Institutional Innovation in Farmer-Trader Exchange Practices in the Indonesian Shallot Market

by

Victoria Suzanne Zeppa

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Science

in

Agricultural and Resource Economics

Department of Resource Economics and Environmental Sociology

University of Alberta

Abstract

When agricultural markets do not function well, the results can impose disproportionate negative effects on smallholder farmers (FAO, 2010). These effects are exacerbated when markets for key inputs, such as skilled labour, are missing or incomplete (de Janvry *et al.*, 1991). To reduce risk and transaction costs in imperfect markets, informal institutions manifest to facilitate economic exchange. However, while informal institutions can set the stage for formal market emergence (McMillan, 1995), they can also impede market growth by fostering underdevelopment (e.g. Shaban, 1987).

Before the impact that individual institutions have on economic development can be assessed, it is critical to understand the specific causes for their emergence in different contexts. An ideal microcosm for this research agenda is exploring the existence of *tebasan*, an informal harvesting institution that has spread to a number of agricultural commodity markets in Indonesia. Using a *tebasan* arrangement, a farmer agrees to a pre-harvest sale of her or his mature crop to a trader. The trader then assumes the responsibility for the costs associated with harvesting and selling, as well as potential processing activities. Subsequently, the trader becomes the sole residual claimant on the harvest output. It is believed that *tebasan* arrangements first manifested in response to increased pressure in supervising harvest labour (Hayami and Hafid, 1979).

The objective of this thesis is to identify factors that lead farmers to use *tebasan* arrangements in Indonesia's shallot market. To do this, the interplay of the input and output market challenges faced by farmers is modeled using a theoretical framework proposed by

Eswaran and Kotwal (1985). This framework demonstrates that the evolution of institutions may be a response to rural market development. It is tested whether the farmer's choice to use a *tebasan* arrangement, or to self-harvest, is determined by the relative importance of two key non-marketed inputs, which can only be accessed by the different arrangements available. The first input, which the farmer has a comparative advantage in, is harvest labour supervision. This is the ability to manage labour during the harvest. The second input, in which the trader is superior, is market management. That is, the ability to coordinate labour hiring and other market activities to process and sell the harvested crop. The extent of the role that each party has in the harvest, as defined by the arrangement choice, therefore depends on the relative importance of these two inputs in the harvesting, processing and selling activities. It also depends on the availability of similar services from other sources, such as formal markets, and changes in the farm's internal environment.

To empirically test the key tenets of this theoretical model, a dataset including household and farm information on 564 shallot farmers is used. The data were collected in the primary shallot-producing region of Brebes Regency, Java in 2011 through a household survey. The University of Adelaide's Global Food Study Research Unit led the data collection activities. Data published in 2013 by Brebes' Bureau of Statistics is also employed.

A probit model is used to econometrically test the framework's main hypothesis that the farmer's arrangement choice is driven by differences in the farmer's/trader's comparative advantage in the two non-marketed inputs. The main explanatory variables include: proxies

for market development, and input and output market intensification, factor input intensities and several control variables.

The results provide empirical evidence supporting the main predictions of Eswaran and Kotwal's (1985) theoretical model. Market development negatively affects the probability of the farmer choosing a *tebasan* arrangement, while output market intensification has a positive effect. These findings demonstrate that farmers will choose a *tebasan* arrangement, placing a relatively high value on the trader's superior market management ability in harvesting and selling, when markets are underdeveloped and characterized by intensive production centers. The findings also show that farm characteristics impact arrangement choice: the greater the farmer's family labour intensity, the less likely a *tebasan* arrangement will be chosen. Therefore, this thesis provides empirical support for economic theory by revealing new incentive mechanisms that are being negotiated to manage the harvest in an imperfect market. These findings suggest that *tebasan* arrangements may be substituting for an imperfect market for managerial services, which has broad policy implications for enhancing the efficiency of Indonesia's shallot market.

Acknowledgements

To my partner, Jordan. Thank you for your endless support and encouragement throughout this journey. I could not have done this without you. Your patience and willingness to jump on a plane to join me on the adventures this degree has taken me on, has made it well worth the ride!

To my family, it is because of you that I know that anything is possible. And to David, it is the adventures that life brings that I am reminded you are right here with me overcoming the challenges and enjoying the thrills.

To the Cummer and Illnicki clans, thank you for making Edmonton home for me. Thank you for the family gatherings, the road trips and the laughs.

To my supervisors, Drs. Sven Anders and Sandeep Mohapatra thank you for guiding me through this challenging, yet rewarding process. The time, resources and supervision you have provided to me to complete this work is very much appreciated.

I would like to acknowledge the support of Dr. Wendy Umberger, who welcomed me to Global Food Studies (GFS) at the University of Adelaide. The time spent at GFS as well as the research journeys to Vietnam and Indonesia were transformative. The rich dataset shared by GFS made this thesis possible. To Drs. Dale Yi and Wahida, thank you for your support and contributions throughout the process.

To Henri Suudi, thank you for providing an unforgettable first-hand introduction to Brebes' shallot markets.

I would also like to acknowledge the support of Dr. Brent Swallow who was influential in the pursuit of my thesis research and my interest in institutional economics. I am grateful for his mentorship, particularly in the early stages of my degree.

To my friends both at REES and GFS. It was a pleasure getting to know and learn from such a talented, inspiring and determined group of individuals. We shared both laughs and tears and just about everything in between. I wish for each and every one of you to achieve your highest potential.

The joy and excitement of being able to develop this research project and travel throughout the world to pursue the activities within it, would not have been possible without the generous financial support of a number of awards, including:

- Social Science and Humanities Research Council's Joseph Armand Bombardier Canada Master's Scholarship and Michael Smith Foreign Study Supplement
- University of Alberta's Education Abroad Individual Travel Award
- University of Alberta's Walter H. Johns Graduate Fellowship
- Agricultural Institute of Canada Foundation's Douglas McRorie Memorial Scholarship

Table of Contents

Tables

Figures

CHAPTER 1 Introduction

1.1 The Importance of Institutions in Agricultural Development Economics

Institutions can be thought of as the "rules of the game," as they prescribe the behavioural norms and enforcement features that serve to shape human interaction (North, 1990). Institutions play a particularly important role in economies that lack formal rules and are characterized by high transaction costs and information problems. When it is costly to find information about what is being traded and the terms of exchange are difficult to enforce due to imperfect or poorly functioning markets, market participants are incentivized to behave opportunistically or to cheat or shirk (North, 1989). As such, institutions manifest in these contexts to constrain market participants' behaviour by substituting for missing markets. Consequently, institutions decrease the uncertainty and costs associated with transacting (North, 1989). Subsequently, institutions can be either formal (e.g. property rights) or informal (e.g. sharecropping or loan sharks).

Agricultural economists are increasingly becoming aware of the impact institutions can have on economic behaviour (e.g. Gabre-Madhin, 2009; Key and Runsten, 1999). Institutions have also been recognized for playing a critical role in economic growth (e.g. North, 1990; Ruttan, 1989) and have been acknowledged in mainstream policy thinking due to their contribution to economic development (World Bank, 2002). The heightened attention from economists on institutions is in part due to the polarizing consequences that they can have on the economy. While institutions can lead to formal market development (McMillian, 1995), they can also impede economic growth by causing inefficiency in economic activity (Shaban, 1987).

The study of informal institutions is particularly important in less developed countries, where many markets remain incomplete. When markets do not function well, the results can impose disproportionate negative effects on the poor, who are in many cases smallholder farmers (FAO, 2010). This is especially true when markets for key inputs, such as skilled labour, credit or insurance, are missing or incomplete (de Janvry *et al.*, 1991; Key and Runsten, 1999). Institutions play a critical role in these contexts as they manifest to facilitate or hinder economic exchange for specific market participants. The decision to engage in institutions can therefore be triggered by market conditions (Key and Runsten, 1999). As a result, institutions can play a role in both including and excluding the poor from market participation (e.g. Escobal *et al.,* 2000; Reardon *et al.,* 2009; Barrett *et al.,* 2012). They can also impact the effectiveness of policy and service delivery and technology adoption (e.g. Poulton *et al.,* 2010; Glover, 1987). However, before we can assess the impact that individual institutions have on economic development, it is critical to understand the specific causes for them to exist in different contexts.

1.2 *Tebasan* arrangements: an Informal Institution

An ideal microcosm for this research agenda is exploring the existence of *tebasan* arrangements, an informal harvesting institution dating back to the 1960s that has spread to a number of Indonesia's agricultural commodity markets. *Tebasan* is a Bahasa-Indonesian word referring to an implicit contractual arrangement between a farmer and a trader that facilitates the sale of a mature pre-harvest (in-ground) crop. Under a *tebasan* arrangement, a farmer makes an informal agreement with a trader up to two weeks before the harvest for that trader to undertake harvest management, including harvest labour hiring and supervision. By making an advanced payment

to the farmer, the trader gains the rights to the *tebasan* crop on the farmer's land on the day of the harvest, assumes all costs and responsibilities of harvesting and becomes the sole claimant on the residual profits. The trader also becomes responsible for post-harvest decisions, including whether to, and timing of, processing and selling of the shallots on the market.

1.3 Research Objectives and Organization of the Thesis

While *tebasan* arrangements have been observed in a number of Indonesia's high-valued agricultural commodity markets (e.g. mangos see Purnomo and Andri, 2012; chili see Jubaedah, 2014 and shallots see Wicaksena and Sahara, 2013) in addition to staple crops (i.e. rice), the causes and consequences of this informal institution have largely gone unnoticed by policymakers and researchers. However, understanding why farmers continue to use *tebasan* arrangements is of importance to policy makers that are interested in ensuring that smallholder farmers are integrated into high-valued agricultural commodity value chains. The overall goal of this paper therefore is to develop a framework that identifies the factors that influence farmers' use of *tebasan* arrangements in Indonesia's modern agricultural sector. This in turn will begin to lay the groundwork needed to assess the impact *tebasan* arrangements have on market development.

To achieve the goal of this thesis, the use of *tebasan* arrangements is explored in Central Java's shallot market, an important high-valued agricultural commodity market for smallholders. The overarching hypothesis of this thesis is that the dominant driving force behind an individual farmer's *tebasan* arrangement choice is a farmer's inability to efficiency access and navigate the market. The ability to manage market activities, it is argued, is an essential input into agricultural

harvesting, processing and selling activities. Dependent on this hypothesis being validated, it is proposed that *tebasan* arrangements may be substituting for a missing market for managerial services. By employing a unique dataset derived from a household survey of shallot farmers as well as sub-district level data derived from a government report, an application of Eswaran and Kotwal's (1985) theoretical model on agrarian contracts is presented to test this overarching hypothesis empirically. For example, the impacts of market development and access, the quality of the farmers' market managerial abilities and the intensity of family labour are tested on farmers' harvesting agreement choice.

This thesis makes a contribution to the existing literature surrounding the institution of *tebasan* arrangements. To date, the literature has been characterized by a rich historical account of the emergence of *tebasan* arrangements in Java's rice market. This thesis contributes a comprehensive empirical analysis of the use of *tebasan* arrangements by Java's farmers, which was previously lacking in the literature. By pointing to market access and development as central drivers behind arrangement choice, rather than just social norms and labour supervision problems, this thesis offers a novel explanation as to why *tebasan* arrangements still persist in Indonesia's agricultural markets. Basing this study in Java's shallot market, this thesis also contributes a comprehensive empirical analysis of the existence of *tebasan* arrangements in a modern agricultural commodity market. To the best of the author's knowledge, no such study exists. As a result, this thesis opens up new avenues for policy makers to explore when assessing how to adequately engage in markets where *tebasan* arrangements still prevail.

The remainder of this thesis is structured as follows: Chapter 2 provides a brief literature review on *tebasan* arrangements; the role of institutions in economic development and methods to modeling harvesting arrangement choice. Chapter 3 provides a historical context for market development in Indonesia to contextualize the initial emergence of *tebasan* arrangements. Chapter 4 provides a background on Indonesia's economy and shallot market. Chapter 5 lays out a theoretical framework for understanding farmers' harvesting arrangement choice, extrapolated from a theoretical model developed by Eswaran and Kotwal (1985) and presents a number of testable hypotheses. Chapter 6 describes the data used for this study. Chapter 7 develops an empirical strategy. Chapter 8 discusses the results and Chapter 9 makes concluding remarks regarding the implications of this work.

CHAPTER 2 Literature Review

This chapter presents a brief review of the literature relevant to the role of institutional change in economic development as it relates to the emergence of *tebasan* arrangements. It begins by highlighting the narrative on how *tebasan* arrangements first manifested in Indonesia's rice market in the 1960s. A discussion of the roles of information economics and institutional change in economic development follows, touching specifically on how institutions form to substitute for missing managerial markets in transitioning economies. This chapter concludes with an overview of the theoretical model applied to explain farmers' contractual choice in this thesis.

2.1 *Tebasan* Arrangements in the Literature

The literature that discusses *tebasan* arrangements is concentrated in a historical context, when *tebasan* arrangements first manifested in Java's rice market. *Tebasan* arrangements became predominant in Java's rice market in the mid-1960s, providing farmers with an alternative to a long-standing harvesting system called *bawon*. The *bawon* system was a centuries-old tradition based on communal village norms that obliged farmers to host open harvests, hiring community labour and paying them with a harvest output share (Hayami and Kikuchi, 1982). The harvesters were generally the most marginalized in society, consisting of women and landless workers (Collier *et al.,* 1973). Therefore, the *bawon* system served as a social safety net by guaranteeing a subsistence income to the poorest segments of society (Kikuchi *et al.*, 1984).

According to the literature, mounting population pressure on the land was the catalyst for institutional change in Java's rice harvesting system (Hayami and Hafid, 1979). With a growing population, especially a landless and near landless population due to shrinking land sizes, farmers became unable to manage the increasing numbers of harvesters arriving at their plots. During this period, there were reports of up to 500 harvesters labouring on plots of just 1 hectare in size (Collier *et al.*, 1973). Therefore, by submitting to the *bawon* system, as the population density intensified, meant that output shares for harvesters and farmers would diminish (Hayami and Hafid, 1979). Despite farmers becoming disadvantaged by the *bawon* system, deviating from it by limiting harvest participation or reducing the harvesters' share was often deterred with the threat of resistance. To enforce the village norms harvesters used methods of coercion, such as physical violence, stealing or trampling plots (Collier *et al.,* 1973).

In light of the growing tensions between harvesters and farmers, *tebasan* arrangements became an effective institutional innovation for farmers to circumvent their obligations to their community and limit harvest participation (Hayami and Hafid, 1979). By using a *tebasan* arrangement, farmers could transfer their responsibility of managing harvest labour and dividing the output shares to the trader (Collier *et al.*, 1973). Unlike farmers, traders could limit harvest labour because they were not held to the same social obligations as the farmers to provide subsistence shares to the harvesters (Hayami and Hafid, 1979). Even if the trader *was* a farmer, as long as the harvest s/he was managing was not on her or his own land, the harvesters would accept the farmer's/trader's authority to deviate from the *bawon* system (Hayami and Hafid, 1979). Subsequently, for both farmers and traders, the *tebasan* system was seen as mutually

beneficial as both parties were able to realize a larger output share by effectively limiting the harvest participation (Collier *et al.*, 1973; White, 2000).

While it is clear that the increased pressure in managing farm labour motivated the shift from the *bawon* to *tebasan* system in the rice market, there remain a number of gaps in this literature. First, although it has been observed that *tebasan* arrangements have coexisted with other harvesting arrangement forms (Hayami and Hafid, 1979), the reasons for this have never been empirically explored to the best of the author's knowledge. Second, while population growth, and possibly technological change, have been pointed to as the leading causes for institutional innovation (Hayami and Hafid, 1979), ignored in the literature is the fact that the rapid spread of *tebasan* arrangements coincided with transformative political and economic restructuring in Indonesia. It was at the same time when the spread of *tebasan* arrangements was documented in the literature, around the mid-1960s, that the nation underwent a major regime change and market development. This alignment of events indicates that there could be significant links with the uptake of this harvesting arrangement with broader market development processes. Additionally, *tebasan* arrangements have been able to transcend a number of diverse agricultural markets and coexist with other types of post-harvest arrangements in the same geographical region (White, 2000; Hayami and Hafid, 1979). This spatial variation provides further evidence that there may be broader links of farmers' harvesting arrangement choice with market development.

2.2 The Roles of Institutional Change and Missing Managerial Markets in Economic Development

The theoretical underpinnings associated with information economics allow a framework to be developed to identify and explain factors that may influence Java's shallot farmers' harvesting arrangement choice. As markets develop in any economy so do information channels (McMillian, 1995), and together these processes reduce transaction costs and make informal institutions less important for efficient transacting. Therefore, there is a strong possibility that economic change and market development may have a significant influence on harvest arrangement choice. However, as economies transform, there remain a number of common impediments to efficiency. For instance, input factors may be hard to locate and output may be difficult to sell due to physical constraints, such as deficient infrastructure or lack of modern modes of transportation, as well as broader information problems (McMillian, 1995). Consequently, an ongoing process of institutional innovation is necessary to allow market participants to adapt to new market conditions.

In transitioning economies, it is often entrepreneurs that motivate institutional change. Entrepreneurs can come in the form of talented managers that help firms take advantage of new market conditions. However, where formal managerial markets do not exist, or any other market for an essential input to production, entrepreneurs will find creative substitutes. These substitutes can consist of novel incentive structures constructed to attract resource owners (i.e. managers) to dedicate their skills to the goals of the firm (or farm) (McMillian, 1995). For example, in Vietnam at a time when there were incomplete financial markets, no formal courts to uphold contracts, and corrupt bureaucrats governing regulation and licensing, entrepreneurs cautiously

built relationships with specific suppliers and customers in order to reduce the risk of transacting (McMillian and Woodruff, 1999). By substituting property rights and contracts with long-term relationships, Vietnamese entrepreneurs in start-up firms developed an informal institution with their suppliers and customers based on reputational effects. Reputational effects would enforce business deals, by creating incentives to cooperate in the context of repeated games (McMillian and Woodruff, 2002). While this is just one example, incentive structures can manifest in a number of different ways. For instance in China, in the context of missing managerial markets, managers were brought into township and village enterprises, former state-owned firms, under various profit-sharing arrangements in order to incentivize them to dedicate themselves to maximizing the firm's profits as it privatized (Chen and Rozelle, 1999). Similar institutional forms also manifest in agrarian societies to entice skilled managers to allocate their effort efficiently, such as sharecropping arrangements (Binswanger and Rosenzweig, 1984).

Developing an informal institution to substitute for formal markets or institutional structures may be similar to what Indonesia's farmers and traders have done to overcome the challenges of underdeveloped markets (explained in more detail in Chapters 4 and 5). In the context of a transforming market economy, entrepreneurial farmers and traders may have devised a novel incentive structure by constructing *tebasan* arrangements, which enables both parties to benefit from new market opportunities. As such, a farmer may use a *tebasan* arrangement to gain the trader's market management expertise (e.g. labour hiring and output selling) by enticing the trader with temporary land ownership rights to harvest the in-ground crop. In effect, when using a *tebasan* arrangement, a trader may be incentivized to efficiently manage market activities and maximize the harvest profits because s/he has ownership stakes in the crop. Therefore, it may be

the case that *tebasan* arrangements are substituting for an incomplete market for managerial services in a transforming economy.

While this may be the case, the current state of understanding of the emergence and continued perseverance of *tebasan* arrangements in Indonesia's modern agriculture sector remains limited. Nevertheless, it is known that institutional change is an important process to economic development (North, 1995). To be able to bridge the gap in the literature that surrounds *tebasan* arrangements, it is important to first understand the more general causes and consequences of institutional change and its role in economic development.

The evolution of institutions plays a critical role in societies as they become more complex and exchange becomes more impersonal, as it is the development of elaborate institutional structures that reduce transaction costs and create a disincentive for individuals to act opportunistically (North, 1995). Institutions that form to specify and enforce property rights, serve to reduce uncertainty and allow for economic agents to capture the gains from trade of more complete contracting. According to North (1995), this process can result in higher rates of productivity and hence economic growth overtime.

However, while institutions can promote market efficiency and even lead to formal market development (McMillian, 1995), they are not always credited for being socially efficient (North, 1995). Institutions are developed to serve the interests of those who have the bargaining power to create and enforce the rules (North, 1995), and therefore institutions can in some cases serve to marginalize the poor. Since institutions, like *tebasan*, can influence the direction of long-run

economic development (North, 1995), they deserve attention from economists and policy makers alike highlighting the importance of understanding the factors that give rise to *tebasan* arrangements.

While it is established that institutional change can play an important role in economic development, the causes of change are widely contested. North (1989) attributes the main cause of institutional change to changes in relative prices, either due to population change, technological innovation or changes in the cost of information. North (1989) also provides a stylized characterization of what the process of change could look like. He states that a change in relative prices may lead to one or more parties involved in a transaction altering their perception of how well they could do under an alternative contract or institutional arrangement. However, he asserts that institutional change only occurs if there are entrepreneurs that choose to respond to the new conditions by renegotiating their contracts and effectively change the rules of the game. North stresses that while it is the speed at which entrepreneurs learn that determines the pace of change in the economy, it is the type of learning that controls the direction of economic change.

Although North is criticized for over simplifying the cause of institutional change, there is a consensus among economic theorists that the cost of information, an important transaction cost, is a key determinant (Bardhan, 1989). Therefore, to be able to understand factors that influence farmers' harvesting arrangement choice, it is critical to accept that while individuals do not require complete information to transact, when information is imperfect and/or asymmetric, individuals may act differently than we otherwise would expect (Stiglitz, 1986). That is, when

individuals do not have unfettered access to information, either because information is asymmetrically held or otherwise costly to obtain, institutions will form to impose constraints on interaction in order to structure exchange (North, 1995). Under the information-cost framework, it is argued that when the availability of information increases, or as other forms of transaction costs decrease, institutions will evolve to reflect these modifications (Stiglitz, 1986). Hence, change in the accessibility of information in an economy underlies the formation and transformation of institutions (North, 1995). It is under this framework that we can understand institutions to be endogenous, rather than exogenous, and that changes in the environment will be met with an institutional response, albeit sometimes with a lag (Stiglitz, 1986).

This discussion provides a broader understanding of the causes and possible consequences of institutional change in economic development. It stresses the role that information plays in both the costs of transacting and in the shaping of relationships between economic agents. Hence, early on in this discussion, the role of missing markets was used to explain the basis of informal institutions. Missing managerial markets were emphasized, with linkages to how traders engaged in *tebasan* may be filling a void for missing marketing managers in Java's shallot market. In conclusion, this section stresses that prior to intervening into markets that *tebasan* arrangements exist, it is important to advance our understanding of what motivates farmers to adopt these contracts in order to identify the "type of learning" entrepreneurial traders and farmers are doing. Therefore, by identifying what factors drive farmers' harvest arrangement choice, we can begin to answer the question of whether market development is a key driver in institutional change in Java's harvesting systems. To do this, it is necessary to first identify an appropriate theoretical model to adopt in order to explain harvest arrangement choice.

2.3 Models on Contractual Choice in Agriculture

In Indonesia's shallot market there are two dominant types of arrangements used for crop trade once the shallots have reached maturity. As mentioned in the introduction, the first is the *tebasan* arrangement and the other is a self-harvest arrangement, whereby the farmer harvests the crop and uses a market transaction to sell it post-harvest. To develop a framework to model farmers' harvesting arrangement choice and test whether the decision to undertake a *tebasan* arrangement has broader links to market development, a theoretical model from the sharecropping literature is used (see Otsuka and Hayami, 1998; Binswanger and Rosenzweig, 1984; and Otuska et al., 1992 for thorough reviews of this literature).

Sharecropping is a type of agricultural contract forged between a landowner and a tenant, whereby the landlord and tenant jointly manage the cultivation of a crop and share the output. While this contractual form is not necessarily relevant to this analysis, it is the alternative contractual forms in which sharecropping is generally juxtaposed with, that are of importance to this thesis, including fixed-wage and fixed-rent arrangements. A fixed-wage contract is when the landowner provides the tenant with a fixed payment to cultivate the plot, leaving the landowner as the sole claimant on the residual profits. In contrast, a fixed-rent contract is one in which the landowner receives a lump sum payment from the tenant to rent the land and the tenant then manages the cultivation and becomes the sole residual claimant. While these contracts do not align perfectly with *tebasan* (comparable to fixed-rent) and self-harvest (comparable to fixed-wage) arrangements used by shallot farmers, the theoretical concepts developed in this body of literature lend insight into what factors may contribute to harvesting arrangement choice.

In this body of literature, there is a group of theorists that pivot their theoretical models on the principal that tenancy institutions function as an adjustment to missing markets or market failure (e.g. Eswaran and Kotwal, 1985). These models assume that in an environment of missing markets, where it is difficult or costly to supervise labour, sharecropping is an attractive alternative for landowners to improve the efficiency of wage labour by providing a positive incentive (Binswanger and Rosenzweig, 1984). It is believed that under a sharecropping contract that wage labourers, who earn a share of output, will be incentivized to provide more labour effort than they would under a fixed-wage contract in the absence of being closely monitored. Alternatively, tenants would provide the maximum amount of effort under a fixed-rent contract. Therefore, these models focus on the moral hazard problems on the part of the tenant, whereby the tenant can control the amount of effort s/he contributes to cultivation, which is determined by the contractual form selected by the landowner.

While moral hazard problems have been well documented regarding the tenant's effort, Eswaran and Kotwal (1985) were pioneers in modeling the idea of competing contractual forms with the possibility of double-sided moral hazard (Agrawal, 1999). In their model, Eswaran and Kotwal introduce the problem of moral hazard of the landlord (shirking in management effort) in addition to the tenant shirking in supervision effort. Another benefit to using this model is that it allows the co-existence of different contractual forms to be explained. These two reasons make Eswaran and Kotwal's theoretical model particularly relevant to the case of *tebasan* and provide a justification as to why it is used in this thesis.

Furthermore, the Eswaran and Kotwal (1985) model (detailed in Chapter 5) has been empirically applied in a number of different instances. To name a few examples, Chen and Rozelle (1999) applied the model to the case of township village enterprises (TVE) in China, illustrating different incentive structures that managers and village leaders devised to incentivize each party to put forth their best effort in making the TVE profitable. Similarly, Escobal *et al.* (2000) applied concepts of the model to explain different contractual structures in various Peruvian agro-industries. More recently, Gjertsen and Barrett (2003) applied the theoretical model to explain the drivers behind co-management strategies in conservation programs. While these are just a few of the many applications of the theoretical model developed by Eswaran and Kotwal (1985), it provides a basis for its applicability in cross-cultural contexts. Therefore, by applying this model to the *tebasan* case, it can be tested if the same hypotheses that this model provides exist within the Indonesian context and subsequently draw linkages to the implications of *tebasan* on Java's shallot market.

A central criticism of the Eswaran and Kotwal model is that it disregards the landlord's long-run optimization problem and considerations of reputation, which would eliminate shirking issues (Agrawal, 1999). However, since *tebasan* arrangements are short-term and generally non-repeat arrangement (explained in Chapter 4, Section 4), this is not an impediment to this analysis.

CHAPTER 3 Historical Context: Colonial Influences, Independence and Indonesia's Transition to a Market Economy

The key argument of this thesis is that farmers' harvesting arrangement choice is a response to market underdevelopment, more specifically an imperfect market for managerial services. From Chapter 2, it was learned that entrepreneurs and/or managers are needed in times of economic transformation to take advantage of new opportunities resulting from emerging information channels. Like markets, institutions subsequently evolve overtime due to changes in economic information.

The evolution of both markets and harvesting institutions has been explicitly illustrated in Indonesia. While in the 1960s *tebasan* arrangements were juxtaposed with *bawon* arrangements (the communal village harvesting system) in Java's rice market, today in the shallot market *tebasan* arrangements coexist with formal post-harvest market transactions. To strengthen the argument that institutional evolution in Java's harvesting institutions is a response to market development, this thesis draws linkages with the previous body of literature on *tebasan* arrangements by exploring the historical factors that may have been the catalyst for the rapid institutional change from *bawon* to *tebasan*. This chapter explores the colonial influences on Indonesia's economy, with a focus on the agricultural sector, and land and labour market development.

Between 1800 to 1942, Indonesia was under Dutch rule. During this period, Indonesia's land and labour markets were stunted in development. Indonesia was organized to provide the colonial

powers with land and labour reserves to secure export crops. This was done to help improve the living standards in the Netherlands, rather than for the benefit of the indigenous population (Booth, 1998). However, the Dutch ruled indirectly so as to minimize administrative costs. Using local leaders as intermediaries, the Dutch transmitted information about how much of what crops to produce through village leaders and allowed them to coordinate the production at the village level (Hayami and Kikuchi, 1982).

This system prevailed until the British came into power. Between 1811 and 1816, the British governed in Indonesia and introduced a regime of direct rule, replacing the tribute-in-kind taxation system, which had previously existed, with a formal monetary taxation system (Hayami and Kikuchi, 1982). However, when the Dutch regained power they restored their old arrangement by introducing the Cultivation System. The Dutch viewed government coercion, rather than market forces, as the only method available to secure the surplus of export crops that they demanded (Booth, 1998). Under this system either 66 labour days allocated to public works projects or 20% of village land used to cultivate export crops could substitute for a formal land tax (Hayami and Kikuchi, 1982). Through indirect rule, the Dutch reinforced many traditional village norms, as the village was treated as a single unit of land and labour for production. Furthermore, the penetration of a market economy was kept to a minimum, since non-market channels were being used to move the export crops through the economy (Hayami and Kikuchi, 1982).

The Cultivation System was successful at generating revenue for the colonial government, but private enterprises were unable to flourish. In the 1870s, the Dutch decided to institutionalize

private plantation development through the implementation of the Liberal System. However, the colonial powers were conscious of the negative consequences that foreign land acquisitions could have on the local economy and welfare of the indigenous population. In order to prevent this from happening, lease regulations, which avoided imposing private property rights, were installed. For example, under certain lease agreements the private owner and the village had to rotate their land every year or so to prevent permanent land holds. This again reinforced communal village norms, allowing many of the traditional rural institutions, like *bawon*, to stay intact for centuries throughout the colonial period (Hayami and Kikuchi, 1982).

Under the Liberal System surplus labour began to mount due to a combination of a growing population and scarcity of land. Consequently, farmers began to diversify their income by pairing agricultural work with non-agricultural employment, primarily finding employment in sugar factories (Booth, 1998). The Ethical Policy, which followed the Liberal System, aimed to restore the rural labour reserves that once existed to be exploited by the Dutch for their export crops. Again, villagers were not allowed to privately own land under this policy, but rather had communal possession as a village unit. This system is believed to have prevailed until Indonesia gained Independence (Hayami and Kikuchi, 1982).

During the colonial period, Indonesia's population, especially in Java, began to grow rapidly (Hayami and Kikuchi, 1982). This change in demographics put a lot of pressure on traditional institutions, particularly because labour markets were slow to establish. As a result, once labour became abundant relative to land, formal labour markets began to develop (Booth, 1995). Workers started to migrate as full-time wage labourers and expatriate employers started to trust

the market to hire them (Booth, 1998). However, indentured labour systems did not disappear immediately. Booth (1998) explains:

> "…in the eyes of many indigenous Indonesians, whether they were full time wage labour on estates or peasant cultivators forced into renting rice land to estates, government coercion and the market economy were inextricably linked. But at the same time, the indigenous population had little option but to become more and more enmeshed in markets for both labour and land; by the early twentieth century, subsistence production was simply not an option…"

In 1949, Indonesia gained Independence. However, there was essentially no indigenous middle class and the economy was still dominated by foreign powers. While the government had the task of building a national economy, distrust for the capitalist market system persisted (Booth, 1998). During this period of the *Guided Democracy* the market began to develop and indigenous producers, especially farmers, received little protection from the government as they were gradually being exposed to stronger market forces (Booth, 1998). At this time, Indonesia was trying to gain an identity and eradicate the dominating influence of the foreign powers in the economy and plantation agriculture. Therefore, while the government purported to be socialist, there were actually few attempts to promote a collectivist economy or support rural co-ops (Booth, 1998). Thus, collective farming had passed its prime and peasants were no longer cooperatively minded. In fact, Booth (1998) explains that village agricultural markets had already become a place of fierce bargaining, where one could transparently observe the forces of supply and demand first hand.

By the 1960s, the government's *Guided Democracy* had run the nation into a massive deficit and inflation had begun to mount. More than half of the rural population was below the poverty line in Central and East Java (Booth, 1995). Family labour institutions, while diminishing, still existed. Furthermore, rural markets were plagued with extreme price volatility (Booth, 1998).

It was also at this time that the Basic Agrarian Law was introduced, which ended the dualistic property rights that had existed to serve the Dutch interests. Individual hereditary right of ownership was implemented, which was similar to property rights, and intended to redistribute land to the indigenous population. However, because landholdings were already so small, the redistribution had little impact. Similarly, many of the reforms under the Basic Agrarian Law and the Sharecropping Law, which followed and was designed to regulate tenancy contracts was ineffective, namely due to the suppression of communism in 1965 (Booth, 1998). Therefore, despite the initial intention of the Basic Agrarian Law, it did in fact contribute to private land accumulation and development of landlordism (Hayami and Kikuchi, 1982).

The New Order Government (1966 – 1998) was brought into power by President Suharto. The government embarked on a program of stabilization on advisement of the International Monetary Fund, which was regarded as being very successful (Booth, 1995). Following, the economy underwent a number of shocks due to volatile oil prices, however with increased intervention in the 1980s the Indonesia government was successful at making the country more internationally competitive and less reliant on oil exports (Booth, 1995). However, the government was criticized for both not successfully facilitating market-led development and for failing to enforce

the rule of law and providing a robust institutional structure of individual and property rights (Booth, 1995).

Nevertheless, today Indonesia is a G-20 member and is purported to have the world's 10th largest economy in terms of purchasing power parity (World Bank, 2015). The country has eradicated much of its poverty, more than halving the poverty rate since 1999, to 11.3% in 2014 (World Bank, 2015). Indonesia's success today is in part attributed to the political and economic transformations that occurred during the reign of the New Order Government, which marked an important milestone for the development of the nation's market economy. After the New Order Government came into power, Indonesia's economy has embraced a movement away from agriculture and towards the manufacturing and service sectors. Indicative of a developing country, however, Indonesia's labour force has exited the agricultural sector at a slower rate than the agricultural sector has retreated from the economy (OECD, 2010). Between 1965 and 2005, the share of agriculture in Indonesia's Gross Domestic Product dropped from 56 to 17%, while at the same time the share of employment in agriculture dropped from 69 to 44% (Fuglie, 2010). While agricultural wages have started to rise due to the relatively high non-farm wages, increasing the opportunity cost of labour (Fuglie, 2010), a large poor rural population persists. Therefore, while Indonesia's market economy is establishing, it is still characterized as a transitioning economy.

This brief historical overview of Indonesia during and after colonization contributes to the understanding of how the *bawon* system could have persisted for centuries prior to Independence. The Dutch colonial powers effectively prevented the development of land and

labour markets as well as private property institutional structures, which played a key role in containing the communal village harvesting system of *bawon*. However, when the country gained Independence and subsequently underwent political change brought on by the New Order Government, Indonesia's market economy was able to develop more freely. As land and labour markets became more established, *tebasan* arrangements became an alternative for entrepreneurial farmers and traders to break free of the restrictive social norms that had once governed rice harvesting. By undertaking the harvest duties, traders participating in a *tebasan* arrangement were able to more fully engage with the market economy by paying labourers a cash-wage instead of a share of the harvest (Collier *et al.,* 1973). With farmers becoming less reliant on family and community labour institutions, *tebasan* arrangements also provided them with an alternative to having to hire and manage labour as well as sell their crop output. With that, evolution in Java's harvesting systems began to occur. Today, in Java's shallot market *tebasan* arrangement is the tradition rather than the innovation. However, while the market forces are likely quite different than they were in newly Independent Indonesia, this thesis argues that market development is still the driving force behind farmers' harvesting arrangement choice.

CHAPTER 4 Background of Indonesia's Shallot Market

This chapter serves to contextualize the modern market environment in which Indonesia's shallot farmers operate. It begins by providing an overview of Indonesia's shallot market. Next, it describes the production process of shallots and details the constraints farmers face when accessing inputs. Following, the constraints that farmers face when they sell their output are discussed. To conclude, the two types of arrangements: *tebasan* and *self-harvest* used in the shallot market are detailed.

It should be noted that there is a considerable lack of reliable data and general information on Indonesia's shallot market. This is particularly true for information around production input and output prices. As a result, this chapter relies upon grey literature and pulls particularly heavily from a project summary on the Indonesia shallot value chain released by the Australian Center for International Agricultural Research (ACIAR, 2013). Unless otherwise cited, this section is informed by that summary. Observations during the author's field visit are also used (detailed further in Chapter 6.3).

4.1 Overview of Indonesia's Shallot Market

This section provides an overview of Indonesia's shallot market. It outlines Indonesia's national production trends, productivity rates as well as the seasonality of shallot production. Following, it discusses consumer demand broadly and touches on Indonesia's international trade of shallots. The infamous price volatility of shallots is then examined briefly.

4.1.1 Production Trends, Productivity and Seasonality

Indonesia is believed to be the largest shallot producer in the world (as cited in USAID, 2008). Shallot production occupies the third largest cultivation area in Indonesia, following chili and cabbage (Surabaya, 2013). As of 2010, nearly 100,000 hectares of land was allocated to shallot production, which produced approximately 1 million tons of shallots. These figures were up by 31 and 43% from 2005, respectively (Ministry of Trade, 2012). Similarly, between 1994 and 2004 shallots were among the top vegetables in Indonesia to have experienced the greatest production growth (World Bank, 2007).

Most of the shallot production in the archipelago originates on the islands of Java and Bali, with over 50% of shallot production occurring in Central Java alone (Wahida, 2015). Brebes Regency, Central Java is a particularly significant area for shallot production and contributes to 40% of the total national supply and 80% of Java's production (Ministry of Trade, 2012).

Nearly 200,000 smallholder farmers earn an income from shallot production, producing an average 9.5 tons of shallots per hectare. Between 2007 and 2012, the productivity rate of shallots has remained relatively stable (Wahida, 2015).

Shallots are mostly grown as a monoculture and can be grown up to three times a year: during two dry seasons and one wet season (Wahida, 2015). Much of Indonesia's shallot production occurs between June and October, with a peak between August and September and a low between March and May (Ministry of Trade, 2012). It is optimal for farmers to grow and harvest

their shallots in the dry seasons to avoid many of the pests and diseases that threaten the crops during the wet season.

4.1.2 Demand

Of all agricultural goods, the demand for shallots is the third highest in Indonesia, following rice and sugar. In 2012, the estimated total demand for shallots was just over 1 million tons. Approximately 83.5% of that demand stemmed from direct domestic consumption; 9.4% came from farmers for seedlings; 2.4% from industry and 4.7% from exports (Ministry of Trade, 2012).

Such a high domestic demand for shallots reflects their importance in Indonesian cuisine. Shallots are considered to be an essential ingredient in almost every local dish across the archipelago and are even included in the consumer price index formula (Wahida, 2015). While there is no formal grading system established for Indonesian shallots, Indonesian consumers generally prefer bulbs that are round, bright red and that are medium in size.

In 1994, Ferrari found that the expenditure elasticity for shallots for both rural and urban consumers is increasing over time, indicating that per capita consumption of shallots will rise as consumers' incomes increase. It is also implied that with an increasing population in Indonesia the demand for shallots will also increase.

4.1.3 International Trade

Indonesia is the largest consumer of shallots across Southeast Asia (Wahida, 2015). It comes as no surprise then, in spite of the production growth over the past two decades, that consumer demand cyclically exceeds supply. As a result, Indonesia imports shallots from other Southeast Asian countries, such as Thailand, the Philippines and Vietnam.

Imported shallots tend to have lower prices than domestically produced shallots. Consequently, to both protect local farmers and stabilize prices, in 2013 the Indonesian government regulated shallot trade (Ministry of Trade, 2012). The government imposed import quotas to restrict shallot imports only to the wet season when domestic supply cannot meet demand (Wahyudin *et al.*, 2015). However, in the first year of the legislation being implemented, prices for shallots skyrocketed rather than stabilized.

Since most locally produced shallots are consumed domestically, Indonesia has a small shallot export market. However, like the import trends, exports follow the seasons, with much of the exports occurring around peak production periods. The main export destinations of Indonesia's shallots are Thailand, Vietnam, Malaysia and Singapore.

4.1.4 Prices

While there is limited literature covering Indonesia's shallot market, the media and government pay attention to this market for two main reasons. The first reason is the volatility of shallot prices. There have been reports of shallot prices fluctuating as much as from US$1.20 per

kilogram to US$7 per kilogram. This extreme price fluctuation has resulted in the threat of crop theft for farmers (Christian Science Monitor, 2013). While there does not seem to be a clear trend in real shallot prices, prices tend to spike during the wet season when supply reaches its lowest point and during cultural festivals when demand peaks (Wahida, 2015).

While there is no clear explanation as to why shallot prices are so volatile, there is speculation that prices are influenced by monopolistic traders that store large quantities of shallots to flood the market at opportunistic times (Bintoro, 2016). However, this theory has never been substantiated. Other reasons suggested include weather conditions and short-term effects of import arrivals.

To address price volatility, in addition to import quotas the Indonesian government has suggested that it may aim to diffuse the production areas by promoting shallot production in non-shallot producing parts of the country (Ministry of Trade, 2012). While this strategy would spread out the production centers across the archipelago, smoothing supply and demand deficits, it is not clear if any action has been taken on this initiative.

The second reason the media and government have paid attention to the shallot market is because of the margins between what farmers receive for their shallots and what consumers pay. In a media release by the Ministry of Trade, in May 2012 1 kilogram of shallots could be bought from farmers for approximately 9,500 Indonesian rupiah (approximately US$0.72) and then sold at the traditional wholesale markets for 11,000 Indonesian rupiah (approximately US$0.83). Consumers, on the other hand, paid 18,690 Indonesian rupiah per kilogram (approximately

US$1.42). Similar to speculation around the causes for price volatility, shallot traders have been pointed to as the culprits of the wide price margins. However, without a rigorous investigation of the shallot supply chain, this claim cannot be substantiated.

To address the wide price margins, in 2015 Indonesia's President's office sponsored a technical competition called Hackaton Merdek to entice entrepreneurs to develop an mobile application (app) that would more closely connect farmers and consumers. The winner developed an app called '5 Kilogram' (translated from Bahasa-Indonesian) (Indonesian News Portal, 2015). The app was designed to help engage farmers and consumers in direct sales, thereby cutting out the trader (middleman) and helping farmers realize a better price for their crop. However, the dispersion of this app is still in its infancy and it is not clear of its impact on the domestic shallot trade.

Overall, there is limited understanding of why shallot prices are volatile and why there are such high marketing margins in this market. This may in part be due to the lack of formal documentation of the shallot supply chain, but it could also be attributed to broader information problems in the shallot market. Both of these issues point to a gap in understanding of the functioning of the Indonesian shallot market. Furthermore, in the available literature, blame is often placed on the traders (middlemen) for the uncertainty of output prices. However, as the existence of *tebasan* arrangements show, traders (middlemen) play a very important role in facilitating the harvest and trade of shallots in Indonesia. Subsequently, the role of traders should be paid closer attention to in the literature and by policy makers. The following two sections dive deeper into the information problems in this market.

4.2 Shallot Cultivation: Factor Input Markets and Processes

From planting the seed to harvesting, shallot production takes around 60 to 100 days (Ferrari, 1994). Prior to and during this period, shallot farmers require a number of inputs and capital. Knowledge on how to apply these inputs is paramount to a successful harvest. This section will provide an overview of the supply-side production process and the issues faced by farmers when accessing input markets.

4.2.1 Land

Indonesia is an archipelago with over 17,000 islands, of which 6,000 are populated and only a few are densely populated (USAID, 2010). On Indonesia's Java Island, the most populated island in the world, accessing adequate amounts of agricultural land is difficult. Of those that do own land, parcels remain small with farmers owning an average of approximately 0.5 hectares (Fugile, 2010).

As discussed in Chapter 3, private land ownership is a relatively new institution in Indonesia. The Basic Agrarian Law of 1960 governs Land in the country. While there is a land registration system in place, it is estimated to take nearly 60 years to register the existing two-thirds of privately held land parcels in the country (USAID, 2010). As a result, most of Indonesia's agricultural land parcels are inherited and are not registered. In rural Java, families traditionally divide their land equally among sons and daughters. In addition, informal leasing, while illegal, is often practiced (USAID, 2010).

4.2.2 Seed, Fertilizer and Pesticide

Aside from land, seeds are one of the first inputs required for shallot production. Farmers plant around 1 ton of seed per hectare. While some farmers use their own seed, others procure their seeds on the market. Imported seeds are believed to be of the highest quality; however accessing them is challenged by government import restrictions. In Wahida's (2015) study of technology adoption among Brebes Regency's shallot producers, it was found that 45% of shallot farmers in Brebes Regency procured their seed on the market but that the majority of farmers relied on saved seed. The decision of whether or not to procure or use saved seeds is often dependent on market prices. When shallot output prices are high, farmers may be more inclined to sell their entire crop without saving seed for the next harvest (Jakarta Post, 2013). The selection of seed varietals available to farmers is also constrained by what is available in local distribution networks and by agro-climatic conditions.

Following obtaining and planting seeds, farmers may opt to apply fertilizer to their crop. Wahida (2015) found that 98% of shallot farmers in Brebes Regency procured chemical fertilizer on the market. However, shallots require fertilizer that has a specific balance of nitrogen, phosphorus and potassium otherwise growth will be stunted (Purba, 2014). The procurement and application of fertilizers is often based on local knowledge rather than modern scientific information retrieved from formal channels, such as extension workers. As a result, decisions are often made with a limited understanding of the impact the fertilizer will have on the crop quality.

In addition, farmers may also choose to apply pesticides to their crop. Shallot crops are threatened by a variety of pests. The threat of seed-borne diseases, resulting in crop loss across

production cycles, increases for farmers who plant three consecutive shallot crops. As mentioned before, the incidence of pest and disease also increases for farmers planting during the wet season.

Indonesian famers have a reputation for excessively and inaccurately applying chemicals to their crops. In his study of Javanese farmers' onion caterpillar management, a common pest in shallot crops, Busuki (2011) found that farmers use a mixture of insecticides intensively, resulting in little, no or negative impacts on their crops. It was also found that farmers used anywhere from 15 to 200% more insecticide than what was recommended on the package, in part a result of the resistance the pests build up. Moreover, Busuki found that there was an overwhelming amount of insecticides on the market, but that farmers had limited information about them. More specifically, he found of the 78 insecticides available on the market to treat the onion caterpillar, only 56 were approved by the government and farmers had knowledge of just 14.

Similar to the application of fertilizer, many farmers often do not rely on formal information sources to gain knowledge on how to best to apply pesticide. Busuki (2011) found that farmers' primarily retrieved information about pesticide input use from other farmers (through self-observation), rather than companies, extension officers, and demonstration plots.

The impact of improper use of fertilizer and pesticides can have long-term effects on the productivity of Indonesian agriculture. Both intensive land use and excessive use of chemical inputs have been attributed as the main causes of soil degradation in Indonesia (Simatupang and Timmer, 2008).

4.2.3 Irrigation

For shallots to be grown, particularly in the dry season, farmers need access to irrigation systems. As of 2005, the total area equipped for irrigation in Indonesia was 15.2% of agricultural land (World Bank, 2016). In Brebes Regency, Wahida (2015) found that shallot farmers had better access to irrigation, with 34% of farmers owning irrigated land. Wahida also indicated that shallot farming in Brebes Regency is mostly done on wetland areas where technical irrigation systems provide farmers with access to water.

4.2.4 Labour

Labour markets are ridden with complexity in Indonesia and especially on Java, which struggles with extreme population density. As a result, there is a high proportion of near landlessness and landlessness agricultural workers (USAID, 2010). As of 2014, 47% of the country's population resided in rural areas and as of 2015, 34% of the labour force was employed in agriculture (World Bank, 2016). The poor in Indonesia saturate the agricultural sector, which provides employment to 68% of people living below the poverty line (Suryahadi *et al.,* 2009). Further, relatively low productivity rates per worker characterize the Indonesian agricultural work force (OECD, 2010).

Cultivating shallots in Indonesia is labour intensive, as a result of farmers' low access to technology and small land holdings. It was learnt through the author's fieldwork, that there are highly specialized labour pools in the shallot cultivation process. For instance, there are specific labourers a farmer would hire for seeding, which are different from the labourers that would be

hired for planting or harvesting. There are even specialized groups of labourers that are hired to carry shallots from the field to the roadside. Consequently, access to labour markets and/or family labour resources is a key component to a successful production cycle.

Wahida (2015) found that shallot farmers in Brebes use a majority of hired labour. Similarly, in their study of Central Java's labour markets, La Fave and Thomas (2012) found that most agricultural households employ both family and hired labour, but that 90% of the respondents indicating they use hired labour at some point during the year. More specifically, they found of 72 working days, family labour was used for 54 days while hired labour was used for the remaining 18 days. La Fave and Thomas found that hired labour was most commonly used for planting, weeding and harvesting and was nearly all paid a daily wage. In their study they found that harvest hired labour was paid the most, amounting up to three times more than the wages set for planting and seeding.

4.2.5 Credit

To procure all the inputs mentioned, having access to capital or credit is important to finance the production cycle. Credit allocated to the agricultural sector in Indonesia, while increasing, remains low. Between 1999 and 2010, of total credit of only 5 to 6% was allocated to agriculture (Brighten Institute, 2012). However, the average growth rate of credit for agriculture was 21.1% between 2004 and 2010. The growth rate for credit for agriculture was slightly smaller than the total credit growth rate of 22.3%, but higher than the growth rate of credit for the manufacturing sector of 12.8% (Brighten Institute, 2012).

In Brebes Regency, Wahida (2015) found that between 27 and 44% of shallot producing households used credit to procure pesticides and fertilizers on the market. However, the credit was sourced from the supplier or buyer of the product rather than from more formal sources. In addition, there were no government programs helping farmers gain access to credit or subsidies for shallot inputs at the time of the study. Without access to adequate credit, many farmers must rely on their own cash base to finance their operations.

4.2.6 Information Constraints

While many farmers do rely on markets to gain access to their production inputs, access to information is a common constraint. While farmer groups (Wahida, 2015), companies and other farmers (Busuki, 2014), are pointed to as the main sources of information for Indonesian shallot farmers, there remains a large gap in adequate information. International Fund for Agricultural Development (2014) also identified a lack of extension services and complete markets as two of the main constraints Indonesian farmers face.

4.3 Output Market

Shallots are high-valued agricultural commodities in Indonesia. However, this market is plagued with considerable uncertainty primarily due to information problems and extreme price volatility of shallots on the domestic market. While shallots are relatively easy to grow, they do require a significant amount of effort to process and sell on the wholesale or retail markets. This section provides an overview of what steps need to be taken in between harvesting shallots and selling

them to consumers. This section will also describe the possible constraints farmers face when engaging in these steps.

4.3.1 Harvesting

Based on filed interviews, it was learnt that harvesting shallots is generally a one-day task. Farmers indicated that they mostly used hired labour to conduct the harvest. On average farmers hired 10 labourers to harvest approximately 1,600 squared meters (1 *bagian)*. Once the shallots are harvested, additional labourers are hired to move the shallots from the farm to the roadside for transport to a processing area.

4.3.2 Storage and Processing

Once shallots are harvested, they need to be processed. The first step in processing is washing and drying the bulbs. Bulbs are typically dried outdoors for up to 9 days by the sunlight (Irama *et al.*, 2015). However, this method is constrained by the weather and available space to lay the shallots out. From the author's fieldwork, it was observed that following drying, shallots need to be fanned off to remove excess skins, sorted by size and packaged. Once processing of shallots is completed they have a shelf life of up to three months (Irama *et al.*, 2015).

One of the biggest risks in shallot processing is post-harvest handling. Improper handling can lead to damage to the bulbs caused by rotting and mold, which ultimately lead to weight loss (Irama *et al.*, 2015).

4.3.3 Selling Shallots on the Wholesale and Retail Markets

Indonesia's horticultural markets have been characterized as inefficient, predominately due to ineffective post-harvest handling and product marketing. In Indonesia, traders (middlemen) play a dominant role in product distribution by acting as an information conduit between farmers and consumers and in assisting farmers in managing off-farm activity (Wickasena and Sahara, 2013).

Based on the author's field visit, once the shallots are processed and packaged they are then taken to wholesale or retail markets. From the wholesale markets the author visited, the activity at the market begins at dawn. The shallot sellers arrive with their product and are transported by truck. Single trucks transport multiple sellers, with their products. The sellers and buyers were mostly all women. Male labourers were present for hire to carry the shallots off the trucks to the sellers' specific selling areas in the wholesale market and again to carry the product to the buyer once a purchase was made.

Once the sellers setup their area, some buyers would take their cash out to signal that they were willing to make a purchase (or signal their wealth). The sellers and buyers would then engage in fierce negotiations, with their calculators and cash in hand, at times raising their voices and acting aggressively. However, once a deal was struck, from the author's observation, smiles would appear and the seller and buyer would laugh and in some situations even exchange a hug. The shallots sold at the wholesale markets would presumably exchange a number of hands along the supply chain until they reached their final destination of a more urban retail market, supermarket, or factory.

While consumers in both rural and urban areas consume shallots, ongoing urbanization has already resulted in half of Indonesia's 250 million people living in urban areas (World Bank, 2016). A growing urban population will likely curtail domestic demand to be centered in urban areas. Hence, making the role of traders more important to connect farmers to more distant urban markets.

4.4 Harvesting Arrangements in the Shallot Market

Based on a field visit by the author (discussed in further detail in Chapter 6.3), it was discovered that *tebasan* arrangements are still common practice in Java's shallot market. However, rather than coexisting with the *bawon* system, *tebasan* arrangements are juxtaposed with a formal market transaction whereby the farmer sells the harvested crop for cash payment. This section details the roles of both the farmers and traders in *tebasan* and self-harvest arrangements, with respect to land rights, crop ownership, labour hiring and supervision and processing and selling decisions.

4.4.1 Tebasan Arrangement

In the shallot market, a *tebasan* arrangement is a short-term, informal ("handshake") agreement between a farmer and a trader that is made up to two weeks before the harvest. Repeat or long-term relationships are not commonplace using this system. At the time a *tebasan* deal is struck, the shallots are mature and emerging from the ground, displaying quality attributes such as size and colour.

In order for the farmer and trader to meet, the trader will either go to the farmer's house or farm or use a broker (*calo*) to connect to farmers willing to do *tebasan* arrangements. According to fieldwork interviews, it was learnt that due to the high level of competition in this market, farmers could expect a lineup of traders willing to negotiate a *tebasan* deal at their farm.

Farmers select traders to sell their shallot crop based on who is offering the highest price. Prices are negotiated between the two parties and are based on word-of-mouth information about current wholesale market prices. The value of the plot is estimated by assessing the size and quality of the emerging shallots and estimating the yield. When farmers sell off the rights to their *tebasan* crop, they *de facto* transfer the rights to their shallot plot on the day of the harvest.

Under a *tebasan* arrangement, the farmer retains the tenancy of the land and ownership of the fixed-capital, but transfers the use rights to her or his land to the trader during the day(s) of the harvest. The trader, however, is responsible to hire and supervise the labour team, coordinate the harvest and make decisions regarding crop processing and selling. Therefore, the trader is responsible for both supervising harvest labour and navigating the market to hire the labour as well as to sell the product. In return, the trader becomes the sole claimant on the residual profits of the shallot sales. Customarily, the farmer will still provide a lunch to the trader's harvest labour team.

Once a deal is struck between a farmer and a trader, depending on the arrangement, payment can either be made in full before the harvest or in installments. Payment installments can be used to

incentivize farmers to continue to monitor and irrigate between the day the deal is reached and the harvest.

For the farmer, this arrangement offers a secure payment (especially if the trader makes a pre-harvest lump sum payment) and minimizes the uncertainty associated with labour hiring and with crop harvesting, processing and selling. However, there is risk involved as traders can default on the agreed price if the farmer does not receive full payment prior to the harvest. Or, if a pre-payment is made, the trader can come back to the farm and demand to be refunded if the price of the commodity drops after the harvest.

4.4.2 Self-Harvest Arrangement

The alternative to a *tebasan* arrangement is a formal market transaction in the form of *self-harvest* arrangement. There are variations of this type of arrangement, whereby the farmer and/or trader can be more or less engaged in the processing of the shallots. However, in general under this arrangement the farmer does not interact with the trader until the crop is harvested. Therefore, the farmer is responsible to hire and supervise the harvest labour, coordinate the harvest and make decisions regarding processing and selling the crop. As a result, the farmer is the sole claimant on the residual profits of the shallot sales.

CHAPTER 5 Theoretical Model

The challenge of this thesis is not only to explain why there is a coexistence of different harvesting arrangements in the same geographical area, but to also explain why there are higher or lower adoption rates of specific arrangements in different geographical areas. To address these overarching research questions, a theoretical framework developed by Eswaran and Kotwal (1985) is adopted. This framework was originally developed to explain profit-sharing contracts. However, it is applicable to the case of *tebasan* arrangements since it provides a convincing theoretical model that not only provides an explanation of why different types of agricultural arrangements may exist, but also provides an explanation that is able to make linkages to geographical variation and to characteristics of the market environment.

The main argument of this model is that aside from labour, land and other variable and fixed capital inputs, it is the farmer's ability to obtain two essential but unmarketed inputs that determines the output and thus the farmer's harvesting arrangement choice: harvest labour supervision and market management inputs. In this Chapter, Eswaran and Kotwal's theoretical model on agrarian contracts as it applies to the Indonesian shallot market is presented. Testable hypotheses are then outlined.

5.1 A Model of Harvesting Arrangement Choice

By adapting and applying Eswaran and Kotwal's theoretical model, it becomes possible to test what factors may lead to the type of harvesting arrangement (self-harvest or *tebasan*) that will dominate in a specific environment. The proposed model contains elements that are critical

features of shallot harvesting, processing and selling. Aside from labour (L), other variable inputs (M), and fixed land and capital inputs ($\bar{A}$), the key difference between the quantity of shallots produced for market (q), and thus the farmer's expected net income, is the provision of the two essential but unmarketed inputs: harvest labour supervision (s) and market management (t) abilities. Hence, it is a person's ability to provide harvest labour supervision and market management inputs into the shallot harvest that marks the subtle, but crucial, basis to this theoretical model. In this section, the components of the model are detailed and the farmer's expected income functions under the two different harvesting arrangement forms: *tebasan* (5.4) or self-harvest (5.8), are presented.

The ability to supervise harvest labour is an essential input into shallot production, but cannot be bought on the market. Harvest labour supervision refers to organizing, scheduling, and monitoring labour during the shallot harvest. Being an adept harvest labour supervisor is critical to the success of the harvest because the quality of effort put forth by the labourers directly impacts the quality of output. For instance, slow or careless harvesting could result in shallots being left in the ground or damaged and rendered unmarketable. As mentioned in Chapter 4, proper handling of the shallots also has profound impacts on the output. Improper handling of the shallots self-harvest could lead to weight loss of the final product (Irama *et al.*, 2015). Furthermore, since shallots are high-valued agricultural commodities there is a heightened incentive for labourers, or thieves in general, to steal the product during the harvest. The importance of effort quality, which is compromised by the underlying moral hazard problems of shirking and stealing, is especially challenging for farmers since the level of effort applied cannot be measured until after the harvest is completed. Therefore, harvest labour is not effective

on its own, but rather becomes an effective input only when supervised. Hence, the ability to provide labour supervision during the harvest, *s*, is defined as the time spent on supervision tasks, and is accounted for in the efficient labour input (E):

$$E = g\ (s, L) \quad (5.1)$$

Where *g* is increasing and concave in *s* and *L*.

It should be noted that family labour plays an important part in shallot famers' harvesting arrangement choice. Family labour is a critical resource for farmers since it is not a perfect substitute for hired labour. Family members are thought to be better incentivized to provide labour support during the harvest and therefore less likely to shirk, thus requiring less supervision (Binswanger and Rosenzweig, 1984). Furthermore, family members can serve as a monitoring technology for the farmer, acting as additional harvest labour supervisors. On the other hand, even if the family and hired labour are considered equal, a farmer may have a moral obligation to hire family over non-family labourers during the harvest (Conrelisse and Thorbecke, 2010). Therefore, a farmer with a large family labour endowment would be considered to have a harvest labour supervision advantage (or obligation) when compared to a trader or a farmer who depends more heavily on hired labour. Hence, for farmers with a large family labour endowment, a self-harvest arrangement is not just a way to hire their own labour but rather to employ family members in the harvest, which would result in less time spent on supervision.

Similar to harvest labour supervision, the quality of market management decisions also plays a significant role in the efficiency of shallot harvesting. Market management is defined as crop management activities that primarily deal with interactions outside of the farm. Examples include finding and procuring sources of labour, transportation and storage space for processing as well as finding markets to sell the crop output. Moreover, the ability to make market management decisions refers to the capability of the agent to make decisions based on market information, more specially factor input and output prices and technical know-how. Therefore, the better a farmer is at accessing and applying information about labour markets and other variable inputs during production and accessing output markets for the finished product, the better that farmer is at market management.

Measuring the quality of market management is more abstract than measuring harvest labour supervision. The quality of market management decisions can be traced back to the early stages of cultivation when the farmer makes critical decisions with respect to what seeds to use; how much land to allocate to shallot production; whether to irrigate and when; and around the timely procurement and application of other inputs. All of these decisions are important to achieving a successful harvest, and are based on sound technical and market information. The varietal choice of shallots, for example, should depend on the expected market demand and irrigation should depend on the product's technical requirements. The selection and procurement of other inputs should require knowledge of the available inputs, their quality and prices, as well as specific information about the input markets such as potential supply shortages. Knowledge about government support policies related to agriculture also feeds into the production decisions made by the farmer. To be able to make informed decisions that will enhance the harvest efficiency

requires a considerable amount of time to collect and verify the information obtained from external sources. The more time that is spent gathering, synthesizing and applying this information, is expected to result in a higher quality of market management decisions. Hence, the time spent on market managerial tasks (*t*) serves as a proxy for market managerial ability.

Therefore, the farmer's production function can be expressed as:

$$q = \theta F(t, E, M, \bar{A}) = \theta f\ (t, s, L, M, \bar{A}) \qquad (5.2)$$

Where F and *f* both are linearly homogenous and increasing in their arguments. The positive random variable θ is intended to capture the effects of stochastic factors such as weather and has an expected value of unity.

While both of the contracting parties are able to provide harvest labour supervision and market management skills to the harvest, processing and selling activities, it is assumed that the farmer has a comparative advantage in *harvest labour supervision*, while the trader always has a comparative advantage in *market management*. This assumption is reasonable, since the farmer, has supervised labour on the farm prior to the decision to undertake a *tebasan* arrangement and therefore has intimate knowledge on the plot requirements. Furthermore, if the farmer has family labour, that farmer's harvest labour supervision advantage would be more emboldened when compared to the trader. On the other hand, the trader, whose profession is specialized off the farm, would have more time to allocate to accumulating, verifying and applying knowledge and technical know-how derived from input and output markets.

Therefore, each party can bring something to the harvest that the other party does not have or cannot provide efficiently. As such, two efficiency parameters, γ_1 and γ_2, are introduced to the farmer's profit function (5.3) and (5.6), which will be introduced shortly, to quantify the distinction between these two abilities, where $0 \geq \gamma \leq 1$. Hereafter, subscripts 1 and 2 refer to the farmer and trader, respectively for the remaining equations to be presented below. Given the rationale outlined, it is assumed that one hour of the farmer's (trader's) time devoted to market management (harvest labour supervision) is only a γ_1 (γ_2) fraction of one hour devoted to market management (harvest labour supervision) by the trader (farmer). See Table 1 for an illustration.

Table 1 Comparative Efficiency Parameters

	Market Management Efficiency	Harvest Labour Supervision Efficiency
Farmer	γ_1	1
Trader	1	γ_2

It is also considered that both traders and farmers have other wage-earning occupations available to them outside of shallot production. Therefore, farmers and traders have one hour of time, which they must allocate between shallot harvesting, processing and selling and to other activities. The opportunity wage for a farmer is *v* (equations 5.3 and 5.8), and that of trader is *u* (equations 5.5, 5.6 and 5.9). The opportunity incomes for the farmers and traders are assumed to be exogenously determined. Other components included in the farmer's profit function consist of: the wage rate provided to the labourers (*w)* in a competitive labour market, the interest rate

(*r)* and the constant market price of shallots (P). These factors are displayed in equations 5.3 – 5.9 below.

While both parties participate in the two proposed harvesting arrangements, the farmer ultimately decides whether or not to choose a *tebasan* arrangement since it is the farmer that possesses the rights to the shallots and the land. Therefore, the farmer can choose to manage the harvesting, processing and selling activities in two different ways: first, by selecting a *self-harvest arrangement,* whereby the farmer coordinates harvest labour hiring and supervising as well as processing and selling activities. The farmer therefore provides both harvest labour supervision and market managerial services to these processes. Under this arrangement, the farmer would be the sole claimant on the residual profits. However, while the farmer will be incentivized to contribute full effort in terms of harvest labour supervision, s/he will have to absorb the costs associated with being unable to efficiently manage the market management tasks associated with labour hiring and crop processing and selling. The farmer will also have to deal with the moral hazard problem of the trader behaving opportunistically or cheating if the farmer is operating in a poorly functioning market environment.

Alternatively, the farmer may select a *tebasan (pre-harvest) arrangement*, allowing the trader to hire the harvest labour and undertake all harvesting and market management activities. Thus the trader is left to provide both harvest supervision and market management services. Under this arrangement, the trader becomes the sole claimant on the residual profits and is incentivized to provide full effort in market management services. However, the trader has to absorb the costs associated with her or his relative inefficiently to supervise harvest labour. The trader also faces

a moral hazard problem of the farmer not putting forth her or his best effort while monitoring the crop between the days of the *tebasan* deal is struck and the harvest. For instance, the trader faces the risk of the farmer or labourers stealing some of the crop during the days between the arrangement and harvest. Or, the farmer may not irrigate the crop as agreed upon during these days. Both scenarios would lead to a decrease in marketable quantity.

In the original Eswaran and Kotwal (1985) model, a third arrangement is introduced, of sharecropping or more generally profit sharing. In the profit sharing arrangement, both parties contribute their special talent and share the profits. Hence under this arrangement, both parties are incentivized to put forth their best effort into the input in which they have a comparative advantage. However, this arrangement is excluded from my empirical analysis, as no such arrangement exists in the *tebasan* context. Below, I present the farmer's expected income functions associated with the different harvesting arrangement forms.

A. Self-Harvest (Fixed-Wage) Arrangement

Under this arrangement the farmer hires (or employs family) labour and allocates her or his time between harvest labour supervision and market management. The farmer is therefore the sole claimant on the residual profits. The time the farmer does not spend on shallot harvesting is allocated to an alternative activity as to maximize the farmer's net income.

Therefore, the farmer's problem is:

$$Max_{t_1,s_1,M,L} \prod\nolimits_1^w = [Pq(\gamma_1 t_1, s_1, L, M, \bar{A}) - p\,M - wL] + (1 - t_1 - s_1)v$$

$$0 \leq t_1 \leq 1, 0 \leq s_1 \leq 1, 0 \leq t_1 + s_1 \leq 1 \qquad (5.3)$$

In the above expression, t_1 and s_1 are the quantities of time that the farmer has allocated to market management and harvest labour supervision. On the right-hand side, the term in square brackets represents the farmer's expected income in harvesting, (potential) processing and selling, which is based on quantity produced and prices received for shallots. This is a function of market management, harvest labour supervision, labour, other variable inputs and fixed capital inputs. Subtracted from the revenues made are the prices paid for the quantity of harvest labour used and other variable inputs. Whereas, the last term represents the farmer's income earned in an alternative activity, with the residual time left over that was not spent on harvest labour supervision or market management. Under this arrangement, the incomes of the two actors are therefore:

$y_1^w = \widetilde{\prod_1^w}$, where $\widetilde{\prod}$ (5.4) denotes maximum profits for the farmer, and

$y_2^r = u$ (5.5) denoted maximum profits for the trader.

B. Tebasan (Fixed-Rent) Arrangement

Under a *tebasan* arrangement, the trader makes all the harvesting and selling decisions as well as potential processing decisions, performs all the harvest labour supervision and market management functions, and is the residual claimant on the profits. Therefore, the traders' problem, which is not affected by the lump sum payment made to gain the rights to the *tebasan* crop on the day of the harvest, is:

$$Max_{t_2,S_2,M,L}\ \prod_2^r = [Pq(t_2, \gamma_2\, s_2, L, M, \bar{A}) - p\,M - wL] + (1 - t_2 - s_2)u,$$

$$0 \leq\ t_2 \leq\ 1, 0 \leq\ s_2 \leq\ 1, 0 \leq\ t_2 + s_2 \leq\ 1. \qquad (5.6)$$

Where t_2 and $s_2$are the quantities of market management and harvest labour supervision contributed by the trader. As a principal, the farmer can charge a fixed rent, R, that will reduce the trader to her or his reservation income:

$$R = \widetilde{\prod_2^r - u} \qquad (5.7)$$

The incomes of the two actors are therefore:

$y_1^r = R + v$ (5.8) for the farmer

$y_2^r = u$ (5.9) for the trader.

From above, it can be seen that harvesting arrangement choice delineates each agent's responsibilities in the harvesting, processing and selling activities and determines each party's claim on the residual profits. The harvesting arrangement choice is based on the farmer's

appraisal of her expected income under the different arrangement forms, that is y_1^w and y_1^r, in which s/he chooses the arrangement s/he believes will maximize her or his net income.

The extent of participation by each party in shallot harvesting, (potential) processing and selling, as defined by the harvesting arrangement choice, will depend on the relative importance of harvest labour supervision and market managerial abilities in these processes. These abilities, however, cannot be accessed on the market and therefore cannot be accessed independently from their owner. That is, the farmer can only provide her or his superior harvest labour supervision skill if s/he self-harvests; and can only obtain the trader's superior market management services through a *tebasan* arrangement. Hence, accessing these abilities is seen as harvesting arrangement determining. Below explains how the interplay between the importance of harvest labour supervision and market managerial abilities will be closely linked to the availability of these inputs from other sources, such as formal markets, and changes in the farm's internal and external environment.

5.2 Hypotheses

By applying the Eswaran and Kotwal (1985) model to the case of *tebasan* arrangements, insight can be developed about what circumstances can lead to the co-existence of *tebasan* arrangements with other harvesting forms in the same geographical area. Using this model, I can clearly define the relations discussed in the model between the relative importance of harvest labour supervision and market management inputs through variations in γ_1/γ_2 (the relative efficiency parameters) and the relative opportunity incomes of the two actors, i.e. the effect of variations in

(*u/v),* based on economic theory. In this analysis, the traders' abilities and income are held constant.

The overarching prediction of this model is that a *tebasan* arrangement will be selected by the farmer to allow that farmer to overcome some source of inefficiency in her or his internal and/or external environment that prevents that farmer from effectively engaging in the market. It is therefore predicted that when $\gamma_1$declines (increases), the farmer will be more (less) likely to choose a *tebasan* arrangement. That is, when the farmer lacks the market managerial ability (γ_1) needed to make harvesting, processing and selling profitable, compared to a *tebasan* arrangement, s/he will be more likely to contract with a trader to undertake those tasks. These predictions are operationalized with a number of hypotheses.

The first hypothesis is based on the premise that it can be expected that as rural Indonesia continues to develop its market economy, the relative ability of farmers to provide the unmarketed input of market management services will improve. More specifically, when a farmer is marginalized in the economy, devoid of market managerial abilities (i.e. small γ_1), s/he is unable to efficiently access the market (Eswaran and Kotwal, 1985) and is therefore more likely to make an arrangement with a trader to harvest, process and sell her or his output. For example, if information on output prices is inaccessible, either due to underdeveloped or distant output markets, marginalized farmers have to spend more time finding and learning how to access those markets, instead of supervising harvest labour. In this case, it will not be efficient for the farmer to harvest and sell her or his shallots. Rather, s/he will be more likely to have a maximized net income by choosing a *tebasan* arrangement and allowing the trader to harvest and

sell the output. As markets develop, however, information across the economy tends to equalize, and the disparity of market managerial abilities between farmers and traders should diminish (i.e. γ_1 increases) (Eswaran and Kotwal, 1985). Therefore, it is expected, as the farmer's ability to provide market management increases *self-harvest* arrangements will begin to dominate. Thus, the first hypothesis follows:

Hypothesis 1: *The dominant harvesting arrangement in a given area depends on the level of market development in the sub-district. The more developed or accessible the markets in a sub-district are, the less likely the farmer will select a tebasan arrangement.*

In a similar vein, the level of intensity in the output and input markets in a given sub-district will impact the ability of the farmer to access the market. For instance, if a farmer operates in an area that has a production-intensive output market, characterized by higher yield rates, s/he will require a high level of market management expertise to be able to find buyers due to the increased market activity, if the number of buyers is held constant. Thus, the trader's superior ability to provide market management services will become more valuable to the farmer. From this, it can be predicted that the *tebasan* arrangement form will be more dominant in areas with more intensive output markets.

On the other hand, as input markets become more intensive, accessing inputs with ease will become more viable (either due to product availability or lower prices). For shallot farmers, labour is the most important input for harvesting, processing and selling. Hence, in areas that are more densely populated, the availability of unskilled labour at competitive wages will be robust,

allowing farmers to access labour markets efficiently. Thus, in areas with intensive labour input markets, farmers will be able to efficiently provide market management services (γ_1 increases) to harvesting, processing and selling activities, relative to the trader. The next hypothesis is as follows:

Hypothesis 2: *The dominant harvesting arrangement in a given area will depend on the level of intensity in the shallot output and production input markets. The more intensive the output market is, the more likely the farmer will use a tebasan arrangement. Alternatively, the more intensive labour input markets are, the more prevalent self-harvesting arrangements will be.*

Furthermore, the farmer's optimal harvesting arrangement depends on the required level of market management to complete the harvesting, processing and selling activities, relative to harvest labour supervision. For instance, if a farmer requires a high amount of hired labour, either due to a small family labour force or a high quantity of output, then that farmer will need to access the market more frequently and intensively. In these instances, the farmer will have a greater incentive to use a *tebasan* arrangement since the level of market management required is relatively high. However, this incentive will be alleviated if the farm's family labour intensity is high, since this not only relieves the farmer of having to hire as much labour but also indicates that the farmer has more harvest labour supervisors. Lower harvest labour supervision requirements means that the farmer can spend more time providing market management to the production process, ultimately making the trader's superior ability in hiring labour and coordinating market activities less valuable. Hence:

Hypothesis 3: *The more important market management is, relative to harvest labour supervision, in a farm's harvesting operations, the more likely the farmer will choose a tebasan arrangement.*

Apart from factors that directly affect harvesting arrangement choice, there are indicators that demonstrate the farmer's ability to engage in the market. For instance, as the intensity of input costs increases, it demonstrates not only larger sunk costs due to a larger investment into the production process, but implies a higher quality of market management decisions. That is, when the farmer decides on what harvesting arrangement to use s/he has already procured inputs on the market. The farmer has also already made decisions regarding the application of these inputs based on production and marketing information. These production decisions can be quantified by the farmer's investment intensity into the shallot production, which acts as an indicator for the farmer's market managerial ability (higher γ_1).

On the other hand, if the farmer is able to produce a premium quality crop, it is also a reflection of the farmer's ability to apply the best production methods and therefore is a proxy for the farmer's market managerial input. This leads to the following hypothesis:

Hypothesis 4: *A shallot farmer's optimal harvesting arrangement will depend on management decisions made during production and pre-harvest periods. As pre-harvest management decisions improve, the less likely the farmer will choose a tebasan arrangement.*

In many agrarian societies, personal connections, wealth and status can get farmers privileged access to market information and other limited resources, whether it be a scarce input or government services (Eswaran and Kotwal, 1985). Having access to privileged information allows farmers to more effectively navigate the market. However, while access to information is challenging to quantify, landholdings are positively correlated with any kind of access (Eswaran and Kotwal, 1985). Therefore, it can be predicted that as the farmers' quantity of land owned increases, s/he will have better access to information and therefore have a more developed market managerial ability.

However, the ability to engage in markets not only requires access to information, but also requires a sum of working capital to be able to finance all of the harvesting and post-harvest activities. Shallot harvesting, processing and selling requires farmers to raise enough working capital to cover the additional input costs for these activities. For marginal farmers, raising working capital often means finding sources of credit**.** However, when capital and credit markets are incomplete, access to informal credit is often dependent on the ability of offering land as collateral (Eswaran and Kotwal, 1985). Moreover, as learned during field interviews (detailed in Chapter 6.3), due to the volatility of shallot prices, informal lenders are much more hesitant to lend to shallot farmers in general. Therefore, it can be predicted that farmers who are wealthier, or who have larger landholdings, will have better access to market information and scarce resources and therefore be more efficient at accessing markets than marginalized farmers.

Aside from the role access and the size of landholdings play, education can play a fundamental role in allowing farmers to become more proficient at acquiring information on changing market

conditions and technology (Eswaran and Kotwal, 1985). This is also true for experience. Having more experience in engaging in market activities enables a farmer to become more efficient at navigating the market. Experience can be measured by age, but also by the farmers' other occupations. For instance, if a farmer is engaged in the market as a primary or secondary career, either as a trader or self-employed, then that farmer would demonstrate a relatively high level of market managerial ability (higher γ_1). On the other hand, if the farmer's spouse holds a primary or secondary career as a trader or is self-employed, it demonstrates a lower transaction cost of that farmer to use a *tebasan* arrangement. Therefore, wealthier, better-educated and more experienced farmers are expected to be better suited to make market management decisions and therefore would have higher market management ability.

Based on the above discussion, the optimal harvesting arrangement form for a specific farmer depends on the farmer's wealth and human capital characteristics. The wealthier and more educated the farmer is, the more efficient s/he will be at accessing markets and therefore less likely to choose a *tebasan* arrangement. Similarly, if the farmer is more experienced, due to age or having a primary or secondary occupation being either self-employed or as a trader, the farmer will be less likely to choose a *tebasan* arrangement. On the other hand, if the farmer's spouse is engaged in the market for a primary or secondary employment source, then more likely a *tebasan* arrangement will be chosen. Together, these predictions lead to:

Hypothesis 5: *The likelihood of a tebasan arrangement will decrease with farmers' wealth, education, and experience.*

Finally, a key component of the theoretical model is the role that opportunity costs play in the farmer's harvesting arrangement choice. As such, if the farmer's, or farmer's family members', alternative method of earning an income has a high return compared to shallot production, the farmer will be more likely to spend time doing that occupation. Therefore:

Hypothesis 6: *The higher the opportunity cost of the farmer's time is, the more likely s/he will choose a tebasan arrangement.*

CHAPTER 6 Data

To operationalize the hypotheses in this study, a dataset from a household survey and dataset sourced from the Indonesian government (BPS, 2013) are employed. The Indonesian Centre for Agricultural Socio Economic Research and Policy Studies (ICASEPS) in collaboration with the International Food Policy Research Institute (IFPRI) and the University of Adelaide led the dissemination of the household survey. The survey was conducted between June and July 2011 in the primary shallot production region of Brebes Regency, Central Java. A field visit also was done to gain a contextual background of the study area as well as to collect qualitative data from farmers and traders that engage in *tebasan* arrangements on how the institution functions in the shallot market. This Chapter outlines the study site, sources of data and survey structure. It also summarizes the qualitative data collected, describes how the variables used in my analysis were generated and provides a summary of the descriptive statistics.

6.1 Study Site: Brebes Regency, Central Java, Indonesia

The empirical analysis in this study is based on a dataset collected from shallot farmers in Brebes Regency (Brebes hereafter). Brebes is located along the north coast of Central Java approximately 280 kilometers southeast from Jakarta. Brebes is known for being one of Indonesia's largest shallot production centers and is home to nearly 80% of shallot production in Central Java and 40% in the country (Ministry of Trade, 2012). However, Brebes is also home to a population of nearly 1.74 million, living on just over 1,662 squared kilometers of land (BPS, 2013) making it one of Central Java's densest regencies.

6.2 Survey and Other Data Sources

A research team at the Global Food Studies Research Unit at the University of Adelaide, Australia provided the household survey that contributed to a large proportion of the data used in this study. The households included in the survey were randomly selected using both a stratified random sample as well as randomly selected from list of producers that used a specific organic fertilizer (since the objective of this study was to compare farmers using organic and conventional production methods). The research team used 16 enumerators to conduct the household interviews. Details of the sample collection methods used and details about the study can be found in Wahida (2015). This thesis uses a proportion of the total sample, resulting in a study sample of 564 (of 687)[1] shallot-farming households across 11 of Brebes' 17 sub-districts[2].

The 24-page questionnaire covered a wide range of topics, including demographic and socioeconomic information on household members. It also included information on household assets, land ownership and tenure and crop and production information of all the crops the farming household participated in. In addition, the survey had detailed questions on shallot production (harvest and input use), marketing (sales and buyer relations) as well as the farmers' perception of modern channels (namely supermarkets). Specially, the question was asked to the farmers whether they sold their shallot last harvest, on their biggest plot in-ground (i.e. *tebasan*) or wet or dried (i.e. self-harvest), which provided a binary variable that is used in the empirical analysis of this thesis. Included were also questions pertaining to whether the farmer had adopted new production systems or had engaged in organic practices. There was also a section outlining

[1] The exclusion of the remaining households was a result of missing variables essential to the analysis.

[2] The following sub-districts are included in the study, the corresponding number of respondents included in the brackets: Larangan (106), Ketanggungan (21), Wanasari (113), Losari (25), Tanjung (32), Kersana (12), Bulkakamba (76), Songgom (45), Jatibarang (32), Brebes (101) and Sirampog (1).

the farmers' household income and attributes of their output. Table 2 highlights the survey questions employed in this analysis.

The survey data was supplemented with information from the Brebes Bureau of Statistics (BPS) report, *Brebes Regency in Figures 2013*, which provided sub-district level data on shallot yields, population density and Gross Regional Domestic Product (GRDP). Combined, these data provide the necessary variables to test the key hypotheses of this thesis.

6.3 Summary of Field Interviews

To gather contextual information, in conjunction with a team of researchers from University of Adelaide's Global Food Study Research Unit, the author conducted follow-up group and key informant interviews during September and October 2014. This fieldwork was part of a larger project that was designed to investigate *tebasan* arrangements in Brebes Regency and was led by Principal Investigator, Dr. Dale Yi. A number of focus groups were held, one with 10 farmers and several others with a range of traders at various locations (wholesale markets, households, and on the farm). This qualitative research process provided a number of insights that will be briefly summarized in this section. While the outcome of these interviews did not enter into the empirical analysis directly, it did serve to inform contextualize modern *tebasan* arrangements in the Indonesian shallot market and informed parts of Chapter 4 on this thesis.

Table 2 Summaries of Relevant Household Survey Questions

Survey Section	Question
A. Characteristics of Members of the Household	• How old are you and all members of the household? • How many years of education and all members of the household? • What are your, and all members of the household's, main income earning activities? (e.g. self-employed trader or other, family labour, etc.)
C. Assets	• How much of each of the following does your household currently own? (e.g. radios, televisions, cellphones, bicycle, motorcycle, water pump, storage, etc.) • How much farmland do you currently own?
E2. Shallot Production	• For the most recent completed shallot harvest, what type of input did you use (e.g. hybrid seed, chemical fertilizer, etc.), how much did you spend on each input and what method of payment did you use.
F1. Shallot Marketing	For the largest and most recent season for which the harvest is complete: • What was the quantity of shallots harvested? • What was the type (size) of shallots harvested? • In what form did the buyer take possession (in ground (*tebasan*), harvested wet or harvested dried)?
G1. Second Horticultural Crop Production	• Quantity of land allocated to rice production in the rainy season
N. Cash income activities	• Income earned outside of shallot production over the past year.

Of the farmers interviewed the most cited reason for undertaking a *tebasan* arrangement was that it improved their profit potential, while providing more certainty to their crop sale. They also noted that they mostly always prefer to do *tebasan* arrangement if there are traders available to make an arrangement with. However, at times, particularly when shallot prices are low, there tends to be a shortage of traders available and farmers will be more inclined to harvest themselves.

Both farmers and traders described the post-harvest production process of shallots as follows: after the shallots are harvested, they are moved to the roadside and then loaded onto a truck before being transported to a storage area. The shallots are then left out to dry for over one week. The shallots are then cut, cleaned and fanned off to remove excess skin. Following the shallots are sorted by size and bagged before they are sent to the buyer. Depending on the arrangement, it is customary that the buyer then pays for the transport.

Both farmers and traders acknowledged that they used hired labour to conduct harvest and post-harvest tasks. In terms of labour used, it was repeatedly cited that per *bagian* (1,600 squared meters or 16% of a hectare) 10 people are hired for the harvest; 3 people to carry the shallots to the roadside; 1 person for transportation; 5 labourers to process the shallots after they are dried and 2 more labourers for packing. In the farmers' focus group, the expense of labour was emphasized as well as the difficultly farmers faced when buying other inputs such as fertilizer due to the availability of affordable inputs.

When discussing credit and loans, the farmers noted that it is becoming easier over time to get credit but that they never source credit from traders. Moreover, the relationships the farmers had with traders were generally not long term, rather short-term, non-repeat relationships.

When interviewing traders that used *tebasan* arrangements, some mentioned that they pay in installments to help mitigate the risk of the farmer acting opportunistically, by either failing to care properly for the crop or stealing. The traders also noted that when using a *tebasan* arrangement they also take on the risk of buying poor quality shallots and/or underestimating the yielded weight.

During this fieldwork, the author also visited locations where harvested shallots were dried and processed as well as to the wholesale markets where the shallots were sold in bulk. Details of the author's wholesale market observations can be found in Chapter 4, Section 3.3.

6.4 Data Used to Generate Key Variables

To explain the difference in harvesting arrangements across Brebes, this section narrows in on the specific variables used to operationalize the theoretical model and presents details on the construction of the specific variables used in the empirical analysis. The construction of some of these key variables were based on other empirical applications of Eswaran and Kotwal's model (e.g. Chen and Rozelle, 1999; Escobal *et al.,* 2000). However, the remaining variables were based on the author's interpretation of the model as it pertained to the Javanese context. Descriptive statistics of these variables are presented in this section.

6.4.1 Description of Explanatory Variables and Expected Signs

Table 3 describes the variables used in this study to explain harvesting arrangement choice and expected signs.

Table 3 Variable Description and Descriptive Statistics

Variable	Variable Description	Obs.	Mean	Standard Deviation	Expected Sign
Dependent Variable					
Tebasan Arrangement	1 = *tebasan* arrangement, 0 = post-harvest arrangement.	564	0.66	0.47	
Market Emergence (M)					
GRDP	Sub-district level Gross Domestic Regional Product at constant 2000 prices (IDR).	564	2,975,921	1,573.68	-
Distance to Sub-District Market	Distance from the farm to nearest sub-district market in km.	553	14.0	10.88	+
Market Intensification (I)					
Average Shallot Yield	Shallot yield (100 kg/ha) at the sub-district level.	564	11,180.97	1,135.26	+
Population Density	Population density at the sub-district level.	564	1,573.68	472.64	-
On-Farm Market Management Requirements (S)					
Family Labour Intensity	Number of family members working on farm over quantity of shallots produced in the last harvest.	564	0.09	0.11	-
Output Quantity	Quantity of shallots produced in the last harvest.	564	8.69	0.63	+
Quality of Managerial Decisions (T)					
Investment Capital Intensity	Amount of money invested (IDR) over quantity of shallots produced in the last harvest.	564	969,167.3	1,479,593	-
Output Quality		564	0.26	0.44	-
Socioeconomic and Human Capital Characteristics (Z)					
Household Asset Count	Count of household assets.	564	9.99	5.64	-
Farmland Owned	Farmland owned (ha)	564	0.40	0.82	-
Self-Employed	Respondent is self-employed as trader or other.	564	0.21	0.41	-
Self-Employed Spouse	Respondent's spouse is self-employed as trader or other.	564	0.46	0.50	+
Age	Age in years.	564	47.39	11.02	-
Education	Education in years.	564	6.06	4.22	-
Opportunity Cost of Time (OC)					
Other Income	Household income (IDR) earned outside of shallot production.	564	81,400,000	554,000,000	+
Land Allocated to Rice in Rainy Season	Amount of land allocated to rice cultivation in the rainy season.	564	0.29	0.43	+

6.4.2 Dependent Variable

The dependent variable in this study is a binary variable indicating whether or not a shallot farmer undertook a *tebasan* arrangement during her or his last shallot harvest. This variable is a dummy variable, whereby 1 indicates that the farmer selected a *tebasan* arrangement for her or his last harvest and 0 indicates s/he self-harvested instead.

In the survey sample, 66% of Brebes' farmers used a *tebasan* arrangement to sell their last shallot harvest prior to the survey, whereas the remaining 34% used *self-harvest* arrangements. The coexistence of *tebasan* arrangements with self-harvest arrangements is observed across the sub-districts in the sample, however the density varies. Figure 1 illustrates the heterogeneity in farmer's harvesting arrangement choice in Brebes. Only the sub-districts outlined and shaded are used in this study. The darker shaded sub-districts indicate a higher concentration of farmers that used a *tebasan* arrangement for their last harvest. It can be seen that in almost every sub-district at least half of the farmers selected a *tebasan* arrangement; whereas in a few the density is upwards of 80%.

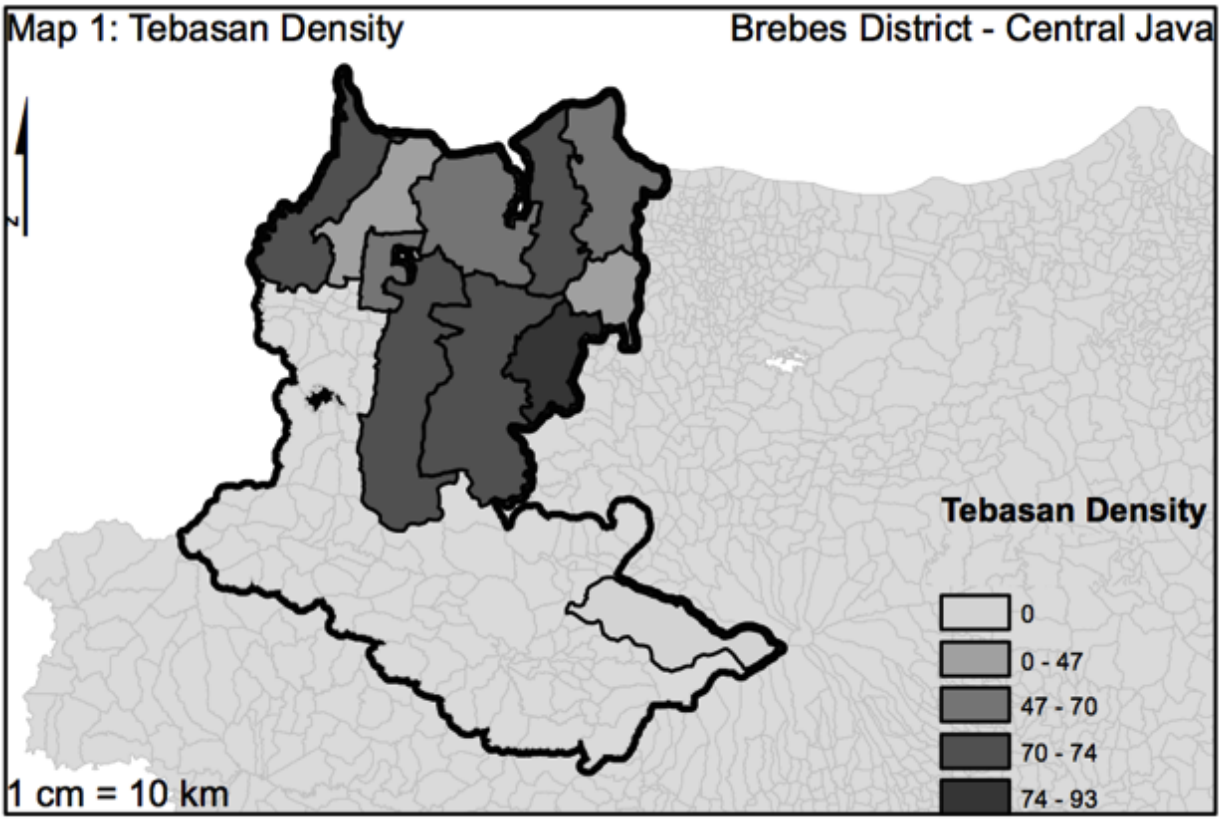

Figure 1 Map of the Density of *Tebasan* Arrangements in Brebes Regency

6.4.3 Market Indicators (H1 and H2)

The variables under market emergence (M) in Table 3 allow H1 to be tested, which seeks to explain the effects of market development and access on farmers' *tebasan* arrangement choice. First, to obtain a measure of market development, the 2012 Gross Regional Domestic Product per capita (GRDP) at constant 2000 prices is used. This original variable is measured in Indonesian Rupiah (IDR) and provides an average at the sub-district level. However, this variable was later rescaled to USD100 per capita for the empirical analysis. This variable was derived from the government report (BPS, 2013). GRDP per capita serves as a good measurement of market development because it measures the size of the Brebes' regional

economy. Formally, GRDP is an aggregated measurement of the gross value added of all the regional producer units and generally includes estimates on the natural resource (agriculture, fishery and forestry), industry and service sectors. It is expected that GRDP per capita will have a negative sign. That is, as market development increases, it is expected that farmers will be less likely to select a *tebasan* arrangement.

The survey data indicating the distance of farm to the sub-district wholesale market in kilometers was used to measure access to markets. Shallot farmers in Brebes are mostly accessing local supply chains, with 99% of the farmers traveling no further than 15 kilometers to sell their output. The remaining 1% traveled between 35 to 500 kilometers to their buyer. While, most farmers rely exclusively on local buyers, the distance to the nearest wholesale market may indicate how accessible that market is. As such, the further away from the market the farmer is, the more likely it is expected for that farmer to select a *tebasan* arrangement, earning this variable a positive expected sign.

The variables under market intensification (I) in Table 3 allow H2 to be tested, which seeks to explain the effect of output and input market intensification on harvesting arrangement choice. Average shallot yield at the sub-district level (100 kilograms per hectares), which proxies for output market intensity, is expected to have a positive sign. That is, the more production intensive the output market is, the more likely a farmer will choose to allow the trader to undertake the harvest and market management tasks. This variable was also rescaled for the purposes of the empirical analysis to 1000 tons per hectare.

On the other hand, population density by squared kilometers at the sub-district level, which proxies for input market intensity is expected to have a negative sign. As the labour market becomes more intensive, it should be easier and cheaper for farmers to access labour inputs and therefore that farmer is expected to be more likely to use a self-harvest arrangement. These two variables were derived from the government report (BPS, 2013).

6.4.4 Harvest Labour Supervision and Market Management Proxies (H3 and H4)

The variables included in the category on-farm market requirements (S) in Table 3 allow H3 to be tested, which seeks to explain the relative importance of supervision and market management on harvesting arrangement choice. The first indicator used to test this hypothesis is family labour intensity, which is constructed using survey data. This variable is generated by dividing the number of family members over the age of 15 working on the farm over the contracted yield. It is expected that as family labour intensity increases, the probably of choosing a *tebasan* arrangement decreases, earning this variable a negative sign.

The second indicator used to test this hypothesis is the contracted yield (tons). It should be noted that during the household survey interviews, respondents were not always able to provide information on yield. The average shallot yield among farmers in the sample replaced missing information for this variable. Contracted yield, or output quantity, is expected to have a positive sign: as the amount of output produced increases, the farmer will be more likely to select a *tebasan* arrangement since the harvest labour requirements will increase, holding labour intensity constant.

The variables under the quality of market managerial decisions (T) in Table 3 align with H4, which seeks to explain the quality of managerial decisions on harvesting arrangement choice. Two proxies are used for quality of market managerial decisions. First, is investment capital intensity, that is the amount of money (IDR) invested into pre-harvest inputs over the contracted yield (tons), which was later rescaled to USD over the quantity (tons) of shallots harvested. This variable is expected to have a negative sign. It is predicted that as a farmer invests more money into her or his contracted yield, that farmer is demonstrating her or his aptitude at accessing markets and applying information as to enhance her or his output. As a result, the amount of money the farmer invests into her or his shallot plot during the cultivation period proxies for the quality of that farmer's market management ability.

The second proxy is the proportion of medium sized shallots the farmer produced in her or his last harvest. It is hypothesized that as the quality of output, measured by the proportion of medium sized shallots produced, increases the likelihood of the farmer choosing a *tebasan* arrangement decreases. Therefore, this variable is expected to also have a negative sign for the same reason as before. That is, it is assumed that for a farmer to produce a specialized size of shallots that are preferred by consumers, this farmer has demonstrated her/his ability to gather and apply information from the market to enhance her/his output. Hence, as market managerial decisions improve, the farmer will be less likely to choose a *tebasan* arrangement.

6.4.5 Human Capital and Wealth (H5)

There are a number of variables that fall under the socioeconomic and human capital characteristics (Z) category Table 3, which align with H5 that wealth, education and experience

influence harvesting arrangement choice. Wealth is measured using two variables. First is the amount of land owned (ha). Second is a household asset count, which includes: radios, televisions, fans, air conditioners, washing machines, refrigerators, telephones, cellphones, internet, bicycle, motorcycle, water pump, spray equipment, tractor, storage, and grain mill. Both of these variables are expected to have negative signs. As wealth increases, so does access of any form. Subsequently, wealth is predicted to have a negative influence on the farmers' probability of selecting a *tebasan* arrangement.

The remaining variables in this category are proxies for experience. It is expected that as experience increases, the farmer will be more likely to undertake her or his own harvest and therefore not choose a *tebasan* arrangement. Experience is measured by age and education of the farmer, as well as the farmer and the farmer's spouse's other occupations. More specifically, two dummy variables were generated to indicate if the respondent or the respondent's spouse held a primary or secondary job as a trader and/or self-employed. Whereby, 1 indicated that the subject was either self-employed or a trader, and 0 indicated that the subject had some other primary or secondary occupation. The variables indicating if the farmer is self-employed in a secondary or primary profession as well as the farmers' age and education have negative expected signs. On the other hand, if the farmer's spouse is self-employed, either as a primary or secondary profession, we predict that farmer will be more likely to undertake a *tebasan* arrangement and therefore that variable has a positive sign.

It should be noted that a wealth index was also generated using a principal-component analysis method and tested. However, was ultimately excluded from the analysis and replaced with the

household asset count and farmland assets in the empirical strategy. Similarly, a credit index was constructed following the approach Chen and Rozelle (1999) took to measure the intensity of market transactions. The author provided a ranking to each farmer based on the use of using credit sources versus using formal cash transactions when procuring inputs for the shallot harvest. However, this variable was also excluded from the analysis, allowing other variables to proxy for market access.

6.4.6 Opportunity Cost of Time (H6)

Finally, there are two variables that align with H6, which seeks to investigate the impact of opportunity cost on harvesting arrangement choice. Opportunity cost of time was measured using two variables. First was other annual household income (outside of shallot production) measured in IDR. This variable was later rescaled to USD to enter into the analysis. This variable has a positive sign, as the opportunity cost of time increases for the farmer, the more likely that farmer will spend time doing those activities instead of shallot harvesting, processing and selling. Hence, it is predicted that farmer will select a *tebasan* arrangement. Second was the amount of land allocated to rice production. Many of Brebes' farmers also produce rice in the rainy season, having this crop as a primary harvested crop indicates a higher opportunity cost of time for shallot producers. This variable is also expected to have a positive sign: the more land a farmer has allocated to rice in the rainy season, the more likely that farmer will be to undertake a *tebasan* arrangement.

CHAPTER 7 Empirical Strategy: Probit Model Investigating Farmers' Harvesting Arrangement Choice

The objective of the empirical approach if this thesis is to identify factors that are able to test the key predictions of Eswaran and Kotwal's (1985) theoretical model to explain farmers' harvesting arrangement choice. As such, a probit model is specified to test what factors influence the probability of a farmer selecting *tebasan* arrangement for her or his last shallot harvest. This section specifies the empirical model used to explain harvesting arrangement choice of shallot farmers.

To evaluate the impacts of the relative importance of harvest labour supervision and market management inputs and opportunity cost of time on harvesting arrangement choice, the following a probit model specification is used:

$$Y_i = \beta_0 + \beta_{m_{i1}} M_{i1} + \beta_{M_{i2}} M_{i2} + \beta_{c_{i1}} I_{i1} + \beta_{S_{i1}} S_{i1} + \beta_{S_{i2}} S_{i2} + \beta_{T_{i1}} T_{i1} + \beta_{T_{i2}} T_{i2} + \beta_{Z_{i1,..,6}} Z_{i1,..,6} + \beta_{OC_{i1}} OC_{i1} + \beta_{OC_{i2}} OC_{i2} + \epsilon_i \qquad (7.1)$$

This specification allows the factors at both the farm and sub-district levels that may induce farmers to choose self-harvest and *tebasan* arrangements to be addressed. In this specification, the dependent variable is the binary choice of a *tebasan* arrangement, Y_i, where 1 indicates that the farmer selected a *tebasan* arrangement for her or his most recent shallot harvest and 0 indicates that self-harvest arrangement was selected. To measure market development and

access, GRDP per capita at the sub-district level, M_{i1}, and distance of the farm household to the nearest sub-district market, M_{i2}, are used.

Average shallot yield at the sub-district level measures the level of output market intensification, $I_{i1.}$ On-farm market requirements, family-labour intensity and output quantity, are represented by S_{i1} and S_{i2}, respectively. The quality of market managerial decisions are measured by investment capital intensity, represented by $T_{i1,}$ and the proportion of medium sized shallots produced, which proxies for the quality of output, is represented by T_{i2}.

A set of variables are used to measure the socioeconomic and demographic characteristics of the farmers and is represented by $Z_{i1}….Z_{i6}$. Two variables other income OC_{i1} and quantity of land allocated to rice in the rainy season OC_{i2} are used to measure the opportunity cost of time of the farmers.

This specification can be extended by including population density at the sub-district level and is as follows:

$$Y_i = \beta_0 + \beta_{m_{i1}} M_{i1} + \beta_{C_{i1}} C_{i1} + \beta_{c_{i2}} I_{i2} + \beta_{S_{i1}} S_{i1} + \beta_{S_{i2}} S_{i2} + \beta_{T_{i1}} T_{i1} + \beta_{T_{i2}} T_{i2} + \beta_{Z_{i1,..,6}} Z_{i1,..,6} + \beta_{OC_{i1}} OC_{i1} + \beta_{OC_{i2}} OC_{i2} + \epsilon_i \qquad (7.2)$$

Equation 7.2 is the same in all arguments as in 7.1 with the exception of the inclusion of $I_{i2,}$ and the exclusion of M_{i2}. I_{i2} is the population density at the sub-district level and is a proxy for intensification of the labour input market.

CHAPTER 8 Results and Discussion

The goal of this thesis was to develop a framework that could identify factors that contribute to the co-existence of *tebasan* arrangements in Java's shallot market with other forms of self-harvesting arrangements. To do this, an empirical strategy was developed to enable a number of key hypotheses derived from Eswaran and Kotwal (1985) theoretical model on agrarian contracts to be tested. Overall, the results provide support many of the predictions of this theoretical model. However, this strategy was not able to entirely validate two key hypotheses: that wealth and opportunity costs influence harvesting arrangement choice. This Chapter interprets and discusses the regression results with reference to both specifications. The results are illustrated in Table 4, which are fully specified according to this thesis' application of Eswaran and Kotwal's (1985) theoretical model. The fit statistics of the specifications used and limitations of this work are also addressed in this Chapter.

8.1 Market Effects (H1 and H2)

Farmers' decisions of how to manage their shallot harvest changed according to how developed and/or accessible the market environment was in which they operated. The negative sign on the coefficient of GRDP per capita in both models demonstrates that in more developed market environments, farmers have a greater propensity to self-harvest. This aligns with our hypothesis that when markets are less developed, *tebasan* arrangements will manifest to structure exchange and help farmers and traders to overcome the challenges characteristic of environments with incomplete markets. These characteristics include high transaction costs, uncertainty and price volatility (Biswanger and Rosenweig, 1984). This discovery is further supported by the positive

sign on distance to the sub-district wholesale market, which indicates the further away a farm is from the market the more likely the farmer will select a *tebasan* arrangement. In other words, as information in the market improves due to the farmer's proximity to output markets, farmers will be able to more efficiently access those markets to locate buyers, compare prices and so on and rely less upon traders in their harvest and selling activities. Together, these findings show strong support for our first hypothesis, which sought to explain the effects of market development and access on farmers' arrangement choice. Thus, this result provides evidence that *tebasan* arrangement persist in environments characterized by incomplete markets.

This conclusion is strengthened by the results that show support for H2, which sought to explain the effect of output and input market intensification on harvesting arrangement choice. The positive coefficient on shallot yield per capita indicates a farmer's propensity to choose a *tebasan* arrangement increases as output markets become more intensive. Therefore, in environments where there are many shallot producers (demarcated by higher output yields), it may be more difficult to find an output buyer. Therefore, to overcome the challenge of selling in an environment of surplus output, *tebasan* arrangements become a viable institution for farmers to elicit traders' superior market managerial abilities.

Table 4 Probit Regression Explaining Choice of *Tebasan* by Farmer[3]

Dependent variable: tebasan arrangement (T)	Baseline Model Coefficient	Extended Model: Labour Market Coefficient
Constant	-3.88	-3.85
	(1.26)	(1.25)***
Market Emergence (M)		
Gross Regional Domestic Product Per Capita (sub-district level)	-0.38***[4]	-0.33
	(0.11)[5]	(0.11)***
Distance to District Market	0.01	
	(0.01)**	
Market Intensification (I)		
Average Shallot Yield (sub-district level)	1.27	1.62
	(0.55)**	(0.61)**
Population Density (sub-district level)		-0.04
		(0.16)**
On-Farm Market Managerial Requirements (S)		
Family Labour Intensity	-2.81	-2.82
	(0.67)***	(0.66)***
Output Quantity	0.41	0.43
	(0.10)***	(0.10)***
Market Managerial Decisions (T)		
Investment Capital Intensity	-0.00	-0.22
	(0.00)*	(0.10)**
Output Quality	-0.56	-0.53
	(0.13)***	(0.14)***
Socioeconomic and Human Capital Characteristics (Z)		
Household Asset Count	0.01	0.01
	(0.01)	(0.01)
Farmland Owned	-0.05	-0.06
	(0.09)	(0.09)
Age	0.00	0.00
	(0.01)	(0.01)
Education	-0.01	-0.01
	(0.02)	(0.02)
Self-Employed	-0.27	-0.25
	(0.15)*	(0.15)*
Self-Employed Spouse	0.30	0.29
	(0.14)**	(0.14)**
Opportunity Cost (OC)		
Other Income	-0.00	-0.00
	(0.00)	(0.00)
Land Allocated to Rice in Rainy Season	0.66	0.72
	(0.20)***	(0.21)***
N	552	563
Pseudo R^2	0.15	0.15
Log Likelihood	-299.76	-305.72

[3] Coefficients imply how explanatory factor induces farmers to move away from (negative coefficients) or towards (positive coefficients) *tebasan* contracts.
[4] Stars indicate statistical significance levels: * for the 10%, ** for the 5%, and ***for the 1% significance.
[5] Standard errors are in parenthesis.

The extended version of the specification incorporates market intensification into the analysis and demonstrates strong support for the remaining prediction in H2. That is, as labour input markets become more intensive, the propensity to choose *tebasan* arrangements decreases. This is indicated by a negative coefficient on population density at the sub-district level. Similar to the aforementioned argument, when there is a surplus of labour, which is one of the few essential inputs into shallot harvesting, farmers will be more efficient at procuring it. Therefore, spending less time on obtaining labour resources from the market provides farmers with more time to allocate to harvest labour supervising, making a self-harvest arrangement a more viable option. In conclusion, it can be stated with a high degree of confidence that the market environment is a determinant for harvest arrangement choice.

It should be noted, however, that there may be multicollinearity between population density and GRDP as well as distance to market, whereby the latter two variables lose significance in the second model when population density is included.

8.2 Harvest Labour Supervision and Market Managerial Effects (H3 and H4)

The baseline model also shows strong support for hypotheses two and three, demonstrating that harvesting arrangement choice by farmers varies systematically on the internal structure of the farm. A negative coefficient on family labour intensity, confirms that as the number of family members working on the farm increases relative to the amount of output produced, the more likely a farmer is to choose a self-harvest arrangement. A positive coefficient on output quantity, demonstrates that holding family labour intensity constant, as the quantity of output increases there is a greater tendency for farmers to move from self-harvest arrangements to *tebasan*

arrangements. These findings demonstrate that as the market management demands of the farm increase, relative to harvest labour supervision tasks, a farmer will be more likely to contract with a trader to manage the harvest, processing and selling tasks. Hence, H3 was supported, which sought to explain the influence of the relative importance of harvest labour supervision and market management on-farm requirements on harvesting arrangement choice.

Alternatively, as the farm becomes more investment intensive, and where the farmers are accessing the markets more intensively, farmers tended to move away from *tebasan* arrangements. Similarly, as output quality, which indicates the outcome of those investment decisions, increases, the likelihood of choosing a self-harvest arrangement increases. That is, as farmers are making better managerial decisions pre-harvest, measured by the proportion of medium sized shallots produced (compared to small, mixed and large), they are more likely to select a self-harvest arrangement. These findings show support for H3. That is, the influence of a farmer's market management ability on harvesting arrangement choice, which is in part determined by the farmer's technical structure. These findings also established the importance of the farmers' demonstrated ability to adequately access markets before the harvesting of their crop (H4).

8.3 Human Capital Characteristics and Wealth (H5)

While there has been strong support for the previous hypotheses on the determinants of harvesting arrangement choice, wealth and specific human capital characteristics, such as age and education, were not found to have a significant impact. This could be because there is not a huge disparity in landholdings, with many of the farmers owning and/or cultivating less than 1

hectare of land. Therefore, the wealth effects may not be as vividly displayed as they would be in regions of the world with higher rates of landownership inequality. Also, since *tebasan* arrangements are struck just days before the harvest, determining factors that may play a role in the decision of whether or not to sharecrop as explained by Eswaran and Kotwal (1985) may not be as relevant in this case. For instance, because there is no certainty in being able to do a *tebasan* deal while cultivating, particularly because there is a possibly of there being no viable buyers when the crop reaches maturity, factors such as age and education may not signal access as it would in the case of sharecropping. Whereas, alternative variables explaining access may be more appropriate.

More specifically, it was found that relevant experience did significantly impact harvesting arrangement choice. The findings showed that if a farmer was self-employed (as a trader or otherwise) as a primary or secondary occupation, indicating her or his experience accessing and applying information from the market, the farmer was less likely to require the assistance from a trader to harvest and sell her or his output. In contrast, it was found that if the farmers' spouse is self-employed, the probably of the farmer selecting *tebasan* arrangement increases. Therefore, the findings do not show support for wealth and human capital characteristics being strong determinants for harvesting arrangement choice, but do show that relevant experience in the household is.

8.4 Opportunity Costs (H6)

Similar to wealth and human capital characteristics, there is not strong support for opportunity cost of time as being a key determinant for harvesting arrangement choice when measured

explicitly as the amount of other household income earned outside of shallot production. However, there is strong support for this conclusion when to the amount of land allocated to rice farming in the rainy season (the main growing season for rice) is analyzed. Java is also a main production area for rice, whereby the government intervenes into this market to incentivize farmers to produce rice in the rainy season (Ferrari, 1994). Therefore, as the farmer increases her or his and allocation to rice in the rainy season, it could demonstrate a higher opportunity cost of her or his time, since the farmer's opportunity costs of processing and marketing her shallots would increase.

However, an alternative interpretation is that *tebasan* arrangements are widely used in the rice market, and therefore by engaging in cultivating both crops there could be a spillover effect whereby the farmer learns how to use *tebasan* arrangements in the rice market. Therefore, when shallot farmers that are also involved in rice cultivation will be more experienced in *tebasan* arrangements, their transaction costs of choosing a *tebasan* arrangement will decrease. While there is not strong support for the effect that opportunity cost of time has on farmers' harvesting arrangements choice, there is some evidence to support this as a determinant.

It should also be noted that there may be a third explanation as to why the amount of land farmers allocate to rice during the rainy season has a significant positive effect on the probability of farmers selecting a *tebasan* arrangement. As discussed earlier, shallot production contributes on average to less one third of household income, with the majority of farmers also cultivating rice. With incomplete credit markets in Java, paired with the fact that shallots can be grown as a monoculture during the dry seasons, it may be the case that *tebasan* arrangements used in the

shallot market may also be in part substituting for incomplete credit markets. With a lack of formal financial markets, many farmers in Java may need to find alternative ways to access capital prior to the rice-growing season to procure necessary inputs, such as seed and fertilizer. With a short growing season, and a relatively secured cash advanced payment, a *tebasan* arrangement in the shallot market may provide a viable alternative to access capital for cash constrained rice farmers.

8.5 Fit Statistics

With binary choice models, like a probit or logit model, unique goodness-of-fit measures do not exist. A common measure is to include and exclude explanatory variables and compare the results. This was done a number of times in my analysis with both of the specifications. Both the signs and the significance of the coefficients remained consistent for the most part. However, when population density was included in the main model, the proxy for market access became insignificant indicating that there may multicollinearity between population density and distance to the district market. This explains why the main specification was extended to include population density. Furthermore, the dummy variable indicating if the farmer is a trader or self-employed only gained statistical significance when it entered the model with the dummy variable indicating if the farmer's spouse was a trader or self-employed, demonstrating joint significance.

Another option to test the goodness-of-fit is to compare the actual values with one's predictions (Rude, 2014). However, no predictions were made in my hypotheses regarding the actual values of the results. It should also be noted that the coefficients in a probit model should not be directly interpreted, rather it is the sign on the coefficient and the level of significance that is important.

To be able to interpret the value of the coefficient, the marginal effects must first be estimated. Marginal effects in turn provide coefficients that are comparable to an OLS regression.

Moreover, in a probit model, a pseudo R^2 is reported. The pseudo R^2 in both regressions was approximately 0.15. This statistic should be interpreted with caution since it is not equivalent to the R^2 generated by an OLS regression, which tells us the variance of the dependent variable that is explained by the independent variables. Therefore, cautiously, it is stated that the probit regressions presented in this thesis explain around 15% of the variation in farmers' *tebasan* harvesting arrangement choice.

The other statistics provided in the regression output include the Likelihood Ratio (LR) Chi-Square test statistic and a statistic indicating the probability of obtaining the Chi-Square statistic given. The LR Chi-Squared tests a null hypothesis that at least one of the independent variables has no effect on farmers' *tebasan* arrangement choice. The LR Chi-Squared for the main model was 105.94, with 15 degrees of freedom. For the extended model, the statistic was 107.10 also with 15 degrees of freedom. For both models, the probability of the Chi-Squared statistic, or the null hypothesis, being true was 0.00. Therefore, there was a 0% chance that the independent variables tested taken together had no effect on farmers' harvesting arrangement choice.

8.6 Applicability of the Theoretical Model to the Case of *Tebasan* and Limitations

Overall the results show support for many of the main hypotheses of Eswaran and Kotwal's (1985) model on agrarian contractual structure. That is, market setting does have a significant impact on farmers' harvesting arrangement choice, and harvesting arrangement choice is

determined by the relative importance of supervision and managerial inputs. The results also illustrate the importance of family-farm structure when deciding on whether or not to harvest and market one's crop. Importantly, indicators for superior marketing management skills before harvest also illustrated that ability influences harvesting arrangement choice. However, there were limited conclusions drawn on the impacts that human capital characteristics and opportunity cost on time has on the farmer's decision of whether or not to offer a *tebasan* arrangement.

A limitation that is consequent of applying Eswaran and Kotwal's (1985) theoretical model is that it tests the assumption that farmers are always better farm supervisors, while traders are better external managers (Bandophadhy 1975 and Nadkarni, 1976). While this generally may not be the case in any agrarian society, this assumption could be especially problematic in my analysis since the roles of traders and farmers are not always clearly defined. Another limitation of this study is that data on traders were not able to be integrated into the analysis, which prevents use from generating any conclusions on how trader's relative abilities and opportunity cost of time may impact harvesting arrangement choice.

In terms of the datasets used, while a number of proxies could be generated using the data available, both the government document and the household survey were not collected with the intention of being used for this study. As a result, the analysis and proxies were limited by the data available.

Another draw back from using the datasets available is that a significant proportion of the original dataset was excluded from this analysis due to missing key variables. Therefore, while the data collected may have originally been representative of farmers in the region, the exclusion of households may have skewed that.

CHAPTER 9 Conclusion

This thesis developed a framework to explain factors contributing to the modern use of *tebasan* arrangements in Java's shallot market. Previous contributions to the *tebasan* literature offered insight into some of the causes for the shift between the *bawon* to the *tebasan* system in Java's rice market in the 1960s. However, absent in this body of work is the fact that the country was undergoing a political and economic transformation during this transition period in harvesting systems. Furthermore, *tebasan* arrangements have tended to coexist with other harvesting systems overtime. Together, these factors point to the possibility that farmers use *tebasan* arrangements as a response to broader market forces. However, this hypothesis has not been formally explored in previous literature. By providing a comprehensive empirical analysis in an important Indonesian agricultural commodity market, this thesis was able to bridge the gap in the existing literature by testing the overarching hypothesis that farmers' *tebasan* arrangement choice is influenced by market conditions.

For shallot farmers today, *tebasan* arrangements are juxtaposed with a formal market transaction; rather than against another informal institution (i.e. *bawon*). Therefore, *tebasan* arrangements are now the traditional institution, demonstrating an evolution of harvesting systems in Java. This thesis provided empirical evidence that explains farmers' harvesting arrangement choice as a response to underdeveloped and/or inaccessible markets. This finding and others provide evidence supporting the hypothesis that *tebasan* arrangements may be an institution that is substituting for a missing market for managerial services. More specifically, *tebasan* arrangements may be a substitute market for skilled traders that are able to

efficiently manage harvest labour hiring and crop processing and selling activities. The findings of this thesis showed that as farmers demonstrated their ability to engage in the market efficiently, they were more likely to self-harvest and sell their shallots using a formal market transaction. In other words, the less efficient a farmer was at navigating the market, the more s/he relied upon the institution of *tebasan* to obtain the trader's market management to harvest.

Furthermore, as farmers become less reliant on family labour institutions, they are more likely to use *tebasan* arrangements. Family labour institutions have been diminishing in Indonesia since decolonization, as mentioned Chapter 3. Therefore, as farmers rely less upon their family labour (a nonmarket resource) to harvest, they must depend more on the market to access wage labour. As family labour intensity decreases for farmers they tend have a higher propensity of using a *tebasan* arrangement. This result again suggests that *tebasan* arrangements are apart of an evolution in Java's harvesting systems, whereby they are used as an intermediate step for farmers moving from traditional methods of harvesting towards using formal market institutions to sell their output in the economy.

In conclusion, Java's shallot market is one that remains plagued with market information problems and extreme price volatility. The results show that *tebasan* arrangements are likely a response to these market imperfections and substitutes for a market transaction when it is otherwise too difficult for farmers to access markets. This conclusion could have one of two implications, or a combination of both: first, the emergence of *tebasan* could be signaling that smallholders are becoming further marginalized in this food value chain because they are unable to efficiently access the market. If this is the case, measures should be taken to make the market

more inclusive by making market information more transparent. As information flows better in the economy, farmers will rely less on non-market institutions and more on market transactions to efficiently trade.

However, this study did not find evidence that shows that wealth, age or education had a significant impact on farmers' *tebasan* arrangement choice. This leads us to the second possibility: the emergence of *tebasan* could be laying the groundwork for a formal market for a skilled market managerial class of traders. Whereby *tebasan* arrangements are a viable option for farmers who want to participate in this food commodity market, but do not want to be burdened with selling in an uncertain environment. At the same time, engaging in a *tebasan* arrangement may be allowing traders who have honed their market managerial skills to realize higher profits by backwards integrating into the shallot supply chain and enjoy the benefits of more efficient transacting. If this is the case, the existence of *tebasan* arrangements could have a positive impact on economic development.

While it is possible that the use of *tebasan* arrangements may be leading to formal managerial market development, spontaneous market emergence has its limits. While informal institutions can reduce transaction costs by making it easier to find buyers as well as negotiate and monitor contracts, as economic activity becomes more complex the need for more formal and sophisticated institutions will grow (McMillian and Woodruff, 2002). The role of government in creating market-supporting institutions can vary, ranging from developing infrastructure, enforcing the rule of law, and so on. For example, the IFAD (2014) call for further investment into management, processing and marketing services in Indonesia's agricultural sector may serve

to help develop a formal market for skilled marketing managers. However, before any assessment on how or if government could or should intervene into this market, further research should be conducted to more conclusively investigate the impact this institution has on the shallot market. One way to do this would be to conduct a study on traders engaged in *tebasan* and assess whether or not they are improving market conditions. An extension to this study could also be undertaken to assess the welfare impacts on the farmers engaged in different harvesting arrangement forms.

REFERENCES

ACIAR. (2013). Agriculture Development Opportunities – Shallot Value Chain Study Executive Summary (Project No. AGB-2012-009). Australian Center for International Agricultural Research.

Agrawal, P. (1999). 'Contractual Structure in Agriculture.' *Journal of Economic Behavior and Organization, 39*: 293-325.

Bandyopadhyay, N. (1975). 'Changing Forms of Agricultural Enterprise in West Bengal,' *Economic and Political Weekly, 10*, 700-01.

Bardhan, P. (1989). 'The New Institutional Economics And Development Theory: A Brief Critical Assessment,' *World Development,* 17(9): 1389-1395.

Barret, C., M. Bachke, M. Bellemare, H. Michelson, S. Narayanan and T. Walker. (2012). 'Smallholder Participation in contract Farming: comparative Evidence from Five Countries,' *World Development*. 4: 715-730.

Basuki, R.S. (2011). Farmers' Knowledge and Effectiveness of Insecticide use by Farmers in Controlling Spodoptera Exigua on Shallots in Brebes and Cirebon. *Indonesian Journal of Agriculture*, 4(1), 22-32.

Binswagner, H. and Rosenzweig, M. (1984). 'Contractual Arrangements, Employment, and Wages in Rural Labour Markets: A Critical Review,' In *Contractual Arrangements, Employment, and Wages in Rural Labour Markets in Asia* (p. 323). Stoughton, Massachusetts: Economic Growth Center, Yale University.

Bintoro, N. (2016, March, 1). Shallots Go Digital with this Shopping Application. Brilio. Retrieved from https://www.brilio.net/en/news/shallots-go-digital-with-this-shopping-application-shallots-go-digital-with-this-shopping-applicatio.html.

Booth, A. (1995). 'The state and the Economy in Indonesia in the Nineteenth and Twentieth Centuries,' In *The New Institutional Economics and Third World Development*. London: Routledge.

Booth, A. (1998). 'Markets and Entrepreneurs,' In *The Indonesian Economy in the Nineteenth and Twentieth Centuries: A History of Missed Opportunities*. New York, New York: Basingstoke: Macmillan and New York: St. Martin's Press.

BPS. (2013). 'Brebes Regency in Figures*,' Central Bureau of Statistics Brebes*. 1102001.3329: 1-374.

Brighten Institute. (2012). Study on Supportive Policies for Maximizing Agricultural Investment in Indonesia. Retrieved from http://www.fao.org/fileadmin/templates/tci/pdf/

CapitalFromation/Final_Report_on_Agricultural_Investment_Policies_in_Indonesia-Send_to_FAO.pdf.

Chen, H. and Rozelle, S. (1999). Leaders, managers, and the organization of township and village enterprises in China. *Journal of Development Economics*, 60:529-557.

Christian Science Monitor. (2013, April, 12). Why Indonesian Farmers Have Begun to Guard their Crop like Gold. Christian Science Monitor. Retrieved from http://www.csmonitor.com/World/Asia-Pacific/2013/0412/Why-Indonesia-s-farmers-have-begun-to-guard-their-crops-like-gold.

Collier, W, Wiradi, G and Soentoros. (1973). 'Recent Changes in Rice Harvesting Methods. Some Serious Social Implications, Bulletin of Indonesian Economic Studies,' 9(2): 36-45.

De Janvry, A., M. Fafchamps and E. Sadoulet. (1991). 'Peasant Household Behaviour with Missing Markets: Some paradoxes explained,' *The Economic Journal*. 101: 1400-1417.

Escobal, J, Agreda, V and Reardon, T. (2000). 'Endogenous Institutional Innovation and Agroindustrialization on the Peruvian Coast,' *Agricultural Economics,* 23: 267-277.

Eswaran, M, and Kotwal, A. (1985). 'A Theory of Contractual Structure in Agriculture,' *The American Economic Review, 75*(3): 352-367.

FAO. (2010). 'Price Volatility in Agricultural Market: Evidence, Impact on Food Security and Policy Responses. Economic and Social Perspectives.' Policy Brief 12. Available Online at [November 3, 2015] <http://www.fao.org/economic/es-policybriefs/briefs-detail/en/?no_cache=1&uid=48900>

Ferrari, M. (1994). 20 Years of Horticulture in Indonesia: The Vegetable Subsector. *The CGPRT Centre, Working Paper Series*, 1-161.

Fuglie, K. (2010). 'Indonesia: From Food Security to Market-Led Agricultural Growth,' *In The Shifting Patters of Agricultural Production and Productivity Worldwide* (pp. 343-381). Ames, IA, Iowa: Iowa State University, The Midwest Agribusiness Trade Research and Information Center (MATRIC).

Gabre-Madhin, E. (2009). 'A Market for all Farmers: Market Institutions and Smallholder Participation.' *CEGA Working Paper Series No. AfD-0903. Center of Evaluation for Global Action*. University of California, Berkeley.

Gjertsen, H and Barrett, C. (2003). Context-Dependent Biodiversity Conservation Management Regimes: Theory and Simulations. Available Online at [November 3] <file:///C:/Users/Owner/Downloads/Cornell_Dyson_wp0314-2%20(1).pdf>

Glover, D. (1987). 'Increasing the Benefits to Smallholders from Contract Farming: Problems for Farmers' Organizations and Policy Makers,' *World Development.* 15: 441-448.

Hayami, Y., & Kikuchi, M. (1982). 'Agricultural Involution or Evolution?' In *Asian Village Economy at the Crossroads* (p. 267). Tokyo: University of Tokyo Press.

Hayami, Y, and Hafid, A. (1979). 'Rice Harvesting and Welfare in Rural Java,' *Bulletin of Indonesian Economic Studies*, 15(2): 94-112.

IFAD. (N.D). 'Rural Poverty in Indonesia,' *IFAD-Rural Poverty Portal*. Available Online at <http://www.ruralpovertyportal.org/country/home/tags/indonesia>.

Indonesian News Portal. (2015, September, 19). Hackers Team up in a Bid to Help Shallot Farmers. Indonesian News Portal. Retrieved from http://en.tempo.co/read/news /2015/09/19/240702007/Hackers-Team-Up-in-a-Bid-to-Help-Shallot-Farmers.

Irama, D, Sari Anggraini, W.R, Hendrarsakti, J. (2015). In-Store Drying Method Utilization in Shallots Drying Using Geothermal Energy. *Proceedings World Geothermal Congress*.

Jakarta Post. (2013, April, 1). Farmers Sell off Shallots Seed Crop. Jakarta Post. Retrieved from http://www.thejakartapost.com/news/2013/04/01/farmers-sell-shallots-seed-crop.html.

Jubaedah, N. (2014). 'Market Integration of Red Chili Commodity Markets in Indonesia,' MA Thesis, International Institute of Social Studies, The Hague.

Key, N. and Runsten, D. (1999). 'Contract Farming, Smallholders, and Rural Development in Latin America: The Organization of Agroprocessing Firms and the Scale of Out grower Production,' *World Development.* 2: 381-401.

Kikuchi, M, Hafid, A and Hayami, Y. *(*1984). 'Changes in Rice Harvesting Contracts and Wages in Java,' In *Contractual Arrangements, Employment, and Wages in Rural Labour Markets in Asia* (p. 323). Stoughton, Massachusetts: Economic Growth Center, Yale University.

La Fave, D., & Thomas, D. (2012). Farms, families and Markets, new Evidence on agricultural Labour Markets. Retrieved from https://www.dartmouth.edu/~neudc2012/ docs/paper_221.pdf.

McMillian, J. (1995). 'Markets in Transition,' *Symposium address at the Seventh World Congress of the Econometric Society*, Tokyo, August 1995.

McMillian, J and Woodruff, C. (1990). 'Dispute Prevention without Courts in Vietnam,' *Journal of Law, Economics and Organizaiton.* 15(3): 637-658.

McMillian, J and Woodruff, C. (2002). 'The Central Role of Entrepreneurs in Transition Economies,' *Journal of Economic Perspectives*, 16(2): 153-170.

Ministry of Trade (Indonesia). (2012). 'Press Release: Shallots Commerce Re-organization,' Available Online [November 3, 2015] at <http://www.kemendag.go.id/>.

North, D. (1993). 'The New Institutional Economics and Development, Economic History,' *EconWPA* <http://EconPapers.repec.org/RePEc:wpa:wuwpeh:9309002>.

North, D. (1989). 'Institutions and Economic Growth: an Historical Introduction,' *World Development.* 17(9): 1319-1332.

North, D. (1990). 'Institutions, Institutional Change and Economic Performance,' 1st ed. Cambridge: Cambridge University Press.

OECD. (2010). 'Economic Importance of Agriculture for Sustainable Development and Poverty Reduction: Findings from a Case Study of Indonesia,' Paper presented at the Global Forum on Agriculture, Paris, France.

Otsuka, K, Chuma, H, and Hayami, Y. (1992). 'Land and Labor Contracts in Agrarian Economies: Theories and Facts,' *Journal of Economic Literature.* 20(4): 1965-2018.

Otsuka, K and Hayami, Y. (1998). 'Theories of Share Tendency: A Critical Survey,' *Economic Development and Cultural Change.*

Poulton, C., Dorward and A., Kydd, J. (2010). 'The Future of Small Farms: New Directions for Services, Institutions, and Intermediation,' *World Development.* 10: 1413-1428.

Purba, R. (2014). Applications of NPK Phonska and KCl Fertilizer for the Growth and Yield of Shallots (Allium Ascalonicum) in Serang, Banten. *International journal of Applied Science and Technology*, 4(3), 197-203.

Purnomo, S. and Andri, K. (2012). 'Study on Community Biodiversity Management Toward on Farm Conservation of Tropical Fruit Trees in East Java,' *Prosiding SeminarNasional Pekan Inovasi Teknologi Hortikultura Nasional: Penerapan Inovasi Teknologi Hortikultura Dalam Mendukung Pembangunan Hortikultura Yang Berdaya Saing Dan Berbasis Sumberdaya Genetik Lokal,* 15-23.

Reardon, T, Barret, C., Berdegue, J. and Swinnen, J. (2009). 'Agrifood Industry Transformation and Small Farmers in Developing Countries,' *World Development.* 37(11): 1717-1727.

Ruttan, V. (1989). 'Institutional Innovation in Agricultural Development,' *World Development.* 17(9): 1375-1387.

Rude, J. (2014). Lecture 18 Maxmimum Likelihood Estimation. AREC513: Course Notes. University of Alberta.

Shaban, R. (1987). 'Testing Between Competing Models of Sharecropping,' *Journal of Political Economy.* 95(5): 893-920.

Simatupang, P, Timmer, C. P. (2008). Indonesian Rice Production: Policies and Realities. *Bulletin of Indonesian Economic Studies,* 44, 65-80.

Stiglitz, J. (1986). 'The New Development Economics,' *World Development*. 14(2): 257-265.

Surabaya. (2013). 'Shallot Stakeholder Consultation Workshop,' unpublished document, Collins Higgins Consulting: 1-102.

Suryahadi, A, Suryadarma, D and Sumarto, S. *(*2009). 'The Effects of Location and Sectorial Components of Economic Growth on Poverty: Evidence from Indonesia,' *Journal of Development Economics.* 89: 109-117.

USAID. (2010). *USAID Country Profile - Land Tenure and Property Rights Profile (Indonesia)*. United States Government.

Wahida. (2015). 'Food System Transformation in Indonesia: Factors Influencing Demand and Supply for Alternative Pest Management Farming Systems.' PhD Dissertation. University of Adelaide.

Wahyudin, M, Maksum, M, Yuliando, H. (2015). The Shallot Pricing in the View of Import Restriction and Price Reference. *Agriculture and Agricultural Sciences Procedia 3*, 132-136.

Wicaksena, B and Sahara. (2013). 'Determinants of Indonesian Shallot Growers' Bargaining Power in the Agrifood Transformation Era,' *ASEAN Journal of Economics, Management and Accounting.* 1(2):78-94.

White, B. (2000). 'Rice Harvesting and Social Change in Java,' *The Asia Pacific Journal of Anthropology*, 1(1): 79-102.

World Bank. (2002). 'World Development Report 2002: Building Institutions for Markets,' New York: Oxford University Press.

World Bank. (2007). 'Horticultural Producers and Supermarket Development in Indonesia,' 38543-ID: 1-193.

World Bank. (2015). 'Indonesia Overview,' The World Bank IBRD IDA. Available Online [November 3, 2015] at <http://www.worldbank.org/en/country/indonesia/overview>.

World Bank. (2016). World Development Indicators. Washington DC: World Bank http://data.worldbank.org/indicator (accessed 28 March 2016).