Transaction Costs of Exchange in Agriculture: A Survey

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ABSTRACT

The concept of transaction cost has been around for more than 75 years. It has been used to explain every economic phenomenon that does not fit with standard neoclassical predictions. It has been applied to so many fields, its definition varying with every application. This paper surveys the literature on transaction costs in general, as well as those that apply transaction costs to agriculture. It focuses on the role of transaction costs in exchange in agriculture, particularly in the context of the household's decision to engage in market exchange, in both input and output sides. The survey literature finds a confluence of definitions of transaction cost as applied to theoretical and empirical models. Coasian and Williamsonian definitions are used in interpreting fixed transaction costs while neoclassical and trade definitions (i.e., the concept of price band) characterize proportional transaction costs. The prominence of transport cost and the effect of distance and isolation in many of the analyses points to the influence of the new economic geography research stream. Measurement of transaction cost as an ad valorem tax also references the trade concept of transaction cost.

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INTRODUCTION

Market failures are pervasive in agriculture, especially in the developing world. De Janvry, Fafchamps, and Sadoulet (1991) explain that market failures occur when the cost of transaction through market exchange creates disutility greater than the utility gain it produces, resulting in the market not being used for transaction. Most affected by these failures are peasant households that often have to face high transaction costs to access markets. Thus, transaction cost plays a central role in peasant household's resource allocation decisions.

Pingali, Khawaja, and Meijer (2005) argue that increased transaction costs deter small farmers from entering the market, thus depriving them of the benefits from commercialization in agriculture. Interventions aimed at reducing transaction cost would encourage increased farmer participation in competitive markets, which would increase their productivity and thus meet the broader poverty alleviation objectives.

The concept of transaction cost has been around for more than 75 years, ever since Hicks (1935) attempted to incorporate the notion of friction as a cost in monetary theory. Since then, it has been used to explain every economic phenomenon that does not fit with standard neoclassical predictions. It has been applied to so many fields, its definition varying with every application. This heterogeneity and lack of a common definition have transformed transaction cost into a catchall term, very much like production cost. This has no doubt invited a lot of criticism from within and outside the field of economics.

If the concept of transaction cost is central to explaining and mitigating market failures in agriculture, then having a clear description of the concept is imperative. With this objective in mind, this paper surveys literature on transaction cost to be able to sketch a brief history of the concept to aid in understanding its various definitions and applications. It then looks at the application of transaction cost to exchange in agriculture and identifies the links of these interpretations to conceptions in other branches of economics.

This paper is structured as follows. The next section presents a short review of the different definitions of transaction cost. The third section surveys the application of the concept to agriculture, focusing on transaction costs emerging from agricultural exchange. The last section summarizes the paper and provides some research and policy implications.

DEFINITIONS

While many definitions of transaction cost can be found in literature, only a few have been operationalized. The definitions have been diverse and fragmented, with no standard terminology. According to Benham and Benham (2001, 1), "many different definitions of transaction costs appear in literature…These definitions offer powerful conceptual insights, but they have not been translated into widely accepted operational standards."

Throughout the history of its development, transaction cost has assumed different forms and different meanings. For Hicks (1935) and the monetarists, it is brokerage cost and the cost of investing in financial markets; for Coase (1937), it is the cost of using the price mechanism; for Stigler (1961), it is search cost; for Niehans (1987), it is a catchall term for a heterogeneous assortment of costs involved in the transfer of ownership from one individual to another. Arrow (1969 as cited by Benham and Benham 2001) defines it as the cost of running the economic system. Barzel (1997 as cited by Benham and Benham 2001) defines transaction cost as the cost associated with the transfer, capture, and protection of rights. Foley (1970)

described it as the effort required to inform buyers and sellers of the existence of a supply or demand for a commodity, and of the price.

More recent authors classify transaction costs and define them within the context of their categories. For instance, Furubotn and Richter (2005, 40) describe the concept as "…the costs of resources utilized for the creation, maintenance, use, change, and so on of institutions and organizations...When considered in relation to existing property and contract rights, transaction costs consist of the costs of defining and measuring resources or claims, plus the cost of utilizing and enforcing the rights specified. Applied to the transfer of existing property rights and the establishment or transfer of contract rights between individuals (or legal entities), transaction cost include the cost of information, negotiation, and enforcement."

Furubotn and Richter (2005, 43) classify transaction cost into three categories: *market transaction cost* or the "cost of using the market," *managerial transaction costs* or the "cost of exercising the right to give order within the firm," and *political transaction costs* or the "array of costs associated with the running and adjusting of the institutional framework of a polity." They also identify two variants of costs in each category: (1) fixed transaction costs, that is, "specific investments in setting up institutional arrangements;" and (2) variable transaction costs, that is, "costs that depend on the number or volume of transactions."

Hardt (2006), on the other hand, placed existing literature on transaction costs under the umbrella of transaction cost economics divided into three complementary branches: exchange, governance, and measurement.

The exchange branch defines transaction cost as the cost of making transactions. It focuses on the role of these costs resulting from market exchange. Included under this branch is the Hicksian transaction cost tradition in monetary economics, Demsetz's "cost of exchanging ownership titles" interpretation, the transaction technology construct in the Arrow-Debreu general equilibrium tradition, and the transaction sector measurement thread pioneered by Wallis and North (1986).

The governance branch focuses on the impact of the transactions' characteristics on the mode governing them. This branch traces its roots to Coase (1937), with transaction cost defined as "the cost of using the price mechanism," which was operationalized through Stigler's (1961) search cost, Marshack's (1950) information cost, and the Williamsonian "transaction cost approach." However, Williamson's (1998) strategy to operationalize transaction cost "is not by elaborating the concept itself, but by replacing it with detailed analysis of contractual and organization arrangements." As a result, this framework studies governance in terms of transactional and human factors which determine whether a transaction takes place in the market or internally. The notion of transaction costs is largely used in an informal way to address the differences in performance that result from this analysis. Hence, Williamson's transaction cost analysis takes place as an exploration of the causes which give rise to transaction costs." (Klaes 2000b, 212) Although Williamson did not articulate clearly the concept of transaction cost in his original framework, later developments in transaction cost analysis have provided a better understanding of the concept. Rindfleisch and Heide (1997) summarize the source and nature of the most common forms of transaction costs encountered in transaction cost analysis.

The measurement branch has to do with the measurement of inputs' productivity in team production, attributed to Alchian and Demsetz (1972 as cited by Hardt 2006)—categorized as the agency sub-branch. It deals with the costs of ascertaining the value of the good before the transaction is concluded, a concept

originally put forward by Barzel (1982), known as the Barzel sub-branch. Alchian and Demsetz (1972) posit that team production is a better option in the market if it yields an output larger than separable production cost and enough to cover the cost of supervision. Thus there is a need to measure input productivity and rewards. Measurement cost, which a firm is expected to minimize, is thus composed of metering costs and the cost of detecting parties responsible for raising production output. These costs are akin to agency costs. Hence, the existence of a firm and what form it will take depend on how well it minimizes these costs.

Barzel's thread of research focused on measuring the characteristics of any trade good. Barzel (1982) worked on the premise that the amount purchased by the buyer is determined not only by the posted price but also by measurement costs. Similarly, the seller ascertains the exchanged goods. Ways by which these measurement costs may be reduced include product warranties, seller's reputation, and standards.

Allen (2000), on the other hand, identifies two main streams of literature on transaction costs, simultaneously claiming ownership over the term: the property rights stream, which defines transaction cost as "the cost of establishing and maintaining property rights," and the neoclassical stream, which defines transaction cost as "the cost resulting from the transfer of property rights." The property rights literature, beginning with Coase (1937), consistently focuses on the role of transaction costs in determining the distribution of property rights (i.e., institutions and institutional arrangements that generate incentives for behavior). This stream calls into question fundamental neoclassical concepts like efficiency and the nature of production. Included in this branch are the subfields of law and economics, the new economic history, and the new institutional economics (i.e., transaction cost economics).

Owing to the type of issues usually examined, the neoclassical literature on transaction cost generally models transaction costs in an analytical way identical to transport charges and taxes. These include the effects of such costs on the volume of trade, abilities to arbitrage, the bunching of transactions, intermediation, and the existence and efficiency of equilibrium, occasionally delving on property rights determination issues like the role of middlemen and the medium of exchange. Allen (2000, 902), quoting Stavins (1995), provides a neoclassical approach description of what transaction costs are:

> "In general, transaction costs are ubiquitous in market economies and can arise from the transfer of any property right because parties to exchange must find one another, communicate and exchange information. There may be a necessity to inspect and measure goods to be transferred, draw up contracts, consult with lawyers or other experts and transfer title. Depending upon who provides these services, transaction costs can take one of two forms, inputs or resources—including time—by a buyer and/or a seller or a margin between buying and selling price of a commodity in a given market."

The preceding discussion highlights the profusion of conceptual interpretations as well as the lack of consensus on a common definition of transaction cost. While attempts to provide structure in the literature and define transaction costs typologically have been notable, such typologies vary from author to author and in some instances are incongruent with one another. Take for example Allen's (2000) and Hardt's (2006) attempts to organize the literature. Under Allen's dichotomy, the research of Wallis and North (1986) falls under the property rights school together with

Williamson (1979) and Coase (1937) and apart from Hicks (1935) and the general equilibrium tradition. In Hardt's interpretation, however, Wallis and North's research thread belong to the exchange branch with the neoclassicals, while Coase and Williamson are under the governance branch.

Although not serious enough to create confusion, such nuances of conflict illustrate the complexity of developing a unified theoretical definition of transaction cost. To this effect, Klaes (2008, 1) advises that "circumspect definition specific to the particular context in which one seeks to use the concept should help [in] avoiding semantic pitfalls." He views the range of extant applications of the concept of transaction cost as forming a spectrum of broadening scope: (1) narrow interpretations typical of the monetary and general equilibrium literature, (2) relational interpretations based on how economic agents interact with each other beyond traditional economic dimensions of price and quantity signals, and (3) institutional interpretations.

Monetary interpretations of transaction cost characterize it as the direct costs that an economic agent incurs when engaging in a market transaction. These costs are expressed as a reduction in the value of a transaction, analogous if not equivalent to a transaction tax. More advanced notions conceptualize these costs as the direct monetary costs incurred, like brokerage fees and transport costs, when engaging in a particular monetary transaction resulting from the use of intermediary services. However, being entrenched in the neoclassical tradition, it leaves most if not all micro-structural details of the exchange context unspecified.

Conversely, relational interpretations of transaction cost rely on a more detailed construct of how agents interact with one another when they engage in market transactions (exchange). Subsumed but not central here is the economic

theory of contracts. It follows Coase's (1937) decomposition of the steps involved in concluding a transaction, thus distinguishing between: (1) the costs of locating and attracting potential trading partners and pre-sale inspection, (2) contracting and fulfillment costs, and (3) policing and enforcement costs.

The institutional interpretation applies the notion of transaction cost to alternative forms of economic coordination. It applies Coasian marketing costs to nonmarket settings, comparing market coordination alongside nonmarket forms within a given set of alternative institutions. Transaction cost is interpreted as the cost of economic coordination.

By far, the broadest interpretation of transaction cost that has been operationalized may be attributed to Wallis and North (1986). They attempted to develop a transaction cost concept that encompasses an assortment of definitions. In the process, they developed the notion of the transaction sector. The transaction sector is an auxiliary construct for measuring parts of the transaction cost in an economy. Basically, transaction costs are defined as the costs related to the realization of exchange in an economy. As such, all economic activities and actors related to economic exchange can be divided into two categories: (1) transaction sector, composed of those associated with exchange; and (2) transformation sector, composed of the ones not associated. Consequently, all economic activities and all actors in an economy belong to one of the two sectors (Chobanov, Egbert, and Giuredzheklieva 2007).

Wallis and North (1986) equated transaction cost with the costs of using transaction services—that is, activities resulting from using markets, the costs of which are recorded in official statistics. The transaction sector therefore contains the costs related to the exchange of services and goods on markets and also those necessary for the protection of private

property rights. The transaction sector includes four categories: (1) transaction industries in the private sector, (2) transaction costs within firms in the non-transaction industries, (3) transaction services in the public sector, and (4) transaction costs in the non-transaction services (Chobanov, Egbert, and Giuredzheklieva 2007).

Since transaction activities are exchanged for money and such exchanges are picked up in the national accounts, then, in principle, they could be measured from either side of the accounts as value of output or value of input. Wallis and North (1986) worked with an output measure, estimating the value added by transaction sector activities. Transaction sector output therefore represents expenditure on enabling and facilitating the exchange process, thereby helping capture the gains from increased specialization and providing a system of property rights within which the productive activity takes place.

Trade costs, which are another class of costs, are conceptually analogous to transaction costs. Broadly defined, they include all costs incurred in getting a good to a final user other than the marginal cost of producing the good itself: transportation costs (both freight and time costs), policy barriers (tariff and non-tariff barriers), information costs, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs, and local distribution costs (wholesale and retail). Trade costs are reported in terms of their ad-valorem tax equivalent (Anderson and van Wincoop 2004). Den Butter and Mosch (2003, 2) defines the transaction cost in trade in much the same way: "…transaction costs in trade do not only comprise traditional costs associated with transportation (distance), trade barriers, tariffs, etc. but also search costs, costs on gathering information of product quality and the reliability of the reading partner, legal costs, control costs, and costs associated with international payments." They identify three

stages in a trade transaction: contact, contract, and control, all of which bring about transaction costs.

Samuelson's "iceberg model" (1954) is one of the most common ways of operationalizing transaction costs in trade. The basic idea is that trade involves transaction costs and that these may be simply thought of as a fraction of the traded good itself, in that "only a fraction of the ice exported reaches its destination as unmelted ice." This model provides another answer to the basic question on the fate of the transaction costs' revenues; it also clarifies how a reduction in transaction costs saves real resources and makes an economy more efficient. These transaction costs can be grouped into three broad categories: geography, technology/infrastructure, and institution/policy related transaction costs (Bussolo and Whalley 2002).

A more important application of transaction cost in trade is perhaps its role in determining the trade pattern in the context of imperfect competition and increasing returns. Krugman (1980 as cited by Holzhey 2003) shows that in the case of two identical countries, except for market size, the country with the larger home market for (manufacturing) goods subject to scale economies will be the net exporter of these goods, but only if transaction costs are neither too low (zero) nor too high (prohibitive). Transaction costs in trade plays a major role in the analysis of the new economic geography stream of research.

Going through the history and the myriad interpretations of transaction cost, one can observe that the notion of transaction cost has become the theoretical equivalent of the metaphorical notion of friction. Niehans (1987) describes transaction cost as a catchall term for a heterogeneous assortment of inputs. The term "transaction cost" has evolved to the point that some critics claim it includes any cost that is convenient and elusive enough to avoid critical examination (Allen 2000). As Klaes (2000b,

193) puts it, "transaction costs emerged as an attempt to replace the 19th century notion of friction, only to gradually become regarded as its 20th century equivalent."

This broadening however, while interpreted by some in a negative way, has enlarged the scope of economic analysis. According to Klaes (2000a, 588), "…the catchall nature with which the term is frequently employed,…is at the same time evidence of the heuristic power of the concept of transaction costs (cf. Dixit 1996). Transaction costs may be regarded as an umbrella which enables many flowers to blossom."

TRANSACTION COST IN AGRICULTURE

The application of transaction cost to agriculture cuts across the various subdisciplines of the field. Agriculture is a host to the spectrum of interpretations—from the monetary to the relational to the institutional. Here can be found the confluence of the property rights and neoclassical schools of thought and the amalgamation of the exchange, governance, and agency branches of transaction cost economics. The variety of issues that beleaguer agriculture—missing markets, information asymmetry, risk and uncertainty, non-separability of consumption and production, incomplete property rights, incomplete contracts, and institutional failures, to name a few—make it a fertile breeding ground for the application and testing of transaction cost theory. Macher and Richman (2008, 190), who comprehensively reviewed the empirical literature on transaction cost economics across multiple social science disciplines and business fields, quoted Masten (2000) as saying, "agricultural transactions provide a rich area for application and refinement of transaction cost theory."

Most applications of the transaction cost theory to agriculture fall under three broad themes: contracts and property rights issues, organizations and institutional arrangements, and market exchange. A number of studies had used the transaction cost approach to analyze agricultural contracts. Alston, Datta, and Nugent (1984) analyzed the choice between wage labor and sharecrop contracts in a model with transaction costs. Allen and Lueck (1998) examined modern sharecrop contracts using the transaction cost approach through a model in which agents are risk neutral and contract rules are chosen to maximize expected joint wealth. Dorward (1999 as cited by Makhura 2001) developed a methodology for modeling negotiated choice of contractual arrangements in buyer/seller relationships in agriculture, integrating in the buyer's decisions his or her pure transaction cost and associated transformation cost. Purcell and Hudson (2004 as cited by Macher and Richman 2008) examined the growth of long-term contracting, the rise of vertical alliances, and the prevalence of integration between feedlots and beef processors brought about by site specificity. Lema (2006) presents an analysis of the effect of tenancy contracts on soil conservation and input use in the Pampas (South American lowlands). Frisvold (2005) developed and econometrically tested a model of labor contractual choice in developing countries, focusing on the choice between directly hiring labor on a spot market and relying on labor contractors. His theoretical model examines the role of market prices and factor endowments on contract choice and the role of labor contracting as an institutional innovation to reduce transaction costs associated with the use of hired labor.

Under the agricultural organization theme, Buduru and Brem (2007) explain transaction cost for the different paths of organizational adjustments in the former state and collective

farms in the Czech Republic after 1989. They focus on the strategic interactions among stakeholders in the agricultural organization undergoing restructuring. Valentinov and Curtiss (2005) applied transaction cost theory to explain organizational change in transitional agriculture of central and eastern European countries. Allen and Lueck (1998), on the other hand, explain why farming has generally not converted from small, family based firms into large factory-style corporate firms using a framework derived from Coase's (1937) seminal work on the theory of the firm. Fuentes (1998) examined, using transaction cost economics as the framework of analysis, some specific institutional arrangements that arise when small, village-based paddy traders and local farmers are used as middlemen and commission agents, respectively, to procure paddy supplies for large rice millers, traders, and retailers/wholesalers in rural Philippines. He found that the institutional arrangements examined generally conform to the propositions set forth in transactional cost economics literature. Naseer, Evenson, and De Silva (2007) examined whether or not community-based networks and associations play a role in improving agricultural productivity and explored the interaction between social capital and the relationship of transaction cost of production and proximity to markets.

Transaction Costs in Agricultural Exchange

While the first two categories are no less important than the third one, the discussions in this section focus on the role of transaction costs in exchange in agriculture, particularly in the context of a household's decision to engage in market exchange, in both input and output sides. Such emphasis narrows down the discussion to transaction costs arising from individual agents or for basic economic units such as the household. This type of transaction

cost includes expenses and opportunity costs, both fixed and variable, arising from the exchange in property rights (Makhura 2001). Transaction costs in this context, however, do not only include the costs of exchange itself, but also encompass costs associated with the reorganization of household labor and other resources in order to produce enough for the market (Makhura, Kirsten, and Delgado 2001). This interpretation of transaction costs draws extensively from North's (1984, 256) definition of the concept as "…the costs of specifying and enforcing contracts that underlie exchange. They include all the costs involved in capturing the gains from trade…, the resources devoted to the organization and integration of the production and marketing of goods and services…"

Likewise, Eggertsson (1990, 14) developed the following definition of transaction cost: "the costs that arise when individuals exchange ownership rights to economic assets and enforce their exclusive rights." He said transaction costs originate from one or more of the following activities: (1) searching for information about potential contracting parties and the price and quality of the resources in which they have property rights (includes personal time, travel expense, and communication costs); (2) bargaining to find the true position of contracting parties, especially when prices (including wages and interest rates) are not determined exogenously; (3) making contracts (formal or informal)—that is, defining the terms of contract; and (4) enforcing the contract and collection of damages when partners fail to observe their contractual obligations.

Hobbs (1995) defines a transaction as an exchange occurring between the two stages of a production or distribution chain as the product changes in form and/or in ownership rights, which can transpire between two firms or between divisions within one firm. Transaction costs are therefore defined as the costs of

carrying out this exchange; included are the costs of discovering prices (information costs), the costs of arriving at an agreement to undertake the transaction (negotiation costs), and the costs of ensuring that the contract is adhered to (monitoring or enforcement costs). Hobbs (1997) provides a more detailed description of the aforementioned categories. Information costs are incurred prior to an exchange and include the costs of obtaining price and product information and the cost of identifying suitable trading partners. Negotiation costs are the costs of actually carrying out the exchange and may include commission costs, the costs of physically negotiating the terms of the exchange, and the costs of formally drawing up the contract. Monitoring and enforcement costs, which occur after the exchange has taken place, are the costs of ensuring that the terms of the agreement (e.g., quality standards or payment arrangements) are carried out by the parties to the transaction.

Holloway et al. (2000) interpret transaction costs as the pecuniary (observable) and non-pecuniary (non-observable) costs associated with arranging and carrying out an exchange of goods and services. Included are both the cost of exchange and the complete set of costs implied when households must reorganize and reallocate labor to generate a marketable surplus. Staal, Delgado, and Nicholson (1997) include the cost of transferring the product, which typically involves transportation, processing, packaging, and securing title, if necessary, to the set of transaction costs. Omamo (1998), on the other hand, identifies farm-to-market transaction costs, which include transport costs and other marketing costs like searching, haggling, and waiting costs.

Sadoulet and de Janvry (1995) describe transaction costs as typically involving the costs of information, search, negotiation, screening, monitoring, coordination, and enforcement. They also include transportation costs as an important type of transaction cost in agriculture. They posit that due to the pervasive existence of transaction costs, agents have to incur high costs to access distant markets, even if these markets are perfect. This results in wide bands between sale price and purchase price. A market may fail when households face these wide price margins.

Key, Sadoulet, and de Janvry (2000) refined Sadoulet and de Janvry's interpretation by defining fixed transaction costs and proportional transaction costs. Fixed transaction costs are invariant, regardless of the quantity of a traded good. They may include the costs of: searching for a customer or salesperson with the best price, or searching for market; negotiating and bargaining; and screening, enforcement, and supervision. Search costs are often lumpy since a farmer may incur the same search costs to sell one ton or ten tons of a product. Negotiation and bargaining costs are important when there is imperfect information on prices (often negotiation and bargaining take place once per transaction, these costs are invariant to the size of the transaction). Screening costs are incurred by farmers who sell their product, land, or labor on credit because they have to screen buyers to make sure they are reliable. They may have to pay legal enforcement costs in case of default. Farmers may also have to screen potential seed, pesticide, or labor sellers when there is asymmetric information as to the quality of inputs. Farmers who hire labor may incur supervision costs that do not depend on the quantity of labor hired, as one supervisor can almost easily monitor one or five workers.

An earlier work by Goetz (1992) also makes use of the notion of fixed transaction costs, describing it as the cost of discovering trading opportunities and the household's cost of observing market prices to make transaction decisions, which he operationalized in terms of reduced leisure time.

Proportional transaction costs, on the other hand, as defined by Key, Sadoulet, and de Janvry (2000) include per-unit costs of accessing markets associated with transportation and imperfect information. They raise the price effectively paid by buyers and lower the price effectively received by sellers of a good, thus creating the price band within which some households may find it unprofitable to either sell or buy.

Pingali, Khawaja, and Meijer (2005) categorize transaction costs as they occurred in modern agri-food systems, namely: specific to the agribusiness firm, farm-specific, location-specific, and crop-specific. Agribusiness firms are usually situated in near-monopsonistic markets. Hayes (2000) enumerates the transaction costs associated with dealing with a large number of small farms:

- bureaucratic costs and distortions associated with managing and coordinating integrated production, processing, and marketing;
- value of the time used to communicate with the participating farms and coordinate them;
- costs involved in establishing and monitoring long-term contracts;
- cost of incentives used to convince farmers to voluntarily participate in integrated production;
- economies of scale forgone when batch production replaces commodity production;
- screening costs linked to uncertainties about the reliability of potential suppliers or buyers and the uncertainty about the actual quality of goods; and
- transfer costs associated with the legal or physical constraint on the movement and transfer of goods.

Farm specific transaction costs are those associated with participation in markets that are unique to the farm, given the household and farm characteristics. Such costs may be household specific, such as cost borne out of the inability to access assets. They can be also the same for all farmers in a particular location such as costs due to the quality of land. These costs can arise in both input and output markets and affect market participation. Location specific transaction costs and their levels, on the other hand, are due to variances across regions. Farmers in high-potential areas may experience a lower total level of transaction costs than those in low-potential areas. Transaction costs may also vary by product (crop-specific transaction costs). High value crops, which are perishable, are often associated with high transaction costs.

Transaction Costs and Market Participation

Transaction costs can significantly affect agents' decisions on whether or not to participate in the market. As previously mentioned, transaction costs raise the price effectively paid by buyers and lower the price effectively received by sellers of a good, creating a price band within which some agents find it unprofitable to either sell or buy (Key, Sadoulet, and de Janvry 2000). In agriculture, the price band explains why many subsistence farmers prefer to produce for home consumption and lack access to profitable market opportunities (De Janvry, Fafchamps, and Sadoulet 1991). Poor infrastructure and distance from the market which increase transportation costs, high marketing margins due to merchants with local monopoly power, high search and recruitment costs due to imperfect information, and supervision and incentive costs to labor increase the magnitude of the price band (Sadoulet and de Janvry 1995).

Goetz (1992) attributes the failure to participate in specific commodity markets to high fixed transaction costs. Renkow, Hallstrom, and Karanja (2003) found that economic isolation is positively associated with the size of the fixed transaction costs. Although both fixed and proportional transaction costs

affect market participation decisions, Key, Sadoulet, and de Janvry (2000) show that only proportional transaction costs are significant in the household's market supply decision. Heltberg and Tarp (2002) used exogenous variables such as distance and types of transport as proxies for proportional transaction costs and information variables to determine fixed transaction costs. Their findings highlight the importance of non-price factors like technology, transport infrastructure, farm endowments, and area characteristics.

Pingali, Khawaja, and Meijer (2005) argue that increased transaction costs deter small farmers from entering the market, thus depriving them of the benefits from commercialization in agriculture. Interventions aimed at reducing transaction cost would encourage increased farmer participation in competitive markets to meet the broader poverty alleviation objectives (De Silva and Ratnadiwakara 2008). Sadoulet and de Janvry (1995) also claim that important productivity gains can be achieved through the promotion of greater specialization and exchange by reducing transaction costs. Heltberg and Tarp (2002) show that policies supporting the expansion of the number of market participants are far more important than those for stimulating farmers who are already in the market to increase their supply.

The household specific factors that influence transaction costs, and thus household's participation decision, include aversion to risk and uncertainty; social networks and organizations; age, gender, and education; and intrahousehold interaction (Pingali, Khawaja, and Meijer 2005). Such variables affect the cost of information seeking, negotiating, monitoring, and enforcement.

Social networks and organizational memberships may substantially reduce transaction costs because they ensure cooperation among farmers in the use of scarce communal resources.

Age, gender, and education can affect transaction costs in a variety of ways. Age can indicate farming experience, which makes certain informational and search costs easier and relatively cheaper. Compared with men, women have greater variability of transaction costs related to accessing land and credit. Education matters in reducing the costs of searching for and processing information.

A strong link between risk behavior and market participation exists. On the one hand, uncertainty is reduced by market participation for as long as it is supported by better information, communication, and increased access to market outlets. On the other, greater market participation may exacerbate uncertainty since the safety of subsistence is replaced by the insecurity of unstable markets and adverse price trends.

Dorward (1999 as cited by Makhura, 2001) presents two views of assessing risk in market participation. First, risk enters market participation as an outcome of market conditions. Households will allocate their limited resources to subsistence and commercial production such that the disutility of risk is balanced against the utility of market goods (Von Braun, De Haen, and Blanken 1991 as cited by Makhura 2001). This implies that the higher the risk the less inclined the household will be to participate. Second, risk and transaction costs are interlinked in market participation. Uncertainty can be represented by high transaction cost due to imperfect knowledge of the different participants in the market. The farmer needs to contract with partners to sell output and purchase inputs. In the absence of formal institutions that regulate such transactions, the farmer has to face costs to obtain information on these different agents, to contract, to monitor, and to enforce these agreements.

Internal transaction costs or "social uncertainty" (Zaibet and Dunn 1998 as cited by Pingali, Khawaja, and Meijer 2005) occur within the dynamics of intrahousehold interaction. This may be a constraint in the decision-making process in extended households and may inhibit market participation, which may then require a premium in the farmer's willingness to overcome these costs. Such a premium is assumed to be proportionally related to the size of the household; large or extended families face higher negotiation costs.

Empirical Studies

There are a variety of empirical implementations of how transaction costs affect household participation decisions in the output and input markets. Goetz (1992) used a selectivity model that endogenously switches households into alternative market participation states, correcting for bias caused by the exclusion of unobservable variables affecting both discrete and continuous decisions. He found out that market information increases the probability of participation by sellers and that access to cereal processing technology increases quantities transacted by both sellers and buyers, conditional on participation. Staal, Delgado, and Nicholson (1997) looked into the role of cooperatives in reducing transaction costs in smallholder dairy farming in east Africa, wherein they analyzed the determinants of producer prices received by a sample of dairy producers. Results suggest that different levels of access to infrastructure, assets, and information explain why farmers accept widely different prices for milk. Hobbs (1997) examined the influence of transaction costs on the choice of marketing channels in cattle marketing using Tobit limited dependent variable analysis. Omamo (1998a) used an integrated household model with endogenous transaction cost to illustrate how, even in the absence of risk, the

tension between gains from specialization and corresponding increases in transaction costs lead to enterprise diversification on small farms. Omamo (1998b), incorporating costly exchange into an agricultural household model, used a numerical non-separable version of the model to show that seemingly inefficient cropping choices can be explained as rational food import substitution given high transport cost in the product market. Obare, Omamo, and Williams (2004) used data from a 1998 survey of farming households in Kenya to estimate the effects of poor rural road infrastructure on the structure of smallholder farm production where simultaneous estimation of cost and input share revealed rational responses by farmers to high access costs.

Key, Sadoulet, and De Janvry (2000) used data on Mexican corn producers to estimate an empirical model that allows for separate tests of significance of both fixed and proportional transaction costs, revealing that both types matter. Holloway et al. (2000) applied a Tobit model on marketable surplus to determine how transaction costs affect participation in the Ethiopian dairy market for small-scale, peri-urban producers. Vakis, Sadoulet, and De Janvry (2003) estimated a market choice model as a function of variables that explain transaction costs using a conditional logit model. These market choice equations are then used to control for selection in predicting the idiosyncratic prices that would be received on all markets and the idiosyncratic proportional transaction costs that would be incurred to reach all markets. The net of the two yields a measure of effective farm-level prices that allows the estimation of a semi-structural conditional logit of the market choice model. Results show that the information on market price that farmers receive from their neighbors reduces fixed transaction costs equal to double the price received and is equal to four times the average

transportation cost. Renkow, Hallstrom, and Karanja (2004) also developed a framework of quantifying fixed transaction costs. Using household survey data from a sample of 324 Kenyan maize farmers, household demand and supply schedules and transaction costs were jointly estimated. Econometric results indicate that the average ad valorem tax equivalent of fixed transaction costs for households is 15 percent.

Henning and Henningsen (2007) developed a farm household model that incorporates various types of transaction costs as well as labor heterogeneity. Results show that non-proportional variable transaction costs and labor heterogeneity significantly influence household behavior. Alene et al. (2008) assessed the effects of transaction costs on smallholder marketed surplus and input use in Kenya using a selectivity model. Output supply and input demand responses to changes in transaction costs and price and non-price factors were estimated and decomposed into market entry and intensity. Results show a negative impact of transaction costs on market entry.

Most of the early empirical evidence of transaction costs in the input markets involved credit provision. Looking into the transaction cost of borrowing from formal and informal sources in rural Bangladesh, Ahmed (1989) found that transaction costs resulting from formal loans are higher than those loans from informal lenders. De Guia-Abiad (1993) examined the influence of borrowers' transaction cost on credit rationing in rural financial markets in the Philippines. Results show that transaction costs have a regressive impact on borrowers, responding to transaction costs in the same manner and for the same reason that they respond to interest rates.

In the labor market, Lanzona and Evenson (1997) measured transaction costs and their effects on labor market participation and wage earnings. The observed differences between buying and selling prices of rice across households were used to calculate transaction costs indices for villages, which were then incorporated into the standard labor market participation and Mincer wage equations. The estimates indicate that transaction costs may be a source of the income differentials between (a) the landed and the landless, (b) rural and urban areas, and (c) males and females. To analyze supervision activities reported in a cross-section survey of rice farmers in the Bicol region of the Philippines, Evenson, Khimi, and De Silva (2000) developed a model on the relationship between supervision intensity and transaction costs. Results show a positive effect of transaction costs on supervision intensity. The analysis was then extended to a farm-efficiency specification to test the proposition that supervision activities improve farm efficiency. Results showed that transaction costs have a negative direct effect on farm efficiency. This effect, however, is partially offset by increased supervision intensity, which enhances efficiency.

Winter-Nelson and Temu (2002) analyzed the roles of relative prices and transaction costs in explaining low use of chemical inputs among Tanzanian coffee growers. Results suggest that travel costs in input and output markets have distinct effects on input usage. Other studies consider the influence of transaction cost on the use of fertilizer (Strasberg et al. 1999; Zaibet and Dunn 1998) and mechanization (Zaibet and Dunn 1998 as cited by Makhura 2001).

SUMMARY AND POLICY IMPLICATIONS

This paper surveys the literature on transaction cost in general and those that apply transaction cost to agriculture. It reviews the different definitions of the concept, highlighting efforts of various authors to organize and categorize the different definitions. It then looks at the application of transaction cost to agriculture. The variety of issues that beleaguer agriculture make it a fertile breeding ground for the application and testing of transaction cost theory. Most applications of the theory to agriculture fall under three broad themes: contracts and property rights issues, organizations and institutional arrangements/ institutions, and market exchange.

The discussion focused on the role of transaction costs in exchange in agriculture, particularly in the context of a household's decision to engage in market exchange, in both input and output sides. Market failures in agricultural markets are largely attributed to high transaction costs caused by differential household characteristics. This presents a unique property of market failures in agriculture; they are household specific rather than commodity specific. This survey of the literature finds a confluence of the different definitions. Coasian and Williamsonian definitions are used in interpreting fixed transaction costs while neoclassical and trade definitions (i.e., the concept of the price band) characterize proportional transaction costs. The prominence of transport costs and the effect of distance and isolation in many of the analyses point to the influence of the new economic geography research stream. Measurement of transaction cost as an ad valorem tax also references the trade concept of transaction costs.

The literature reviewed in this paper is admittedly only a fraction of many that apply transaction costs to various issues in agriculture. However, the prevalence of the problem of access to markets in developing countries justifies this survey's narrow focus. The dearth of empirical studies on transaction costs and market access in the Philippine context implies that this particular area in this field of research is still a lush ground for the application of transaction cost theory. Research on transaction costs can redound to the policy arena and contribute greatly to the improvement of agricultural productivity.

In one of the few studies that tried to fill the current research gaps in the Philippines, Cuevas (2012) used a simple market participation model with transaction costs to look into the effects of different transaction cost variables on farmers' rice market participation as net sellers. Using Heckman's (1979) two-step estimator, the study found that transaction cost variables such as income class of the municipality, access to informal credit, and years of education increased marketed supply through increased market participation and increased marketed supply among participants.

These results highlight the possible contributions that this kind of analysis can provide to policy crafting. As the income class of the municipality proxies for physical and market infrastructure and institutions, investments on physical infrastructure, especially in the rural areas, have the potential of bringing marginal farmers into the market and increasing the marketed surplus of those who are already there. Better roads and communication that ease access to market centers would, therefore, increase productivity.

The significant effect of access to informal credit (which reduces the search, information, and negotiation costs in the marketing of output due to the interlinkage of informal credit provision with marketing arrangements) on the choice and level of market participation provides a policy avenue that can greatly increase productivity in the rice sector. Policies that reduce barriers to entry in trading and informal lending may offer high returns to public resources.

Improvements in human capital through education, on the other hand, not only increase productivity but also lower transaction costs through increased ability to obtain market information. Thus, more investment in education in the rural areas can greatly improve agricultural productivity.

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