-T} \times 100 \tag{20}$$

From national accounts, the share of agricultural output in total output (at basic prices) is 7.4 percent. Since the absolute values of most steady states do not have any meaning and only changes or ratios have interpretation, it is convenient to initially assign values to variables that are often used in ratio form, for example in percent of GDP.

The value of GDP is determined by the equation:

$$GDP = \sum_{i=\{e,b\}} y_i p_i (1+\tau_i) \tag{21}$$

If we define its value as one ($\sum_{i=\{e,b\}} y_i p_i (1+\tau_i) = 1$), then in order for agriculture to represent 7.4 percent of GDP, it must satisfy the abovementioned ratio. For this condition, it is necessary to calibrate the parameters, which determine its steady state. From equations (12) and (9) - by tuning the μ, α, ϵ and τ_e parameters, it is possible to satisfy the condition of the agriculture-to-GDP ratio - y_E^{rat}.

In the same fashion, we can determine the ratio of VAT revenues to GDP:

$$T^{rat} = \frac{T}{GDP} \times 100 \tag{22}$$

Based on fiscal data, VAT revenues stand at 10.6 percent of GDP. The ratio given in the model is determined by the VAT rate on exempt τ_e and non-exempt τ_b consumption. The total value of taxes in the steady state is as follows:

$$T = y_e p_e \tau_e + y_b p_b \tau_b \tag{23}$$

Since τ_e is zero, T^{rat} is determined by τ_b.

Next is the ratio between the average wages of the two types of labor, defined as:

$$w^{rat} = \frac{w_R}{w_U} \times 100 \tag{24}$$

To reconcile this ratio with the data, the ratio of the wages of the urban and rural labor forces, retrieved from GEOSTAT, is used. In the case of Georgia, the salary of a rural worker is 60 percent that of the urban worker.

Also, the agricultural consumption-to-total consumption ratio is defined as follows:

[13] The model is calibrated taking into account the economic indicators of 2019, since the quantitative assessment of tax expenditures has been carried out since 2018, and 2019 is the most recent year before the COVID-19 pandemic.

$$C^{rat} = \frac{C_R}{C} \times 100 \tag{25}$$

Based on national accounts, this ratio for Georgia is equal to 35 percent.

The given ratios can be calibrated directly via σ_L, σ_c, ξ, if we rewrite equations (6-7) in terms of w_U and w_R. They can also be calibrated indirectly via the β parameter from equation (13).

Total factor productivity can, therefore, be written as:

$$TFP = \sum_{j=\{U,R\}} \frac{C_j}{C} \times \frac{C_j}{L_j} \tag{26}$$

In the model, it depends on relative consumption and relative labor supply. After calibrating the ratios, the steady state value of TFP stands at 0.6. This value does not have any economic interpretation, and the focus of this analysis will be on changes to it.

The simulation of the VATE is done by changing the difference between the τ_e and τ_b rates. Per the initial condition, $\tau_e = 0$ and τ_b = 12.6%. Defining this difference via the following equation:

$$\Delta\tau = \tau_E - \tau_B \tag{27}$$

and setting the difference to zero will affect other variables in the steady states of the model (including TFP). By observing changes in these variables[14], we could determine the economy-wide impact of the agricultural sector VATE.

First, the model parameters were calibrated based on the literature and the Georgian Fiscal Model (GFM), following which the values of the subsequent parameters were determined.

Description	Parameter	Value
Preference Parameter for Labor Supply	ξ	1.300
Elasticity of Intertemporal Substitution	σ_C	1.500
Inverse of Frish Elasticity	σ_L	1.000
Substitution Elasticity Between Exempted and Other Goods	η	0.570
Technology Parameter of Other Production	A_b	1.000
Share of Type One Labor in Other Production	ϵ	0.200
Substitution Elasticity of Labor Inputs in Production Function	μ	0.875
Steady State (SS) Rate on Exempted Goods	$\bar{\tau}_e$	0.000

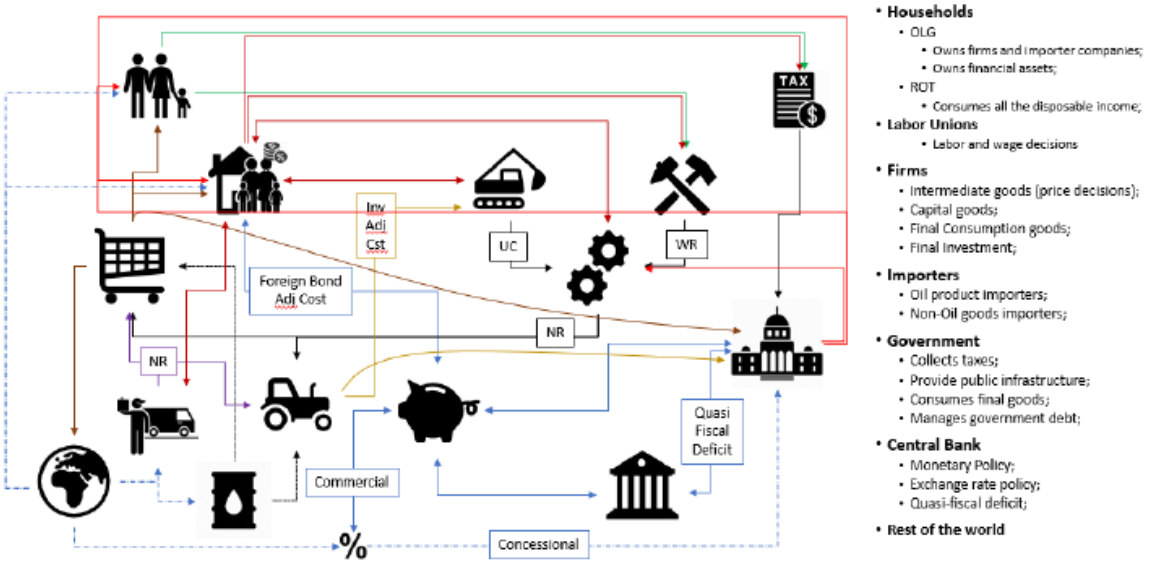
Then, in order to make the ratios of steady states of the model consistent with the ratios we determined, the homotopy method was used to calibrate the remaining parameters. In particular, values of five parameters were calibrated in order to achieve the consistency of five ratios to their empirical values.

[14] In the model, the initial condition is a situation where one sector is already exempted from taxation, and the simulation is carried out by introducing taxation on the exempted sector. The results would be the same (with opposite sign) if the initial condition was equal taxation of all sectors and the given sector was exempted from the tax in the simulation.

Description	Parameter	Value
Propensity of Exempted Goods	α	0.067
Technology Parameter of Exempted Production	A_e	0.671
Steady State (SS) Tax Rate on Other Goods	$\bar{\tau}_b$	0.126
Share of Type One Labor in Exempted Production	β	0.534
Share of Rural in Total Transfers	θ	-0.730

Annex 2. DSGE Model Description

Diagram A.1. Structure of GFM



Note: NR – nominal rigidity; UC – capital utilization cost; WR – wage rigidity.

Households - The Georgian Fiscal Model (GFM) is a TANK (Two-Agent New Keynesian) model. It incorporates two types of consumers, who have finite lifetime horizons. On the one hand, there is an overlapping generation (OLG), savers who have access to assets and debt and therefore can smooth consumption over time; on the other hand, there are rule-of-thumb (ROT) households who are liquidity-constrained poor consumers, because they are forced to consume their entire net income in every period. These finite-horizon agents, who may face liquidity constraints, help break the Ricardian equivalence and, in tandem with price rigidities, make fiscal policy non-neutral with potential significant demand effects on output. This is consistent with the views of the Ministry of Finance. Moreover, the presence of savers helps capture the effects of fiscal policy on the reallocation of assets and liabilities of the private and public sectors, while the existence of liquidity-constrained consumers helps provide a sense of the impact of fiscal policy on the most vulnerable (poor) population.

Labor Unions - Unions make decisions about labor and wages. In the GFM, there is a continuum of labor unions, one for each labor type. These types are uniformly distributed across savers and ROT consumers. In this setup, there is imperfect competition in the labor market and total demand for labor is constrained by the total labor available across households. Because of this imperfect competitive environment, in the case of flexible wages, unions would set wages above the marginal rate of substitution between consumption and labor, charging a constant markup. In addition, there is nominal wage stickiness, which follows a price-setting mechanism $\grave{a}\ la$ Calvo. The combination of imperfect competition and nominal wage stickiness gives rise to a New Keynesian Phillips curve for wage inflation.

Firms - There are four types of firms in GFM: producers of final goods, producers of domestic goods, producers of intermediate goods and producers of capital goods. **Final goods** correspond to consumption and investment, where investment can be divided between private and public. This type of goods is a bundle of non-oil goods and imported oil products. **Domestic goods** are produced by perfectly competitive firms, combining varieties of intermediate goods. **Intermediate goods** are produced by a continuum of monopolistic firms. These firms face a Dixit-Stiglitz-type demand curve for each variety they produce. They also set price following price rigidities *à la Calvo*. Monopolistic competition and nominal price stickiness provide, once more, the foundations for a New Keynesian Phillips curve for domestic price inflation. Producers of **capital goods** decide on the level of utilization of installed capital and rent the effective capital to produce intermediate goods.

Importers – There are two types of importers in this framework: non-commodity importers and oil importers. **Non-commodity importers** work in a monopolistically competitive environment, where there are price rigidities *à la* Calvo. **Oil importers** do not face any optimization problem. They have an exogenous supply of oil that satisfies oil demand.

Central bank - In the GFM, monetary policy is described as a Taylor rule, while the key macroeconomic variables of the rest of the world are assumed to follow exogenous processes. The interest rate rule is consistent with the central bank's primary goal of price stability. The exchange rate regime, on the other hand, is assumed to be fully flexible.

Government - The fiscal block of the GFM comprises several instruments on the revenue and expenditure sides, as well as different types of borrowing. On the revenue side, the model features (distortionary) taxes on labor income, capital income, and consumption. In the model, consumption taxes include VAT, excise duties, and import taxes. Labor taxes correspond to personal income taxes and capital income taxes capture corporate income taxes. Property taxes are lump sum. Besides tax revenues, the government receives revenues from the commodity sector, grants, and the quasi-fiscal deficit from the central bank. On the spending side, the model includes consumption spending, transfers to households, and public investment. In addition, the government has access to three types of borrowing: domestic, external commercial and concessional borrowing. These types of borrowing increase their respective debt stocks for which the government pays different interest rates. The GFM considers several fiscal rules to capture the government's behavior in Georgia. The fiscal deficit is assumed to react to the expected deviation of total debt from a target, ensuring public debt sustainability in the medium term. The deficit, in turn, can be financed from different sources: domestic, external concessional and external commercial borrowing. External concessional and commercial borrowing are determined by additional rules, while the rest of the fiscal deficit is covered by domestic financing.

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