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# Industrial concentration and price-cost margin of the Indonesian food and beverages sector

Maman Setiawan<sup>a,\*</sup>, Grigorios Emvalomatis<sup>b</sup>, and Alfons Oude Lansink<sup>c</sup>

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<sup>a</sup> Business Economics, Wageningen University, Hollandseweg 1 6709 KN, Wageningen, the Netherlands and Faculty of Economics, University of Padjadjaran, Jl. Dipati Ukur 35 Bandung, Indonesia

<sup>b</sup> Business Economics, Wageningen University, Hollandseweg 1 6709 KN, Wageningen, the Netherlands

<sup>c</sup> Business Economics, Wageningen University, Hollandseweg 1 6709 KN, Wageningen, the Netherlands

\* Corresponding author. Email : [maman.setiawan@wur.nl](mailto:maman.setiawan@wur.nl)

## Abstract

This paper investigates trends in industrial concentration and its relationship with the price-cost margin in 54 subsectors of the Indonesian food and beverages sector in the period 1995-2006. This study uses firm-level survey data provided by the Indonesian Bureau of Central Statistics (BPS), classified at the five-digit International Standard Industrial Classification (ISIC) Level. The results show a significant increase in industrial concentration in 1995 to 1999, which coincided with the period of the economic crisis in Indonesia. After 1999, the industrial concentration exhibits a slightly decreasing long-term trend. Furthermore, the industrial concentration for all subsectors tends to converge to the same value in the long run. Additionally, results show that higher industrial concentration yields a higher price-cost margin. Finally, the introduction of the competition law in 1999 has slightly lowered industrial concentration and the price-cost margin.

Keywords: industrial concentration, price-cost margin, competition law, food and beverages sector

## I. Introduction

It is well known that the industrial concentration in almost all of the economic sectors of Indonesia is relatively high (see Bird, 1999). Some sectors in the industry may have a stable and high industrial concentration because of the barriers to entry for new potential firms. The barriers may be caused by natural conditions, such as economies of scale moulded by incumbents, or formal regulations, such as exclusive monopolies, or business strategy.

One of the industry sectors with a high concentration is the food and beverages sector. Data presented by Bird (1999) showed that almost all of the subsectors of the food and beverages sector are highly concentrated. Furthermore, Bird concluded that for some of them, high concentration is particularly persistent.

The food and beverages sector contributes significantly to the Indonesian GDP. Since 2004, the output of this sector accounted for about 7% of the GDP and about 23% of the total industrial manufacturing output. This sector plays a vital role in the Indonesian economy and is a public concern, especially in fulfilling basic food needs. Furthermore, the total Indonesian population of about 206 million in 2000 indicates that this industry is an important sector. Additionally, the food and beverages sector absorbed about 23% of total employment in the Indonesian

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3 manufacturing industry in 2006, and employment in the industry grew significantly (about 19%)  
4 in 2006 compared to 2005.  
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7 Naturally, policy makers and researchers pay considerable attention to the relationship  
8 between the degree of competition and the price markup in the food and beverages sector, mainly  
9 because high industrial concentration in the sector will lead to the extraction of consumer surplus  
10 by the firms, with consequences for the entire population, but especially for lower income  
11 households. The higher industrial concentration may induce a few dominant firms with market  
12 power to behave collusively and to generate excess profits by keeping food prices higher than in  
13 a more competitive market.  
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17 In 1999, the Indonesian Competition Law No. 5 1999 was established. This law was  
18 designed to increase effectiveness and efficiency in economic activities through the creation of  
19 fair business competition and, subsequently, to improve the people's welfare. The Commission  
20 for the Supervision of Business Competition (KPPU) has been the body responsible for  
21 enforcing the law in Indonesia. Although the KPPU has limited the anti-competitive behavior of  
22 firms, the high concentration in the food and beverages sector continues to exist. Furthermore, a  
23 study investigating the competition law in Indonesia that was conducted after the competition  
24 law had been established (Pangestu, Aswicahyono, Anas, and Ardyanto, 2002) found  
25 ambiguities that are still subject to interpretation in the competition law. The ambiguities may  
26 make the investigation and the law enforcement on anti-competitive behavior ineffective.  
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30 Some previous studies, such as Hill (1987) and Bird (1999), focused on the industrial  
31 concentration before the Indonesian Competition Law was implemented. Hill (1987) and Bird  
32 (1999) observed the industrial manufacturing concentration in Indonesia and found that the seller  
33 concentration was remarkably high. Similar research about the trend of the industrial  
34 concentration in another Asian country, Malaysia, was conducted by Bhattacharya (2002).  
35 However, a thorough study of the trend of industrial concentration in the food and beverages  
36 sector has never been conducted in Indonesia.  
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40 As briefly explained in the structure-conduct-performance (SCP) paradigm, the firms in the  
41 concentrated industry will have a better industrial performance (usually measured by profitability  
42 or price-cost margin). Some research related to the relationship between the industrial  
43 concentration and the price-cost margin has been conducted, but mostly in the U.S. and some  
44 European countries (Collins and Preston, 1966; Sizrazi, 1974; Ghosal, 1989; and Prince and  
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Thurik, 1992; Dickson, 2005). A few studies have focused on the relationship between industrial concentration and price markup in Asian countries. Gan (1978) and Kalirajan (1993), for example, observed that there was a positive and significant influence of industrial concentration on the price-cost margin in Malaysian manufacturing. Go, Kamerschen, and Delorme (1999) also found a positive relationship between the seller's concentration and the price-cost margin in Filipino manufacturing industries. Most of the research conducted to date investigated all subsectors of the manufacturing industry. Additionally, the research connecting the relationship between industrial concentration and the price-cost margin in the Indonesian food and beverages sector is hardly found in the published literature, nationally or internationally. The information about the relationship between the industrial concentration and the price-cost margin will provide further insight for the policy makers on whether the firms in the industry gain more producer surplus through the lessening of the competition and anti-competitive behavior in the industry. Therefore, the investigation of the effect of industrial concentration on industrial performance has a high relevance for policy makers.

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The objectives of this paper are twofold. First, this paper analyzes the trend of industrial concentration in the Indonesian food and beverages sector in the period before and after the establishment of Indonesian Competition Law. The analysis of the trend includes a test for the convergence of industrial concentration in the long run. Second, this paper analyzes the relationship between industrial concentration and the price-cost margin in the Indonesian food and beverages industry. Additionally, the effect of the competition law establishment on the price-cost margin is measured.

## 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 **II. Industrial Concentration and the Price-Cost Margin**

Industrial concentration is a common measure of market structure<sup>1</sup>. It reflects both the number and size distribution of firms in an industry. The industrial concentration may represent the market power and the probability of anti-competitive behavior among firms in the market.

The most commonly used measures of industrial concentration are the concentration ratio for  $n$  firms ( $CR_n$ ) and the Herfindahl-Hirshman Index (HHI), which is based on Pepall et al. (2008).

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<sup>1</sup> We define industrial concentration as in Bain (1951)

Both indicators of industrial concentration are based on the market share of the firms and calculated by the following formulas:<sup>2</sup>

$$CR4_j = \sum_{i=1}^4 MS_i \quad (1)$$

$$HHI_j = \sum_{i=1}^n (MS_i)^2 \quad (2)$$

where  $j = 1, 2, \dots, m$  indexes the subsector,  $i = 1, 2, \dots, n$  indexes firm  $i$  in a subsector, and  $MS_i$  is the market share of firm  $i$  in its respective subsector.  $CR4$  considers the collective share of the four largest firms in a subsector, while  $HHI_j$  considers the inequality of distribution of market shares among all firms in subsector  $j$ .

Both the  $CR4$  and the Herfindahl-Hirschman Index ( $HHI$ ) measures have a limitation in the calculation, but they complement each other.<sup>3</sup> Hence, it is necessary to use both concentration measures to clearly picture the market structure in the industry.

Additionally, there are some shortcomings related to the calculation of the concentration ratio ( $CR4$  and  $HHI$ ). The calculation of the concentration ratio will underestimate or overestimate the “true concentration” for a series of reasons (Bird, 1999). First, the survey of industrial manufacturing in Indonesia includes only the firms classified into large and medium firms.<sup>4</sup> This may overestimate the industrial concentration because small firms are not reported in the survey. Second, BPS reports firm data based on establishment. The industrial concentration may be underestimated because the calculation may include leading firms that have more than one establishment. Third, the unavailability of information on merger activity in the data, especially about horizontal mergers, is likely to lead to an underestimation of the industrial concentration. Fourth, because the industrial concentration may be higher in the regional than in the national level, the calculation of industrial concentration in the national level will be underestimated.

<sup>2</sup> Considering stocks, this paper calculates industrial concentration based on sales data because sales seem to explain more about the market share than the output.

<sup>3</sup>  $CR4$  is commonly used to classify the market into some categories of oligopoly (see Shepherd, 1999), but it cannot capture the distribution of the market share for all firms in the market. However,  $HHI$  can capture the distribution of the a firm’s market share in a market, but it is rather difficult to classify the oligopoly categories from the  $HHI$ . In spite of this, Besanko (2004) gave a classification of market structure based on  $HHI$ . Furthermore, Liebenberg and Kamerschen (2008) also discusses the importance of using both  $HHI$  and concentration ratio.

<sup>4</sup> BPS defines medium-sized firms as those firms employing more than 20 workers.



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3 Finally, it is noted that the industries examined may not be “markets” (see Kamerschen, 1994 for  
4 details).  
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7 The degree of the biases induced for the reasons mentioned above may not be substantial.  
8 Bird (1999) gives some arguments in this regard. First, Hill (1990) argued that, in the aggregate,  
9 the exclusion of small firms is not a serious problem because small firms contribute no more than  
10 15% of the total manufacturing value added in 1985. Second, different results may exist in the  
11 industrial concentration calculation between the method that uses the calculation from BPS  
12 establishment data and the one that uses the primary firm data. Although there will be  
13 differences, the industrial concentration trend may still be captured quite accurately. Third,  
14 vertical, rather than horizontal mergers, are more frequent in Indonesian economy. Therefore, the  
15 unavailability of information on merger activity will not have a great impact on the industrial  
16 concentration calculation. Finally, all factors underestimating or overestimating the  
17 concentration appear not to undermine the trend of the concentration, if their net effects remain  
18 constant over time (Bird, 1999).  
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28 This paper also estimates the effect of industrial concentration on industrial performance  
29 measured by the price-cost margin. The relationship arises because higher industrial  
30 concentration may lead to higher industrial performance (Bain, 1951; Gupta, 1983). A  
31 mathematical derivation of the effect of industrial concentration on the price-cost margin can be  
32 found in Saving (1970), Cowling and Waterson (1976), Fischer and Kamerschen (2003a, 2003b),  
33 and Kamerschen, Klein, and Porter (2005).  
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39 Industrial performance is measured by price-cost margin (Sizrazi, 1974; Domowitz, Hubbard,  
40 and Petersen, 1986; Prince and Thurik, 1992). The price-cost margin (PCM) is calculated  
41 according to the formula proposed by Domowitz, Hubbard, and Petersen<sup>5</sup> (1986) and Prince and  
42 Thurik (1992). This formula allows for changes in inventories ( $\Delta$ Inventories), considering that  
43 changes in inventories are important with regard to the fluctuation in the business cycle in the  
44 Indonesian economy from 1995-2006:  
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55 <sup>5</sup> Their (1988) article which has a connection to this article has been challenged by Kamerschen and Park (1993a,  
56 1993b). In the same year, Domowitz, Hubbard, and Petersen (1993) replied that they did not view the Comment by  
57 Kamerschen and Park (1993a, 1993b) as a substantive criticism of their (1988) paper, and the issue remains open.  
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$$\text{PCM} = \frac{\text{Value Added} - \text{Cost of Labor} + \Delta\text{Inventories}}{\text{Sales} + \Delta\text{Inventories}} \quad (3)$$

Value added is calculated by sales minus intermediate inputs except labor cost.

### III. Data

The CR4 and HHI for the food and beverages industry are calculated using firm-level data from the Annual Manufacturing Survey provided by the Indonesian Bureau of Central Statistics (BPS). The dataset covers the period from 1995 to 2006. This paper uses that period because of the tractable and comparable data for all subsectors among the years. Furthermore, data beyond 2007 have not yet been published.

There are 59 subsectors of International Standard Industrial Classification (ISIC) Level<sup>6</sup> in the food and beverages industry, 55 of which are related to food processing, with the remaining to the beverages industry. This paper excludes five subsectors from the analysis because they contain less than four firms in each period. Therefore, this paper uses only 54 of the subsectors in the industry. During the period covered by the data, there were, on average, 5488 firms in the market. About 7.6 percent of them, on average, were involved in exporting activities. In 1995 the food and beverages sector had 5335 firms. This number increased significantly to 7897 in 2006. Despite this, the number of firms had decreased significantly from 5495 to 4850 (a drop of 12%) in 1998, the year that coincided with a major economic crisis in Indonesia.

**Table 1. Descriptive statistics of the variables from 1995-2006**

Variable	Mean	Standard Deviation	Coefficient of Variation	Minimum	Maximum
CR4	0.633	0.274	0.433	0.081	1.000
HHI	2,266	2,143	0.946	51.5	10,000
PCM	0.181	0.126	0.696	-0.380	0.708
Size (Log of VA)	13.700	2.227	0.162	5.552	18.498

<sup>6</sup> Actual codes used are not the ISIC codes, but comparable, coming from Klasifikasi Baku Lapangan Usaha Indonesia (KBLI)

Variable	Mean	Standard Deviation	Coefficient of Variation	Minimum	Maximum
Growth	0.453	1.319	2.912	-0.942	6.963
COR	0.018	0.161	8.944	$5.27 \cdot 10^{-6}$	3.937
N-Subsectors	54	54	54	54	54

Table 1 shows that the data are relatively heterogeneous, with relatively high standard deviations and coefficients of variation for all variables. In the period covered by the data, it is observed that the average of CR4 is 0.6328, which characterizes the food and beverages sector as a tight oligopoly, according to the criteria of Shepherd (1999). It is also seen that the average HHI is 2,266, which according to Besanko (2004), this classifies the food and beverages sector as an oligopoly. The average PCM of 0.181 also indicates that the firms in the sector have a positive price markup. Regarding all variables, the data on demand growth (Growth) and capital output ratio (COR) are very heterogeneous.<sup>7</sup> The heterogeneous condition of the demand growth and capital output ratio are related to the economic condition and capital-output applied by the firms, respectively.<sup>8</sup>

#### IV. Empirical Model and Estimation

This paper uses two econometric models to investigate the trend of industrial concentration and the relationship between industrial concentration and the price-cost margin. The first model examines the trend of industrial concentration in the industry. It measures whether there is a trend for the industrial concentration to move to a certain value. To confirm the movement of the trend of industrial concentration for all subsectors in the food and beverages sector, this paper

<sup>7</sup> Although the data on demand growth and capital output ratio are too heterogeneous, this may not undermine the accuracy of the estimation given that these two variables appear only as instruments in the model.

<sup>8</sup> The lowest demand growth is found on subsector 15316 (Nuts), which dropped about -94.21% in 2002 compared to 2001. According to the data survey, this may be caused by firms exiting the market, as well as the decrease in the demand for this product in 2002. The highest demand growth was experienced by subsector 15134 (Dried Fruit and Vegetables), which increased about 696% in 1998 compared to 1997. The significant increase of the demand growth in 1998 is caused by the considerable increase of sales in 1998, after the sales drop caused by the crisis, starting in mid-1997. The high variation of the capital output ratio seems obvious because of the different capital used in each subsector. The subsector with the highest capital output ratio is 15143 (coconut oil), with a value of 3.937, whereas the subsector with the lowest capital output ratio is 15510 (liquors), with capital a output ratio of  $5.27 \cdot 10^{-6}$ .

uses the theory of absolute convergence<sup>9</sup> (Barro and Sala-i-Martin, 1992; Sala-i-Martin, 1996; Sorensen and Whitta-Jacobsen, 2005). The model can indicate whether there is a tendency for the convergence of the industrial concentration in the long run to one and the same point for all subsectors. In other words, the model assumes that all subsectors have the same steady state in the long run. The assumption is relevant because all subsectors face the same business characteristics in the Indonesian economy. The absolute convergence model<sup>10</sup> is defined as:

$$\frac{\text{Ln MS}_{t_n}^j - \text{Ln MS}_{t_0}^j}{T} \cong \beta_0 - \beta_1 \text{Ln MS}_{t_0}^j \quad (4)$$

where  $j = 1, 2, \dots, 54$  indexes subsector,  $t_0$  is the initial year for which data are available (1995), and  $t_n$  is the final year (2006).  $\text{MS}_t^j$  is the market structure in period  $t$  and subsector  $j$ , captured by the CR4 and HHI. The model is estimated using cross section regression. The food and beverages sector exhibits convergence in market structure if the estimated coefficient of  $\beta_1$  is significantly positive.

The second model estimates the effect of industrial concentration on the price-cost margin in the industry. Higher industrial concentration, followed by higher market power, increases the ability of the firms or an industry to influence the market equilibrium price. Thus, higher concentration is expected to lead to higher price-cost margins. Moreover, based on Konings *et al.* (2001), McCloughan *et al.* (2007), and Looi Kee and Hoekman (2003), the effect of the competition law on the price-cost margin is also investigated. The competition law is represented by the dummy variable of the competition law establishment in Indonesia as used by Looi Kee and Hoekman (2003). This paper also interacts the competition law dummy variable with the industrial concentration. This interaction variable can capture in the way industrial concentration affects the price-cost margin after the competition law establishment. The effect of the industrial concentration on the price cost margin may be lower after the establishment of the competition law because the law can break the cartel and other anti-competitive behavior. As a result, the competition law is also hypothesized to affect the price-cost margin indirectly through its influence on the industrial concentration. In addition, this paper also introduces trend variables and their interaction with the competition law dummy variable to see the trend of the price-cost

<sup>9</sup> This model is different from the model used by Bird (1999), who also investigated the trend of the industrial concentration using the models of Khemani (1980) and Brozen (1982).

<sup>10</sup> Derivation of this model can be found in Barro and Sala-i-Martin (1992) and Sala-i-Martin (1996).

margin in the whole period as well as the competition law effect on the trend of the price cost margin. The final model of the industrial performance-concentration model<sup>11</sup> is:

$$PCM_{jt} = \gamma_i + \theta_1 MS_{jt} + \theta_2 Law_t + \theta_3 Law_t * MS_{jt} + \theta_4 Trend_t + \theta_5 Trend_t * Law_t + v_{it} \quad (5)$$

where  $j$  and  $t$  index subsector and time, respectively.  $Law$  is a dummy variable that assumes the value 1 for the years after the establishment of the competition law (1999),  $Trend = 0, 1, 2, \dots, T$ , and  $PCM$  is the price-cost margin.

Regarding the relationship between industrial concentration and the price-cost margin, there is an endogeneity problem in the variable of industrial concentration (Clarke and Davis, 1982; Kalirajan, 1993). This endogeneity may arise because of the argument that the derivation of the price-cost margin comes from an equilibrium condition for profit maximization (Jacquemin *et al.*, 1980; Kalirajan, 1993). Additionally, Clarke and Davis (1982) established the endogeneity problem through underlying cost and demand conditions. Therefore, this paper uses some instrumental variables for the industrial concentration. The instrumental variables chosen are based on the works of Muller and Ham (1974), Sizrazi (1974), Gupta (1983), Prince and Turik (1992), Kalirajan (1993), Go, Kamerschen, and Delorme (1999), and Delorme, Kamerschen, Klein, and Voeks (2002). The main instrumental variables estimating the industrial concentration are industry size (Size), growth of demand (Growth), and capital output ratio (COR). Besides the three main instrumental variables, this paper also uses a competition law dummy variable and trend variables as exogenous in the equation that determines PCM.

Equation (5) is estimated using unbalanced panel data techniques.<sup>12</sup> This method uses either a fixed effects or random effects model based on the Hausman test (1978). The fixed-effects model is chosen if the Hausman test shows that there is correlation between individual effects and other regressors. Otherwise, the random effects model will be used. In addition, the fixed-effects model uses dummy variables of the subsectors as the source of the heterogeneity, whereas the random effects model uses the intercept deviation of each subsector across the intercept for all subsectors.

<sup>11</sup> The derivation of the relationship between industrial concentration and price-cost margin can be found in Cowling and Waterson (1976) and Clarke and Davis (1982).

<sup>12</sup> Some subsectors, such as 15145 and 15149, are not reported in 2006.

## V. Results

### 5.1 Trends of Average Industrial Concentration

Table 2 describes the industrial characteristics such as concentration for the CR4 (4 firms), the Herfindahl-Hirschman Index (HHI), the distribution of the number of firms, and the average price-cost margin. The table shows that the industrial concentration was high from 1995 to 2006, but there was a slightly declining trend, especially after the year 2000. This finding suggests that industrial concentration increased steadily before the establishment of Indonesian Competition Law No. 5 1999. After the establishment of the law, the industrial concentration decreased slightly over time. Furthermore, the CR4 and HHI decreased on average by 0.7% and 0.8%, respectively, every year from 1995-2006. The average increasing number of the firms in the industry every year may also be the reason for which the concentration is decreasing.

The price-cost margin is always positive and exhibits a significant increase by on average 100.47% from 1995-1999, which coincided with hyperinflation in 1997-1998 (firms sold the old stock at a new price) and the increase in the industrial concentration. The increase in the average industrial concentration from 1995-1999 may also have been caused by firms exiting the industry, especially from 1997-1999 because of the economic crisis. From 1998-1999 there was a 12% reduction in the number of firms in the industry. The reduction in the growth of the price-cost margin occurred simultaneously with the decline of the growth of the concentration from 2000-2006.

**Table 2. Industrial characteristics 1995-2006**

Year	CR4	HHI	Number of Firms	Average PCM
1995-1997	0.645	2572	5495	0.069
1998-2000	0.713	3142	4850	0.225
2001-2003	0.650	2381	5299	0.197
2004-2006	0.626	2345	6308	0.235
Average % Change 1995-2006	-0.693	-0.796	5.133	38.593
Average % Change 1995-1999	3.442	8.019	-5.982	100.470
Average % Change 2000-2006	-3.056	-5.833	11.485	3.234

Based on the estimation of Eq. 4, Table 3 shows that the parameter estimate for the initial industrial concentration is negative (implying that  $\beta_1 > 0$ ), which means that there is absolute

convergence in the industrial concentration in the long run. Therefore, in the long run, industrial concentration tends to converge to one and the same value for all subsectors. It can be concluded that the subsectors with a relatively low industrial concentration in 1995 grew relatively fast after the year 1995.

**Table 3. Absolute convergence of industrial concentration**

Independent Variable	Dependent Variable:	Dependent Variable:
	$\ln CR4_{2006}^j - \ln CR4_{1995}^j$	$\ln HHI_{2006}^j - \ln HHI_{1995}^j$
	T	T
	Coefficients	Coefficients
Intercept	-0.025*** (0.008)	0.270*** (0.073)
$\ln CR4_{j,1995} (-\beta_1)$	-0.029*** (0.007)	
$\ln HHI_{j,1995} (-\beta_1)$		-0.039*** (0.010)
R <sup>2</sup>	0.231	0.222
F-statistics	15.606***	14.806***

**Table 4. Average % change of industrial concentration (CR4)**

The Five Largest Industrial Concentrations	Average % Change	The Five Lowest Industrial Concentrations	Average % Change
15212 (Milk Food)	-1.015	15492 (Ice Cubes, other ices)	6.73
15530 (Beer)	0.055	15311 (Rice Milling)	19.41
15321 (Wheat Flour)	-1.827	15141 (Crude Cooking Oil)	17.64
15131 (Canned Fruit, Vegetables)	1.043	15496 (Crackers and Other Chips)	17.08
15329 (Other Starch Nec)	1.401	15323 (Tapioca)	1.17

Table 4 also supports this finding. It shows that the five most concentrated industries (according to CR4) tend to change slowly over times and some of them experienced concentration reduction, such as the milk, food and wheat flour subsectors. The five least concentrated (CR4) subsectors experienced a significant increase in concentration. For three of them, the increase was larger than 15%, on average.

## 5.2 The Effect of Industrial Concentration on Price-Cost Margin

Table 5 shows the results of the estimation of Equation (5), which is estimated using a fixed-effects model with stationary level-form data. The fixed-effects model is used because the Hausman test (1978) rejected the random effects specification. Furthermore, based on the stationarity test of Levin, Lin, Chu (LLC) test (2002), the null hypothesis of non-stationary data of the CR4 and PCM is rejected at the 1% critical level, which indicates that the data at the level form are valid for use in the model.

The White test for heteroscedasticity (Castilla, 2008) rejects the null hypothesis of the absence of heteroscedasticity at the 1% critical level. To address the problem of heteroscedasticity, this paper applies the generalized least square (GLS) method to estimate the model.

**Table 5. Regression of industrial concentration and other variables on the price-cost margin**

Independent Variable	Dependent Variable : AVERAGE PCM	
	Coefficients	Coefficients
Intercept	-0.499*** (0.110)	-0.189*** (0.043)
CR4	0.824*** (0.196)	
HHI		0.091*** (0.025)
Law	0.373*** (0.043)	0.339*** (0.033)
Law*CR4	-0.342*** (0.088)	
Law*HHI		-0.064 (0.019)
Trend	0.036*** (0.012)	0.049*** (0.011)
Trend*Law	-0.031** (0.013)	-0.049*** (0.011)
R <sup>2</sup>	0.273	0.338
F-statistics	9.690***	10.651***

Notes: \* denotes test statistic significance at the 10% level  
 \*\* denotes test statistic significance at the 10% level  
 \*\*\* denotes test statistic significance at the 10% level  
 Standard error in the parentheses



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The results in Table 5 suggest that industrial concentration has a significant effect on the price-cost margin, both for the CR4 and HHI measures. As expected, higher industrial concentration yields a higher price-cost margin for the firms. The CR4 coefficient of 0.824 indicates that the price-cost margin will increase by 0.824% following a 1% rise in industrial concentration. Additionally, the HHI coefficient of 0.091 shows that the price-cost margin will increase by 0.091 units for every 1-unit (1000) increase in HHI. Therefore, results show that firms in the food and beverages sector benefit from the oligopolistic market structure. This result is also supported by the data, given that every year, on average, the industry experienced about 18.1% of price-cost margin from 1995-2006 (see Table 1). The results presented here also support the findings of other studies, such as Shirazi (1974), Prince and Turik (1992), Kalirajan (1993), Go, Kamerschen, and Delorme (1999), and Delorme, Kamerschen, Klein, and Voeks (2002), which found a positive impact of industrial concentration on the price-cost margin.

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Furthermore, based on the estimated fixed effects of both models with CR4 and HHI, it is observed that without any influences of the industrial concentration and other variables in the model (*ceteris paribus*), the subsectors of the food and beverages sector have a heterogeneous price-cost margin.<sup>13</sup> It is also found that the subsectors that are among the least concentrated have a high price-cost margin, indicating that for these subsectors, the degree of concentration is not a very good predictor of PCM. Instead, the high price-cost margin is captured in the model by the fixed-effects,<sup>14</sup> which is not surprising because fixed effects parameters do not take into account some unobserved heterogeneities, such as different characteristics of the industry and scale effect.

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<sup>13</sup> In the CR4 model, the lowest and the highest fixed effects parameters are -0.248 and 0.333, respectively. Almost similar to the CR4 model, in the HHI model, the lowest and the highest fixed effects parameters are -0.253 and 0.200, respectively.

<sup>14</sup> Based on the parameters of the fixed effects of the model with CR4, some subsectors, such as 15492 (ice cubes and other ice products), 15421 (granulated sugar), 15141 (crude cooking oil), 15540 (soft drinks), and 15496 (crackers and other chips), have the highest price-cost margin in the period of estimation. However, some subsectors, such as 15329 (other starch nec), 15321 (wheat flour), 15530 (beer), 15134 (dried food, vegetables), and 15312 (other grain milling), have the lowest price-cost margin in the period of estimation.

Also, based on the parameters of the fixed effects of the model with HHI, some subsectors, such as 15421 (granulated sugar), 15510 (liquors), 15540 (soft drinks), 15139 (other fruit and vegetables), and 15141 (crude cooking oil), have the highest price-cost margin in the period of estimation. However, some subsectors, such as 15329 (other starch nec), 15134 (dried food, vegetables), 15125 (processed fish), 15321 (wheat flour), and 15423 (other sugars), have the lowest price-cost margin in the period of estimation.

The parameter associated with the trend suggests a positive movement of the price-cost margin during the period. The trend variable coefficient shows that the price-cost margin increases by 0.036 and 0.049 each year for the CR4 and HHI models, respectively.

To examine the effect of the competition law on the price-cost margin, the first order derivatives are calculated for the CR4 and HHI models. We obtain:<sup>15</sup>

$$\frac{\partial PCM}{\partial Law} = 0.373 - 0.342 \times CR4 - 0.031 \times trend$$

$$\frac{\partial PCM}{\partial Law} = 0.339 - 0.064 \times HHI - 0.049 \times trend$$

The averages for CR4 and HHI are 0.633 and 2,266, respectively, and the average trend is 5.5. The net effects of the law on PCM are calculated as -0.014 and -0.075 for the CR4 and HHI models, respectively. The results regarding the Law variable suggest that the Competition law has affected price-cost margin in various ways. First, the parameters associated with the interaction term of Law and the concentration ratios (CR4 and HHI) show that the policy has had a more negative effect on the price cost margins of subsectors that were characterized by higher concentration ratios, which implies that the policy has been targeted more toward sectors with a high price cost margin. Second, the parameters of the interaction terms of Law and trend (-0.031 and -0.049) (almost) offset the positive single trend term, which suggests that the policy was successful in stopping the upward trend in price cost margins before 1999.

Regarding the results on the relationship between the law establishment and the price-cost margin, a number of comments are in order. First, the competition policy may not have been applied effectively to reduce market power. McCloughan *et al.* (2007) argues that only an effective competition policy would decrease the price-cost margin. Additionally, Pangestu *et al.* (2002) found ambiguities that are still subject to interpretation in the Indonesian competition law, which may make the investigation and the law enforcement on anti-competitive behavior ineffective. Second, the political stability and improved economic environment in 2004-2006 may have resulted in higher profits, thereby confounding the effects of the competition law. Better stability and economic environment during 2004-2006 may come as a result of successful parliamentary and presidential elections in 2004. Indeed, the data in Table 2 show that the price-

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<sup>15</sup> We slightly abuse notation here. Although we use the partial derivative sign, we evaluate the effect of the competition law as the dummy variable changes from zero to one.

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3 cost margin increased steadily from 2004 until 2006. Third, the law establishment may induce  
4 firms to innovate and produce differentiated products that may sustain higher prices (Looi Kee  
5 and Hoekman, 2003), which may result in higher price cost margins. Indeed, since 1999, the  
6 variety of products has been significantly increasing in Indonesia. Fourth, the increase of the  
7 industrial concentration for subsectors with low industrial concentration in the initial year may  
8 cause the increase of the price-cost margin, on average (as predicted by the model of absolute  
9 convergence in Equation (4)). This finding is in line with the finding that the competition law  
10 affected the subsectors with high industrial concentration ratios more seriously. Finally, although  
11 there are some factors that may cause the elevation of the price-cost margin, this result may give  
12 a further recommendation for an improvement in the competition law in the industry.  
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## 23 **VI. Conclusions**

24 This paper has investigated the trend and convergence of industrial concentration in the  
25 Indonesian food and beverages sector. Moreover, it has analyzed the relationship between the  
26 industrial concentration and the price-cost margin. This paper contributes to the literature by  
27 applying the concept of convergence to the analysis of the trend in industrial concentration.  
28 Furthermore, this paper contributes an analysis of the relationship between market structure and  
29 industrial performance in the food and beverages sector in Indonesia.  
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35 The results show that the industrial concentration of the subsectors in the food and beverages  
36 sector tend to be slightly lower in the long run, but the subsectors of the industry still have a high  
37 industrial concentration (tight oligopoly structure) in the period covered by the data. In addition,  
38 results show that the industrial concentration converges to the same value for all subsectors.  
39 Finally, as expected, the industrial concentration is found to have a positive effect on the price-  
40 cost margin.  
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46 The competition law has been relatively more successful in reducing the price-cost margin in  
47 subsectors that are characterized by a relatively high industrial concentration. Furthermore, the  
48 law has almost stopped the upward trend in price-cost margins that existed before the  
49 implementation of the law. Nevertheless, the price-cost margin is still higher after the  
50 competition law establishment than before, which suggests that a further improvement of the  
51 competition law is warranted.  
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3 The results of this paper demonstrate that higher concentration in a subsector leads to a higher  
4 price-cost margin. One way to lower anti-competitive behavior is to eliminate barriers to entry,  
5 which effectively lowers concentration. However, the results presented here suggest that the  
6 effect of the competition law on the price-cost margin is through the concentration. More  
7 precisely, the competition law lowers the effect of concentration on the price-cost margin by  
8 breaking cartels.  
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