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# SOME EFFECTS OF TRADE LIBERALISATION ON CAMEROONIAN MANUFACTURING EXPORT PERFORMANCE

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**Abstract.** This study investigates the effect that trade liberalisation had on the export of manufactured goods in Cameroon. The study estimated the effects this liberalisation had on the determinants of exports of manufactured commodities and its influence on the country's economy, using an augmented gravity model. The model revealed that the effect of exchange rate appreciation on the export of manufactured goods was less than it was before trade liberalisation, though still positive. After liberalisation, manufactured exports reacted positively following increased imports of intermediate goods and a lowering of tariffs; but it was restricted by higher production capacity. Further investigation indicates that the exports of manufactured goods were stimulated by the liberalisation of trade, although manufacturing growth was still dampened. The effect of the local economy's size became more important, while the influence from foreign GDP declined. Membership of regional trade agreements became negative, which was unexpected. Distance became more important, and the effect of tariffs declined; though still negative. It was found that international trade liberalisation by Cameroon mostly benefited its manufacturing sector, improving its ability to export and to create jobs.

**JEL Classification:** D22, F13, F14, F63, L60

**Keywords:** Trade liberalisation; manufacturing, gravity model, strategic policy, and Industrial policy

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## 1. Introduction

This study estimates the effect that trade liberalisation had on the determinants of manufactured goods exported by the Cameroon. As a member of the World Trade Organisation (WTO), Cameroon had to implement trade liberalisation measures. The manufacturing sector was expected to benefit from trade liberalisation on international markets, and this study aims to assess these results.

Since the formation of the WTO, world markets had undergone large changes with regard to technological development and changing trade relations. Most countries strive to benefit from free trade through world market access. Classical and neo-classical economic theory predicts that trade liberalisation of economies, through the lowering of tariffs and removing non-tariff barriers, will lead towards such benefits. Cameroon as a developing country liberalised its trade to benefit from the gains expected to come from trade liberalisation. Determining whether these benefits were realised is the objective of this study.

Cameroon is a less-developed country with an undiversified economy that is supported mostly by agriculture and informal activities. The manufacturing sector produces a limited range of basic consumer goods for the domestic market and exports to a few neighbouring countries. This is a consequence of overambitious development of the sector during the era of Import Substitution Industrialisation (ISI).

Cameroon as a member of the Economic and Monetary Union of Central African States, known by its French acronym CEMAC, is expected to benefit from the free movement of goods and services in addition to having a common currency. The CEMAC countries produce similar products; however, using similar production processes based on technology imitation instead of innovation and consequently suffer from the same constraints resulting from the limited resource base (AfDB, 2009:20).

The objective of this study is to ascertain the results of this trade liberalisation empirically, using the single equation supply model and the gravity model (Krugman, Obstfeld and Melitz, 2012; Bos and Van der Laar, 2004). This allows analysis based on various approaches to generate information from various angles. The article is organised as follows: The next section provides a literature review of the divergent views on trade theory concerning trade liberalisation. Section 3 considers the Cameroonian economy, trade policy and the manufacturing sector. Sections 4 and 5 deal with the methodological approach of the various models estimated and report on the findings of the empirical research. Section 6 presents a summary and conclusions.

## 2. Literature review and theoretical framework of trade liberalisation and manufacturing

There exists a vast literature on trade liberalisation, but no specific literature on its effect on the economy of Cameroon, and it is the aim of this study to fill that gap. For the purpose of this study, trade liberalisation will be defined as a change in macro-economic policy, which opens markets and through that affects manufacturing performance. Competitive pressures resulting from liberalisation are expected to lead inefficient producers towards efficiency or force them to leave the market (Gawande, et al., 2012). Competition has favourable effects on

manufacturing efficiency and avoids rent-seeking behaviour (Krueger, 1978:12). By removing rent-seeking behaviour, competition between local and foreign producers can increase, leading to efficiency.

New trade theory emphasises the role of imperfect competition, economies of scale and product differentiation (Strydom, 2006:2, Helpman, 1999:121). On the basis of comparative advantage, countries such as Cameroon, with abundant cheap and unskilled labour, should specialise in the production and export of labour-intensive goods, as they have comparative advantage in those products (Krugman, 1990:483).

Krueger (1980:289) argues that intervention by policy-makers is unproductive because it leads to the sub-optimal functioning of markets. Free trade and export-oriented policies are regarded as a way to achieve fast, efficient and sustainable industrial development (Bhagwati, 1990:5, Little, et al., 1970, World Bank, 1987:2-10). Neo-classical trade theory expects trade liberalisation to create incentives for local firms to increase productivity and become competitive (Ramondo and Rodríguez-Clare, 2013). Particular firms that export are forced to adopt new production and business protocols and new technology to remain in business. This leads manufacturers to allocate resources more efficiently (Greenway, et al., 1993, Khandelwal et al., 2013).

A study by the Organisation for Economic Cooperation and Development (OECD), National Bureau of Economic Research (NBER) and the World Bank from the 1970s and 1980s suggested that countries with more open economies grow faster than those with more protectionist policies, and this is often the justification for liberal trade policies (World Bank, 2000). Economists also argue that trade liberalisation is beneficial to growth and manufacturing performance (Little, et al., 1970, Krueger, 1978:1-22, Heitger, 1987: 249-261, Romer, 1989:1002-1037, Michaely et al., 199, Bhagwati and Srinivasan, 1999, Dollar, 1992:523-544, Edwards, 1992:383-398, Harrison, 1994, Onafowora and Owoye, 1998:497-506).

Baer (1972:95) states that all countries have industrialised using some aspect of Import Substitution Industrialisation (ISI) in which the firms that were protected and that received comparatively large government investments when compared to non-protected firms. On the other hand, history has shown that ISI firms often remain inefficient under the cover of protection. They produce obsolete goods using old machinery and by putting all efforts on supporting such firms, resources are misallocated making local citizens poorer since they produce mostly commodities. These commodities cannot compete in the international market because the currencies are over-valued to support local firms, making their products uncompetitive. This also implies that the support of one sector of the economy deprives others.

Semenick and Morrison (2000) state that specialisation and production under ISI are not based on revealed, acquired or latent comparative advantage, but on political exigencies. Given this situation, firms accustomed to subsidies, such as in the case of Cameroon under inefficient ISI, might become unable to compete and are pushed out of business. An unintended consequence might also be that such firms might become importers of the products they previously produced, making them basic merchants (Kragelund, 2012).

Adam Smith (2003) already stated in 1776 that specialisation leads to efficiency and increased productivity. This is confirmed by several researchers ever since (see e.g. Crinò and Epifani, 2012). Free trade opens markets that absorb higher output resulting from increased productivity (Crinò and Epifani, 2012). The new trade theory adds that trade is influenced by higher returns to scale, which result from growing firms, which is a consequence of increased trade. More trade leads to more capital accumulation, investment, and expansion and productivity increases through learning by doing, which promotes the whole manufacturing sector.

Dynamic models emphasise the role of trade liberalisation in the diffusion of knowledge through the economy (Olivero and Yotov, 2012). Knowledge acquisition, which is considered endogenous, also increases through trade, in addition to the acquisition of new and better technology, and in that way improves the performance of the manufacturing firms, (Grossman and Helpman, 1991).

Jonsson and Subramaniam (2001:197-224) showed that trade liberalisation had a favourable impact on total factor productivity growth (TFP↑) during the 1990s in South Africa. The study also showed that there was a favourable long-run relationship between TFP and openness (Rocha and Oreiro, 2013). Economists such as Grossman and Helpman (1990:86-91) and Krueger (1998:33-60) emphasise that free trade increases the growth rate of an economy and thereby enhances overall economic development in all sectors, including manufacturing (Cream and Cream, 2012:414).

Edwards (1998:383-398) found support for the assumption that trade openness leads to higher total factor productivity growth. Weinhold and Rauch (1999:1010) found that openness accelerates productivity growth through economies of scale. They also found evidence that specialisation in the manufacturing sector increases the rate of growth in manufacturing productivity in less-developed countries.

Using the co-integration technique on Korean manufacturing, Hwang (1998:391-405) found increasing returns to scale due to the adoption of new technology through trade liberalisation, as well as benefits through learning-by-doing effects, as defined by Lucas (1988:3-42). Similar results were obtained by Nair et al. (2001:153-171) in Malaysian manufacturing.

On the other hand, some studies dispute the benefits of trade liberalisation. The assumptions on which trade liberalisation is based are often criticised for being too restrictive and not representing reality (Anderson, 2012). In addition, the methodological approaches and analyses are regarded as problematic (Rodrik, 1992:87-105, Rodriguez and Rodrik, 1999:2-65). Sen (2010:5) argues that the inflexible framework of neo-classical theory is criticised for being too restrictive, given its assumptions. The new trade theory, however, introduces the role of economies of scale in production and is based on the economic theory of second best, which emphasises the notion that imperfections cancel themselves out (Krugman, 1990:499). In our study we now wish to determine which theories and assumptions are the most appropriate and closest to reality. The findings of this study will give some evidence to the current situation and indicates which theory is correct in the case of Cameroon.

Comparative advantage is criticised for being a mostly static analysis. Samuelson (1962:266) agrees that trade is important because it could bring benefits to countries, but he disputes its optimality in all cases. Corden (1974:5) also argues that the theory of comparative advantage does not say that free trade is best. It only states that, given certain assumptions, such as free markets, it is better.

There are also researchers who found that the prediction of better growth and manufacturing performance due to trade liberalisation is not substantiated such as Sachs (1987), Agosin (1991:79-100), Taylor (1991:70-108), Shafaeddin (1994:1-16), Clarke and Kirkpatrick (1992), Greenaway and Sapsford (1994:157-174), Jenkins (1996:693-716), Greenaway, Morgan and Wright (1997:229-244), and Rodriguez and Rodrik (1999:1-60).

Most research findings do, however, emphasise the advantages of trade liberalisation. The next section will describe the economic situation of Cameroon, including its trade regimes, policies and its manufacturing sector.

**3. Cameroonian economy, trade policy and the manufacturing sector**

The Cameroonian economy exports coffee, cocoa, rubber, timber, bananas, palms and sugar, and produces a limited volume of crude oil. The agricultural sector still employs more than 80 per cent of the workforce, and most people live from subsistence farming in the rural areas. The weak economy and the mismanagement thereof led to the adoption of a Structural Adjustment Program (SAP) based on advice from the International Monetary Fund (IMF) as a means of getting out of their self-inflicted economic crisis (Amin, 2012).

These reforms led to trade liberalisation in 1992 and a large devaluation of their currency during 1994 and 1996. Their economy still did not perform well and this forced the Cameroonian government to apply for the debt cancellation initiative known as the Heavily Indebted Poor Country Initiative (HIPC) of the World Bank.

Since independence in 1960, Cameroon implemented a policy of Import Substitution Industrialisation (ISI) until its abandonment in the late 1980s. The lack of competition in less-developed countries led to the development of inefficient firms that lacked economies of scale, but which survived as a result of protection under the policy of ISI (Romer, 1989). When economies of scale are possible, it means that costs will decline in the long-run (Mankiw, 2014). This was however not possible in the Cameroon. Most countries abandoned ISI because of balance of payments deficits, debt and budget-deficit problems.

In line with the Washington Consensus, which inspired free market policies and fiscal discipline, interest rate liberalisation, a competitive exchange rate, trade liberalisation, foreign direct investment, privatisation, or at least commercialisation, and deregulation were also introduced, among other measures (Williamson, 2000:251-264). Beginning in 1989, Cameroon began removing all export taxes, especially on commodities such as cocoa, rubber, coffee and manufactured goods, especially agricultural goods. The remaining export prohibitions that still exist apply mainly to ensure quality, and because of health and environmental protection (MINEAPRD, 2006:5-25).

With regard to the manufacturing sector, Cameroon reduced tariffs to uniformly low levels, and reduced the level of protection in addition to the decrease of import tariff rates in most industries (CEMAC, 2006:5-25).

### 3.1 The manufacturing sector in Cameroon

The manufacturing sector employs approximately two per cent of the population, mostly informal. There is a lack of linkages between the various sectors, limiting growth in manufacturing (GESP, 2010:10 & 30). Production is volatile and varies much from year to year. This caused average output to remain negative over the research period. Although there was much improvement following trade liberalisation, negative growth only declined from minus 40.2 before liberalisation to minus 11.7% thereafter (World Bank, 2013).

The manufacturing industry in Cameroon has a low growth rate as its economy is still factor-based and produces mainly consumer goods (WEF, 2010:118). There are also some oil refining, agro-industries, mining and electricity generation (AfDB, 2009:18). Most of these sectors are underdeveloped, suffering from structural, infrastructural and institutional problems (GESP, 2010: 30). In most cases, manufacturing focuses on the imitation of technology and the assembly of products, ranging from motorcycles to radios and television sets (Hendrickson, 2012).

Despite the efforts made to favour the manufacturing sector as part of ISI policy, the manufacturing sector never penetrated foreign markets sufficiently. There was large government support for the manufacturing industry. These measures were aimed at encouraging manufacturing output, but in many cases firms took advantage of the support, without increasing production. The firms established were mostly government owned, with high levels of corruption (Tabi and Ondoa, 2011:15). Many big businesses failed and several government parastatal companies, which were supported by high protective tariffs under ISI policy, became a burden and a drain on the economy (Njinkeu and Bamou, 2000:2).

## 4. Empirical analysis using the single equation supply model

### 4.1 Research Design of the Empirical Analysis

Measuring the impact of trade liberalisation empirically is important as it informs policymaking. The authorities need to design appropriate policies to create jobs, increase economic growth and wealth, especially in a county with so many people living below the absolute poverty line, like the Cameroon. The results could be utilised by economised to advice policymakers, in an effort to address these challenges.

Most of the approaches analysing the impact of policy changes have been static, despite the fact that the variables under consideration are dynamic. Dynamic analysis is important to capture the effects of policy changes and the effects of trade liberalisation on the manufacturing sector's performance (Jayanthakumaran, 2002:1-5). The single equation supply model and the gravity model were chosen as the most applicable research methods to determine the impact of trade liberalisation on the manufacturing sector in Cameroon. The necessary econometric tests, like multi-collinearity, serial correlation,

heteroskedasticity, co-integration, etc. were performed on the estimations of the various models to ensure that these were in order and enhancements were made were necessary. Economists are scientists that search for the truth and present that to the economic community. It is important to estimate models that are statistically most significant, in order to draw the right conclusions and give appropriate economic advice to policymakers.

**4.2 The Single Equation Supply Model**

The export performance of Cameroonian manufacturing was first ascertained using the single equation supply model. Trade liberalisation affects the performance of the manufacturing sector through prices, exchange rates, tariffs, imported inputs and random variables, and the model was therefore considered applicable. The particular model assumes imperfect substitution between exports and local products. This implies that there might be substitutes that could be used in the place of these goods, but it is far from perfect. Goods that are exactly similar are not available. Since trade flows need some time to adjust, a dynamic model was developed, which takes disequilibrium behaviour of the market into consideration. This means the model is not a static model that is frozen in time. It continually changes and these changes are constantly incorporated and feedback into the model. In real life supply and demand do not always equalise and equilibrium prices that ensure that all are sold, does not always occur, as Classical economics suggests. This model takes all these facts into regard and processes it in such a way to simulate real economic behaviour as closely as possible.

The The Single Equation Supply Model used in our study is based on the works by Goldstein and Khan (1978:275-286, 1985) as well as Tansel and Togan (1987:521-534). We adopted the model to suit our current objectives. The extended manufactured export supply equation can be expressed as:

$$Xt = a1(Px/Pw^{*} e)t + a2MANt + a3TARt + a4IMPt + Ut \quad (1)$$

Where Xt represents the supply of manufactured exports at time t (export supply), MAN is manufactured output that is influenced by capacity utilisation; TARt is average nominal tariff rate on imports into the country, IMPt is import of manufactured intermediate inputs, e is the exchange rate, Px the price of exports, Pw the competitor's prices and U is the random term with its usual classical properties. The implicit assumption made in equation 1 is because of the assumption of instant adjustment of export supply to changes in prices, productive capacity, and trade liberalisation such that the supply of export goods equals manufactured exports at time t, thus Xts = Xt. In reality, it is more reasonable to assume lagged adjustment. Exports are therefore assumed to adjust to the difference between present supply of exports t and the actual flow of exports in the previous period:

$$\Delta Xt = Y [Xte - Xt\text{-}1] \quad (2)$$

Where Y is the coefficient of adjustment (assumed to be positive) and Δ is a first-difference operator, [ΔXt=Xit-Xt-1]. Xit stands for exports at time t and Xt-1 stands for exports for the previous year, which simply means that the export supply

of manufactured goods is assumed to be the same at all times. The adjustment function in equation (2) assumes that exports depend on supply in the rest of the world. Substituting equation (2) into (1) and some further manipulation yields the equation for export demand:

$$Xt = a + a1EXCHt + a2MANt + a3TARt + a4IMPt + Ut \quad (3)$$

The values of a1, a2, a3 and a4 are elasticities. Xt is defined as real aggregate manufactured exports at time t. Real in this instance implies that the effect of inflation was removed. EXCH is the exchange rate that replaces (Px/Pw *e)t in equation 1. EXCH is relative price of exports measured by the real effective exchange rate. This is because EXCH takes into account the weighted real exchange rate between a country and its trading partners. This can also serve as a measure of competitiveness. With trade liberalisation, the exchange rate is expected to depreciate.

As stated above, MAN represents manufactured output. Greater utilisation of capacity is expected to lead to more manufactured exports, although higher exports do not necessarily lead to greater utilisation of available capacity. Different studies have used various measures for productive capacity. Bond (1985:56-77) and Senhadji and Montenegro (1999) state that output of the economy and relative prices alone cannot fully explain the ability to export. Muscatelli et al. (1995:147-155) used the stock of fixed capital to represent increasing productive capacity and productivity estimating supply for some Newly Industrialised Economies in Asia. Ahmed (2000:1077-1084) measured capacity utilisation as the predicted values of GDP. Milner and Zgovu (2004) used agricultural output as a proxy for the productive capacity. The current research used manufacturing output as a proxy for productive capacity. This is justified because the performance of the manufacturing sector of a country is a good indicator of the economic condition and further justification is given by the reasoning that the aim of the research is the empirical determination of the effects of free trade on the manufacturing sector.

If changes in the incentive to export were a significant determinant of export performance, this would show up in terms of a significant positive coefficient on an export incentive variable. If the assumption that increased access to imports is true, a positive relationship between exports and the level of imported inputs (IMP) will exist (Fratianni and Marchionne, 2012). In addition, if there was an absolute bias against exports as a result of high tariffs on imported inputs, this would be reflected as an inverse relationship between tariff and exports.

In the choice and adaptation of the single equation supply model, special consideration was given, among others, to the fact that liberalisation causes competition between domestically produced goods and imports, but they are not perfect substitutes (Goldstein and Khan, 1985:1044-1050). Santos-Paulino and Thirlwall (2004:50-72) also used this principle in their research, but the current study differs in that it considers the supply side instead of the demand side.

OECD studies suggest that firms might apply price discrimination locally and abroad. A model is therefore needed that deals with domestic and export prices simultaneously (Orcult, 1950:117-132; Aspe and Giavazzi, 1982:83-93; Funke and Holly, 1992:83-93). This limitation is dealt with in the current study considering imports, exports, internal demand for locally manufactured goods, level of employment in the manufacturing sector, and manufacturing output at the same time.

Riedel (1988) and Athukorala and Riedel (1990:81-89) criticised the application of simultaneous demand and/or supply models in empirical analysis, arguing that the estimated results depend on whether the export supply equation for prices arise normalised; or the opposite, where the supply equation is normalised for quantity, and demand is normalised for exports. The current study followed Muscatelli et al. (1992:1467-1477), allowing for a general dynamic specification of the model, which eliminates the normalisation paradox that existed in Riedel's research (1988).

### 4.3 The Single Equation Supply Model estimates

The single equation supply model was estimated using data from Communauté Economique et Monétaire in Bangui (CEMAC 2006) and the World Bank (2013). The model estimates revealed that relative prices (EXCH), access to imported inputs (IMP), and productive capacity (MAN) influence export performance of manufactured goods. In addition, it provides evidence that trade liberalisation through tariff reductions does improve manufactured export volumes. With reference to the tariff rate (TAR), Cameroon recorded a significantly negative relationship effect with manufactured export (at the 10% level of significance), which implies that a reduction in tariffs increases the exports of manufactured goods.

Tariffs were omitted in the pre-liberalisation period (1980 to 1991) because the average tariff values were high and at a uniform rate. With no variation it does not explain anything. In equation 4, EXP01 represents the exports of manufactured goods, similar to Xt of equation 3. The estimated equation was as follows:

$$EXP01=14 + 0.64EXCH + 9.3MAN – 1.29IMP + U \quad (4)$$

**Table 1**: Estimated results of the single equation supply model

| | **Pre-liberalisation period** | **Post-liberalisation period** |
|---|---|---|
| *Explanatory variables* | *Dependent variable (Manufactured exports)* | *Dependent variable (Manufactured exports)* |
| Constant | 14.93 | 858.06 |
| EXCH | 0.64 | 0.23 |
| MAN | 9.37 | -35.22 |
| IMP | -1.29 | 1.44 |
| TAR (-1) | n/a | -38.23 |
| R2 | 39% | 62% |
| Adjusted $\bar{R}2$ | 13% | 45% |
| F-statistic* | 1.51 | 3.64 |

*Source: Authors' estimations (2013), based on data obtained from CEMAC (2006) and the World Bank (2013).*

The post-liberalisation period 1992 to 2006 represents the period when trade policy changed with the abandonment of the import substitution industrialisation policy. Here, the impact of the policy change can be measured and

compared with the pre-liberalisation period. This gives an indication as to whether trade liberalisation had the desired effects. The results are presented in Table 1.

Building in a one-year lag, the estimated regression for the post-liberalisation period was:

$$EXP01= 858.06 + 0.23EXCH - 35.22MAN – 38.23TAR+ 1.44IMP + U$$

The findings were:

Before liberalisation, a one-unit increase in real exchange rate (EXCH) increased manufactured exports by 0.64 units, as indicated in Table 1. On an a priori basis, an appreciation in exchange rate makes exports more expensive in foreign markets; however, during the pre-liberalisation period, there were many government policies aimed at supporting exports and inefficient local industries as part of the ISI policy. This means that the changes in exchange rate for purposes of influencing exports could be counter balanced by other distortionary policies.

After trade liberalisation, a one-unit increase in real exchange rate (EXCH) increased manufactured exports by 0.23 units, because the exports became more expensive as a consequence of an appreciated currency, as indicated in Table 1. On an a priori basis, as the exchange rate appreciates, exports become more expensive in foreign markets. This also implies that the large devaluations of Cameroon's currency initially assisted the manufacturing sector towards becoming internationally more competitive.

A one-unit increase in production capacity (MAN) decreased exports by 9.4 units in the pre-liberalisation period, as illustrated in Table 1. This could be the consequence of increased production cost to firms that are uncompetitive, as might be expected given the ISI policy that supported inefficient firms as part of infant industries support.

A one-unit decrease in production capacity (MAN), during the post-trade liberalisation period, increased exports by 35.22 units. This was probably due to higher international competition. In addition, an appreciated exchange rate made exports more expensive, causing demand to decline.

During the pre-liberalisation period, a one-unit increase in imported inputs (IMP) decreased manufactured exports by 1.92 units. Imported intermediate goods were expensive due to the appreciation of the real exchange rate (EXCH), which was part of government policy aimed at the protection of domestic markets.

Following trade liberalisation, a one-unit increase in imports (IMP), increased exports by 1.44 units. Imported capital goods were used as a proxy, and this indicates that if more intermediate capital goods are imported, it is used to produce more manufactured goods.

A one-unit decrease in tariffs (TAR) increased exports by 38.23 units. This meets the a priori expectations. Tariffs represent a cost and affect both imports and exports. Because of the importance of the importation of manufactured inputs for further production of manufactured exports, the effects of tariffs on export performance are very important. A fall in tariffs should obviously increase manufactured exports and in that regard trade liberalisation led to a significant increase in manufactured export volumes.

The evidence obtained in this research confirms similar results obtained by other studies. For example, Ahmed (2000:1077-1084) and Santos-Paulino and Thirlwall (2004) found a positive and significant relationship between their indicators of trade liberalisation and export performance. Jenkins (1996:693-716) on Bolivia, and Utkulu et al. (2004) working on Turkey found, however, that effective exchange rate management rather than trade liberalisation is the major determinant of export performance.

It is important to keep in mind that other domestic policy constraints may be significant factors in affecting manufactured export performance in Cameroon. Oyejide et al. (1999:5-10) indicated that domestic supply constraints constitute a significant part of the anti-export bias observed over the last three decades. The introduction of exchange rate manipulation to clear disequilibrium on the market for foreign exchange has significantly reduced the need to use trade liberalisation instruments to manage balance of payments pressures.

The following section explains the gravity model that was also utilised in this research to obtain more information on the research problem.

## 5. The Augmented Gravity Model

### 5.1 Background to the Gravity Model

The augmented gravity model was utilised for further analysis of the research question and to provide more information on the subject matter. The gravity model analyses bilateral trade flows and it can be estimated for perfect competitive or monopolistic market structures. Many factors that influence trade can be included in an augmented gravity model. Gravity models are standard instruments of analysis in international trade analysis (Anderson, 1979, Deardorff, 1998, Evenett and Keller, 1998, Haveman and Hummels, 2004, Behrens, Ertur and Wilfried, 2012). It determines the strength of various forces attracting business across space and in that way determines where most exports would go, and/or where goods would be imported from, and quantifies the potential trade volumes.

In analogy to Newtonian physics, the gravity model states that bilateral trade between two countries is positively related to their incomes (GDP) and negatively related to the distance (Dij) between them (in this research, distance between capital cities). Krugman, Obstfeld and Melitz (2012) specify the simplest version of the gravity model as:

$$EXij = A * GDPi * GDPj/Dij. \quad (5)$$

Where EXij represents bilateral trade flows (export + imports) between country i and country j and “A” is a constant term.

Initially, the gravity model was criticised for lacking theoretical support. Anderson (1979:106-116) therefore improved thereon by assuming product differentiation in his formulation, and Bergstrand (1985:474-481, 1989:143-153) dealt with it from the perspective of monopolistic competition, while Olivero and Yotov (2012) build dynamics into the system. Helpman (1987:62-81) dealt with differentiated products under increasing returns as a theoretical basis. Deardorff (1998:7-22) justified the model on neo-classical trade theories.

Despite theoretical justification, the econometric expression is sometimes criticised. The quality of the population is often not taken into consideration. Kalirajan and Findlay (2005) also argued that the particular characteristics of countries under consideration are often neglected, which may affect the results. When unobserved trade-limiting variables are left out, it may lead to bias because the assumption that the random variable is normally distributed might not hold, causing heteroskedasticity. Behrens et al. (2012) build a spatial element into their model.

Cheng and Wall (2005:60) made some effort to rectify any heteroskedasticity and also concluded that the fixed effects model is better from a statistical perspective. The current study also followed their approach, using panel data to obtain more accurate estimates.

Anderson et al. (2005) and Ghosh and Yamarik (2004:369-395) argue that the coefficients could be overestimated due to specification problems. In relation to distance, Polak (1996:533-543) found some inconsistencies in its estimation. In an effort to deal with data limitations, Brulhart and Kelly (1999:159-174) included a remoteness indicator variable, but its determination could be problematic.

It can be concluded that the gravity model is a powerful instrument, which yields expectable results and is economical in its utilisation of data. The current research followed the estimation method used by Krugman, Obstfeld and Melitz (2012). It takes into account the possible endogeneity of some explanatory variables and estimations are also corrected for a potential selection bias. The augmented gravity model is then presented as:

$$\ln (EXij) = \beta 0 + \beta 1 \ln GDPi + \beta 2\, GDPj + \beta 3 \ln Dij + \beta 4 Comlangij + \beta 5 COLij + \beta 6 ColMij + \beta 7 BTAij + \beta 8 WTOij + \beta 9 WXij + \beta 10 RTAij + \beta 11 TARij + \varepsilon ij \quad (6)$$

Where the independent variable EXij is the value of real bilateral trade of manufactured goods, where Cameroon is i and other countries j. GDP refers to total production of the respective countries and Dij the distance between i and j. The language variable (Comlangij) is unity if i and j have a common official language; COLij (and ComCol) is unity if countries were colonies after 1945 with the same colonial master; while ColMij is a colonial master variable, which is unity if i colonised j or vice versa. Colin was included in the current study as a measure for countries sharing the same border. If i and j have a bilateral agreement, the bilateral trade agreement variable (BTAij) is unity; and if both countries are members of WTO the WTOij variable is unity – which also implies that their economies are liberalised. If both i and j belong to the same Regional Trade Agreement (Cameroon belongs to CEMAC, as does Gabon), the RTAij variable equals unity. Finally, TARij is the tariff rate on imports into the country and εij is the error term. The following section reports on the empirical results.

### 5.2 Empirical findings using the augmented gravity model

The augmented gravity model applied here differentiates between the determinants of exports of manufactured goods from Cameroon (EXP) before and after liberalisation, applying panel data analysis on both periods. The data used in the estimations were obtained from CEMAC (2006) and the World Bank (2013).

The R2 indicated in Table 2, which varies between 45 and 53 per cent for various estimates, implies that approximately half of the variation in the dependent variable is explained by the independent variables, which is acceptable for panel data analysis. The F-statistics were also significant, indicating that the model is adequate for prediction and estimation purposes. The p-values in Table 2 also show that most elasticities are statistically significant.

**Table 2**: Results with values of bilateral trade as dependent variable

| | **Pre-liberalisation period** | | **Post-liberalisation period** | |
|---|---|---|---|---|
| *Variable* | *Coefficient* | *p-value* | *Coefficient* | *p-value* |
| GDPi | -0.836240 | 0.1875 | 1.286046 | 0.0000 |
| GDPj | 0.661804 | 0.0000 | 0.197967 | 0.0000 |
| Dij | -0.121867 | 0.2291 | -0.200295 | 0.0005 |
| ComLang | 0.298668 | 0.1186 | 0.153164 | 0.1430 |
| ComCol | -1.260178 | 0.0639 | -0.028553 | 0.9407 |
| Colin | 1.426589 | 0.0005 | 0.582389 | 0.0096 |
| RTA | 3.564883 | 0.0000 | -0.608749 | 0.0116 |
| TAR | -0.447725 | 0.0000 | -0.077677 | 0.0074 |
| R2 | 0.5281 | | 0.4468 | |
| Adjusted $\bar{R}2$ | 0.51 | | 0.4308 | |
| F-statistic* | 30.64 | | 27.87 | |

*Source: Authors' calculations (2013), based on data obtained from CEMAC (2006) and the World Bank (2013).*

Analogous to Newton's original model, the augmented gravity model regards the size of the respective economies and distance as the main determinants of international trade. As Table 2 indicates, Cameroon's economy (GDPi) was insignificant before liberalisation, but became significant and positive thereafter. The effect of other economies (GDPj) decreased, although still positive. The predicted negative effect of distance (Dij) became more important, although its elasticity remained small.

The coefficient of Cameroon's GDP (GDPi) before liberalisation, which represents the elasticity of exports, was negative in bilateral trade relations, because of the protection that formed part of its ISI policy. This caused Cameroonian imports to increase and overshadow exports. This relation turned positive, however, during the post-liberalisation period.

Table 2 indicates that GDPj as a determinant of manufacturing export is significant and positive. After trade liberalisation, the influence of foreign economies decreased, but was still positive. As the particular trading partner country's GDP increases by one per cent, the elasticity of exports from Cameroon to that country increases by 0.19 per cent following trade liberalisation.

The distance variable (Dij) is logically negative, as distance implies larger costs and a decline in exports. However, the small elasticity implies that distance is not very important in modern times anymore. Distance does not, for example, explain why Cameroon trades more with China, Japan and France than with

Gabon or Chad bordering it. Sharing a common border (Colin) might have an impact on bilateral trade, but it is not a very important determinant of trade. After liberalisation, the effect decreased even more. Trade, as predicted in the new trade theory, is influenced more by technological competitive behaviour resulting from economies of scale, as costs decline with volume in the longer-term, product differentiation and oligopolistic and monopolistic behaviour. Again, outsourcing and offshoring by foreign firms, for example from the United States of America or France, implies that Cameroon trades more with these countries.

For the dummy variables, the interpretation is that a one-unit increase in any of the variables leads to a one per cent increase in bilateral trade. Common language (Comlang) had a positive impact on trade, but declined after trade liberalisation. This can be explained by the fact that globalisation made language differences less of a barrier to trade or an advantage for that matter. As technology improves, the language barrier to bilateral trade also decreases. This explanation might be acceptable, but the estimate of "Comlang" was not statistically significant. It was, however, kept as part of the estimate because theory demanded so and also made it comparable to other studies.

Cameroon liberalised its trade without specific preferences of goods to RTAs. Membership of a regional trade agreement (RTA) are supposed to have a positive impact on trade, but the results revealed the opposite in the case of Cameroon, which is a member of CEMAC. Before trade liberalisation, membership of an RTA increased bilateral trade, as well as trade diversification, but after liberalisation it turned negative.

Common historical colonial powers (ComCol) had little effect on bilateral trade before liberalisation and thereafter even less. Cameroon traded less with fellow former colonies, especially in the CEMAC area. This negative value of ComCol is contrary to the prediction that countries that shared a common colonial master, would trade more.

In free market economies, higher tariffs (TAR) deter international trade. This negative relationship was confirmed by the empirical results of the augmented gravity model. A one per cent increase in tariff rates reduces bilateral trade by 45 per cent before liberalisation and 7.8 cent per thereafter, but high tariff rates still acted as a hindrance to trade. This had a relatively smaller effect than during the pre-liberalisation period, meaning that other factors also determine trade levels.

## 6. Conclusions and policy recommendations

This study applied the single equation supply model and the augmented gravity models as instruments of investigation as they were most appropriate and is today the standard models of international trade investigation (Krugman, Obstfeld and Melitz 2012). Older models like the Heckscher-Ohlin model only consider single factors, like resource endowment, to determine comparative advantage. The equation model is dynamic and use standard econometric methodology. The gravity model determines the size and directions of international trade flows, on an aggregate scale and indicates changes as they occur. These instruments were therefore ideally suited to meet the current objectives.

The conclusion is basically that trade liberalisation pushes protected and inefficient local firms out of the market. This leads to a more efficient allocation of resources and the elimination of waste by producers, with the benefits of economies of scale.

This study considered the impact that trade liberalisation had on the exports by manufacturers in Cameroon. The empirical findings of this research suggest that the manufacturing sector benefited from the liberalisation of trade, as the neo-classical theories of trade predict. The results indicated that the size of an economy (GDP), as a determinant of manufacturing export is significant and positive. As the particular trading partner country's GDP increases by one per cent, the elasticity of exports from Cameroon to that country increases by 0.19 per cent following trade liberalisation. On the other hand it was found that a one per cent increase in tariff rates reduces bilateral trade by 45 per cent before liberalisation and 7.8 cent per thereafter. Setting the flow of imports and exports free and removing trade barriers are thus to the advantage of the economy as it leads to higher export volumes, promotes economic growth, create job opportunities and increases everyone's level of wealth.

During the ISI era, the government supported and protected firms from competition. Inefficient manufacturing firms survived on the basis of the support and not due to efficiency (Tabi and Ondoa, 2011:2). As part of Cameroon's commitments as a member of the WTO, trade was then liberalised, which was supposed to benefit the manufacturing sector. Despite liberalisation, most manufacturing sectors are still underdeveloped, suffering from structural, infrastructural and institutional problems

This study utilised the single equation supply model and the augmented gravity model using panel data as the basis of analysis. The single equation supply model revealed that the effect of exchange rate appreciation on the export of manufactured goods was less than before trade liberalisation, though still positive. After liberalisation, manufactured exports reacted positively following increased imports of intermediate goods and the lowering of tariffs; but were restricted by higher production capacity. This suggests that although trade liberalisation improved competition and technological flows in addition to knowledge acquisition from trade, manufacturing did not benefit significantly.

The augmented gravity model revealed that the exports of manufactured goods from Cameroon were stimulated by the liberalisation of trade. In most cases, it seems as if the objectives were successful. The effect of the size of the local economy increased, while the influence from foreign GDP declined. Surprisingly, membership of a regional trade block became negative. Distance became more important, and the effect of tariffs declined, though still negative.

The results are, however, still not as good as intended. More measures are still necessary to improve the performance of the manufacturing sector. Manufacturing could be a means of diversification, reducing vulnerability to external shocks. Developing the manufacturing sector should occur in a sustained manner. In the face of international competition, areas of competitive advantage are revealed and domestic firms will need to restructure their production processes in line with it.

In the past import substitution, tariffs and trade barriers were regarded as the best ways to ensure income flows to a country. A single country will however never succeed in forcing global prices structures to adhere to their local cost structures. Modern economies grow more if international trade flows easily and countries can draw foreign demand towards their own firms, because they are more competitive. The most important way to deal with competition is firstly to improve production efficiency and sales efforts (Cream and Cream, 2012, Gray

and Potter, 2012, Kleynhans and Swart, 2012). Improving industrial efficiency in Cameroon developed slowly, because production is focused mainly on factor and basic consumer goods (WEF, 2010:118). Manufacturing is also based on imitation and assembly with little or no local inputs, except for unskilled labour (AfDB, 2009:28). Access to capital and a supportive environment that could result from clustering and agglomeration leading to economies of scale are also important factors (Kleynhans and Drewes, 2008:5).

The competitiveness of a firm is based on efficient operations, skilled labour and the acquisition of modern technology. The Porter's Diamond of Competitiveness states that competitiveness depends on input supply factor conditions, market demand conditions, firm structure, strategy and rivalry, and finally related and supporting firms and associations (Porter, 1998). These are all important to build strong local firms, which constitute their local economies, as it is firms that trade and not countries. They therefore deserve special attention. The development of human capital through an educational system well aligned with the development of a vibrant manufacturing sector is important (Lall, 2004:2). Innovation is therefore needed in all spheres of the economy and the development of institutions to support industrial policy. The provision of infrastructure such as technical and vocational institutions, to facilitate the development of human capital, is needed. Supporting research and development through grants or subsidisation of human resource development training schemes are also essential (Hendrickson, 2012, Connolly and Sicard, 2012).

Countries often attempt to protect themselves from the rest of the world by applying various trade barriers. This study has shown that it is much more to their advantage to free their trade flows and remove these barriers, through trade liberalisation. The previous paragraphs have suggested various ways in which firms can become more competitive an in that way draw foreign buyers to them. When firms are internationally competitive the aggregate export levels of the country will rise, creating jobs and income, much more than trade restrictions would be able to do. This study has shown that trade liberalisation may be good for an economy; the next important step will be to strengthen the competitive position of the country's firms to attract foreign business towards the country.

Some form of strategic industrial policy is necessary, at least in the short term. A shift from basic price-related intervention, which underlies Cameroonian trade liberalisation, to the development of a coherent and applicable industrial policy based on the revealed and latent comparative advantages is necessary (Lin and Monga, 2010:5).

In addition, government assistance could focus on production for the export market, thereby encouraging outward orientation. Research and development, especially for large firms, can lead to innovation and reduce the dependence on imitation and copying of technology. Rigorous research to identify firms will shed light on how many exist with a view to formalising them; such research could also reveal the hidden comparative advantage of the manufacturing sector.

In conclusion, this study found international trade liberalisation by Cameroon mostly benefited its manufacturing sector, improving its ability to export and create jobs; but manufacturing is still volatile and, in total, little progress was made.

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# ANALYSIS OF THE FINAL OBJECTIVES OF MONETARY POLICY. THE CASE OF CENTRAL AND EASTERN EUROPEAN COUNTRIES

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**Abstract.** This paper aims to identify the prioritization of monetary policy final objectives promoted by central banks (CBs) in Central and Eastern Europe that use a strategy of inflation targeting. The analysis is built to determine the behavior of the monetary authorities in the Czech Republic, Poland, Romania and Hungary relative to the short-term nominal interest rate setting based on the estimation of an extended Taylor-type monetary policy rule, which additionally includes the exchange rate and a set of variables aimed at exploring the interactions between the monetary policy and financial stability. The modeling is performed in the context of a semi-structural dynamic stochastic general equilibrium (DSGE) model with implicit micro foundations. The main results revealed a strong orientation of the selected monetary authorities geared towards their fundamental objective of ensuring and maintaining price stability, but in parallel, towards stabilizing the exchange rate and the real economic activity, as well as the existence of moderate guidelines of limiting, through the monetary policy, the uncontrolled expansion of private credit and the formation of a real estate prices bubbles (leaning against the wind).

**JEL Classification:** C11, E52, F41

**Keywords:** DSGE models, Taylor rules, monetary policy, Bayesian estimation, Central and Eastern Europe

## 1. Introduction

A conclusive picture of the objectives pursued by central banks and their prioritization can be achieved by identifying the behavior of CBs in setting the short-term nominal interest rate. A standard approach in this respect is the estimation of the CBs reaction function as a Taylor rule. This paper aims to estimate a Taylor-type monetary policy rule that takes into account both the country-specific factors of Central and Eastern Europe states, all small open economies, (by introducing the exchange rate in the monetary policy rule) and the manner selected monetary authorities approached the asset prices issues in the conduct of monetary policy amid ample discussions following the recent financial crisis on the optimality of *cleaning or mopping-up* approach versus *leaning against the wind* (cleaning the effects of asset price bubble burst or the early intervention to avoid their formation) by introducing financial stability-related variables.

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The unanimous or predominant approach prior to the recent financial crisis, known as the *Jackson Hole Consensus* or the *Greenspan Doctrine*, emphasizes that although central banks should not act through the monetary policy to avoid the formation of asset price bubbles (*leaning against the wind*), they must intervene only insofar as they affect the inflation forecast and apply a strategy of *cleaning or mopping-up* after the burst of a bubble, which means injecting sufficient liquidity to avoid a macroeconomic collapse.

The international turmoil has outlined the high value of the costs of promoting a strategy of *cleaning up or mopping-up*. Consequently, the emerging paradigm ex post the manifestation of the global crisis highlights the importance of intervention at an early stage to avoid the formation of bubbles and limit expansion of asset prices (*leaning against the wind*). However, monetary policy should also be geared towards financial stability considerations only to the extent that macro-prudential instruments use proves inefficient.

Closely related to the above, by estimating a Taylor-type monetary policy rule that includes two terms of financial stability, we aim to identify the predisposition of the monetary authorities in Central and Eastern European states to one of the two strategies (*leaning against the wind* or *cleaning or mopping-up*).

The estimation of the Taylor-type monetary policy rule including exchange rate changes, private credit and property prices fluctuations is supported by a Neo-Keynesian model for a small open economy in which the central bank reaction function is one of the model equations (along with those of aggregate demand, aggregate supply and exchange rate dynamics). The model is a dynamic stochastic general equilibrium-type (DSGE) based on implicit micro foundations, following the general lines developed by Berg et al. (2006 a,b). The model estimation for CEE countries following a direct inflation targeting strategy (the Czech Republic, Poland, Romania and Hungary) is based on Bayesian techniques that offer the advantage of robust results in the context of small samples sizes. Estimation is performed using Dynare, a widely used program both by central banks and academia arena to solve, simulate and estimate DSGE models.

The remainder of the paper presents as follows. The first part consists of an overview of the literature, the second part describes the model, the third is focused on methodology and data sources, while the estimation results are summarized in the fourth part. The fifth section concludes.

## 2. Literature review

While existing evidence reveal that CBs monetary policy in the major developed countries can be described by a reaction function (Clarida et al., 1998), the studies for emerging countries, including Central and Eastern Europe members are much narrower. A number of estimates of Taylor-type monetary policy rules in different specifications and using different methods (OLS, GMM, Johansen cointegration) can be found in the works of: María Dolores (2005), Angeloni et al. (2007), Paez-Farrell (2007), Mohanty and Klau (2007), Frömmel and Schobert (2006, 2011) Vašíček (2008), Orlowski (2008, 2010).

As for exploring interactions between monetary policy and financial stability, a first representative paper that takes into account a number of emerging economies (the Czech Republic, Poland and Hungary) is the one of Munoz and Schmidt-Hebbel (2012). The authors identified specific items that indicate a 'leaning against the wind' orientation of monetary policy in CEE countries.

From a structural perspective, of the dynamic stochastic general equilibrium models, existing evidence of Taylor-type monetary policy rules estimates in the case of CEE is even more limited. Of course, over time, central banks in the region have developed complex structural DSGE models including estimates of monetary authority's reaction function, as shown by a number of recent examples: Andrle et al. (2009) in the case of the Czech Republic; Grabek et al. (2011) for Poland; Copaciu (2013) on Romania and Szilágyi et al. (2013) for Hungary.

To compare, a common estimate of a Taylor-type monetary policy rule within a DSGE model is to be found in Caraiani (2013) for the Czech Republic, Poland, and Hungary and by using the same model in Caraiani (2011) in the case of Romania. The author' model is close to Lubik and Schorfheide (2007) framework. The results retuned by the Bayesian estimation have illustrated that central banks subject to analysis reacted to exchange rate changes, which have generally led to a similar monetary policy, characterized by a high level of conservatism and a moderate or low gradualism.

The Bayesian approach of Taylor-type monetary policy rules within a dynamic stochastic general equilibrium model with implicit micro foundations is present at Caraiani (2008) in the case of Romania. Based on the model used in the study developed by Buncic and Meleky (2008), the author has emphasized the strong focus of the national monetary authority on ensuring price stability and a gradual process of monetary policy implementation.

The present model is a semi-structural, dynamic stochastic general equilibrium with implicit micro foundations following the general framework of the model designed by Berg et al. (2006 a,b). Such a model has also been applied in the context of other small open economies that practice a strategy of inflation targeting, for instance of Canada (Berg et al., 2006b), South Africa (Harjes and Ricci, 2008), or Israel (Epstein et al., 2008).

The estimation of the model is based on Bayesian techniques, which are considered the most appropriate for estimating DSGE models (An and Schorfheide, 2007), in Dynare, an array of programs that allow to solve, simulate and estimate models including rational expectations. The algorithm supporting Dynare can be found in Juillard (1996), a description of it in Juillard (2004) and an initiation into its use in Griffoli (2008).

## 3. The Model

The model considers a small open economy and includes both forward-looking elements of demand and aggregate supply and stylized gaps in the transmission channel of monetary policy. The model also comprises internal shocks and external exogenous Eurozone-triggered shocks and is built to reflect quarterly economic data. The justification for the inclusion of external shocks from the euro area is given by the fact that we built the model taking into account the specific characteristics of countries subject to analysis, all small and open economies. The representation is mainly determined by four key behavioral equations: aggregate demand, aggregate supply, uncovered parity of interest rate and the reaction function of the monetary authority. The series is completed by a set of definitions and equilibrium relationships.

The aggregate supply is described by a neo-Keynesian Phillips curve for an open economy.

$$\pi_t = \alpha_\pi \pi 4_{t+4} + (1 - \alpha_\pi)\pi 4_{t-1} + \alpha_y ygap_t + \alpha_z(z_t - z_{t-1}) + \varepsilon_t^\pi \qquad (1)$$

where: $\pi 4_t$ - the annual inflation rate, $\pi 4_{t+4}$ - inflation expectations over the four quarters, $\pi_t$ - the quarterly annualized inflation rate, $ygap_t$ – national GDP gap (real GDP - potential GDP), $z_t$-real exchange rate, and $\varepsilon_t^\pi$ - captures other temporary exogenous effects that are not explicitly modeled such as supply shocks.

The specification of such a Phillips curve includes: forward-looking component and backward-looking component of inflation, GDP gap, and the depreciation of the real exchange rate. Expected inflation enters the equation following the assumption of price rigidity, while indexing schemes or the assumption of irrationality in the process of price formation can provide a justification for the backward-looking component of inflation (inflation persistence). The real exchange rate reflects the effect of inflation on the price of imported goods in an open economy.

Aggregate demand is described by an IS curve for an open economy.

$$\begin{aligned} ygap_t = {} & \beta_{ygap}^{lead} ygap_{t+1} + \beta_{ygap}^{lag} ygap_{t-1} - \beta_{RRgap}\left(RR_{t-1} - RR_{t-1}^{Equil}\right) + \\ & + \beta_{zgap}\left(z_{t-1} - z_{t-1}^{Equil}\right) + \beta_{ygap^*} ygap_t^* + \varepsilon_t^{ygap} \end{aligned} \qquad (2)$$

where: $ygap_t$ - national GDP gap, $ygap_{t+1}$ - expectations of the *t* quarter related to the national GDP gap of the t+1 quarter, $ygap_{t-1}$ – previous quarter national GDP gap, $RR_{t-1}$ – real interest rate, $RR_{t-1}^{Equil}$ - equilibrium level of the real interest rate, $z_{t-1}$ – real exchange rate, $z_{t-1}^{Equil}$ – equilibrium level of real exchange rate, $ygap_t^*$ - foreign (EZ) GDP gap, $\varepsilon_t^{ygap}$ - captures other effects of temporary exogenous shocks such as fiscal policy or other shocks in demand.

Aggregate demand curve specified in this form emphasizes that national GDP deviation depends on the past values and on expected values, previous deviation between the real interest rate and its equilibrium value, previous deviation between the real exchange rate and the its equilibrium level and euro area GDP deviation. Only deviations of the real interest rate, real exchange rate and domestic and foreign demand from long-term equilibrium are considered. For example, the effect of the past demand on the present demand can be attributed to the persistence of habits (habit formation) in terms of consumption or investment adjustment costs (Buncic and Melecky, 2008). Future domestic demand may reflect the effect of inter-temporal smoothing, or of expected investment options (forward-looking). The equation also includes the real exchange rate and foreign production, the IS curve characterizing an open economy.

Real exchange rate dynamics equation follows the principle of covered interest rate parity.

$$z_t = z_{t-1}^e - \frac{RR_t - RR_t^* - RiskP_t^{Equil}}{4} + \varepsilon_t^z \qquad (3)$$

where: $z_t$ – real exchange rate, $z_{t-1}^e$ - expectations in quarter t on the real exchange rate in t +1 (with $z_{t+1}^e = \delta z_{t+1} + (1 - \delta) z_{t-1}$), $RR_t$ – national real interest rate, $RR_t^*$ - foreign real interest rate, $RiskP_t^{Equil}$ - equilibrium level of internal risk premium, $\varepsilon_t^z$ - captures other temporary exogenous effects of the exchange rate.

The $\delta$ parameter ($0 < \delta < 1$) calibrates the extent of the exchange rate expectations forward-looking or adaptive nature. A value close to 1 implies forward looking expectations and makes the exchange rate to react more strongly to early changes occurred in the fundamentals. A value of 1 indicates uncovered interest rate parity and to the exceeding of Dornbush dynamic; in this case, the real exchange rate is a function of the future interest rate differentials (and risk premia), providing a direct monetary policy operating channel. Interest rate term is divided by 4 since interest rates and risk premia are measured annually.

Monetary policy rule closes the model. The monetary authority sets the nominal short-term interest rate according to the following Taylor-type monetary policy rule (or reaction function):

$$RS_t = \gamma_R^{lag} RS_{t-1} + \left(1 - \gamma_R^{lag}\right)\left[RR_t^{Equil} + \pi 4_t + \gamma_\pi\left(\pi 4_{t+4} - \pi 4_{t+4}^{Target}\right) + \gamma_{ygap} ygap_t\right] + \\ + \gamma_z(z_t - z_{t-1}) + \gamma_{pc}(pc_t - pc_{t-1}) + \gamma_{pp}(pp_t - pp_{t-1}) + \varepsilon_t^{RS} \quad (4)$$

where: $RS_t$ - short-term nominal interest rate, $RR_t^{Equil}$ – equilibrium level of the real interest rate, $\pi 4_t$ – annual inflation rate, $\pi 4_{t+4}$ - inflation expectations over the four quarters, $\pi 4_{t+4}^{Target}$ – inflation target over four quarters, $ygap_t$ – national GDP gap, $z_t$ – real exchange rate, $pc_t$ – private credit level, $pp_t$ - real estate market prices, $\varepsilon_t^{RS}$ - captures other effects of temporary exogenous shocks such as errors in the conduct of monetary policy.

Under such a monetary policy rule, the monetary authority sets the interest rate taking into account its previous value, which highlights a degree of interest rates inertia (interest rate smoothing), the deviation of inflation from the inflation target (the inflation gap) in terms of expectations due to the fact that central banks using a strategy of inflation targeting set the interest rate taking into account the forecasts of inflation and not the current inflation, real GDP percentage change from potential GDP (GDP gap) and real exchange rate changes, in the context of an open economy. In addition, the monetary policy rule considers two additional variables: the variation of private credit and real estate prices to identify the behavior of central banks towards ensuring the financial stability. The inclusion of the two variables determines how selected monetary authorities of CEE states have approached the *cleaning* or *mopping-up* versus *leaning against the wind* strategy.

## 4. Methodology and data

The model is estimated with quarterly frequency data for the four CEE countries in the process of convergence towards the euro area that apply an inflation targeting strategy: the Czech Republic, Poland, Hungary and Romania. The intention of an analysis for a time horizon that starts with the date of adopting inflation targeting strategy by the four countries has been heavily restricted by the availability of data series on the development of real estate prices. Therefore, data samples cover the following ranges: the Czech Republic - 2004q1:2013q1; Poland - 2002q4:2013q1; Romania - 2005q3:2013q1; Hungary - 2001q4:2013q1. All data is provided by Eurostat database, except for private credit and the price of real estate, where the data comes from the database of the Bank for International Settlements.

For observable variables, the data sets include: internal quarterly inflation measured as the difference between monthly national consumer price indices (with fixed base 2005 = 100) as quarterly average multiplied by 400 to obtain annualized inflation (annual inflation rate : $\pi 4_t = 100[\ln(ipc_t) - \ln(ipc_{t-4})]$] and the quarterly annualized inflation rate $\pi_t = 400[\ln(ipc_t) - \ln(ipc_{t-1})]$); quarterly interest rate as nominal short-term interest rates set by central banks; bilateral real exchange rate of the national currency against the euro ($z_t = 100 * \ln(S_t * \frac{ipc_t^{EUR}}{ipc_t})$ with $S_t$ representing the nominal exchange rate, $ipc_t$ national consumer price indices and $ipc_t^*$ the consumer price index in the euro area (where an exchange rate rise means real depreciation); short time real interest rate as the difference between short-term nominal interest rates set by central banks and inflation expectations for the next interval ($RR_t = RS_t - \pi_{t+1}$); quarterly inflation targets; logarithm of private credit as quarterly fixed base index (2005 = 100) and real estate markets quarterly price as fixed base index (2005 = 100) logarithm.

Unobservable variables are determined as follows: domestic and foreign (Eurozone) GDP gap as the difference between the current value of GDP (in volumes with fixed base 2005 =100 ), and the trend given by Hodrick-Prescott (HP) filter with λ = 1600 ($ygap_t = 100(lny_t^r - lny_t^p)$); real exchange rate gap as the difference between the real exchange rate and equilibrium real exchange rate, with the latter being obtained by applying a HP filter to the real exchange rate ($zgap_t = (lnz_t - lnz_t^{Equil})$); real interest rate gap as the difference between the real interest rate and the equilibrium real interest rate determined based on a HP filter of interest rate series ($RRgap_t = RR_t - RR_t^{Equil}$); domestic risk premium as the difference between the equilibrium real national interest rate and the Eurozone equilibrium real interest rate ($RiskP_t^{Equil} = RR_t^{Equil} - RR_t^{*Equil}$).

The theoretical model exogenous variables (foreign GDP gap, foreign interest rate, the deviation of the real exchange rate, the equilibrium real interest rate, the inflation target, the changes in private credit and property price changes) return to average long-run equilibrium values according to an autoregressive process as follows: $X = \lambda * X(-1) + (1 - \lambda) * \bar{X}$, where $X$ represents the seven variables mentioned above and $\bar{X}$, their long-term equilibrium values. Thus, in addition to the 15 parameters of the model, we estimate 7 autoregressive coefficients: $\lambda$, respectively $\lambda_1 - \lambda_7$ plus the standard deviations of the shocks.

The Bayesian techniques are presently considered the best way of estimating such models and consist in adding to the probability function of early information (priors).

Given the vector $\psi$ (6 x 1) of the monetary policy rule parameters:

$$\psi = [\gamma_R^{lag}, \gamma_\pi, \gamma_{ygap}, \gamma_Z, \gamma_{PC}, \gamma_{PP}] \quad (5)$$

vector $\theta$ (28 x 1) containing the other parameters and standard deviations of the shocks:

$$\theta = \begin{bmatrix} \alpha_\pi, \alpha_y, \alpha_z, \beta_{ygap}^{lead}, \beta_{ygap}^{lag}, \beta_{RRgap}, \beta_{Zgap}, \beta_{ygap^*}, \delta, \lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5, \lambda_6, \lambda_7, RR_{ss}, \\ \sigma\pi, \sigma RS, \sigma y, \sigma z, \sigma ygap^*, \sigma RR^*, \sigma zgap, \sigma RR^{Equil}, \sigma\pi 4^{target}, \sigma pc, \sigma pp \end{bmatrix} \quad (6)$$

vector $Y^T$ (7 x 1) of observable variables:

$$Y^T = [\pi_t, RS_t, z_t, RR_t, \pi 4_t^{Target}, \Delta pc_t, \Delta pp_t] \quad (7)$$

a random distribution with density $p(\psi, \theta) = p(\psi)\,p(\theta)$ and a probable distribution function of data $L_D(\psi, \theta \mid Y^T)$ with $Y^T = \{Y_1, \ldots, Y_7\}$ then the posterior density $p_D(\psi, \theta \mid Y^T)$ of the model parameters is given by Bayes' theorem:

$$p_D(\psi, \theta \mid Y^T) = \frac{L_D(\psi, \theta \mid Y^T) p(\psi)\,p(\theta)}{\int L_D(\psi, \theta \mid Y^T) p(\psi)\,p(\theta)\,d(\psi, \theta)} \quad (8)$$

Distribution type is based on the allowable ranges for the parameter values and random information on mean and standard deviation as in Berg et al. (2006,b), Harjes and Ricci (2008) and Epstein et al. (2008). Posterior distribution of the parameters is determined by the Metropolis-Hastings algorithm.

## 5. Estimation results

### 5.1. The Czech Republic case

The model is estimated based on two Metropolis Hastings chains of 50.000 extractions each, with acceptance rates of 23,55% and 23.49%, indicating a high quality of the estimation given that the literature recommends an optimal acceptance rate between 20% and 40%. Convergence statistics supported by Brooks-Gelman (1998) approach presented in Annex 1 have highlighted convergence both in univariate and multivariate terms. Annex 2 includes the prior and posterior distributions and differences between them. The estimation results are illustrated by Table 1, while the values for all model parameters are shown in Appendix 3.

**Table 1** - Results of the Bayesian estimation - the case of the Czech Republic

| Parameters | Prior mean | Posterior mean | Confidence interval | Confidence interval | Prior distribution | Domain | Standard deviation |
|---|---|---|---|---|---|---|---|
| $\gamma_R^{lag}$ | 0.500 | 0.7765 | 0.6969 | 0.8616 | beta | [0,1] | 0.1000 |
| $\gamma_\pi$ | 1.500 | 1.5439 | 1.0780 | 2.0105 | gamma | $R^+$ | 0.3000 |
| $\gamma_{ygap}$ | 0.250 | 0.2248 | 0.1482 | 0.2999 | beta | [0,1] | 0.0500 |
| $\gamma_Z$ | 0.250 | 0.1912 | 0.1252 | 0.2566 | beta | [0,1] | 0.0500 |
| $\gamma_{PC}$ | 0.250 | 0.1629 | 0.1080 | 0.2160 | beta | [0,1] | 0.0500 |
| $\gamma_{PP}$ | 0.250 | 0.1393 | 0.0890 | 0.1882 | beta | [0,1] | 0.0500 |

*Source: author's estimation*

Inflation coefficient in the monetary policy rule ($\gamma_\pi$) is estimated at 1,5439, a high value both *per se* and compared with the corresponding parameters of the other variables taken into account in deciding the monetary policy rule, which firstly confirms the pursuit of price stability objective in full accordance with the inflation targeting strategy. A coefficient of inflation gap greater than one shows the viability of the Taylor principle, a stabilizing monetary policy assuming an increase in the nominal interest rate to a greater extent (more than proportionally) than inflation.

Inflation targeting strategy seems to be applied in a flexible manner, as the stabilization of the real economic activity and exchange rate represents a concern of the monetary authority in setting short-term nominal interest rate, as evidenced by the values of $\gamma_{ygap}$ and $\gamma_z$ coefficients (0,2248 and 0,1912 respectively). Comparative values of the three parameters emphasize the efforts of the monetary policy to stabilize aggregate production and exchange without affecting the primary objective of price stability.

For the variables related to parameters included in the Taylor-type rule to test the orientation of concern central banks towards ensuring the financial stability through monetary policy ($\gamma_{PC}$ and $\gamma_{PP}$), the estimates in the case of the Czech Republic highlights the existence of a limiting trend, through monetary policy, of uncontrolled expansion of the private credit and the formation of a real estate price bubble. Besides, the monetary policy stance of ensuring financial stability can be determined even by simply identifying the importance attributed to the exchange rate in the monetary policy rule, believed to be high. Such an approach seems to be justified if we consider the high degree of euroisation and currency mismatch of financial institutions assets and liabilities, a distinctive feature of selected economies, because the depreciation of national currencies severely affects the financial stability.

The $\gamma_R^{lag}$ interest rate smoothing coefficient returned an estimated value of 0.7765, indicating a relatively high degree of inertia in the adjustment of interest rate. The value of the parameter expresses the position of national monetary authority towards the compromise between less aggressive changes in the interest rate not to cause instability in financial markets, on the one hand, and strengthening the credibility of monetary policy (which would automatically imply fast and powerful interest rates reactions, with a lower level of inertia) on the other hand.

### 5.2. The case of Poland

The estimation was based on 2 Metropolis-Hastings chains of 50.000 extractions each, with final acceptance rates of 24,68% and 24,55%, indicating a high quality of the estimation. Results of univariate and multivariate Brooks-Gelman (1998) convergence statistics presented in Annex 1 reveal convergence after a reasonable number of iterations. Priors and posterior distributions are illustrated in Annex 2. The estimation findings in terms posterior distributions can be found in Table 2.

**Table 2** - Results of the Bayesian estimation - the case of Poland

| Parameters | Prior mean | Posterior mean | Confidence interval | Confidence interval | Prior distribution | Domain | Standard deviation |
|---|---|---|---|---|---|---|---|
| $\gamma_R^{lag}$ | 0.500 | 0.5813 | 0.4586 | 0.7038 | beta | $[0,1]$ | 0.1000 |
| $\gamma_\pi$ | 1.500 | 1.5742 | 1.0925 | 2.0558 | gamma | $R^+$ | 0.3000 |
| $\gamma_{ygap}$ | 0.250 | 0.2367 | 0.1569 | 0.3138 | beta | $[0,1]$ | 0.0500 |
| $\gamma_Z$ | 0.250 | 0.1355 | 0.0836 | 0.1844 | beta | $[0,1]$ | 0.0500 |
| $\gamma_{PC}$ | 0.250 | 0.1213 | 0.0735 | 0.1680 | beta | $[0,1]$ | 0.0500 |
| $\gamma_{PP}$ | 0.250 | 0.1259 | 0.0822 | 0.1696 | beta | $[0,1]$ | 0.0500 |

*Source: author's estimation*

The estimation results indicate a $\gamma_\pi$ value of 1,5742, which emphasizes a stabilizing monetary policy. However, such a high value returned by the Bayesian estimates for inflation coefficient compared to parameters related to other macroeconomic variables in the monetary policy rule underlines a strong orientation towards maintaining the price stability.

The inflation targeting strategy is not applied under a strict form, leaving room for the stabilization of real activity and the exchange rate. The estimated coefficient for the output gap ($\gamma_{ygap}$) is 0,2367, which indicates the stance of monetary policy towards the aggregate output stabilization, while the $\gamma_Z$ real exchange rate change parameter returns an estimated value of 0,1355, underlining the importance attributed to exchange rate stability in the monetary policy decision.

The values obtained for parameters corresponding to the variables in the Taylor- type rule to identify the conduct of monetary policy in ensuring financial stability ($\gamma_{PC}$ și $\gamma_{PP}$) reveal a 'leaning against the wind' approach, a monetary policy that reacts to some extent to unsustainable credit growth and the formation of a real estate asset price bubbles.

For the degree of interest rate inertia, the estimated coefficient ($\gamma_R^{lag}$) indicates a value of 0.5813, showing a moderate gradualism of monetary policy implemented by the national monetary authority.

### 5.3. The case of Hungary

In this case also the Bayesian approach is based on two Metropolis-Hastings chains with 50.000 extractions each, with acceptance rates of 23,48% and 23,39%. Convergence both in terms of univariate and multivariate Brooks-Gelman statistics is present, as illustrated by Appendix 1, while priors and posterior distributions can be found in Appendix 2. Bayesian estimation results are displayed in Table 3.

**Table 3** - Results of the Bayesian estimation - the case of Hungary

| Parameters | Prior mean | Posterior mean | Confidence interval | Confidence interval | Prior distribution | Domain | Standard deviation |
|---|---|---|---|---|---|---|---|
| $\gamma_R^{lag}$ | 0.500 | 0.6959 | 0.5958 | 0.7979 | beta | $[0,1]$ | 0.1000 |
| $\gamma_\pi$ | 1.500 | 1.4477 | 0.9778 | 1.9338 | gamma | $R^+$ | 0.3000 |
| $\gamma_{ygap}$ | 0.250 | 0.2402 | 0.1616 | 0.3202 | beta | $[0,1]$ | 0.0500 |
| $\gamma_Z$ | 0.250 | 0.1583 | 0.1071 | 0.2101 | beta | $[0,1]$ | 0.0500 |
| $\gamma_{PC}$ | 0.250 | 0.1017 | 0.0646 | 0.1399 | beta | $[0,1]$ | 0.0500 |
| $\gamma_{PP}$ | 0.250 | 0.2191 | 0.1480 | 0.2867 | beta | $[0,1]$ | 0.0500 |

*Source: author's estimation*

The estimation result for inflation coefficient within the monetary policy rule ($\gamma_\pi$) indicates a value of 1,4477, highlighting the strong orientation of the NCB towards its primary objective of maintaining the price stability.

The output gap coefficient ($\gamma_{ygap}$) is at 0,2402, emphasizing efforts of the monetary authorities to stabilize the real economic activity. In Romania, the real exchange rate changes coefficient in the monetary policy rule ($\gamma_Z$) indicates a value of 0,1583, which means the orientation to some extent of the NCB to stabilize the exchange rate through interest rate policy.

Besides the importance of exchange rate developments, monetary policy stance geared to financial stability can be identified based on the results for the coefficients of changes in private credit ( $\gamma_{PC}$) and changes in real estate prices ($\gamma_{PP}$). The estimated values of 0,1017 and respectively 0,2191 emphasize a concern of the CBs monetary policy to prevent excessive credit growth and the formation of asset price bubbles in the housing market.

The estimation results indicate for the interest rate inertia coefficient ($\gamma_R^{lag}$) a value of 0.6959, which means a relatively high level of gradualism in the implementation of monetary policy.

### 5.4. The case of Romania

The Metropolis-Hastings algorithm with two chains of 50.000 extractions on data for Romania resulted in acceptance rates of 24,28% for the first chain, and 24,35% for the second. Brooks-Gelman univariate and multivariate convergence statistics presented in Annex 1 indicates convergence after a reasonable number of iterations. The differences between prior and posterior distributions are shown in Annex 2. Estimation results can be found in Table 4.

**Table 4** - Results of the Bayesian estimation - the case of Romania

| Parameters | Prior mean | Posterior mean | Confidence interval | Confidence interval | Prior distribution | Domain | Standard deviation |
|---|---|---|---|---|---|---|---|
| $\gamma_R^{lag}$ | 0.500 | 0.6552 | 0.5351 | 0.7805 | beta | $[0,1]$ | 0.1000 |
| $\gamma_\pi$ | 1.500 | 1.4946 | 0.9954 | 1.9831 | gamma | $R^+$ | 0.3000 |
| $\gamma_{ygap}$ | 0.250 | 0.2460 | 0.1652 | 0.3273 | beta | $[0,1]$ | 0.0500 |
| $\gamma_Z$ | 0.250 | 0.2379 | 0.1570 | 0.3108 | beta | $[0,1]$ | 0.0500 |
| $\gamma_{PC}$ | 0.250 | 0.1425 | 0.0885 | 0.1954 | beta | $[0,1]$ | 0.0500 |
| $\gamma_{PP}$ | 0.250 | 0.1452 | 0.0926 | 0.1988 | beta | $[0,1]$ | 0.0500 |

*Source: author's estimation*

Inflation coefficient in the monetary policy rule ($\gamma_\pi$) returned by the estimation model is 1,4946, indicating in this case also the principle of Taylor and the strong orientation of the national monetary authority towards the primary objective of price stability.

For the output gap coefficient ( $\gamma_{ygap}$) the findings point out a value of 0,2460 that shows a rather low orientation of monetary policy towards the stabilization of the real activity.

The importance attached by national monetary authorities to the exchange rate stability is evidenced by the $\gamma_Z$ value. The coefficient value (0,2379) emphasizes the orientation of of the NCB towards the stabilization of the exchange rate through short-term nominal interest rate.

The estimation results for the variables coefficients introduced into the monetary policy rule to identify the behavior towards financial stability through monetary policy, respectively $\gamma_{PC}$, related to changes in private credit and $\gamma_{PP}$, corresponding to real estate price trends, are 0,1425 and 0,1452. The parameters significant values reveal the presence (though not very strong) of a 'leaning against the wind' monetary policy approach of the national CB. The analysis of central bank behavior in setting the interest rate in order to ensure financial stability shows that it has taken into account to some extent both private credit developments and the evolution of real estate prices.

The coefficient of interest rate smoothing ($\gamma_R^{lag}$) is estimated at a value of 0.6552, emphasizing a relatively high level of gradualism in adjusting interest rates, which can be attributed to the aim of avoiding distortions in the financial markets or credibility losses for the monetary authority following sudden and large amplitude changes of the interest rate path.

## 6. Conclusions

The estimation of the monetary policy rule within the model with implicit micro foundations highlighted a number of important results.

First, we identified a strong orientation of the selected monetary towards fulfilling their goal of maintaining price stability, in full accordance with the practice of inflation targeting strategy.

Second, the IT strategy appears to be used under a flexible form, allowing for the parallel stabilization of the economic activity and real exchange rate through short-term nominal interest rate. Such evidence, however, is not likely to jeopardize the inflation target priority, as the values identified for aggregate production and changes in the real exchange rate corresponding parameters are much lower than those related to inflation.

Thirdly, we identified an existing, although not very strong trend of limiting, through the promoted monetary policy, of uncontrolled expansion of private credit and the formation of real estate prices bubbles. In other words, the results of estimation allowed for the identification, to some extent, of a *leaning against the wind* orientation of the monetary policy applied by selected monetary authorities. Moreover, the existence of a monetary policy stance of central banks in the region towards ensuring financial stability is noted and based on the importance of the exchange rate for the considered monetary policy rule, currency depreciation posing significant challenges in terms of financial stability due to the characteristics of these countries related to their high degree of euroisation and currency mismatch of financial institutions balance sheet assets and liabilities.

Fourth, the values obtained for the coefficients of interest rate smoothing indicated for all states a moderate/relative high degree of inertia in interest rate adjustment. Such a level of gradualism in modifying short-term nominal interest rate can be attributed to the desire of not creating distortions in the financial markets or losses of credibility for the monetary authority following sudden and large changes in amplitude of the interest rate path.

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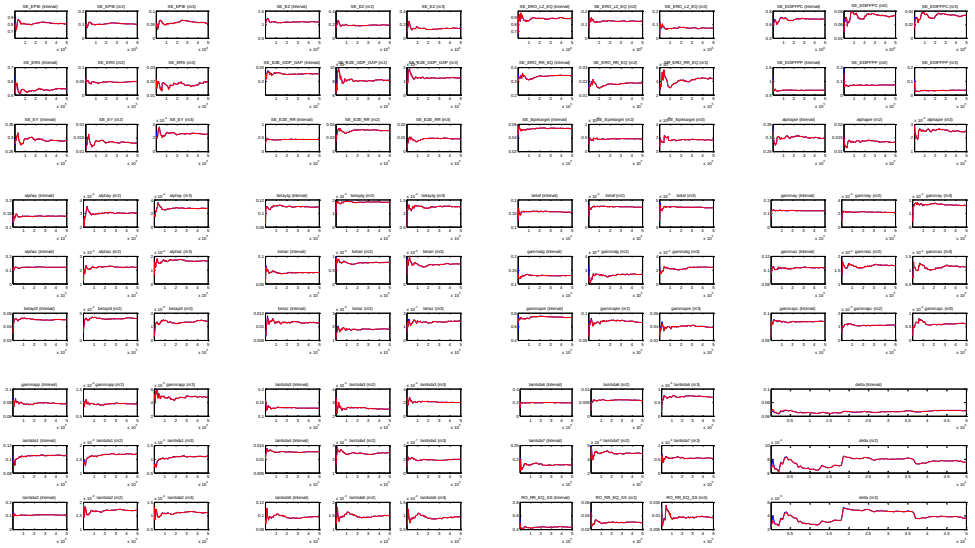
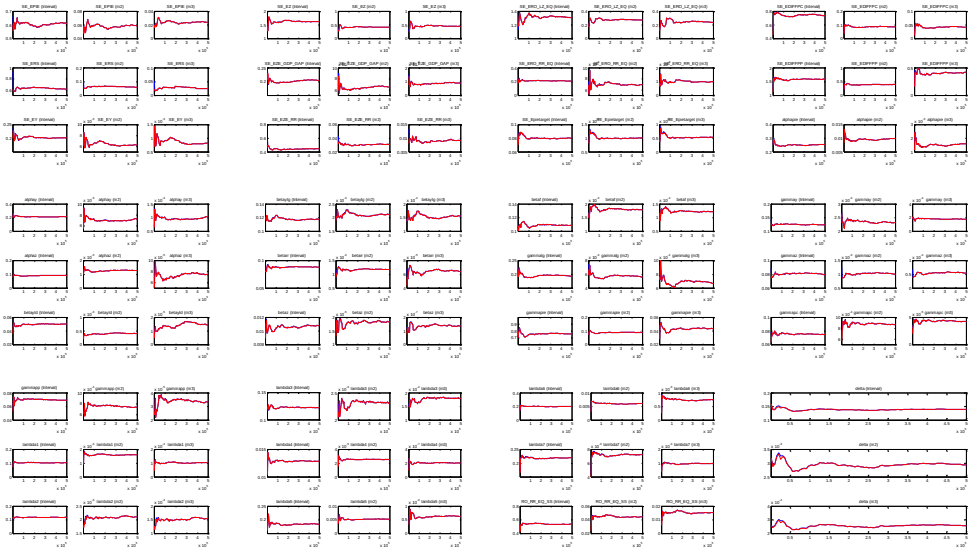
## Annex 1

A. Brooks-Gelman (1998) univariate convergence statistics

the Czech Republic case



the case of Poland



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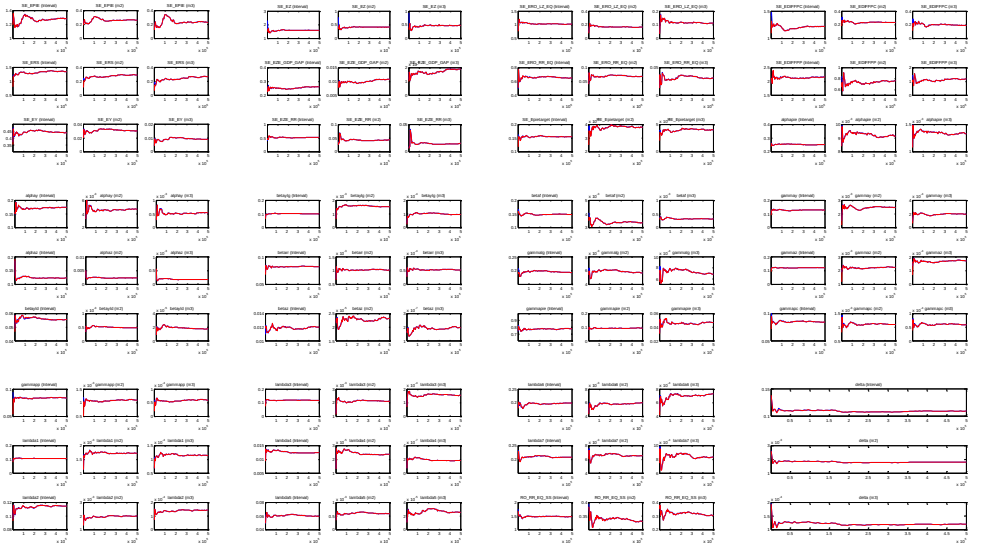

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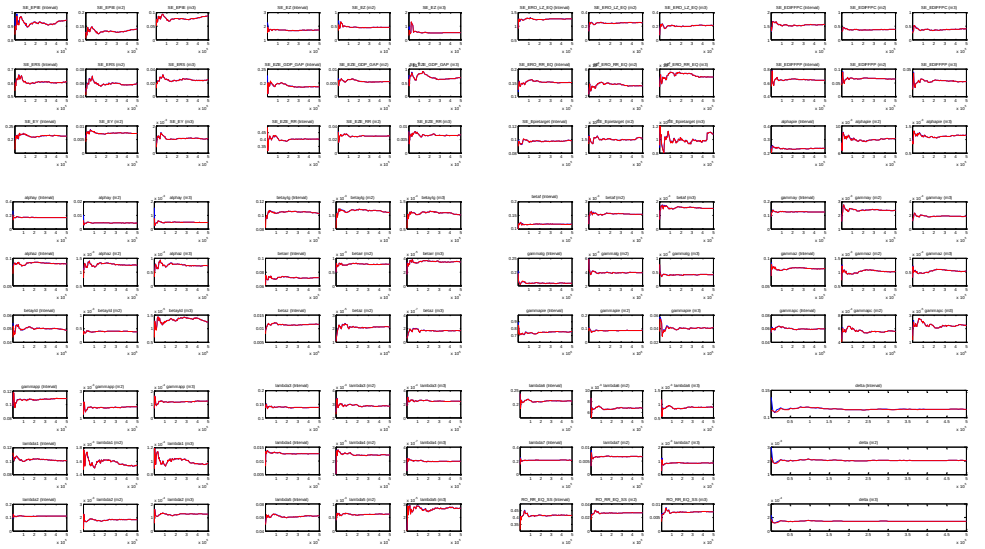
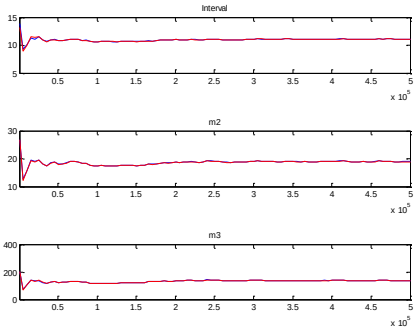


B. Multivatiate convergence statistics

the Czech Republic case

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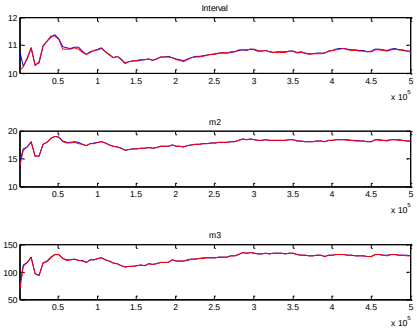
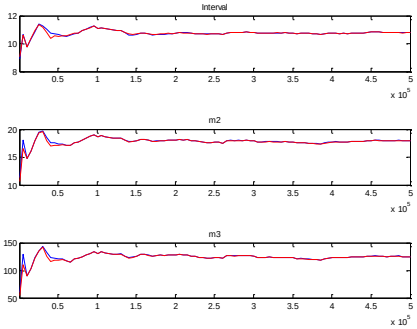
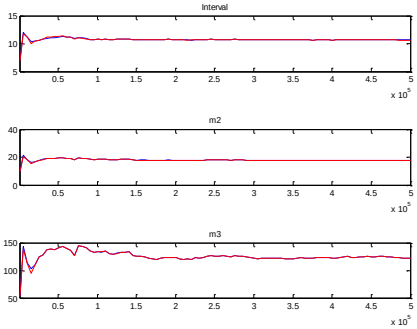



the case of Romania



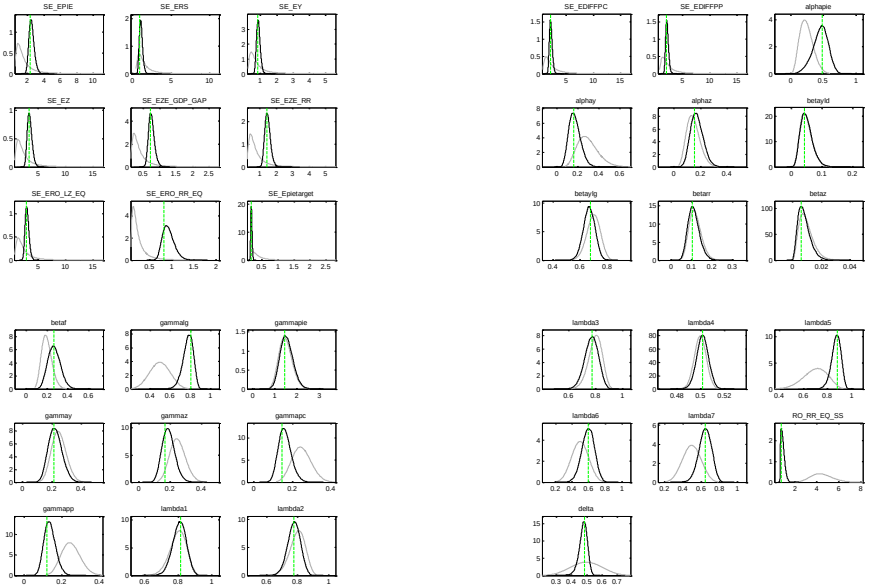

the case of Hungary



**Annex 2**

Prior and posterior distributions

the Czech Republic case

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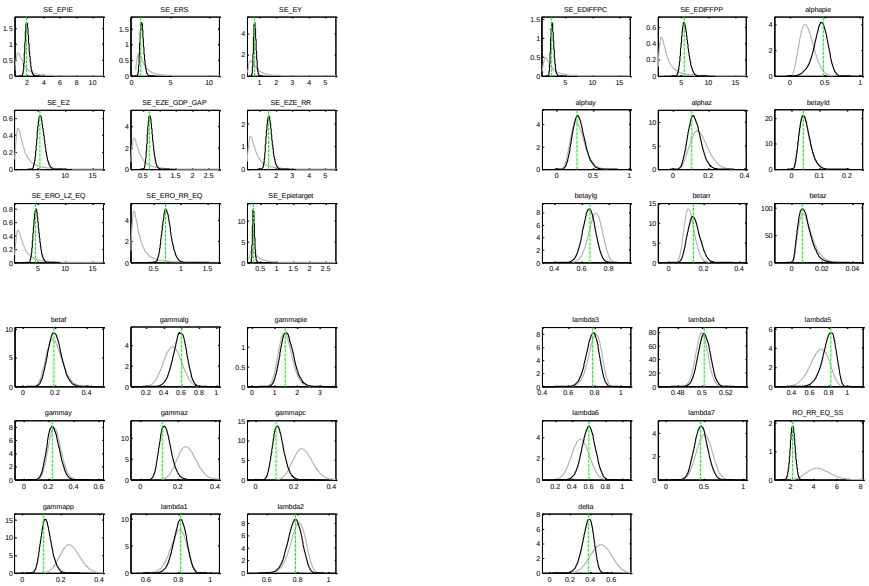

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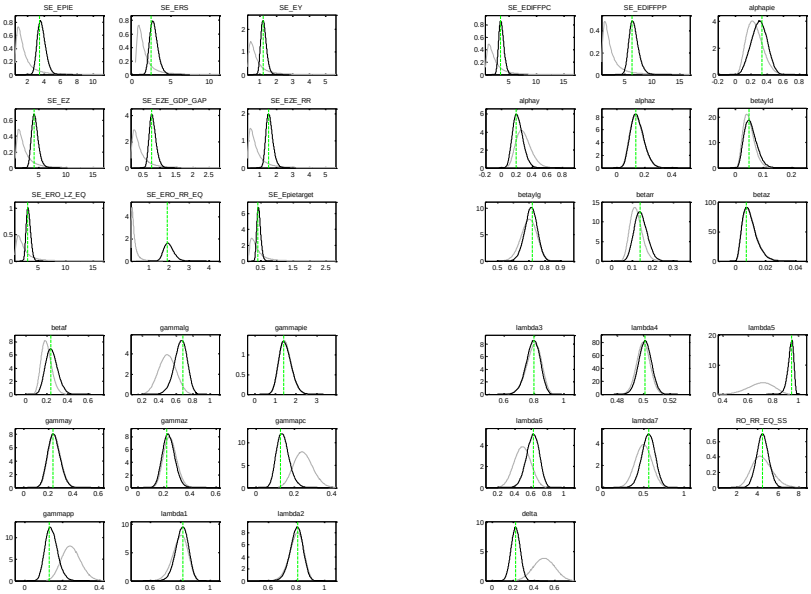


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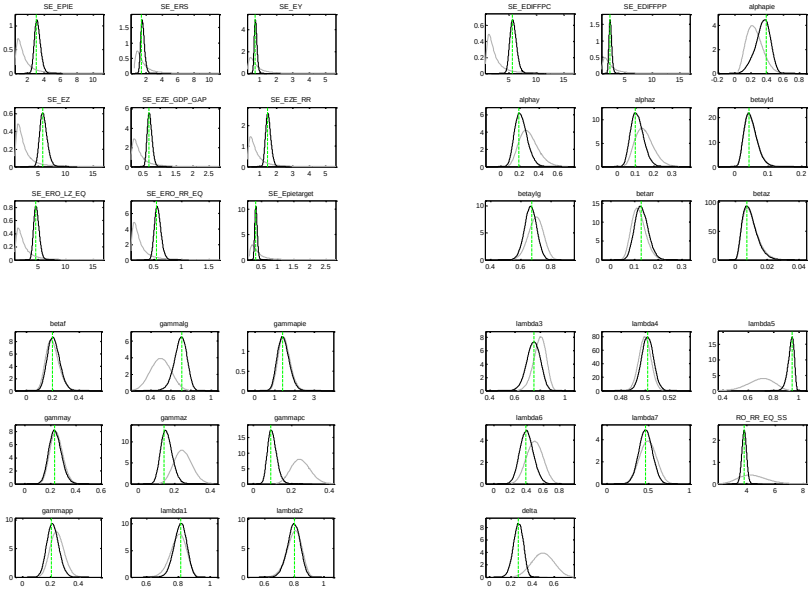

# GENDER ANALYSIS OF HOUSEHOLD POVERTY – AN EMPIRICAL ANALYSIS

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**Abstract.** The study reported in this article used household level data to comparatively analyse the determinants of poverty amongst female and male-headed households in a township of Bophelong, South Africa. A random sample of households was divided into two sub-groups. A logistic regression model was estimated based on this data with the poverty status of a household as the dependent variable and a set of demographic variables as explanatory variables. The poverty rate was calculated at 68% and 59% for female and male-headed households, respectively. Further analysis revealed household income and household size as predictors of poverty in both sub-groups. The age of the household was statistically significant in female-headed households while it was not significant in male-headed households. The employment status of the household head appeared to decrease poverty in female-headed households but in male-headed this variable was not significant. There was a strong negative relationship between the labour force and poverty status in male headed households but this relationship was weak in female-headed households. The results of the study draw attention to a number of policy interventions necessary to reduce poverty in South African townships.

**JEL Classification**: D31, I32, O12

**Keywords**: poverty, gender, household head, township, South Africa

## 1. Introduction

The term household is defined as a group of related or unrelated people living in a dwelling unit or its equivalence, eating from the same pot and sharing common housekeeping arrangements (World Bank, 2001). Household membership is not only restricted to related people but to any group of people dwelling in the same house. People identified as members of a household may also be non-residents for a large part of the year (Posel et al., 2006). A household usually has a head who is a household member with authority and income earning responsibility. The head of the house is usually nominated but can also take the headship without

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any form of nomination. The male is usually the one who heads the household. In the absence of a male figure, a female family member takes over the role of headship giving rise to a female-headed household scenario (Ngwenya, 2008).

The research interest in household headship arose because of the perceived economic and social differences between households headed by women and those headed by men. Female-headed households have become a concern because of the high incidence of poverty and food insecurity in these households. They have therefore become a focus of economic and social policy both in developing and developed nations (Ngwenya, 2008). Buijs and Atherfold (1995) note that the interest in and concern about households and families largely or solely supported by women is not only theoretically significant but is directly related to some of the major economic and policy issues confronting developing countries today. Female-headed households can be understood from two perspectives, namely the de jure and de facto households (Martins, 2008). A de jure female-headed household exists where the head of the household is unmarried, divorced or may have been married before but is widowed with no husband in existence in the household. In contrast, a de facto female-headed household is when the head of the household in practice is a female due to the fact that the male head is absent throughout the year or for a longer period. The wife becomes the main decision maker during the husband's absence and thus heads by default. In South African literature, most households are referred to as de facto situation, where a woman heads the household in the absence of a husband (Liddel, et al., 1991). A female-headed household can also be explained as a situation where the main decision maker and the economic provider for the household is a woman regardless of her marital status (Lingam, 1994).

A number of studies (Barros and Mendonca, 1997; Medeiros and Costa, 2006; Raja, 2009) on gender and poverty have been undertaken. These studies have revealed that poverty has a strong gender dimension. Raja (2009) found that women were poorer than men in plight of the global economic crisis. His conclusion was in line with Barros and Mendonca (1997) who found poverty to be high among women compared to men in developing countries. A study by Woolard (2002) that found that female headed households had an increased probability of being poor (male headed households had a 28% probability of being poor, female headed households had a 48%).

After more than a decade of democracy, South Africa is still a country with high levels of poverty and income inequality (Larsson, 2006). A study by Leibbrandt et al. (2006) found that rural poverty rates are substantially higher than urban poverty rates (regardless of the poverty line chosen). Poverty is found to be more prevalent amongst households headed by female. Leibbrandt et al. (2010) notes increasing incidents of poverty in South Africa's urban areas. Households with one or more children made up the largest share of poor households. Further research (Patel, 2012) indicates that over a 15-year period, aggregate poverty declined among the African population, principally among African males, by 1% with a respective 1% increase in the poverty share of African females. Ngwane et al. (2010) found that the poverty rate of female-headed households in 1995 was higher than that of male-headed households. A study by Rose and Charlton (2001) in major urban centers of South Africa concluded that 42.6% of the sampled population was poor. Among the black population, household size was a significant

predictor of poverty. The employment and educational attainment of the household head were found to be other important predictors of poverty. A study by Woolard and Klasen (2005) concluded that a change in a household's demographic composition is an important determinant of poverty in South Africa.

The formulation of effective poverty eradication strategies requires an understanding of the dynamics of poor households. In order to find how far a country has come in the eradication of poverty, there must be adequate enquiries from time to time in the form of social surveys which adopt certain definite standards of measurement (Townsend, 1979). The existing literature on the determinants of poverty in South Africa is mainly based on national or to some extent regional data. The problem of poverty in South Africa is more evident in urban areas, commonly known as townships. In South Africa, the term township usually refer to the often underdeveloped urban living areas that, from the late 19th century until the end of apartheid were reserved for non-whites, principally the Black racial group. They were usually built on the periphery of towns and cities (Ellis, 2003). In the townships, households are caught in a poverty trap from which they are unlikely to escape without government assistance, which is often in the form of conditional social grants. A large number of the population lives in these townships, which continue to grow at a rapid rate. Although the challenges of economic development and poverty are resonant in major parts of South Africa, Bophelong was the focal area of the study. Previous studies have found seemingly high poverty levels in the area of Bophelong; where 67% of the households were found to be living below their poverty lines in 2003 (Slabbert, 2003). A study by Sekhampu (2004) reported that 62% of the households were income poor. Furthermore, of those who were found to be poor, 45.8% had an income of less than 50% of the poverty line. A similar study by Slabbert (2009) revealed increasing levels of poverty where 69% of the sampled population in Bophelong was found to be poor. Bophelong township is a formerly blacks only residential area established in 1955 on the outskirts of the industrial town of Vanderbijlpark as a dormitory township for cheap black labour for surrounding industries. The area belongs to the Emfuleni Municipality, on the southern part of the Gauteng Province in South Africa. The population in Bophelong is estimated at 37779 and the number of households was estimated at 12352 (Statistics South Africa, 2009).

The present study extends the existing literature on poverty in South Africa by modelling the various socio-economic and demographic household level factors responsible for gender poverty in a township set up. The rest of the article is organized as follows: section two is the description of the data and methodology used for the subsequent analysis; section three reports the results and analyses of the empirical investigation and section four summarises and concludes the article.

## 2. Research methodology

### *2.1. Survey process*

Data used in this research are based on a survey using questionnaires. The questionnaire included information on demographics, respondents' income and expenditure patterns and their general view about their socio-economic status. The area was divided into the different geographical locations and questionnaires were apportioned evenly among the inhabited sites. Sites at which field workers

were supposed to complete questionnaires were identified individually from the map before the field workers went out. However, where people were not available for an interview, or where it was impossible to trace the house, the following pre-selected household was interviewed. Information was obtained from the breadwinner or the spouse. Information obtained from the respondents was kept in strict confidence and the participants were not required to write their names on the questionnaire. A total of 585 households from Bophelong Township were randomly interviewed between January and April 2012. To ensure that each household had a fair and equal chance of being included in the sample, the primary stage of the sampling involved a random selection of households residing in the township of Bophelong. Data were collected from a sample of 585 households, which was divided into two sub-samples based on gender; a sample for male-headed households (MHH) and another one for female-headed households (FHH). Data from each group was analysed (comparably) in order to assess differences in the determinants of poverty in the area. Of the total sample, 289 were found to be headed by females.

### *2.2. Measurement of poverty*

In measuring the poverty rate in the area, the World Bank's (2001) definition of a poor household was used. A poor household was defined as a household whose total income is less than the cost of minimum calorie intake and that of other necessities of the household. Using the 2000 Income and Expenditure Survey data, Statistics South Africa estimated a poverty line of R322 per capita per month in 2000 prices (Statistics South Africa, 2007). The poverty line was said to include basic food and non-food items for a household to attain a minimal standard of living. Once inflation was accounted for, the threshold amounted to R570 in 2010 prices (Statistics South Africa, 2011). For this study, the poverty line was adjusted for inflation and calculated at R593 ($74) per capita per month in 2012 prices.

### *2.3. Empirical model*

The study used a logistic regression with two different dependent variables of a dichotomous nature. The households were classified as either poor or non-poor based on their per capita income. The dependent variable takes a value of 1 for a poor household poor or 0 for non-poor household. This binary poverty status is expressed in a linear form by a latent variable y^* as follows (Gourieroux, 2000):

$$Y_i^* = \sum \beta X_i^{'} + u_i \quad (1)$$

Where $X_i$ represents a set of demographic and socioeconomic variables that determine households' poverty status, $\beta'$ represents the coefficients ($\beta_1$, $\beta_2$, ... $\beta_n$) and $u_i$ is the error term. However y* is not observable, as it is a latent variable. What is observable is an event represented by a dependent dummy variable Y defined by:

$$Y= 1 \text{ if } y^* > 0 \text{ and } Y = 0 \text{ otherwise.} \quad (2)$$

From equations (1) and (2), we can present the probability of being poor as follows:

$$Prob(Y_i = 1) = F(\beta X_i')$$
$$Prob\ (Y_i = 0) = 1 - F(\beta X_i') \quad (3)$$

A cumulative distribution function of these probabilities eventually generates the regression model, expressed by Verbeek (2004) as follows:

$$E(Y_i|\ X_i) = \sum Y_i\ Prob\,(Y_i|\ X_i) \text{ for } Y_i = 0,1 \quad (4)$$
$$= [0 \times Prob\,(Y_i = 0|X_i)] + [1 \times Prob(Y_i = 1|X_i)]$$
$$= Prob(Y_i = 1|X_i)$$

This is similar to the probability that a household is poor, in equation (3), and it is written as:

$$Prob(Y_i = 1) = F(\beta X_i') \text{ such that } 0 \leq F(\beta X_i') \leq 1 \quad (5)$$

This is a logistic distribution (logit model) with assumption of normally distributed, homoscedastic error terms standardised as σ = 1 (Gourieroux, 2000). The logit model used in this study to measure the effect of socioeconomic variables on the probability of being poor is as follows:

$$HHPS_i = \beta_0 + \beta_1 HHI_i + \beta_2 HHS_i + \beta_3 ESH_i + \beta_4 AH_i + \beta_5 EH_i + \beta_6 MSH_i + \beta_7 LB_i + \beta_8 MIG_i + e_i \quad (6)$$

Where: $HHPS_i$ = household's poverty status,
$HHi_i$ = the total monthly households' income,
$HHS_i$ = the household size,
$ESH_i$ = the employment status of the household head
$AH_i$ = age of the head of household,
$EH_i$ = education attainment of the household head,
$MSH_i$ = marital status of the household head,
$LB_i$ = labour force measured by the number of people within the household who can work,
$MIG_i$ = government grants as the main source of income for a household,
$\beta_0$ = the intercept,
$\beta_1$ to $\beta_8$ = the coefficients and
$e_i$ = the error term.

## 3. Empirical results

### *3.1 Profile of the sampled population*

In the analysis of the observations, households headed by males are separated from those headed by female and their results compared. The demographics and descriptive statistics of the respondents are reported in Table 1.

The results indicate that the gender of the household head has an impact on the characteristics of some socio-economic variables considered in this study. On average, a female household head appears to be 14 years older than a male household head. The average household size was calculated at 4 members per household and there was no difference between female and male-headed households. On average, both male and female household heads had primary schooling education of approximately 6 years. The unemployment rate of the household heads in female-headed households was significantly higher (61%) than that of male-headed households (24%). On average, household income in male-headed households was higher than that of households headed by female. The contribution of government grants to household income was found to be higher in female-headed households. Government grants on average contributed 75% to household income in female-headed households, compared to 53% in male-headed households. Furthermore, 41% of households headed by females had government grants as the main source of income. Overall these descriptive statistics suggest that determinants of poverty status may vary with gender but a further analysis is needed to confirm this.

**Table 1:** Descriptive statistics of the respondents

| Description | Female HH | Male HH | Total HH |
|---|---|---|---|
| Number of HH | 289 | 296 | 585 |
| HH size (avg) | 4 | 4 | 4 |
| Married (%) | 39% | 55% | 47% |
| Unemployment rate | 61% | 24% | 58% |
| Labour force (avg) | 2 | 2 | 2 |
| HH income (avg) per month | R2156 | R2943 | R2554 |
| Age (avg) | 58 | 44 | 53 |
| Education in years (avg) | 6.03 | 6.39 | 6.21 |
| Main_Income_Grants (%) | 41% | 22% | 31% |
| Government grants / HH Income (avg) | 75% | 53% | 64% |

***3.2. Poverty status of households by gender***

The headcount index which measures the proportion of the population below the poverty line was used as an indicator of poverty for this study. Table 2 shows a gender comparison of poverty and the characteristics of a household head and that of a household. The results indicate disparities in the poverty rate of the two sub-groups; female-headed households were found to have a higher poverty rate (67%) compared to male-headed households (59%). Poverty was seen to be decreasing with an increase in household income in both male and female-headed households. Higher poverty rates were found with increasing household size, lower educational attainment of the household head and increasing age of the head of the household. Households who had government grants as the main source of income were poorer in both male and female-headed households.

**Table 2:** Poverty headcount by gender and households' demographic information

| Variables | Female-headed HH | | | Male-headed HH | | |
|---|---|---|---|---|---|---|
| | n | Poor | % Poor | n | Poor | % Poor |
| All households | 289 | 194 | 67% | 296 | 174 | 59% |
| HH_Size | | | | | | |
| 1 person | 10 | 3 | 30% | 17 | 4 | 24% |
| 2 - 4 persons | 172 | 101 | 59% | 180 | 100 | 56% |
| 5 - 7 persons | 86 | 70 | 81% | 87 | 59 | 68% |
| >7 persons | 21 | 20 | 95% | 12 | 11 | 92% |
| Education_Head | | | | | | |
| No schooling | 39 | 27 | 69% | 34 | 20 | 59% |
| 1 - 5 years | 208 | 131 | 63% | 56 | 33 | 59% |
| 6-10 years | 36 | 31 | 86% | 198 | 118 | 60% |
| > 10 years | 6 | 5 | 83% | 8 | 3 | 38% |
| Employment_Head | | | | | | |
| Employed | 89 | 49 | 55% | 156 | 80 | 51% |
| Not employed | 200 | 145 | 73% | 140 | 94 | 67% |
| Age_Head | | | | | | |
| < 30 years | 22 | 12 | 55% | 22 | 10 | 45% |
| 30 - 40 years | 60 | 46 | 77% | 92 | 50 | 54% |
| 41 - 50 years | 59 | 45 | 76% | 87 | 59 | 68% |
| > 50 years | 148 | 91 | 61% | 95 | 55 | 58% |
| Labour_Force | | | | | | |
| 1 person | 96 | 66 | 69% | 38 | 19 | 50% |
| 2 - 4 persons | 177 | 113 | 64% | 241 | 150 | 62% |
| 5 - 7 persons | 16 | 15 | 94% | 9 | 4 | 44% |
| Main_Income_Grants | | | | | | |
| Yes | 119 | 90 | 76% | 63 | 44 | 70% |
| No | 170 | 104 | 61% | 226 | 130 | 58% |

***3.3. Determinants of poverty by gender***

Estimates from Equation (6) for both male-headed and female-headed households are shown in Table 3. In general, the results show that variables such as household income and household size have a significant effect on poverty status in both male and female-headed households. Household income is negatively related to the poverty status (as expected) of a household in both male and female-headed households and its coefficient significant at the 1% level of significance. Household income is important as it determines the extent to which the needs of a household can be satisfied. This is similar to findings from previous studies (Anyawu 2010; Geda, et al., 2005). Larger households were associated with an increased probability of being poor in both sub-samples. It is also expected that household size would positively contribute to the probability of a household being in the poor category. Larger households are generally associated with increased dependency ratios due to competing needs for limited resources. There were no differences in the average size of a household in both sub-samples. Similar studies (Malik, 1996; Meng and Gregory, 2007) have also concluded that household size is positively related with the level of poverty.

**Table 3:** Determinants of poverty by gender

| Variables | Female-headed HH | | Male-headed HH | |
|---|---|---|---|---|
| | Coefficient | Z-values | Coefficient | Z-values |
| HH_Income | -0.00027 | -2.82*** | -0.00026 | -4.16*** |
| HH_Size | 0.71570 | 5.78*** | 0.58581 | 5.21*** |
| ES_Head | -0.63371 | -1.64* | -0.47910 | -1.51 |
| Age_Head | -0.37117 | -3.01*** | -0.00856 | -0.74 |
| Educ_Head | -0.04737 | -0.95 | -0.02768 | -0.94 |
| Married_Head | -0.22157 | -0.66 | -0.42621 | -1.51 |
| Labour | -0.29302 | -1.68* | -0.32614 | -2.01** |
| Grants | 0.57672 | 1.51 | -0.23422 | -0.58 |
| Constant | 1.4411 | 1.79 | 0.72510 | 1.02 |
| N = 289<br>LR chi2 (8) = 88.10<br>Prob>chi2 = 0.000<br>Pseudo R2 = 0.2407<br>Log likehood = -138.96487 | | | N = 296<br>LR chi2 (8) = 59.94<br>Prob>chi2 = 0.000<br>Pseudo R2 = 0.194<br>Log likehood = -170.60845 | |

***Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

The age of the household head was statistically significant at the 1% level of significance in female-headed households while it was not significant, even at 10% level of significance in male-headed households. This variable was also found to be significant for households headed by female by Achia, et al. (2010) and Anyanwu (2010). However, a study by Anyanwu (2010) in Nigeria found that the age of the household head was only significant in male-headed households. A study by Baulch and McCulloch (1998) in Pakistan reported that the age of the head of the household made no significant impact on poverty status. In the context of this study, the impact of age on poverty status may be explained by the gap between the average age of female and male-headed households (see Table 1). Older persons in South Africa (females at 60, and males at age 62) are eligible for the state's old age grant. As females receive the grant earlier than males, the increasing age of the head of household might bring income earning possibilities (government grants) sooner in female-headed households compared to their male counterparts. To add to this, the employment status of the head appeared to decrease poverty (significant at 10% level of significance) in female-headed households but in male-headed households this variable was not significant. The poverty rate among household heads that are unemployed was higher in households headed by females (73%) compared to those headed by males (67%).There was a strong negative relationship (significant at 5% level of significance) between the labour force and poverty status in male-headed households but this relationship tends to be weak in female-headed households (only significant at 10% level of significance). This suggests that the size of the labour force in male-headed households have an increased potential to reduce their household's poverty status. A study by Sikander and Ahmed (2008) in India also reached a similar conclusion that the size of the labour force has a negative and significant impact on the poverty status of a household. Variables such as the educational attainment, marital status of the household head and whether government grants are the main source of income had no significant impact on household poverty status in both sub-samples. However, it is important to note that

the relationship between the variable denoting whether government grants are the source of income and poverty status is positive in female-headed households while it is negative in male-headed households. Although this impact is not statistically significant, the sign may suggest that households who mainly depend on government grants are not able to escape the scourge of poverty in female-headed households.

***3.4 Marginal effects***

Marginal effects measure the expected instantaneous change in the dependent variable as a function of a change in a certain explanatory variable while keeping all the other covariates constant. The marginal effect measurement is required to interpret the effect of the regressors on the dependent variable (Cameron and Trivedi, 2009). Table 4 shows the marginal effects of each independent variable for the gendered results reported in Table 3.

The results show that the variables with the biggest impact on the poverty status of the sampled households are household size and the employment status of the head of household. An increase in household size was associated with an 11.35% and 11.64% increase in the probability of being poor in female and male-headed households, respectively. The marginal effect for the employment status of the head of household was 10.05% for households headed by female and not significant for male-headed households. This result needs to be contrasted with a more significant contribution to poverty reduction by labour force and higher income in male-headed compared to female-headed households. This seems to suggest that income earning opportunities in male-headed households still exist despite the unemployment status of the head of household. The labour force had the potential of reducing poverty by 4.56% in female-headed households compared to 6.44% in male-headed households. The variable for age indicated a potential of reducing poverty by 0.59% in female-headed households and was found not to be significant in male-headed households. Household income was significant in both sub-groups. Household income had the probability of reducing poverty by less than a percentage in both male and female-headed households.

**Table 4:** Marginal effects of the determinants of poverty by gender

| Variables | Female-headed HH | | Male-headed HH | |
|---|---|---|---|---|
| | dy/dx | Z-values | dy/dx | Z-values |
| HH_Income | -0.0000428 | -2.97*** | -0.0000506 | -4.67*** |
| HH_SIZE | 0.1135299 | 7.40*** | 0.11640005 | 6.30*** |
| ES_HEAD | -0.1005219 | -1.67* | -0.0945504 | -1.53 |
| AGE_HEAD | -0.0058876 | -3.19*** | -0.0016958 | -0.74 |
| Educ_Head | -0.0075138 | -0.96 | 0.0054632 | -0.94 |
| Married_Head | -0.0351465 | -0.67 | -0.0841122 | -1.53 |
| Labour | -0.0464811 | -1.71* | -0.0643649 | -2.06** |
| Grants | 0.0914822 | 1.52 | -0.046223 | -0.58 |

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

## 4. Summary and Conclusion

This article is an attempt to model the possible determinants of gender poverty in a South African Township of Bophelong. A sample of households in Bophelong was analysed, with the poverty status (0=non-poor and 1=poor) as the dependent variable and a number of socio-economic and demographic characteristics as explanatory variables. The results of the study showed that an increase in household income decreased the probability of being poor in both male and female-headed households. Large households were associated with an increased probability of being poor in both sub-samples. The variable for representing the age of the household head was statistically significant in female-headed households while it was not significant in male-headed households. The employment status of the head appeared to decrease poverty in female-headed households however the variable was not significant in male-headed households. There was a strong negative between the labour force and poverty status in male headed households but this relationship tended to be weak in female-headed households. The educational attainment, marital status of the household head and government grants as main source of income for household have no significant impact on household poverty status.

These findings suggest that policy interventions are necessary to address the challenges of poverty in South African townships in general and Bophelong in particular. There is need to focus on gender based interventions as the results of this study show differing dynamics in the poverty status of households depending on the gender of the head of the household.

Given that the poverty status of a household is positively related to an increase in household size, increasing household income through redistribution measures such as government grants without proper planning of family sizes may not solve the problem of poverty in Bophelong and other similar townships. There is a need to intensify family planning services so as to improve knowledge and benefits of family planning. The employment status of the head of the household in female households is very important in addressing the issue of poverty. Policy-makers should continue to implement policies that create employment opportunities for females. Targeted programs for female-headed households need to be investigated, as the female bears the brunt of poverty. Public works programs targeting women might have a significant dent on poverty as research (Thomas, 1993; Hoddinott and Haddad, 1995) indicates that women's income is likely to be spent on the needs of a household. Increasing the employment opportunities for the labour force in female-headed households may assist in reducing their poverty status.

The type of comparative analysis, adopted by this study, provided an opportunity to identify the determinants of poverty that are unique to female-headed households. The findings of the current study can therefore assist with the design of effective targeted poverty alleviation programs that are specific to challenges faced by female-headed households. Similarly, this study can help policy makers by determining the ways in which resources can be distributed so as to maximize poverty reduction in low-income areas, such as townships. The importance of research in policy making can never be understated. The limitation of this studies lies within challenges associated with use of monetary approaches as a measurement of poverty. As this measurement only uses the income which

mostly provides a short-term measurement of poverty and may sometimes under/overestimate the level of poverty in long-term. Further research can look at the impact of the different government grants in poverty alleviation and incorporate additional factors in the measurement of poverty in order to capture the long-term component of poverty.

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# VOLUNTARY TURNOVER INTENTION AMONG IT EMPLOYEES IN HI-TECH COMPANIES IN ISRAEL: INDIVIDUAL AND ORGANIZATIONAL RELATED CAUSES

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**Abstract.** This paper focuses on individual and organizational related causes of voluntary turnover intention in the IT sector in Israel. Specifically, it takes into account employees' personal resources (such as education), organizational focus on employees' needs fulfillment and organizational focus on values. The sample consists of 170 employees from High-Tech companies in Israel. The findings show that in the companies focusing on organizational values there is less voluntary turnover intention, especially of the best IT employees (with more personal resources), in comparison with IT companies focusing on employees' needs fulfillment

**JEL classification:** M14, M15

**Keywords:** voluntary turnover intention, IT sector employees, personal resources, individual causes, organizational causes

## 1. Introduction

The notion of voluntary turnover refers to individuals' transferring into and out of an organization though generally, research interest in the issue emphasizes employee turnover (Price, 1977). Intent to leave an organization constitutes the final cognitive step in the decision making process in which a worker's intentions to leave include only thinking of quitting, and the employee's statement that he/she actually wants to leave the organization. Ultimately, the employee's actual behavior may be different from his/her intention; in other words, the worker will not leave. However, intention to quit has been found to be a strong predictor of personnel turnover and theoretically it is believed to be an important predictor of actual turnover (Gregory et al., 2007).

The costs related to employee turnover are very high for IT companies and they would like to avoid them.

In understanding voluntary turnover, research has detailed factors such as job satisfaction, organizational commitment and job alternatives (Maertz et al., 1998). Work attitudes appear to play only a relatively small part in employee retention and leaving (Hom and Griffeth, 1995; Griffeth et al., 2000).

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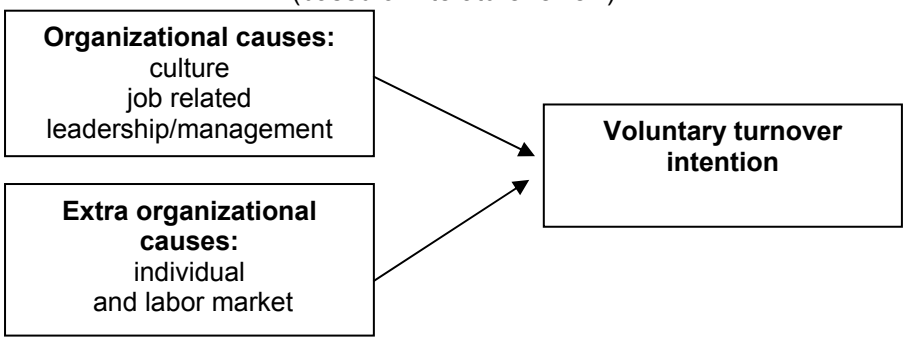
After an extensive analysis of the field literature, we arrived at the following groups of causes affecting voluntary turnover intention (Kessler-Ladelsky & Catana, 2013): 1) organizational causes: HRM related, organizational culture, job related and leadership related 2) extra organizational causes: individual and labor market related causes, as shown in Figure 1. (of course, the range of causes is larger, but to reach our goal, only these were considered).

**Figure 1.** Groups of causes affecting voluntary turnover intention (based on literature review)




*Source:* personal design, based on *Kessler-* Ladelsky *&* Catana, 2013

This paper deals with two components a) extra organizational causes, i.e. the effect of individual/personal related resources on voluntary turnover intention and b) organizational related causes, i.e. the effect of organizational focus on values in comparison to needs fulfillment on employees' voluntary turnover. The literature showed these components apply to members of Kibbutzim in Israel (employed within or outside the Kibbutz). The research examines whether the result are similar in Hi -Tech companies that wish to retain the best IT employees.

The findings show that in the companies focusing on organizational values there is a decrease in employees' voluntary turnover intention, especially among the best IT employees in comparison with those focusing on employees' needs fulfillment.

The paper suggests a tool that companies' management could use to deal with and prevent voluntary turnover intention.

## 2. Aim of the study and research methodology

The article is a part of larger research (Ph.D. thesis), aiming to examine the causes and conditions of voluntary turnover among employees in the IT sector in Israel. The research uses mixed research methods, being carried out among IT employees.

### Research Population

The subjects are IT employees in Hi-Tech companies in Israel, having at least three years of seniority at the moment of survey, such as programmers, developers, computer engineers, information systems engineers, software engineers, mobile and telecom developers, R&D developers, electronics and hardware engineers, software

testers, and IT practical engineers/technicians and so forth. They belong to 500 Hi-Tech companies in Israel with more than 50 employees (no startup companies) and some global companies (like Microsoft).

**Survey procedure**

A pilot questionnaire was administered to 30 randomly selected IT employees (completing time 25-45 minutes). The distribution of the population (including Skewness and Kurtosis indices that were found to be smaller than +3 /- 3) and reliability indices showed that the sample of IT employees had normal distribution and supported parameter tests. 350 final questionnaires were submitted to IT employees, as follows:

- 50 to IT employees working in IT companies (access to them was by mail, at the company's address). The response rate was 90%.
- 100 to IT employees known through personal connections and networking. The response rate (via mail) was 25%
- 200 questionnaires delivered to students in computer science, business administration with specialization in computers, software engineering, and computer engineering/science in the second or third year of undergraduate studies and postgraduate levels, already working as IT employees in development roles in Hi-Tech companies (delivered in the classes and by email). 50% of the questionnaires were completed and returned.

It has to be mentioned that it was decided to use students in the sample due to the difficulty and delay in obtaining approval to deliver questionnaires from Israeli IT companies (domestic and international). Using part of the working day to fill in the questionnaire involved high transaction costs (high hourly salary of this type of worker) at the employer's expenses.

170 completed questionnaires were returned in two stages: November 2012 to December 2013 and February 2013 to July 2013.

**Data analysis**

Hypotheses testing for fitting to normal distribution were done with Kolmogorov - Smirnov test. Skewness and Kurtosis values were found to be smaller than +3 /- 3. Hence it was concluded that a dependent variable symmetry and normal distribution existed and therefore parametric tests were performed (GLM univariate linear regressions). The empirical data were processed with SPSS 21 and AMOS 21 (Structural Equations Models, SEM)[1]

[1] The SEM analysis is intended for the examination of complex models with a variety of variables or a variety of dependency correlations between them (not taken into account in SPSS); an expansion of analysis rules for general linear models for multiple variables. It allows simultaneous examination of a regression equations system and has the advantage that it also takes calculated error into account, so that better estimations are obtained than in accepted correlation analyses such as regressions. The variables and the relations between the variables are examined in one common model. This analysis relates to the model as a set of equations and estimates of all the structural coefficients directly (Byrne, 2001). Additionally, correlations rationally compatible, according to the literature calculated also according to the recommendation of the Modification Index (MI). It was not possible to make such calculations for the hypotheses through SPSS.

With regard to SEM, the research model was partially supported by regression and correlation test which were carried out through SPSS. SEM model was constructed from all hypotheses reinforced in SPSS. The variables were normally distributed in the SEM model.

## 3. Literature review, research hypotheses and measurements

### Literature review and hypothesis

Various studies indicate that the level of personal resources of an organization member, partially explain his/her degree of organizational commitment to workplace or his/her leaving intention. *Personal resources* are aspects of the self that are generally linked to resiliency and refer to individuals' sense of their ability to control and impact upon their environment successfully (Hobfoll, et al, 632).

For example, in a research on the population of young employee's in *Kibbutzim*[2] in Israel, Leviatan (1998) found that those employees with greater personal resources had lower turnover intentions. Based upon these findings, the following hypothesis was proposed.

**H1:** High personal resources of employees will reduce voluntary turnover intention

Many researchers hold the position that employees leave their jobs when their needs are not satisfied by their current job and when an alternative job becomes available. The prevailing thought is that when needs are satisfied, voluntary turnover intention decreases (Mowday et al., 1982; Lazear, 1986; Gupta and Jenkins, 1991; Madrian, 1994; Gruber and Madrian, 1994; Huselid's, 1995).

However, in the research conducted by Leviatan (1996, 1997) it was found that in Kibbutzim, where the needs fulfillment of the members-employees (namely, prominently material compensation) was the main and perhaps the only interest (as a tool to create commitment), voluntary turnover intention (primarily among members-employees with the highest resources) increased. Based upon the above literature findings, the following hypothesis was formulated

**H2:** Needs fulfillment oriented organizations raise voluntary turnover intention. In other words organizations that focus on employees' need fulfillment (mainly through fulfillment of material rewards) lead to higher intentions to voluntarily leave the organization.

Individual satisfaction increases when the employee believes in the values shared with his/her surroundings. Environments with values corresponding to the individual's goals and values result in the individual's self-fulfillment, while those sharing other values do not provide him/her with the opportunity to act according to his/her own values, thus obstructing the accomplishment of important goals (Sheldon and Elliot, 1999). The consequence of shared individual-and organizational values yields positive outcomes both for the individual and the organization,

[2] Kibbutz is a collective community in Israel which was traditionally based on agriculture. Today, farming has been partly supplemented by other economic branches, including industrial plants and high-tech enterprises. Kibbutzim began as utopian communities, a combination of socialism and Zionism. In recent decades, many kibbutzim have been privatized and changes have been made in the communal lifestyle. A member of a Kibbutz is called Kibbutznik.

manifested in various objective parameters, such as high satisfaction, motivation, commitment and less turnover intentions (Hofstede, 1998; O'Reilly et al., 1991). In an environment where the values of the organization and those of its workers are congruent, individuals share the same values such as an environment provides support reinforces the fulfillment of needs. Work place and personal value congruence has a positive effect on individual satisfaction (Sagiv and Schwartz, 2000). Value congruence tolerates a social system and organizational culture which facilitate the interactions of the individuals, aiming at achieving individual goals (Meglino and Ravlin, 1998). Work place commitment emerges from the individual's identification with workplace values (Porter et al. 1974; Steers, 1977; Schein, 1992). On the contrary, the absence of congruence between the work place and the individual's values leads to negative outcomes both for the individual and the organization. The employee's welfare itself would be at risk, and thus, he/she may be less devoted to and productive for the organization (Finegan, 2000). Research shows that workplaces that are value oriented also shape the employee's responses to different situations at work (Black, 1994).

In the research conducted by Leviatan (1996,1997) it was found that in value oriented Kibbutzim, the best employees stay because of their identification with Kibbutz values and disregard alternatives and temptations from the labor market outside the Kibbutz. Hence, they exhibit less voluntary turnover intentions (Ibid, 1996, 1997; Hyde and Weathington's, 2006).

Based upon the above literature findings, the following hypothesis was formulated:

**H3**: Organizations that are values oriented will reduce voluntary turnover intention.

In Leviatan's (1996, 1997) studies, it was found that in Kibbutzim where fulfillment of members' welfare-related needs was emphasized, young employees tended to consider their membership based on a profitability criterion (in other words, based upon the likelihood of fulfilling their welfare-related needs). Under such circumstances, those more skilled in various fields (possessing more personal resources in terms of education and experience), would demonstrate a lower commitment to the Kibbutz. Therefore they were more likely to leave voluntarily (than those less skilled, with inferior resources), and were tempted by alternative jobs offered by competing organizations. In cases where organizations were value oriented, the best employees would remain because of their identification with organizational values. Based upon the above assertions, the following hypothesis was formulated:

**H4**: Personal resources affect voluntary turnover intention differently when the organization is needs fulfillment oriented (focusing on satisfying material needs) as opposed to value oriented. In other words the level of employees' personal resources has a different impact on voluntary turnover intention when the company is oriented toward needs fulfillment (focusing on satisfying material needs) and when it is oriented towards satisfying values.

According to Value Theory, employees are considered to be internal (organizational) customers (Grönroos, 1981:237), having their own values, and seeking a value focused workplace that is in harmony with their own values. Thus, it is logical to conclude that when internal customers' needs change, and the workplace (the needs provider) fails to adapt, internal customers may become dissatisfied and may intend to terminate the relationship (Beverland et al., 2004).

However, research has shown that individuals who believe in *work related values* when working in organization that encourage and promote such orientation, have high organizational commitment and less voluntary turnover intention (Black, 1994; Hyde and Weathington, 2006). Other research showed that an organization that is work values oriented (and therefore, so are its employees) will produce high organizational commitment and hence less voluntary turnover intention (Hyde and Weathington, 2006).

Based upon the above literature findings, the following hypothesis was proposed:

**H5:** Employees' voluntary turnover intention is reduced in organizations that promote work related values. In other words, the more the organization promotes work values the lower employees' voluntary turnover intention exists.

**Measurements**

*a) The dependent variable: Voluntary turnover intention*

Answers to the questions concerning the dependent variable were measured with a five points scale (1 = Strongly disagree, 5 = Strongly agree).

Employees' intention to voluntarily leave the organization was measured with four questions, three of which were taken from Price (2001) and one from Griffeth & Home (1988) as following:

Q11.1"I would like to quit my job at my current work place"

Q11.2 "I plan to quit my job at my current workplace as soon as possible"

Q11.3 "I plan to stay with my present employer as long as possible"

The internal consistency of these three items (Price, 2001) is 0.8.

Q27.1 "I intend to remain in my profession but leave the organization at or before the end of the year"

The four items reliability was checked and the internal consistency value was 0.9. The new variable (composed from the above items mean values) was called *Voluntary Turnover_co.*

*b) Independent variables*

- **Personal resources**

The items related to personal resources in the employees' questionnaire were based on Leviatan's Index of Personal Resources (1996, 1997) and adjusted for this study.

The questions in this part concerned the respondents a) "intellectual capacity", "corporate administrative capacity" and "creative ability"; b) level of economic experience; c) administrative or managerial role; d) social experience and position, as follows:

a) Intellectual capacity, corporate administrative capacity and creative ability of the employees was measured using the following questions:

Q28.1 "Compared to colleagues of your age, how similar do you think your capabilities are to theirs?

Q28.2: "Compared to colleagues of your age, how similar do you think your skills are to theirs?"

Q28.3: "Compared to colleagues of your age, how creative do you think you are?

For these questions the scale was: 1. Above average, 2. Average 3.Below average.

b) The item measuring the respondents' level of *economic experience* (ability) was the following:

Q28.10 “Please specify how long you could afford not to work and still survive economically. Scale was: 1. Do not have the ability; 2. Up to six months; 3. Six months and a day to one year; 4. One year and a day to two years; 5. Two years and a day to five years; 6. Over five years.

c) The respondents' *administrative or managerial role* was determined based upon questions like:

Q28.4 “How many years of experience do you have in Hi Tech?"
Q28.5 “Do you hold a managerial position?”
Q28.6 “Please detail the managerial position you have held in the last five years”
Q28.7 “How many years of experience do you have in management?”

d) The level of *social experience and position* was determined based upon questions like:

Q28.8 “Have you performed a social role in the community in the last five years?" (paid or as volunteer in hospital, police force, work with new immigrants, weak/ needy population and the like) The scale was Yes/No
Q28.9 “Please give detail of your social role”

Because the answers were measured on different scales, the scale reliability could not be done and *factor analysis* with *rotation variamax* was employed. Two factors were created. The first, including variables 28.1, 28.2 and 28.3 was given the name: *Fac1_Social Resilience* (or resilience compared to colleagues). The second factor, including items 28.1 and 28.10 referred to seniority in managerial position and economic survival ability without salary, was given the name: *Fac 2_Economic Resilience*. Fac1_Social resilience explained 61% of the variance and the percent of variance extended in Fac2_ Economic resilience was 67%.

- **Needs fulfillment oriented organization**

The questions concerning the Organization needs fulfillment orientation (focus) were based on an index by Leviatan (1996 1997) and adapted for the study.

The index included 16 items (Q29.1- Q 29.16) about the degree of respondent satisfaction with *material rewards* (salary, benefits, housing, social benefits, car or car allowance, contribution towards tuition, participation in sports telephone and lunch subsidies, short vacations organized by the workplace, training provided by the organization, laptop/computer, satisfaction with work environment, the time taken for salary to enter one's bank account, shares/options that the respondent was given). Some examples are the following:

Q.29.1: “How satisfied are you with your salary in the workplace?”
Q.29.4: “How satisfied are you with the social benefits received?”
Q.29.9:”How satisfied are you with the gym at work?”
Q29.12: “How satisfied are you with the training and guidance provided by the workplace?”
Q29.16: “How satisfied are you with the share/stock options?”

The measurement scale ranged from 1 - Very dissatisfied to 5 - Very satisfied/pleased. The more the employee is satisfied with the level of material compensation (namely high in the scale) the greater the emphasis the organization

placed on the needs fulfillment of the employees and therefore is needs fulfillment oriented. The reliability of the scale was 0.8 (Alpha Cronbach). The new variable was called *Need_ Fulfillment*.

- **Value oriented organization**

The value oriented index in this research questionnaire was based on Leviatan (1996, 1997). 8 items concerning the level of employees' satisfaction with values they get were used in our study (Q 30.1 - Q 30.8). Some examples are the following:
Q30.1 “How satisfied are you with fulfilling your personal ideals at work?”
Q30.3 “How satisfied are you with fair opportunities for promotion?"
Q30.5.“How satisfied are you with sharing in decision making?”
Q30.8 “How satisfied are you with workplace values (fairness, justice excellence, accomplishment, etc.)?”

The scale of responses ranged from 1 Very dissatisfied to 5 - Very pleased. The more the employee is satisfied by the values level (namely high in the scale) the greater the organization's focus on values or is value oriented. The reliability of the scale was 0.9 (Alpha Cronbach). The new variable was called *Value_oriented*.

- **Work values or work related values**

24-items were developed based on theories of motivation including needs theories from Maslow, Alderfer, McClelland, Hetzberg, JCM, and Expectancy Theory (Elizur et al., 1991). One additional question was added based on generational differences, “ethics and integrity”, so a total of 25 items were used to identify the work values of the respondents (Q 21.1-Q 21.25). Respondents were asked to indicate “how important it is for you to have each of the following in your work place" and the 25 values were listed. A six point scale was used: (1) Very unimportant (2) Unimportant (3) Somewhat unimportant (4) Somewhat important, (5) Important and (6) Very important. Examples of items related to work place values are:
Q21.1 “Achievement in work”
Q21.5 “Contribution to society”
Q21.10 'Independence in work”
Q21.15 “Job status”
Q21. 20 “Recognition for doing a good job”
Q21.25 “Ethics and integrity”

The internal consistency of the 25 items scale was 0.96. After the reliability mean testing was done, the new variable was called: *Work_valu*

Hereinafter is a summary table of the major reliability indices.

**Table 1** – Alfa Cronbach values

| VARIABLES | ALFA CRONBACH VALUE |
|---|---|
| Voluntary turnover intention (Dependent variable) | 0.9 |
| Personal resources (Independent variable) | factor analysis (not reliability test) |
| Needs fulfillment oriented organization (Independent variable) | 0.8 |
| Value oriented organization (Independent variable) | 0.9 |
| Work values (Independent variable) | 0.96 |

*Source*: computed by author

## 4. Findings and discussions

Results of all hypotheses tests are shown in the Table 2. The results of hypotheses testing emerge as follows:

**H1** posited that high personal resource of employee will reduce voluntary turnover intention.

To examine the hypotheses, Univariate GLM regression was run that included the dependent variable voluntary turnover intention and only the independent variable personal resources. The hypothesis was not supported. A second stage regression was run with the intervention variable using GLM Univariate. It was found that the intervention variable moderated the relationship between personal resources and voluntary turnover intention and that in both regressions (before entering the controlled variables and after entering them to the regression) the B was negative and small (B=-0.31). However in comparison to the previous regression the negative effect of the variable personal resources on voluntary turnover was not found to be significant (P=0.54). Namely, the employees' sample findings analysis showed that the hypothesis was not supported among IT employees in Hi-tech companies in Israel. The hypothesis was not confirmed in SEM for the employees' sample either [B=0.18, P=1.000).

The findings for employees neither confirmed nor strengthened previous research findings (see Leviatan 1996, 1997).

**Table 2:** Summary of the impact coefficients regarding voluntary turnover intention prediction

| **HYPOTHESIS** | **DEPENDENT VARIABLE: VOLUNTARY TURNOVER INTENTION (TEST AND RESULTS)** | | | | |
|---|---|---|---|---|---|
| | Independent variables | SPSS- GLM Univariate linear regressions - second stage | | SEM by AMOS | |
| | | **B** standard. | P | **B** standard. | P |
| **H1** | Personal resource | | 0.54 F=0.388 | 0.18 | 1.000 |
| **H2** | Need fulfillment orientation | -0.029 | 0.164 | -0.9 | <0.001[2] |
| **H3** | Value orientation | -0.461 | 0.0** | -0.9 | <0.001 |
| **H4** | Work values | -0.112 | 0.27 | -----[1] | -----[1] |
| **H5** | Need fulfillment*value orientation (interaction) | 0.083 | 0.33 | -----[1] | -----[1] |
| **N** | | 170 | 170 | 170 | 170 |

*Source*: computed by author

*p≤0.05 **P≤0.01 ***p≤0.001

[1]---- Was not checked in SEM (work values was not confirmed as predictor in SPSS so was not entered into SEM. Concerning H2 there was limit in the amount of connections due to sample size. It was actually dropped from the model because it did not improve the indices.).

[2] In Amos significant has to be P <0.05

**H2** asserted that: Organizations that are needs fulfillment oriented will raise voluntary turnover intention.

Needs fulfillment oriented organizations raise voluntary turnover intention. Or in other words higher focus on the needs fulfillment of the employees by an organization (and mainly on the fulfillment of material rewards) leads to a higher employee intention to leave the organization voluntarily.

In order to examine the hypothesis, a GLM regression was run that included the independent variable needs fulfillment orientation and only the dependent variable voluntary turnover intention. In the first stage the regression was ran without the demographic intervention variables. It was found that needs fulfillment had a significant effect on the reduction of voluntary turnover intention (B=-0.211 ,P=0.002). Thus it can be stated that, as Hi-Tech companies focus on the satisfaction of needs, voluntary turnover intention reduces. In the second stage, regression model intervention variables were added to the regression and controlled. It was found that satisfaction of needs continued to have a negative effect on voluntary turnover intentions (B=-0.164; P=0.029). That is, none of the variables introduced has a significant effect on the results. The hypothesis was not supported among the IT employees. The employees did not think that needs fulfillment oriented IT companies increased voluntary turnover intention, but reduced it. In hypothesis testing that was done in SEM (Structural Equation Model) it was found that the variable needs fulfillment (the organization focus on needs fulfillment) significantly decreased voluntary turnover intention (B=0.15, $P \leq 0.001$) through the latent variable internal causes of voluntary turnover that decrease voluntary turnover intention (B=-0.90, P<0.001).This accorded with the trend that was found in the SPSS hypothesis testing. In addition in SEM analysis, it was found that the variable needs fulfillment was the fourth important variable accounting for voluntary turnover intentions that had the strongest weight in explaining voluntary turnover intentions (B=0.15, P<0.001).

The finding supported the literature of motivation and related models. In these, the employee perception is that their interest is only maximizing their benefits and this is the reason for making them stay with a particular organization (Shamir, 1990) and from this point of view reduce voluntary turnover intention. The contradiction in the findings can be explained by Herzberg's model (Ryan and Deci, 2000; Hertzberg, 1968, 2003). According to Herzberg the question that arises is how much needs fulfillment (such as material compensation) provided by IT employers will reduces voluntary turnover intention. According to his theory of motivation, from a certain stage needs fulfillment does not increase motivation, and therefore there is a need to emphasize internal factors or *motivators* (Herzberg, 1968, 2003). Thus, if the emphasis is on the external factors only (material rewards) employee motivation will remain average (may even decrease) and this will lead to voluntary turnover intention. This primarily will happen among employees who have more resources (talent and extensive knowledge).

The hypothesis analysis findings in SPSS show that needs fulfillment orientation in organization as a tool for creating employee commitment does not succeed in generating IT employee commitment and may result in or increase voluntary turnover intention particularly among IT employees having more resources (for example, greater talent, knowledge and skills than the organization needs).

**H3** assumed that: Values oriented organizations will reduce voluntary turnover intention.

In order to examine the hypothesis, a Univariate GLM regression was run that included the independent variable values orientation and only the dependent variable voluntary turnover intention. In the first stage the regression was run without the demographic intervention variables. It was found that the value oriented variable considerably reduced voluntary turnover intention (B=-0.461 ,P=0/ P<0.01). Hence it can be said that, as a Hi-Tech company increase their focus on values, voluntary turnover intention decreases. In the second stage the intervention variables were entered into the regression and were controlled. It was found that value orientation retained a negative effect on voluntary turnover intentions (B=-0.461, P=0/<0.01). That is to say, none of the intervening/ controlled variables had a significant effect. The hypothesis was supported, meaning the employees think that value orientation in IT companies decreases the voluntary turnover intention of IT employees. The findings also showed that when employees are satisfied with these values (especially when there is congruence between their own and organizational values), their voluntary turnover intention decreases, especially in the case of the best IT employees. In hypothesis testing that was carried out using the SEM model it was found that the variable value orientation led to a significant decrease in voluntary turnover intention. The latent variable internal causes of voluntary turnover, was found to decrease voluntary turnover intention (B=-0.90, p<0.001). It was found that the variable having the most significant effect on voluntary turnover intention is organizational focus on values (B=0.51, P<0.001).

The SEM model analysis results and findings supported the field literature. For example, Leviatan (1996, 1997) found that the best employee do not voluntarily leave the values oriented organizations. In this case employees' commitment to the organization emerges from their identification with organizational values and from the congruence between organizational values and their own (Porter et al., 1974; Steers, 1977; Schein, 1992).

**H4** held that: Personal resources affect voluntary turnover intention differently when the organization is needs fulfillment oriented (focusing on satisfying material needs) versus value fulfillment oriented /focus (beyond the variables of gender, age, origin, marital status, education, wage).

Firstly the relationship between the level of personal resources and voluntary turnover intention were examined and no relationship was found between them.

Second, Univariate GLM regression was run because there was a categorical independent variable. At the first stage the regression included the independent variables needs fulfillment and value orientation and only the dependent variable voluntary turnover intention. Namely, in this stage the regression was run without the demographic intervention variables. In the second stage the controlled variables were introduced and it was found that needs fulfillment had no effect on voluntary turnover intention (B=-0.347, P=0.07). However, values orientation clearly affected voluntary turnover intention and was found to significantly reduce it (B=-0.669, P=0.05). The combination of need supply and value orientation did not affect voluntary turnover. However, the value

orientation of IT companies in comparison to needs fulfillment focus did reduce voluntary turnover intent. From this point the hypothesis was supported. Value orientation of IT companies was found to reduce voluntary turnover intention especially of the best IT employees with the many resources.

This finding supported the literature (Leviatan, 1996, 1997; Carmeli, 2005; Chang et al., 2009; Sharoni et al., 2011.).

**H5** supposed that: organizations that promote work values reduce employees' voluntary turnover intention**.**

For the hypothesis examination, Univariate GLM regression was done. That is because the independent variable was categorical. In the first stage the regression was run with the value oriented variable but without the demographic intervention variables. The effect of the variable work values on voluntary turnover intention was found to be negative and was not significant (B=-0.112, P=0.270). In the second stage the intervention variables were entered to the regression and were controlled; almost no change was found in the result (B=-0.112, P=0.270) and the results were found not significant. Namely, work values orientation/focus of organization (mainly beneficial to the employee) did not reduce voluntary turnover intentions beyond the controlled variables.

This finding was surprising, because it contradicted the field literature. Studies have shown that organizational focus on work values shapes the employee's responses to different situations at work (Black, 1994). Namely, work values are seen as important in determining the individual's expectations of work, their response to specific work situations and likely performance in a work role (Black, 1994).Therefore organizations focused on work values are supposed to produce high organizational commitment (especially affective commitment) of IT employees to the organization and hence less intention to leave voluntarily among them (Hyde and Weathington, 2006).

However, when considering the findings it can be understood that organization values and work values are not the same. Work values are values that serve the employee and are designed specifically in his/her favor (such as, promotion, self-fulfillment and job satisfaction, interest, challenge, achievement, job security, etc). Organizational values are the organization's ideological values such as achievement of objectives, fairness in appointments, excellence, sharing decision making, etc. (which are led by top management).

When scrutinizing the research findings concerning values, it can be seen that among the IT employees it was found that ideological organizational values (such as fairness and partnership) related to lower voluntary intentions to leave in practice. This is more than work values which were not found to be related to voluntary turnover intentions. Apparently IT employees want to feel that management knows where to lead the organization. It gives them a sense of security in the organization and hence develops less intention to voluntarily leave.

From this finding it can be learnt that organizations focusing on work values (concerning the employee and his working conditions) do not reduce voluntary turnover intention among IT employees. Organizations that want to preserve their human capital, especially IT employees, and avoid organizational voluntary turnover of these employees have to encourage organizational values focus and invest in their implementation of them (and less on work values).

Table 3 summarizes the hypotheses testing:

**Table 3:** Summary of the hypotheses testing

| Hypotheses | SPSS | SEM by Amos |
|---|---|---|
| H1 | rejected | rejected |
| H2 | rejected | rejected |
| H3 | accepted | accepted |
| H4 | accepted | rejected |
| H5 | rejected | rejected |

## 5. Conclusions

It was found that when the organization focuses on values only or on needs fulfillment only, it affects voluntary turnover intention differently. It seems that when a workplace is focused on values IT employees' voluntary turnover intention will reduce. Namely, IT employees will tend less to develop voluntary turnover intentions and hence leave the company voluntarily. The finding is consistent with the literature (for example in Black, 1994; Hyde and Weathington, 2006). H5 result showed that the employee's belief is that organizational focus on work values (which benefit the employee) did not reduce voluntary turnover intention. This finding contrasted with the finding of H4 according to which when the organization focuses on values only or on needs fulfillment only, it affects voluntary turnover intention differently and that when a workplace is focused on values, IT employees' voluntary turnover intention will reduce.

In depth examination of this finding showed that with respect to the cause of voluntary turnover intention of IT employees there is a difference between the concepts of work values and organizational values.

Focusing on *working values* shaping and assimilation, has no effect at all on the development of voluntary turnover intentions among IT employees. By comparison, if the organization emphasizes, designs and implements *organizational values*, voluntary turnover intentions will decrease. Namely, the question is which values produce a higher impact on voluntary turnover intention. The findings suggest that Hi-Tech companies and organizations that employ IT workers are interested in harnessing these employees (by increasing the commitment and avoiding voluntary departure), need to design and implement organization values as a mechanism of eliminating voluntary turnover intention and producing or increasing IT employee commitment.

Researchers have suggested that organizations could develop a turnover policy that anticipates voluntary turnover and attempts to slow it down (Ajzen and Fishbein, 1980; Ajzen, 1991)**.**

*The research findings show that* organizations that employ IT workers and Hi-Tech companies in particular should develop an employee retention policy that is not focused on needs fulfillment such as existing material compensation systems. A non-material compensation system which is based on organizational values agreed upon by companies and their IT employees would encourage the IT employees to be more committed. This value based compensation system would

translate the value system to everyday behaviors and actual policy and could be used as a mechanism that prevents developing voluntary turnover intentions and creates IT employee commitment to the company particularly, those with the best resources.

*The research limitation* concerns the sample size (only 170 IT employees) which might create problems with external validation. The reason for the limited sample is the long processes involved in Hi-Tech companies giving approval for the distribution of questionnaires to IT employees. Companies perceive the cost of completing the questionnaire and interviewing employees as relative to the cost of IT employees' hourly or daily wage. As the wage costs of IT employees are high this can be expensive for the company.

Despite these limitations, the findings suggest some new and intriguing ways to think about employee retention and voluntary turnover intention. They offer certain insights into relevant issues of voluntary turnover intention and employee retention for researchers, HR and organizational development managers and consultants and offer a mechanism for preventing voluntary turnover that is applicable to organizations in general and Hi-Tech companies in particular.

*Future study* should focus on conducting this research on larger populations and in overseas Hi-Tech companies in order to examine whether the reasons for and conditions of voluntary turnover intention in other countries IT sector are similar to or different from those that were found in Israel.

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# IMPACT OF FOOD IMPORT TARRIF DECREASE IN INDONESIA

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**Abstract.** The research aimed to estimate the impact of agricultural trade reform under WTO on the welfare and food security in Indonesia. The analysis of the research data was conducted by using CGE/MPSGE model based on SAM (Social Accounting Matrix) data and input-output table of Indonesia in year 2008. The results showed that the decrease and removal of food import tariff would increase income and welfare of all household classes. Removal and decrease of tariff also increased the output of several commodities, i.e. paddy, nut, corn, as well as other commodities, and also the commodities in the mining sector. However, on the other hand, the tariff decrease and removal also decreased the output of industrial sector, either in the agricuture industry, or in other industrial sectors. The tariff removal and decrease also impacted the service sector in term of the decreasing output. This research concluded that the trade reform will weaken food security in Indonesia because the increase on food crop output has not been able to increase food export yet, and it will in the contrary increase the food import (e.g. paddy, nuts, and corn).

**JEL Classification**: A11, B22, C68, D58

**Keywords**: import tariff, food security, welfare, CGE

## 1. Introduction

The Indonesian Law on Food Number 7 Year 1996 defines that the national food security is a condition where the households' need of food availability can be secured, which is reflected in terms of the food amount, quality, safety, widespreadness, and reachability. Generally, food availability can be procured from two main sources, which are from import and domestical production. Therefore, the performance of national food security is not apart from the international food trade dynamics.

The international trade nowadays tends to take the form of free-trade, which could be formed in various collaboration types such as bilateral, regional or multilateral collaborations. Within the free-trade context, the World Trade Organization (WTO) requires that under the agreement in agriculture sector

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(Agreement on Agriculture (AoA)), there must be a reform on the trading policy in order to create agriculture trading system that is fair and market-oriented. Regarding this policy reform, Indonesia ratified the AoA since January 1st, 1995, which the substance of the agreement is the encouragement of tariff reduction, removal of non tariff obstacles, as well as decreasing of both domestical price subsidy and export subsidy of agriculture sector.

Under the International Monetary Fund (IMF) monitoring, in 1998 Indonesia reformed its national food trade policy. It was the point where the Indonesian government's free-trade liberalization policy started to open the market of particular food products (i.e. soybean, wheat-flour, and sugar) that were previously under the monopoly of the Indonesian Badan Usaha Logistik (BULOG). The monopoly by BULOG on rice import had also been eliminated. It was replaced by general importer with zero percent admission charge. Later on, this policy impacted on the economic performance of rice.

The Indonesian government's agricultural trade policy reformation has promoted around two hundred percent of increase on food import, in which some of those are rice import that increased at 10%, corn at 20%, soybean at 55% and Sugar at 50% (Sawit, 2003). The increase on food import had caused the higher prevalence level of poor farmers in Indonesia. It was because those commodities had absorbed a big share of labor-market. The commodities' labor-market shares were 23 million, 9 million, 2.5 million, and 1 million accordingly, or about 68% of total households in Indonesia.

The dependence on the imported products will tend to get higher when the international market's price is too high due to the decreasing food stock (Baharsjah, 2004).This situation will paralyze the national security and disturb the national social, economic, and political stabillity (Rasahan, 1999). According to Suryana (2008), the instability of national food security will tend to lead the nation to the economic shocks and the higher prevalence of criminality.

In 2005, the Conference of Minister Level (KTM) VI of WTO in Hongkong concluded an agreement on the disbandment of the 3 (three) pillars of negotiation in agriculture, namely domestic support, export subsidy, and market access, which would be realized in 2013. These agreements will influence the economic situation of the WTO countries (including Indonesia) under the condition if these agreements are to be implemented consistently. Due to the fact that Indonesia tends to increasingly depend to imported food, in this study, we focus on the imported-food tariff policy.

Decreased or removal of food import tariff will cause lower food import price so that domestic food price will decrease. This in turn will harm the domestic producers because their income will decrease so that effective demand of food as indicator of food security will also decrease. However, according to Anindita and Reed (2008), if import tariff is disbanded, there will be schemes to pay domestic producers' loss because economic welfare will increase. The impact on consumers could be varied because food crop has subsisten character and according to Aksoy and Hoekman (2010), some households have double roles both as producers and consumers.

Previous researches showed that trade reform impacted welfare and food security in various forms. Ratnawati (1995) in her work found that import tariff policy and export tax could increase the real economic growth but caused

decrease on income distribution and worsened the economic stability. Haryadi et al. (2008) in their study found that liberalization of trade impacted the Product Domestic Bruto (PDB) of three countries, which were Indonesia, Australia, and New Zealand. The study by Charles, Longrigg, and Tugend (2001) concluded that in poor countries, the agriculture trade reform weakened food security due to the increasing food import and the decreasing working opportunity.

Theoretically, trading reform has ambiguous impact on welfare. The theory of second-best stated that trading reform in unperfect competition economics will result in benefit or loss of net welfare (Lipsey and lancaster, 1956). Because there is no perfect competition economics in the world, therefore, all countries are susceptible to the effect of the second-best uncertainty of trade reform (Suranovic, 1999). Based on the theorema of Stolper-Samuelson, trade reform usually results in the benefit of income factor on several production sectors and loss on other sectors (Dixit dan Norman, 1980; Khan, 1998).

Therefore, based on the background that was previously discussed, we formulated a research question in the following form:

"In what way of change the national trade reform implementation has impacted the food security and welfare in Indonesia?"

The research will particularly focus on the impact of the decrease of food import tariff to the food security and welfare in Indonesia.

## 2. Theoretical Framework

### 2.1. Concept of Welfare

When the economy is changing, it will lead the consumer to a better or worse economic situation. Many experts had developed several tools to measure how consumers are affected by economic changing, e.g. compensating and equivalent variations.

*Compensating* dan *equivalent variations* are methods to assess welfare effect on a set of price changing, by using money measurement of welfare change. For example, these methods can be used in the case of price changes from $p^0$ to $p^1$ caused by indirrect tax.

Compensating variations (CV) is the difference between the minimum expenditure that is needed to achieve the original utility level, with a new price and the total of the initial expenditure. Within the context of the price increment, it is an amount that should be given to individual in order to return the original utility level at a new price. Therefore:

$$CV = E(p_1, U_0) - E(p_0, U_0)$$

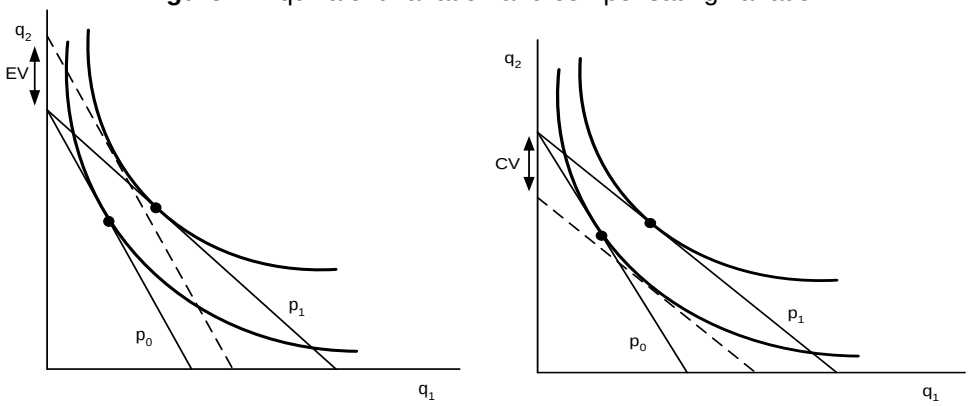
Equivalent variation is the difference between the total expenditure and the minimum after-change expenditure that is needed to achieve the after-change utility at before-change price. This is an amount that should be taken from individual after price change to give the person a new utility level at old price. Therefore:

$$EV = E(p_1, U_1) - E(p_0, U_1)$$

Equivalent variation uses current price as a basis. Meanwhile, compensating variation uses new price as a basis. Picture 1 draws an example of equivalent and compensating variations in the case of two things. Which measurement will be the most suitable will depend on the condition itself. If we try to arrange several schemes of compensation with new price, then compensating variations is a rational measure. But, if we just try to obtain a fair measure of "availability to pay", the equivalent variation might be better.

This research uses Equivalent variation (EV) as indicator that is used to see welfare changes on different scenario of trade reform. Measurement of Equivalent variation (EV) is oftenly used in many studies on CGE base.

**Figure 1.** Equivalent variation and compensating variation




Equivalent variation is used in this reserach because of two reasons. First, equivalent variation measures income changes on current price, and it is easier for decision maker to appraise money value on current price better then hypotetical price. Second, if we compare more than one change in the proposed policy, compensating variation uses different basic price for every new policy meanwhile equivalent variation keeps basic price on the status quo. By this, equivalent variation is more appropriate for comparation of various projects (Varian, 1997). In addition, EV is calculated not only for country in aggregat, but also for various groups of households in the country that possibly for assessment of welfare impact in all households (Nouve, 2006).

In addition to EV, further insight into welfare change may be gained through direct examination of changes in national and household incomes and in the functional distribution of income to factors of production. This study will make use of this insight to complement conclusions drawn for the EV measure.

### 2.2. Food security

One of measurement for public welfare level is capability to get enough food, well-nutrient food, safe food, meet the appetite and food as the belief. Capability in getting food as mentioned above depends on public purchasing power and capability of providing and distributing food to all area.

"Food security" is a very broad and complex concept,, it is continue to develop and different in each context, time and place. There are definitions and indicators for food security, generally definition of food security refer to definition of World Bank (1986) and Maxwell (1996).

Maxwell (1996) proposed four elements of sustainable food security in family level, namely: (1) Food sufficiency, is number of calory needed for active and health life, (2), access on food is right (entitlements) to produce, buy or exchange food or accept as given (transfer), (3) endurance is a balance among susceptible, risks and social security guarantee, and (4) time function when food security could be in chronic, transition and/or cycle.

This study adopts the widely used definition put forward by the 1996 World Food Summit. It will be considered that "food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary need and food preferences for an active and healthy life" (FAO, 1996). It means: food security implies three key conditions, first it requires adequate *availability* of food, i.e., a sufficient, sustainable and stable food supply, second implies a sustained *access* to food by each individual. And three, it requires effective *utilization* of the available food..

Insufficient food supply at any level of aggregation implies undernourishment, hence food insecurity. sufficient food availability in a given geographic area does not assure adequate food access to all individuals living in that area. Food availability and access are preconditions for adequate utilization

The study focuses on the first two dimensions of food security. Physical food sufficiency is measured through nationwide food supply indicators, whereas economic access is captured by both households' effective demand for food and the country's capacity to finance its current food imports through trade. In line with Supadi (2009) in which one of indicator to measure food security is dependency of national food availability to import.

### 2.3. Import Tariff on Case of Small Country

Tariff is tax or cost that charged on an entry or exit products of the country. Tariff charged on imported product is import tariff, tariff charged on exported product is called as export tariff. Theoretically, tax that taken from tariff gives income to government. There are many countries apply tariff policy to protect industry in the country especially for new growing industry.

Impact of tariff could be different in every country. In small country that could not affect world price, tariff implementation will be just changing on price in the country, world price does not change. In the contrary, in the case of big country, tariff implementation will affect world price. The explanation about impact of import tariff in small country and big country is as follow.

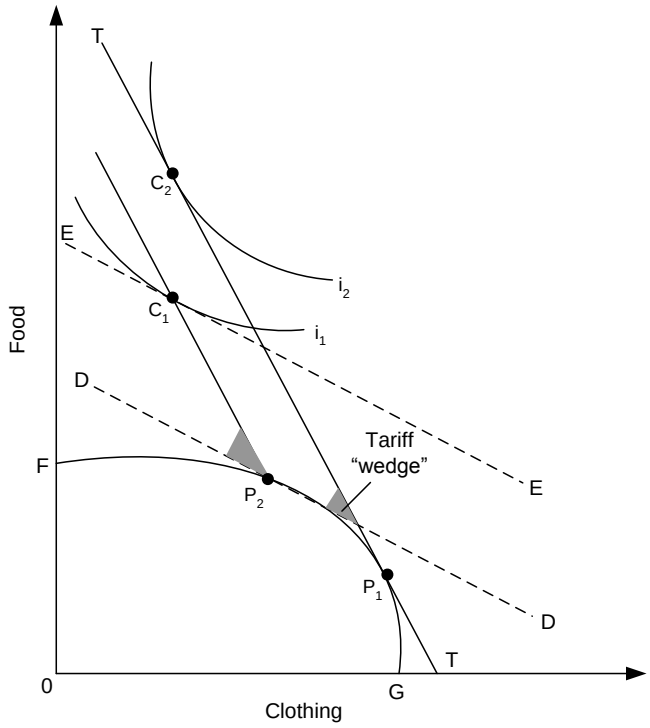
Small country is defined as country who are not able to affect world price, where the world terms of trade remain unchanged. that in free- trade equilibrium, assuming only two commodities, food and cloth, Country A will maximize its welfare by producing at the point where its domestic ratio of marginal costs equals the world exchange ratio.

And then by engaging in trade in order to reach the highest possible indifference curve. Such a free-trade equilibrium is shown in Figure 2, with the world price ratio shown by the slope of TT, production at point $P_1$, and consumption at point $C_1$, where TT is tangent to the indifference curve $i_2$. Country A exports cloth and imports food.

If Country A imposes a tariff on its imports of food, the first effect will be to increase the domestic price of food, thus causing a divergence between the domestic exchange ratio and the world exchange ratio. As the result,the domestic exchange ratio becomes equal to the slope of DD, which is flatter than TT, indicating a higher relative price of food. The tariff drives a wedge between the domestic and external price ratios; geometrically, that wedge can be seen as the angle between the two price lines. The higher price of food induces firms to expand food production and to reduce cloth production. The production point moves to $P_2$, where the domestic price line (DD) is tangent to the production-possibility curve.

Assuming that the world price ratio remains unchanged, international trade takes place along the line $P_2C_2$ (parallel to TT). A new equilibrium in consumption is reached when two conditions are satisfied: (1) a domestic price line, EE, whose slope is equal to the tariff-distorted domestic price ratio, is tangent to a community indifference curve $i_1$; and (2) the world price line, $P_2C_2$, intersects the community indifference curve at its point of tangency with the domestic price line, EE. These two conditions are both satisfied at the point $C_2$ in Figure 2. Technically, the first condition guarantees that the marginal rate of substitution in consumption equals the domestic price ratio facing consumers; the second condition satisfies the requirement that the domestic price ratio diverges from the world price ratio.

**Figure 2.** The effects of a tariff on general equilibrium model for small-country case




*Source*: Dunn Jr and Mutti, 2000

In the new equilibrium, Country A continues to export cloth and import food but in smaller quantities than before. The tariff has stimulated domestic production of food, reducing Country A's dependence on food imports. It has also reduced domestic output and exports of cloth and reduced welfare, as indicated by the movement to the lower indifference curve, from $i_2$ to $i_1$. Thus we reach the same conclusion in both general and partial equilibrium analysis: in the small-country case a tariff reduces national welfare.

## 3. Methodology

### 3.1. Type and Source of Data

This study used secondary data which derived in Table Input-Output (IO) and Social Accounting Matrix (SAM) in 2008 of created by Statistics Indonesia. Those data are the newest data in Indonesia. Other data was obtained from institutions related to this research such as World Bank, International Monetary Fund (IMF), Department of Trading, Foreign Department, Agriculture Departent, and the parameters of the system of equations obtained from the previous studies.

### 3.2. Method of Analysis

Analysis of Computable General Equilibrium (CGE) that is used in the research is a mathematic analysis by basic assumption of general equilibrium theory in the economic that packaged into computer program. CGE Model simulate the performance of market economics, in which price and quantity is adjusted to the market that assumed to be always in equilibrium, either product market or production factor market.

### 3.3. Specification of Model

CGE model in the research is adopted from CGE model developed by Lofgren, Harris and Robinson (2002). Structure of whole CGE model is explained on Picture 3. Equations are divided into 4 blocks: prices, production and trade, institutions, and system constraints.

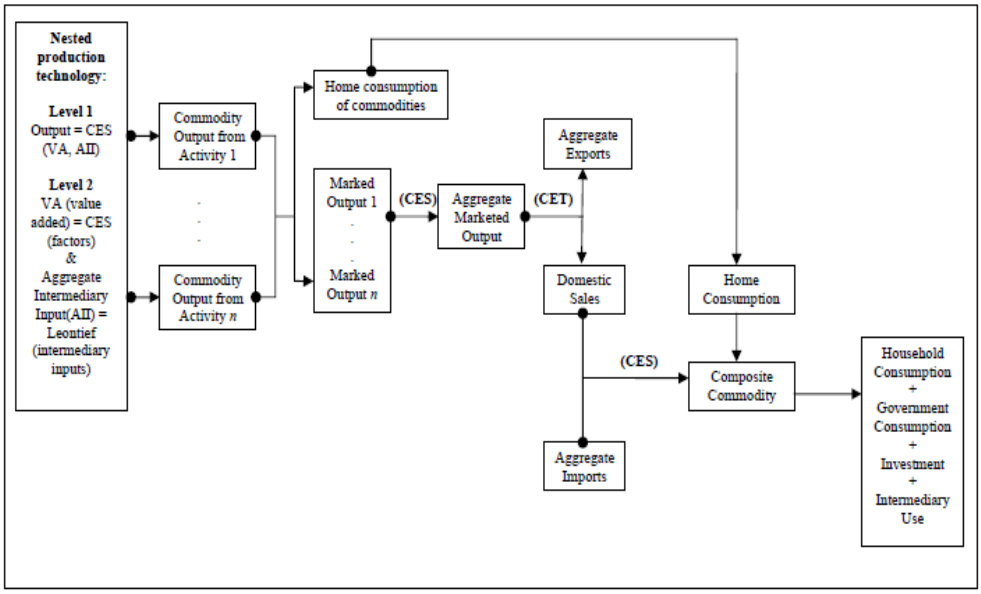
The standard CGE model explains all of the payments recorded in the SAM. The model therefore follows the SAM disaggregation of factors, activities, commodities, and institutions. It is written as a set of simultaneous equations, many of which are nonlinear. The assumption of model CGE is industry that operated in perfet competition market in both input and output market.

Each producer (represented by an activity) is assumed to maximize profits, defined as the difference between revenue earned and the cost of factors and intermediate inputs. Profits are maximized subject to a production technology, the structure of which is shown in Figure 3. The technology is specified by a constant elasticity of substitution (CES) function or, alternatively, a Leontief function of the quantities of value-added and aggregate intermediate input. The Leontief alternative is the default. The CES alternative may be preferable for particular sectors if empirical evidence suggests that available techniques permit the aggregate mix between value-added and intermediate inputs to vary. Valueadded is itself a CES function of primary factors whereas the aggregate intermediate input is a Leontief function of disaggregated intermediate inputs.

Each activity produces one or more commodities according to fixed yield coefficients. As noted, a commodity may be produced by more than one activity. The revenue of the activity is defined by the level of the activity, yields, and commodity prices at the producer level.

Domestic output may be sold in the market or consumed at home. For marketed output, the first stage in the chain consists of generating aggregated domestic output from the output of different activities of a given commodity. These outputs are imperfectly substitutable as a result of, for example, differences in timing, quality, and distance between the locations of activities. A CES function is used as the aggregation function.

**Figure 3.** Commodity Flow in CGE Model




*Source*: adapted from Lofgren, Harris and Robinson, 2002.

At the next stage, aggregated domestic output is allocated between exports and domestic sales on the assumption that suppliers maximize sales revenue for any given aggregate output level, subject to imperfect transformability between exports and domestic sales, expressed by a constant elasticity of transformation (CET) function. In the international markets, export demands are infinitely elastic at given world prices. The price received by domestic suppliers for exports is expressed in domestic currency and adjusted for the transaction costs (to the border) and export taxes (if any). The supply price for domestic sales is equal to the price paid by domestic demanders minus the transaction costs of domestic marketing (from the supplier to the demander) per unit of domestic sales. If the commodity is not exported, total output is passed to the domestic market.

Domestic demand is made up of the sum of demands for household consumption, government consumption, investment, intermediate inputs, and transactions inputs. To the extent that a commodity is imported, all domestic market demands are for a composite commodity made up of imports and domestic output, the demands for which are derived on the assumption that domestic demanders minimize cost subject to imperfect substitutability. This is also captured by a CES aggregation function.

The simulation is conducted to see the impact of agricultural trade reform on welfare and food security consisting of several simulations that we called as scenario of trade reforms. This simulation is: import tariff decerase 2% and removal of import tariff (import tariff 0%).

## 4. Result and Discussion

The analysis was conducted by simulating of food import tariff for food crop commodity (paddy, nuts and corn) in 2 % and removal of import tariff (import tariff 0%). The following will be explained the impact of food import tariff as many as 2 % and removal of food import tariff to welfare and food security.

### 4.1. Impact of Import Tariff decrease on Welfare

Before discussing about welfare, there will be discussion first about impact of food import tariff decrease and removal to income. This policy has positive impact on income and all economic agents, by highest income is 0.39% (Table 1). Decrease of tariff for food import commodity will cause decrease on the commodity price. Household as consumer will get the benefit due to this condition because food price commodity will also decrease as well as other commodity price that indicated by the increasing of purchasing power (real income) of consumer.

**Table 1.** The Change of Income due to Decrease of Import Food tariff

| No. | Household Groups | Baseline (Trillion IDR) | SIM1 | SIM2 |
|---|---|---|---|---|
| 1 | Farm-worker Household | 4.356 | 0,3673 | 0,3673 |
| 2 | Agricultural-Enterpreneur Household | 4.355 | 0,3674 | 0,3904 |
| 3 | Lower-income Household | 4.359 | 0,39 | 0,39 |
| 4 | Non-labour force Household | 4.355 | 0,3674 | 0,3904 |
| 5 | High-income Household | 4.357 | 0,3902 | 0,3902 |

*Source*: Simulation Result 2013

Note SIM 1: import tariff decrease 2% SIM 2: imposrt tariff is removal

Decrease or removal of food import tariff actually will also increase all classes of household welfare (Table 2). Highest increase is 0.18% in the class of farmworker and lower class. Based on Theorema of Stolper Samuelson, decrease of food price will be followed by decrease of production factor price that many

being used in the production process including labor wage. But, income decrease is still smaller than household consumption expenditure so that household welfare increase.

**Table 2.** The Change of Walfare due to Decrease of Import Food tariff

| No. | Household Groups | Baseline (Trillion IDR) | SIM1 | SIM2 |
|---|---|---|---|---|
| 1 | Farm-worker Household | 16.911 | 0,1833 | 0,1597 |
| 2 | Agricultural-Enterpreneur Household | 16.910 | 0,1774 | 0,1538 |
| 3 | Lower-income Household | 16.926 | 0,1832 | 0,1536 |
| 4 | Non-labour force Household | 16.910 | 0,1774 | 0,1538 |
| 5 | High-income Household | 16.919 | 0,1773 | 0,1537 |

*Source*: Simulation Result 2013

Research result of Muhkopadhyay at al (2009) showed that impact of trade liberalization from East and South-East Asia will benefit whith increased output and welfare. Anindita (2009), showed that trade liberalization had a positivie effect on production, consumption, volume of export, net trade.

### 4.2. Impact of Food Tariff Import Decrease on Food Security

Impact of this policy to food security is approached by analyzing change of domestic output, export and import as the result of decrease and removal of import food tariff.

**a. Impact on Domestic Output**

If import food tariff is removal, domestic output of paddy, nuts and corn increase, tuber plants, horticulture of other food crop, ranch, forestry and fishery has decrease output. This is caused by world food price that responded by farmer to increase food production. Food product mostly consumed are paddy, nuts and corn, then farmer must increase the production of those commodity. Meanwhile mining sector, agriculture industry and other industry as well as service sector has decreased the output by both tariff decrease and removal.

Research result of Oktaviani (2000) showed that impact of trade liberalization of APEC to Indonesian economic is relatively small. But, Haryadi (2008) found that the policy of removal for trade obstacles in total will decrease domestic production, decrease export and increase import in the country that still apply those obstacles. Safuan (2012) found that tariff removal will increase output and welfare in ASEAN. Research result of Ismail et al (2009) showed that impact of zero tarrifs application by Sudan under COMESA is negatif on production, trade and food security.

**Table 3.** Change of Domestic Output due to Import Food Tariff Decrease

| No. | Sector | Baseline Trillion | SIM1 | SIM2 |
|---|---|---|---|---|
| 1 | Paddy | 1.447 | 14,9965 | 14,9965 |
| 2 | Nuts | 183 | 14,7541 | 14,7541 |
| 3 | Corn | 525 | 15,0476 | 15,0476 |
| 4 | Tuber Plants | 166 | 0 | 0 |
| 5 | Vegetables and Fruits | 944 | 0 | 0 |
| 6 | Other Plants | 33 | 0 | 0 |
| 7 | Other Farming | 1.554 | 0 | 0,0644 |
| 8 | Ranch | 1.555 | 0 | 0 |
| 9 | Forestry | 472 | 0 | 0 |
| 10 | Fishery | 1.139 | 0 | 0 |
| 11 | Mining | 4.767 | 0 | 0,021 |
| 12 | Agricultural Industry | 5.045 | -0,1586 | -0,0991 |
| 13 | Other Industry | 11.450 | -0,0087 | 0,0175 |
| 14 | Service | 16.775 | -0,0119 | -0,006 |

*Source*: Simulation Result 2013

**b. Impact to Export**

Decrease and removal of import tariff can increase export at several sectors and decrease several other sectors. Increase of export is about 0.01-20,6%. Decrease of export are in tuber plants, other plants and other industry.

**Table 4.** Export Change due to Food Import Tariff Decrease

| No. | Sector | Baseline (Trillion IDR) | SIM1 | SIM2 |
|---|---|---|---|---|
| 1 | Paddy | 2 | 0 | 0 |
| 2 | Nuts | 0,377 | 20,6122 | 20,5684 |
| 3 | Corn | 1 | 0 | 0 |
| 4 | Tuber Plants | 0,419 | 0,0191 | -0,105 |
| 5 | Vegetables and Fruits | 2 | 0 | 0 |
| 6 | Other Plants | 0,862 | 0,0139 | -0,0754 |
| 7 | Other Farming | 139 | 0 | 0 |
| 8 | Ranch | 3 | 0 | 0 |
| 9 | Forestry | 3 | 0 | 0 |
| 10 | Fishery | 22 | 0 | 0 |
| 11 | Mining | 1.326 | 0 | -0,0754 |
| 12 | Agricultural Industry | 1.988 | 0,3521 | 0,2012 |
| 13 | Other Industry | 3.835 | 0 | -0,0522 |
| 14 | Service | 629 | 0,4769 | 0,159 |

*Source*: Simulation Result 2013

**c. Impact to Import**

Decrease of import food tariff impacted on import increase of paddy, nuts, corn and agriculture industry. Decrease of import tariff caused import price decrease and this will encourage increase of food crop import and agriculture industry. Empirical evidence is inline with finding of Pudjiastuti et al. (2013).

**Table 5.** Import Change due to Food Import Tariff

| No. | Sektor | Baseline (Trillion IDR) | SIM1 | SIM2 |
|---|---|---|---|---|
| 1 | Paddy | 84 | 2,381 | -4,7619 |
| 2 | Nuts | 6 | 16,6667 | 0 |
| 3 | Corn | 35 | 11,4286 | 0 |
| 4 | Tuber Plants | 8 | 0 | 0 |
| 5 | Vegetables and Fruits | 44 | 0 | 0 |
| 6 | Other Plants | 0,749 | -0,0227 | 0,1309 |
| 7 | Other Farming | 62 | 0 | 0 |
| 8 | Ranch | 67 | 0 | 0 |
| 9 | Forestry | 8 | 0 | 0 |
| 10 | Fishery | 19 | 0 | 0 |
| 11 | Mining | 335 | 0 | 0 |
| 12 | Agricultural Industry | 792 | 1,7677 | 1,2626 |
| 13 | Other Industry | 7.898 | -0,038 | 0,0253 |
| 14 | Service | 3.019 | -0,1656 | -0,0662 |

*Source*: Simulation Result 2013

This fact need to be aware because the increasing of food import of country will weaken food security of the country.

But, decrease of import tariff will decrease other import plants. This is because government prioritize food import as the food stock than other plants. Other industry and service also decrease.

**5. Conclusion and Recommendation**

Conclusion that can be formulated from this research is as follow. Removal and decrease of import tariff is 2%, increasing an income and welfare of all household classes, but government income decrease. Removal and decrease of tariff will also increase output of commodity for paddy, nuts, corn, other commodity and mining sector. But, this will be decrease of industry sector output either agricultural industry or others as well as service sector. Disbandment and tariff decrease will increase export commodity for nuts, agriculture industry and service, but decrease export of tuber plants, other plants, mining and other industry. Import of paddy, nuts, corn and agricultural industry will increase when import tariff decrease.

Scenario of reform offered by research will bring different implication, but government is expected to increase the program to increase income and public welfare.

CGE model that is used in this research is assumed to work in perfect market competition meanwhile there is no perfect market competition. CGE model is static to one country, data of SAM that is used in this research in which household aggregation is divided into 5 groups and food crop commodity aggregation is a limitation in this research. Continuations research with same theme still can be conducted with adjustment such as assumption of unperfect market (monopoly or oligopoly). Dynamic CGE with many countries can be conducted to see impact of various country that related to trading. Sector aggregation and institution can be added to see disribution of income for other groups.

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