

FOOD PRODUCTS TRADE TRENDS FOR AEA REGION

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Abstract

This research aims to determine the trade trends of various food products in Asia, Europe and Africa, AEA, in which, the trade is examined in both the value of the trade in US dollar and the weight of the trade in kilogram. The trade data of the various food products for the value and the weight of the trade consisting export and import information, was acquired from UN Comtrade Database for 125 countries in Asia, Europe and Africa, for 9 years covering the period of 1965 to 2005. According to the Standard International Trade Classification, SITC, the various food products called Food and Live Animals, are divided into 10 subdivisions as the first level of subdividing this commodity. After the trade data was gathered, linear regressions were drawn for food products within the period cited whereby, the trade trends of the different food products in Asia, Europe and Africa were achieved. The linear regression models obtained for the value of the trade were ascending for whole 10 subdivisions from 1965 to 2005, whereas for the weight of the trade, only the trends of 7 subdivisions were ascending and the trends of 3 other subdivisions encompassing Live Animals, Fish and Feeding Stuff for Animals which are related to animals were descending. Furthermore, regarding the trends obtained for the weight of the trade, the most descending slope belongs to Feeding Stuff for Animals and the most ascending slope belongs to Cereals. By analyzing the gathered data and computing the regression models for the value and the weight of the trade, the impact of the value on the weight of the trade is determined, in a way that it is perceived whether for each food product, the trend of the value of the trade and the trend of the weight of the trade over the period mentioned, are ascending or descending or in opposite direction with respect to each other.

Keywords: Food products, Value of trade, Weight of trade, Regression, Trend.

Introduction

Higher income, urbanization, other demographic shifts, improved transportation, and consumer perceptions regarding quality and safety are changing global food consumption patterns (Regmi, 2001). Increase in trade is considered as one the consequences of shifts in food consumption (Regmi, 2001). One of the primary factors affecting food consumption patterns is the ability to purchase food somehow that the last two decades, have exhibited major increases in per capita income levels of households all over the world (Regmi, 2001). While increases in income have enhanced food purchasing power, better trade and transportation have improved its selection and availability (Regmi, 2001). Besides income and improved transportation, lifestyle changes related to urbanization also determine the composition of the food consumed (Regmi, 2001). Generally, there are some determinants specifying the structural changes in world food trade which encompass factors including growth on the supply side, income growth on the demand side, and barriers to trade (Gehlhar and Coyle, 2001). On the supply side, changes in the relative abundance of primary factors such as labor and arable land, determine changes in production costs (Gehlhar and Coyle, 2001). Meanwhile, a higher rate of educational attainment generally results in an expansion in the supply of skilled labor. Skill requirements can vary with technologies employed in the production process (Gehlhar and Coyle, 2001). Demand-side effects come about as household income rises in a way that an increase in income brings about an increase in food expenditures (Gehlhar and Coyle, 2001). Other factors affecting trade structure in addition to supply and demand-side factors are barriers to trade, existing in the form of policies and transportation costs (Gehlhar and Coyle, 2001). Transport costs can act as a formidable barrier to trade just as tariffs, and like tariffs these costs vary by commodity (Gehlhar and Coyle, 2001).

In this research, trade trends of food products based on the value of the trade in US dollar and the weight of the trade in kilogram have been examined in a way that across Asia, Europe and Africa, AEA region, 125 countries were considered and the value and the weight of the trade amongst these countries since 1965 to 2005 were evaluated. According to the Standard International Trade Classification, SITC, provided at United Nations Statistics Division, food products have been divided

into 10 subdivisions. Each subdivision has been determined as a distinct commodity exhibited by use of a code. Besides, the data of the trade for food products as a whole which is known as Food and Live Animals in SITC, was applied in research. The study exhibits how the trends of the trade for value and weight change and how the changes in the value of the trade can affect the weight of the trade during the aforementioned period.

Trade Classification

In order to comprehend the structure of trade in different countries and be familiarized with the variations of trade within different time sections, the statistics of international trade should be classified in a vivid and unique way (Ghadiri Faraz, 2011). There are several classification systems including Harmonized System, HS, the Standard International Trade Classification, SITC, and the Standard Transportation Commodity Classification, STCC (Ghadiri Faraz, 2011). In this research, SITC system has been utilized. In this classification system, the Code 0 has been ascribed to Food and Live Animals and 10 Codes have been attributed to its subdivisions. Based on United Nations Statistics Division, these codes are defined as below:

- i. Food and Live Animals _ (Code 0).
- ii. Live animals other than animals of code 03 _ (Code 00).
- iii. Meat and meat preparations _ (Code 01).
- iv. Dairy products and birds' eggs _ (Code 02).
- v. Fish (not marine mammals), crustaceans, mollusks and aquatic invertebrates, and preparations thereof _ (Code 03).
- vi. Cereals and cereal preparations _ (Code 04).
- vii. Vegetables and fruit _ (Code 05).
- viii. Sugars, sugar preparations and honey _ (Code 06).
- ix. Coffee, tea, cocoa, spices, and manufactures thereof _ (Code 07).
- x. Feeding stuff for animals (not including unmilled cereals) _ (Code 08).
- xi. Miscellaneous edible products and preparations _ (Code 09).

Data Base

In order to gather the data of the value and the weight of the trade for processing this research, 125 countries in Asia, Europe and Africa were chosen. By Java programming language, a computer software analogous to a Web Crawler was programmed whereby, the data of the value of the trade among 125 countries encompassing, data of export and import since 1965 to 2005 for food products and its various subdivisions was collected from the United Nations Commodity Trade Statistics Database, UN Comtrade. Besides, in order to collect the data of the weight, some countries among 125 remarked countries were selected. After gathering the data of the weight for these selected countries, the coefficients of converting the value of the trade to the weight of the trade were computed whereby, the weight of the trade for 125 countries was acquired.

Each subdivision is represented by a code from code 00 through code 09. In fact, each code symbolizes one of the subdivisions of Code 0. Furthermore, the time period cited previously, was divided into five-year sections from 1965 to 2005. Subsequently, the data of the trade has been obtained for 9 time sections.

Inasmuch as there are 125 countries, 10 subdivisions of food products, 9 time sections and the trade data of import and export, accordingly, for either the value of the trade of subdivisions or the weight of the trade of subdivisions, 2812500 data points were gathered.

Regression Models

By using MATLAB, a program was defined in order to sum the import and export data of trade among 125 countries for each code in each year. In this procedure, the number of the countries whose data was available was counted by the defined program as well. Afterwards, for each code in each year, the sum of the value of trade for import and export for 125 countries was divided by the number of the countries whose trade data was available. The consequence of this process is a number symbolizing the average value of the trade in US dollar for each code in each year between each pair of countries among 125 countries whose data is available. Subsequently, this procedure is repeated for each code in each year. Thus, the chart of the average value of the trade versus time for each code was drawn as shown in Figure 1. In this figure, each point implicating the average value of the trade is linked to

another one in order to form the curve of each code. Besides, the linear regression model of each code was computed and tabulated in Table 1.

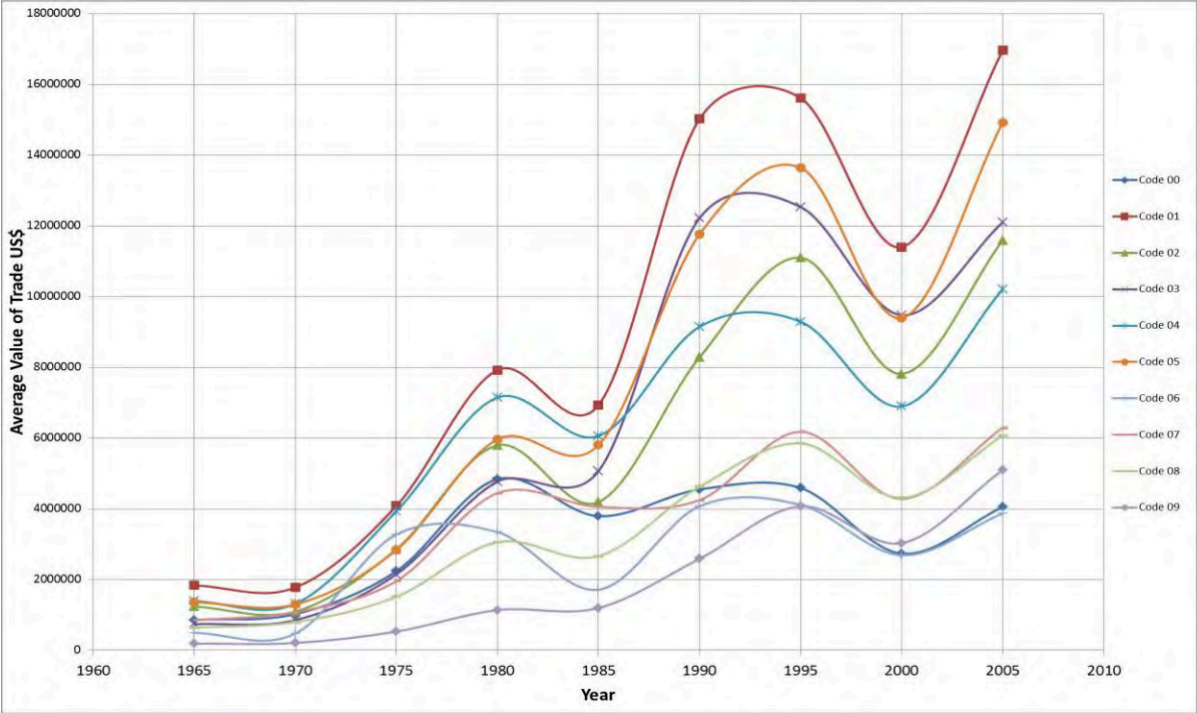


Figure 1: The average value of trade during 1965-2005, 10 subdivisions of Food and Live Animals

Moreover, the procedures mentioned above, are implemented for the weight of the trade. The consequence of this process is a number symbolizing the average weight of the trade in kilogram for each code in each year between each pair of countries among 125 countries whose data is available. Subsequently, this procedure is repeated for each code in each year. Therefore, the chart of the average weight of the trade versus time for each code was drawn as indicated in Figure 2. In this figure, each point implicating the average weight of the trade is linked to another one in order to form the curve of each code. The linear regression model of each code was tabulated in Table 1 as well.

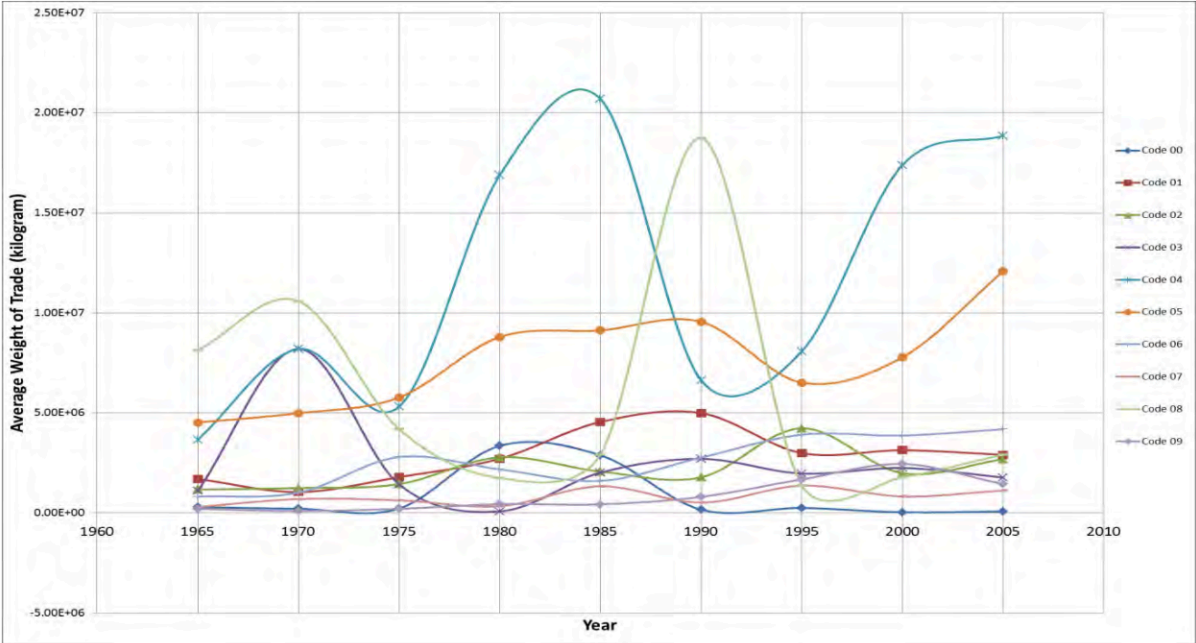


Figure 2: The average weight of trade during 1965-2005, 10 subdivisions of Food and Live Animals

The linear regression models gained for the subdivisions of food products trade and the aggregate food products trade which have been shown in Table 1, determine the trade trends since 1965 to 2005. In these equations, the letter t symbolizes time and the letters V and W represent the value of the trade and the weight of the trade respectively. Besides, the coefficients of determination, R^2 , implicating how reliable the offered models can be, have been exhibited beside each model.

In order to compare the trade of the subdivisions to that of aggregate Food and Live Animals, namely Code 0, the processes accomplished above will be carried out for the value and the weight of the trade of Food and Live animals by which, the charts of the trade of Food and Live Animals versus time are drawn as shown in Figure 3 and Figure 4. In fact, the result is two curves similarly symbolizing the average value of the trade in US dollar and the average weight of the trade in kilogram in each year between each pair of countries among 125 countries whose data is available as denoted in Figure 3 and Figure 4 respectively.

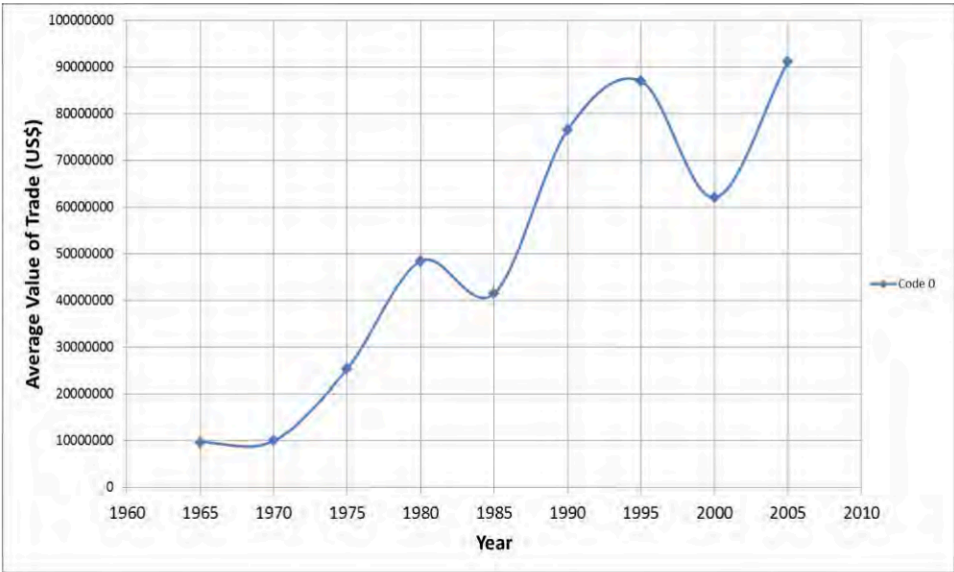


Figure 3: The average value of trade during 1965-2005, Food and Live Animals

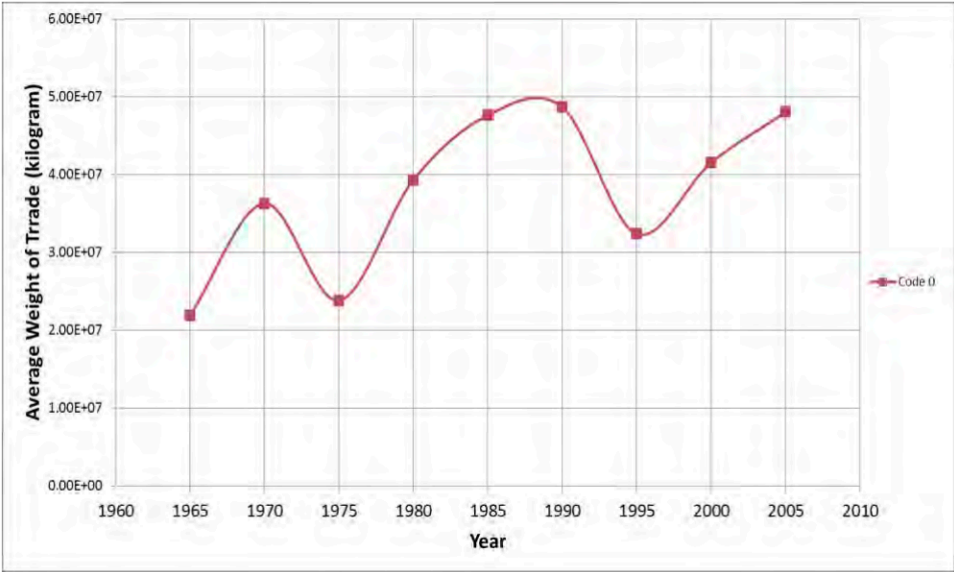


Figure 4: The average weight of trade during 1965-2005, Food and Live Animals

According to Figure 1, the value of the trade of each subdivision increases generally. Albeit there are two striking declines in the vicinity of 1985 and 2000, according to the regression models indicated in

Table 1, the trend of variations in the value of the trade for each subdivision is ascending. In addition, the highest value of trade belongs to code 01 representing meat and meat preparations whose slope of linear regression model is also the most ascending in proportion to the slopes of other subdivisions' linear regression models as indicated in Table 1. According to Regmi, with increased urbanization and higher disposable income among urban residents, the demand for meat, horticultural, and processed products is expected to increase among developing countries (Regmi, 2001). Inasmuch as there are numerous developing countries among the 125 selected countries for this research, according to Figure 1, the higher value of meat compared to the other products can be justified. In other words, the posed demand has brought about a noteworthy increase in the value of the trade of meat and its preparations according to Figure 1. Furthermore, the values of trade for Code 01 through Code 05 consisting Meat, Dairy Products, Fish, Cereals and Vegetables/Fruits have increased drastically since 1985 to 2005 rather than other subdivisions in this period as shown in Figure 1. Likewise, according to Table 1, the trend of the value of the trade of aggregate food products, namely Code 0, is ascending. Moreover, similar to its subdivisions, there are two noticeable declines in 1985 and 2000 in the value of the trade of Code 0 as indicated in Figure 3. As Gehlhar and Coyle cited, factors of growth on the supply side like expansion in the supply of skilled labor, income growth on the demand side, and barriers to trade such as transportation costs contribute in the variations of food trade in the world (Gehlhar and Coyle, 2001). Granted that the factors mentioned by Gehlhar and Coyle have contributed to the trade of food, these elements have totally increased the value of the trade among these 125 countries.

In spite of the fact that the trend of each subdivision's value of trade is ascending, regarding the weight of the trade, according to Table 1, only the trends of 7 subdivisions were ascending and those of 3 other subdivisions comprising Live Animals, Fish and Feeding Stuff for Animals which are related to animals were descending. Among 10 different subdivisions, Code 04 and Code 05 representing Cereals and Vegetable/Fruits respectively, have the highest weight of trade rather than other 8 subdivisions as exhibited in Figure 2. Even though the variations of the weight of the trade are not as consistent as those of the value of the trade, the trend of the weight of the trade of aggregate food products, namely Code 0, is ascending according to Table 1. Also, concerning the trends computed for the weight of the trade, the most descending slope belongs to Feeding Stuff for Animals and the most ascending slope belongs to Cereals. As it can be observed in Table 1, except for 3 subdivisions in the domain of weight, other codes pursue ascending trends among which, the slope of the trends are more drastic for the value of the trade rather than the slope of the trends for the weight of the trade, in particular since 1985.

In respect to the reliability of the models which is determined by the coefficient of determination, R^2 , the models of the value of the trade possess higher coefficients of determination implicating higher reliability, whereas the coefficients of determination for the models of the weight of the trade are less. The incomprehensiveness of the data of the weight can be considered as a reason for the lowness of the coefficients of determination for the models of the weight of the trade. Especially regarding the weight of the trade of 3 subdivisions including Live Animals, Fish and Feeding Stuff for Animals whose trends are descending, the amount of the coefficients of determination are less than 0.1. Thus, these three models do not explain the reliability of the trade trends of the weight of these three subdivisions explicitly.

| Code | Definition of each Code | Value of Trade | | Weight of Trade | |
|------|-----------------------------|--|-------|--------------------------------|-------|
| | | Linear Regression Models (Thousand US\$) | R^2 | Linear Regression Models (Ton) | R^2 |
| 00 | Live animals except Code 03 | $V = 74.4t - 10^5$ | 0.440 | $W = -15.2t + 3 \cdot 10^4$ | 0.025 |
| 01 | Meat | $V = 398.5t - 8 \cdot 10^5$ | 0.844 | $W = 52.6t - 10^5$ | 0.313 |
| 02 | Dairy products | $V = 268.5t - 5 \cdot 10^5$ | 0.860 | $W = 42.8t - 8 \cdot 10^4$ | 0.369 |
| 03 | Fish | $V = 331.8t - 7 \cdot 10^5$ | 0.833 | $W = -38.1t + 8 \cdot 10^4$ | 0.051 |

| | | | | | |
|-------|---------------------------|-----------------------------|-------|------------------------------|-------|
| 04 | Cereals | $V = 215.8t - 4 \cdot 10^5$ | 0.795 | $W = 278.7t - 5 \cdot 10^5$ | 0.335 |
| 05 | Vegetables and fruits | $V = 353.2t - 7 \cdot 10^5$ | 0.859 | $W = 136.2t - 3 \cdot 10^5$ | 0.575 |
| 06 | Sugar and honey | $V = 75.2t - 10^5$ | 0.506 | $W = 82.8t - 2 \cdot 10^5$ | 0.806 |
| 07 | Coffee, tea and etc. | $V = 132.1t - 3 \cdot 10^5$ | 0.812 | $W = 17.7t - 3 \cdot 10^4$ | 0.366 |
| 08 | Feeding stuff for animals | $V = 141.6t - 3 \cdot 10^5$ | 0.887 | $W = -119.7t + 2 \cdot 10^5$ | 0.081 |
| 09 | Various edible products | $V = 122.2t - 2 \cdot 10^5$ | 0.883 | $W = 50.9t - 10^5$ | 0.733 |
| Total | Food and live animals | $V = 2000t - 4 \cdot 10^6$ | 0.855 | $W = 489.1t - 9 \cdot 10^5$ | 0.440 |

Table 1: Linear regression models for 125 countries during 1965-2005

Conclusion

The study exhibited the significant variations in the value and in the weight of different food products. The trends of food products, namely Food and Live Animals and its 10 subdivisions were examined in two domains of the value of the trade and the weight of the trade for 125 countries throughout Asia, Europe and Africa during 1965 to 2005. The trend of the value of the trade for each subdivision along with the trend of the value of the trade of aggregate food products, namely Code 0 was ascending. Nonetheless, there were two declines for 1985 and 2000 for each subdivision and also for the aggregate food products explicating a decrease in the value of trade in these two years. Furthermore, the highest value of trade belonged to meat and meat preparations whose slope of linear regression model was also the most ascending in proportion to the slopes of other subdivisions. Besides, increase in the value of trade for Code 01 through Code 05 was drastic since 1985 to 2005 rather than that of other subdivisions in this period.

Although the trend of the weight of the trade of aggregate food products, namely Code 0, was ascending, the slope of this trend was less than that of the value of the trade. Moreover, the most ascending slope of trend for the weight of the trade of subdivisions belonged to Cereals and the trends of the weight of the trade for 3 subdivisions consisting Live Animals, Fish and Feeding Stuff for Animals were attained descending among which, the most descending slope belonged to Feeding Stuff for Animals. Notwithstanding, on account of low coefficient of determination, the three models gained for these subdivisions could not reliably interpret the trends of the weight of the trade. Also, Cereals and Vegetable/Fruits, had the highest weight of trade rather than other 8 subdivisions since 1965 to 2005. Meanwhile the regression models offered for the value of the trade, were more reliable than those of the weight of the trade.

Finally, it can be conclude that despite increase in the value of different subdivisions of food and live animals since 1965 to 2005, the weight of the trade has increased except for 3 subdivisions as well. In other words, the trends of the variations of trade for value and weight have been in the same direction except for 3 subdivisions and increase in the value of trade has not reduced the weight of the trade. Besides, when the aggregate food products, namely Food and Live Animals, was examined, the trends of the variations of trade for value and weight were in the same direction.

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