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Assessment of Agricultural Taxes Reform on Sudan's Economy

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Abstract - This study evaluates the effects of agricultural taxes changes on Sudan economy. It uses the Computable General Equilibrium model as analytical tool; with Sudan Social Accounting Matrix for year 2004 constitutes the core database. The activity and commodity accounts are disaggregated into agriculture (sesame, sorghum, cotton, wheat and other agriculture), industry and service accounts. The model results show that reduction of wheat import tariff increases wheat imports, output and export of cotton, sesame, industrial and services sectors. The overall effect of this policy is improvement of GDP, balance of trade and investment. The results reveal that reduction of production tax or value added tax for each crop would increase its domestic output and exports and reduce those of the other crops, except for sorghum. The overall effect of reducing these taxes improves the GDP and private consumption despite the mixed effect on investment and balance of trade. The study recommends reduction of taxes on agriculture and increasing direct taxes on private companies to compensate government revenue loss.

Keywords : Sudan, CGE, SAM, CGE, Import Tariff, VAT and Production Tax.

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I. INTRODUCTION

here is a worldwide trend of market globalization and trade liberalization. The World Trade Organization (WTO) is playing a significant role in liberalization of the international trade system, especially between its member countries, through reduction of tariff and non-tariff barriers that hinders flows of goods and services. Trade liberalization brings benefits and drawback to each economy, whereas the comprehen sive impact of trade liberalization has some uncertainty. Bruno (1997) argued that trade liberalization in the long run, would improve resource allocation efficiency and promote economic growth by introducing benefits to local consumers by lowering the cost per unit. He also stated that in the short run trade.1 This work is financially supported by the Economic and Social Research Bureau, Sudan liberalization will result

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in disturbing cost by leaving open some highly protected sectors or negative balance of payment by rapid growth of imports. Agion and Montiel (1996) argued that trade liberalization would not necessary result in decreased employment and output and negative balance of payment.

Sudan has a relatively huge economic potential measured in terms of its endowments of natural resources, including arable and grazing land, water, mineral resources, and a dry and semi-dry climatic zones. Since mid 1970s, Sudan began to pursue a sort of stabilization and adjustment policies with the aim of stimulating agricultural production and the promotion of agricultural exports. These programs included the economic recovery programme (ECRP) 1978-1985, the four-year economic salvation programme (ESP) 1987-1989 and the national economic salvation programme (NESP) 1990-93. The recent 1990s policy reforms were more oriented towards the liberalization of trade, with more flexible exchange rate, removal of subsides, restructuring of taxes (such as agricultural tariff, production and value added tax), and privatizing public corporations and parastatals in the Sudan (Ministry of Finance and Economic Planning (MFEP), 1990).

The performance of agriculture under these programs varied considerably depending on factors such as the magnitude of the economic crisis that preceded each programme, the extent to which the government actually implemented and sustained the adjustment reforms, and the effect of exogenous factors, such as climate, civil war and changes in the terms of trade facing the country (Hag Elamin and Elmak (1997). However, in reality the agricultural sector is still heavily taxed, directly and indirectly.

The agricultural sector in the Sudan is distinguished into four sub-sectors including, the traditional rain-fed, the mechanized rain-fed, the irrigated and livestock. Despite the relative decline in the agricultural share in the national GDP from 45% to 35% during the last decade, it still provides the livelihood for more than 60% of the total population and employs more than 55% of the labour force in the country (Bank of Sudan, 2010). The exploration and exports of petroleum products associated with an increase in the service sector resulted in the relative decline in agricultural GDP and share of agricultural exports, with an appreciating domestic currency exchange rate.

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Today with the secession of the South and the loss of 75% of the petroleum revenues, it seems that Sudan has no way out except to rely on agriculture again. Therefore it is apparent that in the near future the welfare of Sudan's population, especially of the poor who are largely located in rural areas depending on agriculture, will be highly affected by the policy changes. In this regard the government in 2008 launched the five years Agricultural Revival Program (ARP). The main focus of the program is to increase the efficiency of agricultural sector through encouraged private sector investments, improving research and development (technology development and transfer) among farmers.

Removal of production taxes in agriculture would improve its competiveness, where as tariff reduction would result in cheaper imports, changing demand patterns with consequent changes in flow of agricultural and other sectors. The effect of such policy has yiel important implications on income distribution, government finance and the external current account. To capture such implications comprehensively, CGE models are widely used for simulating such effects.

II. OBJECTIVES OF THE STUDY

The main objective of this study is to simulate the expected effects of reduction of agricultural taxes on macro-economic indicators (GDP, balance of trade, private consumption and investment), and on sectoral ones (domestic output, export and imports). Specifically, the study assesses the implications of these changes and shed light on the required policies for enhancing social welfare expected effects of changes in the following variables :

- 1. Import tariff of wheat, sorghum, cotton and sesame on macro and sector economic indicators of Sudan,
- 2. Production tax of wheat, sorghum, cotton and sesame on macro and sector economic indicators of Sudan,
- 3. Value added tax wheat, sorghum, cotton and sesame on macro and sector economic indicators of Sudan,
- 4. Indirect tax reduction on direct tax compensation on government income.

III. Research Methodology

CGE models are frequently used to simulate the effects of policy changes on endogenous variable. They are often regarded as extensions of input-output and linear programming models in the sense that they are multi-sectoral models and capture interdependence between sectors. But in addition they capture the interdependence between other agents in the economic system such as households and other domestic institutions, as well as the external sector. The core of CGE model is a representation of the markets for products and factors. Decisions by producers and consumers determine supplies and demands for products and factors which become mutually consistent through adjustments in relative prices. This is because quantitative assessment made with these models are usually more detailed and comprehensive than those made by others model. The basic merit of CGE lies in its solid microeconomic theory foundation, which facilitates explicit modeling of the behavior of different economic agents.

This study uses the standard CGE model developed by the International Food Policy Research Institute (IFPRI), structured on the tradition of trade-focused CGE models of developing countries. The CGE model analysis is based on a Social Accounting Matrix (SAM). The SAM is a comprehensive, economy-wide database that contains information about the flow of resources associated with all transactions that have taken place between economic agents in a certain economy during a certain period, including the existing relationship on the level of Input–Output Table (Löfgren et al, 2002).

Three model closure rules have been applied in this study. Firstly, the government balance, and here the government savings was assumed to be flexible while direct tax rates were assumed to be fixed. Secondly, the external balance, where foreign savings was assumed to be fixed while the real exchange rate was taken as the equilibrating variable. Thirdly, saving-investment rule, where the model is assumed to be investment–driven indicating a fixed investment and a flexible savings variable. The model was implemented using General Algebraic Modelling System (GAMS) software that computed both equilibrium prices and quantities and their percentage changes in response to policy shocks.

In this study, Sudan SAM for year 2004 (Table 1) constitutes the core database for the CGE model. The activity and commodity accounts are disaggregated into agriculture, industry and service accounts. The adriculture account is further disaggregated into sesame, sorghum, cotton, wheat and other agriculture⁵ accounts. This disaggregation is based on the relative importance of these commodities to the Sudanese economy (export, imports and food security issues). Taxes and tariffs accounts are disaggregating into income tax, production tax, import tariff, and value added tax accounts. Thus, the SAM provides detailed description of the Sudanese economy, with special emphasis on disaggregating agricultural and taxes accounts to achieve the study objectives.

The data for the SAM are derived from the following sources: Central Bureau of Statistics (CBS; 2007), Central Bank of Sudan (BOS, 2010), Sudan Customs Authority (SCA), Ministry of Agriculture and Forestry (2008), and Ministry of Finance and National Economy (MOFNE; 2006). The study has considered the National Accounts reports of the CBS to be the core data source for controlling the totals and balancing of the SAM.

⁵ It includes all agricultural activities other than sesame, sorghum, cotton and wheat activities

IV. LITERATURE REVIEW

CGE models are widely used in literature to simulate the effect of trade liberalization. Fan and Zheng (1999) uses the CGE model to assess the impact of China's trade liberalization for WTO accession. They shows that tariff cuts induced by trade liberalization in China have minor but positive effect on macro-economy in terms of GDP and its components changes. It also has strong effect on the trade pattern. Some industries win and others lose because of their differences in input and output patterns, as well as export transformation and input substitution possibilities.

Sapkota and Sharma (1998) constructed a CGE model for Nepal, and simulated the impact of reduction of import duty across the board by 25% on competitive imports, and the elimination of input tariff. The result of tariff reduction was a slight increase in import demand. The net effect on government income had been negative due to higher reduction in import tariff that crowded out the positive effect of export taxes.

Bautista and Thomas (2000) used an agricultural-focused CGE model for Zimbabwe and a 1991 Social Accounting Matrix (SAM) as a database to quantify the income and equity effects of trade liberalization with and without complementary changes in fiscal policies and land reforms. The study shows that trade liberalization by itself leads to an appreciable increase in total GDP, and even a more significant rise in agricultural GDP, implying an anti- agricultural bias of the existing trade restriction. The exchange rate depreciates, and both imports and exports expand substantially. In addition, there was a positive impact on aggregate real disposable income.

Thurlow and Seventer (2002) adopted IFPRI's CGE model for South Africa using its 1998 SAM. The model was used to simulate the effects of a full elimination of tariff barriers. The results indicated that a complete abolition of import tariffs generated increases in GDP, with negative and positive consequences for aggregate manufacturing and services, respectively.

Norman (2002) developed a CGE model to assess the impact of reduction of import tariff on agricultural sector of Bangladesh. The model results indicated that by reducing import tariffs, domestic output increased in almost all sectors but government revenue and savings declined significantly. It also depicted an increase in exports coupled with a greater increase in imports, a matter that caused deterioration in the balance of trade.

In Sudan, few studies have been conducted to evaluate the effect of trade liberalization on Sudan economy using CGE models. Elbushra (2007) used the standard IFPRI CGE model based on Sudan SAM for the year 2000 to analyze the possible effects of trade liberalization policy on the Sudanese economy. The study revealed that indirect tax reduction (import tariff and activity (production) tax) had improved the GDP, but at the cost of deteriorated balance of trade. It also argued for increasing the direct tax to compensate for the declining government income. Siddig (2009) examined the impact of macroeconomic and trade policies on the Sudanese economy applying the standard IFPRI CGE model based on Sudan SAM of the year 2004 and Global Trade Analysis Project (GTAP) CGE model. The study concluded that tariff elimination will promote exports; raise GDP, employment, and welfare.

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Table 1: Sudan Social Accounting Matrix for Year 2004 (SDG Million)

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/	Receipts		agic cor	nmodity			Industry	Service		Taxes ar	nd tariffs		Rest of	Total
Expenses		csesa	csorg	ccott	cwhea	cother	Comm.		ytax	atax	tar	vtax	world	
Prod.	Lab													17781.5
factor	Cap													47474.2
current	ЧН												707.8	62550.3
acc.	Gov								760.7	1549.8	1188.0	727.8		10308.2
capital	I-S												2110.4	13069.6
ac.	DSTK													1845.0
	Asesa	954.2												954.2
	Asorg		1352.5											1352.5
	Acott			278.2										278.2
Agic.	Awhea				226.7									226.7
act.	Aother					25701.5								25701.5
Industry a	lct.						21687.9							21687.9
Sevice aci	t.							51038.3						51038.3
	Csesa												451.9	954.2
	Csorg												6.0	1352.5
	Ccott												237.2	278.2
Agic.	Cwhea													916.2
comm	Cother												814.9	26221.8
Industry c	somm.												8250.4	22318.5
Sevice co.	mm.												108.6	62392.6
	Ytax													760.7
Taxes	Atax													1549.8
and	Tar				19.9	11.2	60.9	1090.0						1188.0
tariff	Vtax													727.8
Rest of w	orld acc.				669.7	509.1	563.6	10264.3						12687.1
Total		954.2	1352.5	278.2	916.2	26221.8	22318.5	62392.6	760.7	1549.8	1188.0	727.8	12687.1	

Source : Authors Compilation

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V. Model Simulation, Result and Discussion

a) Model scenarios

Three Scenarios with fifteen affiliated subscenarios have been developed to assess the impact of agricultural taxes on Sudan economy (Table 2). Scenario 1 is dealing with Import tariff and it is one of trade barriers: therefore its reduction is expected to create better opportunities for free trade between countries. At the same time, import tariff is a main source of government income in the developing countries, thus its reduction will negatively affect the government budget. Wheat is the main agricultural import commodity in the Sudan. Based on this, a reduction in wheat import tariff by 50% (partial liberalization) and 100% (full liberalization) is assessed in scenario Tar1 and Tar2, while Tar3 is performed to measure by how much the direct tax should be raised to compensate for government revenue loss of full liberalization of wheat import tax.

Scenario 2 is concerned with production tax and it is one of the indirect tax measures that affect the price of both producers and consumers. In the Sudan, production tax contributed about 15% of the total government revenue in 2004. Scenarios (Prod1 to Prod4) simulate the impact of 50% reduction of this tax on sesame, sorghum, cotton, wheat. Scenario (Prod5) applies production tax reduction (50%) to all agricultural commodities together, while scenario (Prod6) is performed to measure by how much the direct tax should be raised to compensate for government revenue loss of full liberalization of production tax on the agricultural sector.

Scenario 3 is concerned with Value Added Tax (VAT); it is a special type of indirect tax in which a sum of money is levied at a particular stage in the sale of a product or service. In 2004, it constituted about 7% of total government revenue. In 2007, the government of Sudan abolished the value added tax on the agricultural sector; therefore, a full elimination of this tax is simulated in this study to assess its impact on the Sudanese economy. Scenarios (Vat1 to Vat4) simulated the impact of a 100% reduction of this tax on sesame, sorghum, cotton, wheat. Scenario Vat5 applies full liberalization of value added tax to all agricultural commodities together, while scenario Vat is performed to measure by how much the direct tax should be raised to cover full liberalization of value added tax on the agricultural sector.

Scenario	Scenario Definitions
Codes	
Scenario1	Reduction of Import Tariff
Tar1	50% reduction of wheat import tariff (Partial liberalization)
Tar2	100% reduction of wheat import tariff with flexible government savings
Tar3	100% reduction of wheat import tariff with fixed government savings
Secnario2	Reduction of Production Tax
Prod1	50% reduction of sesame production tax
Prod2	50% reduction of sorghum production tax
Prod3	50% reduction of cotton production tax
Prod4	50% reduction of wheat production tax
Prod5	50% reduction of production tax for all agricultural sector
Prod6	100% reduction of production tax for all agricultural sector production tax
	with fixed government savings
Scenario3	Reduction of Value Added Tax
Val1	100% reduction of sesame value added tax
Val2	100% reduction of sorghum value added tax
Val3	100% reduction of cotton value added tax
Val4	100% reduction of wheat value added tax
Val5	100% reduction of value added tax for all agricultural sector
Val6	100% reduction of value added tax for all agricultural sector with flexible government savings
	5

Table 2 : Scenarios Codes and Definitions

VI. Results and Discussion

a) Impact of Import Tariff Reduction on the Economy Reduction in import tariff of wheat (partial and full) had broad inter-linkages among all sectors which have been reflected in the macroeconomic indicators. It has increased wheat imports, associated with a decrease of imports of other agricultural, industrial and service commodities (Table 3) The increased wheat imports would lower domestic prices forming disincentive to produce and deviate resources to production of cotton, sesame, industrial and services sectors that would be reflected in their increased output and exports. On the other hand, the decrease in sorghum output would result in decreased consumption associated with increased consumption of wheat as a substitute and perhaps increased sorghum exports (Table 3). The overall effect of reducing wheat import tariff is shown in the form of improvement of the GDP, balance of trade and investment, while the private consumption depicted a drop due to the reduction in imports and domestic output of other agricultural commodities.

Sectors	Base value	Percentage change from the base				
	(Million SDG)	Tar1	Tar2			
Macroeconomic indicat	ors					
Private consumption	52053	-0.0001	-0.0004			
Investment	13070	0.0070	0.0140			
GDP	68721	0.0010	0.0030			
Balance of Trade	-3326	-0.0015	-0.0030			
Imports						
Wheat	689.5	0.356	0.722			
Other agric	520.3	-0.007	-0.014			
Industry	630.6	-0.006	-0.013			
Service	11354.3	-0.010	-0.021			
Total	13194.7	0.009	0.018			
Exports						
Sesame	451.9	0.003	0.006			
Sorghum	6.0	0.019	0.038			
Cotton	237.2	0.002	0.003			
Wheat	0.0	0.000	0.000			
Other agric	814.9	0.012	0.024			
Industry	8250.4	0.013	0.027			
Service	108.6	0.027	0.054			
Total	9869	0.013	0.025			
Domestic output						
Sesame	954	0.0005	0.0010			
Sorghum	1353	-0.0012	-0.0025			
Cotton	278	0.0011	0.0022			
Wheat	227	-0.1949	-0.3914			
Other agric.	25701	-0.0012	-0.0024			
Industry	21688	0.0046	0.0092			
Service	51038	0.0002	0.0004			
Total	101239	0.0003	0.0006			

Table 3 : Impact of Import Tariff Reduction on the Economy.

Source : Model Results

b) Impacts of Reduction in Production Tax and Value Added Tax on the Economy

Reduction of each production tax or value added tax for each crop (scenario Prod1 to Prod4 and Val1 to Val4) would increase its domestic output and exports, and would reduce those of the other crops, industry and service sectors except for sorghum, which is associated with increased exports of service sector (Tables 4 and 5). These are due mainly to increases in resource use drawn from other competing activities such as wheat and cotton in the irrigated schemes. On the other hand, reducing the production tax and value added tax of sesame and cotton would increase the imports of wheat, other agriculture, industry and service sectors while the reduction of these taxes on sorghum would have opposite effects. Moreover, the effect of reduction of wheat taxes is operative only on its import reduction reflecting in decreasing total imports.

The overall effect of reducing production tax and that of value added tax would improve the GDP mainly due to improvement in private consumption despite the mixed effect on investment and balance of trade. For the case of sorghum, the improvement in the GDP could be attributed to increase in investment and export of service with improved balance of trade.

When reducing the production tax for aggregate agriculture (Pro5), the output and export of all crops increase except for those of other agricultural, industry and services sectors. Similar results were obtained with reduction of value added tax for aggregate agriculture (Val5), except for that of other agricultural commodities. In addition, the impact of the production tax for aggregate agriculture would reduce import of wheat and increase those of other agricultural, industry and services. In the same venue, similar results were obtained with reduction of value added tax except for that of other agricultural commodities. The different effects of the two taxes with respect to other agricultural commodities can be attributed to the heavy tax on the other agricultural commodities by the value added tax compared to the production tax.

In general, the reduction of production tax would improve the GDP due to improvement in private consumption and investment despite the deterioration in the balance of trade. In the case of reducing the value

added tax, GDP has improved due to improvement in private consumption, despite the deterioration of both investment and balance of trade.

Sectors	Base value	Percentage change from the base						
	(Million SDG)	Prod1	Prod2	Prod3	Prod4	Prod5		
Macroeconomic indicator	s							
Private consumption	52053	0.001	0.000	0.001	0.0002	0.002		
Investment	13070	-0.001	0.008	-0.001	0.0010	0.004		
GDP	68721	0.001	0.002	0.001	0.0006	0.006		
Balance of Trade	-3326	0.007	-0.001	0.007	0.0004	0.014		
Imports								
Wheat	689.5	0.002	-0.003	0.003	-0.154	-0.15		
Other agric	520.3	0.016	-0.003	0.016	0.003	0.025		
Industry	630.6	0.009	-0.002	0.010	0.002	0.018		
Service	11354.3	0.021	-0.004	0.021	0.004	0.043		
Total	13194.7	0.019	-0.004	0.019	-0.004	0.031		
Exports								
Sesame	451.9	1.111	-0.006	-0.017	-0.005	1.081		
Sorghum	6.0	-0.056	2.323	-0.056	-0.013	2.191		
Cotton	237.2	-0.014	-0.005	2.116	-0.004	2.091		
Wheat	0.0	0.000	0.000	0.000	0.000	0.000		
Other agric	814.9	-0.051	-0.006	-0.048	-0.012	-0.095		
Industry	8250.4	-0.027	-0.006	-0.026	-0.005	-0.066		
Service	108.6	-0.069	0.002	-0.063	-0.014	-0.151		
Total	9869	0.023	-0.004	0.023	-0.006	0.036		
Domestic Output								
Sesame	954	0.632	-0.004	-0.009	-0.003	0.6146		
Sorghum	1353	-0.004	0.212	-0.003	-0.001	0.2031		
Cotton	278	-0.012	-0.004	1.832	-0.003	1.8102		
Wheat	227	-0.008	-0.004	-0.007	0.744	0.7239		
Other agric.	25701	-0.0049	-0.004	-0.004	-0.002	-0.0117		
Industry	21688	-0.0110	-0.004	-0.011	-0.002	-0.0288		
Service	51038	-0.0050	-0.0022	-0.003	-0.0013	-0.0130		
Total	101239	-0.0002	-0.0002	0.000	0.0001	-0.0006		

Table 4 : Impact of Production Tax Reduction on the Economy

Source : Model Results

Table 5 : Impact of Value Added Tax Reduction on the Economy

Sectors	Base value		Percentage	e change fr	om the base	
	(Million SDG)	Val1	Val2	Val3	Val4	Val5
Macroeconomic indicator	S					
Private consumption	52053	0.001	-0.00003	0.001	0.0003	0.002
Investment	13070	-0.002	0.012	0.000	0.001	-0.083
GDP	68721	0.002	0.003	0.001	0.001	0.013
Balance of Trade	-3326	0.012	-0.002	0.005	0.001	0.022
Imports						
Wheat	689.5	0.003	-0.004	0.002	-0.181	-0.203
Other agric	520.3	0.026	-0.005	0.011	0.004	-0.147
Industry	630.6	0.015	-0.003	0.007	0.002	0.013
Service	11354.3	0.035	-0.006	0.014	0.005	0.072
Total	13194.7	0.032	-0.006	0.013	-0.005	0.047
Exports						
Sesame	451.9	1.891	-0.0098	-0.012	-0.0056	1.796
Sorghum	6.0	-0.095	3.6616	-0.038	-0.0152	3.369
Cotton	237.2	-0.025	-0.0071	1.443	-0.0043	1.351
Wheat	0.0	0.000	0.0000	0.000	0.0000	0.000
Other agric	814.9	-0.086	-0.0097	-0.033	-0.0143	0.518

Industry	8250.4	-0.046	-0.0092	-0.018	-0.0064	-0.121
Service	108.6	-0.118	0.0028	-0.043	-0.0170	-0.371
Total	9869	0.039	-0.0068	0.016	-0.0071	0.055
Domestic Output						
Sesame	954	1.0759	-0.0066	-0.006	-0.0033	1.012
Sorghum	1353	-0.0064	0.3328	-0.002	-0.0015	0.288
Cotton	278	-0.0205	-0.0068	1.249	-0.0037	1.165
Wheat	227	-0.0132	-0.0062	-0.004	0.8730	0.807
Other agric.	25701	-0.0083	-0.0063	-0.003	-0.0018	0.057
Industry	21688	-0.0187	-0.0065	-0.007	-0.0028	-0.062
Service	51038	-0.0086	-0.0034	-0.002	-0.0015	-0.0552
Total	101239	-0.0005	-0.0003	0.0001	0.0001	-0.0081

Source : Model Results

c) Effect of Reducing Indirect Taxes on the Rate of Direct Tax to compensate for Government Savings losses

The government depends on taxes as a main source of generating income. However, levying taxes has repressive effect on economic activities and therefore the reduction of indirect tax could be compensated for by increasing the direct taxes. Figure (1) reveals that the elimination of wheat import tariff (Tar3), production tax (Prod6) and value added tax (Val6) on the agricultural sector would increase the levies of direct tax by 3.7%, 17.3% and 32.6% respectively.

Figure 1: Impact of indirect Tax Reduction on the Rate of Direct Tax to Sustain Government Savings



Source : Model Results

VII. Recommendation

The following recommendations are based on the study results:

- 1. Encourage the innovation of fast food from traditional food to decrease wheat consumption,
- 2. Increasing direct taxes on private companies to compensate reduced government revenue as a result of indirect tax reduction.

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