J. Japanese Int. Economies 39 (2016) 91–107

Contents lists available at ScienceDirect

Journal of The Japanese and International Economies

journal homepage: www.elsevier.com/locate/jjie

A panel study of zombie SMEs in Japan: Identification, borrowing and investment behavior☆

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ARTICLE INFO

Article history:
Received 17 September 2014
Revised 23 November 2015
Available online 21 December 2015

JEL classification:
G21
E22
E44

Keyword:
Zombie firms
Evergreening
SMEs
Borrowing
Investment

ABSTRACT

Imai, Kentaro—A panel study of zombie SMEs in Japan: Identification, borrowing and investment behavior

Utilizing a panel dataset of firms for the period 1999–2008, we estimated the prevalence of zombies among Japanese Small- and Medium-sized enterprises (SMEs) and their borrowing and investment behaviors. We observe that 4–13% of SMEs were zombie firms during the period 1999–2008. The estimation of the borrowing function reveals that SME zombie firms did not change their loans in response to a change in land values due to evergreening. We also observe that the profitability of investment, measured by marginal *q*, did not have positive effects on investments of zombie firms. This indicates that investment increase resulting from evergreen loans was not necessarily productive or profitable. *J. Japanese Int. Economies* **39** (2016) 91–107. Graduate School of Economics, Osaka University, Machikaneyama-cho, Toyonaka, Osaka 560-0043, Japan.

☆ I am grateful to Kazuo Ogawa, anonymous referee and the participants of the poster session at the 2012 Spring Meeting of the Japanese Economic Association for their helpful comments and suggestions. I am responsible for any remaining errors.

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http://dx.doi.org/10.1016/j.jjie.2015.12.001
0889-1583/

1. Introduction

This paper explores the extent to which zombie SMEs existed in Japan and their borrowing and investment behavior utilizing firm panel data. The dataset we employ is a balanced dataset of non-consolidated financial statements of SMEs from 1998 to 2008 that were edited by Tokyo Shoko Research.

Many studies have analyzed listed zombie firms in Japan, but far less research explores the existence of zombie SMEs in Japan. The misallocation of bank lending has been implicated in the evergreening of loans. Caballero et al. (2008) (hereafter, CHK) argue that the existence of zombie firms, that is, firms that should exit the market but continue to operate through bank assistance such as interest rate exemption and evergreening, has negative effects on the firm performance, productivity and investment of healthy firms. CHK conclude that the existence of zombie firms is responsible for stagnation in the Japanese economy. Fukuda and Nakamura (2011) (hereafter, FN) argue that CHK include excellent firms in their definition of zombie firms. Thus, FN identify zombie firms employing a unique method. Additionally, FN consider why most of these firms recovered and did not experience bankruptcy primarily utilizing listed firm data. However, CHK and FN consider only listed firms.

However, the Japanese economy consists dominantly of SMEs rather than listed firms. In non-primary industry, 99.7% of firms operated were SMEs, and 62.7% of full-time workers were employed in SMEs in 2012.[1] Moreover, SMEs may have been more affected by the banking sector than listed firms because the SMEs primarily rely on bank loans and do not issue bonds.

Therefore, it is important to analyze how extensively the banking sector influenced SMEs. No research has examined the emergence of evergreening and zombie SMEs utilizing the analytical methods employed by CHK and FN. Moreover, very few studies estimate the borrowing and investment functions of SMEs employing micro data. In particular, no research has shed light on the borrowing and investment behaviors of zombie SMEs. For these reasons, we examine the characteristics of zombie SMEs in Japan and their borrowing and investment behaviors.

Previewing our main findings, we find a non-negligible proportion of zombie firms among SMEs in the early 2000s. In particular, there were approximately 7–20% of zombie firms among very small firms capitalized at less than 10 million yen during 2002–2008. This might be due to the credit-guarantee system of local governments, which led to the protection of insolvent SMEs and hence, increased zombie SMEs. We also analyzed the borrowing and investment behavior of zombie firms. Borrowing of zombie firms did not respond to a change in land value. It implies that the decrease in land value in the early 2000s did not affect borrowing, which is consistent with the evergreening of SMEs loans. We find that investment of zombie firms did not respond to marginal q, fundamental profitability of investment. This suggests that investment by zombie firms was not necessarily profitable or productive.

The remainder of this paper is organized as follows. In Section 2, we review previous research on borrowing and investment behaviors of SMEs in Japan. In Section 3, we discuss the identification method of zombie firms and estimate the extent to which zombie SMEs existed in Japan by modifying the methods developed by CHK and FN. In Section 4, we present our estimated model. In Section 5, we present descriptive statistics, and in Section 6, we report the estimation results. Section 7 concludes.

2. A literature review of borrowing and investment behaviors of SMEs

In this section, we review the previous research that addresses the borrowing and investment behavior of SMEs during recent years in Japan.

A considerable amount of research addresses recent firm investment in Japan. However, no research investigates recent borrowing and investment behaviors among SMEs from the viewpoint of changes in bank lending and the soft budget problem. We consider banks' capital adequacy ratio and ratio of nonperforming loans to proxy for bank soundness, which intrinsically affects the behavior of their client firms through bank lending.

[1] See 2012 Economic Census reported by Ministry of Internal Affairs and Communications and Ministry of Economy, Trade and Industry.