



Optimal credit period and green consumption policies with cash-credit payments under asymmetric information

Kai Wang^a, Ruiqing Zhao^{a,*}, Huiru Chen^b

^a College of Management & Economics, Tianjin University, Tianjin 300072, China

^b College of Mathematics and Physics, Huanggang Normal University, Hubei 438000, China

ARTICLE INFO

Article history:

Received 3 December 2017

Received in revised form

2 August 2018

Accepted 9 September 2018

Available online 17 September 2018

Keywords:

Green consumption

Cash-credit payment

Default risk

Asymmetric information

Credit risk customer

ABSTRACT

To encourage green consumption, companies that produce renewable energy products often offer customers cash-credit payments, which allow the customers to pay cash payments when signing a contract and grant the customers a credit payment after a certain period. However, granting credit also inevitably negatively impacts the capital opportunity cost and default risk, especially when customers are privileged with private information concerning their own credit status. Hence, the design of cash-credit payments is increasingly recognized as important in increasing the profitability of companies. Additionally, the supplier has three common mechanisms to address credit default problems: the screening, checking and insurance mechanisms. Under these three mechanisms, we develop a supplier-customer chain in which the customer's credit level, which is either high or low, is the customer's private information. We find that compared with symmetric information, the high-credit customer's credit period and green consumption are restricted and limited, while the those of the low-credit customer are maintained in the screening mechanism, promoted in the checking mechanism and lessened in the insurance mechanism. We identify the conditions under which the supplier decides to choose each of the mechanisms. Finally, we show that if the market credit status is relatively poor, the supplier prefers to adopt only the screening mechanism. Otherwise, the supplier attains more leeway to decide whether to transfer risk via the insurance mechanism or to undertake risk via the screening and checking mechanisms based on the tension between the credit incentive effect and the default risk gap effect.

© 2018 Elsevier Ltd. All rights reserved.

1. Introduction

Green consumption has long attracted considerable attention worldwide due to its ability to reduce environmental damage (Tseng et al. (2013)). This has resulted in the trend of environmental sustainability, which in turn has brought changes in consumer demands and behavior (Yadav and Pathak (2016); Khan and Mohsin (2017)). To promote green consumption, cash-credit payment schemes are widely used in renewable energy products business transactions as customers often have difficulty paying the entire purchase cost at once. When the green procurement cost is high, suppliers usually ask the customers to prepay some procurement cost in cash as a good-faith deposit when signing a contract and complete the final payment (i.e., a credit payment) after a certain

period. For instance, a contractor often requests that a customer pay an upfront deposit when accepting a proposal to install a new roof or to pave a driveway (Li et al. (2017)). Seifert et al. (2013) report that more than 80% of business-to-business transactions in the United Kingdom are made on credit. In addition, by using over 2.5 million observations for 600 firms in 8 euro area countries (Belgium, Germany, Spain, Finland, France, Italy, Netherlands and Portugal) in the period 1993–2009, Ferrando and Mulier (2013) show that the economic impact of credit payments is indeed significant and that firms can always use credit payments to manage growth.

The provision of cash-credit payments inevitably has negative effects such as capital opportunity costs and credit default risk that reduce the operational efficiency of firms and severely damage profitability. For example, using data from French firms, Boissay and Gropp (2013) show that credit defaults are relatively common: on average, 18.5% of firms default at least once per quarter, while 7.2% are defaulted upon at least once per quarter. Hence, when offering a cash-credit policy, the supplier often adopts three widely used

* Corresponding author.

E-mail addresses: kaiwang@tju.edu.cn (K. Wang), zhao@tju.edu.cn (R. Zhao), chenhuru@hgnu.edu.cn (H. Chen).

methods to manage credit default risk, including the screening mechanism, which involves setting specific terms that can reveal customer credit types through their payment practices (Klapper et al. (2012)); the checking mechanism, which involves using an in-house risk assessment system to evaluate the creditworthiness of target customers before trading (Crook et al. (2007)); and the insurance mechanism, which entails insuring the account receivable through credit insurance from external financial institutions at the expense of an insurance premium (Wang and Luo (2015)).

In practice, it is difficult for the supplier to evaluate the customer's credit default risk as the customer's understanding of its own financial status and behavior performance is private knowledge. Most previous studies have explored the optimal credit period and consumption policies based on an economic order quantity (EOQ) model with the assumption that the supplier and the customer are equally knowledgeable about the likelihood of credit default risk. Therefore, motivated by how the customer's asymmetric credit level information affects above policies, we aim to answer the following questions: for the optimal solution, how does a supplier design the optimal credit period and green consumption policies under each mechanism in the presence of asymmetric information? For the strategy comparison, what is the characteristic of each mechanism in setting cash-credit policy? For the equilibrium preference, how should the supplier choose the optimal mechanism in the presence of asymmetric information?

Our goals in this study include integrating green operations and financing decisions as well as providing insights into the impact of asymmetric information on cash-credit policy design and mechanism choice. This study contributes to the existing literature in four ways. First, we investigate the supplier's cash-credit policy design problem under asymmetric credit information. To our knowledge, asymmetric credit information has rarely been studied in the literature, although it exists in practice. Second, we analyze the characteristic of each mechanism in setting cash-credit policy and show how the supplier chooses a specific mechanism. Third, we find that compared to symmetric information, the high-credit customer's credit period and green consumption are all restricted and limited, while those of the low-credit customer are maintained in the screening mechanism, promoted in the checking mechanism and lessened in insurance mechanism. Finally, we show that if the market credit status is relatively poor, the supplier prefers to adopt only the screening mechanism. Otherwise, based on the tension between the credit incentive effect and the default risk gap effect, the supplier attains more leeway to decide whether to transfer risk via the insurance mechanism or to take risk via the screening and checking mechanisms.

This paper is organized as follows. Section 2 reviews relevant literature. Section 3 describes the model setup. Section 4 introduces the benchmark under symmetric information. Section 5 investigates three mechanisms under asymmetric information. Section 6 compares the characteristics of each mechanism. Section 7 provides several numerical examples to illustrate the results and obtain managerial insights. Section 8 summarizes the main conclusions. Proofs can be found in the Appendix.

2. Literature review

Our study is related to multiple streams of research, among which three topics are most relevant to this paper: cash-credit payments, asymmetric information, and the optimal credit period under green consumption policies. In the following, we review the existing literature and highlight our contributions.

One stream in the literature related to our research is the research on cash-credit payment. Studies on this payment scheme

date back to Harris (1913), who adopted a cash payment to establish the economic order quantity (EOQ) inventory model to analyze the optimal consumption quantity. Then, Goyal (1985) was the first to consider the influence of a manufacturer's delayed payment on the retailer's EOQ. These works were extended by considering more general model settings. Teng (2009) proposed a cash-credit payment for a retailer to trade with customers with credit risk. Kreng and Tan (2011) obtained the optimal replenishment decision in an economic production quantity (EPQ) model under a delayed payment policy. Taleizadeh (2014) studied how a gasoline supplier adopts an advance cash payment to improve profits. Chen et al. (2014) examined the retailer's optimal EOQ when the supplier offers conditionally permissible delays in payments linked to order quantity. Zhang et al. (2014) established an advance credit payment to reflect how sellers often request an upfront payment to reduce risk and a credit payment to stimulate sales volumes. Das et al. (2015) investigated an inventory model with permissible delays in payment. Lashgari et al. (2016) established an EOQ model with partial prepayment to the supplier and partial delayed payment from customers. In general, the essential difference between these models and ours is that they investigate the optimal credit period and consumption under complete information, while we study the supplier's optimal decision under asymmetric information and investigate the effect of the credit default management mechanism on contract terms.

Another relevant stream of literature is on asymmetric information, which is widely used in exploring private information problems in supply chains. Studies on this problem can be generally classified into two categories: in one set of studies, uninformed members offer contracts to informed members to induce information revelation, and in another set of studies, informed members offer contracts to uninformed members to signal information (see Babich et al. (2012)). Our work here belongs to the first category. Under this category, Yang et al. (2009) explored how manufacturers select risk management strategies in the presence of a supplier with private information about supply disruptions. Gan et al. (2010) endowed the retailer with better demand information and proposed commitment-penalty contracts for the supplier in dropshipping supply chains. Kim and Netessine (2013) investigated how proprietary cost information and procurement contracting strategies interact to influence the supply chain parties' incentives to collaborate. Oh and Özer (2013) discussed how to design capacity planning under dynamic evolutions of asymmetric demand forecasts. Subsequently, Lobel and Xiao (2017) considered a situation with a manufacturer selling to a retailer with private demand information under long-term supply contracts. More relevant research can be found in Wang et al. (2018), Yu et al. (2018) and Lu et al. (2017). In contrast to these papers, which operate from an operations perspective and focus on asymmetric information in view of cost, demand, quality or reliability, we investigate the influence of asymmetric credit level (or credit default) information on the credit period and green consumption policies from the perspective of the interaction between green operations and finance.

The last relevant stream of literature concerns the optimal credit period under green consumption policies. Li et al. (2016) empirically explored green consumption policies and customers' green consumption behaviors. Giri et al. (2018) investigated the how a revenue sharing contract inspires green-sensitive consumers to consume more. Wu et al. (2017) investigated the optimal order quantity and selling price under fluctuating purchasing costs and demand rates. Li et al. (2017) explored the effect of cash-credit payment schemes on consumption policy and proposed advance cash-credit payments for the EOQ inventory model to explore

Download English Version:

<https://daneshyari.com/en/article/10156325>

Download Persian Version:

<https://daneshyari.com/article/10156325>

[Daneshyari.com](https://daneshyari.com)