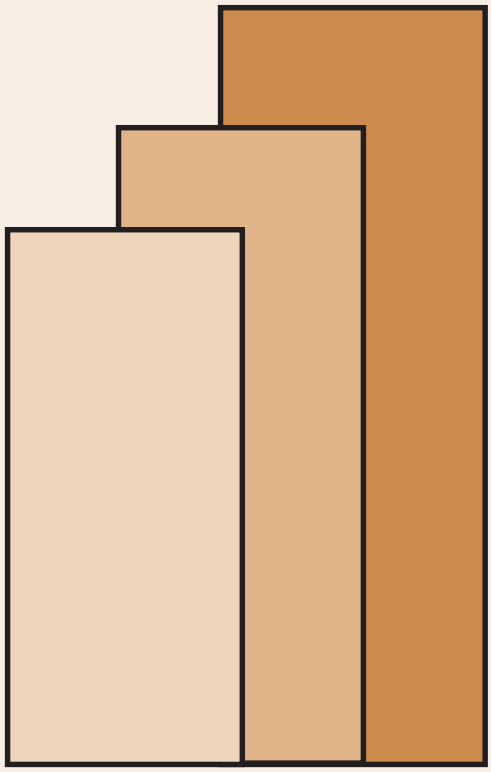
Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

Can Imports Discipline Collusive Firms? Case of the Philippine Cement Industry

Rafaelita M. Aldaba

DISCUSSION PAPER SERIES NO. 2008-01



January 2008

For comments, suggestions or further inquiries please contact:
The Research Information Staff, Philippine Institute for Development Studies
5th Floor, NEDA sa Makati Building, 106 Amorsolo Street, Legaspi Village, Makati City, Philippines
Tel Nos: (63-2) 8942584 and 8935705; Fax No: (63-2) 8939589; E-mail: publications@pids.gov.ph
Or visit our website at http://www.pids.gov.ph

Abstract

Applying a conjectural variations (CV) model introduced by Haskel and Scaramozzino (H&S model 1997), the paper examines the impact of trade liberalization on the Philippine cement industry where alleged cartel activities have taken place after the entry of the world's Big Three cement firms: Holcim, Cemex, and Lafarge. In the H&S model, the relationship between firm behavior and competition is estimated with price cost margin (price minus marginal costs over price) as indicator of competition and profitability. The model is extended to assess the impact of imports on competition using import penetration ratio as proxy for trade policy.

The paper focuses on the following questions: did the removal of import restriction and reduction of tariffs affect competition in the cement industry? Are imports effective in disciplining domestic firms and reducing their market power? The results imply that imports do not seem to affect profitability and competition in the industry. Given the ability of firms to engage in anticompetitive behavior and the absence of an effective competition policy in the Philippines, the gains from trade liberalization are nullified. The country's experience in the cement industry illustrates that trade liberalization is not a substitute for competition policy. For imports to effectively discipline the market, trade liberalization must be accompanied by strict competition policy.

Keywords: cement industry, cartel, conjectural variations, competition, trade liberalization

Can Imports Discipline Collusive Firms?
Case of the Philippine Cement Industry[1]

Rafaelita M. Aldaba

1. Introduction

In the Industrial Organization literature, conjectural variations (CV) describe how firms think others will react to changes in their quantities, i.e., the CV summarizes the response of firm *j* to changes in quantity set by firm *i.* Applying a CV model introduced by Haskel and Scaramozzino (1997), the paper examines the impact of trade liberalization on the Philippine cement industry where alleged cartel activities have taken place after the entry of the world's Big Three cement firms: Holcim, Cemex, and Lafarge. In the Haskel and Scaramozzino model (H&S), the relationship between firm behavior and competition is estimated with price cost margin (price minus marginal costs over price) as indicator of competition and profitability. The model is extended to assess the impact of imports on competition using import penetration ratio as proxy for trade policy.

2. From protection and regulation in the 70s to liberalization in the 80s

Historically, the Philippine cement industry thrived under a government-sanctioned cartel. Due to the economic slump in the early 1970s, cement firms pushed for government regulation to prevent cut throat competition. The government allocated supply, controlled prices and regulated entry in the industry. However, in the absence of the necessary firm-level information to efficiently perform these tasks, the government delegated the setting of production quotas to the industry association. Collusion took place through the firms' informal agreement to set production quotas and to assign geographic markets among themselves. This practice divided the country into regional markets served by a dominant player which eliminated competition from taking place.

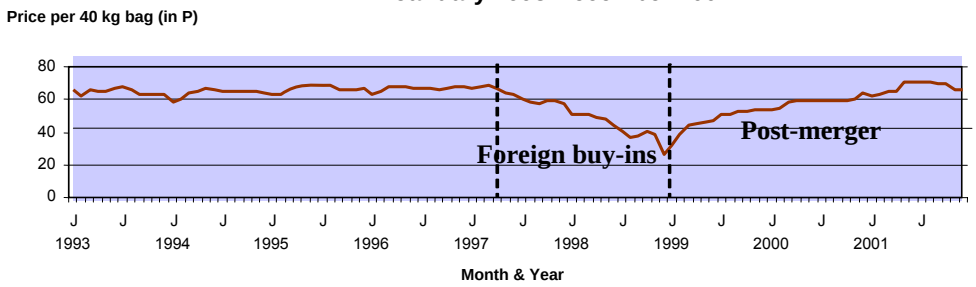
3. Price behavior after the entry of the big 3 in the late 90s

As the government pursued market-oriented reforms in the 1980s, the industry was deregulated and liberalized. In the early 1990s, the cement companies invested in capacity expansion; however, they encountered serious financial difficulties due to the 1997-98 Asian financial crisis. Foreign companies came in and bought into the industry through mergers and acquisitions. The industry which used to be dominated by several family-owned firms is now controlled by the world's Big Three cement companies: Holcim, Lafarge, and Cemex.

[1] This is based the author's PhD dissertation entitled "Imports to Discipline the Market: The Experience of the Philippine Manufacturing Industry", University of the Philippines- School of Economics, Summer 2007.

Figure 1 shows that prior to 1997, price movements in the industry were fairly stable with prices generally rising during the dry season (January to May) and falling during the rainy months (June to December). With the 1997-98 crisis, prices dropped from P104 per bag in March 1997 to P45 per bag in December 1998; but starting in January 1999, prices began to increase.

Figure 1: Average Ex-Plant Prices (at constant 1990 prices)
January 1993-December 2001



The price increases in 1999 coincided with the completion of most mergers and consolidations in the industry. Prices started to go up from P45 in December 1998 to P70 in February 1999. Prices steadily rose to P97 by December 1999. In May 2000, ex-plant price/bag was already P109 reaching P132 per bag in May 2001. Considering that the industry was facing oversupply and low demand, price coordination was seen as the only explanation for the price increases. Note also that during this period of rising prices, there was excess capacity in the world market; imports were coming in and sold at prices lower than those charged by domestic manufacturers.

4. Impact of imports in an industry with collusive behavior

4.2 Haskel & Scaramozzino Model

This brings us to the following questions: did the removal of import restriction and reduction of tariffs affect competition in the cement industry? Are imports effective in disciplining domestic firms and reducing their market power? In addressing these questions, the CV model by Haskel and Scaramozzino is applied. With price cost margin (PCM) as a measure of competition and profitability, the model focuses on the relationship between PCM and conjectural variations by looking at how the profits of one firm are affected by firm characteristics such as physical capacity and financial condition.

The H&S approach assumes that the conjectures of a firm about the reactions of its rivals depend on its own and rival firms' physical and financial capacity. The CV of firm *i*

depends on the capacity utilization of other firms because a rival with excess capacity can easily respond to changes in quantities of its competitors. A competitor in financial distress is expected to respond less aggressively than one whose financial condition is more healthy.

Price cost margins are often used to measure the degree of competition in the market. Assuming homogeneous goods industry, the first order condition for profit maximization yields:

(1) $$PCM = \frac{s_i}{\varepsilon}\left[1 + \lambda_i\right]$$

where *PCM* is a firm *i's* price cost margin, s_i is its market share, ε is elasticity of demand and λ_i is firm *i's* conjectural variation or expectations about the reaction of other firms to a change in its quantity.

In estimating λ_i, the H-S approach allows conjectural variations to depend on the actual ability of other firms to respond based on physical capacity and financial capability. Haskel and Scaramozzino use capacity utilization as an indicator of physical capacity while borrowing ratio; cash liabilities ratio; and interest payment ratio are used as indicators of financial position. Assuming that a firm's conjectures are affected by the characteristics of the firm itself and of other firms in the industry, the λ equation is modeled as:

(2) $$\lambda_i = \alpha_0 + \alpha_1 CU_i + \alpha_2 CU_{-i} + \alpha_3 FS_i + \alpha_4 FS_{-i}$$

where *FS* refers to a vector of measures of financial status and the subscript *–i* refers to rivals. To allow responses to differ between leaders and followers, equation (40) is rewritten as:

(3) $$\lambda_i^{\omega} = \beta_1^{\omega} + \beta_1^{\omega} CU_i + \beta_2^{\omega} CU_{-iL} + \beta_3^{\omega} CU_{-iF} + \beta_4^{\omega} FS_i + \beta_5^{\omega} FS_{-iL} + \beta_6^{\omega} FS_{-iF}$$

where ω= L (leader); F (follower).

The H-S approach allows responses to differ between leaders and followers in the industry. The equations to be estimated are obtained by substituting equation (2) in equation (1), these are given by the following:

(4)

$$PCM_{it}^{L} = \psi_0^{L} adjMS_i + \psi_1^{L} adjMS_i CU_i + \psi_2^{L} adjMS_i CU_{-iL} + \psi_3^{L} adjMS_i CU_{-iF} + \psi_4^{L} adjMS_i FS_i + \psi_5^{L} adjFS_{-iL} + \psi_6^{L} adjMS_i FS_{-iF} + \psi_7^{L}\left(\frac{K}{Y}\right)_{it}^{L} + FE_i + TD_i + \varepsilon_{it}$$

and

(5)

$$PCM_{it}^{F} = \psi_0^{F} adjMS_i + \psi_1^{F} adjMS_i CU_i + \psi_2^{F} adjMS_i CU_{-iL} + \psi_3^{F} adjMS_i CU_{-iF} + \psi_4^{F} adjMS_i FS_i + \psi_5^{F} adjFS_{-iL} + \psi_6^{F} adjMS_i FS_{-iF} + \psi_7^{F}\left(\frac{K}{Y}\right)_{it}^{F} + FE_i + TD_i + \eta_{it}$$

where *L* and *F* denote leaders and followers, respectively; ε_{it} and η_{it} are disturbances; and FE_i and TD_i are firm fixed-effects and time dummies. The subscript *–i* refers to rivals. *adj* MS_i is

firm *i's* market share adjusted for imports, *CU* is capacity utilization, and *FS* is a vector of measures of financial status.

4.2 Analysis of Results

Based on firm level data of 18 cement companies covering the period 1994 to 2003, the H&S model allows us to estimate firm CVs and examine the impact of trade liberalization. Table 5.9 reports the descriptive statistics on the main variables used. The price cost margin (PCM) is calculated using the following formula:

$$PCM = \frac{Net\ Sales - Cost\ of\ Goods\ Sold}{Net\ Sales} \quad (6)$$

Data on the Cost of Goods Sold are taken from the firms' income statements. This account consists of the following cost items: power and fuel; raw, packing, and production materials; depreciation; repairs and maintenance; transportation; personnel; and others.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Price Cost Margin (PCM)	109	0.1443515	0.2312443	-1.120171	0.6443633
Borrowing Ratio (BR)	109	0.3405189	1.166529	0	11.91405
Cash Liabilities Ratio (CL)	101	0.3393691	1.195246	0.0014901	11.54943
Capacity Utilization Rate (CU)	109	0.54456	0.2347538	0.0342494	1.25
Capital-Sales Ratio (K/Y)	109	3.871203	3.771939	0.0145845	24.78601
Import Penetration Ratio (MPR)	109	6.024269	5.985602	0.0806322	19.0635
Market Share (MS)	109	0.0694324	0.049295	0.0014862	0.3045608
Market share adjusted for imports (MS_{adj})	109	0.0651423	0.0465906	0.0014291	0.2971806
Effective Protection Rate (EPR)	103	1.033736	0.0596734	0.9198	1.2341
Construction Growth Rate (CGR)	109	0.9047147	14.58636	-27.07994	23.31661

Two financial indicators, borrowing ratio and cash liabilities ratio, are computed as follows:

$$(7) \qquad BR = \frac{Total\ Long\ Term\ Debt}{Capital\ Stock}$$

$$(8) \qquad CL = \frac{Cash\ and\ Cash\ Equivalents}{Total\ Current\ Liabilities}$$

The firm's capital stock consists of fixed capital including buildings, machines, transportation equipment, and other fixed assets such as furniture, fixtures, and office equipment. The value of capital is measured by the replacement cost of capital, that is, what it would cost today to replace the existing capital of the firm.

The other indicators such as capital-sales ratio is given by the proportion of the replacement cost of capital to net sales Capacity utilization is obtained by getting the ratio of cement production to total installed capacity. Import penetration is the proportion of imports to total domestic supply of cement (production less exports plus imports). Market shares are adjusted by the industry share of imports.

There are four major players in the industry. These firms were able to reach individual annual market shares that ranged from 10 to 15 percent during the period 1994 to 2001. These firms also had the highest average market shares during the period 1999 to 2003 accounting for an average total share of almost 38 percent of the market.

Equations (4) and (5) are estimated by least squares dummy variable (LSDV) regression technique. Panel data have unobserved, time-constant factors that affect PCM_{it} known as *unobserved or fixed effect* and *idiosyncratic error or time-varying error* representing unobserved factors that change over time and affect PCM_{it}. A traditional view of the fixed effects model is to assume that the unobserved effect is a parameter to be estimated for each firm. To estimate fixed or unobserved effects, a dummy variable technique is applied, hence it is called least squares dummy variable regression or LSDV. Under fixed effects, the intercept is allowed to vary across firms which may be due to special features of each company.

The results presented in Table 2 suggest that firm interaction which depends on the firms' physical capacity and financial condition is an important determinant of price cost margin. For leaders, the most important determinants are leader firms' own physical condition $(adjMS_{it}*CU_{it})$ and own financial status $(adjMS_{it}*BR_{it})$ as well as rival leaders' physical ($adjMS_{it}*CU_{-iL,t}$) and financial $(adjMS_{it}*BR_{-iL,t}$ and $adjMS_{it}*CL_{-iL,t})$ characteristics. As the results show, the coefficient on own market share is positive and highly significant. When interacted with own capacity utilization, the coefficient turns negative and highly significant. The coefficient on own market share interacted with the capacity utilization of major rival firms show a positive and significant sign. The results also show that the coefficient on own

market share interacted with own BR is negative and highly significant. In terms of the effect of financial status variables of leader rival firms, the coefficient on own market share interacted with the CL of other rival leader players shows a highly significant positive sign. The results also indicate that the coefficient on own market share interacted with the BR of other rival leaders a highly positive effect on leaders' conjectures.

Table 2: Firm Conjectures as Determinants of PCM

Dependent Variable: PCM	Leaders	Followers
$adjMS_{it}$	7.230078***	-0.2231883
	(0.680476)	(1.066197)
$adjMS_{it}*CU_{it}$	-6.826383***	2.322326**
	(0.7300138)	(1.11604)
$adjMS_{it}*CU_{-iL,t}$	0.4797935*	-0.1211166
	(0.2940344)	(0.3928477)
$adjMS_{it}*CU_{-iF,t}$	-0.1404564	0.0013463
	(0.1370133)	(0.2048648)
$adjMS_{it}*CL_{it}$	-0.215368	0.9518469***
	(0.160818)	(0.0584158)
$adjMS_{it}*CL_{-iL,t}$	0.3693449***	-0.3797919
	(0.1287209)	(0.3216298)
$adjMS_{it}*CL_{-iF,t}$	0.0077585	-0.0283554
	(0.0226771)	(0.0342034)
$adjMS_{it}*BR_{it}$	-0.7517635***	0.3899996***
	(0.2015318)	(0.1487846)
$adjMS_{it}*BR_{-iL,t}$	0.0691973***	-0.0264484
	(0.0210149)	(0.0590076)
$adjMS_{it}*BR_{-iF,t}$	0.0043805	0.0243232
	(0.0279925)	(0.1370107)
$(K/Y)_{it}$	0.0194575***	-0.0228076***
	(0.0040007)	(0.0012047)
constant	0.2528175***	0.4425579***
	(0.0287328)	(0.0227305)
R^2	0.81	0.85
Number of	582	1984

Note: Robust standard errors in parentheses; *** indicates significance at the 1 percent level, ** at the 5 percent level, and * at the10 percent level.

With respect to followers' responses, the results tend to indicate that the physical and financial conditions of minor players do not seem to matter to major players. The coefficients on the interaction variables $MS_{it}*CU_{-iF,t}$, $MS_{it}*CL_{-iF,t}$ and $MS_{it}*BR_{-iF,t}$ all turned out to be insignificant. The coefficient on *K/Y* is positive and highly significant.

The results for followers show that the most important determinants are their own physical and financial conditions. The coefficient on own market share is negative but not significant. Own market shares interacted with own *CU* is positive and significant at the five

percent level. Both the coefficients on own market share interacted with own *CL* and own *BR* are also positive and highly significant. Followers' *K/Y* is negative and highly significant.

The implied conjectural variations or $\lambda_{ij}s$ can be computed based on the parameters obtained from the two estimated equations. Table 3 presents the average conjectural variations for major and minor players. The simplest type of oligopolistic behaviour is the Cournot case where $\lambda_{ij} = 0$. When λ_{ij} is between 0 and -1 (where $\lambda_{ij} = -1$ implies price-taking behaviour), expectation of price taking behaviour is indicated. When λ_{ij} is between 0 and 1 (where $\lambda_{ij} = 1$ indicates monopolistic or cartel behavior), the conjectures imply strategic behavior. Haskel & Scaramozzino (1997) indicated that a positive sign is in line with cartel/fringe models.

Table 3: Estimates of Conjectural Variations

	CV Estimate	F test: $\lambda_{ij}=0$
λ_{LL}	0.0687***	F(1, 559)=19.97 Prob>F=0.0000
λ_{LF}	0.0442***	F(1, 559)=12.06 Prob>F=0.0006
λ_{FF}	-0.01942	F(1, 1953)=0.99 Prob>F=0.3208
λ_{FL}	-0.02985	F(1, 1953)=1.69 Prob>F=0.1941
$\lambda_{LL} = \lambda_{LF}$	F (1, 559)= 5.22 Prob>F=0.0227	
$\lambda_{FF} = \lambda_{FL}$	F (1, 1953)= 0.49 Prob>F=0.4821	

λ_{LL} refers to how major players expect other major players to respond
λ_{LF} refers to how major players expect minor players to respond
λ_{FF} refers to how minor players expect other minor players to respond
λ_{FL} refers to how minor players expect major players to respond

Table 3 shows highly significant positive signs for leaders' conjectures on other rival leaders, λ_{LL} and on followers, λ_{LF}. The F tests suggest that the point estimates for leaders' conjectures on the behavior of other rival leaders, λ_{LL} and on other rival followers, λ_{LF} are significantly different from zero. These results indicate that leaders' conjectures with respect to other rival leaders and rival followers tend to show strategic behavior.

With respect to followers, the results show negative signs for both followers' conjectures on other rival followers, λ_{FF} and leaders, λ_{FL}. However, the F tests show that these are not statistically different from zero, hence, the null hypothesis of Cournot or non-strategic behaviour cannot be rejected. This tends to imply that followers have Cournot or non-strategic conjectures with respect to the responses of rival leaders and followers.

To assess the impact of trade liberalization on the cement industry, import penetration ratio (MPR)[2] which is used as a proxy for trade variable, is incorporated in equations (4) and (5). Table 4 presents the impact of imports arising from trade liberalization. The results differentiate the impact of import penetration on the profitability of leaders and followers. Table 4 indicates that for leaders, both MPR_t and MPR_{t-1} have the unexpected positive sign

[2] Import Penetration Ratio = [Imports/(Output – Exports + Imports)]

and are highly significant. This result tends to suggest that for leaders, imports do not have a disciplining effect with the coefficient on MPR indicating that high import penetration is associated with high PCM or low penetration of imports is associated with low PCM. For followers, the same results are obtained. On the overall, these results tend to provide weak support for the import discipline hypothesis.

Table 4: Impact of Trade Liberalization on Major and Minor Players' PCM

Dependent Variable: PCM	Leaders		Followers	
	MPR_t	MPR_{t-1} (with 1 year lag)	MPR_t	MPR_{t-1} (with 1 year lag)
MPR	0.0781644***	0.0168971***	0.0708058***	0.0153064***
	(0.0180333)	(0.0038984)	(0.0252413)	(0.0054565)
MS_{it}	9.86942***	9.86942***	-0.0150656	-0.0150656
	(0.8034117)	(0.8034117)	(0.9430546)	(0.9430546)
$MS_{it}*CU_{it}$	-9.425659***	-9.425659***	0.6713342	0.6713342
	(0.8779415)	(0.8779415)	(0.8616651)	(0.8616651)
$MS_{it}*CU_{-iL,t}$	0.2679453	0.2679453	-0.1354697	-0.1354697
	(0.2568113)	(0.2568113)	(0.2691042)	(0.2691042)
$MS_{it}*CU_{-iF,t}$	-0.1042423	-0.1042423	0.0767126	0.0767126
	(0.1314014)	(0.1314014)	(0.1452713)	(0.1452713)
$MS_{it}*CL_{it}$	-0.8938663***	-0.8938663***	1.446465***	1.446465***
	(0.2207391)	(0.2207391)	(0.0416134)	(0.0416134)
$MS_{it}*CL_{-iL,t}$	0.0478895***	0.0478895**	-0.5193541**	-0.5193541**
	(0.0189205)	(0.0189205)	(0.2210168)	(0.2210168)
$MS_{it}*CL_{-iF,t}$	0.0025126	0.0025126	-0.0053455	-0.0053455
	(0.0211494)	(0.0211494)	(0.0347575)	(0.0347575)
$MS_{it}*BR_{it}$	-0.1486152	-0.1486152	-0.0526274	-0.0526274
	(0.1545325)	(0.1545325)	(0.1086144)	(0.1086144)
$MS_{it}*BR_{-iL,t}$	0.32005***	0.32005***	-0.0515855	-0.0515855
	(0.1185023)	(0.1185023)	(0.034374)	(0.034374)
$MS_{it}*BR_{-iF,t}$	0.006945	0.006945	0.0461157	0.0461157
	(0.0203706)	(0.0203706)	(0.1048383)	(0.1048383)
$(K/Y)_{it}$	0.0123206***	0.0123206***	-0.037077***	-0.037077***
	(0.0045207)	(0.0045207)	(0.0006005)	(0.0006005)
Constant	-0.1886495***	0.1482584***	0.1806664	0.4858571***
	(0.0906013)	(0.0292174)	(0.1199253)	(0.0189027)
R^2	0.83	0.83	0.90	0.90
Number of observations	576	576	1879	1879

Note: Robust standard errors in parentheses; *** indicates significance at the 1 percent level, ** at the 5 percent level, and * at the10 percent level.

4.3 Testing the impact of imports based on SCP model

The impact of trade reforms on price cost margins is further examined by applying a structure-conduct-performance model. The traditional SCP argues that a concentrated

industry (structure) will facilitate collusion (conduct) and hence monopoly pricing (performance). This suggests that firms in a concentrated market, if protected from competition through barriers to entry, are expected to generate supra-normal profits. Thus, firms operating in oligopolistic industries with large market shares are more likely to coordinate their pricing and output or to unilaterally engage in anticompetitive behavior resulting in higher profit margins.

The model is estimated using firm-level data and is extended to include a trade policy variable. Two trade proxies are applied, effective protection rate[3] and import penetration ratio.

$$(9) \qquad PCM_{it} = f\left(MS_{it}, EPR_t, \frac{K_{it}}{NS_{it}}, CGR_t, I_{it}\right)$$

where

MS_{it}: market share of firm *i* which is expected to be positively correlated with the degree of profitability;

EPR_t: effective protection rate, this is expected to be positively correlated with the price cost margin

K_{it}/NS_{it}: capital-sales ratio, which is a standard regressor used as a control variable since PCM is measured as operating profit margin rather than price and marginal cost. As such, the estimated price cost margin consists of both pure profit and return to capital.

CGR_t: real growth rate of the construction industry

I_{it}: firm and time dummies.

The same model is tested using import penetration ratio, or MPR.

$$(10) \qquad PCM_{it} = f\left(MS_{it}, MPR_t, \frac{K_{it}}{NS_{it}}, CGR_t, I_{it}\right)$$

Based on firm level data from 1995 to 2003, the two equations are estimated using fixed effects method with time dummies. Random effects and feasible generalized least squares estimators are also applied. The estimation results are set out in Tables 5 and 6 with EPR and MPR as trade policy variables, respectively.

Tables 5 and 6 show that based on the three methods applied, the coefficients on EPR and MPR are negative and positive, respectively and are significantly different from zero. This tends to imply that cement imports do not have a disciplining effect on the domestic market. Based on the FGLS results, the coefficient on market share is positive and significant

[3] The effective protection rate measures the proportion by which value added measured in domestic prices exceeds the same value added measured at world prices. EPRs measure the net protection received by domestic producers from the protection of their outputs and the penalty from the protection of their inputs.

at the five percent level. The coefficients on capital intensity and construction growth rate are both negative and highly significant.

Table 5: Determinants of PCM (EPR as Trade Policy Variable)

Dependent Variable: PCM	Fixed Effects Method (robust standard errors)	Random Effects Method (robust standard errors)	Feasible Generalized Least Squares (FGLS)
EPR	-2.649672***	-2.357227***	-2.021508***
	(0.7550611)	(0.6391348)	(0.7152694)
MS	1.541314	0.9969583**	0.8978004**
	(1.238792)	(0.4809817)	(0.3742343)
K/Y	-0.015091	-0.0139713	-0.0109947**
	(0.0123802)	(0.0142424)	(0.0050102)
CGR	0.0052202	0.0051436	0.0066544*
	(0.0042423)	(0.0036999)	(0.0038011)
Constant	2.672306***	2.410122***	2.059295***
	(0.6929306)	(0.5667444)	(0.6972674)
R^2 within	0.5140	0.5100	
between	0.0867	0.0788	
overall	0.3323	0.3456	
Autocorrelation test#	F=13.454	F=13.454	no autocorrelation
	Prob>F=0.0019	Prob>F=0.0019	
No. of obs	109	109	109

Note: # For FE regression model, the modified Wald test for groupwise heteroskedasticity is used while the Woolridge test for autocorrelation in panel data (Ho: no autocorrelation) is applied. The robust standard errors are White's heteroskedasticity-corrected standard errors.
*** indicates significance at the 1 percent level, ** at the 5 percent level, and * at the10 percent level.

Table 6: Determinants of PCM (MPR as Trade Policy Variable)

Dependent Variable: PCM	Fixed Effects Method (robust standard errors)	Random Effects Method (robust standard errors)	Feasible Generalized Least Squares (FGLS)
MPR	0.2829674***	0.2517363***	0.2158837***
	(0.0806355)	(0.0682554)	(0.076386)
MS	1.541314	0.9969583**	0.8978004**
	(1.238792)	(0.4809817)	(0.3742343)
K/Y	-0.015091	-0.0139713	-0.0109947**
	(0.0123802)	(0.0142424)	(0.0050102)
CGR	-0.1585028***	-0.1405092***	-0.1182544***
	(0.0438284)	(0.0365126)	(0.0429358)
Constant	0.0413451	0.069541	0.052062
	(0.1301338)	(0.0877807)	(0.0696948)
R^2 within	0.5140	0.5100	
between	0.0867	0.0788	
overall	0.3323	0.3456	
Autocorrelation test#	F=13.454	F=13.454	no autocorrelation
	Prob>F=0.0019	Prob>F=0.0019	
No. of obs	109	109	109

Note: # For FE regression model, the modified Wald test for groupwise heteroskedasticity is used while the Woolridge test for autocorrelation in panel data (Ho: no autocorrelation) is applied. The robust standard errors are White's heteroskedasticity-corrected standard errors
*** indicates significance at the 1 percent level, ** at the 5 percent level, and * at the10 percent level.

5. Conclusions

The results show that in the cement industry, conjectures and firm interaction as measured by the firms' financial condition and physical capacity are important determinants of PCM. PCM depends both on own and rivals' physical capacity and financial condition. The results also indicate that conjectures differ between leaders and followers: leaders are characterized by the tendency to engage in strategic behavior while followers are characterized by Cournot behavior.

With respect to the impact of trade liberalization, the results indicate that imports do not seem to have a disciplining effect on domestic firms. Given the behavior of domestic market players, the inclusion of import penetration ratio in the H&S regression model shows that for both leaders and followers, the coefficient on the import ratio is unexpectedly positive and highly significant.

The results imply that imports do not seem to affect profitability and competition in the industry. Given the ability of firms to engage in anti-competitive behaviour and the absence of an effective competition policy in the Philippines, the gains from trade liberalization are nullified. The country's experience in the cement industry illustrates that trade liberalization is not a substitute for competition policy. For imports to effectively discipline the market, trade liberalization must be accompanied by strict competition policy.

References

Aldaba, R.M. (2002), " Of Cartels and Collusion: An Analysis of the Philippine Cement Industry" *Toward a National Competition Policy for the Philippines*, edited by E. Medallla, Philippine Institute for Development Studies, Makati City.

Appelbaum, E. (1979). "Testing Price Taking Behavior", Journal of Econometrics 9, 283-294, North-Holland Publishing Company.

_____. (1982). "The Estimation of the Degree of Oligopoly Power", Journal of Econometrics 19, 287-299, North-Holland Publishing Company.

Breshnahan, T.F. (1989), "Empirical Studies of Industries with Market Power" in Handbook of Industrial Organization, Volume II, edited by R. Schmalensee & R.D. Willig, Elsevier Science Publishers BV.

Feenstra, R. (1995), "Estimating the Effects of Trade Policy" in G. Grossman and K. Rogoff, eds., Handbook of International Economics, Volume 3.

Harrison, A. (1994), "Productivity, Imperfect Competition and Trade Reform", Journal of International Economics, 36, pp 53-73. North Holland. Elsevier Science B.V.

Haskel, J. & Pasquale Scaramozzino (1997). Do Other Firms Matter in Oligopolies? The Journal of Industrial Economics, Volume XLV, No. 1, Blackwell Publishers Ltd, Oxford, UK and MA, USA.

Iwata, G. (1974). Measurement of Conjectural Variations in Oligopoly, Econometrica Vol. 42, No.5.

Lamberte, E. D., E. de Dios, D. A. Flores, J.F. Tabbada and E. Ramiro. 1992. Barriers to Entry Study, Volumes I and II. United States Agency for International Development.

Lerner, A.P. The Concept of Monopoly and the Measurement of Monopoly Power, The Review of Economic Studies.

Levinsohn, J. (1993) "Testing the Imports-as-Market Discipline Hypothesis", Journal of

International Economics 35 (1-2), pp 1-22, North Holland, Elsevier Science Publishers B.V

Onada Engineering and Consulting Co. (OECC). 1991. *Industrial Restructuring Studies: Cement.* Development Bank of the Philippines.

Schmalensee, R. (1989), "Inter-Industry Studies of Structure and Performance" Chapter 16 in Handbook of Industrial Organization, Volume II, edited by R. Schmalensee & R.D. Willig, Elsevier Science Publishers BV.

Shapiro, C. [1989] "Theories of Oligopoly Behavior", in R. Schlamensee and R.D. Willig, eds. *Handbook of Industrial Organization, Vol. I*, Elsevier Science Publishers B.V.