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PROFITABILITY AND TRADE IN DEVELOPING COUNTRIES

Sheikh Shahnawaz

Although quite a bit of research has been done on investigating the relationship between profitability and trade in developed countries, the area has not received proportionate attention in the context of developing countries, especially more recently. Given continuous trade reforms and the increasing influence of the WTO, policy formulation for developing country markets requires continual examination of this link between profitability and trade for more developing countries than have been analyzed thus far. This article, therefore, studies this relationship for Egypt empirically using panel data analysis. It finds that capital formation and openness of an industry have significant impact on price-cost margins. Moreover, unlike many previous studies, statistically significant linkage is also found between exports and margins. The results support further movement toward openness.

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I. INTRODUCTION

This article investigates the effects of market concentration and openness on profitability in developing countries using data for Egypt. With more and more countries around the world acceding to the World Trade Organization (WTO), some understanding of the consequences of this opening-up is called for. This includes the effect of imports on domestic market discipline.

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While the literature in the area, starting with Stigler's (1964) theoretical exposition, has examined the relationship between concentration and profitability in quite general terms in the context of developed countries, studies that have addressed these issues as they relate to developing nations need further and continuing investigation. This is especially true given the specific idiosyncrasies and regional and structural features that characterize different developing countries. An important developed-country study is Jacquemin et al. (1980) which analyzed the Belgian manufacturing sector using cross-sectional data. It found that trade reduces profitability and that concentration ratios are not very useful indicators of market power for industries that are engaged in export or import competition.

Chou (1986) studied the role of foreign trade in the analysis of market structure and performance, and the determinants of trade intensity in Taiwan. He used cross-sectional analysis to conclude that import control measures offset potential impacts of imports on concentration and on profitability. The effects of imports on market power have also been explored in Jacquemin and Sapir (1991) who found that price-cost margins for France, Germany, Italy, and the United Kingdom are unrelated to intra-European Community imports but are significantly and negatively related to imports from outside the EC.

Roberts and Tybout's (1996) collection is partly devoted to this issue and is the most significant contribution in the developing country context. The novel feature of these studies is the use of plant-level data which has often eluded researchers working on developing countries. The results largely tally with stylized facts derived from studies focusing on developed countries and identify negative correlation between openness and import penetrtion on the one hand and margins on the other. Using firm data from the Ivory Coast, Harrison (1994) also arrived at similar conclusions.

Faini (1994) took up the reverse relationship and focuses on the effect of profitability on trade. Using data from Morocco and Turkey, he concluded that prices significantly determine export supply. In a very interesting sector-based study, Rakotoarisoa and Shapouri (2001) looked at vanilla bean imports by the United States from five developing countries and investigated "new" trade theories that suggest that market structure plays an important role in relating exchange rate devaluations to price declines. The article concentrated on the market structure and estimates the impact of exchange rate movements on prices for vanilla beans imported by the United States.

A more micro-data-intensive approach is Levinsohn's (1993) study on the effect of Turkey's trade liberalization on the price-cost margins of Turkish firms. Using annual firm-level data, Levinsohn reached the conclusion that firms in an imperfectly competitive industry see a decline in their price-cost margins. Since it is often a challenge to find micro data at the firm level for developing countries, Levinsohn's study, together with the collection by Roberts and Tybout, remains fairly unique and perhaps the most comprehensive in this area.

Given the changing nature of the global economic environment in which developing countries are situated, particularly with the increasing thrust toward international economic integration and the rising importance of the WTO, this article attempts to contribute to the bridging of the gap between economic analysis and policy concerns in the developing world. The existing studies on developing countries have often analyzed a fairly limited time period ranging mostly from five to eight years. This presents us with the unfortunate situation where trade reform has most likely not had its full impact due to the brief time period under study. Additionally, Egypt, which is arguably the most diverse if not the most dynamic economy in the Middle East and North Africa (MENA) region, has seen little if any formal

examination of the relationship between its industrial and trade policies. Hence, using disaggregated data spanning a decade and a half for Egypt, the article investigates the relationship between industry concentration, trade, and profitability. Our results support further trade reforms and the further removal of protective measures in order to foster domestic competition. Specifically, exports, capital formation, and openness of an industry are found to have a significant impact on price-cost margins.

II. EGYPT AND TRADE: Some Background

The import substitution-industrialization approach to development has figured quite prominently in the economic history of Egypt. It dates back to Gamal Abdel Nasser's Pan-Arabic and socialist movement of the 1950s. One of the two major waves of liberalization in Egypt is the *Infitah* (the opening) that was promoted by Anwar Sadat in the 1980s. The other was the further trade and privatization by Hosni Mubarak in the 1990s. These included World Bank- and IMF-sponsored structural adjustment programs that attempted to transform the institutional structure of the economy. The objective was to integrate Egypt into the world market by unifying the exchange rate, raising interest rates to internationally competitive levels, and progressively removing import prohibitions and oil subsidies. However, even after these efforts, the extent of liberalization is somewhat lacking when compared with similar countries. Despite a decade of liberalization, the trade regime continues to go through gradual reforms. In 1999, these reforms had led to average tariffs of approximately 30 percent (Madani and Olarreaga, 2002).

Some reasons behind this slow movement toward liberalization included successful opposition from private industrialists due to their trade monopolies, domestic market concentration, and the like. On the other hand, import agents and businessmen with

an eye on public assets to be privatized supported reforms. At the same time, the government wanted to provide domestic machinery and intermediate goods to promote the production and export of semi-finished products. Thus, this dual policy slowed down the pace of liberalization.

Rentier income seems to characterize Egyptian foreign trade much more than productive income. For instance, in 1998 rentier income totaled $10–$11 billion, consisting of tolls worth about $2 billion on the Suez Canal, $3 billion from tourism, $2.5 billion through workers remittances, foreign aid worth $1 billion, and $1.5 billion from petroleum (Madani and Olarreaga, 2002). Non-oil commodity export earnings adding up to some $3 billion complemented these figures and were equally divided between primary products and manufacturing.

As mentioned earlier, while Egypt's liberalization has led to more than a 50 percent decrease in tariffs, it pales in comparison with countries that have implemented sweeping trade reforms. In Egypt, average tariffs are high with an extremely high dispersion of tariff levels across tariff lines and significant tariff escalation. As an illustration, consider Egypt's nominal average tariff rates in 1999 obtained from Madani and Olarreaga, which were 27.4 percent. It should be noted that these levels are quite at par with its North African neighbors like Morocco (average tariff rates of 25 percent) and Tunisia (33.6 percent). However, these rates stand in sharp contrast with those observed in Argentina (13.5 percent in 1998) and Chile (11 percent) and are far higher the average of 14 percent of all IMF member nations.

The relatively restrictive Egyptian tariff structure can also be seen in the country's average import-weighted tariff of 13.8 percent, which is close to Argentina's 12.9 percent and not too far from Chile's 10.9 percent or Colombia's 10.6 percent. In fact it is lower than Brazil's 16.6 percent. The degree of tariff escalation in Egypt is perhaps the most prominent feature of the country's

tariff structure: tariffs are higher for finished products than for raw materials or intermediate goods. Sectors especially affected by this phenomenon are Textile and Leather, Wood and Wooden Furniture, and Basic Metal. Most distorting tariffs are found in the manufacturing sectors where the tariff range is between 0–3000 percent.

III. THE ECONOMETRIC MODEL

The model combines the advances made by previous literature in this area with the extra room for analysis provided to us by our disaggregated sectoral data. At the same time, we are confined by the data—there is no information available on the market share held by each firm, or even the average size of the largest plants accounting for 50 percent of industry shipments, as is sometimes done in the literature. We adopt panel data methodology to conduct our analysis and delineate our model. Trade variables affect profits in the manner expressed in the equation below:

$$(1) \qquad PCM_{it} = \alpha_i + \beta_1' FIRMS_{it} + \beta_2' Mratio_{it} + \beta_3' Xratio_{it} + \beta_r' Kform_{it} + \varepsilon_{it}.$$

Here, the definition of the variables mostly follows Jacquemin et al. (1980) and Bowen et al. (1998) as:

PCM_{it} = (value added − payroll)/total sales = price-cost margin in sector i at time t;
$FIRMS_{it}$ = the number of firms in sector i at time t;
$Mratio$ = the ratio of imports to domestic shipments (total industry sales minus exports plus imports);
$Xratio$ = the ratio of exports to total sales;
$Kform$ = fixed capital formation.

As an aside, note also that the analysis was conducted under alternative definitions as well, the results of which are also briefly discussed in the next section.

Although it would be ideal to capture the effect that trade has on concentration as suggested by Adams (1980), the unavailability of data on market share as well as any other firm level data in developing countries poses a challenge. This limits the analysis to an investigation of the effects of trade on profitability and thus our model to the one described in Eq. (1) above.

Given the absence of data related to market share, the number of firms in each sector is used as a replacement, albeit a less than perfect one, to examine the impact of concentration on profitability. The idea is to determine whether the domestic degree of concentration accurately reflects domestic market power in small open economies and therefore exercises a positive and significant influence on the price-cost margin. The rate of growth of capital in each sector gives a sense of sectoral expansion and is expected to have a positive effect on profits. This is done with the caution alluded to before that the use of the number of firms as a proxy for industry concentration enters the model as an imperfect substitute for more detailed data.

Import- and export-related variables are introduced to cover sectoral trade activities. A high rate of import is expected to negatively affect the price-cost margin since high import rates could be a sign of comparative disadvantage. Also, domestic sectors facing import competition would find it difficult to maintain prices above average costs.

The more interesting relationship here is between the rate of exports and the price-cost margin. However, before going on to explore this relationship, the legitimate concern of endogeneity should be addressed. It can clearly be argued that although it is possible that exports influence price-cost margins, it is also possible that only profitable firms enter the exports market. However, as Kambhampati and Parikh (2003) pointed out, while

the impact of exports on price-cost margins is contemporaneous, the effect of price-cost margins on exports is lagged. This helps us get around the problem of endogeneity and the use of panel data helps to separate out some of these effects. This is particularly important in the case of capital formation. Olley and Pakes (1996) argued that if firm beliefs regarding the timing of the use of inputs are serially correlated, then inputs would be correlated with them. While the use of capital as an explanatory variable is pervasive in the literature (see, for example, Nadiri and Nandi [1999]) the need for assuming the lack of such correlation should be noted. It should also be pointed out that our variables were tested for serial correlation and that the null of no serial correlation could not be rejected.

Given that the domestic industry can dump abroad and prevent re-import, there could be significant development of domestic market power. However, as Caves and Khalilzadeh-Shirazi (1977) pointed out, if exporters cannot segment their less competitive domestic market from the more competitive international market, exports will weaken oligopolistic interdependence by flattening the demand curve that faces the individual seller. The theory of comparative advantage implies that, in a competitive sector, a country will export goods for which the pre-trade relative price is lower at home than abroad and this leads to higher profits. But in sectors with monopoly, a monopolist will either behave like a competitive industry if there are no impediments to trade, with profits being influenced negatively if world prices are lower than those charged by the monopolist prior to opening up, or, if there are impediments to trade,

1) quantities sold at home could increase and prices could fall leading to lower profits, or
2) profits could rise if the monopolist reduces quantities sold at home and increases domestic price, as a result of a flattened export demand.

The former would happen if there is no discrimination and the latter would result if the monopolist is able to discriminate and sells on both markets. Similar arguments hold for the case of oligopoly sectors where producers prevent re-import and thus segment the domestic market from the export market.

IV. EMPIRICAL ANALYSIS

This article utilizes annual data for Egypt at the 3-digit ISIC level of disaggregation. This allowed for the consideration of a significant panel of data on 28 Egyptian industries over a 15-year long period spanning from 1981 to 1995. The data was obtained from the Trade and Production CD-ROM of the World Bank.

Since panel data analysis is employed, both fixed ("within" as well as "between") and random effects estimation approaches are used. The two fixed effects techniques allow for industry-specific fixed effects ("within") as well as for cross-sectional ("between"). The F-test was used to infer which one of these two models had a better fit. The results are presented in Table I below. The results show that the within-effects model dominates the between-effects model.

The table also presents results from the random-effects model in which the error term consists of industry-specific effects as well as a composite industry and time varying error. If these industry-specific effects are uncorrelated with the independent variables, the random effects model is better than the fixed effects model. GLS estimation is employed in the estimation of the random effects model because, given that the random effects model is indeed the true model, OLS underestimates the standard errors. The Hausman specification test was used to test the random effects model against the fixed effects model. The test statistic reported in the table above suggests that the fixed effects model is dominant over the random effects model.

Table I
Panel Data Analysis Relating Price-Cost Margins to Domestic and International Variables

Independent	Fixed Effects (Within)	Fixed Effects (Between)	Random Effects
Number of Firms	0.000049	-3.87×10^{-6}	-6.30×10^{-7}
	(1.33)	(−0.24)	(0.05)
Ratio of Imports	−0.0031925	−0.0125837	−0.0118411
	(−0.10)	(−0.29)	(−0.94)
Ratio of Exports	−0.0964919*	0.1502898*	−0.0560196
	(−1.98)	(2.13)	(−2.64)
Capital Formation	−0.0000656	0.0000124	-3.37×10^{-8}
	(−1.01)	(0.03)	(−0.40)
Intercept	0.1485327**	0.1384525**	0.1570517**
	(12.00)	(7.61)	(14.32)
R^2	0.05	0.17	0.04
F	4.22	1.21	
Hausman			25.64

*Significant at the 5 percent level.
**Significant at the 1 percent level.

Note: The numbers in parentheses are t-statistics for the two fixed-effects cases and z for the random-effects case.

At this point, it is useful to mention that the above analysis was redone with an alternative definition of price-cost margin. Taking the margin to equal the ratio of value added to labor cost (cost of capital could not be included in the denominator, which it generally is, due to unavailability of data), the results were found to largely match the ones obtained above but with slightly higher magnitudes of the relevant coefficients.

The fixed-effect specifications, particularly the within-effects results, are mainly used below in commenting on our estimates. Although the signs on the independent variables turn out to be in accordance with our expectations in the between-effects model, the within-effects version is chosen using the F-test as our criterion as described above. Thus, the sign on capital formation

is negative in the fixed-effects case, which is not as expected. The impact of capital formation on profitability should be positive given that an increase in fixed capital formation is an indicator of an expanding sector. Although the result is as expected in the between-effects model, the estimate is insignificant in both cases.

The rate of imports, on the other hand, has the expected negative sign in both models. This should be the case since an increase in imports translates into more competition in the sector and therefore lower profitability. However, the estimates are again statistically insignificant. The estimates of the coefficient on the number of firms is extremely low in both cases and highlights the importance of more detailed firm-level data that would include information on concentration and market share.

The rate of export figures into both models as a significant variable but it has a positive sign in the between-effects estimation and a negative sign in the within-effects model. Given these opposing results and the fact that this creates a problem in deciphering which one of the two situations delineated earlier is more plausible, the estimation was conducted again, this time after the inclusion of a dummy variable following Jacquemin et al. (1980) and Morel and Steinherr (1978) to disentangle the various cases and to split our sample of industries between discriminatory and open sectors.

This dummy takes on the value of 1 if the sector is overprotected—average tariffs are above 30 percent—and 0 otherwise. The 30 percent mark is chosen as a dividing line because the average tariff rate in Egypt, as discussed earlier, is about 30 percent. However, sensitivity of our results was examined using the 20 percent and 40 percent marks as well and the results of these are also briefly discussed below. The dummy enters the model after being multiplied with the export rate. The protected sectors are Food Products; Beverages; Tobacco;

Textiles; Leather Products; Footwear except Rubber or Plastic; Wood Products except Furniture; Other Chemicals; Rubber Products; Pottery, China, and Earthenware; Electric Machinery; Transport Equipment; and Other Manufactured Products. The dummy is included to adjust the model in accordance with the possible rate-of-export interpretations discussed in the last section. Thus the sample is split between discriminatory sectors and those that are unable to discriminate. The latter tend to be the more open sectors. The results are reported in Table II

Most of the results are the same in substance as they were before the dummy was incorporated into the models. However, the between-effects estimation fares better than it did before. Apart from the ratio of imports and the number of firms, all

Table II
Panel Data Analysis Relating Price-Cost Margins to Domestic and International Variables Including Dummy

Independent	Fixed Effects (Within)	Fixed Effects (Between)	Random Effects
Number of Firms	0.0000471	−0.0000108	1.47×10^{-6}
	(1.35)	(−0.74)	(0.11)
Ratio of Imports	−0.0052579	−0.0595576	−0.013709
	(−0.40)	(−1.55)	(−1.09)
Ratio of Exports	−0.0830138*	0.1265108**	−0.0398843***
	(−3.56)	(2.54)	(−1.85)
Capital Formation	-8.47×10^{-8}	3.29×10^{-7}***	-2.98×10^{-8}
	(−0.92)	(1.64)	(−1.36)
Differential Slope	−0.1246818	−0.3185307**	−0.1739294**
	(−0.41)	(−2.28)	(−2.29)
Intercept	0.1522209*	0.1525706*	0.1612933*
	(12.86)	(9.03)	(15.41)
R^2	0.05	0.42	0.04
F	4.22	3.24	
Hausman			31.59

*Significant at the 1 percent level.
**Significant at the 5 percent level.
***Significant at the 10 percent level.

variables are significant, at least at the 10 percent level under this estimation. This is more than the number of significant variables suggested by the fixed-effects estimation. We obtain a negative sign for the differential slope for discriminatory or closed sectors, which agrees with the theoretical exposition given earlier. Both capital formation and the ratio of exports are positive and significant which implies an increase in profitability with a rise in exports as well as growth in the sector. Clearly, these results seem to follow economic intuition better than those that were obtained without taking the relative openness of different sectors into account.

Even under this revised estimation procedure, the number of firms remain insignificant with impact close to zero. Although the lack of data concerning concentration could be to blame and the following analysis should be read with this in mind, the results agree with previous findings in the literature. For example, Jacquemin et al. (1980) got similar results for the Belgian manufacturing sector even after using concentration ratios. With the opening up of an economy, differences between domestic and international prices decrease with the domestic market structure playing little part in the price-quantity decision of producers. Caves (1974) used a general equilibrium model to point out that even if a firm holds 100 percent of an industry's domestic sales and even if there is no actual import, the monopolist is still constrained by export opportunities or potential import competition. This would imply that there should be absolutely no relation between domestic concentration and the price-cost margin. This, together with our empirical results, could be taken to imply that Egypt is open enough. However, recalling that average tariffs in Egypt are above many other similar developing countries, this interpretation should be taken with a grain of salt. But it does suggest that other more open developing countries can be expected to fit this point of view even better and that,

therefore, in more open developing economies, domestic structure should matter less to the price-quantity decisions of producers.

Finally, sensitivity analysis mentioned earlier deserves some discussion at this point. The analysis was conducted with respect to the openness criterion. The models computed above were redone with the level of protection first moved up to 40 percent from 30 percent and then moved down to 20 percent. While our results did not change substantially when the level was moved up to 40 percent (perhaps due to few industries falling between the 30 and 40 percent average tariff levels), the results did display a movement toward more significance with no significant change in the signs of the coefficients determined than those obtained with the 30 percent tariff level. This is as expected from a statistical point of view since the number of observations now classified as protected is higher. Given what is observed from this sensitivity analysis and the relatively small number of industries that have tariff levels of over 30 percent *and* less than 40 percent, there is compelling reason to use the 30 percent mark as a natural cut-off point to distinguish between protected and open industries.

V. CONCLUSION

This article examined the relationship between profitability and domestic and international variables in developing countries. Using the data for Egypt, it was found that while more firms in an industry do not seem to have a significant impact on profitability, exports, capital formation, and the level of protection do. The magnitude of the impact of capital formation in a given sector is, however, quite low. In terms of policy, results favor further trade reforms in developing countries since these would promote domestic competition.

Although the relationship between trade and profitability exists, stronger results might be obtained by investigating the

indirect effects of reforms on price-cost margins. For instance, the impact of opening up on R&D and managerial ability could be examined. This again underscores the need for better micro-level data collection in developing countries.

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