

令和 5 年 5 月 22 日現在

機関番号：32689

研究種目：若手研究

研究期間：2021～2022

課題番号：21K13296

研究課題名（和文）Digitalisation, global value chains, and enterprise formalisation: A cross-country, firm-level analysis

研究課題名（英文）Digitalisation, global value chains, and enterprise formalisation: A cross-country, firm-level analysis

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交付決定額（研究期間全体）：（直接経費） 3,500,000円

研究成果の概要（和文）：この研究は、企業のフォーマライゼーションとグローバルバリューチェーン（GVC）への参加におけるデジタル化の役割を評価する。2007年～2019年における世界銀行の企業調査に基づく、116か国の56,304の企業を含むプールされた横断的企業レベルのデータを用いて、プロビットおよびトビット推定を行っている。推定結果は、デジタル接続性を持つ企業ほど、フォーマルセクターでの活動がより可能性が高いことを示している。更に、フォーマライゼーションは企業がGVCに参加し、参加レベルを高めることを可能にする。この結果は、デジタル化とフォーマライゼーションが企業のGVC参加を促進する上で重要であることを強調している。

研究成果の学術的意義や社会的意義

This study highlights the importance of digitalisation on enterprise formalisation and GVC participation, which remains largely unknown. Moreover, relevant policy implications that facilitate firms to benefit from digitalisation and formalisation are derived based on the research findings.

研究成果の概要（英文）：This study assesses the role of digitalisation in enterprise formalisation and participation in global value chains (GVCs). This study employs probit and tobit estimations, using pooled cross-sectional firm-level data from the World Bank's Enterprise Surveys, including 116 countries and 56,304 enterprises from 2007 to 2019. The estimated results show that enterprises with digital connectivity are more likely to operate in the formal sector. Moreover, formalisation enables enterprises to engage in the GVCs and increase their participation level. The findings underscore the importance of digitalisation and formalisation in facilitating enterprises' GVC participation.

研究分野：Development economics

キーワード：Digitalisation Firm-level analysis Formalisation Global value chains Informal enterprises

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1 . 研究開始当初の背景

According to the Transition from the Informal to the Formal Economy Recommendation No. 204 (ILC, 2015: p.4), informal economy refers to ‘all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements’. Economic units in the informal economy involve units with employees, units run by individuals working on own account (either self-employed persons or units with the help of contributing family workers), and cooperatives and social and solidarity economy units. Accordingly, informal enterprises are typically characterised by labour-intensive and low productivity activities with little growth potential as they have limited access to financial resources and government supports. Informal enterprises are significant contributors to economic activity and employment, particularly in developing countries (Chen, 2012; ILO, 2018; Narula, 2018).

In Asia, small and medium enterprises (SMEs) represent over 97 per cent of number of businesses (APEC, 2020), of which largely belong to the informal sector (Andrade et al. 2015; Bruhn and McKenzie 2014; Cusolito, Safadi, & Taglioni, 2016). International Finance Corporation (2020) estimates that 80-90 per cent of SMEs are concentrated in the informal sector. For instance, 83.4 per cent of enterprises in South Asia are considered informal enterprises (ILO, 2018). Similarly, informal enterprises also dominate in African economies in terms of employment and production (ILO, 2018). Estimates of the shares of informal enterprises in the total number of enterprises are as high as 70 per cent or more in Sri Lanka (de Mel, McKenzie, & Woodruff, 2013) and Brazil (Ulyssey, 2015). Even though the informal sector is considered as one of the economic driving forces for developing economies, especially in the early stage of development, the prevalence of informal enterprises and the informal sector in general possibly hinders long-run economic growth due to insufficient level of aggregate productivity and inefficient resource allocation. Therefore, the size of the informal sector is expected to shrink along the growth of the formal sector and the overall economy. Nevertheless, the recent statistics tell different story. Informal enterprises are prevalent in urban and rural areas of both developing and developed economies (ILO, 2018).

The rapid development of global value chains (GVCs) introduces opportunities and challenges to informal enterprises. GVC participation can benefit informal enterprises in several ways, including access to financial resources, capabilities and competitiveness enhancement, market expansion, and product quality improvement (Korwatanasakul and Paweenawat, 2020). Despite all the benefits, the informal sector remains underrepresented in the GVCs (Ganne & Lundquist, 2019; Cusolito, Safadi, & Taglioni, 2016) as informality is one of the key constraints preventing enterprises from the participation. With the ongoing industrial revolution, ‘Industry 4.0’, digital technologies have become significant, as never before, for industrial and economic development. Through reduction of compliance costs and productivity enhancement, digitalisation of enterprises may possibly facilitate the transition of informal enterprises to the formal sector. Although the importance of digitalisation, formalisation, and GVCs has been recognised widely, only a handful of previous studies examined the impact of digitalisation on enterprise formalisation, while common notions regarding the positive effect of formalisation on GVC participation have been made without sufficient empirical supports.

2 . 研究の目的

Against this backdrop, this study aims to address two research questions that disentangle the relationship of digitalisation, formalisation, and GVC participation. Firstly, does digitalisation affect enterprise formalisation? Secondly, does formalisation facilitate enterprises in joining the GVCs? In other words, this study examines the impact of digitalisation on formalisation as well as the effect of formalisation on GVC participation at the firm level. This study argues that digitalisation helps enterprises facilitate the process of formalisation, while formalisation further supports enterprises to smoothly participate in the GVCs. The main estimation methods are probit and tobit estimations at the firm level, utilising pooled cross-sectional data from the World Bank’s Enterprise Surveys. The data covers 116 countries and 56,304 firms for the period 2007–2019. The estimated results demonstrate that firms with digital connectivity such as the usages of email and website are more likely to be formally registered. Furthermore, being formally registered has a positive predicted impact on GVC participation. Thus, the estimated results underscore the importance of digitalisation and formalisation on GVC participation. The analysis of this

study makes three significant contributions to the existing literature and policy debates on digitalisation, formalisation, and the GVCs. Firstly, analysis in this area aids in achieving greater understanding of the role of digital technologies and formalisation in facilitating GVC participation, which remains largely unknown. Secondly, the analysis is at the firm level and at a global scale, which is considered a rare opportunity for research in this area. Data is often unavailable at the firm level, even in advanced economies, and is therefore regarded as a critical technical issue in the study of digital technology and enterprise formalisation. Utilising the unexplored firm-level data from the World Bank's Enterprise Surveys, this study is able to account for important heterogeneity in firm-level digitalisation and formalisation. Lastly, based on the research findings, relevant policy implications that help firms efficiently and effectively leverage the benefits of digitalisation and formalisation are derived.

3 . 研究の方法

Data

The analysis is conducted at the firm level, utilising pooled cross-sectional data from the World Bank's Enterprise Surveys. The data covers 56,304 firms from 116 countries¹ for the period of 2007–2019. Following Urata and Baek (2020) and Korwatanasakul and Paweenawat (2020), this study constructs two indicators of GVC participation, namely GVC participation dummy and GVC participation index. Firms can participate in the GVCs directly and indirectly through different patterns of engagement in foreign trade. Based on these patterns, the GVC participation dummy indicates whether firms join the GVCs, whereas the GVC participation index is calculated by multiplying the ratio of exports to total sales and the ratio of foreign input to total input. Each indicator is used in different estimation models, including probit and tobit estimations.

Methodology

The first probit model (Table 2) estimates the probability that a firm with particular characteristics e.g. digital connectivity, firm size, types of ownership, etc. will fall into one of the two possible binary outcomes i.e. formal firm or informal firm. In order to investigate the relationship between digitalisation and GVC participation, the following model was employed:

$$\Pr(\text{Formalisation}_{ict} = 1 | Z_{ict}) = \theta(\beta_0 + \beta_1 \text{Digitalisation}_{ict} + \beta_2 X_{ict} + \gamma_c + \sigma_k + \mu_t + \epsilon_{ict}) \quad (1)$$

Here, *Formalisation_{ict}* indicates whether a firm is formally registered firm, while *Digitalisation_{ict}* is proxied by the adoptions of email, website, or both of firm *i* in country *c* and year *t*. *X_{ict}* represents a set of control variables: firm size, labour productivity, foreign ownership, internationally recognised quality certificate, credit access, and GVC participation (both GVC participation dummy and GVC participation index). Robust standard errors are used, and the estimation model includes country-, industry- and time-fixed effects, represented by γ_c , σ_k , and μ_t respectively. ϵ_{it} is the disturbance term.

On the other hand, the second probit model (Table 3 Columns 1-4) examines whether formalisation affects the probability of being engaged in the GVCs. The estimation model is as follows:

$$\Pr(\text{GVC participation}_{ict} = 1 | Z_{ict}) = \theta(\beta_0 + \beta_1 \text{Formalisation}_{ict} + \beta_2 X_{ict} + \gamma_c + \sigma_k + \mu_t + \epsilon_{ict}) \quad (2)$$

Similar to the first probit model, *Formalisation_{ict}* indicates whether a firm is formally registered firm, whereas *GVC participation_{ict}* refers to GVC participation dummy. *X_{ict}* represents a set of control variables including *Digitalisation_{ict}* and other variables as defined above. The estimation model includes country-, industry- and time-fixed effects as well as the disturbance term, represented by γ_c , σ_k , μ_t , and ϵ_{it} respectively. Robust standard errors are also used in the estimation.

In addition, the tobit model (Table 3 Columns 5-8) estimates the effect of formalisation on the level of GVC participation by the following model specification:

$$\begin{aligned} \text{GVCindex}_{ict}^* &= \text{GVCindex}_{ict}^*, \text{ if } 0 < \text{GVCindex}_{ict}^* < 1 \\ \text{GVCindex}_{ict}^* &= 0, \text{ if } \text{GVCindex}_{ict}^* \leq 0 \\ \text{GVCindex}_{ict}^* &= 1, \text{ if } \text{GVCindex}_{ict}^* \geq 1 \\ \text{GVCindex}_{ict}^* &= \beta_0 + \beta_1 \text{Formalisation}_{ict} + \beta_2 X_{ict} + \gamma_c + \sigma_k + \mu_t + \epsilon_{ict} \end{aligned} \quad (3)$$

¹ Sweden is excluded from the analysis since information on formalisation is not available.

Except $GVCindex_{ict}^*$, all variables are the same as those specified in the equation (2). $GVCindex_{ict}^*$ refers to the level of GVC participation estimated from the multiplication between the ratio of exports to total sales and the ratio of foreign input to total input. Robust standard errors are used, and the estimation model includes country-, industry- and time-fixed effects, represented by γ_c , σ_k , and μ_t respectively. ϵ_{it} is the disturbance term.

4 . 研究成果

Despite the importance of digitalisation, formalisation, and global value chains (GVCs), common notions regarding the positive effects of digitalisation on enterprise formalisation and GVC participation have been made without sufficient empirical supports, while only a handful of previous studies examined the impact of formalisation on GVC participation. This study, therefore, aims to examine the relationship of digitalisation, formalisation, and GVC participation. The estimation methods employed in this study are probit and tobit estimations, utilising pooled cross-sectional firm-level data from the World Bank's Enterprise Surveys. The data covers 116 countries and 56,304 enterprises for the period 2007–2019.

The estimated results show that enterprises with digital connectivity, i.e. the adoptions of email or website, are more likely to operate in the formal sector. Furthermore, this study finds that formalisation enables enterprises not only to participate in GVCs but also to increase the level of GVC participation. Thus, the findings underscore the importance of digitalisation and formalisation in facilitating enterprises' GVC participation. Based on the estimated results, the first policy priority should be given to policy measures that enhance enterprises' basic digitalisation as they are cost-effective and can concurrently promote the formalisation of enterprises and their GVC participation. In addition, policy measures that foster labour productivity and formalisation can be implemented as supporting policies.

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5. 主な発表論文等

〔雑誌論文〕 計1件（うち査読付論文 0件 / うち国際共著 1件 / うちオープンアクセス 1件）

1. 著者名 Upalat Korwatanasakul	4. 巻 forthcoming
2. 論文標題 Digitalisation, global value chains, and enterprise formalisation: A cross-country, firm-level analysis	5. 発行年 2023年
3. 雑誌名 ADB Working Papers	6. 最初と最後の頁 forthcoming
掲載論文のDOI（デジタルオブジェクト識別子） なし	査読の有無 無
オープンアクセス オープンアクセスとしている（また、その予定である）	国際共著 該当する

〔学会発表〕 計1件（うち招待講演 1件 / うち国際学会 1件）

1. 発表者名 Upalat Korwatanasakul
2. 発表標題 Digitalisation, global value chains, and enterprise formalisation: A cross-country, firm-level analysis
3. 学会等名 Digitalization for Green and Inclusive Growth Brown Bag (ADB) (招待講演) (国際学会)
4. 発表年 2023年

〔図書〕 計0件

〔産業財産権〕

〔その他〕

6. 研究組織

氏名 (ローマ字氏名) (研究者番号)	所属研究機関・部局・職 (機関番号)	備考

7. 科研費を使用して開催した国際研究集会

〔国際研究集会〕 計0件

8. 本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関		
日本	Asian Development Bank Institute		