# Impact of Human Capital and Capabilities on Labor Productivity: Case of Small and Medium Food Manufacturers in Malaysia

VGR Chandran, Rajah Rasiah, Tien Hong Lim

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**UNIVERSITY OF MALAYA**

# Background and Motivation

- Manufacturing is one of the main sectors in Malaysia
- Economic Corridor Development efforts - intensified to promote investments.
- However, Malaysia's declining contribution from the manufacturing sector may indicate that the sector is losing its competitiveness
- Facing premature deindustrialization and lower productivity level
- Gaps:
  - firms in developing countries, more often than not, do not operate at the technological frontier – so knowing their existence through developing capabilities is vital – How do we do it?
  - another important theoretical question that has remained open for debate is why even small firms could still drive performance despite their disadvantage of not enjoying the scale especially in the manufacturing sectors.
  - Therefore, this paper attempts to examine a set of capabilities that would drive performance.

# Data and Methodology

- Cross sectional – from the Annual Manufacturing survey, 1090 firms representing the food manufacturers.

- Model :

$$Ln\left(\frac{Y_i}{L_i}\right) = \beta_0 + \beta_1 Ln\left(\frac{K_i}{L_i}\right) + \sum \beta_{2j} X_{ij} + \beta_3 Size_i + \beta_4 Ownership_i + \beta_5 Industry_i + \varepsilon_i$$

- We used quantile regression –
  - neglected area is the treatment of firms as homogenous agents and the failure to account for their heterogeneity
  - to observe how capability matters along the productivity distribution

# Measurements

- Labour productivity is measured by dividing value added output with the number of workers
- capital per worker is measured as the total assets per worker
- Dummy Variables:
- Ownership takes the form of dummy variables with 1 representing foreign ownership (more than 50%) and 0 representing the local firms.
- We consider two industrial categories and introduce two dummy variables, one involving the manufacturing of bakery products and the other the production of coco, chocolate, coffee and tea.
- Total employment measures firm size.

# Measurements

- Capabilities:
  - First, we measure them as a bundle of capabilities (CAP) by combining the investment per worker in R&D, Marketing and ICT.
  - Second, we introduce dummy variables for each of the capabilities e.g. R&D, Marketing and ICT

- Human Capital:

  - First, the ratio of skilled labour is measured by qualification, ratio of workers with diploma and above in total employment and training spending. The human capital measures is then normalized and the normalized score is then averaged (divided by two) to obtain the average scores for each of the firms.
  - Alternatively, we also move away from just using qualification as a proxy and measured the actual number of managers, technicians and professionals employed as a ratio of total employment in a firm.

  - Normalization takes the form of

$$HC_i = \frac{(Actual\ Score\ of\ ith\ firm - Minimum\ score\ of\ the\ sample)}{(Maximum\ score\ of\ the\ sample - Minimum\ score\ of\ the\ sample)}$$

# Findings

**Table 1: Sample Profile**

| Variables | No. of Firms | Percentage | Mean |
|---|---|---|---|
| Value Added (RM Thousand) | 1063 | - | 5064.94 |
| Employment (Person) | 1063 | - | 52.32 |
| Labor Productivity (RM - Thousands) | 1063 | - | 60.33 |
| Human Capital (Ratio of skilled workers - Managers/Technicians/Professionals) | 1063 | - | 0.194 |
| Capability ( R&D, Marketing and ICT Investment/per worker) | 1063 | - | 1.67 |
| Industry (Bakery Products) | 539 | 50.70 | - |
| Industry (Chocolate/Tea/Coffee Products) | 94 | 8.84 | - |
| Industry (Other Food Products) | 430 | 40.45 | - |
| R&D Investment (RM thousands) | 129 | 12.13 | 120.55* |
| Marketing Investment (RM Thousands) | 604 | 56.82 | 251.19* |
| ICT Investments (RM Thousands) | 132 | 12.42 | 47.36* |
| Human Capital (Training Investment) RM Thousands | 234 | 22.01 | 34.74* |

Note: * Mean values are only for those firms investing in the respective capabilities. The overall sample mean for the whole sample (1063) is R&D (14.58), Marketing (142.68) and ICT (21.51) respectively. This accounts for 0.29%, 2.82% and 0.42% of value added output respectively.

# Findings

**Table 2: Effect of Capabilities, Human Capital and Firm Characteristics on Labour Productivity**

| Variables | OLS | Q(0.10) | Q(0.25) | Q(0.50) | Q(0.75) | Q(0.90) |
|---|---|---|---|---|---|---|
| Constant | 2.690*** | 2.157*** | 2.411*** | 2.797*** | 3.123*** | 3.279*** |
| | (41.23) | (15.75) | (24.46) | (30.85) | (43.63) | (44.92) |
| In K/L | 0.190*** | 0.140*** | 0.160*** | 0.176*** | 0.196*** | 0.222*** |
| | (11.48) | (5.12) | (7.57) | (11.83) | (9.97) | (14.05) |
| Capabilities (CAP) | 0.0140** | 0.0115 | 0.0143 | 0.0351* | 0.0400*** | 0.0385*** |
| | (3.12) | (1.53) | (0.81) | (2.16) | (4.01) | (4.75) |
| Human Capital (HC) | 0.00652*** | 0.00107 | 0.00351* | 0.00534*** | 0.00769*** | 0.0103*** |
| | (5.55) | (0.53) | (2.48) | (4.04) | (5.87) | (7.96) |
| Size | 0.135*** | 0.159*** | 0.137*** | 0.122*** | 0.0896*** | 0.0909*** |
| | (7.64) | (6.42) | (5.77) | (4.54) | (3.55) | (4.05) |
| Ownership (Foreign) | 0.348** | 0.131 | 0.536 | 0.429*** | 0.517*** | 0.349*** |
| | (2.72) | (0.30) | (1.90) | (3.41) | (4.46) | (4.26) |
| Industry (bakery products) | -0.110** | -0.152* | -0.103* | -0.155*** | -0.0831 | -0.0656 |
| | (-2.91) | (-2.08) | (-2.03) | (-3.44) | (-1.87) | (-1.05) |
| Industry (cocoa/chocolate /coffee/tea) | 0.0537 | -0.140 | -0.0621 | -0.0467 | 0.112 | 0.157 |
| | (0.65) | (-0.80) | (-0.77) | (-0.63) | (1.39) | (0.63) |
| $R^2$ | 0.360 | - | - | - | - | - |
| Pseudo $R^2$ | - | 0.120 | 0.154 | 0.204 | 0.269 | 0.3204 |
| F | 60.38 | - | - | - | - | - |
| N | 1063 | 1063 | 1063 | 1063 | 1063 | 1063 |

*t* statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
*t*-value for OLS is computed from white heteroskedasticity-consistent standard errors.
*t*-value for Quantile regression is computed from bootstrap standard errors to correct for heteroscedasticity.

# Findings

**Figure 2: Coefficient Estimates for Various Quantiles, Capabilities and Human Capital**
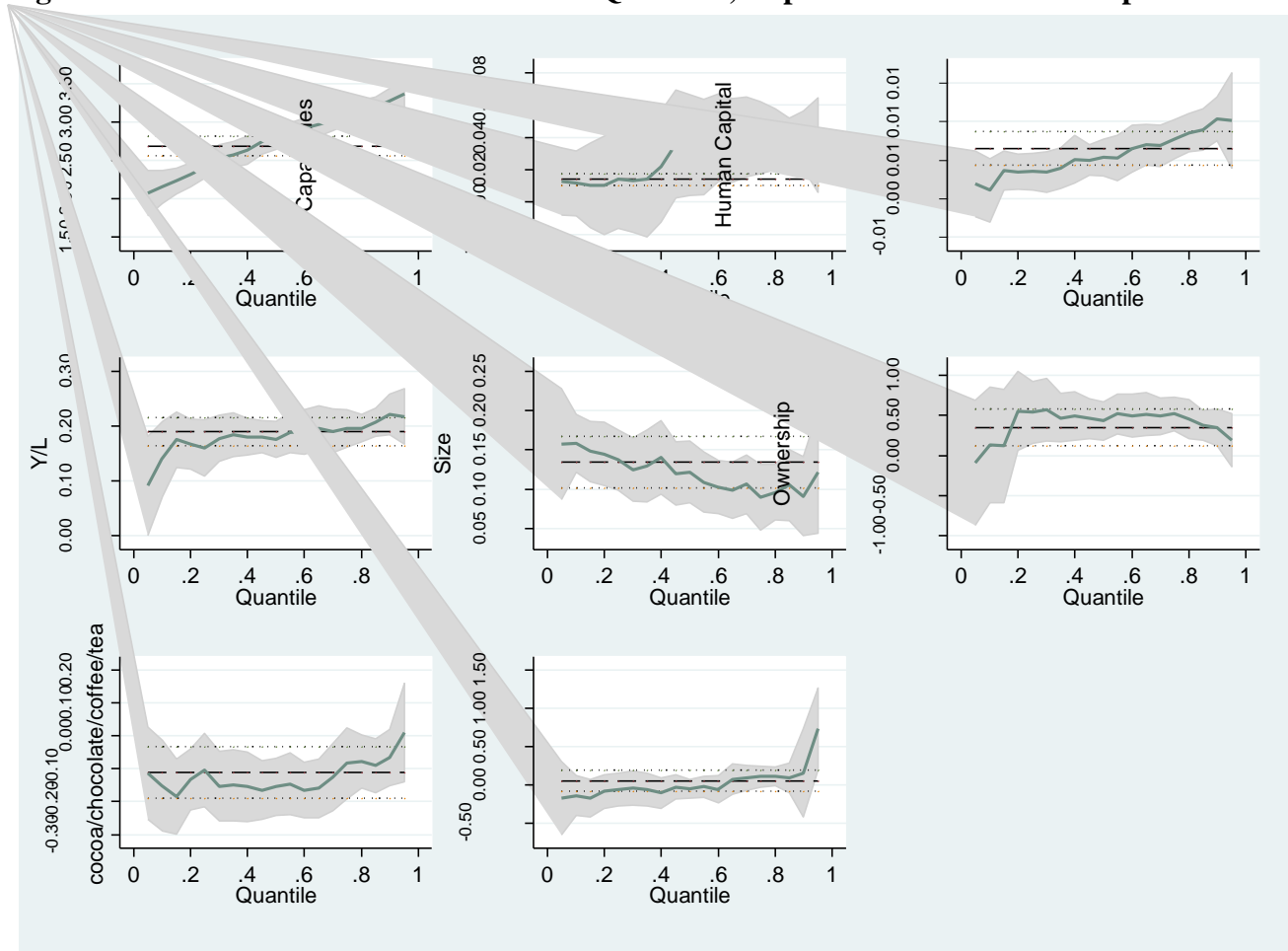


Variation in the coefficients on variable of interest, $X_{ij}$ and other firm specific characteristics (i.e. $\beta_2, \beta_3, \beta_4, \beta_5$ in Equation (2)).

Note: Horizontal lines represent OLS estimates with 95% confidence intervals.

# Findings

**Table 3: Effect of Innovation, ICT and Marketing Capabilities**

| Variables | OLS | Q(0.10) | Q(0.25) | Q(0.50) | Q(0.75) | Q(0.90) |
|---|---|---|---|---|---|---|
| Constant | 2.696*** | 2.172*** | 2.353*** | 2.710*** | 3.064*** | 3.541*** |
| | (37.06) | (14.23) | (23.69) | (21.32) | (25.04) | (24.31) |
| Innovation Capability (R&D) | 0.348*** | 0.169* | 0.180* | 0.382*** | 0.329*** | 0.460** |
| | (4.87) | (2.43) | (2.27) | (4.17) | (3.79) | (3.13) |
| ICT Capability | 0.245*** | 0.201 | 0.387*** | 0.349*** | 0.214 | 0.0482 |
| | (3.77) | (1.50) | (7.79) | (4.62) | (1.77) | (0.30) |
| Marketing Capability (MAK) | 0.213*** | 0.218 | 0.217*** | 0.214*** | 0.202*** | 0.173 |
| | (4.92) | (1.88) | (4.32) | (3.96) | (3.54) | (1.91) |
| ln K/L | 0.190*** | 0.138*** | 0.166*** | 0.156*** | 0.196*** | 0.223*** |
| | (11.08) | (3.58) | (9.14) | (8.06) | (10.88) | (12.48) |
| Size | 0.0558** | 0.0735 | 0.0418* | 0.0494 | 0.0583* | 0.0351 |
| | (2.72) | (1.38) | (2.43) | (1.34) | (2.09) | (1.02) |
| Ownership (Foreign) | 0.393** | 0.0809 | 0.535*** | 0.420** | 0.470 | 0.482* |
| | (3.00) | (0.25) | (4.21) | (2.60) | (1.95) | (2.33) |
| Industry (bakery products) | -0.129*** | -0.155** | -0.134** | -0.125** | -0.167** | -0.130** |
| | (-3.37) | (-2.63) | (-3.10) | (-2.86) | (-2.82) | (-2.84) |
| Industry (cocoa/chocolate/coffee/tea) | 0.0254 | -0.264* | -0.145 | -0.0177 | 0.0803 | 0.505** |
| | (0.29) | (-2.43) | (-1.55) | (-0.16) | (0.67) | (2.78) |
| $R^2$ | 0.345 | - | - | - | - | - |
| Pseudo $R^2$ | - | 0.1276 | 0.1760 | 0.2004 | 0.2404 | 0.2704 |
| F | 61.46 | - | - | - | - | - |
| N | 1063 | 1063 | 1063 | 1063 | 1063 | 1063 |

*t* statistics in parentheses

$^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$

*t*-value for OLS is computed from white heteroskedasticity-consistent standard errors.

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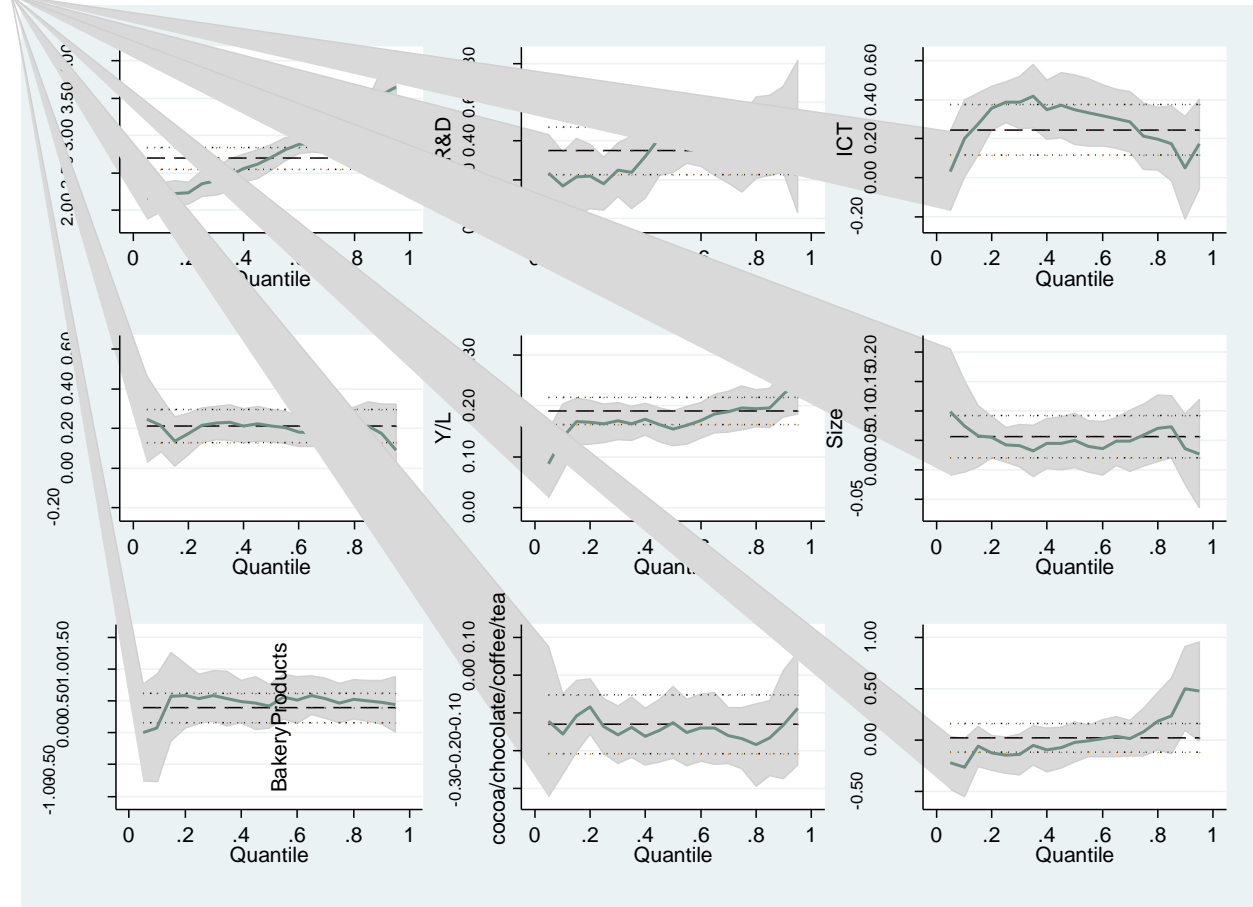
# Lessons and Conclusion

- An intervention policy should, at least, target more on developing human capital and capabilities as it shows a greater impact on productivity.

- An intervention policy should recognize the issues of firm heterogeneity

- One laudable approach would be to assist firms based on their current position and to facilitate them towards a higher productivity level. In other words, support programs established for one setting may not prove to be adequate when applied elsewhere and it may need more targeting.

- Policy makers can use capability audit as an instrument to identify gaps in the local support system.

- We have already known that firms do invest in these capabilities, and further exploring  how they can better manage these capabilities would help translate into productivity gains.

- Inculcating and educating managers and owners on the best practices in human capital and capabilities building would translate into managerial decisions to invest in those capabilities