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EGYPT IMPORT DEMAND FOR SOURCE-DIFFERENTIATED TEA

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ABSTRACT

Egyptian tea market is one of the largest tea import markets as it ranked fifth among the world import markets for tea. Nevertheless, there is no economic research has been done on Egyptian tea market. Accordingly, this paper is the first study analyzing the Egyptian import demand for tea differentiated by source of production. Thus, the source differentiated Almost Ideal Demand System (SDAIDS), in which sources of tea are differentiated and the expenditure is treated as endogenous, has been adopted.

The results showed that India still has good opportunity to increase their exports to Egypt by removing trade barriers or/and trade agreements rather than price reduction are the key factors to increase the access of Indian tea in Egyptian tea market.

Indonesia has the largest expenditure elasticity (6.12) and strong elastic own-price elasticity indicating that Indonesia encountered sever competition in the Egyptian market. Consequently, price decrease policy has to be taken into consideration in addition to trade facilities in terms of increasing the Indonesian access to Egyptian tea market.

Keywords: Tea – Source Differentiated Almost Ideal Demand system – Egypt

INTRODUCTION

Although there are several legends which tell of the origin of tea, but the discovery by the Chinese emperor and inventor Shen Nung in 2737 BC (Li 1973) is the most prevalent one. Since then, the tea is spreading steadily among continents to become now the second popular drink in the globe, after water for a number of developing countries.

Just 7 countries import half of all the tea traded internationally (by volume, corrected for re-exports). In descending order of importance, these are the Russian Federation (11.3 %), the UK (9.2), Pakistan (8), USA (7.4), Egypt (5.4), Iraq (4.5) and the United Arab Emirates (3.8) (Van Der Wal 2008). Egypt tea imports concentrated on six supplier countries counting for more than 80% of Egypt tea imports. The exporter countries include Kenya, Sir Lanka, India, Indonesia, U.K, and China.

However, no economic research has been done on Egyptian tea market. Accordingly, this paper is the first study analyzing the Egyptian import demand for tea differentiated by source of production. Aggregation (non-source-differentiated) demand studies assume that commodity types from different sources are homogenous with single prices. However, paying no attention to source of origin, that may reflect the commodity quality, may lead to biased elasticity estimates (Mutondo and Henneberry 2007).

OBJECTIVES

In this light, the primary objective of this study is to provide reliable estimates of Egyptian tea import demand elasticities, differentiating tea by source of origin. Thus, the present study uses source differentiated Almost Ideal Demand System (SDAIDS), in which sources of tea are differentiated and the expenditure is treated as endogenous.

BACKGROUND OF EGYPTIAN TEA MARKET

Tea is considered to be one of the main strategic foodstuff commodities to Egyptians. It is a deeply ingrained part of Egyptian culture to drink tea with meals as well as between meals. Tea in Egypt has such widespread popularity because it is the cheapest beverage after water. In rural areas, it is a substitute for fruits and is served to guests as a welcome drink. According to FAO database, Egypt spends about 3 billion pounds a year for the tea and consume 100 tons of tea annually, and per capita consumption rate ranges between 3 and 5 cups per day, Egypt ranks fifth globally in the consumption of tea.

The Egyptian government had taken several actions under the economic reform policy starting at the beginning of 1990s that would affect trade and consumption of tea: tax exemption given to new operations (not just tea) under Investment laws introduced in 1989. Therefore, new enterprises are exempt from tax for up to ten years; reinstatement of food subsidies on some products including tea and applying sales tax in September 2003; floating the Egyptian pound in January 2003, which affected prices and inflation that reduced the imports quantities as shown in figure 1 during 2003 - 2007; removed monopolistic control on imports from state-owned companies in 1994/95, encouraged the rapid growth of private sector trade; service charge on tea imports; a reduction in import tariffs under the Common Market for Eastern and Southern Africa (COMESA), which favored imports from Kenya over other main suppliers. There have, however, been trade disputes between Egypt and Kenya, with Egypt retaliating for controls placed on a range of Egyptian exports to Kenya, by imposing restrictions on tea from Kenya. (FAO 2005)

The price trend of tea imports had decreased during 1990 -2000 as shown in figure 1. On the contrary, the prices showed significant fluctuation during 2000 – 2009 as the highest price was in 2009 and the lowest price was in 2006. The presence of these price fluctuations may reflect the lack of trade policies in line with both local or/and international economic circumstances.

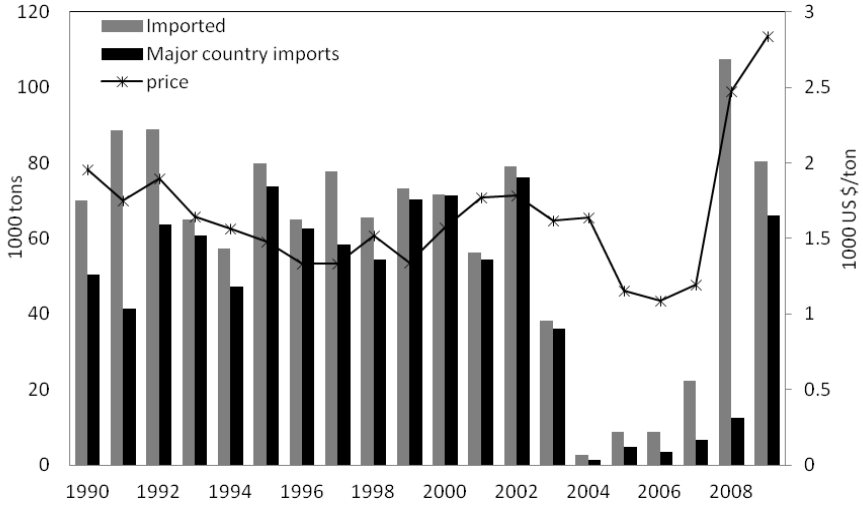

Figure 1. Egypt Tea Imports and prices, 1990-2009

DATA

The data consists of Egypt tea imports and import values from six countries; China, India, Indonesia, Kenya, Sir Lanka, and UK. The rest of the world countries were summed in one variable named ROW. The annually data of quantity and import values were obtained from FAO database for the period between 1990 and 2009. Unit value of import was used as a proxy for price.

METHODOLOGY

Unlike other competing demand system estimation models, the Almost Ideal Demand System AIDS model of Deaton and Muellbauer (1980) give an arbitrary first order approximation to any demand system without recalling homotheticity and additivity of the utility function. The derivation of the AIDS model starts with an expenditure function, representing the Price Independent Generalized Logarithmic (PIGLOG) preference.For the source differentiated AIDS (or simply SDAIDS) model, the expenditure function is rewritten to approximate the importer's behavior that differentiates goods from different origins (Yang and Koo 1994).

Alston, Foster, and Gree (1994) mentioned that Deaton and Muellbauer also proposed to convert the nonlinear AIDS into simplified linear AIDS (LA/AIDS) model by using so called “stone index” to replace the nonlinear price index. Because of its simplicity and less computation burden, Model was very popular for empirical demand analysis.

Because of the mentioned reasons LA/SDAIDS has been adopted. The system of equations is estimated using Restricted Seemingly Unrelated Regression (RSUR) method with the homogeneity and symmetry conditions imposed. The procedures of model estimation are as follows:

Assume the AI expenditure share equation where:

$$(1) \qquad \omega_i = \alpha_i + \sum_j \gamma_{ij} \ln P_j + \beta_i \ln\left(\frac{X}{P^\circ}\right) + \mu_{ij}$$

Where ω_i is the import share of tea from country *i* in the total Egyptian import of tea $(i = 1,2,...,n)$. P_j is the normalized price from country j $(j = 1,2,...,n)$. X is the total expenditure. $\alpha_i, \gamma_{ij}, and \beta_i$ are RSUR parameter estimates for the LA/AIDS model. μ_i is the random or error term. P° is the translog price index defined by:

$$(2) \qquad \ln(P^\circ) = \alpha + \sum \alpha_j \ln P_j + \frac{1}{2}\sum_i^n \sum_j^n \gamma_{ij} \ln P_i \ln P_j$$

It is clear that the translog price index is complicating the model. Deaton and Meulbauer (1980) suggested the Stone's price index, which can be used instead of the translog price index that is defined as follows:

$$(3) \qquad \ln P^\circ = \sum_{i=1}^n \omega_i \ln P_i$$

Substituting equation 3 in equation 1, then it can be written as follows:

$$(4) \qquad \omega_i = \alpha_i + \sum_j \gamma_{ij} \ln P_j + \beta_i (\ln X - \sum_{i=1}^n \omega_i \ln P_i) + \mu_i$$

As seen in equation 4 the substitution of the Stone's price index for the translog price index causes a simultaneity problem, because the dependent variable (ω_i) also appears on the right hand side of the LA/SDAIDS. So, Eales and Unnevehr (1994) suggested using the lagged share ($\omega_{i,t-1}$) for equation 4. Replacement of equation 3 with the lagged shares, into equation 1 yields the LA/SDAIDS, given by:

$$(5) \qquad \omega_i = \alpha_i + \sum_j \gamma_{ij} \ln P_j + \beta_i (\ln X - \sum_{i=1}^n \omega_{i,t-1} \ln P_i) + \mu_i$$

Since budget shares sum to one, we impose the following set of restrictions on the parameter of the SDAIDS model:

1- Adding up implies: $\sum_{i=1}^n \alpha_i = 1 \qquad \sum_{i=1}^n \beta_i = 0 \qquad \sum_{i=1}^n \gamma_{ij} = 0$

Then it follows that $\sum_{i=1}^n \omega_i = 1$ which is obvious from equation 1.

2- Homogeneity requires that $\sum_{j=1}^n \gamma_{ij} = 0$.

3. Symmetry is satisfied if $\gamma_{ij} = \gamma_{ji}$ for any two goods i and j .
The elasticities have been calculated at the sample mean of expenditure shares. The uncompensated (Marshallian) own-price elasticities (ε_{ii}) and cross-price elasticities (ε_{ij}) can be derived respectively as: See Alston *et al.* (1994)

$$(6) \qquad \varepsilon_{ii} = -1 + \frac{\gamma_{ii}}{\omega_i} - \beta_i$$

$$(7) \qquad \varepsilon_{ij} = \frac{\gamma_{ij}}{\omega_i} - \beta_i \frac{\omega_j}{\omega_i}, i \neq j$$

The formula used to calculate the expenditure elasticities can be written as:

$$(8) \qquad \eta_i = 1 + \frac{\beta_i}{\omega_i}$$

A positive value suggests that good i is normal. The income compensated or net (Hicksian) own-price elasticities (ℓ_{ii}) and cross-price elasticities (ℓ_{ij}) respectively are obtained by applying the Slutsky decomposition to (8) and using the price index in (3). These can be written as:

$$(9) \qquad \ell_{ii} = -1 + \frac{\gamma_{ii}}{\omega_i} + \omega_i$$

$$(10) \qquad \ell_{ij} = \frac{\gamma_{ij}}{\omega_i} + \omega_j, \; i \neq j$$

Consumer theory suggests that compensated own-price elasticities are negative for normal goods. Moreover, if (7) and (10) are positive the two goods are cross substitutes, otherwise they are complements.
Using again the Slutsky equation, it is possible to derive a relationship between the compensated cross-price elasticities and expenditure elasticities as follows:

$$(11) \qquad \varepsilon_{ij} = \omega_j \sigma_{ij} - \omega_j \eta_i$$

where σ_{ij} are the partial elasticities of substitution, known also as the Allen elasticities
of substitution.

$$(12) \qquad \sigma_{ij} = 1 + \frac{\gamma_{ij}}{\omega_i \omega_j} \;\; i \neq j$$

The sign of σ_{ij} determines whether the goods i and j are complements or substitutes. If σ_{ij} is positive, the two goods are substitutes where if it was negative, the two goods are complements.

RESULTS AND DISCUSSION

The model in 7 equations was estimated using Zellner's iterative restricted Seemingly Unrelated Regression (RSUR) procedures. To avoid singularity problem, one of the share equations has been dropped from the system. This is the ROW share equation that represents the lowest expenditure share on average.

The results of the RSUR system are shown in table1. At the average sample values of the expenditure shares, the estimated expenditure coefficient of china equation is statistically significant at level 0.01 while those in other supplier countries were not found to be different from zero and overall the model fits the data well. The determination coefficients R^2s ranged between 0.39 and 0.81 for India and China equations respectively.

The Marshallian demand function specifies what the consumer would buy in each price and wealth situation, while the Hicksian demand function is the demand of a consumer over a bundle of goods that minimizes their expenditure while delivering a fixed level of utility (Mas-Colell *et al.* 1995). In other words, uncompensated price elasticities indicate how a change in one source import's price affects the demand for it and other sources. compensated elasticities measure these effects, assuming that real expenditures are held constant. Divisekera (2003) argued that cross-price elasticities allow the classification of sources as substitutes or complements with respect to an alternative source.

Mashallian price elasticities showed in table 2. All own-price elasticities for tea from different sources are negative according to the law of demand. They are highly elastic and statistically significant for China -2.13 and for Indonesia -2.57. Such results indicating that Egyptian consumer respond more to price reductions for Indonesian and Chinese tea. On the other hand, all own-price elasticities for rest supplier countries are inelastic.

The cross-price elasticities presented in table 2 indicate that tea imported from china showed complementary relation with the tea imported from Indonesia and UK. Furthermore, it showed a highest substitutability to Kenyan tea reflecting the high competition between Kenyan and Chinese tea. Indian tea showed complementary relation to Kenyan tea however it showed a substitutability relation to the tea imported from UK and ROW. Indonesian tea has a substitutive relation with Sri Lankan and UK tea while it has complementary relation with Indian tea. Kenyan tea showed complementary relation with Indian, Sir Lankan, and ROW tea, however it showed substitutive relation with Chinese tea. Sri Lankan tea has complementary relation with Kenyan and UK tea, while it has substitutability relation with Indian tea. UK tea is complement to Chinese and substitutive to Kenyan tea.

Table 1. Sdaids model parameter estimates for tea demand import in Egypt (1990-2009)

Explanatory Variables	Dependent variables					
	China	**India**	**Indonesia**	**Kenya**	**Sri Lanka**	**UK**
China	-0.017 *(-1.48)*					
India	-0.002 *(-0.194)*	0.051 *(2.37*)*				
Indonesia	-0.027 *(-1.49)*	-0.046 *(-1.31)*	-0.092 *(-1.19)*			
Kenya	0.034 *(1.84)*	-0.134 *(-1.87)*	0.228 *(-1.77)*	0.782 *(2.49*)*		
Sri Lanka	0.011 *(0.729)*	0.045 *(2.18*)*	0.087 *(1.99)*	-.116 *(-1.61)*	0.015 *(0.36)*	
UK	-0.011 *(-1.88)*	0.040 *(5.07**)*	0.006 *(0.38)*	0.013 *(0.59)*	-0.041 *(-3.13*)*	0.009 *(1.28)*
ROW	0.011 (0.639)	0.045 (1.51)	0.300 (5.14**)	-0.352 (-2.96*)	-0.002 (-0.06)	-0.017 (-0.97)
Expenditures	-0.035 *(-7.07**)*	0.044 *(2.17)*	0.0003 *(0.01)*	0.049 *(0.57)*	-0.008 *(-0.37)*	-0.012 *(-1.93)*
CONSTANT	0.144 *(7.57**)*	-0.133 *(-1.74)*	0.067 *(0.47)*	0.373 *(1.13)*	0.173 *(2.04)*	0.059
R^2	0.81	0.39	0.43	0.66	0.54	
DW	2.18	1.91	2.07	1.9	2.10	
System AIC	197.7					
System Log-likelihood	230.7					

Note: t-ratio are in parentheses where *, and ** denote significant at 0.05 and 0.01 respectively.
AIC is system Akaike information criterion .

The exporter country has strong export potential in an import market if demand for the product is insensitive to price changes but increases with import expenditure. Therefore, India still has good opportunity to increase their exports to Egypt as it has expenditure elasticity more than one and significant inelastic own-price elasticity. Such result is implying that removing trade barriers or/and trade agreements rather than price reduction are the key factors to increase the access of Indian tea in Egyptian tea market.

Indonesia has the largest expenditure elasticity (6.12) and strong elastic own-price elasticity indicating that Indonesia encountered sever competition in the Egyptian market. Consequently, price decrease policy has to be taken into consideration in addition to trade facilities in terms of increasing the Indonesian access to Egyptian tea market.

Table 2. Marshallian Demand Elasticities, Egyptian Tea Import Demand, 1990-2009

	China	India	Indonesia	Kenya	Sri Lanka	UK	ROW
China	**-2.13***	-0.04	-0.46	0.06**	0.08	-0.51**	0.08
India	0.01	**-0.17***	-0.78*	-0.25**	0.31*	2.01	0.31**
Indonesia	-1.72*	-0.82	**-2.57***	-0.42	0.60*	0.33	1.98
Kenya	3.65*	-2.71**	-3.90*	**-0.38****	-0.76*	0.97*	-2.16*
Sri Lanka	1.13*	0.66	1.48*	-0.22**	**-0.89**	-1.90	0.02
UK	-0.67*	0.68**	0.10*	0.02	-0.28*	**-0.57***	-0.11*
ROW	1.12*	0.66*	5.12	-0.65*	-0.01	-0.74	**-0.87**
Expenditure Elasticity	1.75	1.78	6.12	0.36	0.98	0.17	1.09

where *, and ** denote significant at 0.05 and 0.01 respectively.

Compensated own-price elasticity estimates in Table 3 show similar trends but smaller values than uncompensated ones, which is theoretically consistent. Alboghdady and Alashry (2010) reported that such result reflects the expenditure effect on the quantities demanded of tea from the different sources of the major exporter countries is very significant.

Table 3. Hicksian Demand Elasticities, Egyptian Tea Import Demand, 1990-2009

	China	India	Indonesia	Kenya	Sri Lanka	UK	ROW
China	**-2.12****	-0.02	-0.45	0.08*	0.09	1.99**	0.31
India	-0.07*	**-0.07***	-0.72	-0.19*	0.37*	0.35	2.02*
Indonesia	-1.80*	-0.72	**-2.51****	-0.36*	0.65**	0.71	-2.24**
Kenya	2.89**	-1.75**	-3.35*	**-0.37***	-0.24	-1.44*	0.53
Sri Lanka	0.93	0.92	1.63*	-0.06*	**-0.75****	0.56	0.04
UK	-0.700*	0.71*	0.12	0.05	-0.26	**-0.56**	0.11*
ROW	0.91	0.93	5.27	-0.49	0.14	-0.68	**-0.75**

where *, and ** denote significant at 0.05 and 0.01 respectively.

CONCLUSION

It is necessary to understand the Egyptian tea market, which is one of the largest tea markets in the globe. Therefore, the present study estimates the economic factors like tea prices and expenditure on the Egypt's quantity demanded for source-differentiated tea.

Most of the estimated own-price elasticities are inelastic except for Chinese tea and Indonesian tea indicating that the Egyptian market is not sensitive to the price changes of the tea itself. The estimated cross-price elasticity indicated the Egyptian consumer responds to Chinese and Kenya tea as substitutes to each other. However, the Egyptian consumer responds to Indian and Indonesian tea as complementary to Kenyan tea.

The positive sign for all estimated expenditure elasticities indicates that tea is a normal good to Egyptian consumer. Kenyan, Siri Lankan, and UK teas are necessary goods as the values of the expenditure elasticities are less than one. Alternatively, Chinese, Indian, and Indonesian teas are luxury good as the expenditure elasticities are more than one.

REFERENCES

Alboghdady, MA, and MK Alashry. 2010. "The demand for meat in Egypt: an almost ideal estimation." *African Journal of Agricultural and Resource Economics* no. 4 (1):70-81.

Alston, J.M., K.A. Foster, and R.D. Gree. 1994. "Estimating elasticities with the linear approximate almost ideal demand system: some Monte Carlo results." *The Review of Economics and Statistics*:351-356.

Deaton, A., and J. Muellbauer. 1980. "An almost ideal demand system." *The American Economic Review* no. 70 (3):312-326.

Divisekera, S. 2003. "A model of demand for international tourism." *Annals of tourism research* no. 30 (1):31-49.

Eales, J.S., and L.J. Unnevehr. 1994. "The inverse almost ideal demand system." *European Economic Review* no. 38 (1):101-115.

FAO. 2005. *Tea market studies : Egypt, Islamic Republic of Iran, Pakistan and Turkey : sixteenth session, Bali, Indonesia, 20-22 July 2005 / Committee on Commodity Problems, Intergovernmental Group on Tea*. Vol. CCP:TE 05/CRS 2. Rome: FAO.

Li, H.L. 1973. "An archaeological and historical account of cannabis in China." *Economic Botany* no. 28 (4):437-448.

Mas-Colell, A., M.D. Whinston, J.R. Green, and Universitat Pompeu Fabra. Facultat de Cičncies Econňmiques i Empresarials. 1995. *Microeconomic theory*. Vol. 1: Oxford university press New York.

Mutondo, J.E., and S.R. Henneberry. 2007. "A source-differentiated analysis of US meat demand." *Journal of Agricultural and Resource Economics*:515-533.

Van Der Wal, S. 2008. Sustainability issues in the tea sector: A comparative analysis of six leading producing countries. edited by Jim Turner. The Netherlands: Somo.

Yang, S.R., and W.W. Koo. 1994. "Japanese meat import demand estimation with the source differentiated AIDS model." *Journal of Agricultural and Resource Economics*:396-408.

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يُعتبر السوق المصري للشاي واحد من كبرى الأسواق العالمية حيث يقع في المرتبة الخامسة عالمياً من حيث حجم الطلب. و على الرغم من ذلك لم تجرى اي ابحاث على هذا السوق. كما شهدت اسعار استيراد الشاي تقلبات واضحة خلال العقد الأخير مما قد يعكس عدم استقرار سياسات الاستيراد في ظل المتغيرات الاقتصادية سواء على الصعيد المحلي او الدولي. و لذلك فإن الهدف من هذا البحث هو تحليل الطلب على الواردات المصرية من الشاي مع مراعاة ان اختلاف مصدر التوريد قد يعكس اختلاف لجودة المنتج. و لذلك فقد تم استخدام النموذج شبه الأمثل للطلب على الواردات متباينة المصادر (Source Differentiated Almost Ideal Demand System - SDAIDS) و قد تم تقدير معلمات النموذج باستخدام الانحدار غير المترابط ظاهرياً (Seemingly Unrelated Regression – SUR).

اوضحت النتائج ان دولة الهند لديها فرصة جيده لزيادة صادراتها الى مصر ليس عن طريق خفض اسعار التوريد و لكن عن طريق التسهيلات التجارية و الاتفاقات الدولية و ذلك لإنخفاض المرونة السعرية للشاي الهندي في مقابل ارتفاع المرونة الإنفاقية له.اما فيما يتعلق بالشاي الأندونيسي فكانت المرونة الإنفاقية له اعلى المرونات بالإضافة الى ارتفاع المرونة السعرية له مما يوضح ان الشاي الأندونيسي يواجه منافسة شديدة في السوق المصري و من ثم فإن سياسة خفض الأسعار يمكن ان تؤخذ في الإعتبار الى جانب التسهيلات التجارية.

و بتقدير المرونات التقاطعية، تبين ان الشاي الصيني له علاقة تكاملية مع كل من الشاي الإندونيسي و الشاي الإنجليزي . و تفسير ذلك ان الشاي الأندونيسي و الإنجليزي تدخل كحزمة في نصيب سوقي واحد مع الشاي الصيني. فإذا ما ارتفع النصيب السوقي لها ادى ذلك الى jتوزيع هذه الزيادة على كل من الشاي الأندونيسي و الإنجليزي. في حين كانت علاقه الشاي الصيني احلالية مع الشاي الكيني. اما الشاي الأندونيسي فكانت علاقتة احلالية مع الشاي السيرلانكي و الإنجليزي في حين كانت العلاقة تكاملية مع الشاي الهندي.

تبين من نتائج تقدير المرونة الإنفاقية ان جميع المرونات الإنفاقية لأنواع الشاي من مصادره المختلفة كانت موجبة الإشارة للدلالة على ان الشاي سلعة عادية بالنسبة للمستهلك المصري. و من ناحية اخرى كانت المرونة الإنفاقية للشاي الكيني و السيرلانكي و الإنجليزي اقل من الواحد الصحيح مما يشير الى ان هذه الأنواع هي سلع ضرورية للمستهلك المصري، في حين تبين ان الشاي الصيني و الهندي و الأندونيسي سلع كمالية.

قام بتحكيم البحث

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