

学位論文及び審査結果の要旨

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論文の要旨

Since the public work is a kind of public services that are required for maintenance and operation of social capital, the public work is needed to stable supply. Because the prime contractors are selected by the competitive bids, in order to continue the stable supply of the public services, it is important to secure sufficient market participants which participate in the competitive bids.

However, at the present condition in the Japanese construction industry, it is increasing the number of bids that fail to get bidders of the public works. In the engineering works that is ordered by Tokyo Metropolis, the incidence rate of the bids that fail to get bidders exceeds 30% from December 2013 to January 2014. The incidence rate approaches 40%. In the background, it is the shortfall of human resources by decreasing the number of the contractors. Though the number of contractors is about 601,000 in 1999, it decreases about 470,000 in 2012. As a result, the number of workers is decreasing more than one million.

Especially, it is remarkable that the small scale works whose estimated prices are less than 150 million yen tend to fail to get bidders. In the public works, each contractor are restricted to participate the maximum and minimum of estimated price of bids depending its scale. Therefore, it indicates that the public works that fail to get bidders are often occurred in the bids by the SMEs. Here, if it is able to choice the contractors that continue the business as prime contractors, it gives support to increase the SMEs in construction industry.

The present condition of Japan's construction industry and SMEs is summarised as follows. In line with the definition of SMEs by the Small and Medium-sized Enterprise Basic Act of Japan, this study analyses only companies with a capital of 300 million yen (approx. US\$ 3 million) or less. These companies comprise roughly 99% of Japan's construction industry. The market size of Japan's construction industry is decreasing. However, since the construction industry forms 8% of the total number of persons engaged, the construction industry is an important industry that still contributes to the stability of employment.

As for the actual structure in the construction industry, the number of contractors that contract subcontracted construction projects account for 79.2% of the whole, and the number of

contractors where subcontract revenue occupies 50% or more account for 49.6%. Furthermore, the contractors where dealings with one specific prime contractor occurs 50% or more account for 31.7% among contractors that contract subcontracted construction projects, and the exclusive ratio tends to increase as the capital decreases.

Overall, these statistics reflect the increasing dependence on subcontractors and the stratification of the subcontract structure by prime contractors. Moreover, the public works ordering ratio, which accounts for the construction revenue of public works among the entire construction industry in Japan, is 30.4%. When classifying companies with regard to capital, the ratio of the companies with capital of more than 30 million yen but less than 50 million yen is 40.8% (highest in the class) and of those with capital of more than 50 million yen but less than 100 million yen is 31.5% (second highest in the class). In contrast, the ratio of the companies with capital of less than five million yen is 20.3% (lowest in the class).

This study aims to focus on contractors that contract public works construction projects. Preventing several major contractors from controlling the bidding of public works projects can ensure that a certain number of other participants are involved. Therefore, analysing the factors that affect the defaults or exits of SMEs can effectively contribute to the stable supply of public services and the fair competition of bids.

In Japan, it is not enough to develop the database that includes financial information of SMEs. There is a few database of SMEs. However, they are almost questionnaire data and they may lack accuracy. Therefore, there are few studies for the default and the exit from the industry using microdata of SMEs. Moreover, the most of literatures are studies in related areas focus only on default and bankruptcy or leave an industry containing default. However, the default contractors are very different from exit contractors in terms of their corporate activity. Thereby, it is necessary to distinguish between defaults and exits for analysis.

This study analyzes the credit risk and exits risk of SMEs in the Japanese construction industry using construction company evaluation (*Keiei Jikou Sinsa* or *Keisin* in Japanese) data for bid entry qualifications of public works. Using national technological, management, and social standards, *Keisin* evaluates the responsibility of each company that contracts public works projects according to Japan's Construction Business Act. In order to bid for public works projects, the prime contractors must be evaluated by *Keisin*. Furthermore, since *Keisin* is provided penalty for false application, *Keisin* data is high reliable data that has enough information for analysis of risk management.

Based on the *Keisin* applications, this study defines the default, exit and continuation of public works for contractors, as follows. Default refers to contractors that applied for *Keisin* in a certain fiscal year, but not in the following year, and contractors that were either forced to discontinue their business or went bankrupt. Exit refers to contractors that applied for *Keisin* in a certain fiscal year, but not in the following year, and contractors that are not cases of default. Continuation refers to contractors that applied for *Keisin* in a certain fiscal year as well as in the following year and contractors that are not cases of default.

Organization of this Dissertation

This dissertation comprises largely for studies: Japanese competitive bid entry qualifications: An examination of public works; An empirical analysis of the exit of SMEs tendering for public works in the Japanese construction industry; Default or Exit?: Empirical Study on SMEs in the Japanese Construction Industry; Analysis of Japanese contractor's activity according to panel data.

Japanese competitive bid entry qualifications: An examination of public works

Chapter 2, "Japanese competitive bid entry qualifications: An examination of public works", summarizes the independent competitive bid entry qualifications examination of public works

in Japan, and considers its significance. Each orderer of public works examines the contractors who will participate in competitive bidding. Those contractors not disqualified must be graded on the basis of the objective examination score and an independent assessment by the orderer. Firms may be disqualified on the grounds of, for example, bankruptcy or false qualifications. The Japanese grading system in public bids ensures competitive bidding among firms with similar scale and capability. If orderers order only large scale construction, only large contractors with higher scores can obtain the construction contracts. However, in split orders, SMEs with lower scores have the opportunity to obtain construction contracts. Moreover, as the bid entry qualifications and bids themselves are conducted for every industry class, contractors of all industries can also win the construction contract as the prime contractor. Therefore, the Japanese grading system in public bids provides opportunities for SMEs in every industry class to obtain constructions contracts as prime contractors.

An empirical analysis of the exit of SMEs tendering for public works in the Japanese construction industry

Chapter 3, “An empirical analysis of the exit of SMEs tendering for public works in the Japanese construction industry”, empirically analyzes the factors that affect exits of SMEs in the Japanese construction industry. To contract public works projects, prime contractors must undergo *Keisin* that is bid entry qualifications of public works. Therefore, Chapter 3 regard the contractors which they did not apply for *Keisin* as having exited from public works, because they cannot be principal contractors of public works. Based on the *Keisin* applications, Chapter 3 empirically analyzes their exits using the binary logit model. From these results, contractors with low capital and score of *Keisin*, and those that have been operating for fewer years tend to exit. Because of this, since total score is high, the contractors that get the opportunity to be able to participate in the bids of large scale construction and contract the large scale construction continue the public-works. On the other hand, younger contractors with low capital tend not to participate in bids for public works and prefer to serve as subcontractors for public works or in the private sector.

Default or Exit?: Empirical Study on SMEs in the Japanese Construction Industry

Chapter 4, “Default or Exit?: Empirical Study on SMEs in the Japanese Construction Industry”, empirically analyses the factors that affect the defaults and exits of SMEs in the Japanese construction industry by using the multinomial logit model. Consequently, Chapter 4 shows that the characteristics of defaulting and exiting contractors are different. In the case of financial indicators, debt turnover period affects defaults. When contractors are not able to pay their debts, a default is considered to have occurred. Therefore financial debt ratios such as debt turnover period are relevant to defaults. In contract, financial debt ratios do not have a significant effect on exiting, and contractors with low capital and those that have been operating for fewer years tend to exit. Because of this, Chapter 4 considers that younger contractors with low capital tend not to participate in bids for public works and prefer to serve as subcontractors for public works or in the private sector. In addition, as the profit ratio became small, it is easy to exit and default. Also, it is suggested that contractors with high profit ratios are able to continue operating without having to default or exit.

Analysis of Japanese contractor’s activity according to panel data

Chapter 5, “Analysis of Japanese contractor’s activity according to panel data”, examines what factors affect defaults and exits of prime contractors of public works on SMEs in the Japanese construction industry, and determines how changes in the characteristic of contractors affect default and exit by analyzing data for several years as panel data, using the panel binary logit random effect model. Chapter 5 can thereby analyze the factors that affect defaults and exits

for each explanatory variable while considering heterogeneity among contractors. The result shows financial indicators, non-financial indicators, and *Keisin* scores significantly affect default and exit. Especially, the result that non-financial performance such as taking out insurances (retirement allowances or company pension and non-statutory worker's compensation system) explains the differences between defaulting and exiting contractors is novel. Although the *Keisin* data are used only to determine whether contractors are qualified to enter bids for public works, it is possible to apply them to the attribution analysis of the default and exit of contractors.

審査結果の要旨

本研究では、公共工事の入札参加資格である経営事項審査のデータを用いて中小建設業者のデフォルトリスク及び公共工事からの元請からの撤退リスクについて分析を行っている。経営事項審査とは、公共工事の入札に参加を希望する建設業者の財務状況やその他の状況など客観的事項に基づいてスコアリングを行う審査である。建設業法に定めがあるとおり、公共工事を元請として請け負うには毎年、経営事項審査を受審しなければならない、さらに虚偽申請に対して罰則が設けられている。このため、経営事項審査のデータは、リスク管理の分析に必要な情報がそろった信頼性の高いデータであるといえる。経営事項審査のデータを用いて、ある年に経営事項審査を受審しており、翌年も受審した企業を継続企業、翌年受審せずに破産の手続きや廃業の届け出を行った企業をデフォルト企業、翌年受審していないが企業活動を継続している企業を撤退企業と定義し、これらの企業の特徴の違いについて分析を行っている。

本研究は、これまでに研究が行われてこなかった中小建設業のデフォルトと公共工事の元請からの撤退の要因の違いについて研究を行っている。通常、中小企業の財務及び非財務データを入手することは困難であるため、アンケート調査を用いることが多い。紺野氏はこれまで入札参加資格にしか用いられてこなかった経営事項審査のデータベースが虚偽申請に罰則のある信頼のおける建設企業のデータベースであることに着目し、このデータを用いて中小建設業の研究を行ったことが、本研究の独創性である。

これまでの研究であまり考慮されてこなかった産業からの撤退とデフォルトを明確に識別して、実証分析を行ったことがこの研究の新規性である。実証分析の結果、デフォルトや撤退に対して、非財務データが有意に影響を与えていることが示唆され、とくに営業年数や退職一時金制度、企業年金制度、法定外労働災害補償制度といった労働者に対する年金や補償制度とデフォルトと撤退の関係を明らかにした点が大きな貢献である。非財務データを用いることでデフォルトや撤退予測の精度を上昇することができるかどうかはこれまでにそれほど研究が進んでおらず、これを明らかにしたことは、今後のこの分野の研究の発展に大きな寄与をしていると考える。

3章ではバイナリーロジットモデル、4章ではマルチノミアルロジットモデル、5章ではパネルバイナリーロジットモデルと統計的な手法を適切に使い分け、当てはまりの尺度に関しても論文中に明示し、分析に用いていることも評価に値する。

本研究の2章から5章は独立した論文として、それぞれ既に発表している。2章の内容は建設マネジメント分野で国際的に最も権威の高い *Construction Management and Economics* に掲載されている。3章の内容は国際的な学術誌 *Journal of Financial Management of Property and Construction* に掲載されている。4章の内容も既に述べた *Construction Management and Economics* に掲載されている。5章の内容は学会で発表を行い、現在国際的な学術誌に投稿を行い査読改訂中である。そのため、本研究は国際的にも一定以上の評価を得ているといえる。

以上のことから、本論文審査委員一同は、本研究科の博士号審査基準①に照らして、紺野由希子氏の学位請求論文「Default or Exit?: Empirical Study on SMEs in the Japanese Construction Industry」が博士（経営学）の学位を授与するに値するものとして、判断する。