CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

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The Impact of the CAP on Food Security in Eastern Africa Region

The price transmission analysis of maize and wheat in Kenya, Uganda and Tanzania

DIPLOMA THESIS

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Declaration

I hereby declare that I have written presented master thesis "The impact of the CAP on food security in Eastern Africa region – Price transmission analysis of maize and wheat in Kenya, Uganda and Tanzania" by myself with help of the literature listed in resources.

Prague, 24 April 2015

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Kim Králík

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Abstract

The recent period starting in the year 2007 has been called global food crisis and was characterised by high staple commodity prices combined with their unpredictable volatility. High and volatile food prices are major threat towards reaching food security in developing countries. This thesis describes price trends and developments for maize and wheat on the world market and EU market and compares them with those of Kenya, Uganda and Tanzania. The thesis analyses the level of price volatility and the possible determinants of high and volatile food prices on world market and the degree to which EU could influence changes on the world market and the degree to which world market could influence changes on domestic markets of Kenya, Uganda and Tanzania. Author used descriptive statistics e.g.: standard deviation, coefficient of variation, to explore the levels of volatility and Pearson correlation and correlation coefficients to explore price trends and possible co-movements of market prices.

The results showed that price trend developments in all selected countries in the recent period were similar to those of the world market, with even higher food prices on domestic markets of Kenya, Uganda and Tanzania. The levels of price volatility were high for maize and relatively lower for wheat, but in both cases comparable on African markets and on the markets of world or the EU. The moderate integration of African countries into the world market is evident from the delayed price adjustments, which could take few months. No direct influence of the EU's CAP was discovered, however there are still some market distorting measures as a part of the policy.

Key words: high food prices, price volatility, food security, Kenya, Uganda, Tanzania, CAP, maize, wheat

Abstrakt

Poslední období, začínající rokem 2007, bývá označováno za období globální potravinové krize, charakterizováno vysokými cenami potravinových komodit a nepředvídatelnou volatilitou těchto cen. Vysoké a kolísavé ceny jsou vnímány jako hrozba pro dosažení potravinové bezpečnosti v rozvojových zemích. Tato práce popisuje trendy vývoje cen kukuřice a pšenice na světovém trhu, trhu EU a porovnává je s vývojem cen na trzích Keni, Ugandy a Tanzanie. Tato práce také analyzuje úroveň cenové volatility a její determinanty na sledovaných trzích a také potenciální vliv EU, kterým může přispívat ke zvyšování cen potravin v Keni, Ugandě a Tanzanii. Autor použil ke zkoumání úrovně volatility běžné popisné metody statistiky, například směrodatné odchylky a variační koeficienty a také Pearsonovu korelaci a korelační koeficienty k popsání cenových trendů a možných souvislostí v těchto trendech.

Výsledky práce ukázaly, že vývoj cen na všech sledovaných trzích byl podobný, s tím, že cenové hladiny za sledované období byly významně vyšší na trzích Afrických zemí. Úroveň cenové volatility byla vyšší pro kukuřici než pšenici, v obou případech byla však úroveň volatility srovnatelná pro světový trh, trh EU a pro trhy Keni, Ugandy a Tanzanie. Relativně slabá integrace Afrických trhů do světového trhu byla v některých případech evidentní také ze zpožděné odezvy cenového vývoje, které se pohybovala v řádu měsíců. Přímý vliv Společné Zemědělské Politiky EU na vývoj cen a volatility nebyl popsán, nicméně některé součástí této politiky mají stále nepřímý negativní vliv na trhy.

Klíčová slova: vysoké ceny potravin, volatilita cen potravin, potravinová bezpečnost, Keňa, Uganda, Tanzanie, Společná Zemědělská Politika, kukuřice, pšenice

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Abbreviations

AMIS – Agriculture Market Information System
CAP – The Common Agricultural Policy of the European Union
EAC – East African Community
EC – European Commission
EU – European Union
EPA – Economic Partnership Agreement
FAO – Food and Agriculture Organization of the United Nations
GDP (PPP) – Gross Domestic Product (Purchasing Power Parity)
GIEWS – Global Information and Early Warning System on Food and Agriculture
HDI – Human Development Index
HLPE – High Level Panel of Experts on Food Security and Nutrition
IFAD – International Fund for Agriculture and Development
IFPRI – International Food Policy Research Institute
IMF – International Monetary Fund
LDC – Least Developed Country
NBS – National Bureau of Statistics
NGO – Non-governmental Organization
OECD – Organisation for Economic Co-operation and Development
RATIN – Regional Agricultural Trade Intelligence Network
UN – United Nations
UN COMTRADE – United Nations Commodity Trade Statistics Database
UNCTAD – United Nations Conference on Trade and Development
UNDP – United Nations Development Programme
USA – United States of America
USD – United States dollar
WTO – World Trade Organization

1. Introduction

There are more than 800 million undernourished people in the world 200 million of which live in the Sub-Saharan Africa. Despite the substantial progress in limiting poverty around the world, food security remains the key problem in many developing countries and thus remains at the core of the developmental efforts of international organizations, governments, NGOs and academia.

Generally, there are four dimension of food security, which determine the causes of food insecurity and those are: availability, access, utilization and stability. Put together, these four dimensions form the basis for achieving food security. Food has to be available, people must have physical and economic access to it, they have to know how to utilize it and this state has to be stable, without disruptions, over time.

In the case of Eastern Africa, availability of food is often limited, population have to face difficulties when food prices are high and unpredictably volatile, which also threatens the stability of both availability and access dimension of food security. The recent period starting in the year 2007 was marked by high and volatile prices of many food commodities, including maize and wheat, which are important staple foods in the region.

The high and volatile commodity prices were common in all parts of the world and they were driven mainly by weather related supply shocks, increasing prices of oil and fertilizer, or rapidly increasing demand for food in emerging countries and also increased demand for biofuels. As a response to these price developments, many governments decided to protect their domestic markets from the outside disturbances by using various measures such as export bans, import tariffs reduction, direct market interventions, subsidised food purchases and so on. The EU, with its powerful Common Agricultural Policy, was not an exception.

The overall effect of this wave of protectionist measures has been further destabilization of the world market, resulting in increased price volatility for unprotected developing countries. Kenya, Uganda and Tanzania went through a period of record high prices accompanied with unpredictable volatility, which negatively influenced the food security of the poorest households. Poor urban and rural households had to squeeze their budgets by limiting non-food expanses such as health and education. Many people were driven back into poverty and starvation. It is therefore interesting to analyse forces behind

price creation and high price volatility, in order to better understand this complex phenomenon, to be able to predict similar situations in the future.

The overall objective of this thesis is therefore to analyse food security situation in three selected developing countries Kenya, Uganda and Tanzania, with possible influences of the Common Agricultural Policy of the EU. The thesis is divided into two main parts, literature review and analytical part. Specific objectives and methodology are presented in corresponding sections.

The literature review introduces basic information about the Common Agricultural Policy, food security, recent developments of food prices and their determinants. It is followed by description of agriculture and rural development in selected countries and provides us with specifics of food security and agricultural production of the East African region. Major determinants of food security in the area are food prices, which are partially formed by forces outside the country borders, like world food prices and oil prices. Short review of Common Agricultural Policy criticisms and its possible negative impacts on food prices is disclosed to give readers broader view into the issue.

The analytical part consists of the analysis of price trends of maize and wheat, on markets of the EU, World, Kenya, Uganda and Tanzania. Author analyses price trends and level of price volatility on selected markets. Correlation analysis was conducted to observe possible co-integration and price transmission from the world market to domestic markets of African countries. Specific results are presented in conclusion section and they are put in broader context in the discussion. Author also presents his recommendation and comments on further research in the discussion part.

2. Literature Review

2.1 Common Agricultural Policy of the EU

The Common Agricultural Policy (CAP) is the agricultural policy of the European Union. It implements a system of agricultural subsidies, quotas, import tariffs, price interventions and other measures to reach its objectives. According to the Article 39 of the Treaty on Functioning of the European Union (Treaty of Rome), the objectives of the CAP shall be: 1. to increase productivity, by promoting technical progress and ensuring the optimum use of the factors of production, in particular labour, 2. to ensure fair standard of living for the agricultural Community, 3. to stabilise markets, 4. to secure availability of supplies, 5. to provide consumers with food at reasonable prices (European Council, 2012).

The Treaty of Rome, signed in 1957, established the European Economic Community and its Common Market. The CAP has roots in 1950s Western Europe, whose societies had been damaged by years of war, and where agriculture was unable to produce sufficient food supplies. The principal idea behind agricultural policy at that time was to provide sufficient production while ensuring good incomes for farmers. Incentives for production were provided through a system of high support prices for farmers, combined with border protection and export support. The CAP itself was introduced in 1962, by implementing three major guiding principles of market unity, community preference and financial solidarity. With every passing year, farmers produced more food, therefore the objective of food security has been met (European Commission, 2012).

The system of farmers support depending on their production caused a problem of oversupply during 1970s and early 1980s. Farms became so productive that they grew more food than needed. The surpluses were stored and lead to "food mountains". Due to this overproduction, the CAP had become expensive and wasteful, therefore new measures to bring production levels down were introduced in 1984. These measures were for example quota on diary production or ceiling on expenditures to farmers. Despite these measures the production was still growing which led to comprehensive reform in 1992 (European Commission, 2012). This reform was called MacSharry reform, after the Commissioner for Agriculture who was its proponent. The main principle of the reform was to scale down product support through prices and replace it with product support through direct aid payments to farmers. The reform focused to improve the

competitiveness of European agriculture, to stabilise markets, to diversify the production and to protect the environment, as well as stabilise budget expenditure. Direct payments were introduced in order to reimburse farmers for the decrease of the price support. Cereal guaranteed prices were lowered by 35 percent and beef prices by 15 percent (European Commission, 1991). Since the MacSharry reforms, cereal prices have been closer to market equilibrium and the de-coupling of income support from production had begun. Compulsory set-aside and other environmental measures like afforestation and diversification were also introduced.

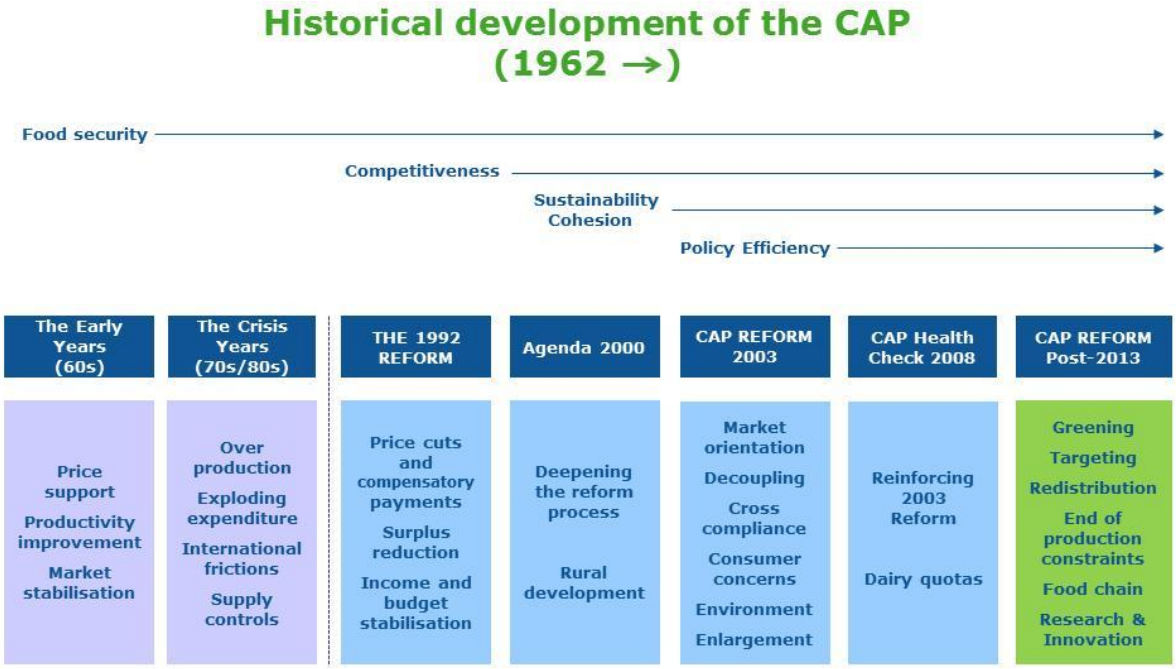

Figure 1 Historical development of the CAP, Source: http://ec.europa.eu/agriculture/cap-history/index_en.htm

A new set of reforms was initiated in 2003, with aims to enhance competitiveness of the farm sector, to promote a market-oriented and sustainable agriculture and to strengthen rural development. The reform was based on "decoupling" subsidies from particular crops. The new single farm payments were subject to cross-compliance conditions, related to environmental, animal welfare and food safety standards. Progress of the reform was checked in 2008 during a process called "CAP Health check" (European Commission, 2009). The aim of this was to further modernise, simplify and streamline the CAP to make it more market oriented. Among range of measures, the EU agriculture ministers agreed to abolish arable set-asides, to increase milk quotas gradually and convert market interventions into a safety net.

The last reform of the CAP was done between the years 2010 and 2013. The post-2013 CAP should reach three long-term objectives: viable food production, sustainable management of natural resources and climate action and balanced territorial development (European Commission, 2013). These objectives should be reached through enhanced competitiveness of farmers, improved sustainability of the agrarian sector and greater effectiveness of resources spent for the CAP.

Despite the reforms and changes of the measures, the CAP remains the largest item of the EU budget, costing annually around €60 bn. (see Figure 2), which is approximately 40 percent of the EU budget. Expenditures devoted to CAP had been rising steadily, while the form of how the CAP budget is spent has changed. The reduction of export refunds and other market support since the 1990s is evident with increase of direct coupled payments instead. These direct coupled payments had been criticized for being inefficient and having distorting effect on markets, therefore the 2003 reform introduced de-coupling instead (IFPRI, 2012).

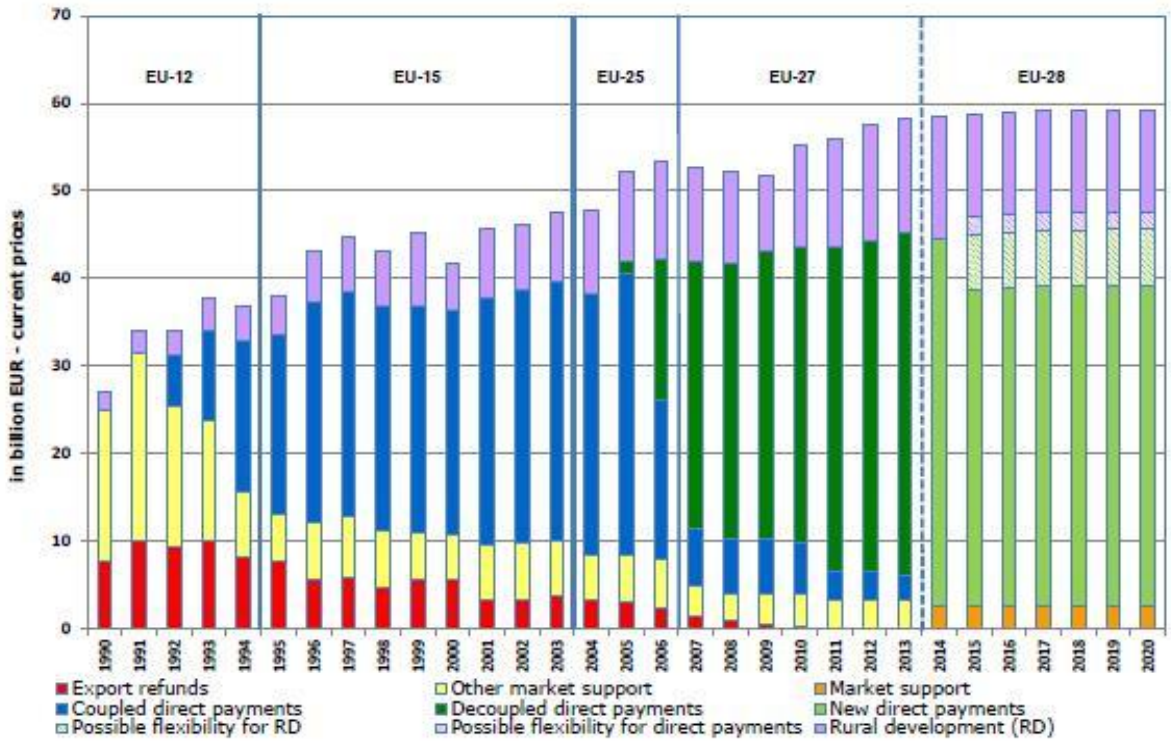

Figure 2 Development of CAP expenditure by year, European Commission, 2013

Resources devoted to Rural Development have been rising steadily since mid-1990s, making it the second largest part of the budget after New direct payments in contemporary years. As mentioned above the overall expenditure of the CAP has been

rising in order to support farmers and agrarian sector as such in enlarging EU. Despite all reforms and changes in the way the resources are being spent, the CAP remains a great advantage of European farmers compared to those of developing countries. Although EU proposed to stop providing direct production incentives, the new measures will still continue EU farmers to out-produce and hence out-compete their counterparts through the developing world (IFPRI 2012).

2.2 Food security

Combating hunger and undernourishment[1] is a core mission of many international organizations as hunger is one of the most terrible manifestations of poverty in the world. Reduction of hunger is not only a moral duty or a policy choice it is also a legally binding obligation in order to secure one of the human rights. The right to food is recognised in the 1948 United Nations Universal Declaration of Human Rights (Article 25) as a part of the right to an adequate standard of living. The Article 25 says that: *"Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services"* (UN, 1948).

The right to food is also reflected in the 1966 International Covenant on Economic, Social and Cultural Rights in the Article 11. The States Parties not only recognise the right, but they commit themselves in the Article 11.2 to: "*take appropriate steps to ensure the realization of this right, recognizing to this effect the essential importance of international co-operation based on free consent"* (UN, 1966).

Recognition of the right to food as universal human right, and the commitment to realise this right, established this problem as a key issue of international development efforts. Perception of hunger evolved over time into more comprehensive and complex concept of food security. The term World Food Security was first used in 1974 during the World Food Conference (FAO, 1974), however new and more specific definition of food security emerged at 1996 FAO World Food Summit, with more emphasis being put on individual rather than national level. According to the Summit Plan of Action: "*food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life*" (FAO, 1996).

Based on this definition, FAO identified four dimensions of food security. These are *food availability, economic and physical access to food, food utilization* and *stability* over time (FAO, 2008a). Food security is realised when all four dimension are fulfilled at the same time. It is a precondition for the full enjoyment of the right to food. However, the

[1] `Undernourishment` refers to "*A state, lasting for at least one year, of inability to acquire enough food, defined as a level of food intake insufficient to meet dietary energy requiremenents."* (FAO, 2015)

concept of food security itself is not a legal concept *per se* and does not impose obligations on stakeholders.

2.2.1 Dimensions and trends in measuring food security

Food security is a complex phenomenon, which is influenced by many factors and manifests itself in numerous conditions, it is therefore very challenging to study and measure it. In general, it is possible to study food security from three perspectives, by either focusing on its determinants, by studying its progress over time, or by analysing its outcomes. The above mentioned dimensions of *availability*, *access* and *utilization* are determinants of food security. The *stability* dimension of food security focuses on its development over time (FAO, 2013b).

In a situation when these dimensions are not fulfilled, food insecurity occurs as an outcome. It can be caused by unavailability of food, insufficient purchasing power, inappropriate distribution and use of food at household level. Food insecurity may be chronic, seasonal or transitory. Chronic food insecurity is a long-term or persistent situation, when people are not able to meet their food requirements over a sustained period of time. Transitory food insecurity is a short-term or temporary situation, when there is a sudden drop in production or access to food. Seasonal food insecurity falls between chronic and transitory. It is usually predictable and it occurs when there is a cyclical pattern of inadequate availability or access to food. It can be associated with seasonal fluctuations in the climate, cropping patters or disease (FAO, 2008a).

2.2.2 Determinants of food security

Availability

Availability of food is clearly a necessary condition for food security to occur. The availability dimension addresses the supply side of food in sufficient quantity and of appropriate quality for all inhabitants in the whole territory. Availability can be achieved through domestic agricultural production, through import of food or in form of food aid (Godfray et al., 2010). The availability dimension captures not only the quantity, but also the quality and diversity of food. It is important to note that authors distinguish between macro or national level and micro or household/individual level. The reason for this is clear as availability of food on a national level does not in itself guarantee that the food security is achieved on household or individual level (Pangaribowo et al. 2013).

To measure the determinants of the availability dimension, the FAO statistical dimension recommend to use for instance *Avarage value of food production, Avarage dietary energy supply adequacy*, or *Avarage protein supply* (FAO, 2013a). These indicators help us understand whether undernourishment is mainly due to insufficient food supply or to bad distribution and they give us information about the diversity of food.

Access

Access to food, from the market or other sources, by all people is the second condition to achieving food security. Concerns about insufficient food access have resulted in greater policy focus on incomes, expenditure, markets and prices. To have an access to food depends on two components. First, to physically access food, there need to be infrastructure and facilities, to be able to reach the market or simply allow food trade. Typically there need to be a road, a railway and the market or shop itself. Second, to economically access food, you either need income to purchase it, or you need assets to produce it yourself. So people who want to buy or produce food need a source of income in terms of money or assets like land, labor, water, fertilizer, seeds, livestock (Ecker and Breisinger, 2012).

The determinants of physical access are measurable by the density of transport infrastructure through *Road and Rail-line density*. The determinants of economic access are measured through *Domestic food price index*, which allows comparison of the relative price of food across countries and over time, or simply through *GDP per capita (PPP)* (FAO, 2013b). There are also other factors that influence the grade of access to food like cultural habits, right to access market, right to use land, social structures and capital. Price of food is another crucial factor of access dimension. Domestic prices are formed by supply-demand balance, but if we consider that many of the developing countries are net food importers, we can conclude that factors like food price index, inflation, exchange rate and import tariffs can have significant impact on food prices too (Pangaribowo et al. 2013).

Utilization

The utilization of food is commonly understood as the way body makes the most of various nutrients in the food. This dimension of food security embraces concerns about the diversity and nutritional value of food that people consume. Important factor for proper utilization of food is the way how the food is stored, prepared and cooked. Combination of diverse, nutritious and healthy diet determines the health, physical and mental development of individuals (FAO, 2013b). Crucial part of the utilization dimension is also access to

improved water and improved sanitation as a way to prevent diseases. To fulfil the utilization dimension it is important to educate people about food, nutrition and health and hygiene. In this regard it extremely important to focus these efforts on women, who are usually in charge of food preparation and care for children and household (FAO, 2014a).

The determinants of utilization are measured via *Access to improved water sources* and *Access to improved sanitation facilities*, as both water and sanitation are crucial to ensure hygiene, proper food preservation and preparation (FAO, 2013a).

Stability of food security

Stability of food security is achieved when all other dimension are valid simultaneously over time. Stability is concerned about risks and shocks to availability, access and utilization of food. The main risks which have adverse effect on these three dimensions are for example extreme weather conditions, political and social instability, economical factors like unemployment, high inflation or rising food prices. The stability dimension recognises that the food security status may change over time (Pangaribowo et al. 2013).

Indicators to measure stability dimension of food security are: *Cereal import dependency ratio, Percent of arable land equipped for irrigation, Value of food imports over total merchandise exports, Domestic food price level index volatility, Per capita food production variability, Per capita food supply variability* and others (FAO, 2014a).

2.2.3 Outcomes of food insecurity

The outcome of food insecurity is basically insufficient food access or inadequate food utilization. Insufficient food access is often expressed through the *number of undernourished* or the *prevalence of undernourishment.* Undernourishment is defined as "*a state, lasting at least one year, of inability to acquire enough food, defined as a level of food intake insufficient to meet dietary energy requirements*" (FAO, 2015). Prevalence of undernourishment is then the proportion of the population, which is in risk of insufficient caloric consumption. These indicators mark, which areas, are the most affected by food insecurity. We can also measure the *Depth of food deficit*, which is a more specific indicator describing how many calories would be needed to lift the undernourished from their status. Another useful indicator is *Share of food expenditure of the poor* which gives us indication of the economic burden connected to purchasing food. These indicators are useful to state the extent and severity of food insecurity and to compare areas (FAO,

2013a). Outcome of inadequate food utilization can be measured via several indicators of anthropometric failures such as *Percentage of underweight population, Prevalence of children under 5 who are underweight, stunted or affected by wasting,* or *Prevalence of vitamin A deficiency in population* (FAO, 2013a).

2.2.4 Food security in the world

According to FAO (2014a), there were about 805 million people who were chronically undernourished in 2012-2014, which is approximately 12 percent of the world population. From these 805 million, 790 million or 98 percent of the people live in developing regions of the world, with the highest number of undernourished people coming from Southern Asia, Sub-Saharan Africa and Eastern Asia.

In the last several decades we observed substantial reduction of undernourishment across the world. The number of undernourished has fallen by more than 200 million since the beginning of 1990s. In the same period, the prevalence of undernourishment has fallen from 18.7 to 11.3 percent globally and from 23.4 to 13.5 percent for the developing countries. But if we look at individual regions the results are mixed. Eastern Asia has made the biggest progress by reducing the number of undernourished from almost 300 million in 1990-1992 to 161 million in 2012-2014. The prevalence of undernourishment in the region decreased from 23.2 percent to 10.8 percent. Southern Asia has made some progress by reducing the number of undernourished from 291 million to 276 million, while the prevalence of undernourishment in the region decreased from 24 percent to 15.8 percent (FAO, 2014a).

In contrast, in Sub-Saharan Africa the total number of undernourished people rose from 176 million to 214 million, while the prevalence of undernourishment decreased from 33 percent 23.8 percent, mainly due to the highest population growth in the world (FAO, 2014a). As seen from the Figure 3, the situation in the world is worst in Sub-Saharan Africa, mainly in its Central and Eastern parts.

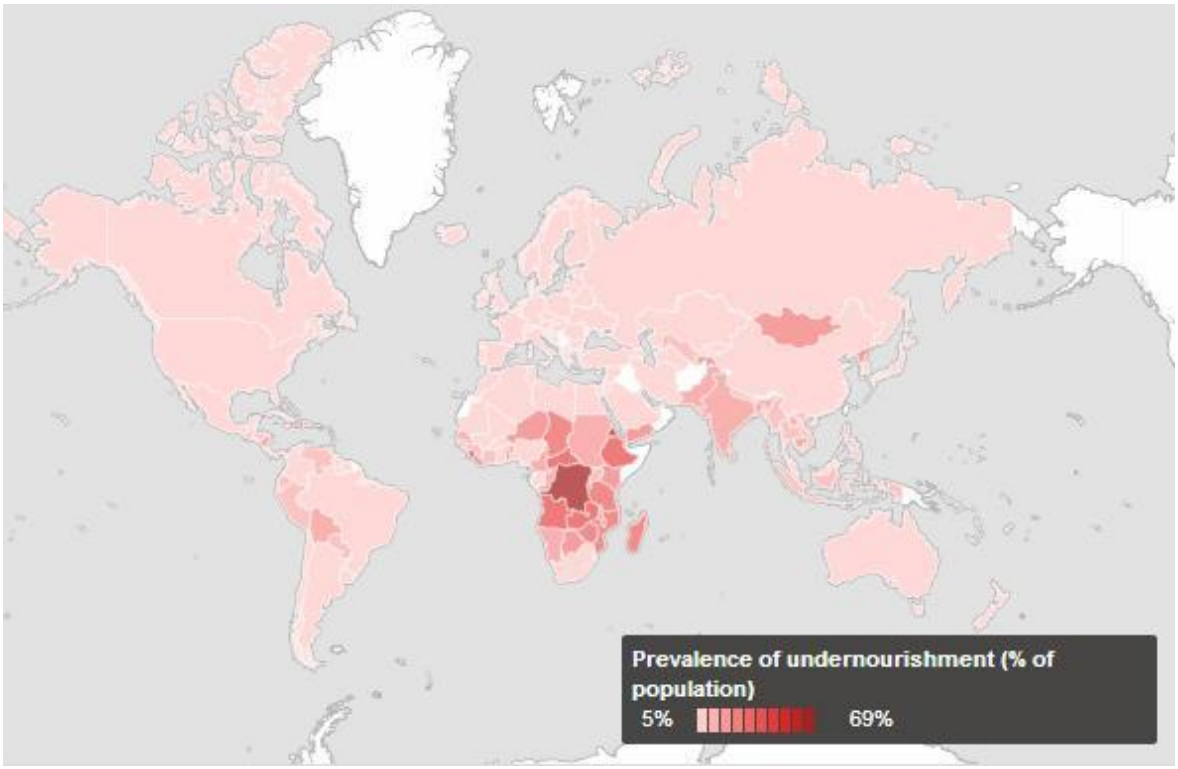

Figure 3 Prevalence of undernourishment in the world 2012-2014, (World Bank, 2015)

Food security situation in Sub-Saharan Africa is determined mainly by the low production capacity of local agriculture, low economic development, poor infrastructure, low investments, preference towards growing cash crops and recently also food prices. Price volatility and high food prices could mean a threat towards food security to many net-food buyers in Sub-Saharan Africa and elsewhere (IFPRI, 2011).

2.3 Price volatility and high food prices

Price volatility is a statistical measure of the tendency of an asset's price to fluctuate over time. It can be defined as a dispersion of price series from the mean, or in other words, price volatility is a sequence of sudden price rises and drops over time. These sudden price rises are called price spikes and usually refer to large price rises in short time. Price spikes may become problematic, when they are large and cannot be predicted. In such cases they create uncertainty that constitute risk for producers, consumers, traders and governments. For these reasons, price volatility in food commodities is considered a major factor, that negatively influence economic growth, development, poverty and food security (IFPRI, 2011).

It is important to note that not everybody is hurt by high commodity prices. Producers of those commodities which prices are rising can benefit, by increasing their revenues. Higher food prices also stimulate production, which can be beneficial for the whole society. Rising food prices may represent and important opportunity for agricultural and rural development (Salami et al., 2010). Consumers, on the other hand, and especially poor consumers, are negatively affected. Poor households in developing countries spend a high share of their budget on food, and at the same time they usually produce some food themselves. For these households the impacts of price volatility are complex, but in most cases households have higher food expanses. Volatile prices bring uncertainty and both consumers and producers are hurt in the short term (FAO, 2011a).

2.3.1 Determinants and current state of price volatility and high prices

There are many determinants of food price volatility. It is caused by population growth and economic development in developing countries, which is increasing the demand for food. The demand is also pushed up by increased use of food commodities for biofuel production and by the increasing prices of inputs, mainly oil and fertilizers. There is also growing demand for animal products, which means increased demand for its feed (IFAD, 2011). These determinants put pressure on finite resources such as water and land and if we combine this pressure with possible consequences of climate change, the result is continuing high food prices (Aksoy and Hoekman, 2010). Another determinant can be also currency fluctuations, domestic inflation and other distorting effects on the economy. Protectionist measures put in place by governments to reduce fluctuations and shocks

within their domestic markets, such as import or export restrictions, taxes, quotas and stocks, lead to increased prices in the rest of the world (Anderson et al., 2013).

Price volatility is from the long term perspective not a new phenomenon (Figure 4). Recent price spikes of 2007-2008 and their continuation since 2011 came after almost two decades of relatively low and stable prices and the era of high food prices is likely to continue (OECD/FAO, 2011).

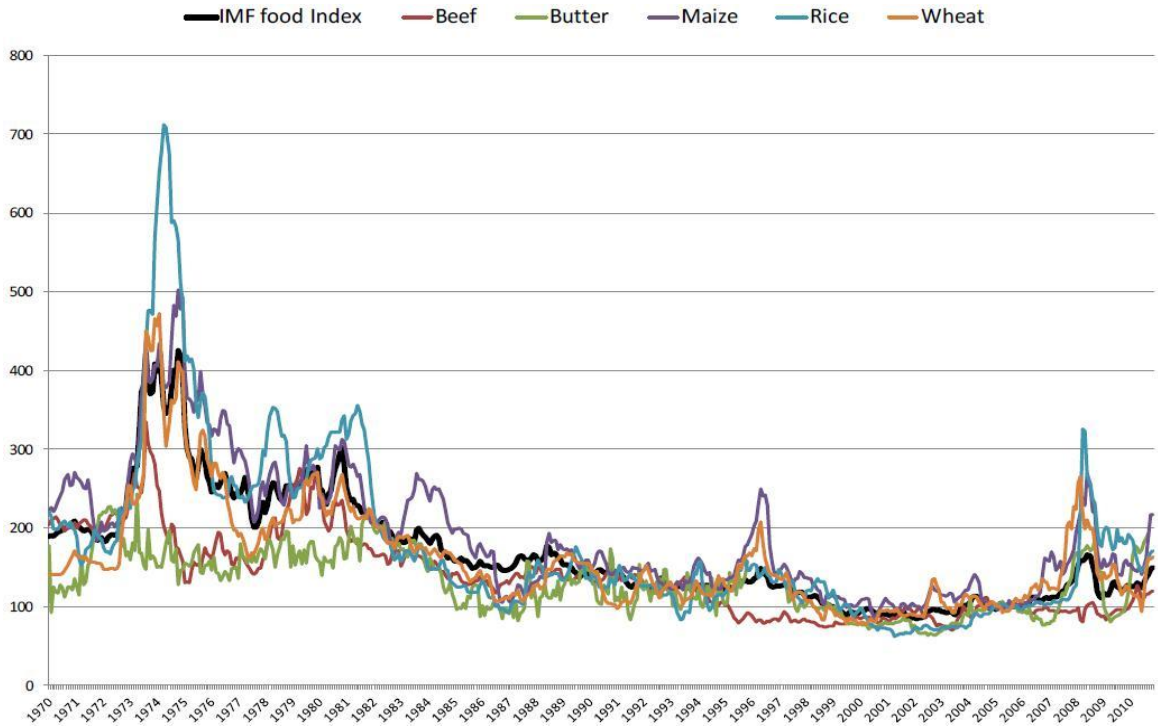

Figure 4 World prices of relevant commodities in real terms (2005=100), 1970-2010, (OECD et al., 2011)

Commodity prices had shown increased variability since 2007-2008. In the following years it seemed that commodity markets became stable again, but since mid-2010 price movements occurred again and demonstrated that agriculture remains prone to extreme price volatility. In reflection of these developments, World Bank‘s index of international food prices reached its record level in 2011 (Figure 5).

These developments were caused by multiple factors. The 2007-2008 price spikes could be explained by then occurring financial crisis, accompanied with high oil prices, currency fluctuations and other economic factors. The 2010-2011 price spike was caused by a weather related supply shocks, due to lower wheat harvests in Russian Federation, Ukraine and Kazakhstan, leading to almost 5 percent decline in the world wheat production. Yields of maize in the same year were negatively influenced by hot and wet

winter and rice harvests were affected due to floods in Pakistan and other Asian countries (OECD/FAO, 2011).

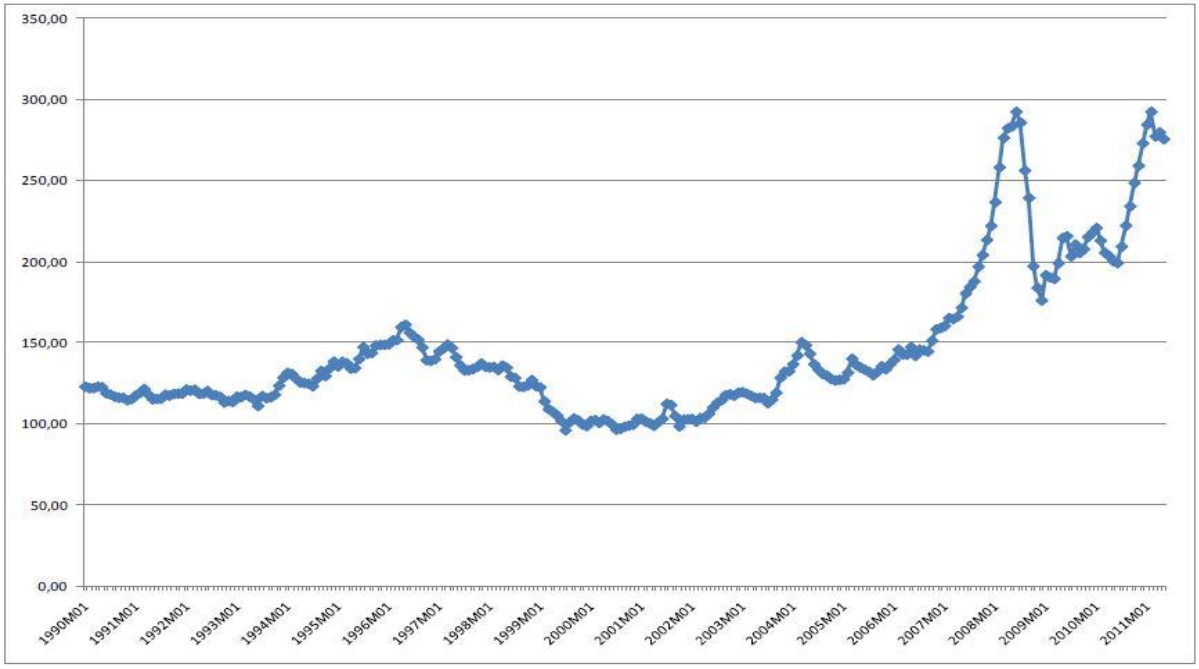

Figure 5 : World Bank Food Price Index, monthly, 1990 – 2011, (index 2000=100) (HLPE, 2011)

2.3.2 Consequences of price volatility and high prices

Recent concerns related to food price volatility are raised because of the high prices, rather than volatility itself. The volatility is in the focus, but this is because it occurred at a moment of high prices. The High Level Panel of Experts on Food Security further deduces that agricultural price volatility is conceived as a "natural and permanent problem" of agricultural markets, caused by climate and supply shocks. The Panel adds another explanation that current price increases are possibly an early signal of coming and lasting scarcities on agricultural markets, caused by the increasing pressures on natural resources like water, soil, biodiversity, greenhouse gases or oil (HLPE, 2011).

This situation could be dangerous particularly for developing countries, as their economies are generally underdeveloped and their populations are poor. Minot (2011) states that high world food prices were transmitted to domestic markets of developing countries, reducing the purchasing power of urban households and other net food buyers. Similar finding was established by Anderson et al. (2013), who conclude in their study that developing countries were insulated more than developed countries by the food price spikes of 2007-2008. Food importing countries have to face balance-of-payment pressures, because the cost of imports increased. This is valid especially for Sub-Saharan African

countries, because the region as a whole is net importer of food commodities, therefore higher food prices lead to trade imbalances. Another reason is that although majority of the population of the region live in rural areas and produce their own food, large proportion of rural population are also net buyers of staple foods. Finally, as mentioned above, the population of Sub-Saharan Africa is generally very poor, and food accounts for large proportion of household budgets and this is also true for budgets on food imports done by governments (Minot, 2011).

Price spikes of 2007-2008 and 2010-2011 were caused by multiple factors of either natural or economic character. Price increases influenced all countries in the world, which are integrated into the world market. Some governments were trying to deal with high prices by various measures, depending on their political and economic possibilities. It is clear that governments of developed and rich countries enjoy better means than those of developing countries. Aksoy and Hoekman (2010) claim, that agricultural policies have helped to create a floor for agricultural prices, with policy changes in OECD and developing countries supporting higher food prices. This is also true for the EU which has instruments to stabilize markets or support farmers such as the CAP.

2.4 Agriculture and rural development in East Africa

The thesis aims on East African region, with focus on Kenya, Uganda and Tanzania as representatives of the region. East Africa is a dynamic region, with rapid population growth, and it is also the region with persistent problems connected with food security. It is therefore important to have some information about the agriculture and overall development in Kenya, Uganda and Tanzania. To have a broader picture, the next chapter provides outlook of the most important facts about agricultural production, population growth, consumption trends and trade with agricultural commodities in selected countries.

2.4.1 Agriculture and rural development in Kenya

Kenya is the biggest and most advanced economy in the East African region. It is the only country in the region without the status of being among the least developed countries (LDCs) (UNCTAD, 2014). It has a Human Development Index (HDI) of 0.535, which is the second highest in the region (UNDP, 2013). Its GDP per capita in 2013 was according to World Bank $ 1,245, putting it into the group of lower middle income countries (World Bank, 2013). The country is generally perceived as eastern African hub for financial, communication and transportation services. Kenya has a booming population of 45 million with annual population growth rate of 2.7 percent (Table 1).

More than 40 percent of the population lives below the poverty line of $1.25 per day (UNDP, 2013). Poverty is still a major impediment to robust economic development as it limits the ability of population to reach basic needs such as education, health services, safe drinking water and food of sufficient quality and quantity. According to FAO, there was still more than 24 percent of the population undernourished in 2014, which makes more than 10 million people (FAO, 2014b). The prevalence of undernourishment has decreased from 35 percent in 2004, but the total number of people undernourished ranges between 9 and 11 million since the early 1990s, mainly due to high population growth (Figure 7, p. 26).

Even though Kenya is perceived as relatively advanced compared to its neighbours, agriculture is still a key part of its economy. Agriculture made up around 30 percent of the GDP in 2012 (World Bank, 2012a). Majority of the population, around 75 percent, live in rural areas and out of 21.9 million labour force of the country, more than 68 percent work in agriculture (Table 1). It is therefore clear that agricultural sector provides not only food

but it is a source of employment and income to vast majority of people. It is also major source of foreign exchange for the whole country, as agricultural products account for large portion of total exports, with tea, coffee and cut flowers as principal cash crops.

Table 1 Evolution of population and labor force size, Kenya, (1999-2014), (FAO, 2014c)

	1999	2004	2009	**2014**
Total population (millions)	30.4	34.8	39.8	**45.5**
Labor force (millions)	13.8	16.9	18.4	**21.9**
Rural population (% of total)	80.4	78.6	76.8	**74.7**
Labor force in agr. (% of total)	75.8	73.5	71.2	**68.4**

Besides cash crops, majority of farmers in Kenya are cultivating small plots of land for subsistence, food and as a source of income. First it is important to note that principle staple foods produced domestically in Kenya are maize, potatoes or sweet potatoes, cassava and beans. Second, the importance of wheat and rice in consumption is steadily increasing but the supply is realised mainly through imports (FAO, 2014c).

Table 2 Production and trade figures of selected commodities, Kenya (2011) (FAO, 2011b)

Commodity	Production (1000 tons)	Imports (1000 tons)	Exports (1000 tons)	Imports as a percentage of consumption	Exports as a percentage of production
Maize	3377	314	15	9.2%	0.4%
Wheat	268	1561	5	90.1%	1.8%
Potatoes	2365	7	6	0.3%	0.2%
Cassava	678	17	0	2.5%	0%
Beans	578	52	7	1.3%	1.2%
Rice	74	373	7	86.1%	9.4%
Total	7340	2324	40		

Cereals cover the majority of caloric intake in the Kenyan diet, with maize as the most important staple food being grown by roughly 90 percent of farming households (Government of Kenya, 2006). Traditional products like cassava, beans and potatoes are produced in big volumes but they are relatively low in calories. On the other hand some varieties of potatoes and beans are rich in vitamin A and other nutrients, which make them

good supplement product. Importantly, the consumption and the importance of cereals are increasing over time.

Table 3 Importance of staple foods in diet of Kenya[2], (2011), (FAO, 2011b)

Commodity	Food supply (kg/person/year)	Daily caloric intake (kcal/person/day)	Share of caloric intake (percent)
Maize	77	671	52.3%
Wheat	34	255	19.9%
Cassava	15	45	3.5%
Potatoes	48	93	7.2%
Beans	12	119	9.2%
Rice	10	98	7.6%
Total	196	1281	100%

As previously mentioned, agriculture plays an important role in Kenya's economy, despite the fact that only around 10 percent of total land is arable (FAO, 2014c). Cash crops, for instance, are the largest part of country's exports. Kenya is a leading producer and exporter of tea with annual exports worth more than $1bn. Kenya is also annually exporting cut flowers worth $400 million, coffee worth $200 million and vegetables like onions and cabbages worth $150 million (UN COMTRADE, 2013a). On the other hand Kenya is becoming dependent on food imports, particularly cereals and processed foods like refined sugar or cooking oils. According to FAOSTAT, cereals accounted for 40 percent of agricultural imports and other foods accounted for other 40 percent. Food imports account for more than 10 percent of total imports of the country and its share is growing (FAO, 2014c).

2.4.2 Agriculture and rural development in Uganda

Uganda is the smallest and the only landlocked country out of three selected African countries in this thesis. It has favourable conditions for agriculture, with range of various environmental and climatic conditions. Uganda's HDI reached 0.484, which is lower compared with Kenya or Tanzania (UNDP, 2013). Its GDP per capita in 2013 was according to World Bank $572 (World Bank, 2013). Uganda is included among the LDC countries (UNCTAD, 2014). The total population of Uganda in 2014 was over 38 million with an annual growth rate of 3.4 percent (Table 4). According to the UNDP (2013) almost 38 percent of Ugandan population lived below the poverty line of $1.25 per day, which

[2] Note that mentioned commodities are not the entire content of diet, some products like fruit, vegetables, milk or meat has not been mentioned as they are not so important and predicative for the aim of this thesis.

makes more than 14 million. FAO (2014b) estimates that around 26 percent of the population is undernourished, while the prevalence of undernourishment is slowly decreasing over time, the total number of undernourished has increased substantially from 4 million in 1992 to 9.7 million in 2013. This situation is caused by high population growth, which is faster than the capacity of the country to provide adequate food for everyone (Figure 7, p.26).

Similarly like in many developing countries, agriculture is a major part of Uganda's economy. Agricultural sector made up more than 25 percent of country's GDP in 2012 (World Bank, 2012b). Majority of the population, around 83 percent live in rural areas, and out of 17.3 million labour force of the country, more than 72 percent is still employed in agriculture (Table 4). Agriculture plays critical role in people's lives as a source of food, income and employment. It is also principal source of income and foreign exchange for the country, as agricultural products account for large portion of total exports and export earnings, with coffee, tea, sugar cane, cotton and tobacco as examples.

Table 4 Evolution of population and labor force size, Uganda, (1999-2014) (FAO, 2014c)

	1999	2004	2009	**2014**
Total population (millions)	23.5	27.7	32.8	**38.8**
Labor force (millions)	10.2	12.1	14.4	**17.3**
Rural population (% of total)	88.1	87.1	85.2	**83.1**
Labor force in agr. (% of total)	80.6	78.1	75.3	**72.3**

Principal staple foods produced domestically in Uganda are maize, cassava, sweet potatoes, beans and plantains (Table 5). Plantains/matoke is an important staple food in the area of African Great Lakes and Uganda is the second biggest producer of plantains in the world. It is interesting to note that cereal imports, particularly those of maize, rice and wheat are not so high, compared to neighbouring countries Kenya and Tanzania (Gollin and Rogerson, 2010).

Table 5 Production and trade figures of selected commodities, Uganda (2011) (FAO, 2011b)

Commodity	Production (1000 tons)	Imports (1000 tons)	Exports (1000 tons)	Imports as a percentage of consumption	Exports as a percentage of production
Wheat	23	435	49	100%*	213%*
Maize	2551	22	92	1.5%	3.6%
Cassava	4758	4	41	0%	0.8%
Sweet Potatoes	2554	0	0	0%	0%
Beans	447	1	28	0%	6.2%
Plantains	9600	0	0	0%	0%
Total	19933	462	210		

Maize and wheat are not so common in the diet and they are substituted by traditional staple foods like cassava, sweet potatoes, beans and plantains. Notable is especially the high consumption of plantains, which makes up for their low caloric content. Products that had not been mentioned in the table, such as vegetables and fruit are grown commonly and these are substantial source of nutrients and vitamins.

Table 6 Importance of staple foods in diet of Uganda[3], (2011), (FAO, 2011b)

Commodity	Food supply (kg/person/year)	Daily caloric intake (kcal/person/day)	Share of caloric intake (percent)
Wheat	11.2	85	6.7%
Maize	40.7	344	27.1%
Cassava	88.8	267	21%
Sweet Potatoes	61.8	162	12.7%
Beans	9.8	91	7.1%
Plantains	130.3	318	25%
Total	342.6	1267	100%

Uganda has favourable conditions for agriculture, with fertile soils and plenty of rain. According to FAOSTAT, more than 34 percent of its total land is arable land or land used for permanent cultivation (FAO, 2014c). Uganda's diverse climatic conditions allow the country to produce wide range of products. Besides the variety of staple food crops, Uganda is also a large producer of cash crops. Uganda is among African leading producers and exporters of coffee with annual exports worth more than $400 million. Uganda is also exporting fish fillets worth $100 million, tobacco worth $100 million, sugar cane worth

[3] Note that mentioned commodities are not the entire content of diet, some products like fruit, vegetables, milk or meat has not been mentioned as they are not so important and predicative for the aim of this thesis.

$80 million and also cotton, which annual worth is decreasing due to decreasing prices (UN Comtrade, 2013b). On the other hand Uganda is also importing many food commodities. The share of cereals among agricultural imports reached 30 percent and all other food account for other 60 percent of total agricultural imports (FAO, 2014c).

2.4.3 Agriculture and rural development in Tanzania

Tanzania is the largest country out of the three selected African countries in this thesis. Tanzania has favourable conditions for agriculture and in fact it is the largest producer of agricultural products among the three selected countries. Tanzania's HDI reached value of 0.488 (UNDP, 2013) and its GDP per capita was according to World Bank $694, putting it ahead of Uganda but behind Kenya (World Bank, 2013). The total population of Tanzania in 2014 reached 50.7 million with an annual growth rate of 3 percent (Table 7). According to the UNDP (2013), 67 percent of Tanzania's population lived bellow the poverty line of $1.25 per day, which makes more than 33 million people. FAO (2014b) estimate, that around 34 percent of the population is undernourished, which makes more than 17 million people. The prevalence of undernourishment is fluctuating around 35 percent since the end of 1990s, but the total number of undernourished people had increased dramatically, from more than 6 million in 1992 to current 17 million people. This could be attributed to the high population growth rate, which is overreaching the capacity of the economy to provide food for everyone (Figure 7, p.26).

Agriculture is still extremely important sector for the country's economy and development. Agricultural sector made up more than 27 percent of country's GDP in 2012 (World Bank, 2012c). It is also a major source of employment and livelihood for majority of the population. As of 2014 more than 71 percent of Tanzania's population lived in rural areas. Out of the country's total labour force of 25.5 million, approximately 74 percent were employed in agriculture (Table 7). Agricultural sector is not only important for households and individuals but also for the country as a principal source of income and foreign earnings. Agricultural commodities accounts for large portion of Tanzania's total exports, with coffee, tobacco, cotton, cashew nuts or coconuts as examples of widespread cash crops (World Bank, 2012c).

Table 7 Evolution of population and labor force size, Tanzania, (1999-2014) (FAO, 2014c)

	1999	2004	2009	**2014**
Total population (millions)	33.1	37.7	43.6	**50.7**
Labor force (millions)	16.4	18.6	21.6	**25.5**
Rural population (% of total)	78.1	76.2	74.1	**71.8**
Labor force in agr. (% of total)	80.9	78.8	76.3	**73.8**

Principal staple foods produced domestically in Tanzania are maize, cassava, sweet potatoes, rice, beans and wheat. From the production volumes it is clear, that Tanzania is the biggest producer of cereals from the three selected countries. It is important to note that popularity and consumption of wheat is increasing and its supply is secured mainly through imports similarly like in Kenya and Uganda (Minot, 2010a).

Table 8 Production and trade figures of selected commodities, Tanzania (2011) (FAO, 2011b)

Commodity	Production (1000 tons)	Imports (1000 tons)	Exports (1000 tons)	Imports as a percentage of consumption	Exports as a percentage of production
Maize	4341	30	18	1.1%	0.4%
Wheat	113	1134	103	100%*	100%*
Sweet Potatoes	3573	0	0	0%	0%
Cassava	4647	0	0	0%	0%
Beans	676	0	12	0%	1.7%
Rice	1500	52	36	3.7%	2.4%
Total	14850				

Cereals cover the majority of caloric intake in the Tanzanian diet, with maize as the main staple crop being grown by 80 percent of farming households (NBS of Tanzania, 2014). Traditional products such as cassava, sweet potatoes and beans are produced in sufficient amounts to supplement cereal products in the diet. Tanzania's specific, compared to Kenya and Uganda is the relatively high production and consumption of rice, thanks to suitable climatic conditions for rice cultivation (Minot, 2010a).

Table 9 Importance of staple foods in diet of Tanzania, (2011) (FAO, 2011b)

Commodity	Food supply (kg/person/year)	Daily caloric intake (kcal/person/day)	Share of caloric intake (percent)
Wheat	15.3	116	9.7%
Maize	57.1	511	42.7%
Cassava	77.8	149	12.4%
Sweet Potatoes	44.0	116	9.7%
Beans	12.0	111	9.2%
Rice	19.8	192	16%
Total	226	1195	100%

Tanzania is the largest country among selected countries. This is also evident from the comparison of areas of arable land. According to FAO, more than 16 percent of total area of Tanzania was in 2012 used as arable land, which is approximately 14.5 million hectares of land (FAO, 2014c). Tanzania is also the only country from selected countries, which increased its arable land significantly from 8.9 million hectares in 1997 to current area, which is larger than arable areas of both Uganda and Kenya combined (FAO, 2014c).

Besides the relatively large production of cereals and other staple foods, Tanzania is also producer and exporter of variety of cash crops. Tanzania is annually exporting coffee worth $160 million, cotton worth more than $100 million, tobacco worth $100 million, cashew nuts and coconuts worth more than $150 million and sesame seeds and other oil seeds worth more than $120 million (UN Comtrade, 2013c). Other cash crop exports include spices, fruits, fish products and others. On the other hand it is worth mentioning that Tanzania is also food importer. It is importing wheat worth more than $300 million annually and palm oil worth more than $250 million. Total food imports reached $673 million in 2012, which is large increase compared to food imports worth $25 million in 1992 (World Bank, 2012c).

2.5 Determinants of food insecurity in Kenya, Uganda and Tanzania

The effort to limit undernourishment had different progressions from country to country (see Figure 6). The largest decrease in the prevalence can be observed in Kenya, where the prevalence dropped from 35 percent in 1993 to less than 25 percent in 2014. In the case of Uganda, the prevalence increased in 1990s than dropped during 2000s and stabilised around 25 percent. Tanzania showed the worst scenario of the three countries. It initially had relatively low prevalence of undernourishment of less than 25 percent at the

beginning of 1990s but it increased quickly to more than 35 percent at early 2000s and stabilised around this value.

Despite these developments, the total number of undernourished people increased in all three countries. In Kenya the total number of undernourished increased the least, from 8 million in 1993 to 10.8 million in 2014, which is in concordance with the relatively largest decrease of prevalence. In Uganda the number of undernourished people more than doubled from 4.2 million in 1993 to 9.7 in 2014. In Tanzania the development was the worst of all three countries, as the number of undernourished increased from 6.8 million in 1993 to more than 17 million in 2014 (FAO, 2014b).

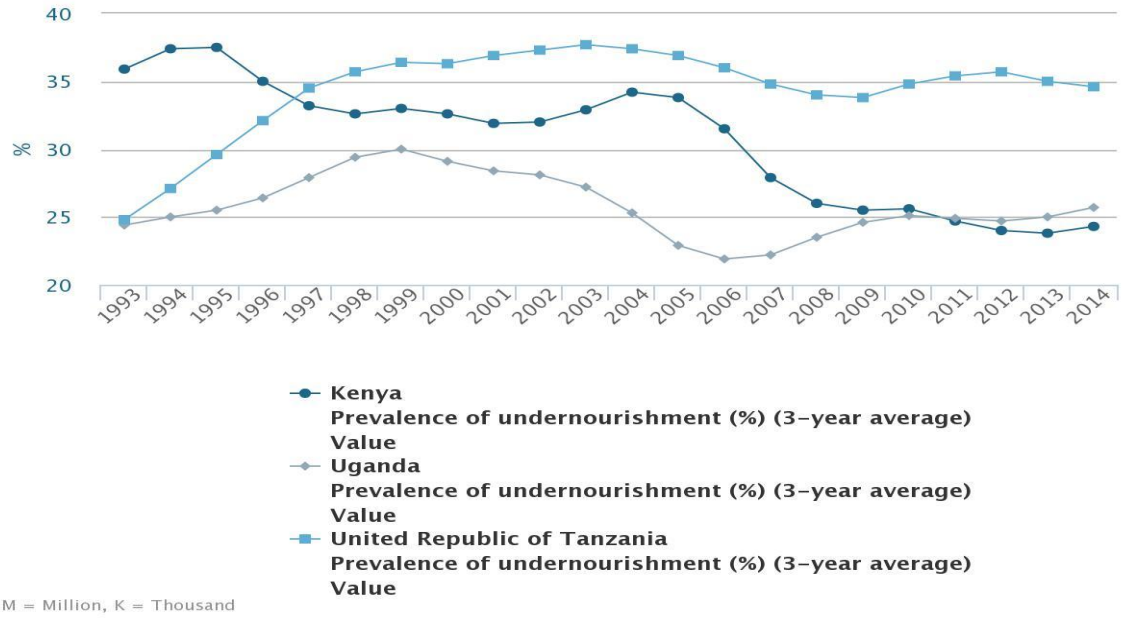

Figure 6 Prevalence of undernourishment in Kenya, Uganda and Tanzania (1993-2014) Source of data: http://faostat3.fao.org/compare/E

One of the possible causes is rapid population growth (Figure 7). Population growth in such pace is a major impediment towards reaching food security for the whole society. Populations of selected countries almost doubled since the beginning of 1990s and they continue to grow at similar rates constantly. Bigger population means bigger labour force and larger economy but it also means increase in demand for food, water, shelter, energy and so on. Rapid population growth could also mean environmental degradation, pollution and possible threat towards reaching food security, as we see from the example of many emerging countries (Godfray et al., 2010).

To secure the availability of food and water for everyone, it is necessary to increase supply without compromising the finite resources and the ability of the nature to restore the

environment. This could be reached with more efficient utilization of food, increased productivity through innovative techniques of cultivation, research and development and so on (HLPE, 2011). However the example of Kenya, Uganda and Tanzania provide us with a different picture which is unfortunately common for many developing countries. Instead of focusing on domestic production of food to ensure sufficient supply for the population, countries rather invest or support production of cash crops for export, as a source of revenue in foreign exchange (Bussolo et al., 2010). The unmet demand for food commodities has to be realized through food imports, which is common for all selected countries.

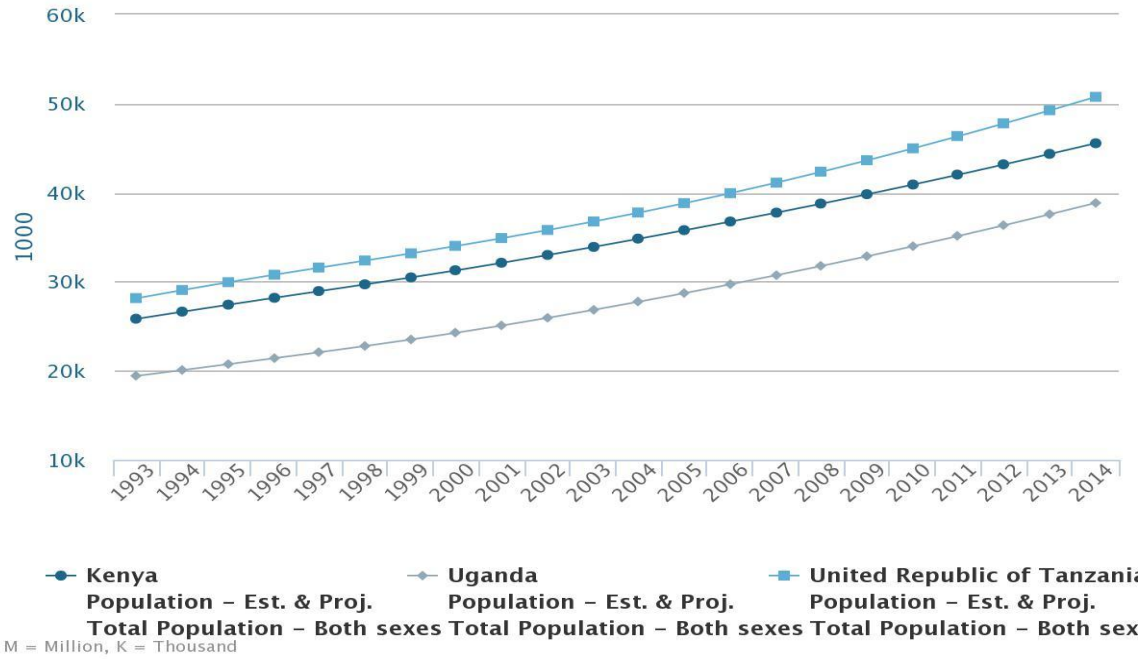

Figure 7 Population growth in Kenya, Uganda and Tanzania (1993-2014), Source of data: http://faostat3.fao.org/compare/E

It is true that for many small farmers, cash crops such as coffee or tea represent vital source of income and suitable complement to growing staple food crops. But it is also true, that in many cases, the earnings from selling cash crops are spent for food (Campenhout et al., 2013). In such situation the affected households or even whole states can suffer from adverse market conditions, particularly price levels and developments. In a situation when prices of cash crops are decreasing and prices of food commodities are increasing, dependency on food commodities purchases lead to lowering incomes and growing expanses, making poor countries or households even poorer (Campenhout et al., 2013).

On household level, economically vulnerable households and net food buyers such as poor urban dwellers, rural landless communities, pastoralist communities or food deficit subsistence farmers depend heavily on food purchases on local markets. For these affected communities, food prices became extremely important and any sudden increase presents a serious threat towards food security. Within households, the most affected would probably be children, pregnant woman, ill members of households or old members (Conceicao et al., 2011). Not all food commodities are prone to price volatility and increases, as some of the local products are non-tradable internationally and therefore protected from outside influences. Examples of such commodities could be plantains/matoke or local varieties of potatoes. The possible negative impact of price increases of food commodities also depend on their usage and popularity (Haggblade and Dewina, 2010). It is though important to focus to on the most widely used food commodities, which in Kenya, Uganda and Tanzania are cereals. As the demand for cereals exceeds their domestic production levels the supply has to be realised through imports (Figure 8). The volume of cereal imports has been increasing since the beginning of 1990s and since 2000s we can see steady increases in all three countries, with the maximum in recent years.

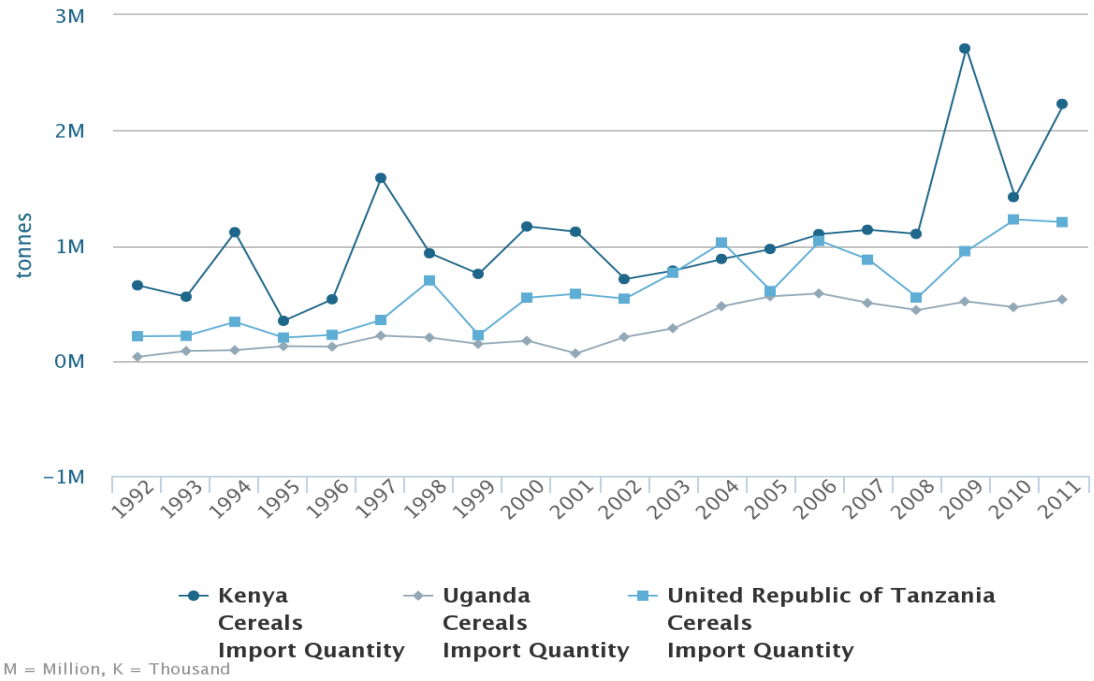

Figure 8 Import quantity of cereals in Kenya, Uganda and Tanzania (millions of tons) (1992-2011) Source of data: http://faostat3.fao.org/compare/E

The food commodity with the highest importance in the East African region is indisputably maize. Virtually all smallholder farmers grow maize which accounts for a large fraction of total area under cultivation, and it is also an important input into the animal industry and other agricultural activities, and is "*likely to play a central role in a well-formulated rural growth and poverty reduction strategy*" (Ariga and Jayne, in FAO 2010, pp. 232). The government of Tanzania, according to Temu et al., regards maize as a "*key food security commodity for the growing urban population and for the many rural households who do not produce maize*" (Temu et al., in FAO 2010, pp. 318). Even though maize imports are not so common in Kenya, Uganda and Tanzania, maize prices are largely influenced by forces outside domestic markets, like price of maize on world market and price of oil and other inputs (Salami et al., 2010).

Food price spikes were extremely high in recent period as the price of maize in 2008 doubled in Kenya and almost tripled in Uganda and Tanzania and very similar situation occurred again in 2011 (Figure 9). It is important to note that the record high prices for maize, but also for other commodities, not only increased suddenly, but they remained high and volatile for a long period of six years, with the exception of 2010, when the prices dropped temporarily. As a result of such dramatic price increases and following high prices, many of the poorest households became food insecure (FAO, 2011a).

Figure 9 Development of maize prices in Kenya, Uganda, Tanzania (USD/t) (2006-2015) Source of data: http://www.fao.org/giews/pricetool/

Many authors studied the impact of price increases on poverty and food security. Their evidence is in most cases very similar. For instance Herrmann (2009), Aksoy and

Hoekman (2010) conclude that any significant food price spike would result in households limiting their non-food expenditures, consumption or ultimately would fall below the poverty line. This is in concordance with the finding of FAO (2008b), which state in their brief 'Hunger on the rise', that rising prices have plunged additional 75 million people into hunger worldwide in 2008. Other studies tried to estimate the impact of price spikes on specific countries and regions. According to Sanogo (2009), 10 percent increase in the cost of food basket would result in a 6 percent decline in Ugandans household purchasing power. Wodon and Zaman (2008) conclude in their study, that a 50 percent increase in prices of selected foods would mean a 35 percent increase in poverty headcount, which would be approximately 30 million people in the whole Sub-Saharan Africa. Rapsomanikis (2009) further estimates in his article focused on Uganda, that a maize price increase by 50 percent would reduce the consumption by 30 percent.

Minot (2014) recently studied price volatility in Sub-Saharan Africa, on sample of price of various commodities from different countries. His findings show that generally the level of price volatility is higher in Africa than in the world. The commodities with the highest price volatility were for example maize, beans, sorghum and cowpeas. The volatility was also high for other products like rice, wheat and millet. Given the importance of maize, as a major staple food in East Africa, the high volatility of its price is a major determinant of food insecurity. In the case of maize, he also observed higher price volatility for landlocked countries than for coastal ones. Very important finding is that the price volatility of rice, wheat and maize was significantly higher in recent period of 2007-2011 than in previous periods. This is in concordance with the overall development of world prices in the period (Minot, 2014).

2.6 CAP criticism

The Common Agricultural Policy of the EU is very complex in its objectives and effects. With the annual budget reaching almost €60 bn., its impact on European agriculture is huge but it is also directly and indirectly affecting world markets and thus having impact on developing countries. It has been criticised for its detrimental effect on developing countries by academics, NGOs, the WTO and by representatives of other countries. Literature describes several examples of these negative effects, but it is necessary to see the CAP in its broader picture, as a domestic support instrument which goes hand-in-hand with trade policy with agricultural commodities.

Indirect effects of protectionist measures as well as direct EU interventions into the market are affecting production, trade and prices of commodities. The incentives of the EU to stabilise its own market, to protect European farmers or to invest in biofuels production, contribute to supply and demand changes and influence international agricultural markets. Matthews (2011) identified two channels through which impacts of the CAP could be transmitted to developing countries, first through changes on world market prices and second through the impact on volatility of world market prices.

Even though the CAP has been reformed several times, there are still measures which influence the markets through impact on supply, demand and prices. The WTO recognizes these measures as market price support measures, which are designed to influence domestic price of agricultural products and they include also market access measures, such as tariffs, tariff quotas, export subsidies, public interventions, aids to private storage and production quotas (WTO, 2011). The official note of the European Commission says that: "*Since the 2013 CAP reform, new safeguard clauses are introduced for all sectors, including the cereal sector, to enable the Commission to take emergency measures to respond to general market disturbances*." In other words, there are measures which can be possibly used to stabilise the internal market in different situations (European Commission, 2014a, pp. 5).

Any measures that are distorting the market are possibly harmful for developing countries, which are generally poorer and thus affected heavily by trade conditions such as high prices or price volatility. The author sees these measures as anti-free-trade and also contradictory to EU Policy Coherence for Development.

2.6.1 Public intervention scheme

First example of such measure is the so called public intervention scheme, which is embodied in the CAP. Public intervention in the EU was designed, in the past, to support internal market prices. It has been used often in the past, as it allowed large quantities of cereals to be bought in at fixed prices and without any limit. Today its scope is limited and it serve as a safety-net when serious market disturbances occur. Public intervention scheme works as follows: when the market prices are too low, the EU would buy in large quantities of commodities and store them and release these stocks in the situation when prices are high, in order to stabilise its prices. This is usually happening through subsidised public auctions (Matthews, 2014).

This measure was used in the recent years as the 2007-2008 harvest was relatively poor and the prices were unusually high which resulted in a situation when the intervention stocks were all cleared, serving as a buffer. These stocks were built up again the following years, but were again used as a buffer in 2010-2011, when the high prices occurred again. According to WTO, more than 1,5 million tonnes of cereals were bought into intervention in 2008/09 marketing year and more than 5,7 million tonnes were bought again in 2009/10 (WTO, 2011, pp. 107). As from 2011, the intervention is open automatically for common wheat. Other commodities such as hard wheat, barley, maize and sorghum have not been removed from to intervention, but a quantitative limit has been set at "0". The intervention price has been fixed at €101.31 per tonne for all eligible cereals. Cantore (2012, pp. 11) states that "*in principle, buffer stocks represent an instrument to control price volatility. As buffers are being used for anti-cyclical purposes (to raise prices when they are reducing or to reduce prices when they are surging beyond appropriate threshold), they may have an important stabilisation role*".

2.6.2 EU trade measures

The EU use "protectionist" measures also in trade relations with other states. Such measures are for example import tariffs, which are variable, in the case of cereals, and the EU uses them either as incentive for imports or as a restrain for imports. Usually the tariffs are being used as a protection against the low-price imports, but they can also serve as a stimulus for imports in a situation of supply shortages within the EU. As Matthews pointed out, "*even today the EU continues to vary applied tariffs for cereals within its bound rates, helping to maintain EU demand for cereals at the very time when high global prices are putting a strain on import abilities of developing countries*" (Matthews, 2014, pp. 3).

Although the Uruguay Round of the WTO negotiation resulted in the conversion of nearly all variable import duties into fixed charges, this still does not apply for wheat, rye, maize and sorghum, as a result of an agreement between the EU and the USA. It was established that for these major cereals, the import price, including custom duties, should not be lower than 155 per cent of the ceiling of 101.31 €/t. Nevertheless the EU can decide to increase or reduce the tariffs as it wants. According to WTO, the EU in a response to world prices fluctuations reduced its tariffs on cereals to zero in January 2008 and reintroduced them at the end of October 2008, and the same was repeated in 2010/11 with the continuation until 2012/13. The WTO adds onto this that "*such changes in duties in*

response to world market prices can reduce predictability and exacerbate fluctuations in world market prices" (WTO, 2011, pp. 109). Abbott (2012) studied the behaviour of the world's major grain exporters during the 2007/08 food price crisis and the impact of their policy response on grain prices. He found out that the EU's grain prices in the period rose by less than half compared with the "open" exporters such as the USA, Canada or Australia, who did not use variable tariffs, thus proving that variable import tariffs helped to stabilise the EU prices.

The CAP also entailed measures to support the EU exports to third countries. The infamous export subsidies or export refunds were subject of massive criticism from the side of NGOs, developing countries and academia. As the UN Special Rapporteur on the right to food Olivier de Schutter put it: "*The strategic objective today should be to support developing countries to "feed themselves" not be to "feed the world*". It has been estimated that the dumping rate for cereal exports by the EU in 2006 was on average 54.7 per cent, which extremely high figure, making it almost impossible for local producers of importing countries to compete with such imports (Schutter, 2011, pp. 1). As a result of massive criticism, the EU committed itself to reducing its expenditure on export subsidies and in recent years this type of export support have not been used, however it is still an option as part of emergency measures.

The European Council defines these events and exceptional measures as follows: "*In order to react efficiently and effectively against threats of market disturbance caused by significant price rises or falls on internal or external market or other events and circumstance significantly disturbing or threatening to disturb the market, where that situation, or its effects on the market, is likely to continue or deteriorate, the Commission shall be empowered to adopt delegated acts to take the measures necessary to address that market situation*" (European Council, 2013, Article 219).[4]

2.6.3 Decoupling issue

One of the main subjects of the latest 2013 CAP reform was the decoupling of payments from production and price. The EU sees this as a major step towards higher market orientation of the CAP and towards less distorting CAP. The decoupling means that payments to EU farmers are no longer coupled or tied with production or price. In other

[4] Council Regulation (EC) No 1234/2007, Article 187 (replaced by Council and EP Regulation N° 1308/2013, Article 219)

words, the farmers will not get higher payments for higher production anymore. Instead the new direct payments schemes ensure a safety net for farmers in the form of income support, stabilising their income from the sales on market, which are subject to volatility. This is another form of protection of EU farmers against market volatility with and expected result of lowering the overall EU production and thus decreasing the impact of the EU on the world markets.

This assumption is however very questionable, as the high world prices remain attractive for EU producers, and they work as an incentive for not reducing their production. Matthews deduce that as long as the prices remain high, the EU production will not decrease and the EU would remain its dominant market position (Matthews, 2011). Cantore also further questioned the effect of decoupling by saying that theoretically the decoupled direct payments should be non-distortive but evidence shows that there are channels by which these payments could create effects on production and consequently on world prices and "*produce effects on price volatility similar to those of coupled payments*" (Cantore, 2012, pp. 11). Femenia further deduces that the reformed CAP created a whole new situation, in which the European and international agricultural markets tends to reconnect, and therefore expose EU farmers to market disturbances and fluctuations they did not face in the past (Femenia, 2012).

2.6.4 Biofuels

Another controversial issue which is connected with the CAP is the EU's support to biofuels. The EU committed itself that by 2020, 10 percent of transport fuels in the EU will come from renewable resources such as biofuels. Biofuel production in the EU is not sufficient to meet this demand, therefore much of the biofuels are imported from developing countries. Production and export of biofuels has evolved into profitable business and its production in developing countries is recently booming. Nevertheless it has many negative implications as biofuels compete with staple food crops for land, water and investments.

The UN Special Rapporteur on the right to food Olivier de Schutter stated in his report that the EU goal has significant implication for global agricultural markets, including by increasing tension between supply and demand. "*Biofuel production is already resulting in pressures on land and water resources in developing countries, whether directly for biofuel production, or indirectly in response to the need within the EU*

for more agricultural imports that it is not producing internally because of agricultural production switching to energy crops" (Schutter, 2011, pp. 6)

IFPRI disclosed that with high oil price in recent years, combined with the subsidies of the US and the EU, many farmer have shifted their cultivation toward biofuel crops like maize, sugar cane and oilseeds, most of which are also used a food (IFPRI, 2011). This shift and further co-integration of prices of staple foods with prices of fuel, whether oil or biofuel, lead to escalating the prices of such commodities. Minot (2011) estimated that the growth of biofuel production explains about 33 to 39 percent of the rise in maize prices. WTO also recognizes the impact of biofuels support on world markets, as the increased demand will be met by increased production or increased imports, and it will require land to be diverted from other crops, which is likely to have an impact on world markets, particularly for oilseeds and cereals (WTO, 2011).

2.6.5 Price transmission

Problem derived from both direct payments and above mentioned trade measures is the price transmission from the EU to the world markets and further to local markets of developing countries. As above mentioned Cantore stated "*direct payments help stabilise EU farmers' income, but they export price volatility outside the EU*" (Cantore, 2012, pp. 11). It is clear that price volatility does not originate solely within the EU, but the CAP is a powerful instrument to protect the EU market and to shift the volatility outside its market. Minot stated on this issue that the "*high world prices were transmitted to domestic market, eroding the purchasing power of urban household and other net buyers of food, forcing them to reduce non-food spending and shift for cheaper foods*" and he further continues by stating that "*when the shock from international markets is large, as it was in 2007/08, the price changes are transmitted to local markets or at least the transmission becomes measurable*" (Minot, 2011, pp.1, pp. 27) This is in compliance with the findings of other authors summarized in Boysen and Matthews study, where authors state that "*model simulation confirm that the CAP has in the past distorted both the level and the volatility of world market prices to the detriment of farmers in developing countries*" (Boysen and Matthews, 2012, pp. 1). This statement is also supported by the findings of Aksoy and Hoekman, who state that agricultural policies created floor for agriculture prices "*with policy changes in both OECD and developing countries supporting higher food prices in developing countries*" (Aksoy and Hoekman, 2010, pp. 19).

3. Objectives of the thesis

Food security in developing countries is largely influenced by prices of food commodities on local markets, as they are the major determinant of food affordability for local population. The recent period, starting in the year 2007, was marked by uncommonly high food commodity prices combined with their high volatility. This combination contributed to increasing food insecurity and poverty in many parts of the world, as poor populations of developing countries were forced to cut on quantity and quality of their diet and other basic needs. It is therefore important to look at the determinants of recent high prices, their volatility and to answer the question: whether the developed countries, such as the EU, and their policies does not contribute to this situation.

Main objective

The main objective of the thesis is to analyse the food security situation in Kenya, Uganda and Tanzania, with respect to the possible influences of the Common Agricultural Policy of the EU.

Specific objectives

The main objective will be accomplished through the specific objectives as follows:

1. To analyse the food security situation of selected countries through analysis of food production capacity and trade patterns.
2. To define the main determinants of food insecurity in selected countries.
3. To describe price trends of maize and wheat in Kenya, Uganda and Tanzania.
4. To analyse the extent of food price and volatility transmission from the EU to world market and to domestic markets of Kenya, Uganda and Tanzania for maize and wheat.

4. Methodology

4.1 Focus countries

Kenya, Uganda and Tanzania were selected as focus countries from the broader set of countries from Eastern Africa region. The scope of the thesis would not allow analysis of all of them, therefore the author selected three. The rationale behind the selection of Kenya, Uganda and Tanzania was to select both coastal and landlocked countries, with different sizes of areas, populations, economies and economic status. All three countries are net food importers, which makes them strongly dependent on food prices determination factors, which are out of the control of national agricultural policies. Selected countries are also endowed with different climatic and natural conditions.

Kenya has the biggest economy of selected countries and it is the only country from the whole region, which is not classified as the LDC. As a coastal country, Kenya should be well integrated into the world market with Mombasa port serving as an important transport hub for the whole region. Kenya has highly diverse climatic and natural conditions ranging from coastal to highland and from dry to humid. Climatic diversity is also reflected in differences among regional agricultural preferences, with pastoralism or subsistence farming to large plantations of cash crops.

Uganda is the smallest country out of selected countries both by area and population. It is also the poorest country with the smallest economy and the only landlocked country. Uganda's relative isolation is evident not only from its position on the map but it also one of the symptoms of country's relative underdevelopment. On the other hand, Uganda has very favourable climatic and natural conditions for agriculture with more temperate climate than its neighbours and plenty of rain during the season. It is a major producer of cash crops with majority of Ugandan population living from subsistence agriculture.

Tanzania is the largest country by area and also country with the highest population among selected countries. It is a coastal country and therefore should be well integrated into the world market. Tanzania has diverse climatic and natural conditions, which are favourable for agriculture. Tanzania is a major producer of cash crops but is also producing large quantities of food commodities for export and domestic consumption. Majority of Tanzania population live in rural areas with agriculture as main source of income and food.

4.2 Focus commodities

Maize and wheat were selected as focus commodities of the research. Maize and wheat enjoy high popularity among the populations of East African countries. Maize is the staple cereal grown and consumed in Kenya, Uganda and Tanzania and it is an important source of protein in the diet of local populations. Wheat is not grown so commonly, however wheat products are increasingly becoming popular, as the diet patterns of the societies change. The supply of maize is secured mainly through production and partially through imports, whereas the supply of wheat is secured almost exclusively through imports. Maize and wheat trade within countries is an important factor contributing to limiting food shortages however it is limited by inadequate infrastructure and slow transfers of market information.

Given the importance and popularity of both staple commodities it is important to look at the development of their price on local markets and to focus on determinants of their price setting. As both commodities are tradable they are prone to market fluctuations and price volatility. High and volatile prices of key commodities are a potential source of food shortages, poverty and civil unrest. Maize and wheat serve as a vital source of food in all selected countries and the development of their price in recent period is a sign of turbulent conditions on food markets.

4.3 Methods of analysis

The analysis was divided into two parts. The first part is descriptive and the latter is correlational. In the descriptive part, the author describe obtained datasets with custom descriptive statistical tools using mean, median, minimum, maximum, standard deviation and coefficient of variation. These tools are commonly used to describe the price trends over period of time. The standard deviation and mainly the coefficient of variation are common measures of price volatility (Minot, 2011) (Huchet-Bourdon, 2011).

As a main methodical approach in the correlational part the author conducted correlation analysis, using Pearson correlation. Correlated data series were drawn on the graph to visualise price developments over time. Correlation matrixes of correlated data series were conducted, using also lagged variables to explore the time needed for price adjustment, providing us with the information on correlation coefficients over time.

Price transmission analysis measures the impact of prices in one market on prices in another market. It uses price data to measure various aspects of the relationship between the prices in the two markets.

This analysis can be used to study the relationship between:

- world prices and local prices for a specific commodity
- local prices for the same commodity in different markets within one country
- prices of two competing commodities

Practical uses of the analysis:

- If there is a relationship, the analysis reveals how quickly, would local prices react to a change in world prices
- If there is a relationship between international prices and the local price, the analysis reveals whether the current domestic price is above or below the long-run price trend on international market.
- With the help of rice transmission analysis, it is possible predict local prices

Data requirement:

Price transmission analysis uses data from two or more markets. It is preferable to have monthly data of at least 5 following years, in order to identify the relationships between the prices (Food Security Portal, 2012).

4.4 Data and data sources

For the analysis, author used monthly average wholesale prices of maize and wheat for the EU, Kenya, Uganda, Tanzania and world price. The source of the data were the database of FAO called the GIEWS price tool, which stands for the Global Information and Early Warning System, the EC's price monitoring database, and the database of RATIN, which stands for the Regional Agricultural Trade Intelligence Network.

The GIEWS and RATIN databases collect daily and monthly data on prices of agricultural commodities in developing countries. The data are collected in various locations across those countries. Both databases allow to adjust local prices for inflation and to convert them into US dollars per tonne. The price monitoring database of the European Commission, provide the monthly prices extracted from AMIS2. Data from this database are provided in Euros, therefore author had to transfer them into US dollars using the monthly average exchange rates of IMF exchange rate archives. The international prices are represented by the US Gulf prices. The EU prices are represented by the prices from French stock exchange. The prices of Kenya, Uganda and Tanzania are represented by the prices in Nairobi, Kampala and Dar-es Salaam and were obtained from the GIEWS and RATIN databases.

4.1 Timeframe and possible limitations

The general rule is that the longer the time series the more precise analysis is enabled, with the lowest limit of having at least monthly data for the period of 5 years (Food Security Portal, 2012). The prices of maize were analysed for the period from January 2006 to December 2014. The prices of wheat were analysed for shorter period from January 2009 to December 2014, due to missing data for African countries in the years prior to 2009. This could be limiting, as the missing data would provide better picture of the price developments in the price spike years of 2007-2008. The author is aware, that the data hold some inconsistencies and are not fully representative, as they represent monthly averages and come from one market in the whole country. The adjustment of the prices from local currencies to US dollars can be another source of inaccuracy, as the exchange rates are also monthly averages. It is also important to note that the prices represent the wholesale prices, which are generally lower than retail prices.

Wholesale prices were selected due to lower distortion which can be cause by retail margins.

All variables were tested for stationarity using Augment Dickey Fuller unit root test. It failed to reject the null hypothesis of non-stationarity, therefore variables are non-stationary. This brings limitations. Given the fact, that the only possible solution was to modify the data variables using differentiations, the author continued, with the risk, to work with the data in primary form and assumed that variables are co-integrated in time, despite the fact, that co-integration between variables was rejected through Johansen co-integration test. The non-stationarity of data variables did not allowed author to use to regression analysis, as the results of the analysis could be misleading (Minot, 2010b). Regression analysis is a common way how to measure food price transmission. The author therefore had to stick to correlation analysis, knowing that results of this analysis provide us with limited information. Although price transmission analysis is a useful tool for better understanding and predicting price trends, it only provides information about relationship between two prices over time. It does not tell us why the price transmission is strong or weak, fast or slow. This interpretation can only be done with the knowledge of particular international or local value chains.

4.2 Data analysis

Data were analysed using software SW Gretl (1.9.92.) and MS Excel (2007). First, the correlation of markets was done through Pearson correlation of prices of commodities for the same time period. This analysis tells us to what extent are markets integrated, if the prices correlate.

Secondly, this analysis was extended, using correlation of lagged prices to obtain the time period, in months, in which the prices correlate the most. This simple analysis tells us how long does it take for the local prices to adjust to world price, which is important information about the integration of the markets and price co-movements.

The third part extended the analysis, by using reversed lagging of prices. This analysis provides us with the information about the potential causation of the influence, whether the world price follow the local prices or vice versa. Author is aware about the differences between correlation and causation, and this part of the analysis was done to support potential causality between the EU and world markets and markets of Kenya, Uganda and Tanzania.

5. Results

5.1.1 Price trends of maize

This part of the Thesis describes the price levels, trends and price volatility in selected markets for maize and wheat. Author used descriptive statistical methods of mean, median, minimum value, maximum value, standard deviation and coefficient of variation to describe the market trends of maize and wheat markets in the world market, EU market, Kenyan, Ugandan and Tanzanian markets for the period of 2006-2014.

The price levels of maize in the study period of 2006–2014 were subject of large disparities. The mean price of maize on the world market for the period reached $211/t. The mean price in the EU in the period was slightly higher, reaching $242/t. Mean prices in African markets were in all three cases higher than the world price. The mean price reached $311/t in Kenya, $239/t in Uganda and $280/t in Tanzania. Such disparities are interesting, given the fact, that all three countries are neighbours.

The median value of maize price was lower on world market and on the EU market compared with their mean price. Median values of maize prices were higher in Kenya, Uganda and Tanzania, compared to their mean prices, and also compares to median prices of the EU market and world market. The lowest median value reached $197/t on the world market and the highest reached $328/t on the market of Kenya. The higher values for median then for mean illustrate, that prices in African markets are usually higher than those of the statistical mean, leaning to the higher values.

Table 10 Descriptive statistics of maize price data

Variable	N	Mean (USD/t)	Median (USD/t)	Min. (USD/t)	Max. (USD/t)	Standard deviation	Coefficient of variation
World price	108	211.08	197.83	102.85	331.17	64.35	30%
EU price	108	242.97	237.46	143.13	354.68	60.69	24%
Kenya price	108	311.77	328.91	164.27	509.65	83.58	26%
Uganda price	108	239.74	243.92	107.24	452.26	79.77	33%
Tanzania price	108	280.81	282.00	115.22	486.18	91.57	32%

The comparison of minimum and maximum prices within the period, provide us with further information about price disparities. The comparison showed large disparities of market prices in all selected markets, which is common as the period was marked by

high market price variability. The lowest values of minimum and maximum price were reached on the world market with the minimum value of $102/t and maximum $331/t. The EU market prices reached slightly higher minimal and maximal prices than those of the world market, with the minimum reaching $143/t and maximum reaching $354/t, but the relative disparities were lower than for the world market. Interestingly, the minimum price in the EU is relatively higher than the world price minimum, and also higher compared to the minimum values in Uganda or Tanzania.

Selected African markets showed largest disparities, with the minimum prices reaching relatively comparable values with those of the EU and world markets, reaching $164/t in Kenya, $107/t in Uganda and $115/t in Tanzania but with maximal prices reaching record high levels of $509/t in Kenya, $452/t in Uganda and $486/t in Tanzania. Such price spikes are symptoms of high price volatility, which is common in all focus markets, but significantly higher on markets of Kenya, Uganda and Tanzania.

5.1.2 Volatility levels of maize

The above mentioned volatility of African markets is also evident from values of standard deviations depicted in the Table 10. Standard deviation gives us information about the distribution of average deviation from the mean in dollar terms. The lowest value of standard deviation among selected markets could be observed on the EU market with the value 60.69, slightly lower than the standard deviation on the world market of 64.35. Those values are relatively lower than those of the African markets. Standard deviation observed on the data from African countries was the lowest in case of Uganda, reaching value 79.77. Slightly higher value was observed in case of Kenyan market, with the value 83.58. The highest standard deviation was observed in case of Tanzanian market with value 91.57.

The coefficient of variation is a common measure of volatility in grain prices of world markets. The coefficient of variation is a ratio of the standard deviation to the mean price in selected market. The observed coefficients of variations do not differ very much, however price volatility reaching values higher than 30 percent is considered as high volatility. The lowest observed coefficient of variation was in the case of the EU market with 24 percent which is slightly lower than the coefficient of variation observed for the world market prices of 30 percent. This means that the EU had the relatively lowest price volatility in maize markets among all selected markets. Interestingly the levels of volatility

measured via coefficients of determination were not dramatically higher for African markets. With coefficients of variation of 26 percent for Kenyan market, 33 percent for Ugandan market and 32 percent for Tanzanian market, the level of volatility is comparable with the world market level.

5.1.3 Price trends of wheat

The price levels of wheat in the period of 2009-2014 were also subject of large disparities. The mean price of wheat in the world market for the period reached $293/t. The mean price in the EU for the period was relatively lower reaching $251/t. Mean prices in the African markets for the period were in all three cases significantly higher than the mean world price. The mean price reached $456/t in Kenya, $336/t in Uganda and $567/t in Tanzania. The relatively high disparities in mean prices among three neighbouring African countries are worth further explanation. The median value of wheat price was higher than the mean value in all cases with the exception of Uganda. The lowest median value reached $256/t on the market of the EU and the highest median value reached $574/t in Tanzania. The higher median values compared to mean values illustrated the price trend, with prevalent higher prices in the period.

Table 11 Descriptive statistics of wheat price data

Variable	N	Mean (USD/t)	Median (USD/t)	Min. (USD/t)	Max. (USD/t)	Standard deviation	Coefficient of variation
World price	72	293.18	299.37	182.75	374.00	50.51	17%
EU price	72	251.35	256.94	160.36	357.75	57.29	22%
Kenya price	72	456.04	467.50	370.00	550.00	47.53	10%
Uganda price	72	336.28	321.50	246.00	491.00	60.94	18%
Tanzania price	72	567.06	574.00	453.00	679.00	52.13	9%

The comparison of minimum and maximum prices within the period, provide us with further information about price disparities. The comparison showed large disparities of market prices in all selected markets, which is common as the period was marked by high market price variability. The lowest values of minimum and maximum price were reached on the market of the EU with the minimum value of $160/t and maximum of $357/t meaning that the EU market had the relatively lowest prices in the period. The world market prices for wheat reached slightly higher values of minimum and maximum

than those of the EU market, with the minimum reaching $182/t and maximum reaching $374/t.

Selected African markets showed large disparities, with the minimum prices reaching relatively higher values than those of the EU or world markets. The minimum price in the period reached $370/t in Kenya, $246/t in Uganda and $453/t in Tanzania. The minimum price of wheat in Tanzania was more than twice as high compared to world minimum price in the period. The maximum prices reached $550/t in Kenya, $491/t in Uganda and $679/t in Tanzania. Such price spikes are common in all focus markets, but significantly higher for African markets.

5.1.4 Volatility levels of wheat

Table 11 provides us also with the values of standard deviation and coefficients of variation. Standard deviation gives us information about the distribution of average deviation from the mean in dollar terms. The lowest value of standard deviation among selected markets in the period could be observed on the market of Kenya with the value 47.53, slightly lower than the standard deviation on the world market with the value 50.51 and on the market of Tanzania with the value 52.13. Standard deviation for the EU market had the value 57.29 and for Ugandan market had the value 60.94. These observations are quite surprising, as author expected that standard deviations would generally be higher for African markets than for those of the EU and world, as observed in the case of maize.

The coefficient of variation is a common measure of volatility, in grain prices of world markets. The lowest observed coefficient of variation was observed in the case of Tanzania with 9 percent and in the case of Kenya with 10 percent. Those two markets had the lowest relative price volatility in the period among selected markets. Coefficients of variation observed for other markets reached 17 percent for the world market, 18 percent for Ugandan market and 22 percent for the market of the EU.

Generally the observed values of standard deviations and coefficients of variation do not differ significantly. Interestingly, in some cases they were lower for African markets than for the markets of the EU and world, which was not expected. This could be partially explained by the shorter period of only 5 years, in which the relative volatilities could have been higher on the EU and world markets. Also the comparison of volatility values for wheat and maize is distorted by the relatively shorter period of measurement for wheat, as the previous spikes of 2007-2008 were not involved into the measurement.

5.2 Correlational part

5.2.1 Correlation analysis of the EU market and world market in maize

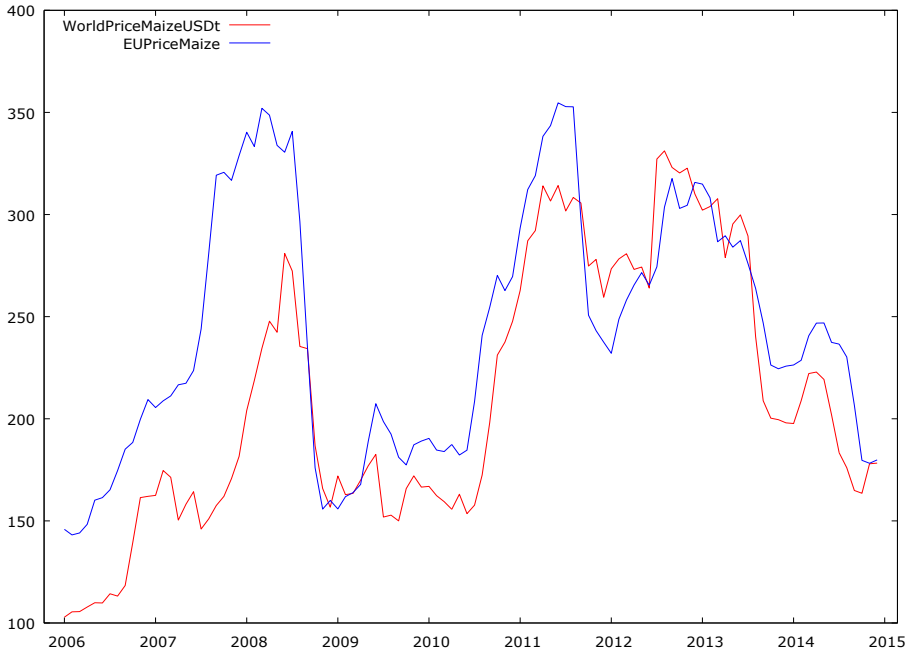

Figure 10 Development of prices of maize on the EU and world markets (2006-2014) (USD/t)

The development of price trends of maize on the EU and world markets, as depict on the Figure 10, illustrates the severity of price spikes during 2007-2008 and 2010-2011. The prices almost doubled within a period of one year, which was uncommon for decades. From the Figure 10 and from the attached correlation matrix (Table 12) we can observe that price developments on both markets follow very close pattern. From the Table 12 we can derive that the correlation is the highest during the first month with the correlation coefficient reaching (0.77) on the level of statistical significance of 1 percent. The correlation is decreasing over time, as we lag the world price by months. We can though state that the EU market with maize is well integrated in the world market, and the prices adjust relatively quickly.

Table 12 Correlation matrix of maize prices for EU with world markets

Lag	0	1	2	3	4	5	6	7	8	9	10	11	12
Correlation Coefficient	0.77	0.72	0.64	0.55	0.44	0.35	0.26	0.17	0.11	0.07	0.04	0.00	-0.03
Statistical significance	1%	1%	1%	1%	1%	1%	1%	10%	30%	50%	75%	99%	75%

5.2.2 Correlation analysis of Kenyan market in maize with the EU and world markets

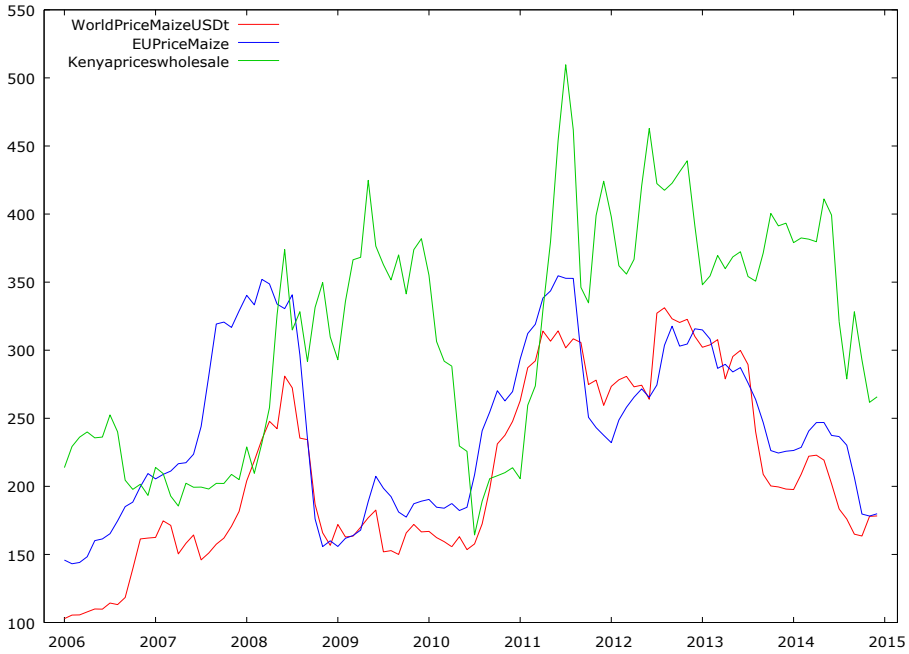

Figure 11 Development of prices of maize on the Kenyan, EU and world markets (2006-2014) (USD/t)

The development of prices on the Kenyan market was in the period of 2006-2014 marked by even higher price spikes than those of the EU and world markets. What is evident from the Figure 11 is also the higher tendency of maize price to reach enormous heights within few months. This could be partially explained by unfavourable weather conditions and unpredictable harvest losses, which are not uncommon in Kenya. But the development of maize price was also partially influenced by the similar upward development on the world market. The correlation matrix (Table 13) gives us clearer idea on the price adjustment time. It took 8 months for the Kenyan price to reach the highest correlation coefficient (0.73) with the world market price, even though the adjustment in previous months was moderate. The strong co-integration of maize markets of Kenya, Uganda and Tanzania is evident, as their price adjusted relatively quickly.

Table 13 Correlation matrix of maize prices for Kenya with world, EU, Uganda, Tanzania

Lag	0	1	2	3	4	5	6	7	8	9	10	11
Correlation Coefficient World	0.59	0.63	0.66	0.69	0.70	0.70	0.70	0.71	0.73	0.73	0.73	0.71
Correlation Coefficient EU	0.22	0.27	0.31	0.36	0.39	0.42	0.45	0.49	0.54	0.59	0.61	0.61
Correlation Coefficient Uganda	0.81	0.81	0.74	0.72	0.70	0.64	0.55	0.45	0.35	0.27	0.24	0.19
Correlation Coefficient Tanzania	0.72	0.72	0.70	0.67	0.58	0.51	0.45	0.38	0.31	0.24	0.19	0.16
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

5.2.3 Correlation analysis of Tanzania market in maize with the EU and world markets

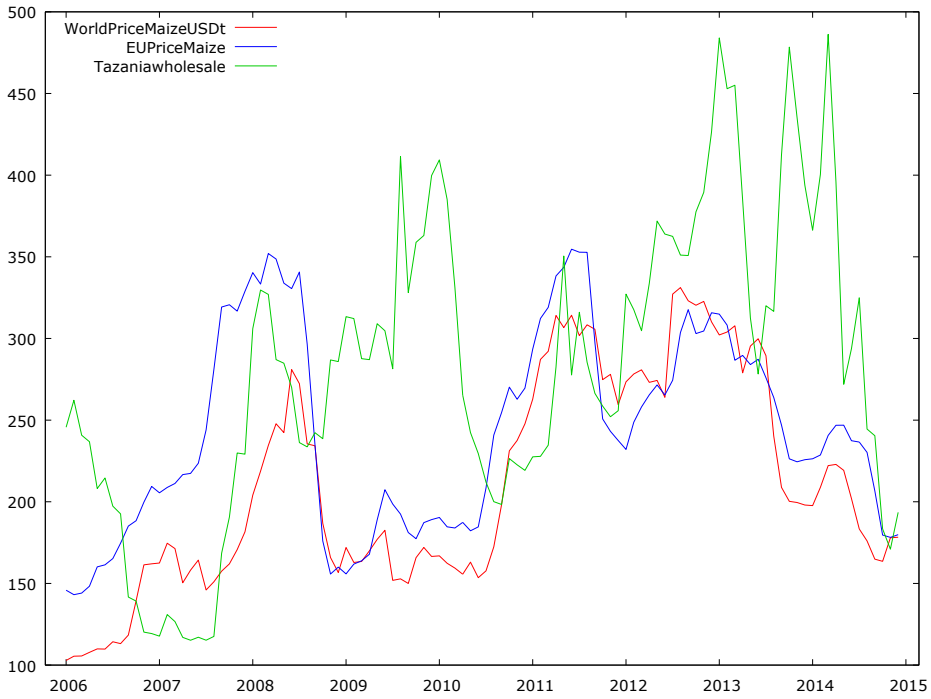

Figure 12 Development of prices of maize on the Tanzanian, EU and world markets (2006-2014) (USD/t)

The development of maize price in Tanzania was subject of dramatic spikes similar like in Kenya. It is interesting because in general, Tanzania should have more suitable climatic conditions than Kenya. Another explanation could be high inflation or government interventions. The prices in Tanzania peaked during 2009-2010 and again in 2013-2014. The correlation matrix (Table 14) revealed that the strongest adjustment to the world price was observed after 13 moths with correlation coefficient of (0.71). Tanzanian market is though integrated into world market only moderately. On the other hand, regional integration is strong as Tanzanian prices correlate with neighboring markets quickly.

Table 14 Correlation matrix of maize prices for Tanzania with world, EU, Kenya, Uganda

Lag	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Correlation Coefficient World	0.44	0.46	0.50	0.53	0.56	0.57	0.59	0.62	0.65	0.66	0.67	0.69	0.71	0.71	0.71	0.68
Correlation Coefficient EU	0.20	0.23	0.26	0.28	0.31	0.33	0.36	0.38	0.40	0.42	0.43	0.44	0.46	0.49	0.51	0.54
Correlation Coefficient Kenya	0.72	0.72	0.69	0.67	0.64	0.62	0.59	0.56	0.53	0.50	0.47	0.43	0.41	0.39	0.38	0.38
Correlation Coefficient Uganda	0.62	0.60	0.57	0.54	0.52	0.48	0.47	0.47	0.46	0.41	0.37	0.30	0.24	0.20	0.21	0.24
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

5.2.4 Correlation analysis of Ugandan market in maize with the EU and world markets

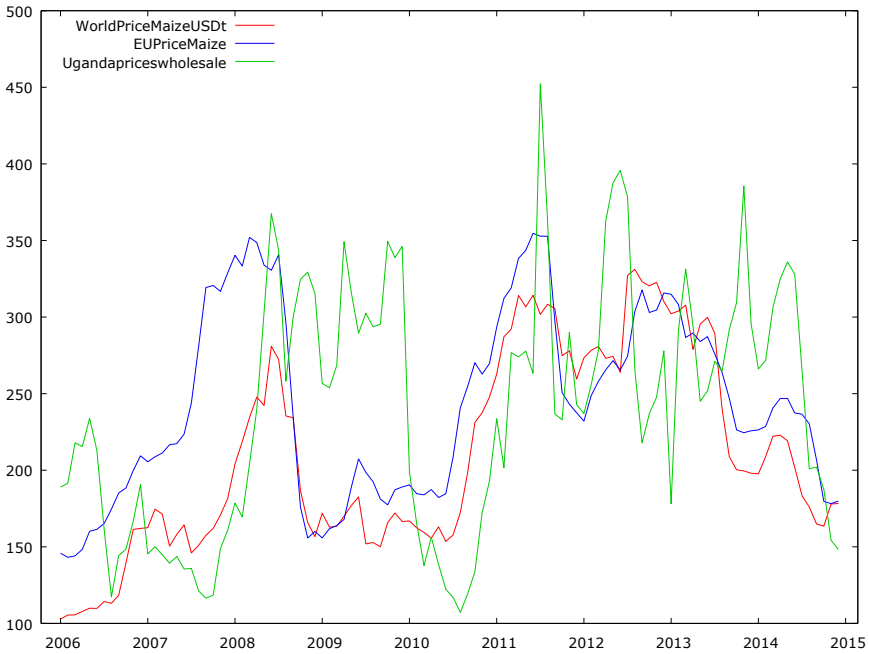

Figure 13 Development of prices of maize on the Ugandan, EU and world markets (2006-2014)

The developments of maize prices in Uganda were also marked by large price spikes, mainly during 2008 and since 2010 to 2014. Interestingly maize prices in Uganda did not reached such heights compared to Kenya and Tanzania. The co-integration of Ugandan market with the world market is also relatively moderate compared to neighboring countries, with the strojngest price adjustment after 5 months. This could be explained by the relative isolation of Uganda, as it is the only landlocked country in the focus. Relatively strong integration with neighboring countries is also evident in the case of Uganda, with the price adjustments being strongest in the first month. Another interesting observation is the relatively stronger correlation with the EU market (0.62) than with the world market (0.55). This finding requires further explanation.

Table 15 Correlation matrix of maize prices for Uganda with world, EU, Kenya, Tanzania

Lag	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Correlation Coefficient World	0.45	0.48	0.51	0.54	0.55	0.55	0.54	0.53	0.5	0.53	0.54	0.53	0.53	0.52
Correlation Coefficient EU	0.16	0.22	0.30	0.36	0.38	0.41	0.44	0.47	0.52	0.58	0.62	0.62	0.61	0.59
Correlation Coefficient Kenya	0.81	0.73	0.59	0.50	0.46	0.41	0.33	0.25	0.18	0.16	0.14	0.13	0.09	0.03
Correlation Coefficient Tanzania	0.62	0.60	0.58	0.50	0.42	0.32	0.28	0.22	0.17	0.13	0.11	0.06	0.02	0.03
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

5.2.5 Reversed lagging

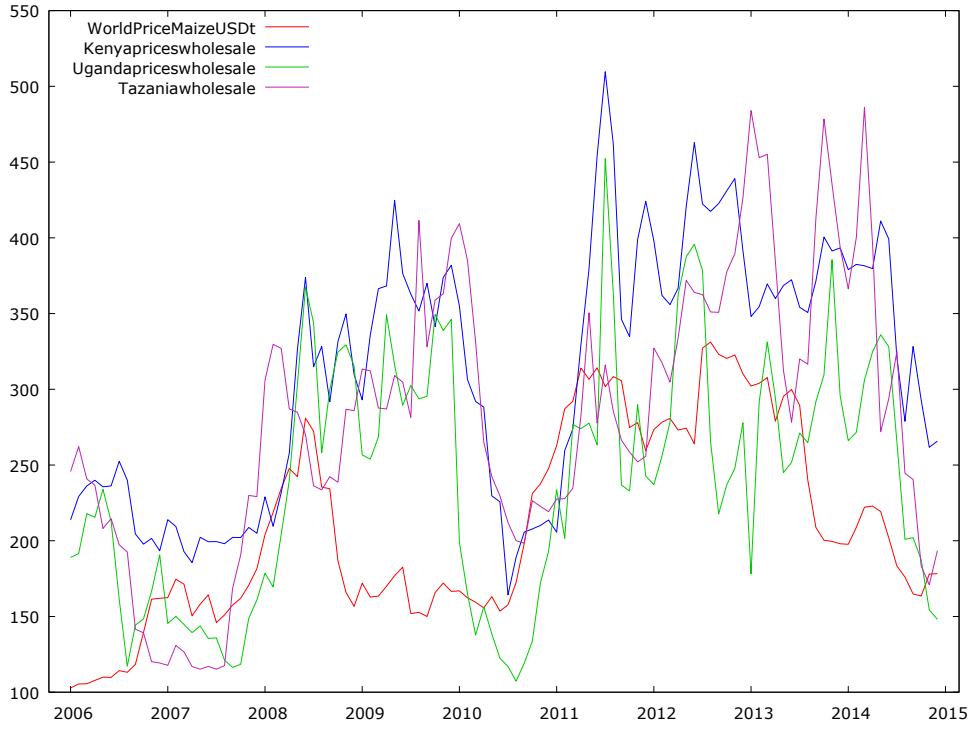

Figure 14 Development of prices of maize on the world and African markets (2006-2014) (USD/t)

The reversed lagging showed clear results (Table 16). The correlation coefficients were highest in the same time period and were decreasing over time in all cases, when used lagged prices. Author interprets this as a evidence of causation that prices on maize markets of Kenya, Uganda and Tanzania are influence by the price trends on the world market. This is in concordance with earlier findings, that African markets correlate with the world market, though with delay, depending on the integration of particular market. This gives us evidence that any sudden or large changes on the world market are transmitted to the markets of Kenya, Uganda and Tanzania, again with some delay and the transmission depends on the relative integration of markets.

Table 16 Correlation matrix of maize prices on the world and African markets (reversed lagging)

Lag	0	1	2	3	4	5	6	7	8	9	10	Max.
Correlation Coefficient Kenya	0.59	0.54	0.47	0.38	0.30	0.23	0.19	0.17	0.16	0.13	0.10	0.58
Correlation Coefficient Uganda	0.45	0.40	0.33	0.26	0.16	0.08	0.01	-0.04	-0.08	-0.12	-0.13	0.44
Correlation Coefficient Tanzania	0.44	0.42	0.39	0.36	0.31	0.24	0.17	0.09	0.03	-0.02	-0.04	0.44
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	X

5.2.6 Correlation analysis of the EU market and world market in wheat

Figure 15 Development of prices of wheat on the EU and world markets (2006-2014) (USD/t)

The development of price trends of wheat on the EU and world markets, as depict on the Figure 15, illustrates the severity of price spikes during 2007-2008 and 2010-2013. The world price of wheat trippled within a the period of one year in 2007, which is a dramatic increase uncommom for decades. From the figure and the attached correlation matrix (Table 17) we can observe that price developments on both markets follow very close pattern. The correlation between prices was stronges in the null time, with the correlation coefficient of (0.93) on the level of statistical significance of 1 percent, which is very strong correlation. The correlation coefficients are decreasing over time, as we lag world the world price by months. We can state that the EU market in wheat is well integrated into the world market of wheat, with prices adjusting very quickly and influencing one another.

Table 17 Correlation matrix of wheat prices for EU and world markets

Lag	0	1	2	3	4	5	6	7	8	9	10	11	12
Correlation Coefficient	0.93	0.91	0.84	0.77	0.68	0.59	0.49	0.38	0.27	0.18	0.10	0.02	-0.03
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	10%	35%	85%	75%

5.2.7 Correlation analysis of Kenyan market in wheat with the EU and world markets

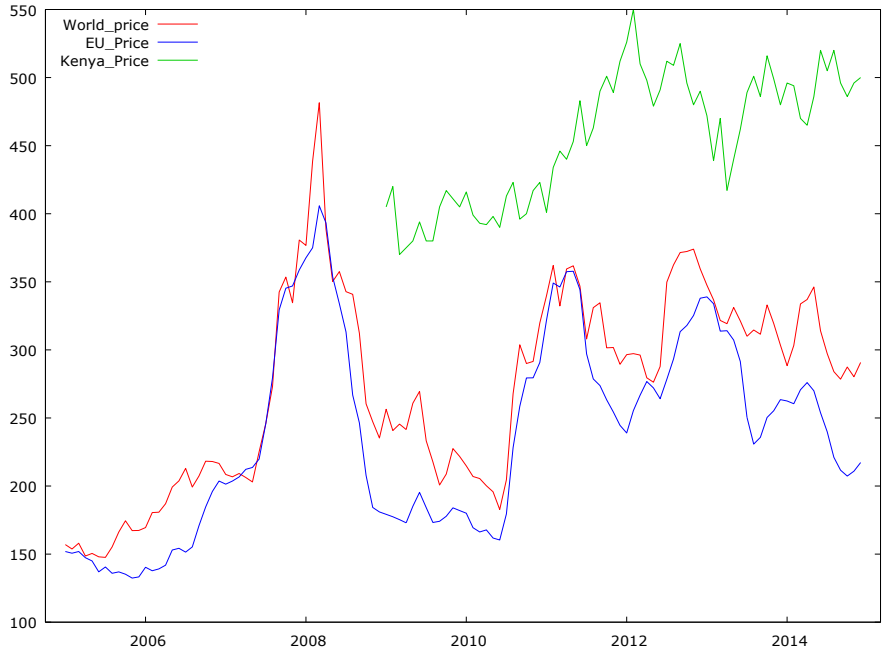

Figure 16 Development of prices of wheat on the Kenyan, EU and world markets (2006-2014) (USD/t)

The development of prices on Kenyan market was in the period 2009-2014 by higher prices than those of EU and world markets (Figure 16). For wheat, the situation is different than for maize, as almost 100 percent of wheat is imported into Kenya. The tendency of the price to reach record heights could have more possible explanations, such as, growing margins and transportation costs, inflation and so on. The correlation matrix (Table 18) gives us idea on the possible influence of forces outside Kenyan market and price adjustment time. It took 4 months for Kenyan prices to reach the highest correlation coefficient (0.64) with the world market price, even though the correlation in previous period was almost the same.

Table 18 Correlation matrix of wheat prices for Kenya with world, EU, Uganda, Tanzania

Lag	0	1	2	3	4	5	6	7	8	9	10	11	12	Max
Correlation Coefficient World	0.59	0.61	0.62	0.64	0.64	0.63	0.60	0.57	0.57	0.51	0.40	0.32	0.26	0.64
Correlation Coefficient EU	0.43	0.46	0.51	0.56	0.62	0.65	0.66	0.65	0.62	0.54	0.45	0.37	0.30	0.66
Correlation Coefficient Uganda	0.66	0.65	0.60	0.53	0.50	0.47	0.43	0.40	0.41	0.41	0.42	0.38	0.34	0.66
Correlation Coefficient Tanzania	0.40	0.34	0.31	0.30	0.29	0.27	0.20	0.13	0.05	-0.04	-0.06	-0.09	-0.09	0.40
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	X

5.2.8 Correlation analysis of Tanzanian market in wheat with the EU and world markets

Figure 17 Development of prices of wheat on the Tanzanian, EU and world markets (2006-2014) (USD/t)

The development of wheat prices in Tanzania was subject to dramatic price spikes similar like in Kenya. The prices in Tanzania peaked in 2013, with the record high prices exceeding $650/t. Generally, the climatic conditions in Tanzania are favourable for growing grains, though much of the supply is secured through imports. The correlation matrix (Table 19) reveals that Tanzanian market is integrated moderately into the world market, with the highest correlation coefficient (0.56) observed with the lag of 6 months. The integration of Tanzanian wheat market with markets of neighbouring Kenya and Uganda is also limited, possibly due to dependency of all three countries on imports from outside the region.

Table 19 Correlation matrix of wheat prices for Tanzania with world, EU, Kenya, Uganda

Lag	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Max
Correlation Coefficient World	0.25	0.29	0.35	0.42	0.48	0.54	0.56	0.56	0.52	0.47	0.41	0.42	0.44	0.43	0.44	0.46	0.56
Correlation Coefficient EU	0.10	0.17	0.26	0.32	0.36	0.37	0.35	0.33	0.33	0.33	0.34	0.37	0.38	0.39	0.43	0.48	0.48
Correlation Coefficient Uganda	0.37	0.43	0.48	0.57	0.63	0.64	0.61	0.60	0.58	0.60	0.63	0.61	0.56	0.52	0.46	0.43	0.64
Correlation Coefficient Kenya	0.40	0.46	0.50	0.56	0.59	0.66	0.67	0.69	0.71	0.72	0.73	0.76	0.79	0.79	0.77	0.68	0.79
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	X

5.2.9 Correlation analysis of Ugandan market in wheat with the EU and world markets

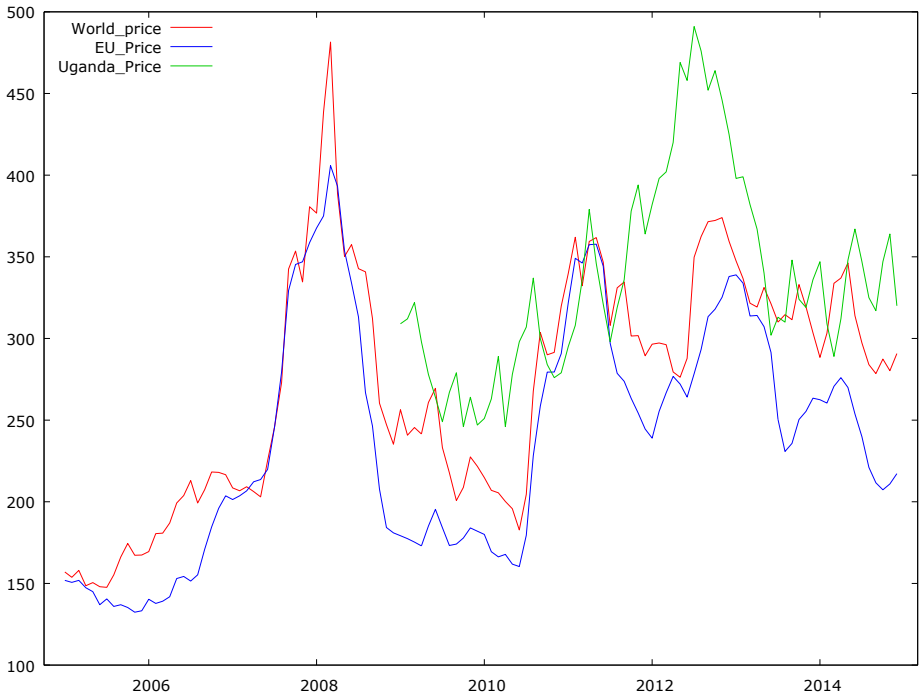

Figure 18 Development of prices of wheat on the Ugandan, EU and world markets (2006-2014) (USD/t)

The developments of wheat prices in Uganda were also marked by price spikes, with prices peaking in 2012-2013. Interestingly, wheat prices in Uganda did not reached such heights as prices in Kenya and Tanzania. The co-integration with the world market is moderate, which is similar with Kenya and Tanzania. On the other hand, the correlation with the world prices and EU prices was strongest in the null month, which is different from neighbouring countries, which market prices adjustments took few months. The correlation coefficient of (0.60) shows moderate integration into the world market. Higher correlation coefficient was observed with the market of Kenya, which confirms Kenya's role as a transportation corridor for Uganda to reach the sea and thus world markets.

Table 20 Correlation matrix of wheat prices for Uganda with world, EU, Kenya, Tanzania

Lag	0	1	2	3	4	5	6	7	8	9	10	11	12	Max
Correlation Coefficient World	0.60	0.56	0.54	0.51	0.47	0.44	0.43	0.42	0.39	0.33	0.24	0.22	0.24	0.59
Correlation Coefficient EU	0.55	0.52	0.50	0.49	0.47	0.47	0.47	0.46	0.43	0.38	0.33	0.33	0.33	0.55
Correlation Coefficient Kenya	0.66	0.69	0.71	0.72	0.74	0.74	0.72	0.70	0.68	0.63	0.55	0.47	0.40	0.74
Correlation Coefficient Tanzania	0.37	0.33	0.29	0.22	0.15	0.07	0.00	-0.06	-0.11	-0.15	-0.21	-0.30	-0.34	0.36
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	X

5.2.10 Reversed lagging

Figure 19 Development of prices of wheat on the world and African markets (2006-2014) (USD/t)

The reversed lagging for wheat showed clear results (see Table 21), similar to those for maize. The correlation coefficients were highest in the null month and were decreasing over time in case of Kenya and Tanzania, when used lagged prices. In case of Uganda the highest correlation coefficient appeard in the second month. Author interprets this as a evidence of causation that prices on wheat markets of Kenya, Uganda and Tanzania are influence by the price trends on the world market. This is in concordance with earlier findings, that African markets correlate with the world market, though with delay, depending on the integration of particular market. This gives us evidence that any sudden or large changes on the world market are transmitted to the markets of Kenya, Uganda and Tanzania, again with some delay and the transmission depends on the relative integration of markets.

Table 21 Correlation matrix of wheat prices in the world and African markets (reversed lagging)

Lag	0	1	2	3	4	5	6	7	8	9	Max.
Correlation Coefficient Uganda	0.60	0.62	0.64	0.64	0.62	0.60	0.57	0.52	0.48	0.43	0.64
Correlation Coefficient Kenya	0.59	0.57	0.55	0.52	0.50	0.52	0.52	0.53	0.51	0.52	0.59
Correlation Coefficient Tanzania	0.25	0.23	0.18	0.10	0.00	-0.06	-0.09	-0.12	-0.15	-0.19	0.25
Statistical significance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	X

6. Discussion

The results helped author to better understand dynamics and factors influencing food security in Kenya, Uganda and Tanzania, however not all specific objectives of the thesis were answered as author expected at the beginning of his work.

The author first analysed the food security situation of three East African countries by looking at their agricultural production and trade patterns. First important finding was that cereals are key staple foods in all three countries, with maize being the most widely produced and utilized cereal. There are favourable climatic conditions in all three countries and production of maize is increasing. Maize serves as a main staple but also as a common fodder for livestock. This was confirmed by the data obtained from FAOstat but also by the works of other authors, for example (Ariga and Jayne, in FAO 2010). The production of maize should be, according to author, increasing at much faster pace, given the fact that demand is increasing rapidly and high prices could serve as a stimulus for increased production.

Another important staple commodity in East Africa is wheat. However the domestic production of wheat is very limited, which is in contrast with its increasing popularity in the diet of local population. The vast majority of the wheat on domestic markets of Kenya, Uganda and Tanzania is imported from third countries. Such purchases could have major disadvantages, with higher prices due to margins and transportation costs as an example. Further investment into the production capacity of both maize and wheat, but also other staple commodities should be encouraged. Author recognises the limited options of governments and the possible solution to this should be private investments or development cooperation. This effort should go hand-in-hand with limiting the production of cash crops on the most fertile lands and further continuation of land grabbing practices. The current state of increasing cereal imports is unsustainable and it means ballast for government budgets.

Another interesting and important observation is the high popularity and demand for local and traditional products like beans, cassava, sweet potatoes or cooking bananas. These commodities are non-tradable internationally, therefore their prices are more stable and their local varieties fit the climatic conditions of East Africa. Agricultural research should pay more attention to these traditional staple foods in order to increase their productivity, resistance and tolerance to extreme weather conditions like drought. Author sees traditional staples as a solid base for achieving food security in the region.

Author also defined some of the major determinants of current state of food insecurity in Kenya, Uganda and Tanzania. First and foremost it is the rapid population growth, which is limiting the ability of population to reach food security. All three countries are experiencing dynamic and rapid population growth, with their populations almost doubling since the beginning of 1990s. This situation is expected to continue, therefore it is challenging for the governments of those countries to come out with possible solutions to the situation (Godfray et al., 2010). Author sees the solution in above mentioned increased investments into agricultural productivity, agricultural education and education in general, which could help to meet the demands of growing populations and slow its growth over time. Educated and vivid livelihoods usually tend to have less children, than vulnerable and poor households.

The current state of securing the supply of food by imports and purchases in times of need is only a temporary solution. Author analysed price trends of maize and wheat in Kenya, Uganda and Tanzania and also on the markets of the EU and world. The price developments in the current period starting in the year 2007 were marked by high commodity prices combined with relatively high price volatility. The recent situation is yet another argument to support domestic self-sufficiency and increased productivity of domestic agriculture. The prices of food commodities generally and those of maize and wheat particularly had become more and more connected with one another, with prices of inputs such as oil and fertilizer and with overall economic circumstances. IFPRI (2011) deduces that prices spikes and volatility hit maize and wheat the most, compared with other food commodities. Price volatility in agricultural products is to some extent natural phenomenon, as those products are prone to natural disasters and shocks causing imbalances in the supply, however when combined with the increasing interconnectedness, food price volatility could become a major problem (HLPE, 2011).

Any sudden shock, like the economic crisis of 2007-2008 in the USA and other parts of developed world, impacts the prices of food commodities, as they are traded on international markets. Another risk is connected with speculations with food commodities, which could also translate into artificially increasing prices, to the detriment of consumers. Finally, the support for biofuel production is according to author putting finite resources like land and water into a strain, creating a situation when producing cash-crops for biofuel production is more profitable than growing food. This is in agreement with other authors like Bussolo et al., (2010), Schutter (2011) or Minot (2011). The biofuel support should be

reconsidered taking into account its side effects like deforestation, rising food prices and limiting food production.

Food price developments in recent period, as mentioned above, were marked by a combination of high and volatile prices. Author analysed these developments on set of data from Kenya, Uganda and Tanzania and compared them to developments in the EU and world market. The first important observation is that, prices of maize and wheat were generally higher on African markets than on European or world market. Similar findings were observed by FAO (2013b) as they state in their report that high prices were increasing rapidly in East Africa, compared to other development regions. The dramatic rises and drops in prices were observed on all markets but again reaching much higher values on African markets than European or world market. Author interprets this that African markets are less protected by their governments and therefore more vulnerable to outside shocks. It is also true that the price creation factors are much more expensive in African than elsewhere. For example transportation costs, inadequate infrastructure, high inflation of local currencies and others contribute to increasing prices of food commodities (OECD/FAO, 2011), but according to author they cannot explain such differences as could be observed among neighbouring African countries Kenya, Uganda and Tanzania.

The level of price volatility was also analysed using standard deviation and coefficient of variation on the datasets covering period 2007-2014 for maize and 2009-2014 for wheat. Obtained results were surprising, as author expected that the volatility levels on African markets would be much higher than on European or world markets, which was not confirmed by the obtained results. On the other hand Minot (2014) in his recent work come out with similar conclusion, by stating that the long term price volatility had not increased in Africa. There are few possible explanations to this. Given the fact that in general the price levels on African markets were much higher than on European or World market, the relative perceived volatility was not so high. The prices did indeed rose and fall unpredictably, but the overall trend of high prices mitigated the levels of volatility, as the prices were not able to drop to lower levels comparable to European or World market price levels. Another explanation could be the possible inconclusiveness of data sets, as the thesis focused on the recent period only, the perceived volatility within the period was lower than it would have been within the extended dataset starting for example in the year 2000. The non-stationarity of the data is also to be blamed for some inconsistencies and limitations.

Finally, author analysed the co-integration of the markets of Kenya, Uganda and Tanzania with the world market, using Pearson correlation. The obtained results were expected by author, providing him with the evidence that African markets are moderately co-integrated into the world market. More interestingly it take them some time to adjust to changes on the world market, which can be seen as a sign of low integration, but it can be also used to predict price changes and trends. FAO (2013b) in their report assume that generally, price transmission could take some time, but particularly in the case of Sub-Saharan African countries it lags in the matter of months. The results also showed that the integration among African markets of neighbouring countries of Kenya, Uganda and Tanzania is quite weak, having much space for improvements, which could lead to stabilising local prices. Author was quite surprised by the relative price differences among neighbouring countries markets, but also among different regions within those countries. This could be explained by the overall underdevelopment of trade, which is hindered by missing infrastructure, capital and cooperation.

The main objective of the thesis was to analyse the food security situation in Kenya, Uganda and Tanzania, with respect to possible influence of the Common Agricultural Policy of the EU. The negative impacts of the CAP has long been criticised which led to substantial reforms to limit these negative impacts. Author recognizes the effort to make the CAP more development oriented and sees positive change since the last reform of 2013. The most evident and criticised measures like export dumping and production subsidies were partially abolished or flattened. However author also sees other measures, which are according to him protectionist and may have negative impact on food prices around the world. These measures are for example biofuel support, variable import tariffs, public intervention scheme and subsidised private stocks. Combined effect of these measures could lead to increasing food prices, and in a way, protecting the EU, from high and volatile prices, exporting the volatility outside its market. Detailed explanations should be found in works of Matthews (2011), (2014), Cantore (2012) and Abbott (2012).

It would need more time to fully observe and assess the impacts of the new CAP, as the reformed measures are just being put in place. For instance, it was in March 2015, when the milk quotas finally phased out. It is important to mention that the broader topic of agricultural policy and food security is connected with the WTO negotiations of current Doha round which is extremely difficult and is ongoing since 2001. The Doha round was characterised by repeated failures to reach basic agreements among states, however since

signing the Bali Package in December 2013, the things should start moving in the right direction again (WTO, 2014). Author also had to comment on the yet unsuccessful Economic Partnership Agreements negotiation between the EU and East African Community. EPA should be designed to encourage and boost trade between the EU and EAC by providing duty and quota free access on the EU market, with exception of few agricultural commodities, which are still being protected and further liberalisation of trade relations. Yet, the EAC was not able to reach comprehensive agreement and the current EPA is again only interim agreement (European Commission, 2014b). Author sees EPA as a big opportunity for East African Community and it should therefore put much more effort in its successful negotiations.

The future development of the region will be, according to author, very dynamic, given the population growth trends. East African countries have a high chance to win their fight against poverty and become emerging economies within few decades. The high population growth is a threat towards reaching food security but it is also an opportunity, as bigger population means bigger labour force, more hands and brains to help countries to overcome their current problems. The key toward fast transition and development is political stability, which also has its roots in poverty and food security. Ethnical and religious conflicts should be overcome by the joint effort of the whole society to reach a better future. The whole region should cooperate tightly within the network of EAC, and cooperate with other developing nations.

There is a large potential in natural resources and favourable climatic conditions, given the area of the region. This potential has to be exploited for the benefit of local communities. Increasing population is also potentially large source of relatively cheap labour. Governments of African countries should encourage investments by creating and stabilising the security situation, political and economical environment. Only then will be investors willing to start their businesses.

7. Conclusion

Author analysed the food security situation of Kenya, Uganda and Tanzania and defined some of the main determinants influencing it. The trend leads toward increasing the total number of undernourished while reducing the prevalence of undernourishment in all countries. The current production capacity is not able to provide adequate supply of food for the entire population therefore food imports mainly in cereals are increasing.

The main determinants negatively influencing food security in East Africa are the rapid population growth in the long run and high and volatile food prices in the current period. The price trends of maize and wheat in the focus period were marked with record high prices and sudden price increases and drops. Price volatility was in general higher for maize than for wheat, but the dataset for wheat were of shorter period and did not include period of price spikes prior to 2009. The volatility among all markets was comparable nevertheless the price trend developments were much more dramatic on markets of African countries, as the prices reached record heights several times, for both commodities.

Author was not able to specify the extent of high price and volatility transmission, as the domestic markets of Kenya, Uganda and Tanzania are moderately integrated into the world market of maize and wheat, and any changes in world prices are transmitted with certain delay, usually taking few months. On the other hand, this delay should be used to partially forecast the future price developments in selected countries. The results also showed the relatively weak integration among neighbouring markets in East Africa. The reasons behind it would need further explanation.

Results confirmed that price trends in the recent period were turbulent, with price spikes and high volatilities as major evidence. High food prices drove many poor households back to poverty and threatened their food security. The rapidly growing population will further increase demand for food, which will lead to further escalation of the whole region. The relatively low integration of selected markets into world market and among themselves within East African region is a symptom of overall underdevelopment of regional trade and cooperation. The East African Community is a platform to enhance integration, cooperation and security, but member countries are not yet able to fully exploit its benefits.

8. Resources

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