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Governance and net-import dependency on food and agricultural products in Sub-Saharan Africa: does any causality exist?

Esther N. Mwangi[a,b]*, Fuzhong Chen[a], Daniel M. Njoroge[c]

[a] School of International Trade and Economics, University of International Business and Economics, Beijing, China

[b] Department of Business and Economics, Karatina University, Karatina, Kenya

[c] Institute of Food Bioresources Technology, Dedan Kimathi University of Technology, Nyeri, Kenya

*** Corresponding author at:** esthermwangi2013@gmail.com

Abstract. Though most countries in Sub-Saharan Africa (SSA) are agricultural-based, the region is a net importer of food and agricultural products and experiences the highest level of food insecurity globally. The government have a joint goal of achieving a favourable balance of trade and food security; hence this study examines the causal relationship between quality of governance and net-import dependency on food and agricultural products for 25 SSA countries during the period 1995-2015. Principal component analysis is employed to develop a governance index based on the six worldwide governance indicators and a multivariate panel vector error correction framework applied to infer causality in the short and long run. The results reveal that a higher governance index is correlated with a lower net-import dependency ratio and the relationship is statistically significant. Evidence of unidirectional causality running from governance to net-import dependency is reported in 14 SSA countries, mainly in the long run. In conclusion, improving governance quality could support reduced food and agricultural net-import dependency through promoting agriculture production, exports and consequently reduced trade deficits in the long run. Hence, governance reforms in the region should be placed at the heart of the agricultural development agenda.

Keywords. agriculture; causality; governance; net-import dependency; Sub-Saharan

JEL Codes. C59; H11; Q17

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1. Introduction

Global food demand is expected to increase with the increasing world population which is projected to be over 9.1 billion by 2050 with much of the population increase expected to be seen in SSA (Parker, 2011; OECD and FAO, 2016; EIU, 2018). Governments and international organizations are working aggressively by employing policies and innovating ways tailored towards eliminating hunger and malnutrition for all in the context of the Sustainable Development Goal (SDG) agenda 2030. Most countries rely on food and agricultural imports to cover their demand deficits and feed their growing population. The number of countries depending on food imports and the rate of import dependency have been growing gradually as population and national income increases. However, most developing countries listed as Net Food-Importing Developing Countries (NFIDCs) by World Trade Organization (WTO) suffer from food trade deficit (WTO, 2016) and more often than not find difficulty in covering their food import bills. Less Developed Countries (LDCs) and NFIDCs receive WTO Agriculture

Agreement special treatment[1], which may be further driving them to fall into the net-importer trap. The 2007-2008 global financial crisis revealed that international trade on food is not always efficient in delivering food security (Christiaensen, 2009; Gilbert, 2011; Murphy, 2015). This view led most economies to re-examine their food supply agenda with much consideration on food self-sufficiency[2] and sustainability. Food self-sufficiency is now open to debate where some authors hold the view that international agricultural trade promotes food security by stabilizing food supply and food prices (Clapp, 2015; FAO and Ishrat, 2016; Clapp, 2016; EIU,2018), while others advocate domestic production to meet local food demand (Christiaensen, 2009; Murphy, 2015). More importantly, advocates of international agricultural trade are cognizant of the fact that imports dependency makes a country vulnerable to external shocks such as food price spikes, volatility, food riots and export bans imposed by exporting countries (Clapp, 2016; Martin, 2017; EIU, 2018). Moreover, trade deficits have undesirable implication to the overall economic performance of a country.

Despite SSA being well endowed with fresh water, labour and arable land for agriculture production, the region is a net importer of food and agricultural products, having the highest percentage cereal import dependency of 18.59 percent on average over the years from 2001 to 2013. Moreover, it is the most food-insecure region globally and has the highest prevalence of undernourishment which has been increasing from 2014-2017. The percentage of the population suffering from chronic food deprivation was 23.2 in 2017 (FAO et al., 2018). Apparently, the underlying problem in SSA and Africa, in general, is beyond a resource endowment one. Besides, the underdevelopment problem and food insecurity in the region is partly due to failures in local policy, institutions, local governance and international governance regimes (World Bank, 1989; Chhotray and Stoker, 2008; IFPRI, 2018). Moreover, the frequent food and agriculture scandals in African economies pertaining to food supply, food safety and health standards, and embezzlement of funds meant for agriculture and rural development is clear evidence of deficiency in governance. Governance failure portrayed by political and economic instability, limited voice and accountability, low government effectiveness, poor regulatory quality, corruption, and the poor rule of law, is among the major challenges facing the implementation of agriculture policies for development agenda (World Bank, 2008). According to IFPRI (2018), a few African countries have improved their food and nutrition status significantly as a result of their governments' commitment and reforms for agriculture development and food security. The big question, therefore, is how governance in SSA positions itself in reference to a country's food and agriculture net-import dependency amidst high levels of food and nutrition insecurity.

Basically, there is limited literature on the relationship between governance and agricultural trade despite the critical role of government in regulating trade and ensuring food and nutrition security. As a matter of fact, much of the existing literature is qualitative and is characterized by policy responses to major global food crises such as the world food crisis of the early 1970s, the

[1] LDCs and NFIDCs are eligible to request financial assistant under aid programme to facilitate their food imports see WTO (2016).
[2] For a broader discussion on food self sufficiency, see Clapp J. (2016).

2007-08 food crisis and 2010-11 price shocks (Margulis, 2017). This study examines the causal effect of the quality of governance on food and agricultural products import dependency in SSA. The study is quantitative and focuses on the disaggregated dimensions of governance. Moreover, we develop a composite governance index based on the six worldwide governance indicators using the Principal Component Analysis (PCA). We compare the effect of each governance indicator and the overall governance index on net-import dependency. Consequently, the causality between the composite governance index and import dependency on food and agricultural products is examined.

The study contributes to the existing agricultural international trade literature by showing that governance plays a significant role in the food and agricultural import dependency status of a country. The results reveal that a higher governance index is correlated with lower net-import dependency. As such, strengthening corruption control measures, government effectiveness, voice and accountability, and the rule of law significantly reduces net-import dependency on food and agricultural products. Hence, increasing governance quality in SSA could support reduced net-import dependency in the long run. These results provide a basis for formulating policies designed to promote international agricultural trade for economic development and food security.

The rest of this paper is organized as follows; section two provides a review of literature on agricultural international trade and governance. Empirical application and procedure of analysis are explained in section three, while section four presents the results and further discussions on the findings. Finally, section five provides the conclusion and recommendations of the study.

2. Literature review

Governance and agricultural trade

Governance and agricultural trade interact in different pathways that promote the four pillars of food security, namely, food accessibility, availability, utilization and stability. Agriculture production facilitates food supply and availability while agricultural trade ensures the distribution of food and global food stability. Government has a role in solving market failure and promoting competition which in turn lowers commodity prices making food affordable and accessible to consumers. In addition, through the labor market, households earn income which increases their purchasing power which enables them to diversify their dietary intake and improve their nutritional status. Furthermore, trade policies affect government services which in turn impact either positively or negatively on the various food security dimensions and the general performance of the national economy (FAO and Ishrat, 2016). Furthermore, stable governance reduces the uncertainty that hinders investment and pollutes the business environment, thereby promoting international trade.

According to Martin (2017), trade liberalization reduces poverty rates and improves nutritional outcomes. However, export subsidies in developed countries lead to dumping in developing countries. Dumping gradually destroy local agricultural industries which cannot

compete in the international market, causing more harm to the importing countries. Logically, if the money used to cover imports bills were spent within the domestic economy, it would have a multiplier effect, thereby boosting agriculture and economic growth. Sadler and Magnan (2011) provide an overview of strategies which if adopted by importing governments, could lead to a reduction of risks associated with imports dependency.

The government ought to and can create an enabling environment for the smooth functioning of the different pathways and agencies actively involved in food policy to support agriculture for development (Gupte and Longhurst, 2018). In addition, some studies (Fanzo et al., 2014; Nisbett and Barnett, 2017; Kohli et al., 2017) found that a high level of political leadership is an important driver and creates an enabling environment for improved food security and nutrition in a country. However, most national governments in developing countries face difficulty in providing public goods such as the rule of law, civil peace, infrastructure and public research necessary for promoting agricultural productivity (Paarlberg, 2002). While on the one hand, governance affects international trade, on the other, a feedback effect exists whereby a country's governance is shaped by international trade (Eichengreen and Leblang, 2008). Governance at the national level should be redesigned to effectively provide public goods and services in order to promote agricultural productivity, international agricultural trade and accelerate the realization of Sustainable Development Goal number 2 (SDG2).

Trends on food and agricultural import dependency

About 16 percent of the world population depends on international trade to meet their food and agricultural products demand. It is expected that most low-income countries will continue to depend on external land and water resources (Fader et al., 2013). Trade, whether domestic or international, increases household income and government revenue. By this, it increases diet diversity and promotes the stability of food supply (Burnett and Murphy, 2014; Brooks and Matthews, 2015).

In 1993, Latin America and the Caribbean were the leading grain importer in the world with an import dependency of 36.5 percent followed by SSA with 13.6 percent (Paarlberg, 2002). Africa, Asia and the Caribbean have been net importers of food and agricultural products on average and have been experiencing trade deficit for all periods between 1990 and 2016. Moreover, they are net importers of cereals and pulses, which are the major foods that they depend on for their daily meals. The trade deficits have been increasing over the years, and the figures more than doubled for the period 2010-2016. The increase in trade deficits could partly be explained by the rising import dependency coupled with the rising international food prices. For all these periods, most developed countries had a food and agricultural trade surplus. Interestingly, Europe has a trade deficit on food and agricultural products for all the periods but, the deficits decreased significantly for the period 2010-2016, contrary to what was happening in many developing countries. These world trade balances on agricultural products, food and selected crops are illustrated in **Appendix A, Table A.1**.

According to Valdés and Foster (2012), the number of developing countries who are both net-agricultural importers and net-food importers increased from 74 in 1999 to 89 in 2009, with an increase from 25 to 31 out of 51 SSA countries. Most developing countries are net-importers of staple food grains, and their dependency on imports has been increasing over the recent years (Murphy, 2015; EIU, 2017).

All African countries depend on food and agricultural products imports though the degree of dependency varies across countries. FAO (2012), using data for the period 1960-2007, reported that Africa, despite its agricultural potential, has been a net importer of food and of agricultural products. During 2007-2011, 37 African countries were net importers of food while 22 countries were net importers of agricultural raw materials (Blein et al., 2013). Due to arable land and water constraints, the Middle East and North Africa (MENA) mostly depend on imported food and is the largest grain importer in the world (Sadler and Magnan, 2011).

Conceptual framework

For the purpose of discussions in this paper, the study adopts the United Nations Development Programme (UNDP) (1997) definition of governance as; "the exercise of political and administrative authority at all levels to manage a country's affairs. It comprises the mechanisms, processes and institutions, through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences"[3]. This definition consolidates three World Bank definitions of governance. That is, "the exercise of political power to manage a nation's affairs" (World Bank, 1989), "the manner in which power is exercised in the management of a country's economic and social resources" (World Bank, 1994), and "the manner in which public officials and institutions acquire and exercise the authority to shape public policy and provide public goods and services" (World Bank, 2007). World Bank uses six indicators, namely, control of corruption, government effectiveness, political stability and absence of violence, regulatory quality, voice and accountability, and the rule of law to assess the quality of governance (Kaufmann et al., 2004). Good governance is built on three basic principles, namely, Participation and Inclusion, Accountability and Rule of Law, and Non-Discrimination and Equality (UNDP, 2011). Based on these principles, good governance is participatory, consensus-oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive, and respects the rule of law. It takes into account the interests and the most vulnerable in society in decision-making and minimizes corruption. In addition to these components of good governance, Organization for Economic Cooperation and Development (OECD) states that good governance is also forward-looking in the sense that it is able to make predictions about future trends and develop policies to deal with anticipated future changes. Any compromise on the stated principles and components of good governance results in poor governance and its consequences. Good governance is claimed to promote international trade for sustainable economic development (UN, 1998; Kaufmann and Kraay,

[3] See more discussion on governance in UNDP Strategy Note on Governance for Human Development, 2000.

2002; Resnick and Birner, 2006). According to Knack and Keefer (1995), the quality of governance significantly affects the investment rate in an economy. Moreover, donor agencies tag their aid disbursement on the quality of a country's governance (Gisselquist, 2012).

3. Data and methodology

Data

The study used Panel data for 25 SSA countries for the period 1995-2015. The countries were selected based on data availability. Since countries are heterogeneous in reference to their levels of development, environmental aspects, and consequently imports demand, they were classified into middle income, low-income countries, oil producers, and non-oil producers based on World Bank classification. The countries included in the sample are shown in **Table A.2**. Data were mainly collected from World Bank, Food and Agriculture Organization (FAO), The Food and Agriculture Organization Corporate Statistical Database (FAOSTAT) and International Monetary Fund (IMF). Net Imports Dependency Ratio (NIDR) was computed based on FAO definition of Import Dependency Ratio (IDR)[4]. NIDR on food and agricultural products was computed using data on total agriculture, which includes cultivation of crops for food and feed, cash crops, livestock production, plus forestry, hunting, and fishing as described by FAO. It was calculated as follows:

$$NIDR = (Imports - Exports)*100/(Production + Imports - Exports) \quad (1)$$

The quality of governance was measured using the Worldwide Governance Indicator (WGI) scores on the six governance dimensions, namely voice and accountability, corruption control, government effectiveness, political stability and absence of violence, regulatory quality, and the rule of law (Kaufmann et al., 2004; 2010). We developed a composite governance index that comprehensively captures the six dimensions of governance using PCA. **Table 1** presents the description of the variables and the corresponding data sources.

The dependent variable is NIDR, while the predictor variables of interest in this study are the six governance dimensions and the composite governance index. Control variables added in our analysis include agriculture productivity indicators such as agriculture value added per worker and total factor productivity (TFP). Other control variables are the exchange rate, inflation, foreign reserves, population, economic growth and natural resource endowment indicators, including fresh water and agricultural land.

[4]IDR is computed as; imports * 100/ (production + imports - exports).

Table 1. Variable description and data sources.

Variable	Code	Definition	Data source
Net-import dependency ratio	NIDR	Ratio of net imports to domestic food utilization	Computed
Governance Index	Govindex	Composite governance indicator	Computed
Control of corruption	Corrpcont	Governance indicator 1	World bank
Government effectiveness	Goveff	Governance indicator 2	World bank
Political stability and absence of violence	Polstab	Governance indicator 3	World bank
Regulatory quality	Regqlty	Governance indicator 4	World bank
Rule of law	Ruoflaw	Governance indicator 5	World bank
Voice and accountability	Voiceacc	Governance indicator 6	World bank
Agriculture value added per worker	Agrivapw	Productivity indicator 1	FAOSTAT
Total factor productivity	TFP	Productivity indicator 2	FAO
Exchange rate	Exrate	Real exchange rate	IMF
Inflation	CPI	Consumer Price Index	IMF
Foreign currency reserves	Foretodebt	Foreign reserves to debt ratio	World bank
Population	lnpopu	Log (population)	World bank
Economic growth	GDPpc	Real GDP per capita	World bank
Fresh water endowment	lnfreshh20	Log(fresh water)	FAOSTAT
Agricultural land	lnland	Log(agricultural land)	FAOSTAT

Methodology

Model identification

To examine the impact of the quality of governance on food and agricultural import dependency, panel data framework was used due to the flexibility it allows in modelling differences in behaviour across entities and its ability to solve sample selection bias (Greene, 2012). Panel regression models, namely, Pooled Ordinary Least Squares (OLS), which assumes homogeneity, Fixed Effect (FE) and Random Effects (RE), were estimated in order to select the appropriate model for the data. The general modelling framework is expressed as:

$$y_{it} = x_{it}'\beta + z_i'\alpha + \varepsilon_{it} = x_{it}'\beta + c_i + \varepsilon_{it} \quad (2)$$

where c_i capture the heterogeneity or individual effect and ε_{it} is the idiosyncratic errors. For the case of pooled regression, z_i contains only a constant term. However, if z_i is unobserved but correlated with x_{it} then fixed effect would be the appropriate model. Finally, if c_i is uncorrelated with x_{it}, then random effect would be evident.

First, the pooled OLS and RE were estimated using STATA software. Breusch-Pagan Lagrange Multiplier (LM) test developed by Breusch and Pagan (1980) was done to make a decision between a random effects regression and a Pooled OLS regression. The null hypothesis of variances across entities is zero, H_0: $\sigma^2_\mu=0$; was tested against the alternative hypothesis that variances across entities is not equal to zero; H_1:$\sigma^2_\mu\neq0$. The LM test statistic is calculated by:

$$LM = \frac{nT}{2(T-1)}\left[\frac{\sum_{i=1}^{n}(T\bar{e}_i)^2}{\sum_{i=1}^{n}\sum_{t=1}^{T}e_{it}^2} - 1\right]^2 \quad (3)$$

The estimated pooled OLS and RE equations are given in model **4** and **5**, respectively.

$$NIDR_{it} = \alpha + G_{it}'\lambda + X_{it}'\beta + \varepsilon_{it} \quad (4)$$

where *NIDR* is the net import dependency ratio, G is a vector of governance indicators and *X* is a vector of control variables. In the case of pooled OLS, λ and β include constant terms.

$$NIDR_{it} = \alpha + G_{it}'\lambda + X_{it}'\beta + \mu_i + \varepsilon_{it}, \quad (5)$$

where, μ_i is a group specific random element.

Consequently, RE model and FE model were estimated and Hausman specification test devised by Hausman (1978) was done in order to make a choice between RE model and FE model. Under the null hypothesis, the preferred model is RE, while for the alternative hypothesis, FE is the preferred model. The Hausman test statistic is computed as:

$$H = (b_{FE} - \hat{\beta}_{RE})'[V_{FE} - V_{RE}]^{-1}(b_{FE} - \hat{\beta}_{RE}) \quad (6)$$

where b and $\hat{\beta}$ are the coefficient vectors, V is the covariance matrix, FE is the consistent estimator and RE is the efficient estimator.

The FE models which account for entity fixed effect only and for both entity and time fixed effects are as follows:

$$NIDR_{it} = G_{it}'\lambda + X_{it}'\beta + \gamma_i + \varepsilon_{it} \quad (7)$$

$$NIDR_{it} = G_{it}'\lambda + X_{it}'\beta + \gamma_i + \sigma_t + \varepsilon_{it} \quad (8)$$

where γ_i is the country fixed effect and σ_t is the year fixed effect.

Cross-section dependence and Panel unit root test

Pesaran (2006) show substantial bias and size distortions in estimates when cross-section dependence in panel data is overlooked. Hence we test the data for cross-section dependence using LM test devised by Breusch and Pagan (1980). The test has a null hypothesis of no

cross-section dependence $H_0 : \text{cov}(\varepsilon_{it}\varepsilon_{jt}) = 0$ for all t and $i \neq j$ and an alternative hypothesis of cross-section dependence $H_0 : \text{cov}(\varepsilon_{it}\varepsilon_{jt}) \neq 0$. To compute the LM statistic, fixed effect model **(7)** is first estimated then the LM is calculated as:

$$LM_{CD} = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^2 \sim \chi^2 N(N-1)/2 \quad (9)$$

where $\hat{\rho}_{ij}$ is the estimate of the pair-wise correlation of the residuals from the estimation of the model (7).

Given that causality tests require the variables to be stationary, we tested our data for non-stationary using panel unit root tests proposed by Maddala and Wu (1999), and Pesaran (2007). The Fisher-type test by Maddala and Wu (1999) denoted as MW hereafter is a first-generation panel unit root test and assumes cross-section independence across panels. The assumption of cross-section independence is very restrictive; hence we also apply the Cross-sectional augmented Im, Pesaran, and Shin (CIPS) test proposed by Pesaran (2007). The CIPS test is a second-generation panel unit root test that allows for cross-sectional dependency. Both tests can be applied in unbalanced panels and series having different lags. The tests are based on the following model:

$$\Delta y_{i,t} = \alpha_i + \rho_i y_{i.t-1} + \sum_{z=1}^{pi}\beta_{i,z}\Delta y_{i,t-z} + \varepsilon_{it} \quad (10)$$

where Δ is the first difference operator, ρ_i and β_i are the autoregressive coefficients, T is the time span of the panel, and N is the number of cross-sections. The null hypothesis, $H_0 : \rho_i = 0$ for all *I*, all panels contain unit root is tested against the alternative hypothesis; $H_1 : \rho_i < 0$ for at least one *i,* some panels are stationary. Both tests allow for heterogeneity, since ρ_i is allowed to vary across the cross-sections.

Panel cointegration test

Having established the order of integration and non-stationary of our variables from the unit root tests, the next step is to test whether governance is cointegrated with net-import dependency on food and agricultural products. Cointegration implies long-run equilibrium relationship between the two variables. The two widely used panel cointegration tests in economic literature proposed by Pedroni (1999, 2004) and Westerlund (2005) are used. Pedroni (1999, 2004) test is residual-based and allows for heterogeneity in the slopes and intercepts of the cointegrating equation. Fixed effects and individual specific deterministic trends in the panels are allowed. Westerlund (2005) is based on error correction model hence have a higher power of test compared to the test proposed by Pedroni (1999, 2004). It allows for heterogeneity and accounts for cross-section correlation. The null hypothesis in both tests is that of no cointegration among variables in individual panels. The alternative hypothesis in Pedroni (1999, 2004) test is that all panels are cointegrated while in Westerlund (2005) test, the alternative hypothesis is that some panels are

cointegrated.

Granger causality test

By definition, if the past values of a stationary variable x can aid in the prediction of another stationary variable y_t conditional on having accounted for the effects of past values of y on y_t then, x is said to "Granger cause" y_t (Granger, 1969). We established that governance and net-import dependency are integrated of order one, I (1). Hence, a Vector Error Correction Model (VECM) was used to test whether governance index "granger cause" net-import dependency. Two steps procedure of estimating VECM followed by Engle and Granger (1987) were adopted. The first step involves the estimation of the following model in order to obtain the residuals.

$$NIDR_{i,t} = \alpha_i + \gamma_{1i} Gov_{i,t} + \varepsilon_{i,t}, \tag{11}$$

where α_i is the cross-sections fixed effect. The first lags of the residuals are used as a proxy for vector error correction term, which represents any deviation from long-run equilibrium between governance and import dependency. In the second step, a multivariate panel VECM with dynamic error correction term (ECT) is estimated. Specifically, the model estimated is as follows:

$$\begin{aligned} \Delta NIDR_{i,t} &= \theta_{1i} + \sum_{k=1}^{K} \theta_{11,k} \Delta NIDR_{i,t-k} + \sum_{k=1}^{K} \theta_{12,k} \Delta Gov_{i,t-k} + \lambda_1 ECT_{i,t-1} + \mu_{it,1} \\ \Delta Gov_{i,t} &= \theta_{2i} + \sum_{k=1}^{K} \theta_{21,k} \Delta Gov_{i,t-k} + \sum_{k=1}^{K} \theta_{22,k} \Delta NIDR_{i,t-k} + \lambda_2 ECT_{i,t-1} + \mu_{it,2} \end{aligned} \tag{12}$$

where, θ_{ni} for n = 1,2 are country-specific fixed effects and $\theta_{nn,k}$ are the coefficients corresponding to the *k*th lag of the endogenous variables. λ_n are the coefficients of the error correction terms and $\mu_{it,n}$ are idiosyncratic errors.

The VECM is used to test both short-run and long-run causality. To test short-run causality, the significance of the coefficients $\theta_{nn,k}$ is tested using the standard Wald F-test. The null hypothesis $H_0 : \theta_{nn,k} = 0$ for k=1,..., K is tested against the alternative hypothesis $H_0 : \theta_{nn,k} \neq 0$

Since the focus of this study is on whether governance "granger cause" imports dependency, rejecting the null hypothesis $H_0 : \theta_{12,k} = 0$ imply that governance "granger cause" import dependency in the short run. For long-run causality, the significance of the coefficient λ_n is also tested using the standard Wald test. The null hypothesis is $H_0 : \lambda = 0$ where $\lambda = \lambda_1, .\lambda_2$ and the alternative hypothesis is $H_0 : \lambda \neq 0$. In this study, rejecting the null hypothesis implies governance "granger cause" import dependency in the long run. The coefficients of the ECT, λ_n represents the speed of adjustment to the long-run equilibrium in case a shock occurs.

4. Results and discussion

Table 2 presents the results of the preliminary analysis in the model specification. The results of Breusch-Pagan LM for random effect provide strong evidence for rejecting the null hypothesis for no random effect. In other words, strong evidence for significant difference across units and within group's correlation was found.

Table 2. Summary of preliminary tests results.

Test	Statistic	p-Value
LM for Randon effects	1509.54	0.000
Hausman Specification	22.95	0.018
Time-fixed effect	1.49	0.079
LM_{CD}	998.267	0.000

Notes. The data used for these tests covers the full sample period from 1995 to 2015.

The results for Hausman test were in favour of FE. Therefore, FE model was selected as the consistent model with the data and was used for the analysis. Furthermore, the results for the presence of time-fixed effects test provided evidence for not rejecting the null hypothesis that the coefficients for all the years' dummies are jointly equal to zero. Therefore, in this case, no time fixed effects were needed. The test for cross-section dependence gave strong evidence to reject the null hypothesis of no cross-sections dependence. In other words, the residuals across entities are correlated.

Table 3 summarises the results of the estimated regression using fixed effect model, where the NIDR is the dependent variable is presented. At first, we used the six governance indicators as our variables of interest and later added control variables. Column 1 of **Table 3** shows the result of the short model without the control variables. Here, the coefficients for corruption control, government effectiveness and, voice and accountability are negative and statistically significant at the 0.01 significance level. The coefficient for the rule of law is also negative and statistically significant at the 0.05 significance level. However, the coefficients for political stability and regulatory quality are positive and are both not significant at the 0.05 and 0.01 significance levels. 84.8% of the variation in the net-import dependency ratio is explained by the six governance indicators. This value of R-squared is considerably high.

Column 2 of **Table 3** shows the estimation results when agricultural productivity indicators, namely agricultural value-added per worker and total factor productivity are added to the model. The signs of all the governance indicators remain the same as before. The coefficients for corruption control, government effectiveness, and voice and accountability are significant at the 0.01 level. When exchange rate, inflation and foreign reserves to debt ratio are added to the base model, the signs of the coefficients for the governance indicators remain the same as before. The coefficients for regulatory quality and rule of law are significant at the 0.05 significance level. These results are shown in column 3 of **Table 3**.

Table 3. Regression results for net-import dependency and governance indicators.

VARIABLES	(1) NIDR	(2) NIDR	(3) NIDR	(4) NIDR	(5) NIDR	(6) NIDR
Corrpcont	-0.416***	-0.436***	-0.438***	-0.361***	-0.357***	-0.357
	(0.089)	(0.093)	(0.097)	(0.098)	(0.099)	(0.266)
Polstab	0.073	0.059	0.071	0.0822	0.086*	0.0861
	(0.047)	(0.048)	(0.049)	(0.052)	(0.052)	(0.101)
Goveff	-0.293***	-0.306***	-0.313***	-0.325***	-0.325***	-0.325
	(0.085)	(0.086)	(0.086)	(0.085)	(0.085)	(0.196)
Regqlty	0.131	0.149	0.193**	0.221**	0.219**	0.219
	(0.091)	(0.092)	(0.094)	(0.093)	(0.094)	(0.174)
Ruoflaw	-0.229**	-0.212*	-0.279**	-0.287**	-0.289**	-0.289
	(0.110)	(0.111)	(0.116)	(0.116)	(0.117)	(0.212)
Voiceacc	-0.264***	-0.263***	-0.242***	-0.241***	-0.242***	-0.242
	(0.089)	(0.089)	(0.091)	(0.090)	(0.090)	(0.155)
Agrivapw		-0.001	-0.002*	-0.003**	-0.003**	-0.003
		(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
TFP		0.017	-0.020	-0.122**	-0.121**	-0.121
		(0.043)	(0.049)	(0.054)	(0.058)	(0.089)
Exrate			-0.002	-0.001	-0.001	-0.001
			(0.001)	(0.001)	(0.001)	(0.002)
CPI			0.0377*	-0.046	-0.048*	-0.048
			(0.020)	(0.028)	(0.028)	(0.041)
Foretodebt			0.005	0.004	0.004	0.004
			(0.004)	(0.004)	(0.004)	(0.004)
lnpopu				20.49***	20.85***	20.85*
				(5.826)	(7.183)	(12.00)
GDPpc				0.003**	0.003**	0.003
				(0.001)	(0.001)	(0.002)
lnfreshh2o					-7.258	-7.258
					(11.380)	(9.234)
lnagril					-0.302	-0.302
					(5.192)	(7.936)
Observations	525	525	525	525	525	525
R-squared	0.848	0.849	0.851	0.856	0.856	0.278
Number of country	25	25	25	25	25	25

Notes: Standard errors in parentheses.

***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

Furthermore, addition of more control variables into the model, that is; log population, GDP per capita, log fresh water and log agricultural land, does not change the sign and the significance of the coefficients for all the governance indicators. All the control variables have the expected signs. (See column 4 and 5 of **Table 3**). Finally, fixed effect robust errors are used to solve possible heteroscedasticity, and the results are illustrated in column 6 of **Table 3**.

These results imply that an increase in corruption control is expected to reduce food and agricultural import dependency, holding all other things constant. The same case applies to government effectiveness, voice and accountability, and rule of law. However, an increase in political stability is expected to increase food and agricultural import dependency. Similarly, an increase in regulatory quality is expected to increase food and agricultural import dependency, holding all other things constant.

Corruption undermines agricultural productivity by eroding national and farmers' income. It creates market failures such as monopoly and enhances selfish arrangements that address personal interest gains (EIU, 2018). Campos et al. (1999) and Dahlström et al. (2012) showed

that reducing corruption encourages productive investment. In addition, corruption diverts public funds meant for boosting agriculture development to personal gains. As such, corruption reduces public spending on agriculture leading to low agricultural output. Public expenditure on agriculture in SSA has been stagnating at relatively low levels in comparison to other regions in the world (Vos, 2015; FAO, 2012). Corruption control, therefore, can promote investment in the agriculture sector which in turn would increase domestic agricultural production and supply. This could reduce dependency on imports and also provide a surplus for export.

Conflict and political instability hamper economic and trade integration (Blein et al., 2013). In addition, conflicts and political unrest negatively affect the production and distribution of food and agricultural products, both domestically and internationally. Political stability, therefore, creates a good environment for trade, the creation of bilateral agreements and agricultural FDI flows. Furthermore, it promotes the distribution from areas of high supply-low demand to areas of high demand-low supply. Increases in income further boost consumption demand. According to EIU (2018), political stability is essential for agricultural productivity. Since the agriculture sector in Africa has been stagnating, much of the increased consumer demand is met by imports. Hence, if governments do not support agricultural production to meet local demand and promote exports, import dependency will be inevitable.

Improving government effectiveness promotes the provision of public goods such as infrastructure, agricultural research and other public expenditures in agriculture which promote agricultural productivity and reduce import dependency. According to Paarlberg (2002), East and Southeast Asia experienced reduced hunger and malnutrition through the provision of public goods such as internal peace, the rule of law, infrastructure, agricultural research and investment by the government. However, in SSA where the governments have not effectively provided these public goods, the citizens continue to suffer from hunger and rural poverty. To reduce import dependency in SSA, the agriculture sector needs to be revived. This calls for a paradigm shift of governance at the local, institutional and national level. Therefore, governance reforms should be placed at the heart of the agricultural development agenda.

Since regulatory quality captures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, the positive sign of regulatory quality can be explained by the fact that the few large companies and importing cartels are able to corrupt their operations in order to maximize their gains from imports at the expense of the public interest. Therefore, improving regulatory quality without reducing corruption, promotes private sector development and increases import dependency. Moreover, corruption threatens the respect for the rule of law and voice and accountability. Consequently, deficiency in the rule of law encourages corruption.

Table 4. Regression results for net-import dependency and the composite governance index.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	NIDR	NIDR	NIDR	NIDR	NIDR
Lgovindex		-2.606***	-2.592***	-1.903***	-1.903
		(0.575)	(0.618)	(0.622)	(1.337)
Agrivapw			-0.0003	-0.003*	-0.003
			(0.001)	(0.001)	(0.003)
TFP			0.003	-0.154**	-0.154
			(0.055)	(0.061)	(0.109)
Exrate			0.0004	0.001	0.001
			(0.001)	(0.001)	(0.001)
CPI			0.0105	-0.101***	-0.101*
			(0.022)	(0.030)	(0.058)
Foretodebt			0.004	0.004	0.004
			(0.004)	(0.004)	(0.004)
lnpopu				26.24***	26.24*
				(6.324)	(15.29)
GDPpc				0.005***	0.005**
				(0.001)	(0.002)
Govindex	-2.893***				
	(0.561)				
Observations	525	500	500	500	500
R-squared	0.811	0.816	0.817	0.828	0.102
Number of country	25	25	25	25	25

Notes: Standard errors in parentheses.
***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

To allow a comparison of the effect of the different governance indicators and the composite governance index on net-import dependency, we examined the relationship between the composite governance index and import dependency on food and agricultural products. Lag one of governance index is used to control potential endogeneity. The results in **Table 4** shows that the coefficients for governance index and lag governance index are negative and significant at the 0.01 significance level. In line with the results presented in **Table 3**, 81.1% of the variation in net-import dependency is explained by governance index.

Adding control variables does not change the sign and significance of the coefficient of lag governance index, but the magnitude decreases, as shown in column 3 and 4 of **Table 4**. Robust standard errors are used, and the results are shown in column 5 of **Table 4**. These results imply that governance and lag of governance are negatively related to the net- import dependency.

Robustness checks

In order to gain more insight, in this section, we provide robustness checks on the aforementioned estimation results. The sample was divided into sub-samples with more homogeneous characteristics. At first, the sample was divided into middle income and low-income countries then into non-oil producing and oil-producing countries. Thereafter, the

analysis was repeated using FE model. Since adding more control variables into our base model does not change the sign of our variables of interest, we focus on the results presented in column 1 of **Table 3**.

Table 5 and **6** present the results for the robustness checks. **Table 5** shows that in all the sub-samples, the results are robust for most of the six governance indicators coefficients. All the coefficients of governance indicators have similar signs but different magnitude as observed in the main estimation results (Column 1 of **Table 3**) except for the case of government effectiveness in the oil producer sub-sample and the case of the rule of law in the middle-income sub-sample. Otherwise, the coefficient of government effectiveness is negative in middle income, low income and non-oil producer sub-samples and is significant at the 0.01 significance level. The coefficient for the rule of law is negative in low income, non-oil and oil producer subsamples but is only significant at the 0.01 significance level in low-income sub-sample.

Table 5. Regression results for governance indicators and net-import dependency in different country groups.

	(Middle Income)	(Low income)	(Non-oil Producer)	(Oil Producer)
VARIABLES	NIDR	NIDR	NIDR	NIDR
Corrpcont	-0.765***	-0.061	-0.307**	-0.223***
	(0.155)	(0.116)	(0.137)	(0.085)
Polstab	0.036	0.136**	0.131*	0.0891**
	(0.086)	(0.064)	(0.076)	(0.045)
Goveff	-0.126	-0.392***	-0.679***	0.189***
	(0.160)	(0.103)	(0.125)	(0.068)
Regqlty	0.434***	0.372***	0.319**	0.069
	(0.141)	(0.121)	(0.148)	(0.076)
Ruoflaw	0.333*	-0.657***	-0.185	-0.038
	(0.191)	(0.144)	(0.173)	(0.102)
Voiceacc	-0.228	-0.431***	-0.657***	-0.221***
	(0.142)	(0.111)	(0.149)	(0.066)
Agrivapw	-0.003***	-0.014**	-0.004	-0.004***
	(0.001)	(0.006)	(0.006)	(0.001)
TFP	-0.303***	-0.064	-0.147*	-0.179***
	(0.080)	(0.069)	(0.079)	(0.046)
lnpopu	22.91***	43.19***	12.75*	29.26***
	(8.014)	(7.837)	(6.827)	(3.861)
GDPpc	0.003***	-0.029***	-0.002	0.003***
	(0.001)	(0.007)	(0.002)	(0.001)
Observations	189	336	315	210
R-squared	0.943	0.764	0.849	0.950

Notes: Standard errors in parentheses.
***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

The coefficient of corruption control is negative in all sub-samples and significant at the 0.01 level in middle income and oil producer sub-samples, while it is significant at the 0.05 level in the non-oil producer sub-sample. Coefficients for political stability and regulatory quality are positive in all sub-samples. Political stability coefficient is significant at the 0.05 level in low-income countries and oil producers sub-samples, while regulatory quality is significant at the 0.01 level in middle income and low-income sub-samples and is significant at the 0.05 level in the non-oil producer sub-sample. The coefficient of voice and accountability is negative in all the sub-samples and is significant at the 0.01 significance level in low income, non-oil producer and oil producer sub-samples.

Table 6. Regression result for the composite governance index and net-import dependency in different country groups.

	(Middle Income)	(Low income)	(Non-oil Producer)	(Oil Producer)
VARIABLES	NIDR	NIDR	NIDR	NIDR
Lgovindex	-0.569	-3.733***	-4.646***	-1.401***
	(0.801)	(0.846)	(0.950)	(0.451)
Agrivapw	-0.002	-0.008	0.0002	-0.004***
	(0.001)	(0.007)	(0.007)	(0.001)
TFP	-0.196**	0.0536	-0.006	-0.046
	(0.085)	(0.081)	(0.091)	(0.046)
lnpopu	1.023	-11.35*	-8.604***	8.511***
	(2.700)	(6.650)	(3.010)	(1.550)
GDPpc	0.005***	0.021	0.001	0.003***
	(0.001)	(0.014)	(0.002)	(0.001)
Observations	180	320	300	200
R-squared	0.928	0.656	0.794	0.942

Notes: Standard errors in parentheses.
***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

The analysis of the relationship between the composite governance index and import dependency in the sub-samples reveals that the lag of the governance index is negative in all the sub-samples and significant at the 0.01 level in low income, non-oil producing and oil-producing countries. The results presented in **Table 6** are robust in consideration to the results presented in **Table 4**.

Panel Granger causality

After we have established the relationship between the quality of governance and net-imports dependency on food and agricultural products, the next step is to determine the existence or non-existence of causality between the two variables. In this section, we present the results of the panel unit root, cointegration and causality tests. The variables of interest are the NIDR and the composite governance index. MW and CIPS unit root tests were applied to test non-stationary in our data. The results of both panel unit root tests are presented in **Table 7.**

Table 7. Panel unit root tests results.

(a) CIPS test					
		Without trend		With trend	
Variable	lags	Z-bar statistic	p-value	Z-bar statistic	p-value
NIDR	0	-4.514	0.000	-3.838	0.000
	1	-3.036	0.001	-2.073	0.019
	2	-1.018	0.154	0.274	0.610
Govindex	0	-0.642	0.261	1.254	0.895
	1	-2.057	0.020	-0.533	0.297
	2	-0.751	0.226	2.245	0.988
(b) MW test					
		χ^2	p-value	χ^2	p-value
NIDR	0	108.629	0.000	112.946	0.000
	1	77.940	0.007	82.671	0.002
	2	46.662	0.608	44.634	0.688
Govindex	0	47.15	0.588	49.295	0.502
	1	60.814	0.141	80.659	0.004
	2	43.459	0.732	44.442	0.695

Note: The data used for these tests covers the full sample period from 1995 to 2015.

The test for cross-sectional dependence gave strong evidence to reject the null hypothesis of no cross-section dependence (see **Table 2**). However, the results of CIPS test that allows for cross-section dependency are considered. Lag 2 was selected when carrying out the test though lag one is believed to be optimal. The results show that NIDR is stationary at level and at the first difference, both with trend and without trend. The governance index is not stationary at level but becomes stationary after the first difference without trend. Hence NIDR and governance index are integrated of order I (1).

The results for the two-panel cointegration tests reveal strong evidence to reject the null hypothesis for no cointegration. **Table 8** presents the results for Pedroni (1999, 2004) residual based test and the Westerlund (2005) error corrected panel cointegration test. The test statistics for Pedroni test are negative and significant except for the *v*. The p-values for the test statistics in Westerlund test are less than 0.05. Therefore, in both tests the null hypothesis for no cointegration is rejected. These results imply that net-import dependency and governance have a long-run relationship.

Table 8. Panel cointegration tests results.

Pedroni cointegration test			Westerlund cointegration test			
statistic	panel	group	statistic	value	Z-value	P-value
v	0.836		Gt	-2.194	-2.255	0.012
ρ	-3.92***	-2.002**	Ga	-10.982	-3.488	0.000
t-pp	-4.726***	-4.699***	Pt	-12.798	-5.355	0.000
t-adf	-1.674*	-2.561***	Pa	-10.044	-6.198	0.000

Notes: The data used for these tests covers the full sample period from 1995 to 2015.
***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

To determine parameter estimates of the long-run cointegrating relationship between governance and net-import dependency, panel Dynamic Ordinary Least squares (DOLS) were estimated using panel group means. DOLS involves including lags and leads in order to eliminate potential feedback effects and to control for potential endogeneity and serial correlation in the residuals. Lag one and two were included in the model **(11)**. The estimated coefficient of governance index is -0.699 and significant with a t-statistic of -2.729. This implies that a higher governance index is correlated with lower import dependency. For robustness check, and in order to deal with endogeneity problem and ensure consistent estimators are obtained, Generalized Method of Moments (GMM) estimator proposed by Arellano and Bond (1991), which uses lagged differences of the dependent variable as instruments were estimated. The first lags of the residuals were used as a proxy for vector ECT in the estimation of the VECM specified in model **(12).** The model was estimated by country in order to better infer the existence and directions of the causality. **Table 9** presents the summary of the coefficients of the lag of the independent variable and the ECT. Significance of the coefficient of the ECT implies rejection of the null hypothesis in determining causality in the long run while the significance of the coefficient of the independent variable determines causality in the short run. The table shows evidence of causality running from governance to net-import dependency in Angola, Botswana and Congo in the short run. Evidence of unidirectional causality from governance to net-import dependency, in the long run, is seen in Angola, Cameroon, Guinea, Rwanda, Zimbabwe, Benin, Burkina Faso, Mali, Mozambique, Niger, Senegal and Togo. In Angola and Botswana, there is evidence of unidirectional causality from governance to net-import dependency both in the short run and in the long run.

A unidirectional causality running from net-import dependency to governance is evident in the case of Guinea and Kenya. In addition, net-import dependency Granger cause governance in the long run in Congo, Ghana, Kenya, Malawi, Nigeria, Uganda, Zambia, Zimbabwe and Niger. In Kenya, there is evidence of causality both in the short run and in the long run. There is a presence of bidirectional causality in the long run between governance and net-import dependency in Zimbabwe and Niger. Out of the 25 SSA countries analyzed, we find unidirectional causality from governance to net-import dependency in 14 countries. Wherein, 13 out of the 14 countries, the causality is in the long run. Unidirectional causality from net-import dependency to governance is evident in 10 countries in which 9 out of the 10 countries, the causality is in the long run. In conclusion, causality between governance and net-import dependency in these countries is mainly in the long run.

Good governance creates an agricultural investment climate while poor governance strengthens the grabbing hand leading to misappropriation of funds meant for agriculture investment. This hinders agricultural development and leads to low productivity, which in turn creates a supply deficit as the population and demand for more food increases. The resulting effect is increased imports to meet the local demand upon which the imports grow more, particularly in the case of dumping. If domestic agriculture production is not boosted in order to meet the demand and provide for exports, import dependency is inevitable.

Table 9. Causality between governance and net-import dependency results.

	H_0:Governance does not Granger-cause net-import dependency		***H_0: net-import dependency does not Granger-cause Governance***	
Country	Short-run LGovindex	Long-run LECT	Short-run LNIDR	Long-run LECT
Angola	-10.975***	-1.834***	-0.009	-0.464
Botswana	3.385*	-0.767***	-0.026	-0.350
Chad	0.549	-0.099	0.020	-0.287
Cameroon	0.362	-0.436***	-0.024	-0.202
Congo	3.370*	-0.074	0.042	-1.014***
Ethiopia	-5.951	-0.380	-0.004	-0.057
Guinea	0.602	-0.558**	-0.159*	-0.002
Ghana	0.782	-0.002	0.014	-1.04***
Kenya	1.862	-0.137	0.039*	-0.328*
Malawi	-0.478	-0.373	0.047	-1.058**
Nigeria	0.518	0.000	0.036	-0.634*
Rwanda	1.218	-1.122**	0.375	0.011
Sierra Leone	-0.498	-0.302	0.047	-0.101
South Africa	1.319	-0.532	0.016	-0.038
Uganda	-0.831	-0.268	0.007	-0.405***
Zambia	-4.027	-0.003	0.003	-0.586*
Zimbabwe	21.534	-0.265*	-0.006	-0.004*
Central Africa Re	-0.353	-0.314	0.144	-0.244
Benin	2.481	-0.727*	0.017	-0.13
Burkina Faso	2.307	-0.550*	-0.019	-0.007
Mali	-3.333	-0.593**	-0.014	-0.057
Mozambique	1.253	-2.021***	0.657	-0.131
Niger	-0.458	-0.307*	-0.096	-0.763***
Senegal	-3.065	-0.644*	0.170	-0.156
Togo	-5.311	-0.946*	-0.008	-0.062

Note: The data used covers the full sample period from 1995 to 2015.
***, **, and * denote statistical significance at 1%, 5% and 10%, respectively.

5. Conclusions

This research investigated the causal relationships between the quality of governance and net-import dependency on food and agricultural products for 25 SSA countries during the period 1995-2015. The study was motivated by several factors; firstly, despite most SSA countries being agricultural-based and depend on agriculture for their livelihood and economic development, the region has the highest level of food insecurity and undernourishment globally. Secondly, the persistent increase in food and agricultural net-imports and consequently increasing food and agricultural trade deficits in the region and thirdly, governance and institution failures have been cited as some of the challenges facing implementation of agricultural development agenda and economic development in the region (World Bank, 2008).

We developed a governance index based on the six worldwide governance indicators using the principal component analysis. Subsequently, a fixed effect model was applied to analyze the relationships. Panel DOLS and GMM were applied to deal with the endogeneity problem. The empirical results reveal that corruption control, government effectiveness, the rule of law and, voice and accountability are negatively related to food and agricultural net-import dependency and are statistically significant. Therefore, Governments should employ measures to improve these governance dimensions in order to promote agricultural productivity. In addition, political stability and regulatory quality are positively related to food and agricultural import dependency

in SSA. This could be explained by the fact that political stability creates a conducive environment for investment and trade. Moreover, it encourages regional integration and bilateral agreements, thereby promoting international trade in food and agricultural products. Given the high levels of corruption in SSA, government regulations favour private sector development at the expense of public interest. This scenario could explain the positive and significant relationship between regulatory quality and net-import dependency. Overall, a higher governance index is correlated with a lower net-import dependency ratio.

On causality between governance and net-import dependency on food and agricultural products, a multivariate panel vector error correction framework was applied to investigate the long-run and short-run causality. Out of the 25 countries studied, evidence of unidirectional causality running from governance to net-import dependency in 14 countries is found. In addition, unidirectional causality running from net-import dependency to governance is evident in 10 countries. We also find evidence of bidirectional causality in 2 countries, i.e. in Zimbabwe and Niger. The causality between governance and net-import dependency in these countries is mainly in the long run.

Based on these findings, we conclude that increasing governance quality could support reduced net-import dependency on food and agricultural products through promoting agricultural production, exports and consequently reduced trade deficit in SSA in the long run. Governance reforms considerations in the region are pivotal for sustainable agriculture, food security and overall economic development. Therefore, to meet the desired results, measures to reduce corruption and strengthen government effectiveness and efficiency should be put in place. Moreover, governance needs to be inclusive and democratic so as to factor in the interests of all stakeholders in the food and agriculture sector and, more importantly, those of producers and the vulnerable population.

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Appendix A

Table A.1. World food and agricultural products trade balances 1990-2016 (Average value in million US$). Source: Authors' calculation using FAO data,1990-2016.

	1990-1999			2000-2009			2010-2016		
	Import value	**Export value**	**Deficits (Net-imports)**	**Import value**	**Export value**	**Deficits (Net-imports)**	**Import value**	**Export value**	**Deficits (Net-imports)**
Agricultural products									
Africa	18507.6	13540.2	4967.3	34887.7	21488.8	13399.0	79558.5	45712.4	33846.1
Asia	112195.2	63712.8	48482.3	188843	111521	77322	451983.8	266848.4	185135.4
Caribbean	3027.1	2804.1	222	5371	2263.3	3107.7	8953.3	3229.1	5724.2
Europe	215245	190612.6	24632.4	342629.6	318530.7	24098.9	560424.6	553711.4	6713.3
North America	43026	66334	-23308	80690.7	97725.2	-17034.5	142997	182606.5	-39609.5
South America	11357.9	30693.6	-19335.8	18066.4	67618.3	-49552	39639.9	152372.2	-112732.3
Oceania	4055.5	19350.9	-15295.4	8506.4	29982.6	-21476.2	17935.1	54367.1	-36432
Food excl. fish									
Africa	14880.6	7861.3	7019.2	28801.4	13699.8	15101.6	66486.7	31300.0	35186.7
Asia	74293.5	38120.2	36173.3	132577.5	74614.2	57963.3	326903.7	180188	146715.7
Caribbean	2494	2262.8	231.2	4240	1240.3	2999.7	7154.1	1824.3	5329.8
Europe	145688.7	133615.4	12073.3	239453.4	220738.4	18715	397819.3	390644.9	7174.5
North America	26573.4	46119.5	-19546.1	51540.1	74639.7	-23099.6	93216	144452.4	-51236.4
South America	8375	18797.3	-10422.2	13548.1	48063.7	-34515.7	29901.4	110558.7	-80657.3
Oceania	2776.5	13521.6	-10745.1	5882.3	22445.6	-16563.2	12286.3	43589.3	-31303
Cereals, Total									
Africa	6160.5	496.4	5664.1	11826.9	764.5	11062.4	24396.4	1587.1	22809.2
Asia	18473.8	5815.2	12658.6	26232.3	11100.3	15132	53278.3	22821.3	30457
Caribbean	759.4	56.1	703.3	1144.8	31.5	1113.3	1929	55	1874
Europe	11987.2	12059.9	-72.7	14248.7	17040.9	-2792.2	24170.3	37916.7	-13746.4
North America	1026.8	15571.6	-14544.8	2017.2	18872.8	-16855.6	3852.7	28865.1	-25012.4
South America	2918.3	2388.2	530.1	4214.7	4939	-724.3	8287.1	14212.7	-5925.6
Oceania	240.5	2626.2	-2385.8	438.5	3230.9	-2792.4	788.4	6946.1	-6157.8
Pulses, Total									
Africa	333.3	70.5	262.9	607	154.1	452.8	1144.2	679.2	465
Asia	806.9	857.8	-50.9	2076.7	1513.4	563.3	5944.2	2857.1	3087.1
Caribbean	88.3	1.3	87.0	132.7	4.3	128.3	150.1	6.9	143.2
Europe	1161.1	624.6	536.4	1033.6	511.2	522.4	1516.5	1042.9	473.7
North America	85.2	627.8	-542.6	231.1	1367.1	-1136	485.1	3440.3	-2955.1
South America	215.3	185.2	30.1	277	230.9	46.1	600.4	499.7	100.8
Oceania	17.7	155.1	-137.4	22.6	287.8	-265.2	39.2	991.6	-952.3
Coffee, Tea, Cocoa+ Sp, Total									
Africa	830.8	4091.5	-4922.3	1194.8	5976.8	-7171.6	2938.5	11512.3	-14450.8
Asia	4507.5	5214.8	-707.3	7870.9	8629.7	-758.8	20088.9	21260.8	-1171.9
Caribbean	52.2	196.3	-144.1	112	175.8	-63.8	205.3	280.4	-75.1
Europe	17200.1	9669.6	7530.5	26284.7	19085.5	7199.2	52198.2	39656.3	12541.9
North America	5422.7	1154.1	4268.6	7953.5	2347.3	5606.2	15985.6	4912.7	11072.9
South America	438.4	4835	-4396.6	720.3	5654.9	-4934.6	1782	12189.5	-10407.4
Oceania	432.3	342.7	89.6	789.9	459.8	330.1	1804	732.5	1071.5
Fruits and vegetables									
Africa	1076	2337.5	-1261.5	2229.1	4335	-2106	5838.4	11242	-5403.6
Asia	12893.8	12273.5	620.2	21455	23091.5	-1636.5	55673.7	54074.9	1598.8
Caribbean	306.2	334	-33.7	574.6	331.1	243.5	843.7	601.7	242
Europe	43460.1	29873.1	13587	70781.1	51289.2	19491.9	113218	82236.7	30981.3
North America	10640.9	7890.4	2750.5	20378	13958.1	6419.9	37481.5	28364.1	9117.4
South America	1392.4	5395.4	-4003	1818.4	9378.9	-7560.5	4461.3	18768.2	-14306.9
Oceania	643.9	1398.3	-754.4	1322.4	2137.3	-814.9	2651.5	4171.2	-1519.7

Table A.2. List of countries by sub-samples.

Middle income	Angola, Botswana, Cameroon, Congo, Ghana, Kenya, Nigeria, Zambia, South Africa
Low income	Chad, Ethiopia, Guinea, Malawi, Sierra Leone, Rwanda, Uganda, Zimbabwe, Central Africa Re, Benin, Burkina Faso, Mali, Mozambique, Niger, Senegal, Togo
Non-oil producer	Botswana, Ethiopia, Kenya, Rwanda, Sierra Leone, Uganda, Zambia, Zimbabwe, Central Africa Re., Benin, Burkina Faso, Mali, Mozambique, Senegal, Togo.
Oil producer	Angola, Chad, Cameroon, Congo, Guinea, Ghana, Malawi, Nigeria, South Africa, Niger