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Biodiesel policy for family farms in Brazil: One-size-fits-all?

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ABSTRACT

Driven by the increasing environmental concern related to the use of fossil fuels and the growing worldwide demand for biofuels, the Brazilian government launched a national biodiesel policy promoting feedstock supply from family farms. Especially in semi-arid regions farmers have been encouraged to grow castor bean. However, there has been little farmer uptake and knowledge is lacking regarding the main constraints that hamper farmers' engagement in the biodiesel market. A farm typology, developed on the basis of original data gathered in two municipalities in the Southeast region of Brazil, revealed that the majority of farmers (livestock, mixed and less endowed farm types) face great challenges to participate in biodiesel markets. A stronger policy impact could be achieved by the promotion of biodiesel crops that have alternative markets and fit more easily into the current farming system, such as sunflower, resulting in reduced trade-offs with current crop activities and allowing synergies between fuel and feed production (livestock farmers). Better enforcement of resource providing contracts are critical to avoid default and to alleviate labour (mixed farmers) and land constraints (less endowed farmers), thereby improving farmers' ability to engage in biodiesel crop production. Furthermore, soybean farmers lack policy instruments based on price incentives which could enable their engagement in sunflower production.

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1. Introduction

Worldwide increasing environmental concern has drawn attention to bioenergy policies that could improve renewable fuel availability while complying with sustainability criteria (EC, 2008). In Brazil local governments believe that biodiesel has great potential as a renewable energy source with accompanying benefit of boosting rural economic development. In 2004 a national biodiesel program was created, framed by a set of regulations which aim to promote biodiesel production in a sustainable way through the inclusion of

family farmers (Supplementary Material) and communities in rural areas (MDA, 2011). Currently, federal legislation mandates a blend of 5% of biodiesel in diesel (Brasil, 2005). Furthermore, the Brazilian government offers tax reductions and sales preferences for biodiesel producers that purchase a minimum amount of their feedstock from family farms. The minimum amount of feedstock obtained from family farms varies from 15% in the North and Midwest to 35% in the South, Southeast and Northeast regions (MDA, 2012).

Many questions have been raised concerning family farmers' ability to reap economic benefits from the biodiesel market. While semi-arid regions as the Northeast have the

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highest concentration of family farmers in the country (50%), they account for only 5% of the family farm feedstock acquisitions by biodiesel producers (MDA, 2011). In these regions castor bean has been at the forefront of government initiatives due to its suitability for semi-arid conditions. Furthermore, 95% of the feedstock is supplied by soybean family farmers from Southern regions where the agricultural per capita GDP is up to seven times higher than in the Northeast (IBGE, 2006). The weak engagement of the non-soybean farmers could jeopardize further implementation of the biodiesel program. Although an increase of the mandatory blending of biodiesel from the current 5% to 10% in 2014 and to 20% in 2020 is foreseen (Ubrabio, 2010), the success of this policy greatly relies on the ability of family farmers to engage in biodiesel crop production thus ensuring a sustainable supply of feedstock.

Despite the government being keen to improve family farmers' participation in biodiesel markets, especially in semi-arid regions, knowledge is lacking regarding the main constraints that prevent these farmers from taking advantage of this opportunity. Transaction cost literature indicates that their small scale together with the lack of information and connections to established market, distorted or absent inputs markets and limited or no access to credit often make it difficult for family farmers to benefit from new market opportunities (Markelova et al., 2009; Wiggins et al., 2010). In addition, from the production perspective biodiesel crops might imply trade-offs between current and alternative crop activities which would pose further obstacles for farmers' engagement.

Smallholder farming systems are characterized by a strong rural diversity which is commonly driven by the interlocking of socioeconomic and biophysical factors (Ruben and Pender, 2004). Across geographical areas smallholders differ in resource endowment (land, labour, capital) and market opportunities, which are some of the factors that shape farmers' objectives and resource management strategies as well as production and consumption decisions, crop, livestock, and off-farm labour choices (Pender et al., 1999). Hence, no household has the same resources or faces the same constraints, every farming system is different, facing distinctive decision-making problems which require specific if not unique solutions (Köbrich et al., 2003). Recognizing such variability within and among farm households and across localities is the first step to design effective rural economic development and environmental policies (Ruben and Pender, 2004; Tittonell et al., 2010). Higher policy impact could be obtained by better targeting policy instrument to specific groups of farmers. Improved targeting requires knowledge on the main causes of household heterogeneity, and on the ability to categorize diversity patterns that lead to distinct livelihood strategies and farming objectives (Pender et al., 1999).

To address such heterogeneity many policy studies use categorization methods or typologies to group farmers into recommendation domains which are composed of a group of roughly homogeneous farmers (Köbrich et al., 2003). Typologies are used *ex ante* to design effective environmental and socioeconomic rural policies (Blazy et al., 2009; Briggeman et al., 2007), as well as *ex post* to evaluate such policies (Andersen et al., 2007; Hazeu et al., 2011).

Although different claims have emerged, roughly eight years after the beginning of the biodiesel program in Brazil little is known about how this policy impacts different farming systems across geographical regions. Uncertainty exists regarding constraints faced by different farmers who try to access biodiesel markets and regarding options for better targeting less endowed farmers, thereby ensuring a more successful implementation of the biodiesel program.

The emerging research questions are: Which factors explain the weak response of family farmers to the biofuel policy?; and How the policy could be adjusted to increase its attractiveness to these farmers? To answer these questions, we developed a farm typology based on farm surveys and expert consultation in two municipalities of the State of Minas Gerais, in the Southeast region of Brazil. Transaction costs theory was used to identify variables to enrich the typology. We deployed a questionnaire with stakeholders to improve our understanding of the relationship between farmers and biodiesel producers. We conclude by assessing the suitability of the current policy for each of the identified farm types and proposing adaptations of policy that could improve the participation of family farms in the biodiesel market.

1.1. Theoretical approach

In selling their products, smallholder farmers and the agents with whom they transact, whether they are private or public, face high transaction costs (Wiggins et al., 2010). Transaction costs are the costs of contact, contract and control. In other words, transaction costs are the costs that transaction partners must incur to inform themselves about market conditions, the costs of negotiating an agreement, and the costs of monitoring and enforcing contract compliance. These costs can be reduced using particular contractual or ownership arrangements, such as contract farming (Stockbridge et al., 2003; Williamson, 2000) or producer organizations, which is a more formal expression of collective action. Acting collectively farmers can benefit from economics of scale, increased bargaining power, and reduced information and transportation costs (Bijman, 2007; Dorward, 2001). The more farmers participate in highly coordinated supply chains, the higher their potential transaction costs, as farmers in such chain make investments that are specific to the chain or the customer.

Pingali et al. (2005) classify the causes of farmers' transaction costs as household specific, location specific, and crop specific. Household specific factors that influence transaction costs are the knowledge of the farmer, the size of the farm, and the availability of family labour. These factors influence the extent to which farmers can bear risks and deal with uncertainty. Transaction costs can also vary across locations and regions and are often related to distance to the main market for the farmer's products. A large distance often entails few buyers, which increases the risk of exploitation. Also, high potential areas often have more reliable access to production inputs, better transport and communication infrastructure and hence relatively lower search and information costs (Wiggins et al., 2010). Transaction costs can also be related to crop characteristics. A perishable crop is more likely to entail high transaction costs, as farmers have few options

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