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The Impact of Oligopoly Structure of Global Date Market on the Iranian Foreign Exchange Earnings

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Abstract
This study tries to identify the structure of global date market under the concentration indices. The results made by indices of and show that during the period of 1990 to 2009, their values increased from 1292 to 1466 and from 63 to 67, respectively. It reflects that the inequality intensity of market distribution has grown while the number of exporters is expanded at this time. So, it can be concluded that the new exporters who have entered to the market had a small share and didn't have an ability to reduce the distribution of market share of major exporters. The degree of competition (term CQ) in the market has declined from 37 percent in 1990 to 33 percent in 2009. Based on these indicators, it can be deduced that the policies adopted by the major countries of the market have been in such a way that they have maintained their dominant position and have reduced the share of competitors. The findings also indicate that the global market concentration has no significant effect on Iran-date foreign exchange earnings while exchange rate, production, and price have a significant impact on the foreign earnings.
Keywords: Date Market, Concentration, Foreign Exchange Earnings.
JEL Classification: F12, D43, F16.

1. Introduction

Date crop is one of the important horticultural crops which plays an outstanding role in food security, job creation, export and gaining foreign exchange earnings. Iran is a country with 185,000 hectares under date fertile groves cultivation and the production of 88000 tons of various species of date has attained the second place after United Arab Emirates (in terms of cultivation) as well as after Egypt and Saudi Arabia (in terms of volume of production). Table 1 indicates the position of Iran and major exporting countries of date. As it can be seen in this table, Tunisia is known as the major exporting country in the date global market such that it has 26 percent of the market export. The main exporting countries of date during the period 1990-2009 are Iran, Pakistan, Saudi Arabia and Algeria. The data of Table 1 reports that the share of Iran's export has had considerable fluctuations in the market. For example, the share in 2009 was about 16 percent, in 2000 nearly 11 percent, in 1995 approximately 22 percent and in 1990 around 14 percent of the global market share.

Table 2. Share of Iranian Export in the Global Date Market

Year	Country	Market share of global exports (by percent)	Export value	Export ranking
2009	Tunisia	29	93337	1
	Iran	16	10433	2
	Palestine	10	30820	3
	Pakistan	9	28973	4
	KSA	6	20882	5
2000	Tunisia	23	44052	1
	Pakistan	15	29202	2
	Iran	11	21139	3
	France	85	15801	4
	KSA	8	15499	5
1995	Tunisia	25	53004	1
	Iran	22	48323	2
	Algeria	8	16679	3
	USA	7	15293	4
	China	6	143330	5
1990	Tunisia	26	44974	1
	Iran	14	25645	2
	Pakistan	13	22973	3
	Algeria	9	16614	4
	China	88	16233	5

Source: Current Research.

Exports of agricultural crops and especially date crop have had a remarkable importance in the basket of Iranian non-oil exports. It is noteworthy that appropriate policy making for promoting the position of exports of this sector requires enjoying applicable and realistic information and research in the global arena. It should be noted that some studies like Khodadad Kashi (1994, 2000, 2001), Khodadad Kashi and Dehghani (2005), Khodadad Kashi and Tash (2005), Ebadi and Shahiki Tash (2004a, 2004b), Hossaini and Parmeh (2004), Azizi (2004), Abonouri and Samanipour (2002) and Gorji and Saadatiyan (2000) at the Iranian scope and some other researchers such as Bourguignon (1979), Love (1974), Michael (1990), Shephard (1990), Honnah (1977), And Hart (1971) in abroad have investigated the issue of this study.

This study also aimed at recognizing realistically the structure of global date market using a scientific approach. The first part of paper reviews literature on measuring degree of competition and monopoly in the markets besides introducing the employed indices in the researches. The second part goes on examining the concentration indices and the theoretical bases as a practical tool for computing the degree of competition and monopoly so that appraising the focus of exporters (Supply side) by using these indices can indeed be happen. Then, given the topics of supply side concentration, we will show that the global structure of date market is oligopoly. The fourth part attempts to examine the impact of degree of global date market concentration on the Iranian exchange earnings and finally we offer conclusion and some policy recommendations.

The Export Concentration Indices

The buyer and seller concentration is one of the most prominent organizational aspects and characteristics of a market. Since the concentration indices are employed for evaluating the structure of markets and industries, hence applying the indices in order to assess the degree of concentration in the export markets are also credible. Indeed, judging the level of competition and monopoly of a market depends on knowing the number of active countries and the manner of market distribution among them. It is expected that, a market is closer to a monopolistic structure whatever number of countries is lower and level

of dedicated distribution of market belongs to the small number of them. Market focus and indices of concentration provide the possibility to summarize the information related to the number and type of market distribution in a given number. This paper focuses on the index of concentration ratio of n countries (CRn) and Herfindahl-Hirschman index. The CR_n index is defined as:

$$CRn = \sum_{i=1}^{i=N} S_i \qquad i = 1,...,K \qquad K > N$$

Where, K is the number of active countries at the global arena of the crop; N and Si are symbols of the number of large countries and market share of i-th country, respectively. Additionally, term CR_n implies the concentration ratio of n countries. Here, in order to gain the market share, the ratio of export of every country to total global export is applied as follows:

$$S_i = \frac{x_i}{\sum x_i} \qquad i = 1,...,K$$

$$\text{CRn} = \sum_{i=1}^{n} x_i (\sum_{i=1}^{k} x_i)^{-1}$$

It should be noted that to measure the degree of competition in a market, the value of CR_n should be subtracted from one.

Herfindahl-Hirschman concentration index (CH_k) also is obtained through sum squares of market share of all active countries.

$$CH_k = \sum_{i=1}^{K} S_i^2$$

$$CH_k = \sum_{i=1}^{K} S_i^{\ 2} = \sum_{i=1}^{K} (x_i (\sum_{i=1}^{k} x_i)^{-1})^2 = (k\mu)^{-2} \sum_{i=1}^{k} x_i^{\ 2}$$

$$\mu = k^{-1} (\sum_{i=1}^{k} x_i)$$

Where, CH_k is the Herfindahl-Hirschman index; S_i indicates the market share of i-th country and K present number of active countries. The above index considers all developments of countries' market share and is known as a comprehensive criterion.

Measuring Trade Concentration of Global Date Market

As mentioned, the concentration indices are used as the criteria for calculating the degree of competition and monopoly in a market. These indices are considered as the standards of market structure investigation. A high correlation between degree of market concentration and monopoly in many empirical researches is observed. At this part of study, we are trying to evaluate concentration of global date market and the active presence of Iran in it through selecting appropriate indices and citing their priorities. The results of concentration indices cited in table 2 indicate that, firstly, the number of exporters is large and, secondly, the manner of market distribution among the exporters is unfair. Consequently, it results in high degree of concentration in the market. For instance, there were 87 active exporters in 1990 that just four of them gained 63 percent of the market exports value so as these facts imply high degree of concentration. Moreover, CH_k index is around 1392 which confirms the CR_n index results.

The following notes about the structure of global date market are important:

1-The number of exporters in this market has increased over time. As shown in table 2, number of exporters from 87 in 1990 increased to 104 countries in 2009.

2-By average, 62 percent of exports of this crop have belonged to four major countries over the period so that the CR_n and CH_k indices were about 63 percent and 1392 in 1990, respectively. These figures represent high level of concentration intensity in the market as far as the major countries by adopting trade strategic policies can direct the market toward effective monopolistic and non-competitive behaviors.

3-Both CH_k and CR_n indices have increased during the period 1990-2009 from 1392 to 1466 and from 63 to 67, respectively, which indicates a great intensity of market distribution inequality among the exporters. Thus, it can be concluded that the new exporters who have entered, distributed a small share of the market to themselves and have not been able to reduce the market share distribution of the major exporters.

4-degree of competition has decreased during the period 1990 to 2009 in this market such that the index has dropped from 37 percent

in 1990 to 33 percent in 2009. Thereby, the policies adopted by major countries have been in such a way that maintain their dominant share and reduce the competitors share.

Table 2. Degree of Concentration of Global Date Market based on CH_k, CR_n and CQ Indices from

year	Number of Exporters (K)	(CQ)Degree of Competition	Index (CR_n)	Index (CH_k)
1990	87	37	63	1392
1991	86	39	61	1362
1992	105	40	60	1284
1993	105	39	61	1321
1994	108	35	65	1485
1995	111	37	63	1475
1996	110	38	62	1308
1997	108	43	57	1267
1998	109	39	61	1411
1999	105	42	58	1243
2000	104	42	58	1221
2001	106	38	62	1527
2002	103	39	61	1410
2003	103	40	60	1346
2004	99	39	61	1407
2009	104	33	67	1466

Source: Current Research.

Overall, by appraising concentration index in the date market it should be understood that the structure of this market is highly concentrated and there are many obstacles for entering into the market. Also, it is noteworthy that the above analysis are reliable if new enterers are able to supply their crops at a competitive price.

Given the above discussion, we can now classify the global markets under the CR4 and indices (represented in table 3) in order to study the markets structure more precisely.

Table 3. Assessing Degree of Concentration (CH_K and CR_i) Based on Empirical Studies & Determining the Structure of Market.

Market Structure	CR_i	CH_K	Concentration Status (degree of monopoly)
a)Effective monopoly markets: 1- Monopoly 2- Dominant Firm 3- Tight Oligopoly	$CR_1 > 33.3\%$ $CR_3 > 50\%$ $CR_5 > 66.7\%$	$CH_K > 1800$	High concentration
	$40\% < CR_4 < 60\%$	$1000 < CH_K < 1800$	Moderate concentration
b) Effective Competition Markets: 1-loose Oligopoly 2-MonoplosticCompetition 3- Complete Competition	$CR_4 < 40\%$	$CH_K < 1000$	Low concentration

Source: Current Research.

As is shown in the above table, when concentration index CH_K is more than 1,800 it results in high level of market concentration and dominance of effective monopoly structure. If CH_K is less than 1000 and CR_4 value is less than 40 percent an effective competitive structure in a market is observed. Separating markets to effective competition and effective monopoly markets helps us to assess market structure scientifically by using CH_K and CR_i indices.

Now, with respect to the above classification and based on calculated indices citation in Table 2, it can be concluded that the following circumstances are dominant in the global date market:

1- Average Degree of CH_K concentration

index during the period 1990 to 2009 was near 1370 that according to Table 3 indicates a moderate concentration.

2- Average Degree of CR_i concentration index during the period 1990 to 2009 was almost 60 percent that, according to Table 3, it can be deduced that the concentration of this market is moderate, so it verifies the result of CH_K index.

3-The CR_1 quantity of this market has been around 23 percent over 1990-2009 on average. It means there is a major country in this market (i.e Tunisia) which earns 26 percent of global exports and according to Table 3 and it can be concluded that since there is no more than 33 percent for CR_1 index therefor there is no dominant country in the market.

4-because, on average, 100 countries are active in the market and only four countries on average have more than 60 percent of global exports, so the market structure has a tight oligopoly structure.

Impact of Degree of Concentration of Global Date Market on the Iranian Foreign Exchange Earning

In the previous section the degree of global date market concentration and competition degree among the active exporters as well as an oligopoly structure of date market was mentioned. In this section we look forward to examine the date market structure and its impact on the Iranian foreign exchange earnings. If we symbolize the date foreign exchange earnings, price index and volume of exports for country i with components π_i or RNOX, p and EX respectively, thus, the following relation is obtained:

$$\pi = \text{RNOX} = P.EX$$

With respect to the new international trade theories we know that the export price index of good i is function of competitors' market share (S_j) and the exchange rate of export (ERX). In other words, the international price level of the export goods has an imperfect competition structure and affected from the market share of exporters. Based on microeconomic theories, if a firm possesses a significant share of a market and known as a dominant firm of industry expected that it affects the pricing pattern in the industry. Thus, exporters' concentration and market share have a large role in determining the level of prices in the export markets which have an imperfect competitive structure.

$$P_i = P_i(S_1, S_2, S_3, \dots, S_n, ERX_i)$$

As well, according to the theories of international trade, the export supply function is influenced by the following factors:

$$EX_i = EX_i(PRO, ERX, P)$$

Where EX is volume of date exports for country, i; term PRO reflects amount of date production, and ERX implies the exchange rate of export.

$$\pi = \text{RNOX} = P_i(S_1, S_2, S_3, \dots, S_n, ERX_i).EX_i(PRO, ERX, P)$$

To determine how each of the above variables affect the foreign exchange earnings for country i can be taken differentiate from both sides of current relation as:

$$\begin{aligned} d\pi_i = dRNOX &= \frac{\partial p}{\partial S_1} dS_1 EX_i + \frac{\partial p}{\partial S_2} dS_2 EX_i + \cdots \\ &+ \frac{\partial p}{\partial S_n} dS_n . EX_i \\ &+ \frac{\partial p}{\partial FER} . dERX . EX_i \\ &+ P . d(EX_i) \\ d\pi_i = dRNOX &= \sum_{j=1} \frac{\partial p}{\partial S_j} dS_j . EX_i \\ &+ \frac{\partial p}{\partial ERX} . dERX . EX_i \\ &+ P . d(EX_i) \\ d\pi_i = dRNOX &= \sum_{j=1} \alpha_j dS_j + \beta_i dERX . EX_i \\ &+ P . d(EX_i) \quad (1) \end{aligned}$$

$$\alpha_j = \frac{\partial p}{\partial S_j} . EX_i \ , \ \beta_i = \frac{\partial p}{\partial FER}$$

We know also that dEX_i changes can be obtained through taking differentiate from $EX_i = EX_i(PRO, ERX, P)$ equation as:

$$\begin{aligned} dEX_i &= \frac{\partial EX_i}{\partial PRO} dPRO + \frac{\partial EX_i}{\partial ERX_i} dERX \\ &+ \frac{\partial EX_i}{\partial P} dP \\ dEX_i &= \theta_i dPRO + \gamma_i dERX + \varphi_i dP \quad (2) \end{aligned}$$

$$\theta_i = \frac{\partial EX_i}{\partial PRO} \quad , \gamma_i = \frac{\partial EX_i}{\partial ERX_i} \quad , \varphi_i = \frac{\partial EX_i}{\partial P}$$

Given the equations 1 and 2, it can be deduced that:

$$d\pi_i = dRNOX = \sum_{j=1} \alpha_j dS_j + \beta_i dERX.EX_i + P.\{\theta_i dPRO + \gamma_i dERX + \varphi_i dP\ \}$$

$$d\pi_i = dRNOX = \sum_{j=1} \alpha_j dS_j + \psi dERX + P.\{\theta_i dPRO + \varphi_i dP\ \} \quad (3)$$

According to the derived equation 3 is expected theoretically that when date production increases leads to incline amount of date exports and have a positive impact on the foreign exchange earnings of country i. It is also expected theoretically that augmenting exchange rate of export increases amount of exports, but cannot be expected that increase in the degree of concentration causes to increments foreign exchange earnings of country i, because it depends on the export share of country i in the market. For example, if Iran is dominant country in the field of date exports so that increasing degree of concentration in the global market is due to expanding the Iranian export share, theoretically predicted that there is a positive correlation between the degree of concentration and Iranian foreign exchange earnings.

Now, according to the theoretical equation 3 and econometric patterns, in order to investigate the impact of degree of concentration on the Iranian foreign exchange earnings can be used the following export supply function as:

$$RNOX = f\left(PRO, \sum_{i=1}^{k} S_i^2, ERX, \frac{PPWI}{PDSI} \right)$$

$$RNOX = A\left(\frac{PPWI}{PPSI}\right)^{\alpha_0} (PROD)^{\alpha_1} (ERX)^{\alpha_2} (\sum_{i=1}^{k} S_i^2)^{\alpha_3}$$

$$\Rightarrow LogRNOX = C + \alpha_0 Log\left(\frac{PPWI}{PPSI}\right) + \alpha_1 Log(PROD) + \alpha_2 Log(ERX) + \alpha_3 Log(\sum_{i=1}^{k} S_i^2)$$

Where term RNOX is the rials value of Iran's date exports; PRO is amount of date production in Iran; CH_K indicates the concentration index of date market (as a proxy of market structure which indicating the market share of competitors); ERX shows the exchange rate of export; PPWI is the World average export price of date and finally PDSI implies the average price of Iranian export.

The bellow relation can be posed for the above regression pattern given the explanation of equation 3:

$$i)\ COV(RNOX, PRO) > 0 \text{ و } \frac{\partial RNOX}{\partial(PRO))} > 0$$

$$ii)\ COV(RNOX, PRO) \geq 0 \text{ و } \frac{\partial RNOX}{\partial(PRO))} \geq 0$$

$$iii)\ COV(RNOX, ERX) > 0 \text{ و } \frac{\partial RNOX}{\partial(ERX))} > 0$$

$$iv)\ COV(RNOX, \frac{PPWI}{PDSI}) > 0 \text{ و } \frac{\partial RNOX}{\partial(PPWI/PDSI))} > 0$$

The table 4 reports the results of above equation by using the Ordinary Least Squares (OLS) method:

$$ii)\ COV(RNOX, PRO) \geq 0 \text{ و } \frac{\partial RNOX}{\partial(PRO))} \geq 0$$

Table 4. Investigating the Impact of Concentration Degree of Global Date Market on the Iranian Foreign Exchange Earnings

Variable	Coefficient	t-statistic & probability
Intercept	-4.68	)0.72 = P (-0.35
Transaction Ratio (logarithm of the world average export price to the domestic price)	0.70	)0.0001 = P (4.66
Logarithm of Date Production	1.17	)0.04 = P (2.16
Logarithm of Exchange Rate of Export	0.87	)0.0009 = P (3.79
Logarithm of Date Market Concentration (Degree of Competition)	0.90	)0.78 = P (0.27
$0.91^{۲}$= R		
)0.30P= (1.09LM:F=2.45D-w=		
)0.000(59.25F=		

Source: Current Research.

The results of fitted model indicate that there is not a significant impact between the world date market concentration and Iranian foreign exchange earnings. This could be due to not having an acceptable position in the global market. Because firstly, the share of Iran compared to the major countries (eg in comparison with Tunisia) is very low and secondly the fluctuations of Iranian market share in the global arena is remarkable, hence the global date market concentration cannot be an affecting variable on the Iranian foreign

exchange earnings.

As seen at the export supply function, three other variables namely the exchange rate of export, amount of production and transaction ratio (ratio of prices) are quite significant. The coefficient of transaction ratio which indeed is the elasticity of export relative to the changes of transaction ratio states that one percent increase in transaction ratio leads to augment around 0.70 percent the foreign exchange earnings. Meanwhile, one percent increase in the Iranian date exports leads to enhance about 1.17 percent the earnings. The foreign exchange earnings has been as an incentive of Iranian date exports so as it has had a significant impact on the earnings (one percent increase of this rate causes an increase approximately 0.87 percent).

The quality of model fitness was confirmed based on the following standards are confirmed: the autocorrelation problem (under the D-W and LM tests), credibility of whole regression (under F=59.25 statistic) besides co-integration existence (not spurious R squired)

Conclusion

Exports of agricultural products especially date crop has had a considerable importance in the Iranian non-oil export basket. Promoting the position of the crop export requires a realistic and applicable researches and information for appropriate policy making. This study also at aimed recognizing the structure of global date market tried realistically and scientifically to present a proper approach for evaluating this issue. The findings of the study confirm that:

1- The trade concentration of agricultural products and productions of selected countries show that the date market has a strong oligopoly structure.

2-The CRn and Herfindahl indices of the global date market over the period have increased which indicate monopoly intensity and high export inequality.

3-the global market concentration has not had a significant impact on the Iranian foreign exchange earnings while the exchange rate, production and price had a significant impact on the earnings. As well the findings confirmed that the exchange rate of export has been an incentive for supplying the date exports.

Based on the results, the following recommendations are presented for policy making in order to promote the Iranian export share:

1-Since the degree of competition in the global market is high, it is suggested that the four P's of marketing (elements of marketing include: designing products and services, pricing, promotion and distribution) should be regarded in order to upgrade the Iranian position.

2-The Q index which indicates the degree of competition is growing. Thereby, it is recommended that the formation basis of export cartels also should be examined besides considering the appropriate marketing and behavior patterns.

3-As the results show a positive elasticity of export supply relative to the domestic products, thus increasing the production of this crop causes an improvement in the value of export and income from its exports. So, increasing production accomplished through expanding area under cultivation as well as improving yield of crops per hectare by government financial supports and labor training should be highlighted.

4- Studying strategic trade policies particularly the re-export policies is necessary in order to control the dramatic activities of competitors.

5- The findings indicate that the share of date export is fragile and it is recommended to change the market development pattern. Accordingly, some measures and strategies like expanding R&D divisions, making the exporters network in the framework of Consortium activities, and employing the content marketing should be adopted in order to promote Iranian market share.

6- The results demonstrate that structure of date market is going to be more concentrated and the competitors have extended their oligopolistic intensity in the market. Henceforth, it is recommended to peruse the sale promotion strategy relative to the competitive price and upgrading the quality in addition to professional packaging.

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Appendix

Figure 1: CH Index of Date Market over 1990-2009

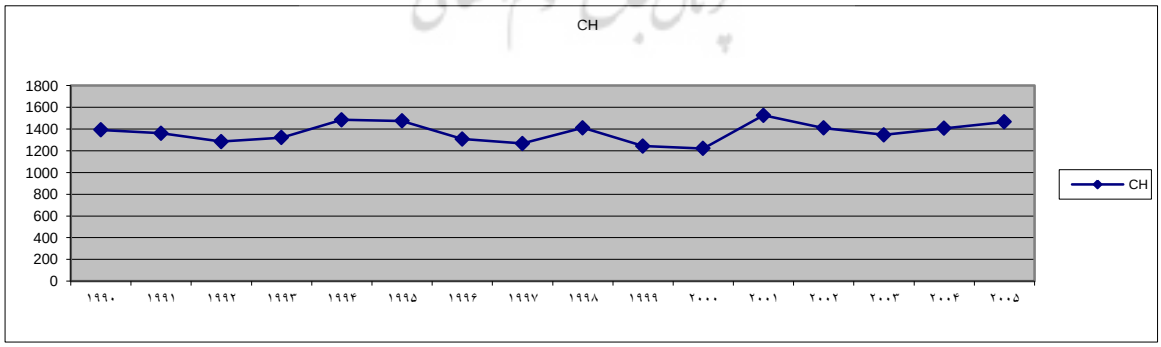

Figure 2: CR Index of Date Market over 1990-2009

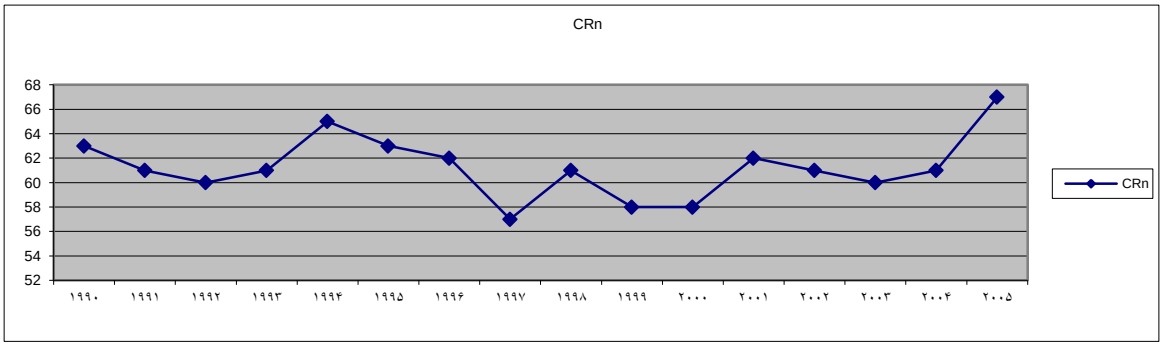

Figure 2: K Index of Date Market over 1990-2009

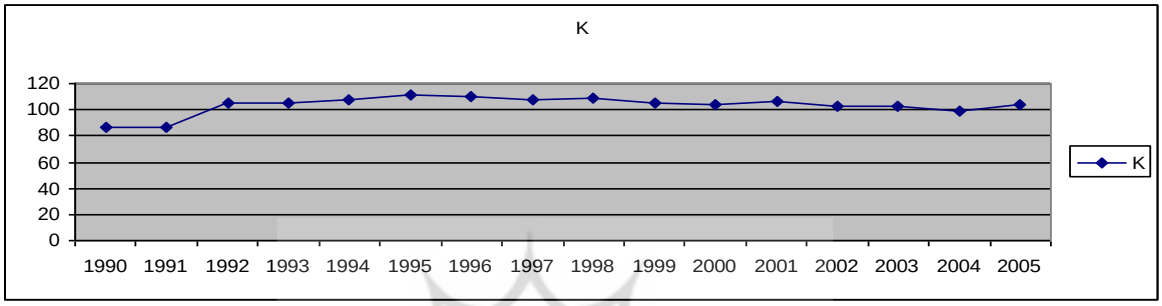

Figure 3: CQ Index of Date Market over 1990-2009