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MEASUREMENT OF THE TAX EFFECT ON THE HOUSEHOLD CONSUMPTION IN SOMALIS REFORMING ECONOMY

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Abstract

The purpose of this study is to examine the effect of tax on household consumption and to get an estimation of the optimal tax rate in Somalia. Time series data collected from World Development Indicators and the FAO Country Data were used. Generalized Method of Moments (GMM) model was applied to measure tax effect on consumption as Ramsey inverse elasticity was employed to calculate optimal tax. Unit root of the data and co integration between the series was tested.

Results from the GMM model indicate that there is an inverse relationship between taxes; price and the consumption where wage and none wage income have direct positive relation with consumption. The study found that all variables are none stationary at level but stationary at the first difference. Johansen co integration found that pairs of consumption, tax wage and none-wage income have long run relation and make equilibrium adjustment. Price is linked to consumption in the short run and it has no influence in long run adjustment.

Household consumption in Somalia is steadily decreasing at a decreasing rate; price level is also declining in response to demand reduction. The study found that petrol sugar should have been levied a low tax since they are income inelastic. Tax rates should be minimal for food unless the government is prepared to subsidize it.

Keywords: Optimal Tax, Commodity Tax, Ramsey Rule and Inverse Elasticity. 1

Introduction

Commodity tax has been given much consideration in the last two decades when different countries across the globe adopted it as part of economic reform. Ever since commodity tax studies have emphasized two major problems; given level of the of the government revenue to be collected with main source of tax, how much of tax to be charged to raise the required revenue and to minimize the society's cost of the tax. If social welfare function is the state's preference, commodity tax rate that maximizes social welfare will be subject to the revenue constraint (Myles, 2001).

Commodity taxation is more like public sector pricing. For both, the government sets the consumer prices that minimizes social cost and maximizes welfare and they are subject to the revenue constraint (Samuelson, 1986). In the commodity taxation, level of the tax to be included the consumer price is determined where price is directly set in the context public sector pricing.

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Choice of the Tax rate is similar to the public pricing. Optimal pricing in public sector is referred to the Ramsey pricing (Ramsey, 1927).

Tax continues to be a significant source of the government revenue in all countries in general and developing countries in particular. The need of the additional revenue is crucial to the African countries as revenue mobilization has far more importance. Such revenue is used to the poverty alleviation, public good provision and the infrastructure development.

In the past few decades, government of Somalia did not succeed to provide necessary public service as individuals and the firms had failed to pay tax. Currently there is pressing need to restore public service and the state's ability to generate revenue. Hence, policy development and the establishment for institutions to collect public revenue is corner stone to the state reconstruction and the economic reformation (IMF, 2017).

Design of the optimal tax is relevant to the preference and the endowment, both characters are private those which may not be available under the optimal tax system. Commodity tax is good option that government can collect revenue and it only needs to government to be able to observe trading commodities. Uniform lump sum tax is only possible in economy with identical household which is unrealistic in the modern economy (Myles, 2001). It is essential to examine the optimal tax rate to be levied to commodity in Somalia. The purpose of this study is to model the effect of tax and household consumption and to estimate the optimal commodity to be adopted in Somalia. In the following pages, related literature will be reviewed. Then, the theoretical framework and the methodology of the research will be presented respectively. The results of the study will be shown in the fourth section and the estimate optimal tax rate will be proposed afterwards. Finally, the paper will be concluded and policy implications recommended.

Literature Review

The literature available on the commodity added tax is admittedly limited, as only few studies have been conducted in the different countries around the world. Such studies include D.OSei (2000) which examined political liberalization and the introduction of the Value Added Tax (VAT) in Ghanaian economy. Study found that VAT implementation in Africa is hindered by the poor governance in Africa.

Lewis and Seidman (1999) examined the effect of converting income tax to consumption tax by using saving elasticity. Study found that the consumption tax is not equivalent to income tax as it brings different results in the steady state of the labor and capital ratio. Matsuzaki (2003) examined the effect of the consumption tax on effective demand in period of the stagnation. The study found that increase of the consumption tax decreases the demand of the low-income class. Fullerton, Shoven, J., & Whalley (1983) applied dynamic general equilibrium to evaluate U.S tax system and found that increase of the tax causes reduction in demand, which will increase when capital stock increases. Freebairn (1991) found that consumption tax has small tax effect on the saving and investment in the short run.

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Andrikopouloset al. Brox, and Georgakopoulos (1993) investigated the effect of the short run effect of the VAT on the consumption patterns on Greece, study found that VAT increased consumer prices about 4.7%, and changed the allocation of the consumption expenditure of the goods. Rege (2002) found that immediate implementation of the VAT in India led welfare loss more than it could cause if it was implemented gradually. Narayan's (2003) result showed that VAT decreased consumption, saving and the investment but rises government revenue about 4% in Fiji. Metcalf (1995) suggested the issue to account when designing VAT. This study found that VAT increases saving due to the tax returns of after tax. Bird (2005) presented issue to be considered for VAT design; study presented that VAT works well in developing and transitional economies.

Blumkin et al. (2012) examined the behavioral response of the converting income tax to consumption tax. They found that consumption tax leads individuals to work to extra hours. Cashin and Takashi (2011) examined the impact of the VAT on household expenditure in Japan, the study found that VAT lifts up the price and consumer involves temporal substitution as price increases. Ajakaiye (1999) studied the impact of the VAT on the macroeconomic variables and the real sectors. His study found that VAT is beneficial if the revenue raised is re-injected to the economy.

Christandl, Fetchenhauer, and Hoelzl (2011) conducted impact analysis of the VAT and found that VAT increases market price. Keen and Lockwood (2010) studied consequence of the price increase of the VAT, they concluded that VAT decreases marginal cost of the public expenditure and helps government revenue optimization by expanding tax ratio.

Tax literature had also examined the form of the tax to be adopted by the government. Some Early studies of the commodity tax favored the idea of the progressive tax. Feldstein (1972) suggested that sales tax should be progressive. Diamond (1980) stated that at the presence of the distributive grants, commodity tax should be progressive. Atkinson and Stiglitz (1976) extended income tax model proposed by the Mirrlees (1971). They found that income tax optimality is theoretically solution and that commodity tax should uniform or zero.

Boadway and Pestieau (1989) stated that uniformity of the commodity tax works only when income tax in Mirrlees functions. Murty and Ray (1987) found that at the absence of the demo grant, and the existence of the egalitarian objectives, progressive commodity tax will increase the social welfare.

Heady and Mitra(1992) examined optimality of the commodity tax taking demographic factors into account. They found that non uniform commodity tax is appropriate when commodity and the leisure are not separable, demo grants are not linked to the age and the children and Engal curves are not parallel to the household. Mirrlees et al. (2012) studied UK tax system and found that VAT exemption should be eliminated. Arnold (2011) applied an econometric approach and presented that consumption and the property tax contributed to economic growth, given constant tax revenue.

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Leahy, Lyons and Tol(2010) examined distributional effect of the VAT in Ireland. They stated that the current system was regressive, and that flat tax system would differently affect the various groups of the house hold. Crossley, Low and Wakefield (2009) suggested that rate of VAT reduced to 15% to increase purchasing power of the consumer and household's real income. Besides that income increment resultant from the VAT has one-year life time and will have small effect. Keen and Ben (2010) found that VAT is main revenue source in U. S and but, tariff works for the developing countries due to their inability to tax informal sector.

Theoretical Framework and Methodology

Definition

Although commodity tax takes many forms, value added and sales tax are the most prominent ones. In VAT, "value added" to product, service or materials are taxed in each stage of production or distribution. Producers remit the government difference between the amount of production and the tax amount already paid to inputs (Sivasakkaravarthi and ganesan, 2011). Value added is the difference between the sale price and the cost of the materials and other taxable input of the production. On the consumers prospective, VAT is tax on the purchase price. VAT is identical to the sales tax since both of them impose tax on the end consumers. The only difference between them is that sales tax is only in the point of purchase where VAT is charged when every purchase occurs in the supply chain.

Ramsey Model.

Ramsey model is one of the earliest models to address the problem of the optimal commodity tax. The model is established on assumption of that economy is in general equilibrium and there is single household which drives out the problem of the equity and describes the tax system as efficient. Ramsey rule is built on the context of the competitive economy where there is number of the consumer goods and single form of labor as the only input of the production. Industry is characterized with constant return to scale and produces single identical output. There is population of equivalent household whose preference can be represented by the indirect utility function. Implied for these assumptions are each good (i) has coefficient c^i showing input labor required to produce one unit of the product. Input cost is represented by the wage rate (w). Competitive assumption ascertains that pre-tax price of good (i) can be defined

$$p_i = c^i w, \qquad i = 1, \ldots\ldots k \qquad (1)$$

We employ the normalization rule and chose labor as numeriare and treat wage rate as constant value of (w). Normalization rule is applied to fix the pretax prices of consumer goods. Labor is also untaxed in this assumptions. Post tax price is additive of the pretax price and the tax. Consumer price of good i can be determined

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$$q_i = p_i + t_i, \qquad i = 1, \ldots\ldots k \qquad (2)$$

Consumption level of good (i) is devoted to (x_i) so tax rate of consuming (n) must be specified to collect the revenue required by the government. Revenue is labeled to (R), and revenue constraint can be set

$$R = \sum_{i=1}^{n} t_i\, x_i \qquad (3)$$

To keep the economy's wide balance of supply and demand, revenue collected by the government is used to hire labor with value of (R). Government uses the labor of its state function like defense and they don't engage in production of the goods that will be traded in the economy. Household preference is represented indirectly by the utility function

$$U = V(q_i \ldots\ldots\ldots q_n, w, I) \qquad (4)$$

Equation (4) tells us that household uses the goods produced by the firms and house supplies labor used by the firms and the state as well. Household does not earn lump sum and profit income because of the constant return scale and competitive behavior of the firms. So (I) equals to zero.

In the economy with this assumption, optimal tax problem can be addressed by the maximization

$$\frac{max}{\{t_t \ldots\ldots, t_n\}} = V(q_i \ldots\ldots\ldots q_n, w, I) \text{subject to } R = \sum_{i=1}^{n} t_i\, x_i \quad (5)$$

Lagrangean form of the equation (5) is

$$L = V(q_i \ldots\ldots\ldots q_n, w, I) + \lambda\left[\sum_{i=1}^{n} t_i\, x_i\right] - R \qquad (6)$$

Choice of the tax of good k has first order necessary condition that is

$$\frac{\partial L}{\partial t_k} \equiv \frac{\partial v}{\partial q_k} + \lambda\left[x_k \sum_{i=1}^{n} t_i \frac{\partial x_i}{\partial t q_k}\right] = 0 \qquad (7)$$

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As identity is

$$\frac{\partial v}{\partial q_k} \equiv \frac{\partial v}{\partial t_k}, \frac{\partial x_i}{\partial q_k} \equiv \frac{\partial x_i}{\partial t_k} \qquad (8)$$

Equation (7) can be rearranged by subtracting right hand from the left and gives us

$$\frac{\partial v}{\partial q_k} - \lambda \left[x_k \sum_{i=1}^{n} t_i \frac{\partial x_i}{\partial t q_k} \right] \qquad (9)$$

Equation (9) tells us that for all goods, utility cost of increase tax rate must be proportionally equal to the marginal revenue gained by the government for the tax rise. In other words, extra tax revenue per unit utility cost should be same regardless the tax rate that was changed to raise this revenue.

Roy's identity states

$$\frac{\partial v}{\partial q_k} = \frac{\partial v}{\partial I} x_k = -\alpha x_k (10)$$

So (I) in equation is (10) is household's lump sum income and α is the marginal utility driven form the lump sum income. If we plug (9) to (10) when find that

$$\alpha x_k = \lambda \left[x_k + \sum_{i=1}^{n} t_i \frac{\partial x_i}{\partial q_k} \right] (11)$$

Equation (11) can be rearranged to get

$$\sum_{i=1}^{n} t_i \frac{\partial x_i}{\partial t q_k} = -\left[\frac{\lambda - a}{\lambda} \right] x_k \qquad (12)$$

We use Slutsky equation to derive the optimal tax and we find

$$\frac{\partial x_i}{\partial t q_k} S_{ik} - x_k \frac{\partial x}{\partial I} \qquad (13)$$

Substitute (12) to (13) gives us

$$\sum_{i=1}^{n} t_i S_{ik} - \left[x_k \frac{\partial x}{\partial I} \right] = -\left[\frac{\lambda - a}{\lambda} \right] x_k \qquad (14)$$

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$$\sum_{i=1}^{n} t_i S_{ik} - \left[\frac{\lambda - a}{\lambda}\right] x_k + \sum_{i=1}^{n} t_i x_k \frac{\partial x_i}{\partial I} \qquad (15)$$

Equation (15) can be simplified by subtract both sides by x_k which common factor

$$\sum_{i=1}^{n} t_i S_{ik} \left[1 - \frac{a}{\lambda} \sum_{i=1}^{n} t_i \frac{\partial x_i}{\partial I} \right] x_k \quad (16)$$

Slutsky matrix tells that $S_{ki} = S_{ik}$ so this symmetric matrix can be utilized to arrange the equation (16) and we get

$$\sum_{i=1}^{n} t_i S_{ik} = \theta x_{k,} \theta = \left[1 - \frac{a}{\lambda} \sum_{i=1}^{n} t_i \frac{\partial x_i}{\partial I} \right] \qquad (17)$$

Above equation presents Ramsey problem of the optimal commodity tax that must be consist for all goods. Multiply both sides of the of equation (17) t_k and we get

$$\sum_{k=1}^{n} \sum_{i=1}^{n} t_i t_i S_{ik} = \theta R \qquad (18)$$

Left hand side of the Slutsky is negative so slutsky matrix and the government revenue has same sign. This makes possible to get interpretation for Ramsey rule.

$$S_{ik} = \frac{\partial x_k}{\partial q_i} \qquad (19)$$

So, x_k in the equation is said to Hicksian or compensated demand for good$k$. It starts with situation where no tax is and tracks the changes of the tax rate in good i.

$$t_i S_{ki} = t_i \frac{\partial x_k}{\partial q_i} (20)$$

Equation (20) is estimation of the changes in the compensated demand when tax is introduced. Derivative in here is used to evaluate the set of the prices and post-tax utility. This will be true approximation if the tax rates are small. If this abides to all sets of the taxes, it will be

$$\sum_{i=1}^{n} t_i S_{ki} \qquad (21)$$

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Equation (21) measures entire changes of the compensated demand of good k_i after tax imposition compared to the pre-tax position. Tax introduction leads both price and the utility change, so actual change demand can be represented

$$x_k(p, U^0) - x_k(p, U^1) \qquad (22)$$

U^0 Represents the initial utility before tax introduction and U^1 captures after tax utility level. If we combine these points and assume that both R and θ are positive, the equation can be Ramsey rule if it is written in this form

$$\frac{\sum_{i=1}^{n} t_i S_{ki}}{x_k} = -\theta, k = 1 \dots \dots, n \qquad (23)$$

This is standard Ramsey rule that states optimal tax is that one which reduces compensated demand at same proportion in comparison to pre-tax position. Optimal tax should increase prices of all goods by same rate so that tax system does not lead distortion. Ramsey rule emphasis that distortion of the quantity should be minimized. Welfare depends on the consumption not price and they are treated only as normalizing factor. Significance of the quantity can be defined

$$d_k \frac{\sum_{i=1}^{n} t_i S_{ki}}{x_k} \qquad (24)$$

Equation (24) (d_k) measures reduction of the demand and it is called Mirrlees's index of the discouragement. According to the Ramsey rule, tax system is optimal when index of discouragement is equal for all goods demanded by consumer.

Optimal tax can be calculated by using inverse elasticity rule discussed by Baumol and Bradford (1970). Inverse elasticity imposes further restrictions to economy used by the Ramsey rule. It assumed that there is not price elasticity between the goods and the demand for each good is determined by its price and the wage rate. This assumption removes all interactions between the goods and the returns general equilibrium into the partial equilibrium. Atkinson and Stiglitz (1980), presented that inverse elasticity can be used by minimized by using partial equilibrium framework. Inverse elasticity strongly builds up to the independence of the demand. Inverse elasticity derivation starts from equation (11) that is

$$\alpha x_k = \lambda \left[x_k + \sum_{i=1}^{n} t_i \frac{\partial x_i}{\partial q_k} \right] (25)$$

The assumption of the independence of the demand imposes

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$$\frac{\partial x_i}{\partial q_k} = 0 \; as \; i \neq k \qquad (26)$$

Plunging equation (25) and (26) and reducing them give us

$$\alpha x_k = \lambda\left[x_k + t_k \frac{\partial x_i}{\partial q_k}\right] \qquad (27)$$

We arrange (27) and divide both sides (q_k) assuming that $q_k = p_k + t_k$

$$\frac{t_k}{p_k + t_k} = \left[\frac{a-\lambda}{\lambda}\right]\left[\frac{x_k}{q_k}\frac{\partial q_k}{\partial x_k}\right] \qquad (28)$$

Where

$$\frac{x_k}{q_k}\frac{\partial q_k}{\partial x_k} = \frac{1}{\varepsilon_k^d} \qquad (29)$$

As ε_k^d is the price elasticity of demand for good k so equation (28) can be expressed

$$\frac{t_k}{p_k + t_k} = \left[\frac{a-\lambda}{\lambda}\right]\frac{1}{\varepsilon_k^d} \qquad (30)$$

This is inverse elasticity rule which states that optimal tax rate should be inverse related to the price elasticity of demand for the good which tax is levied. It is a version of the Ramsey rule interpretation. This is rule will be applied to calculate optimal tax rate to be charged to the household consumption.

Econometrics Methods

Generalized Method of Moment

This study applies generalized Method of Moment (GMM) to estimate study parameters. GMM was developed by (Hansen, 1982) and ever since has become wide used in econometric literature. GMM required identified moments derived from the model to estimate GMM parameters. Unlike maximum likelihood method, GMM does not require perfect knowledge of the data distribution. One the import features of the GMM is that it gives straightforward way to specify the model even when number of moments exceeds the proposed model parameters. GMM is applied to solve the problem of the endogenous problem of the model by using previous variables as instrument of the variable endogenity. GMM estimate the line of unknown slope and

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constant by using two moment condition as rooted by the Gauss Markov assumptions. Two moment restriction are specified

$$E(\varepsilon_i) = 0 \; and \; E(x_i \varepsilon_i) = 0 \qquad (31)$$

In this condition we have only one parameter to estimate which is slope(β) of the model that can be estimated. The first

$$\frac{1}{n}\sum \widehat{e_i} = \frac{1}{n}\sum (y_i - \hat{\beta} x_i) = 0 \qquad (32)$$

Second

$$\frac{1}{n}\sum x_i \widehat{e_i} = \frac{1}{n}\sum x_i (y_i - \hat{\beta} x_i) = 0 \qquad (33)$$

Both equations have only one unknown $\widehat{\beta}$. Two equations give us different result if we solve$\hat{\beta}$.

The first equation estimate

$$\hat{\beta} = \frac{\frac{1}{n}\sum y_i}{\frac{1}{n}\sum x_i} = \frac{\sum y_i}{\sum x_i} = \beta_k 2 \qquad (34)$$

Second equation yields that

$$= \frac{\frac{1}{n}\sum x_i y_i}{\frac{1}{n}\sum {x_i}^2} = \frac{\sum x_i y_i}{\sum {x_i}^2} = \beta_k 4 \qquad (35)$$

Both $\beta_k 2$ and $\beta_k 4$ are moment of the slope estimation where there is no intercept under the assumptions of the Gauss Markov assumptions where $E(\varepsilon_i) = 0 \; and \; E(x_i \varepsilon_i) = 0$ including some intendent variables those are not fixed.

Data Source

Data in this study is collected from various data sets since study measured different variables. World Development Data, FED Economic Data, FAO Market Data, were combined to examine the effect of the tax on house consumption and to establish the optimal tax rate. Time series data from 1970 to 2014 was employed. Consumption was measured to the Net Household Consumption (NHC), price level was measured to the CPI; Tax was measured to Total Tax Rate. Other effect to tax was included to model such GNI as proxy of wage and GNP per capita as

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proxy of none wage income. Some years of the data are not available so we refer to unbalanced time series data.

Unit Root Test

Time series data requires to be checked the presence of the unit root in order to avoid the problem spurious regression. Time series data with unit root is referred to none stationary and unless is it co integrated with other none stationary, the series of this regression false states that there is meaningful economic relation while the observed effect is contemporaneous correlation. It is very important to check the order of the integration of each variable in the model to decide whether it is none stationary. We also need to identify how many times variable to be differenced to give stationary series.

Testing unit root in single variable is like checking if the linear combination of the variable co-integrates to establish stationary equilibrium relationship. There are several econometric approach to test the unit root, this study adopts dickey-fuller test.

Dickey-fuller Test

Dickey and fuller (1979) proposed method to test the presence of the unit root. It tests the null of that series contains unit root against alternative that series does not contain unit roots. If we fail to reject the null this means that series has unit problem and it is none stationary.

Df test unit root by estimating

$$\Delta y = \rho y_{t-1} + \varepsilon_1 \qquad (36)$$

$$\Delta y = \gamma_0 + \rho y_{t-1} + \varepsilon_1 \qquad (37)$$

$$\Delta y = \gamma_0 + \rho y_{t-1} + \gamma_2 t + \varepsilon_1 \qquad (38)$$

Three equation are in difference with presence of the deterministic element γ_0 andγ_2. The fist equation is without intercept or pure walk model. Second equation has intercept while third has intercept and the linear time trend. DF test estimate the value of ρ and standard error by using OLS, If $\rho = 0$, sequence has unit root. We compare resultant t-test with DF table to determine the presence of the unit root.

Johansen Co integration

Johansen co-integration is one of the tools in applied econometrics used to multivariate co integration. Given that none stationary variable can lead spurious regression unless it has at least one co integration vector is present, co integration test is necessary in time series modelling. This study uses Johansen approach to test co integration. First step in of Johansen approach is to test the lag length of the variables to determine their order of integration. The second step is to

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estimate the model and determine rank δ which measured number of the co integrated vectors. The is done by employing vector error correction model

$$\Delta y = \gamma_0 + \delta x_{t-1} + \sum_{i=1}^{p-1} \delta x_{t-1} u_1 \qquad (39)$$

Where x_t is $(n \times 1)$ vector of $I(1)$ variable and u_1 is disturbance

Model Specification

The model of this study is specified by utilizing Ramsey model which it derivation was presented in the theoretical section

$$\ln NHC = \beta_0 + \beta_p lnP_t + \beta_{TX} lnTX_t + \beta_W lnW_t + \beta_N lnN_t + u_t \qquad (40)$$

NHC is Net Household Consumption

P is Price

TX is total Tax Rate

W is wage

N is none wage income

Results and the Discussion

Unit Root Test Result

To determine the existence of the unit root in the variables, DF test was used; we run this equation $\Delta y = \gamma_0 + \rho y_{t-1} + \gamma_2 t + \varepsilon_1$ to test $(H_0: \rho = 0)$. below shows the result of the DF test

Table (1) Unit Root Result of the Series

Variable	Test Statistics	Lag Length	Critical value 1% level
NHC	-2.4756		-3.770
		(0)	

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ΔNHC	-5.2861	(0)	-3.770
P	-2.0795	(0)	-3.770
ΔP	-5.3755	(0)	-3.770
TX	-2.1041	(0)	-3.770
ΔTX	-5.7456	(0)	-3.770
W	-1.700	(0)	-3.770
ΔW	-3.9115	(0)	-3.770
N	-1.7693	(0)	-3.770
ΔN	-5.7523	(0)	-3.770

Table (1) shows the result of the unit root test at critical value at significance level of the 1%. We fail to reject the null hypothesis and the series of all variables have unit root. This implies that all variables are none stationary at the level we differenced and found that NCH, Price and Wages are stationary at the first difference while are tax and the income are stationary at the second difference.

Johansen Co integration Test Result

Co integration test was conducted by using Johansen co integration's trace statistics. Akaike Information Criteria was selected to check optimal lag length of the pairs. Null hypothesis of no integration was rejected for the pairs NHC-TX, NHC- W, and NHC- N. The results of the trace statistics indicate that these pairs are co integration. We fail to reject the null of no co integration for NHC- P. below table presents result of the

Table (2): Co integration Result

Variables	Hypothesized	Trace Statistics	Critical Value at 5%-level
NHC, TX	$H_o: r = 0.\ H_1: r > 0$	23.77	15.49
	$H_o: r = 1.\ H_1: r > 0$	4.7379	59.00377

NHC, P	$H_o{:}r = 0.\ H_1{:}r > 0$	13.72	15.49
NHC, W	$H_o{:}r = 0.\ H_1{:}r > 0$	82.46	15.49
	$H_o{:}r = 1.\ H_1{:}r > 0$	7.56	3.84
NHC, N	$H_o{:}r = 0.\ H_1{:}r > 0$	118.16	15.49
	$H_o{:}r = 1.\ H_1{:}r > 0$	7.62	3.84

Result in the table (2) shows that consumption is co integrated to tax rate, wage and the income of those variables are integrated in the long run and they do not drift apart in the long run. Price has no long run relation to the consumption, which indicated that price factors are short run while all other factors have long run effect to the consumption equilibrium and the long run adjustment. If the variables are co integrated they form equilibrium relationship even if the series contains stochastic trend. Result in here shows that consumption and tax move close together and the difference between them is constant.

Estimation of the Model Parameters

Model of this study was estimated by using equation (), GMM method was applied to estimate model parameters. Result of the model is presented below table

Table (3): Result of the Model Parameters

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	9.758	2.493	3.912	0.0079
P	-0.790	0.040	-19.68	0.0000
TX	-0.123	0.597	-20.69	0.0433
W	1.718	0.051	33.55	0.0000
N	0.101	0.027	3.727	0.0098

The result in table (3) shows that all variables are significant and different from zero. Prices and taxes are negative linked to the consumption where wage and none wage income are positively related to the consumption. Result from the table presents change of one variable effect to the changes of consumption. Constant is not interpreted in here since it does not give meaning full

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economic information, it tells us how much consumption will be when the factors that affect consumption are none existent, those in this study are all significant.

Price is very important factor in consumption model so if prices are increased at one-dollar, consumption decreases about 0.7 dollars. Tax rate is also negatively linked to the consumption where increase tax by 1 percent will lead consumption to decrease about 0.12 percent. Wage is the dominant factor when it comes to the consumption as increase of the wage by 1 percent leads consumption to increase more than 1 percent. None wage income has very small contribution to the consumption. The implication in here is that consumption in Somalia is largely induced consumption.

R square is as higher as 99% percent which is not good sign at is highlights the problem of autocorrelation. GMM model solves the problem of autocorrelation, so higher are R square is not given much attention in GMM model.

Household consumption has taken secular trend in the last several years; household consumption is determined by the price, income where tax had a negligible influence to the pattern of the consumption in the country.

Figure (1): Net Household Consumption

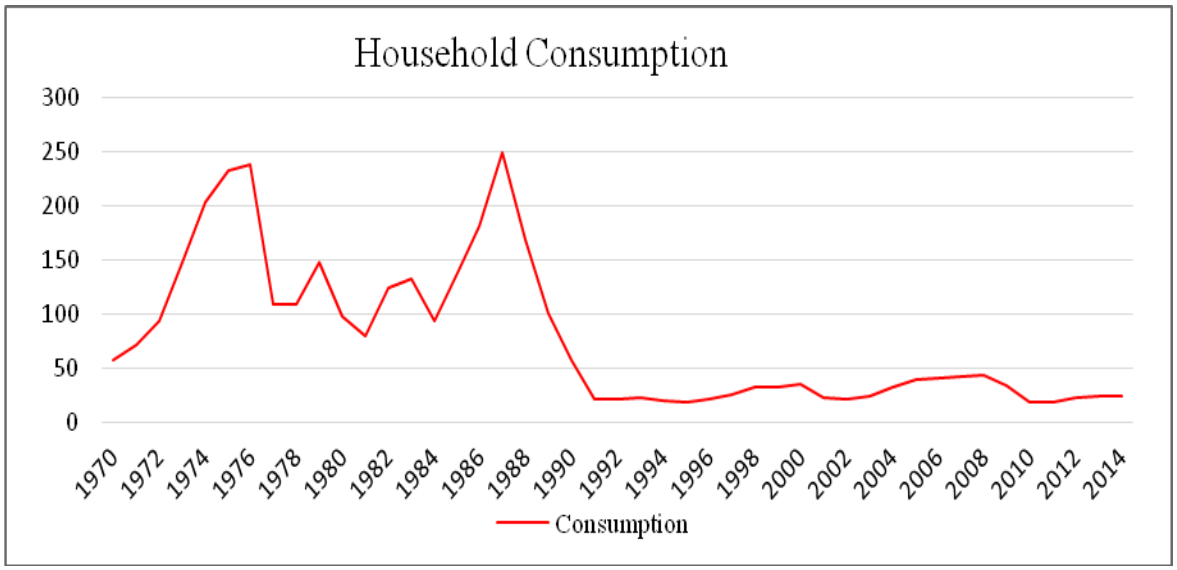

Figure (1) shows that household consumption has been decreasing over the year and constantly been low in the past three decades. Consumption has only increased in the form 2004-2009 and started to steadily decrease in the form 2014. The implication in here is that introduction of the tax will cause consumption decrease even further since tax rate are negatively associated to consumption.

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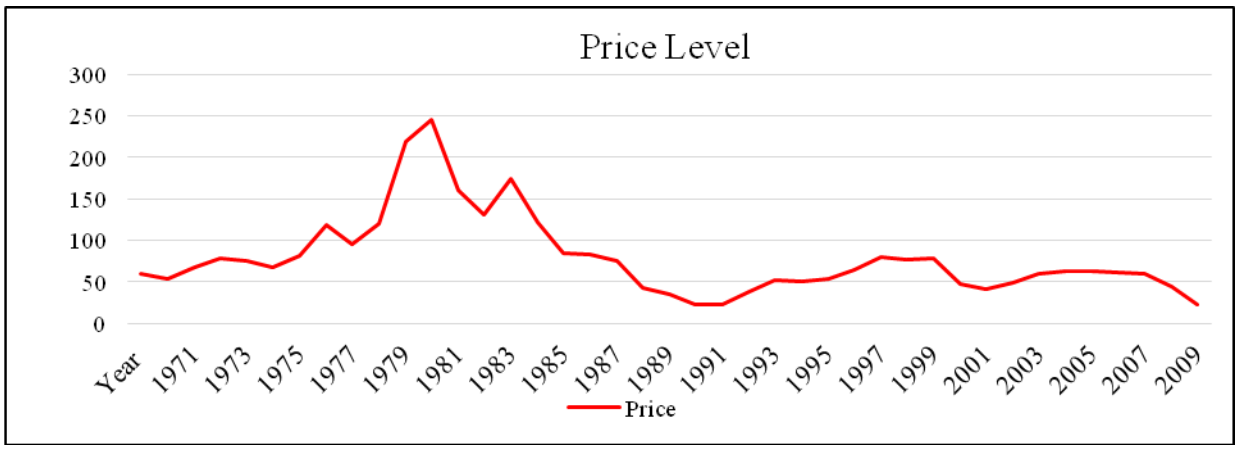
Figure (2): Consumer Price Level



Price level is an unpredictable trend as it increases one year and decreases in the other. Recently, prices have been decreasing to encourage consumption which has been low as shown the previous figure. Imposition of the tax cause price to increase and will also cause consumption to decline even further.

Result highlights that tax consumption can be viewed as signal of extraction. In the purchase of households, the government attempts to intervene consumer's choice and preference in order to tax their consumption according to the circumstance. Tax increases the price that consumers pay and reduces the profit of the producer, which in long run will cause decline of both production and consumption and for the government to subsidize the taxed goods.

Conclusion and Policy Implication

The purpose of this study was to examine the effect of the tax on household consumption and the estimation of the optimal tax rate in Somalia. GMM model was applied to measure tax effect on the consumption and Ramsey inverse elasticity was employed to calculate optimal tax. Time series data collected from World Development Indicators and the FAO country data were used. Unit root of the data co integration between the series was tested.

GMM found that there is inverse relation between taxes. Price and the consumption where wage and none wage income have direct positive relation with consumption. Study found that all variables are none stationary at the level and stationary at the first difference. Johansen co integration found that pairs of consumption, tax wage and none wage income, have long run relation and make equilibrium adjustment. Price is linked to the consumption in short run period and has no influence in long run adjustment. Tax rate should be small to the food staff unless government wants to subsidize it.

Several policy implications follow from this study,

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Firstly, if the government wants to take equity and efficiency into consideration when designing tax policy, differential tax rate should be adopted and weight should be placed to the elastic demand goods to safeguard welfare of low-income class.

Secondly, tax on consumption encourages the capital accumulation as many tend save and invest the money instead of consumption expenditure. Hence, policy makers should give consideration temporal optimization when reforming tax proposals

Increases of tax rate create incentive to tax evasion; making economic activity underground. Collective effort should be done to decentralize fiscal administration to eliminate the fraud and corruption.

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