Corvinus University of Budapest

Doctoral School of Economics Business and Informatics

Economics Program

THESIS SUMMARY

Ph.D Dissertation

“Essays on Industrial Development "

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1. Research Background and Justification for the Selection of the Topic

Manufacturing has a significant role in the economies of both developed and developing nations worldwide (Szirmai and Verspagen, 2015). The data demonstrate that the trade or service sector now dominates in many countries, despite the current debate about the industrial sector's continued importance in driving economic growth. Currently, there is much debate over whether manufacturing in emerging nations should continue to be the primary focus of industrial policy. In truth, our limited comprehension of the significance of the manufacturing sector, especially for middle-income nations, is reflected in the disagreement. Well-documented patterns of structural change across several industries are widely acknowledged as factual reality, in contradiction to theories' predictions.

Indonesia's economy remains heavily reliant on its industrial sector. The manufacturing sector contributes approximately 20% to the country's GDP, which is above the global average, and accounts for around 50% of total exports. However, despite Indonesia being the largest economy and having the largest workforce in ASEAN, it ranks only 5th among ASEAN countries in the Competitive Industrial Performance Index on the global stage. In terms of business risk, Indonesia—particularly in the manufacturing sector—offers a relatively favorable environment for business development. According to surveys by Coface, Indonesia holds a solid position on the global business risk map, indicating that the industrial sector still has significant growth potential. A study by Cushman & Wakefield further supports this, placing Indonesia among the top-ranked countries in their baseline, cost, and risk assessments for the manufacturing sector. Therefore, business risk is not seen as a significant hindrance to the development of manufacturing in Indonesia.

Kim and Sumner (2019) argue that many developing countries are experiencing de-industrialization, with Indonesia serving as a notable case. The Indonesian government has responded to the challenge of "premature de-industrialization" by mobilizing state-owned enterprises to drive re-industrialization efforts. However, Indonesia’s high-tech industry remains less competitive compared to its peers in other developing nations. To address this, the government has prioritized infrastructure development, boosting high-tech manufacturing, and revitalizing downstream resource industries. Furthermore, Grabowski and Self (2020) highlight Indonesia as a very good example where industrialization and de-industrialization coexist, influenced by the price of staple foods. The rapid expansion of labor-intensive manufacturing sectors between the 1970s and the late 1990s coincided with agricultural growth, particularly in rice production, the country’s primary food staple. Low rice prices

enabled the manufacturing sector to expand quickly, as the state successfully stabilized domestic rice prices in line with global levels, preventing cost increases that could hinder industrial growth.

Therefore, this dissertation explores three key topics related to the development of Indonesia's industrial sector. The first examines the impact of Information and Communication Technology (ICT) on rural development through small industrialization, using evidence from the Indonesia Village Level Survey. The second focuses on firm performance and market dynamics, analyzing the survival of medium and large manufacturing enterprises in Indonesia. Lastly, the third theme investigates the relationship between firm ownership, productivity, and export performance.

The first topic examines the impact of ICT access on rural industrialization and its role in improving village welfare. This topic was chosen for several reasons. While many studies explore the direct effects of ICT access on community welfare, few consider rural industrialization as a mediating factor in enhancing the well-being of rural populations. Additionally, Indonesia has implemented a village-level Internet program for over a decade, making it essential to assess its impact on rural welfare and economic transformation—from traditional sectors to industrialization—which can positively influence livelihoods.

The second topic focuses on the efficiency and productivity of firms and their impact on the survival of medium and large enterprises in Indonesia. This issue is particularly relevant, as industrialization in the country is accompanied by challenges for these firms in maintaining performance and market dominance. Various factors contribute to these challenges, including government policies and the rapidly evolving dynamics of both global and domestic markets. By employing advanced efficiency measurement techniques and ensuring consistency by comparing results at the macro level, this study offers valuable insights for policymakers and academics concerned with industrial sector development, particularly in developing economies.

The third theme explores the intricate relationship between ownership, productivity, and exports. While existing research often assumes a causal link between productivity and exports, it tends to overlook the role of ownership in influencing export decisions and productivity growth. Given that Indonesia's exports are heavily dominated by the manufacturing sector, understanding this relationship is crucial. This study seeks to bridge this gap by examining how

ownership structures shape export performance and drive productivity, providing important insights for industrial policy and economic strategy.

2. The Methods Used

This study employs a quantitative approach by estimating an econometric model. Given that the dissertation encompasses three distinct topics, each requiring different estimation models and techniques, the methods are described based on each topic.

1. ICT Access, Rural Industrialization, and Village Welfare

The first topic examines how ICT access influences rural community welfare through industrialization, utilizing a multi-stage estimation process. The data used come from Indonesia's village-level surveys, covering approximately 75,000 villages, with observations from the years 2018 and 2021.

The first stage of analysis estimates the impact of base transceiver stations (BTS) on telephone and internet signals, as well as the number of cellular operators providing service in a village, collectively defined as ICT access. Logistic regression is used to estimate the probability of signal strength, while Ordinary Least Squares (OLS) estimates the number of operators. Fixed effects for time and sub-district are incorporated to control for unobserved heterogeneity. Following Olken (2009), who used geographic factors as an instrumental variable for estimating television and radio channel availability, this study also employs geographic characteristics as instruments to determine ICT access strength. Control variables include infrastructure and BTS availability.

The second stage examines how ICT access affects rural industrialization by analyzing factors such as the presence of mobile operators and the strength of cellular and internet signals. Various industrialization indicators are used as outcome variables, including the number of micro and small-scale manufacturing enterprises, the presence of small industrial clusters, the number of industrial zones, the existence of industrial villages, and a binary variable indicating whether the majority of the population derives income from the manufacturing sector. These estimates are conducted using OLS with robust standard errors, incorporating year and sub-district fixed effects.

The final stage analyzes the direct impact of ICT access on village development, using two key indicators: (1) the number of rural residents living in poverty and (2) the number of individuals

working abroad (migrant workers). The migration variable is further divided into two measures: the total number of migrant workers and a binary variable indicating whether the village has migrant workers. Two estimation strategies are employed: the first independently incorporates ICT variables, while the second models the interaction between ICT access and industrialization indicators. In addition to assessing the direct effects of ICT, this study also examines its indirect (mediating) impact on poverty and international migration.

2. Firm Performance and Markets: Survival Analysis of Medium and Large Manufacturing Enterprises

This study investigates the determinants, especially efficiency, market competition, and other key determinants of manufacturing firm survival in Indonesia. Not only looking at the factors that influence manufacturing companies in surviving operations in Indonesia but also looking at what causes them to enter and leave the market.

This study utilizes data from Indonesia's annual censuses of large and medium-scale industries, covering approximately 20,000 firms per year, with observations spanning from 1995 to 2015. To address the research questions, this study employs multiple techniques and strategies across two main stages.

1. Measuring Efficiency

The first stage involves calculating firm efficiency using the Ackerberg-Caves-Frazer (ACF) method, as proposed by Ackerberg, Caves, and Frazer (2015). This approach is designed to address endogeneity issues in the estimation of production functions. According to Manjón and Mañez (2016), the error term in such models often includes output determinants that are observable to firms but not to analysts (such as firm productivity or efficiency). As a result, input levels may be endogenous if firms optimize them dynamically in response to profit maximization.

For robustness, this study also applies alternative estimation methods, including standard stochastic frontier analysis (SFA) models on panel data. These models incorporate both time-invariant (TI) and time-varying decay (TVD) structures, using maximum likelihood estimation techniques to evaluate efficiency.

2. The Impact of Technical Efficiency on Firm Survival

The second stage examines how technical efficiency influences firm survival using two complementary approaches: one at the firm level and another at the 2-digit ISIC industry level,

both structured as panel datasets. This dual approach ensures consistency in the findings across both individual firms and aggregated industry-level trends.

To enhance analytical clarity, firms are categorized into three groups: survivors, exits, and new entrants. The firm-level analysis employs the Proportional Hazard Model to assess the likelihood of firm survival, while the industry-level analysis at the 2-digit ISIC classification utilizes Poisson regression to capture broader industry dynamics. These combined methodologies provide a comprehensive understanding of how technical efficiency affects firm longevity and resilience.

3. Causality of Export and Productivity: The Role of Ownership

This study aims to contribute by enhancing the literature's discussion on the simultaneous interaction of these three factors, providing a more comprehensive analysis of studies related to this issue. The study addresses several key questions: What are the characteristics of companies with a tendency to export? Does the relationship between productivity and exports vary among different ownership statuses?

This study aims to contribute to the literature by deepening the discussion on the simultaneous interaction between productivity, exports, and ownership, providing a more comprehensive analysis of their interrelationships. It addresses key research questions, including: What characteristics define firms with a higher tendency to export? And does the relationship between productivity and exports vary depending on ownership status?

The study utilizes annual survey data from medium and large firms, as classified by Indonesia's Central Statistics Agency (BPS). Medium-sized firms are defined as those with 20 to 99 employees, while large firms have 100 or more employees. The dataset spans from 1995 to 2015, offering a long-term perspective on firm dynamics.

To identify the triangular relationship among productivity, exports, and ownership, the analysis proceeds in several stages:

1. **Estimating Total Factor Productivity (TFP):** This study applies the Ackerberg, Caves, and Frazer (2015) method to estimate TFP while addressing endogeneity in the production function.

2. **Examining the Effect of Foreign Ownership (FDI) on TFP and Exports:** This stage incorporates both TFP and export activity into the model to assess their relationship. The interaction terms capture the moderating effect of FDI on exports and productivity.

3. **Estimation Techniques:** The analysis employs Fixed and Random Effects models, while System Generalized Method of Moments (GMM) estimation developed by Abrigo and Love (2016) is used to address potential endogeneity in TFP, exports, and other key variables.

By integrating these approaches, this study provides a nuanced understanding of how firm ownership influences productivity and export performance, contributing valuable insights to the discourse on industrial competitiveness and globalization.

3. Scientific Results of the Dissertation

The results of this study can be compiled into three study results, including:

1. ICT Access, Rural Industrialization, and Village Welfare

The results of the study clearly show that

- ICT is essential to the rise of industrialization in rural areas, with higher internet and phone connectivity signals favorably correlated with higher industrial growth. The study includes control variables that reflect village features, including infrastructure, financial resources, village administration governance, and the effects of natural catastrophes on the village, in addition to the ICT access factor. Numerous factors affecting the course of industrialization demonstrate how these control variables significantly contribute to the development of industry in rural areas.
- The study further highlight the significant impact of ICT on village development. A key element in promoting rural development is having high-quality access to ICT services, which includes strong phone and internet signals as well as more operators. Having easily accessible information makes it easier to do business and broadens the population's knowledge base, which increases communal output.
- Interestingly, a synergistic relationship that has a substantial impact on the wellbeing of village communities is revealed by the interaction variable between industrialization and ICT access. This dynamic connection highlights how industrialization and ICT access reinforce one another, driving rural communities' economic development toward a modern and sustainable transition. In essence, the study underscores the transformative potential of ICT in catalyzing positive socio-economic change in rural areas and emphasizes the interconnectedness of technological access and industrial

development in fostering a modern and sustainable economic landscape for these communities.

2. Firm Performance and Markets: Survival Analysis of Medium and Large Manufacturing Enterprises

- The Cox proportional hazard model estimation results show that technical efficiency reduces the hazard ratio or increases company survival for all models used. This confirms that the company's ability to achieve efficient production is an important factor in supporting the company's ability to survive.
- Apart from that, the aggregate data and Poisson regression models show that company efficiency increases the number of companies that survive during the observation period and increases the number of companies that enter.
- On the other hand, efficiency harms the number of companies leaving the market; in other words, the more efficient the company, the smaller the possibility of the number of companies leaving the market.
- Although there are differences in data structure at the micro and aggregate levels that have methodological consequences, The corresponding results of the two estimation techniques, both the Cox proportional hazard model and Poisson, are supported by several previous applied statistics studies that show that the Poisson and proportional hazard models are equivalent

3. Causality of Export and Productivity: The Role of Ownership

- When considering the relationship between FDI, exports, and TFP, the estimation results from the single and unrestricted Panel Vector Autoregression (VAR) models, using the Generalized Method of Moments (GMM) system, show a consistent pattern. The Granger causality results and the system of equations 3 and 4 support the static coefficients obtained from equations 1 and 2, confirming a reciprocal relationship between the variables. The Impulse Response Functions (IRF) offer a dynamic viewpoint on the influence dynamics of the export and TFP coefficients, even though the Granger results may not clearly distinguish between their positive and negative features. This dynamic perspective is discernible both independently for the FDI and Non-FDI cohorts, as well as across the entirety of observations, shedding light on the nuanced dynamics at play.

- The single equation estimation findings from both the export and Total Factor Productivity (TFP) models illuminate a reciprocal relationship: TFP exerts a significant positive impact on exports, while exports, in turn, bolster productivity. This study delves into the intricate nexus among productivity, exports, and ownership, with a specific focus on Foreign Direct Investment (FDI), recognizing their interconnected nature.

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5. List of own (or co-authored) publications on the topic.

I have already published chapter 3 of my dissertation at international peer-reviewed journal and here is the publication citation

Afin, R., Tibor, K. & Ilona, C. Firm performance and markets: survival analysis of medium and large manufacturing enterprises in Indonesia. *J. Ind. Bus. Econ.* **52**, 107–151 (2025). https://doi.org/10.1007/s40812-024-00302-7