

# Fiscal Decentralization, Revenue Independence and Technical Efficiency of County Governments in Kenya

John Mose Nyaoko<sup>1</sup>, Stephen Githae Njaramba<sup>2</sup>, Julius Korir<sup>3</sup>

<sup>1</sup>Department of Applied Economics, School of Business, Economics and Tourism, Kenyatta University, Nairobi, Kenya

<sup>2</sup>School of Business, Economics and Humanities, Mama Ngina University College, Gatundu, Kenya

<sup>3</sup>Department of Economic Theory, School of Business, Economics and Tourism, Kenyatta University, Nairobi, Kenya

Email: john.mose2018sp@gmail.com

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## Abstract

Since independence, Kenya has implemented various programmes for fiscal decentralization and revenue independence to enhance technical efficiency in public service delivery. The 2010 Constitution emphasized fiscal devolution as a vital driver of economic growth by lowering costs, promoting transparency, and improving allocative efficiency. As county funding increases, technical efficiency is expected to improve as more resources are allocated to smaller government units. However, despite increased allocations and greater independence through tax powers, there is no clear evidence of improved efficiency, with no significant gains in health and agricultural services and a decline in county GDP over time. Revenue collections remain low and declining despite higher targets. The study aimed to assess how fiscal decentralization and revenue independence influence fiscal efficiency, using a Tobit Model to identify the factors that affect it. Findings indicate that fiscal decentralization only boosts efficiency beyond a threshold of Ksh. 512.8 billion annually; below this, increased funds diminish efficiency, while above it, efficiency improves by 8% for each 1% rise in funds. Revenue independence, however, negatively affects efficiency. The study recommends gradually increasing devolved funding towards the threshold or re-evaluating devolution structures if targets are unattainable, and reforming revenue assignment to improve own-source revenue capacity.

## Keywords

Technical Efficiency, Own Source Revenue, Fiscal Decentralization, Revenue Independence

## 1. Background

Fiscal decentralization involves transferring revenue, revenue sources, and spending responsibilities to local governments, bringing resources and governance closer to the citizens. While fiscal decentralization is considered in terms of the percentage of total government expenditure executed by sub-national governments, revenue independence focuses on a regional government's ability to tax or generate its own revenue and is measured by the amount local governments are able to collect from the public, loans, and grants.

The argument provided by the theory of fiscal decentralization and revenue independence is that the inhabitants of the different jurisdictions have different tastes (Musgrave, 1959). Together with the effort of reducing transaction costs, providing sufficient information and fiscal incentives along with healthier investment climate, fiscal decentralization and revenue independence end up enhancing technical efficiency in the devolved sectors. Smaller and productive government is believed to be a source of technical efficiency that potentially reduces waste of expenditure and raises income growth (Brennan & Buchanan, 1980). Technical efficiency is equivalent to achieving productive efficiency which entails maximizing results or minimizing the cost of production factors per unit of product. Though technical efficiency imperative is a necessary condition for sub government performance measure and not a sufficient condition due to its role in income distribution and social protection to the society. Technical efficiency propels economic growth both at national and at the sub national levels. Fiscal decentralization and revenue independence are supposed to reduce costs associated with inefficiency and rent seeking activities as they focus on transparency and accountability (Hamalainen, 2003).

While smaller jurisdictions with more homogeneous populations may be better suited to match the provision of public goods with the preferences of their constituents, an exceedingly small scale of operation may be economically unviable (Oates, 1972). The desire to increase revenue and narrow budget deficits, regional governments are noted to introduce additional taxes, fees, and charges that are not conducive to private sector growth. Fiscal decentralization may also exacerbate the central government's inability to deal with structural fiscal imbalances and fiscal inefficiencies. In addition, localities might engage in destructive competition to attract industry (Muriu, 2013). In addition, the undesired rise of rent seeking and corruption at the regional government levels has diminished the ability of governments to efficiently allocate resources (Muriu, 2013).

The foregoing implies that technical efficiency from fiscal decentralization and revenue independence is not that obvious. There are serious drawbacks that should be considered when and after designing the devolution program. In many cases the problem is not so much whether a certain service should be provided by a central, regional, or local government, but rather how to organize the joint production of the service by the various levels to achieve efficiency (Tiebout, 1956). In many cases, such measures have enormous potential and could, if properly designed and

implemented, significantly improve the efficiency of the public sector.

Many countries over the world have deepened fiscal decentralization and revenue independence over the time, but the degree of real fiscal independence varies greatly between federal and unitary systems and across income groups (Blöchliger & Petzold, 2009). Advanced federations show high subnational shares of spending and considerable revenue autonomy. In addition, many low- and middle-income countries have implemented fiscal decentralization reforms, whereas subnational own-source revenue remains limited, so they rely heavily on transfers from the national government, producing vertical fiscal imbalances and constrained autonomy (The World Bank, 2021)

Several fiscal decentralization programs in Kenya have been instituted since independence to combat growing regional disparities. The Programmes include the Special Rural Development Program (1972), the District Focus for Rural Development (DFRD) in 1983, and Regional Development Authorities (RDA's). However, it is from Mid-90s, that the government introduced numerous fiscal decentralization initiatives, namely the National Government Constituency Development Fund (NGCDF), Local Authorities Transfer Fund (LATF), Poverty Eradication Fund (PEF) and Women Enterprise Fund (WEF), among many others, in a bid to decentralize decision making and participatory governance (GoK, 2000).

The main form of fiscal decentralization in Kenya was established following the promulgation of the Constitution of Kenya, 2010. This resulted in a unitary state (National Government) with 47 County Governments. The implementation of this decentralization began after the 2013 general election. The creation of the 47 county governments aimed to improve service delivery and involved a substantial re-organization of government functions, which now had discretion over significant budgets, staff, and programmes. The constitution also requires that at least 15 per cent of audited revenue be transferred to the counties yearly. Several government functions were devolved, and counties were assigned to perform them, including health and agriculture. However, their performance has shown stagnation and decline over time. Figure 1 illustrates the expanded budget at the county level and the performance of selected (devolved) economic activities in the country.

As the devolved funds increase to the counties, the performance of devolved economic activities remains unappealing, as shown in Figure 1. Following the enactment of the 2010 Constitution, resources allocated to counties increased exponentially from below 4 per cent of the total government expenditure in 2009 to about 15 per cent in 2009. However, the performance of selected development indicators shows stagnation and decline over the same period. The growth rates of the National GDP, Education, Health, and Agriculture indicate stagnation from 2009 to 2013, followed by a decline. This decline has happened during a period when fiscal decentralization expanded rapidly. The benefits of fiscal decentralization are supposed to enhance the performance of these economic sectors, which should be reflected in improved output, health, and education outcomes. As the country decentralizes, it was expected to bring much-needed growth, develop-

ment, and ultimately balanced regional growth. According to proponents of fiscal decentralization, such as Hayek (1945), Tiebout (1956), and Musgrave (1959), fiscal decentralization improves the public sector through enhanced efficiency. However, from Figure 1, it appears that the effect of fiscal decentralization on economic performance may not have contributed to its improvement.

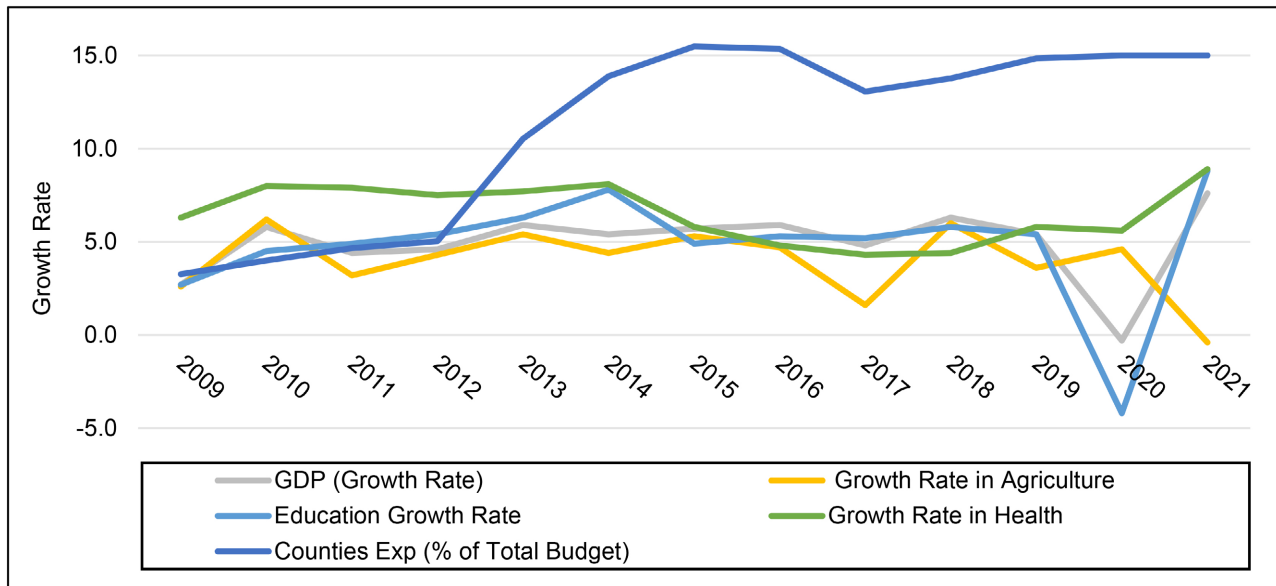


Figure 1. Counties expenditure and performance of selected economic activities. Source of data: Economic surveys (2010-2022).

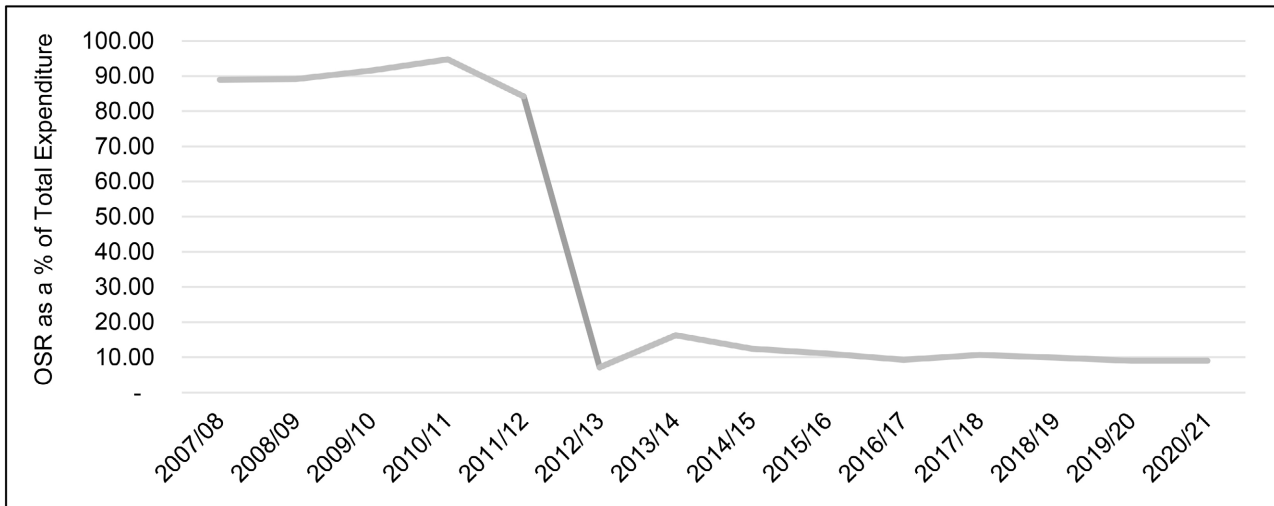
### 1.1. Revenue Independence in Kenya's Decentralized System

Failure to ensure the existence of sound and stable revenue sources for county governments implies that counties rely solely on central government grant transfers, and this effectively de-links local leaders from their electorate, weakens accountability and concern for cost-effectiveness (Tiebout, 1956). The need for county governments to have reliable revenue is a key principle of Kenya's devolution. This is contained in Article 175(b) of the Constitution of Kenya, 2010. The constitution recognizes a two-tier system of revenue allocation and taxation. Article 203(2) of the Constitution assigns the national government the responsibility for over 85 per cent of the tax collection. As mentioned earlier, county governments' revenue sources include their own revenue sources and disbursements from the national government.

The Kenya Constitution (2010) grants limited powers to county governments regarding revenue-raising measures. The counties are authorized to levy only property rates and entertainment taxes. They may also impose charges for services they provide if such revenue-raising does not conflict with national economic policies, economic activities across sub-national boundaries, or the national mobility of goods, services, capital, or labor. Other non-tax sources include fees, licenses, and conditional and unconditional grants from the national government. Counties can also take loans, albeit under restricted circumstances, and receive funding

from development partners.

Since their establishment in 2013, County Governments rely almost entirely on the equitable share and conditional transfers from the national government to fund their budgets. **Figure 2** illustrates the county’s dependence on transfers from the national government.



**Figure 2.** OSR as a percentage of total county expenditure. Source of data: Economic survey (Various).

In the first three years of devolution, the equitable share transfer accounted for over 80 per cent of counties’ total expenditure. The equitable share has financed about 92 per cent of counties’ actual spending since financial year 2012/13. During this period, the counties’ equitable share transfer increased from Kshs. 196 billion in financial year 2013/14 to Kshs. 280 billion in financial year 2016/17, and then to Kshs. 302 billion in financial year 2017/18. This growth seems to be linked to counties’ growing dependence on transfers.

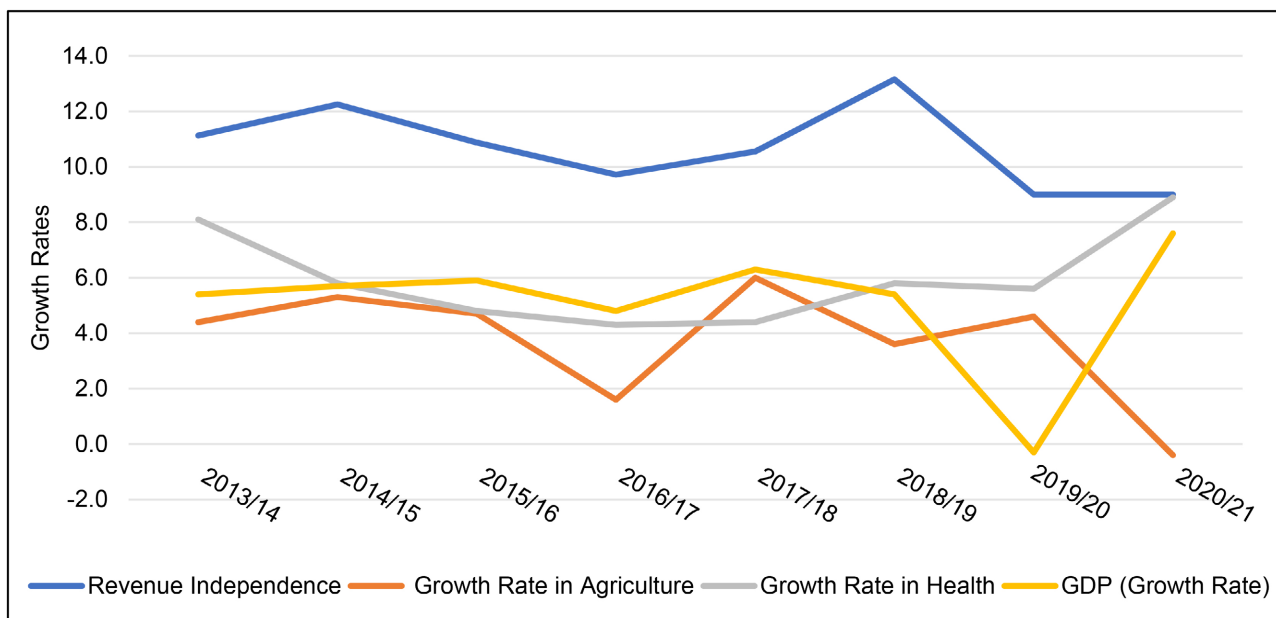
As previously noted, a key step in designing a system of inter-governmental revenue relations is clearly defining the functional responsibilities among different levels of government (Bahl, 1992). Instability and controversy in the practice of decentralized systems occur when the law is silent or unclear regarding the technical efficiencies and revenue obligations of various levels of government (McLure, 2017). **Table 1** illustrates insufficient revenue from an unstable tax base for the counties.

**Table 1.** Own source revenue against the targeted revenue (Ksh Billion).

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Revenue target	54.2	50.4	50.5	57.7	49.2	53.9	53	53
Realized revenue	26.3	33.8	35.1	32.5	32.5	40.3	35.8	35.2
Deficit	27.9	16.5	15.5	25.1	16.7	13.6	17.2	17.8

Source of data: Economic survey (2014-2024).

**Table 1** shows that revenue targets for the counties have not been achieved since devolution began in the country. The OSR remains equally unstable and unpredictable. This is because revenue allocations come from sources that do not consistently generate steady income. As a result, there is considerable volatility and unreliability in the revenues collected by county governments. This leads to frequent revisions of county plans to cover missed targets through additional supplementary budgets. Consequently, this results in a reduction of funding for devolved functions. Additionally, the revenue independence of the counties is limited, as they must rely on the national government to carry out devolved functions. Therefore, the technical efficiency of delivering these functions, given their limited revenue independence, must be assessed. **Figure 3** illustrates the counties' revenue independence and the performance of selected devolved functions from 2013/14 to 2020/21.



**Figure 3.** Counties' revenue independence and the performance of the devolved sectors. Source of data: Economic survey (2014-2024).

Insufficient revenue in county governments may have negatively affected their performance. **Figure 3** illustrates unstable revenue independence. As a result, the growth rates of agriculture, health, and the national economy also show signs of decline. These poor performances occur despite larger fiscal assistance and increased resource transfers from the central government, as shown in **Figure 3**. To increase revenue and reduce budget deficits at the counties, it may be necessary to allow them to introduce additional taxes, fees, and charges that support private sector growth. This could lead to more efficient resource allocation in counties and foster growth in devolved functions. It is believed that revenue independence promotes accountability and enhances the provision of public goods (Tanzi, 2008). However, studies have found that relying too heavily on central govern-

ment can weaken accountability and lead to inefficiency.

## 1.2. Statement of the Problem

The transfer of powers and resources from national governments to lower tiers of county governments, carried out through the enactment of the 2010 constitution, was expected to better align public policies with local needs and thus improve the efficient allocation of resources. This, in turn, was anticipated to enhance local economic performance and outcomes. In anticipation of this, there were calls for national authorities to transfer fiscal powers from the national to local governments to achieve a more effective response to local needs. The enactment of the 2010 constitution marked the beginning of devolution as a key strategy for attaining technical efficiency in the delivery of public goods and services. This created one unitary state (1 National Government and 47 county governments).

The formation of the counties was intended to deliver public goods and services more efficiently. This required a major reorganization of government functions and revenue-raising powers to counties. Kenya adopted this approach because fiscal decentralization and revenue independence would promote technical efficiency and better resource allocation. For this reason, several functions were devolved, including health and agriculture. However, issues such as disagreements between the National Government and County governments over funding, poor or no consultation on matters affecting County Governments, limited technical support for implementing functions, inadequate allocations and delayed disbursements of funds by the National Treasury, lack of capacity and skills to deliver services, corruption, and lack of public participation have hampered implementation of the function efficiently at the county level. These challenges have significantly impacted on the performance of county functions, including health and agriculture. Furthermore, counties are believed to receive fewer and less productive revenue sources than what fiscal federalism principles would justify, with the most lucrative sources retained by the national government. Despite increased transfers from the national government to county governments, Kenya continues to perform poorly in devolved sectors such as health and agriculture. Fiscal decentralization has also been associated with rising transfer dependency among counties as the own revenue continues to decline. This decline in own-source revenue has created uncertainty for county governments and over dependence on the national government. Revenue collection at the county level remains low, even though counties continue to set higher targets. This has the potential to hamper their ability to achieve technical efficiency.

Despite the fact that gains in technical efficiency in the provision of public goods through fiscal decentralization and revenue independence, and the linkages thereof, have attracted considerable attention in development economics literature, their effects in Kenya have not received sufficient focus so far. Most studies on fiscal decentralization concentrate on measuring and analyzing the effects of fiscal decentralization on poverty (Mwiathi et al., 2018), the significance of own

source revenue in the provision of public goods (Development Initiatives, 2018), and on own source revenue potential and the tax gap (Adam Smith International, 2016). None of these studies establishes the effectiveness of fiscal decentralization and revenue independence on technical efficiency. Against this backdrop, the current study aimed at examining the impact of fiscal decentralization and revenue independence on fiscal efficiency in providing public goods.

### 1.3. Objectives of the Study

The purpose of this study was to establish the effect of Fiscal Decentralization and Revenue Independence on Technical Efficiency within the framework of regional competitiveness. The specific objectives were as follows:

- 1) Establish the effects of Fiscal Decentralization on County Governments' Technical Efficiency in Kenya.
- 2) Determine the effects of Revenue Independence on County Governments' Technical Efficiency in Kenya.

### 1.4. Significance of the Study

This study contributes to the literature on fiscal decentralization and provides policy recommendations related to fiscal decentralization. First, the study examined the effects of fiscal decentralization on county technical efficiency. This covered a comprehensive assessment of counties' revenue independence, specifically, it examined the potential for increasing efficiency and expanding the base for assigned taxes, fees, and charges to county governments. The findings informed policymakers on the importance of counties' revenue independence. Additionally, the study contributed to the growing theoretical and empirical literature on fiscal decentralization and technical efficiency.

### 1.5. Scope of the Study

The study focused on Kenya for the period 2013 to 2021. A model was developed to assess the effect of fiscal decentralization and revenue independence, to determine the extent to which they affect technical efficiency in sub-national governments' provision of public goods. Accordingly, the study employed a panel analysis of all the counties in Kenya.

## 2. Methodology

This study falls under the purview of relationships between variables. The study employs a non-experimental retrospective research design. In the design, cross-county panel data for the period 2013 to 2021 was collected and used for analysis. The combination of time series with cross-sections enhanced the quality and quantity of the data set in ways that would be impossible using only one of these two dimensions.

### 2.1. Theoretical Framework

The study uses a theory by Robalino et al. (2002) for theoretical underpinning.

The theory focuses on the effect that greater control of finances by the local government has on technical efficiency. A decentralized system is expected to better allocate scarce resources with higher control of resources and accountability. The policy maker (local government) attempts to maximize the average outcomes in provision of public good by allocating resources where they are optimally needed. It is assumed that within each county  $g$ , the outcome indicator  $M$  is a function of structural characteristics of the county (e.g., population and resource base), represented as  $\varphi$  and the optimal allocation of resources  $X_{gi}$  among a set of public goods or service  $i$ . This is expressed as in Equation (1)

$$M_g = f_g(\varphi, X_{g1}, \dots, X_{gi}) \tag{1}$$

It is assumed that  $f(\cdot)$  is a continuous function with  $\frac{\delta f_g}{\delta x_{gi}} > 0$  and  $\frac{\delta^2 f_g}{\delta x_{gi}^2} < 0$

such that an increase in resources to the counties increases public good outcomes indicators. Then the problem is to attain the maximum outcome  $M$ . This problem is solved by the county governments by maximizing the outcome given the county resource at their disposal noted as  $Y$  where  $Y = f(X_i)$ . The function in equation 1 is then specified to express the optimization of welfare. The optimization function is expressed as in Equation (2)

$$\text{Max } M = n_g \cdot f_g(\varphi, X_{g1}, \dots, X_{gi}) - \lambda(X_{gi} - Y) \tag{2}$$

where  $n_g$  is the contribution of local government  $g$  to the national average and  $Y$  is the total budget for the county government. The assumption underlying Equation (2) is that a balanced budget is maintained in the analysis (no borrowing), and the budget is taken as given. Further interpretation suggests that revenues need to be allocated in a way that the marginal impact of additional resources or borrowing to a good or service  $i$  in county  $g$  (adjusted by its weight  $n_g$ ), differs across all counties but is optimal for each county government. Equation (2) gives the problem that would be solved by a county government in control of budget  $Y_g$ . It is observed that the allocation of resources by county governments would generate national optimum only if the budget allocated to each state was optimal in the first place. If the revenue allocated to the counties is suboptimal, the resulting level of expenditure in each state will be different from the optimal level; however, the relative level of expenditure will be optimal. It thus becomes (from first order condition) as in Equation (3)

$$\frac{X_{gi}}{Y_g^{obs}} = \frac{X_{gi}^*}{X_{gi}^{obs}} \tag{3}$$

where  $Y_g^{obs}$  is observed total income for local government  $g$  and  $X_{gi}^{obs}$  is observed allocated revenue to public good  $i$ . When the revenue is managed at central level, the level of efficiency in the allocation to public goods can be measured by Equation (4)

$$\frac{X_{gi}}{Y_g^*} = \frac{X_{gi}^{obs}}{Y_{gi}^{obs}} \tag{4}$$

Taking  $\mu$  as an indicator of inefficiency, it is noted that it becomes  $\mu_{gi} = 0$  for a completely efficient system. Hence,  $\mu = \mu_{gi}^2$  can be seen as a general indicator of inefficiency for a county and central government.  $\mu$  will be a function of the share of the total revenue  $Y$ , noted as  $S$ , that is managed by the county governments. The partial derivative of  $\mu$  with respect to  $S$  will depend on the relative levels of efficiency of the county and central governments of public expenditures. Hence, it can be proposed that:

$$\frac{\delta\mu}{\delta S} = C(c - I) \tag{5}$$

where  $c$  and  $I$  are indicators of the level of efficiency in managing public resources of the central and state government respectively. Given this, if  $c > I$  (meaning the institutional capacity at the local level is low relative to the center), an increase in the share of public revenue controlled by the county governments will increase inefficiency and reduce outcomes and vice versa. It is therefore imperative to conclude that (inefficiency or lack of it) is a function of the share of the total revenue  $Y$ , noted as  $S$ , that is managed by the county governments (the Revenue Independence). This implies that,

$$\text{Efficiency} = f(\text{FD, RI}) \tag{6}$$

## 2.2. Empirical Model

To determine the effects of Fiscal Decentralization and Revenue Independence on County Technical Efficiency, the study made use of a Tobit Panel Data Model. The Tobit Model was used because the observed technical efficiency scores are censored within the range of 0 and 1. Tobit regression is usually the appropriate model when the dependent variable is continuous and has a constrained range (Tobin, 1958). In a normal panel data regression, the estimates of the parameter are biased and inconsistent because the scores lean to the upper bound. The Tobit Panel Data Model is therefore a maximum-likelihood random or fixed effect model that has the ability to examine factors that influence technical efficiency levels of county governments in Kenya.

The technical efficiency scores were considered as latent variables because the efficiencies of counties are not directly observed but rather inferred through other variables in the SFA model. The study used Stochastic Frontier Analysis (SFA) using the form of production function as Cobb-Douglas function to estimate counties' technical efficiency indexes. The estimation used Equation (7)

$$TE_{it} = \exp\left[-\mu_{it} + \frac{1}{2}\sigma^{*2}\right] X \left[ \frac{1 - \Phi\left(\sigma^* - \frac{\mu_{it}}{\sigma^*}\right)}{1 - \Phi\left(-\frac{\mu_{it}}{\sigma^*}\right)} \right] \tag{7}$$

where variables  $\mu_{it}$  and  $\sigma^*$  are estimated as in Equations (8a) and (8b) respec-

tively, and  $\Phi(\cdot)$  denotes the cumulative distribution function of the normal variable whereas  $\sigma$  is the variance.

$$\mu_{it} = (1 - \gamma) \left( \alpha_0 + \sum_{j=1}^q \alpha_j Z_{jit} \right) - \gamma W_{it} \tag{8a}$$

$$\sigma^{*2} = \gamma(1 - \gamma)\sigma^2 \tag{8b}$$

$\gamma = \frac{\sigma_U^2}{\sigma_V^2 + \sigma_U^2}$ , where  $\gamma$  must lie between 0 and 1. If  $\gamma$  is statistically different

from zero using a likelihood test, then there is presence of inefficiency in the model. The Tobit model was estimated by using Equation (9)

$$y_{it} = \beta_0 + \beta_1 FD_{it} + \beta_2 RI_{it} + \beta_3 CGDP_{it} + \beta_4 POP_{it} + \mathcal{E}_{it} \tag{9}$$

where  $y_{it}$  is the efficiency index,  $\mathcal{E}_{it}$  is the error term in the efficiency distribution of the Tobit panel model and was assumed to be normally distributed  $N(0, \sigma^2)$ . The explanatory variables included Fiscal Decentralization (FD), Revenue Independence (RI), County Output (CGDP) and Population (POP).  $\beta$ s are estimated parameters. The estimation technique was the Maximum Likelihood Estimation (MLE).

### 2.3. Definitions and Measurement of Variables

The data (Table 2) was sourced from Controller of Budget Reports, Economic Survey, Various government publications, Budget Estimates Books and Budget Statements.

**Table 2.** Definitions and measurement of variables.

Variable	Definitions of variables	Measurements of variables
Fiscal decentralization (FD)	This refers to taking the expenditure powers from national government to local government	It was measured as total national government transfer to the counties per fiscal year
Revenue independence/own Source revenue (OSR)	This is the county government’s own revenue	It was measured as total own revenue by a county in a given financial year
Human development index (HDI)	This is defined as a summary measure for assessing progress in human development	Measured in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living
Gross county product (GCP)	This is the estimated total level of output per county	This was measured as the total value of county output per fiscal year; the unit of measurement will be Kenya Shillings
County’s land size (CLS)	They are geographical units as delineated by the 2010 Constitution of Kenya as the units of devolved government	Measurements were in square kilometers
Labor force (LF)	The labor force comprises all persons of either sex who furnish the supply of labor for the production purposes in a county	All individuals between the ages of 15 and 65 who were employed or unemployed each year

## 2.4. Diagnostic Tests and Data Analysis

To avoid spurious regressions, stationary time series in panel data sets were required. Panel data unit root tests were conducted to rule out the existence of non-stationary time-series. Where non stationarity was established, the data was differenced until stationary. The study made use of Tobit Panel Data on Equation (7). The Tobit Model is used because the observed technical efficiency scores are censored within the range of 0 and 1. Tobit regression is the best model when the dependent variable is continuous and has a constrained range (Tobin, 1958). In a normal panel data regression, the estimates of the parameter are biased and inconsistent because the scores lean to the upper bound.

## 3. Data Analysis

The county macroeconomic variables considered by the study are identified using the devolution objectives that resulted in devolving health, agriculture, and economic development functions of the counties. The indicators identified included HDI, County GDP, Labor Force, Own Source Revenue, and Devolved Fund. The method of analysis used was a two-stage approach; a Cobb Douglas stochastic frontier analysis and a Tobit regression to compute the mean technical efficiency and determine factors influencing technical efficiency. The summary statistics are given in Table 3.

**Table 3.** Summary statistics.

Variable	Number of observations	Mean	Std. Dev.	Min	Max
Land size (Sq KM)	423	12318.24	17251.7	219	70961
HDI (score)	423	0.5024704	0.0572099	0.37	0.64
Labor force	423	520082.9	384272.2	55,663	2,895,579
GCP (Ssh. million)	423	164370.4	312327.7	12,909	2,755,389
OSR (KSh. M)	423	687.4164	1521.157	27.42	11710.01
Fiscal decentralization (FD) (KSh. million)	423	5922.551	3271.342	145.1018	19861.01

Source: Own computation.

Land is one of the factors of production. However, large part of land in Kenya is arid or semi-arid. This has made it to be categorized as a liability in most counties. The current study has taken into consideration that where land cannot support crop farming, it is used as grazing land by pastoralists, ranches, parks/reserves, forests, water mass, settlements/housing, or mining/quarries. It is, therefore, utilized efficiently or inefficiently and therefore determines the technical efficiency of the counties. From Table 3, the mean size of land in the counties is 12,318.24 square kilometers (km<sup>2</sup>) with a standard deviation of 17,251 (km<sup>2</sup>). This

indicates a major difference in land size among the counties. The minimum land size is 219 km<sup>2</sup> and a maximum of 70,961 (km<sup>2</sup>).

The Human Development Index (HDI) is a summary measure for assessing progress in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. The HDI emphasizes that people and their capabilities should be the ultimate criteria for assessing the development of a country and not economic growth alone since two countries/regions with the same level of GNI per capita can end up with such different human development outcomes.

The labor force represents the economically active population. The labor force comprises all persons of either sex who furnish the supply of labor for production purposes in a county. The study used all individuals between the ages of 15 and 65 who were employed or unemployed each year in every county. Labor availability can reflect counties' ability to generate higher output. The labor force in the counties averaged 520,083 with the highest accounting for 2,895,579 size of labor force and the least accounting for 55,663 size of labor force. The standard deviation was 384,272 over the period, indicating a huge disparity in labor force distribution amongst the counties.

Gross County Product (GCP) is a geographic breakdown of Kenya's Gross Domestic Product (GDP) that gives an estimate of the size and structure of county economies. It also provides a benchmark for evaluating the growth of county economies over time. The GCP estimates are consistent with the published national GDP in the sense that the sum of the GCP is equal to national-level GDP. The average GCP was KSh. 164370.4 million with a standard deviation of Ksh. 312327.7 million and the least county having an average GCP of Ksh. 12,909 million and the highest county recording an average of Ksh. 2,755,389 million over the period.

Own Source Revenue (OSR) represents the counties' power to collect their own revenue as enshrined in the Constitution and Act of Parliament. The counties are allowed to impose levies for activities that do not undermine national economic activities and policies or impact the national distribution of services, goods, labour, or capital. The average county's collection of own revenue was KSh. 687.4 million with a standard deviation of KSh. 1521.2 million, an indication of differing capacity for counties to raise their own revenue. The highest county's own revenue collection averaged KSh. 11710.01 million and the least county averaging KSh. 27.42 million over the study period.

Fiscal Devolution represented the disbursement of finances from the central government for revenue allocation and expenditure in the sub-national governments. The main form of fiscal decentralization in Kenya was realised after the new Constitution was enacted in the year 2010. This created a unitary state (National Government) with 47 counties. The implementation of this decentralization started after the year 2013 general election. The average county devolved funds between 2013 and 2020 were KSh. 5922.6 million with a standard deviation

of KSh. 3271.3 million. The highest devolved fund received in the counties averaged KSh. 19,861 million, and the least received averaged KSh. 145 million over the period.

### 3.1. Impact of Fiscal Devolution on the Technical Efficiency of County Governments

In estimating the SFA model, the study used the True Random Effect (TRE) to separate time invariant from time variant variables given the counties unique features that included poverty, difference in literacy and development. These differences were captured using the Average Human Development Index over the period. In addition, the uniqueness in terms of geographical features was captured by using percentage of arable land to the total county area and capacity to generate revenue using a percentage of OSR to total county revenue. The unique features were believed to contribute to the differences in performances other than from technical inefficiencies. The counties efficiency indices results from SFA model are given in **Annex 1**.

Tobit Panel Data Model was used to examine the impact of fiscal decentralisation on county technical efficiency. The Tobit Model was used since the observed technical efficiency scores are truncated between 0 and 1. Tobit regression happens to be the best model when the dependant variable is continuous and has a limited range (Tobin, 1958). Maximum-likelihood random effect estimation methods were used. The model included other variables that impact on technical efficiency. The Tobit Model results are presented in **Table 4**.

**Table 4.** Tobit model output.

Model: Tobit regression model		
Log simulated likelihood = 818.28864	LR Chi <sup>2</sup> = 20200.45	Prob > Chi <sup>2</sup> = 0.0000
Observations	423	Pseudo R <sup>2</sup> = 0.71
Dependent variable	Technical efficiency	
Independent variable	Coefficient	Standard error
County domestic product	0.150***	0.00949
Devolution	-0.807***	0.239
Devolution squared	0.0434***	0.0136
Own source revenue	-0.0633***	0.0213
Own source revenue squared	-0.00341*	0.00180
Arable land to county size	-0.000752***	0.000116
Human development index	0.335***	0.0843
Years	-0.00421***	0.00138
Variance		0.00262***

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

To evaluate the appropriateness of the Tobit Model, log likelihood statistics and Pseudo-R squared are utilized. The log likelihood is used in the Likelihood Ratio Chi-Square test of whether all predictors' regression coefficients in the model are simultaneously equal to zero. The null hypothesis was that all the regression coefficients are simultaneously equal to zero. The null hypothesis is rejected at one percent level of significance, concluding that the coefficients jointly are not equal to zero. Pseudo R<sup>2</sup> is McFadden's pseudo-R-squared. It represents the improvement in the log-likelihood that results in adding regressors. Like the R<sup>2</sup> statistic in linear regression, if the additional regressors add no improvement to the model significance, the pseudo-R<sup>2</sup> = 0. The results in **Table 4** show that the estimated Tobit Model (restricted model) has improved on the unrestricted model by about 71 percent. Because of the suspected quadratic relationship between the devolved funds and TE and between OSR and TE, polynomial variables were added to the Tobit Model by including squared devolved funds and OSR variables.

Devolution represented by devolved funds has a negative effect on technical efficiency at their low levels. However, the effect is positive at higher levels represented by a positive devolution squared. This means that there exists an optimal level of devolution below which the effect of devolution to TE is negative and above which the effect is positive. The optimal devolution amount is calculated as given in Equation (10)

$$\frac{\delta TE}{\delta Devolution} = \frac{\delta(0.0434)Devolution\ squared}{\delta Devolution} - \frac{\delta(0.807)Devolution}{\delta Devolution} = 0 \quad (10)$$

$$0.0868\ Devolution = 0.807$$

$$Devolution = \log 9.297235$$

$$Optimal\ Devolution = Ksh \cdot 10.9\ Bilion \quad (11)$$

Equation (11) gives the optimal value that should be devolved to each county per year to ensure that the counties realize improvement in technical efficiency. Since the devolution was estimated in Ksh. Million, the minimum funds needed to be devolved to each county that ensure improvement in technical efficiency should not be below Ksh 10.9 billion per year. This amount has not been attained for a number of counties in Kenya. This implies that the country has been experiencing declining technical efficiency. The elasticity of efficiency with respect to devolution is 0.8. Increase in devolved funds by one percentage point reduces the TE with 8 by percent for counties below the optimal value. This, however, could change if the devolved funds were to increase to above KSh. 10.9 trillion. With this figure, technical efficiency could increase with 0.4 percentage point with a percent increase in devolved funds. This is shown by the fact that Devolved Fund Squared is positive. So, the relationship between Devolved Fund and TE is inverted U-shaped (a cost function). As the level of devolved funds increases, the counties become accountable to the electorates and also take advantage of economies of scale. Similar results were found by *Mwiathi et al. (2018)*. Devolution is, therefore, a way of improving access and efficiency in the delivery of services to

the people since the decisions are made close to the people, hence decision makers are more accountable to them. The findings agree with Njuguna, 2016 who found that devolution influences community development as it improves living standards by improving accessibility to services such as schools, clean water, and health care.

### 3.2. Effects of Revenue Independence on County Governments' Technical Efficiency

The Tobit Panel Model was also used to examine the impact of revenue independence on counties' technical efficiency. The estimation of the Tobit Panel Model used maximum-likelihood random effect estimation technique to establish the effect of revenue independence on technical efficiency of county governments in Kenya. The Tobit Panel Model results are given in **Table 5**.

**Table 5.** Tobit model output (OSR output).

Model: Tobit regression model		
Log simulated likelihood = 818.28864	LR Chi <sup>2</sup> = 20200.45	Prob > Chi <sup>2</sup> = 0.0000
Observations	423	Pseudo R <sup>2</sup> = 0.71
Dependent variable	Technical efficiency	
Own source revenue	-0.0633***	0.0213
Own source revenue squared	-0.00341*	0.00180

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

The elasticity of TE with respect to revenue independence is negative and statistically significant including the polynomial term. This means that the effect of OSR on TE does not have a curvature. The results contradict the assertion that OSR increases sub-national governments efficiency (Andrés et al., 2009; Bahl, 1992; Yingyi & Barry, 1997). The positive effect of OSR on TE is not supported by the findings. OSR provides a means for local governments to collect information about the level and quality of public services that their citizens desire as local governments need to provide improved services in exchange for taxes. According to Andrés et al. (2009), Bahl (1992) and Yingyi and Barry (1997), increasing OSR can provide funding to local governments whose responsibilities often surpass funding received from the national government. This could help facilitate access for more infrastructure investment at the local level. Enhancing domestic resource mobilization by strengthening the ability of local governments to collect revenues is assumed to be an important enabler for governments to become technically efficient and more accountable to their citizens. Instead, the results indicate that county governments in Kenya may not need to boost revenues collected directly by themselves, and hence, there is no need to become fiscally independent.

The results on revenue independence may point to revenue assignment from

sources that do not generate consistent and efficient revenues. Some of the tax assignments attached to the county governments like property taxes, while representing long-term potential, are time-consuming and resource-intensive to implement. Other sources such as licensing fees and user charges often have negative economic distortion effects that must be carefully balanced. This suggests county governments should explore alternative interim or complementary revenue sources to address financing OSR. There is county government's failure to generate stable revenue in Kenya, which highlights counties' overreliance on the central government, which undermines the link between local leaders and the citizens. When the law is unclear about the revenue expectation, obligations, and technical efficiencies within the other levels, controversy and instability become highly likely (McLure, 2017). The OSRs are also unstable and unpredictable. This is brought by the fact that the effect is small in magnitude at a higher level of independence. This may emanate from the basis that revenue assignments are from sources that do not generate consistent and predictable revenues. This has resulted in high volatility and unreliability in revenues generated by the county governments. Reliable and sufficient funding for local governments is crucial for the provision of public services such as water supply, sanitation, and waste management. By investing in public services, counties can create an environment for their residents which can lead to economic benefits such as increased productivity. For their funding, local governments need a reliable as well as a solid own source revenue base.

#### 4. Summary, Conclusions and Policy Implications

The provision of fiscal decentralization under the country's law was aimed at enhancing technical efficiency through revenue independence. This was then to realize productive government that was to reduce wastage in expenditure and tailor-make locally focused production at the counties. However, as the devolved funds increased and the fact that the allocations to counties and enhanced revenue independence, there seems to be no evidence of improved technical efficiency as there has been no significant improvement in the provision of goods and services for devolved functions, including health and agriculture. There is an observed decline in the county's growth in domestic product over the years. In this regard, the study's aim was to determine whether devolution and fiscal independence are affecting the technical efficiencies.

The study made use of Tobit Panel Data Model to examine the effect of fiscal decentralisation on county technical efficiency levels. Devolution was found to negatively affect technical efficiency at low levels of devolution. However, at higher levels of devolution, technical efficiency improves. County domestic product levels and human development index contributed positively in the determination of efficiency. Revenue independence (measured by Own Source Revenue, OSR) had a negative effect on counties' TE in Kenya. The elasticity of TE with respect to OSR is negative, meaning that increased revenue independence reduces technical efficiency. This relationship is linear and consistently negative, meaning no opti-

mal turning point was identified. This result contradicts prevailing theories (e.g., Andrés et al., 2009, Bahl, 1992, Yingyi & Barry, 1997), which suggest that higher local revenue control should improve efficiency by making governments more accountable and responsive. Instead, the Kenyan counties' increased OSR appears to undermine technical efficiency. Revenue sources are weak, inconsistent, and inefficient (e.g., property taxes, licenses, user fees). Counties rely heavily on unstable or politically unpopular taxes. Implementation challenges, such as poor enforcement, unclear legal frameworks, and limited administrative capacity, reduce the effectiveness of OSR.

The study concludes that at levels of devolution to each county below 10.9 billion, devolution reduces efficiency, whereas at a higher level, it improves TE. The effect of fiscal decentralization becomes positive only beyond this threshold. While devolution positively affected production, it can be concluded that overall devolution reduced the efficiency level of the counties as more counties receive less than the threshold amounts. This conclusion was based on the negative effect of devolution on efficiency levels. Furthermore, the results support the conclusion that county domestic production levels are very important determinant of productive efficiency in county service provision. Similarly, human development is a key factor.

Finally, it can be concluded that, unexpectedly, own source revenue was detrimental to efficiency improvements. The effect of this variable was negative. It should be pointed out that own source revenue made up a small portion of county revenue and may not be an important determinant of service production.

### Policy Implications

The national government should progressively increase funding towards the optimal threshold to realize efficiency gains. Alternatively, if such levels are fiscally unattainable, Kenya should re-evaluate the structure of devolution, possibly by reducing the number of devolved units into economically viable sizes.

Conduct a comprehensive review of OSR sources to align them with counties' capacity to administer and enforce. Invest in revenue collection systems, staff training, and legal frameworks to improve OSR efficiency and predictability. Consider interim revenue-sharing mechanisms to buffer counties against OSR volatility. The study recommends revisiting revenue assignments and exploring more stable and efficient revenue sources to reverse this trend.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Annex 1: County Efficiency Index

No.	County	2013	2014	2015	2016	2017	2018	2019	2020	2021	County Average PE
1	Narok	0.5352	0.5107	0.5358	0.5448	0.6151	0.5566	0.5018	0.5385	0.7571	0.5017
2	Busia	0.6480	0.5864	0.6104	0.6124	0.6754	0.7513	0.7039	0.7501	0.6951	0.6704
3	Samburu	0.6749	0.6086	0.6938	0.7428	0.7004	0.6562	0.6976	0.6949	0.8344	0.7004
4	Mandera	0.7619	0.6342	0.6799	0.6773	0.7496	0.7724	0.7355	0.7178	0.7241	0.7170
5	Baringo	0.8152	0.7528	0.7391	0.7169	0.7421	0.7171	0.7178	0.7412	0.7930	0.7484
6	Makueni	0.7988	0.7826	0.7918	0.7945	0.7985	0.7688	0.7127	0.6994	0.6476	0.7550
7	Vihiga	0.7764	0.7246	0.7510	0.7486	0.8110	0.7802	0.7713	0.8012	0.7893	0.7726
8	Migori	0.8219	0.8090	0.7477	0.7322	0.8091	0.8385	0.7808	0.7994	0.7981	0.7930
9	Tharaka-Nithi	0.8040	0.8178	0.8016	0.7899	0.8699	0.8376	0.7527	0.7484	0.7678	0.7989
10	Kakamega	0.8243	0.8332	0.7935	0.8193	0.8460	0.8505	0.7791	0.7218	0.7220	0.7989
11	Isiolo	0.7268	0.7498	0.7881	0.8098	0.8291	0.8311	0.7979	0.8241	0.8843	0.8046
12	Mombasa	0.8788	0.8820	0.8630	0.8558	0.8606	0.7903	0.7736	0.7496	0.6979	0.8168
13	Garissa	0.8317	0.8749	0.7381	0.8088	0.8341	0.8449	0.8171	0.8182	0.8277	0.8217
14	Siaya	0.7889	0.8445	0.8300	0.8296	0.8226	0.8584	0.8413	0.8466	0.7724	0.8260
15	wajir	0.8724	0.7791	0.7787	0.8160	0.8289	0.8415	0.8596	0.8520	0.8230	0.8279
16	Bungoma	0.8523	0.9007	0.8166	0.7919	0.8225	0.8254	0.8093	0.8084	0.8725	0.8333
17	Laikipia	0.8681	0.8233	0.8426	0.8499	0.8495	0.8685	0.8039	0.8155	0.7952	0.8352
18	Murang'a	0.8718	0.8482	0.8355	0.8292	0.8514	0.8582	0.8124	0.8401	0.8382	0.8428
19	Kirinyaga	0.8410	0.8626	0.8388	0.8237	0.8663	0.8483	0.8399	0.8490	0.8518	0.8468
20	Nyeri	0.8478	0.8560	0.8381	0.8452	0.8613	0.8463	0.8569	0.8781	0.8607	0.8545
21	Kericho	0.8977	0.8435	0.8573	0.8477	0.8613	0.8746	0.8575	0.8583	0.8375	0.8595
22	Kajiado	0.9030	0.8827	0.8397	0.8692	0.8723	0.8658	0.8237	0.8656	0.8220	0.8605
23	Kisii	0.8319	0.8502	0.8542	0.8634	0.8894	0.8874	0.8673	0.8700	0.8548	0.8632
24	Kisumu	0.8755	0.8747	0.8472	0.8443	0.8544	0.8720	0.8771	0.8743	0.8660	0.8651
25	Uasin Gishu	0.8717	0.8841	0.8623	0.8742	0.8888	0.8751	0.8682	0.8679	0.8180	0.8678
26	Homa Bay	0.8588	0.8659	0.8551	0.8415	0.8775	0.9029	0.9054	0.8295	0.8935	0.8700
27	Trans Nzoia	0.8781	0.8837	0.8604	0.8387	0.8940	0.9008	0.8689	0.8727	0.8768	0.8749
28	Tana River	0.8950	0.8824	0.9113	0.9063	0.8984	0.8508	0.8656	0.8578	0.8249	0.8769
29	Kitui	0.8730	0.8811	0.8769	0.8354	0.8756	0.8868	0.8855	0.8901	0.9023	0.8785

**Continued**

30	Nyandarua	0.7910	0.8856	0.8868	0.8856	0.9025	0.8887	0.8907	0.8922	0.8854	0.8787
31	Taita-Taveta	0.8640	0.8982	0.8733	0.8927	0.8980	0.8956	0.8663	0.8696	0.8620	0.8800
32	Nyamira	0.9103	0.8480	0.8669	0.8779	0.8989	0.9073	0.8759	0.8717	0.8849	0.8824
33	Turkana	0.9277	0.8606	0.8891	0.8792	0.8572	0.8970	0.8948	0.8921	0.8785	0.8862
34	Kwale	0.8752	0.8717	0.8624	0.8728	0.8990	0.8924	0.8880	0.9051	0.9105	0.8864
35	Kilifi	0.8955	0.8979	0.8960	0.8954	0.8881	0.8996	0.8809	0.8710	0.8547	0.8866
36	Kiambu	0.9188	0.9102	0.8929	0.8852	0.8979	0.9038	0.8763	0.8747	0.8665	0.8918
37	Bomet	0.8505	0.8468	0.8811	0.9063	0.9034	0.9183	0.9072	0.9114	0.9183	0.8937
38	Nandi	0.9165	0.9079	0.8742	0.8927	0.9013	0.9148	0.9053	0.8873	0.8911	0.8990
39	Embu	0.9210	0.9229	0.8817	0.8960	0.8951	0.9026	0.8703	0.8910	0.9114	0.8991
40	Nakuru	0.9066	0.8961	0.8967	0.9020	0.9151	0.8967	0.8904	0.8900	0.9081	0.9002
41	Machakos	0.9234	0.9042	0.9030	0.9060	0.8979	0.9088	0.8850	0.8888	0.8887	0.9007
42	Lamu	0.9279	0.9262	0.9153	0.9177	0.9157	0.9160	0.9012	0.8731	0.8533	0.9051
43	West Pokot	0.9126	0.9035	0.8863	0.9018	0.9018	0.9059	0.9009	0.9327	0.9375	0.9092
44	Elgeyo-Marakwet	0.8977	0.9200	0.8719	0.8978	0.9244	0.9342	0.9326	0.9368	0.9510	0.9185
45	Meru	0.9239	0.9202	0.9106	0.9128	0.9169	0.9256	0.9274	0.9383	0.9363	0.9236
46	Marsabit	0.9289	0.9348	0.9237	0.9205	0.9088	0.9331	0.9375	0.9378	0.9417	0.9296
47	Nairobi	0.9329	0.9256	0.9262	0.9270	0.9314	0.9348	0.9351	0.9356	0.9280	0.9510
	Average	0.8500	0.8406	0.8323	0.8368	0.8555	0.8560	0.8372	0.8400	0.8437	0.8436

Observations = 423 Standard Deviation = 0.0782264