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LIFE SATISFACTION, CONTRACT FARMING AND PROPERTY RIGHTS: EVIDENCE FROM GHANA

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Abstract

Recently, large-scale land acquisition has increased dramatically in the developing world. The question whether land deals can benefit both the local population and the investor is therefore high on the international agenda. Contract farming is discussed as a possible solution but studies identifying the causal effects are rare. Using data from a quasi-natural experiment in contract allocation, we compare the subjective well-being of outgrowers and independent farmers in the sphere of the biggest palm oil producer in Ghana. We identify a positive causal effect of the outgrower scheme which increases subjective well-being by 1.5 points on a scale of 0 to 10. We find a substitutive relationship between having an outgrower contract and having property rights, and thus we argue that by increasing security a contract increases well-being, as secure rights to land matter substantially for the overall life satisfaction of non-contract but not of contract farmers.

JEL Codes: D60, I31, Q13

Keywords: contract farming, property rights, quasi-natural experiment, subjective well-being, large-scale land acquisition

1. INTRODUCTION

Large-scale land acquisition, especially in Africa, is recently on the rise. Whether large-scale investment in agricultural land promotes growth and development by increasing productivity, providing infrastructure, improving technology, and creating work opportunities or whether it harms the local population by exploiting the workers, causing environmental destruction, and taking land away from local users is currently the subject of much debate in the literature (Cotula *et al.*, 2009; Görgen *et al.*, 2009; Von Braun and Meinzen-Dick, 2009; Deininger *et al.*, 2011; Cotula, 2012; Deininger and Byerlee, 2012). Some authors argue that where a country has a weak land governance system and at the same time a strong customary system, as Ghana does, large-scale investors can acquire land through traditional authorities at the cost of the local population (Schoneveld *et al.*, 2011; Wisborg, 2012; Amanor, 2012).

Outgrower schemes[1] could bring dual benefits in the sphere of large-scale investment in agricultural land. Contracts, if they respect existing local land rights, could foster the commercialization of farmers' produce while at the same time enabling the investor to profit from local land resources (Von Braun and Meinzen-Dick, 2009; De Schutter, 2011). Because they are so prevalent in developing countries, especially in Africa, outgrower schemes deserve particular attention (Grosh, 1994; Oya, 2012). In general, "contract farming" refers to an agreement between a farmer and a firm which processes the farmer's produce or puts it on the market (Grosh, 1994). Institutional arrangements vary widely between different contracts. De Schutter (2011) describes the optimal scheme as one which has reliable producers for the investor, reliable buyers for the farmers and untouched secure land rights.[2]

Even though many studies identify positive effects of contract farming on the livelihood of farmers, outgrower schemes are still controversial. On the positive side, several authors, for example Porter and Phillips-Howard (1997), Warning and Key (2002), Bolwig *et al.*, (2009), Minten *et al.*, (2009), and Bellemare (2012), identify income and productivity gains of contract farming in Africa. Moreover, since contract farming can lead to risk-sharing between the producer and the processor (Key and Runsten, 1999), it can reduce price and income

[1] We use the terms "contract farming" and "outgrower schemes" interchangeably.
[2] For political discussions on the benefits of contract farming for poverty alleviation see also World Bank (2007) and UNCTAD (2009).

volatility (Minten *et al*., 2009; Bolwig *et al*., 2009), show positive spillover effects for non-contract crops and for adjacent non-contract farmers (Warning and Key, 2002; Govereh and Jayne, 2003; Minten *et al*., 2009; Bellemare, 2012), and reduce market imperfections by providing credit, inputs, technology and information and hence lower transaction costs (Grosh, 1994; Key and Runsten, 1999; Deininger, 2011).

On the negative side, contract farming is interpreted as just a tool for the investor to extract rents without positive effects for landowners (Little and Watts, 1994; Porter and Phillips-Howard, 1997). Very unequal power relations can make producers more vulnerable, since risks may be transferred to them and they may lose autonomy (Little and Watts, 1994; Porter and Phillips-Howard, 1997; Key and Runsten, 1999). Moreover, the prevalence of contract farming is found to disrupt social structures, disturb the local political ecology, increase economic inequality, and increase workloads (Carney and Watts, 1990; Korovkin, 1992; Dolan, 2001; Yaro and Tsikata, 2013).

Despite these negative findings, however, farmers seem generally very willing to enter into contracts. Huddleston (2006) and Väth and Kirk (2014) have shown for our research setting that contract offers were not refused and, similarly, Guo and Jolly (2009) find a large excess demand for contract farming in China. Farmers' main motive for signing a contract seems to be to reduce uncertainty. Masakure and Henson (2005), for example, using principal component analysis, show that reduced market uncertainty (a guaranteed market for crops, a reliable supply of inputs, guaranteed minimum prices, and reliable transport provided to collect the produce) is what drives farmers to produce under contract.[3] In Ghana, it has been found that farmers are eager to secure access to inputs, credit and extension services via an outgrower scheme (Huddleston, 2006; Väth and Kirk, 2014). Guo and Jolly (2009) identify market access and price stability as their main motives for entering into contracts. These findings are supported by Blandon *et al*. (2009), who identify prearranged quantities and prices as an incentive for farmers to sign contracts with supermarkets in Honduras. It therefore seems that the big advantage of contracts is that they satisfy security needs.

In rural areas, a land tenure regime which guarantees secure property rights to land is another way to satisfy these needs. By ensuring that future profits from investing in land return to the landowner, these rights reduce uncertainty and help to overcome the inevitable time lag

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[3] Farmers in Schipmann and Qaim's (2001) study in Thailand, on the other hand, did not show a preference for contract farming. Farmers were, however, more likely to choose a contract when input or credit provision was involved.

between agricultural investment and output, and hence stimulate investment (Besley, 1995; Brasselle *et al*., 2002; Carter and Olinto, 2003). Moreover, income gains (Bouis and Haddad, 1990; Grootaert *et al*., 1997; Carter and May, 1999; Scott, 2000; Gunning *et al*., 2000) and better social standing (Binswanger *et al*., 1995) for the holder of these rights ease the access to credit (Feder, 1988)[4] and open up social networks (Townsend, 1994), which in turn help to smooth consumption patterns and improve food security (Deininger, 2003; Dekker, 2006).

To jointly capture all effects contract farming and its relation to secure property rights to land we used a subjective well-being approach, which we understand as a measure of utility (Frey and Stutzer, 2002). Since it comprises both monetary and non-monetary aspects, subjective well-being is a good complement to more traditional approaches, which concentrate mainly on monetary issues (Diener and Suh, 1997; Frey and Stutzer, 2002) and dominate the literature on contract farming. Thus, by controlling for income effects, a subjective well-being approach allows us to focus on risk-reducing mechanisms and security-related aspects, which form a key dimension of subjective well-being (Oishi *et al*., 1999; Webb, 2009; Wills-Herrera *et al*., 2011). In doing so, we go far beyond the direct monetary effects of contract farming.

Whereas some authors find high correlation between subjective well-being and objective measures (Oswald and Wu, 2010), others argue that adaptation to circumstances and stable dispositional characteristics lead to rather low correlations (Diener and Suh, 1997). Identification of causal effects has therefore attracted considerable attention in the subjective well-being literature (see Ferrer-i-Carbonell and Frijters, 2004, for a good overview on estimation techniques).

We contribute to this literature by identifying the causal effect of contract farming on subjective well-being in the sphere of a large-scale land acquisition. Unobserved differences between contract and non-contract farmers, which are correlated with the outcome variable (e.g. entrepreneurial spirit and ability, risk preferences, trust, or effort), make appropriate estimation techniques necessary to avoid biased estimates. Several studies have used an instrumental variable approach to correct for selection bias (e.g. Warning and Key, 2002; Simmons *et al*., 2005; Miyata, 2009; Rao and Qaim, 2011; Bellemare, 2012). However, Dedehouanou *et al*. (2013) claim that instruments are often weak. Using panel data on contract farmers in Senegal, they find that having a contract had a positive influence on subjective well-being.

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[4] Some authors do not find improved access to the credit market from providing secure land titles (see for example Place and Migot-Adholla, 1998; Carter and Olinto, 2003).

Our study confirms the positive link between contract farming and subjective well-being for oil palm farmers in Ghana. We take advantage of a research setting where contract allocation took place as a quasi-natural experiment. Whereas using panel data can bias results because of omitted time-variant variables,[5] natural experiments provide the most robust evidence of causality (MacKerron, 2012). In addition, we broaden the view by using two measures of contract farming, firstly a dummy variable indicating that a household has an outgrower contract on at least one of its agricultural plots, and secondly by using the size of land under outgrower contract. Both variables remain positively significant throughout different model specifications. However, it seems that holding an outgrower contract, independently of the size of land under contract, explains gains in subjective well-being better. Moreover, we propose that contract farming contributes to subjective well-being by fulfilling security needs, as property rights for land play an important role for non-contract holders but not for contract holders. Hence, contract farming turns out to be a promising tool for overcoming lack of security.

The remainder of the paper is structured as follows. In the next section, we discuss the connection between contract farming and subjective well-being, and between secure property rights to land and subjective well-being, and the way these two kinds of connection are interlinked, with a special emphasis on security aspects. Section 3 describes our research setting, including contract allocation as a quasi-natural experiment, Section 4 presents our estimation strategy with a discussion of previous findings in the subjective well-being literature, the data and descriptive statistics, as well as our empirical findings, and Section 5 concludes.

2. LIFE SATISFACTION AND THE SECURITY DIMENSION OF CONTRACT FARMING AND PROPERTY RIGHTS

Overall life satisfaction can be understood as an aggregate concept which comprises various domains (Meadow *et al.*, 1992; Cummins, 1996; Van Praag *et al.*, 2003; Rojas, 2007; Van Praag and Ferrer-i-Carbonell, 2008). The identification and demarcation of different domains is somewhat arbitrary (Rojas, 2008; Bardo and Yamashita, 2013), but over the last decade the International Wellbeing Group (2013) has developed a standard "personal well-being index" (PWI) which is widely used in developing and emerging countries (e.g. Tiliouine *et al.*, 2006;

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[5] For example income movements and changes in well-being are linked through omitted variables such as "seniority in the workplace" (Gardner and Oswald, 2007).

Webb, 2009; Wills-Herrera *et al.*, 2011; Davey and Rato, 2012). The index identifies future security as an important feature of overall life satisfaction.[6] Especially in developing countries, where (rural) markets show high imperfections, formal safety nets are underdeveloped, and stability needs are inadequately satisfied, security plays an important role in overall life satisfaction (Oishi *et al.*, 1999). Webb (2009) shows for Tibet that future security is even slightly more important for overall life satisfaction than the standard of living domain. Willis-Herrera *et al.* (2011) show from a different angle that perceptions of political, economic and communitarian insecurity in turn have a negatively significant correlation with subjective well-being in Columbia.

In the sphere of large-scale land acquisitions, contract farming is seen as one important way to address security needs, as it reduces some of the risks a farmer has to face. Dedehouanou *et al.* (2013) point out that marketing risk is reduced because there is a secure buyer for the produce and improved access to the market, and production risk is reduced because inputs and credit are provided by the contractor. However, they also mention that it brings one new risk: a contract may be breached, either by the buyer, because of decreased demand for processing or by the farmer, because of failure to meet high quality standards.

Apart from the security aspects, Dedehouanou *et al.* (2013) indicate that contract farmers may earn higher income, have more self-esteem, be more efficient because they receive training, and have better health conditions due to access to less harmful pesticides and other chemicals – all benefits which increase subjective well-being. On the other hand, contract farmers lose their autonomy and may have to adapt their production and management techniques to meet specified quality standards (especially for export production), which can mean increased pressure and higher labour requirements and consequently decreased subjective well-being. In a setting with very unequal power relation, farmers are endangered to enter into adhesion contracts which foster such negative effects. Therefore, Dedehouanou *et al.* (2013) argue that contract farming can affect overall life satisfaction both positively and negatively. As in our particular setting the risk of contract breach by the buyer is rather negligible due to the excess demand for oil palm fruits, and as the contractual agreement does not specify particular quality standards, we expect that positive effects will outweigh the negative ones. Thus, we hypothesize that holding an outgrower contract has a positive influence on farmers' subjective well-being. In line with Masakure and Henson (2005), Guo and Jolly (2009), and Blandon,

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[6] Based on Cummins (1996), the PWI lists eight domains of life: standard of living, personal health, life achievement, personal relationships, personal safety, community connectedness, future security, and spirituality/ religion.

Henson and Islam (2009), who highlight the reduction of uncertainty as the main motive for entering into contracts, we believe that security is the aspect most responsible for enhanced overall life satisfaction, when controlling for income effects.

Secure property rights to land are a second important way to address the security needs of rural households and thus increase their subjective well-being. In the absence of these rights, land conflicts arise when an increasing demand for land meets a limited supply. This is especially the case when a large-scale investor enters the scene and demands huge tracts of land. Thus, numerous studies document land disputes around large-scale investments, mostly to the disadvantage of the local population (Li, 2011; Borras Jr and Franco, 2012; German, 2013). Clearly defined property rights can foster social stability and prevent disputes (Palmer 1998) and are therefore a precondition for satisfying the needs of both the local population and the investor.

Moreover, land with secure property rights can be used as collateral to access the credit market (see for example the seminal work by Feder, 1988, in Thailand, which identifies the credit supply effect as the main benefit from land titling). In particular, it allows the farmer to enter the formal lending market, where imperfect information about the borrower and high monitoring costs are even more of an obstacle than in the informal sector (Feder and Nishio, 1998). If households are credit constrained, any increase in investment may be accompanied by decreased consumption in the short run. Access to credit in turn reduces food insecurity, mitigates health shocks and decreases vulnerability to environmental disasters. Thus, in line with Deininger (2003), we can say that secure property rights to land provide an important safety net function which is expected to enhance subjective well-being.

In addition, secure ownership reduces the time spent on protecting property and allows household members to spend it on other activities (Field, 2007). This may lead to greater labour market participation, thus increasing non-agricultural income, which may lead to an increase in subjective well-being beyond addressing security needs. Finally, secure property rights guarantee the long-term use of the land and thereby increase investment incentives, which may bring additional income and improve agricultural productivity (e.g. Deininger and Chamorro, 2004; Deininger and Jin, 2006; Goldstein and Udry, 200; Fenske, 2011). Higher income in turn is positively associated with subjective well-being.[7] Consequently, we hypothesize that holding secure property rights to land has a positive influence on farmers'

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[7] Compare Besley (1995) for a discussion on endogeneity issues, for example that investment may not be a response to higher levels of tenure security but rather undertaken to enhance tenure security.

subjective well-being. Again, we assume that this is mainly caused by gains in security when controlling for income effects.

Considering that both holding an outgrower contract and possessing secure property rights are expected to have a positive influence on the security domain and in turn overall life satisfaction, it is worthwhile conceptualizing possible links. Whereas several researchers assume an additive relationship between domain satisfaction and overall life satisfaction (e.g. Møller and Saris, 2001; Van Praag and Ferrer-i-Carbonell, 2008), Rojas (2006) provides theoretical and empirical evidence that a constant elasticity of substitution (CES) specification is preferable. Thus, allowing a variety of imaginable relationships between domain satisfaction and overall life satisfaction, he shows for Mexico that effects on overall life satisfaction emanating from increasing satisfaction in one domain tend to decay with increasing satisfaction in this domain. This is in line with Palmer's diminishing marginal returns argument (1998), which states that once a certain level of security has been reached, the benefits of additional security will be too small to foster further efforts to realize extra security. In the context of overall life satisfaction, we therefore assume a substitutive rather than an additive relationship between contract farming and secure property rights to land.

3. RESEARCH SETTING

3.1. The Investor

Our research was conducted within a 30 km radius of the Ghana Oil Palm Development Company (GOPDC) large-scale investment. GOPDC is the biggest palm oil producer in Ghana. It was founded in 1976 as a state-owned company with 8,953 ha of land, expropriated from the local population by the military government (Republic of Ghana, 1976; Sutton and Kpentey, 2012). The land known as the Kwae Concession was gradually transformed into oil palm plantations to feed the newly constructed large-scale mill. The investment is located in the remote Kwaebibirem District in the Eastern Region, where the oil palm business was introduced to facilitate local development (Huddleston, 2006; Huddleston and Tonts, 2007; Fold, 2008; Fold and Whitfield, 2012; Adjei-Nsiah et al., 2012).

From 1986 onwards, an outgrower scheme was established through a World Bank supported development programme which aimed to integrate the local population. At that time the mill was not being used to anywhere near full capacity, because the expansion pace and yield of

the nucleus farm had been overestimated (World Bank, 1994; interviews with Lands Commission senior official and GOPDC senior manager),[8] so GOPDC was interested in increasing the local supply.

In the course of the privatization wave in 1994, the government transferred GOPDC to the Belgium investor Société d'Investissement pour l'Agriculture Tropicale (SIAT), which took over the majority of shares (GOPDC, 2013; SIAT, 2013). In addition to the 50-years leasehold for the Kwae Concession (as of 1976), GOPDC acquired 5,205 ha for the adjacent Okumaning Concession (as of 2000) (Republic of Ghana, 2008; Sutton and Kpentey, 2012). However, neither the concessions nor the outgrower scheme yielded enough oil palm fruit to run the mill at full capacity (interview with GOPDC senior manager),[9] so GOPDC complements its nucleus-estate system with third party purchases from independent farmers.

Focus group discussions revealed that the local people have very mixed feelings about GOPDC (Gyasi, 1994; Huddleston, 2006; Väth, 2013). On the one hand they complain about the original expropriations by the military government in the 1970s, low wages, and problems with daily operations, but on the other they are very grateful for the expansion of the oil palm business in the area, the outgrower scheme, infrastructural developments, employment creation, and corporate social responsibility (Huddleston, 2006; Huddleston and Tonts, 2007; Väth, 2013). Thus it cannot yet be claimed that there is a stable relationship between the investor and the local population.

3.2. Oil Palm Production Around the Large-Scale Investment

Besides a few large-scale producers, oil palm is typically grown by small- and medium-scale farmers in Ghana. Investment costs for oil palm cultivation are high, and it is only a rational choice for those who hold secure land use rights (property rights or long-term sharecropping agreements), as the break-even point is not reached until the seventh year after planting (Poku and Asante, 2008). Consequently, the poorest are excluded from any form of commercial oil palm farming and we can conclude that all those farmers who cultivate oil palm hold secure land use rights.

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[8] Semi-structured expert interviews were conducted in the Kwaebibirem District or Accra between October and November 2011 to enrich the quantitative database. To guarantee the anonymity of the interviewees, we reveal their (rough) position and organization but not their names. All interviewees were informed about the purpose of the study. Due to their reservation and the sensitiveness of the topic, interviews were not recorded.

[9] For more details on GOPDC, please refer to Väth (2013).

There are two ways that the roughly 10,000 smallholder farmers in our research area can cultivate oil palms: either independently or under contract. Roughly 3,000 households grow them as fully independent farmers. They can choose whether to sell their produce to the local market or to GOPDC (interview with Ministry of Food and Agriculture official). In contrast, at the time of data collection, 7,279 outgrowers were obliged to deliver the fruit from a contracted oil palm plot to GOPDC. Households typically cultivate more than one plot; hence a farmer can be an outgrower on one plot and also grow oil palm or other crops as an independent farmer on another non-contracted plot. In our sample more than 90% of households holding an outgrower contract on one plot are at the same time growing oil palm independently on other plots.

GOPDC and the local economy compete in their demand for oil palm fruit (Poku and Asante, 2008). GOPDC's pricing, for both outgrowers and independent farmers, is based on developments in the world market price for crude palm oil (GOPDC, n.d.; interviews with GOPDC senior manager and outgrower association executives; focus group discussion with farmers). GOPDC offers higher prices than the local market in the domestic peak season as the Ghanaian supply is too small to have an impact on the world market. In contrast, the local market pays more in the lean season when oil palm fruit is scarce and domestic demand is high. In a weak institutional setting paired with high monitoring costs, outgrowers could breach contracts and sell to local markets (Fold, 2008; Fold and Whitfield, 2012) without fear of legal consequences.[10] The competitive demand setting is therefore more advantageous for oil palm farmers than a situation where monopolistic structures weaken the smallholders' bargaining power. Output markets for GOPDC and small-scale processors are discrete. Whereas the red cooking oil for local demand can technically be produced only by the small mills, GOPDC produces the crude palm oil used by various industries (Osei-Amponsah *et al.*, 2012).

3.3. Contractual Treatment as Quasi-Natural Experiment

When it introduced the outgrower scheme, GOPDC did not follow a systematic strategy for location and scope. Uneven performance and changing attitudes of different managements created the framework for various expansion waves and their particular locations over the years (interviews with GOPDC senior managers and outgrower association executives). To

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[10] To prevent side-selling, GOPDC improves its relations with the local population by enhancing its corporate social responsibility activities or increasing its prices. Since legal processes are expensive and slow in Ghana, legal action against breach of contract is not a workable solution to the problem (interviews with GOPDC senior managers).

minimize the transaction costs of extension activities and fruit collection, each phase of expansion was bound to a strictly demarcated area with a one-shot offer to accept the contract (interviews with GOPDC senior managers). Thus farmers were unable to predict the pace, scope or sites of these expansions. Consequently, self-selection by strategic migration was impossible in our research setting.

When GOPDC decided at a specific date to expand the scheme at a specific location, it offered at short notice a 25-year contract for a specific plot to all farmers who were currently holding a "ready-to-cultivate plot" with ownership rights (interviews with GOPDC senior manager and outgrower association executives).[11] Recognizing the domestic role of sharecropping, at the same time GOPDC introduced a tripartite outgrower contract for sharecroppers with 25-year land use rights.[12] Apart from the fact that the landlord has to sign the outgrower agreement, such tripartite contracts are indistinguishable from contracts with farmers holding property rights to land (GOPDC, n.d.). Outgrowers receive extension services, inputs and credit from the investor (GOPDC, n.d.). Corroborating the findings by Huddleston (2006) and Fold (2008) that farmers were eager to enter into contracts to access credit and technology, our interviews with the executives of the outgrower association and focus group discussions with farmers revealed that to the best of their knowledge nobody had ever rejected an offer.[13]

To prove ownership rights in rural Ghana is challenging as land administration is cumbersome (Amanor, 1999). At the time of data collection, titles verifying property rights to land were not available in the catchment area and deed registration was poor (interview with Lands Commission senior official). But the predominantly customary land tenure system of the Akyem proved to be dynamic as it invented a kind of "informal deed" (Gyasi, 1994; Amanor, 1999). Clan heads and chiefs began to document customary ownership rights and for a small fee enabled land-owning farmers to participate in the scheme (interview with outgrower

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[11] A ready-to-cultivate plot is a cleared plot which is not cultivated with other food or cash crops, but ready to be newly planted. In our research area farmers typically cultivate various plots with food (maize, plantain, cocoyam, cassava, etc.) and cash crops (cacao, citrus, and oil palm) which can be partly intercropped (interview with Ministry of Food and Agriculture official). Given the different crop cycles over multiple farms as well as fallow periods, rural households commonly have ready-to-cultivate plots.

[12] From the late 19th century, long-term sharecropping arrangements became more common than customary ownership rights in Akyem (Gyasi, 1994; Amanor, 1999; Amanor and Diderutuah, 2001). This was the result of increasing land pressure through population growth and the migration associated to the cocoa boom (Gyasi, 1994). Thus, as a flexible instrument to enhance the allocation efficiency of land and labour resources, sharecropping spread (Amanor and Diderutuah, 2001; Amanor, 2010).

[13] To enrich the quantitative data, focus group discussions were conducted between September and November 2011 with independent farmers and outgrowers. Each group consisted of 7 to 15 participants of similar wealth level. They were held in the local languages Twi and Fante, and recorded and transcribed into English.

association executives; Amanor and Diderutuah, 2001). But even though the outgrower scheme was established as a World Bank supported development project and contract farmers received inputs and credit to cope with high investment costs, the poorest farmers are still excluded from the oil palm business as they cannot provide the required land use rights (see also Watts, 1994).

De facto, as many eligible farmers as possible were recruited for the project (Huddleston 2006; interview with GOPDC senior manager) since the investor strove to make full use of the mill and the World Bank aimed to integrate the local population. Given the high cost and the intention of expanding the scheme quickly, agronomic characteristics such as soil fertility or rainfall patterns were not measured on the plots under consideration (interviews with GOPDC senior managers). GOPDC's staff only verified that plots were on low-lying land. This assessment was rather pro-forma, as it is common knowledge in rural Ghana that low land is more suitable than high for oil palm cultivation (Gyasi, 1994; Amanor and Diderutuah, 2001) and farmers do not cultivate oil palm on unsuitable land but rather enter into sharecropping arrangements to balance their needs for low and high lands (Amanor and Diderutuah, 2001). Moreover, to the best of our knowledge, GOPDC assessed neither personal attitudes nor socio-economic characteristics.

De jure, additional criteria were introduced in the contract. Firstly, outgrower plots had to be within 400 metres of an accessible road (GOPDC, n.d.). Recognizing that the road system in the area was underdeveloped, either all farms had to be accessible or none, hence this requirement was de facto not applicable (interviews with GOPDC senior managers and outgrower association executives). Secondly, the outgrower contract called for participants aged 18 to 45, but Huddleston's data set (2006) shows that this criterion was not implemented (which is also in line with statements made in interviews with GOPDC senior managers and outgrower association executives).

To sum up: For oil palm farmers, both outgrowers and independent, secure land use rights (i.e. property rights or long-term sharecropping arrangements) are indispensable and therefore different performance cannot be the result of unequal access to documented land use rights. Moreover, neither our treatment nor our control group (i.e. outgrower or independent farmers) includes the poorest farmers, since high investment costs and difficult access to long-term land use rights prevents them from cultivating oil palms commercially. Most importantly, it was impossible to anticipate the location and scope of the scheme or the date when it would be introduced, and no farmers rejected the scheme. Within the chosen area, both GOPDC and

the World Bank wanted to offer the contract to as many farmers as possible and de facto no pre-selection of participating farmers took place. Hence, we treat the outgrower contracts as a quasi-natural experiment.

4. EMPIRICAL ANALYSIS

4.1. The Empirical Model, Variables, and Estimation Strategy

We estimate the effect of the contractual treatment on subjective well-being using the following general model:

$$y_i = \alpha_0 + \boldsymbol{\beta}' \boldsymbol{x_i} + \boldsymbol{\gamma}' \boldsymbol{l_i} + \boldsymbol{\delta}' \boldsymbol{c_i} + \varepsilon_i$$

y_i stands for the dependent variable, $\mathbf{x_i}$ is a vector of explanatory variables, including socio-demographic variables of the respondents, $\mathbf{l_i}$ represents land related variables, most importantly our measure of contract farming and property rights for land, $\mathbf{c_i}$ includes geographic information for the village and area, and ε_i refers to the error term. $\boldsymbol{\beta}', \boldsymbol{\gamma}'$ and $\boldsymbol{\delta}'$ are parameter vectors relating to the corresponding individual variables, land related variables and geographic information respectively.

Our indicator for subjective well-being is overall life satisfaction, which runs from 0, representing very low subjective well-being, to 10, representing very high subjective well-being. We use ordinary least square estimations throughout our paper, following Ferrer-i-Carbonell and Frijters (2004), who have shown that ordinal and cardinal treatment of the dependent variables leads to similar results. Ordered logistic regressions are estimated as a robustness check and can be found in Appendix B.

Our aim is to identify the causal effect of contract farming on subjective well-being in the context of a large-scale land investment. We use two alternative measures for contract farming. First, we include a dummy variable which takes on a value of one if a household has an outgrower contract on any of its agricultural plots. Second, we replace the dummy by the logarithm of land size under outgrower contract. The majority of households in our sample cultivate several plots. Therefore, outgrowers may have some plots under contract and others used independently. Using the dummy variable, we assume that contract farming has a uniform effect on households independently of the size of land under contract. With our

second measure we relax this assumption by testing size effects assuming that a percentage increase in the size of land under contract has a constant effect.

As having a contract may influence not only subjective well-being but also other household characteristics such as income or aggregated assets, we start by estimating the net effect of contract farming on subjective well-being by including only our measures for participation in the outgrower scheme and exogenous socio-demographic characteristics (model 1 in Table 4 includes the dummy variable and model 2 in Table 4 the logarithm of land size under outgrower contract).

In a second step, we include further land related controls in model 3 in Table 4, most importantly the percentages of land with secure property rights, as well as additional socio-demographic and wealth-related controls. We distinguish between two bundles of property rights, to take into account the fact that customary land rights can vary in quality with regard to disposal and mortgage. The first bundle comprises both the right to use the land as collateral and the right to sell the land, whereas the second contains only the right to use the land as collateral. Recalling that households typically cultivate more than one plot, we include land with secure bundles of property rights as the percentages of the total amount of land owned (running from 0 to 1). These are proxies for landownership at the household level which allow us to capture different property rights regimes of different plots.

In model 4 we also include an interaction term between the bundles of property rights and the outgrower dummy to identify heterogeneous effects for the treatment and the control group. Even though we cannot know if the bundles of property rights to land are exogenous, the interaction might give us a hint about the transmission channels of contract farming. In all estimations we cluster the standard errors on the village level.

The socio-demographic control variables included in models 1 and 2 in Table 4 are age of the head of household and its square, gender of the household head, a dummy variable indicating whether the household does not belong to the regional ethnic majority (Akan), and a dummy for households which migrated to the region before the start of the outgrower scheme. Many studies find a u-shaped relationship between age and subjective well-being (e.g. Blanchflower and Oswald, 2008), indicating lower levels of subjective well-being around middle age. Studies on gender and subjective well-being find either no significant gender effects (Van Landeghem *et al*., 2013) or higher average subjective well-being for females (Dolan *et al*., 2008; MacKerron, 2012). Belonging to an ethnic minority or being a migrant show more

consistent results in the literature, with lower subjective well-being reported for these groups (Verkuyten, 2008; Safi, 2010; Kirmanoğlu and Başlevent, 2013). Whereas some scholars argue that the extent of assimilation to the host environment provides some explanation (Neto, 1995), others find that it is driven rather by perceived discrimination (Verkuyten, 2008; Safi, 2010).

Models 3 and 4 in Table 4 add additional controls. These include a dummy for marital status of the respondent, because married people are believed to be more satisfied with life (Stack and Eshleman, 1998; Diener *et al*., 2000),[14] years of education, which are often found to be correlated to subjective well-being, with results differing in terms of strength and direction (Dolan *et al*., 2008), and a health variable (illness within the household during the previous two weeks), because healthier people show higher subjective well-being (Dolan *et al*., 2008).[15]

Income as a determinant of subjective well-being is the focus of a sizable number of research papers. In general, they find a positive but diminishing correlation of income and subjective well-being. However, reverse causality and further endogeneity problems, caused for example by latent personality traits or uncontrolled health effects, make direct interpretation often problematic. This is shown for example by Graham *et al*. (2004), using panel data from Russia, who find that more satisfied people tend to have higher incomes. Therefore, some studies instrument income with expenditure data (e.g. Kingdon and Knight, 2007; Asadullah and Chaudhury, 2012; Van Landeghem *et al*., 2013). We decided to use data on household's self-rated surplus income, which we consider more relevant in the context of subjective measures.[16] This has the advantage of controlling at least partly for possible measurement errors if we assume that measurement errors are correlated with each other over different subjective measures. People's understanding of what the levels on a scale mean can vary considerably (Winkelmann and Winkelmann, 1998; Van Landeghem *et al*., 2013). For example, a choice of 3 on a scale of 1 to 5 could indicate either a fairly high or a fairly low level of well-being, depending on personal judgment. Moreover, people can show the same

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[14] Including marital status as a right-hand side variable raises issues of reverse causality. See for example Frey and Stutzer (2005) for a discussion.

[15] Oswald and Powdthavee (2008), in their longitudinal study, find partial hedonic adaptation to becoming disabled. In line with this argument, Diener *et al*. (1999) argue for the use of subjective health measures. However, our results hold, as we include subjective health as an additional explanatory variable.

[16] Question: Which of the following is true? The current income of the household: 1= Allows you to build your savings, 2= Allows you to save just a little, 3= Only just meets your expenses, 4= Is not sufficient, so you need to use your savings to meet expenses, 5= Is really not sufficient, so you need to borrow to meet your expenses. In addition we control for household size. We assume that sharecropping is captured by our control for household income. Nonetheless, our results hold as we include a sharecropping dummy.

average well-being levels despite different variance in well-being over time (Ravallion and Lokshin, 2001).

We also use this proxy to construct a relative income variable. People tend to compare themselves with their peer group, with two opposing effects at work (see Van Landeghem *et al.*, 2013, for the subsequent discussion). On the one hand, higher income of one's peers can be seen as a positive sign for overall development, hinting at future improvement of one's own situation, or it can lead to positive externalities, again improving one's own situation; on the other hand, having a higher income than one's peers may lead to higher status, incorporating material and social benefits and a better chance of survival in times of crisis. Empirical research mostly finds the latter effect more pronounced, with negative correlation between average peer's income and subjective well-being (e.g. Dedehouanou *et al.*, 2013, for Senegal; Addai *et al.*, 2013 for Ghana). We construct our measure of relative income of household i as the average self-rated surplus income of all households living in the same traditional area, excluding household i itself. Our data set includes households from three traditional areas, Abuakwa, Kotoku, and Bosome. Anecdotal evidence supports our assumption that people identify with their traditional group; however, results hold if we use the village as the group identifier. In addition, we include an asset index as a stock variable for household's wealth. This variable can of course also be subject to endogeneity, further, it might be correlated to household's income. However, results hold for alternate use as well as for including both variables and the variance inflation factor does not point to serious multicollinearity.

Land related controls are the size of own and neighbours' average agricultural land, the size of the land under cultivation, and the duration of the outgrower contract. Again multicollinearity is not a problem and results hold for alternative specifications. The effect of landownership and secure access to land is seriously under-researched in the subjective well-being literature even though land plays a key role in agrarian societies. In a study of a land reform in Moldova, Van Landeghem, *et al.* (2013) find that own landholdings have a positive effect on subjective well-being but that neighbours' average landholdings have a negative effect. Gobien (2014) has corroborated these findings in the context of a land distribution project in Cambodia.

4.2. Data and Descriptive Analysis

Our survey was conducted between October and December 2010 within a 30 km radius of the GOPDC oil palm mill. In total 824 household heads were interviewed – 436 outgrowers and 388 independent farmers. GOPDC permitted us to draw a random sample out of a total outgrower population of 7,279. Choosing the 95% confidence level with a confidence interval of 5, we ended up with 436 outgrowers spread over 47 different villages in the catchment area (see Table 1).

In addition, we interviewed 388 independent farmers out of an estimated population of 3,000 households in a two-stage selection process (see Table 1). In a first step, we selected 25 villages out of these 47 villages by using village size (small, medium, large) as the stratum for proportional sampling. In the small villages (< 1,000 inhabitants) we sampled all the independent oil palm farmers, but we applied a second-stage cluster sampling for medium (>1,000–5,000 inhabitants) and large (>5,000 inhabitants) villages. To avoid biases through migration effects, we excluded from our survey migrant households which had been in the catchment area less than 24 years since the introduction of the outgrower scheme.

Table 1. Populations and sampling

Contractual arrangement	Population size	Sample size
Outgrowers (OG)	7,279	436
Independent Farmers (IF)	unknown ≈ 3,000	388
Observations	≈ 10,279	824

Note: OG are based on random sampling. IF are based on a two-stage sampling with community size as stratum and clustering at village level.

Tables 2 and 3 and Figure 1 offer some descriptive statistics for our sample. Table 2 shows that mean life satisfaction for outgrowers (6.853) is significantly higher than for independent farmers (5.345).

Table 2. Descriptive statistics of outcome variable

Outcome variable	Observations	Means (sd)	Diff. in means

		Outgrowers	Independent farmers	
Overall life satisfaction	824	6.853 (1.651)	5.345(1.702)	***

Note: Significance levels at: *** $p<0.01$, ** $p<0.05$, * $p<0.1$, difference in means according to Wilcoxon rank sum test.

A more detailed look at the histogram in Figure 1 shows that the modus for independent farmers is at a satisfaction level of 4, reported by roughly 30%, whereas for the outgrowers it is at a level of 8, reported by roughly 27%. Hence, descriptive analysis provides some initial evidence that life satisfaction is higher for contract than independent farmers.
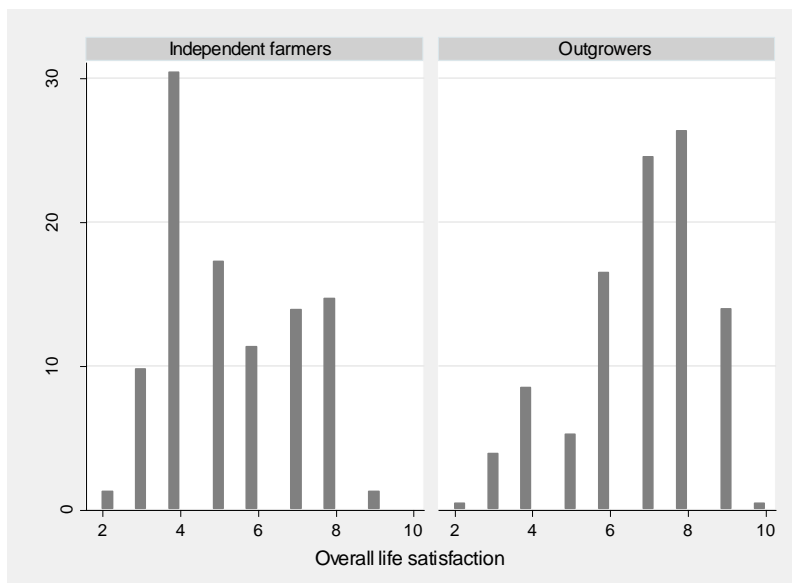
Figure 1. Histogram of overall life satisfaction (0–10) for independent farmers and outgrowers

In line with this finding, Väth (2013) concludes that focus group discussions with contract farmers in our research area reveal that GOPDC's outgrower scheme is perceived quite positively, especially with regard to security-related aspects. Benefits mentioned were reduced market uncertainties, infrastructural improvements, training in agricultural techniques and technologies promoted by GOPDC, such as plant spacing, fertilizer application and the use of chainsaws. Topping the list of things these farmers appreciated were improved market participation through the introduction of commercial oil palm farming in the area, and access to inputs, credits and training, which allowed them to set up businesses and earn cash. These benefits enabled them to enrol their children in school, and enabled some to save enough money to send their children to university.

Table 3. Descriptive statistics of independent variables (means)

CATEGORIES	VARIABLES	Means (sd)				Diff. in means
		Outgrowers (436)		Independent farmers (388)		
Land-related characteristics	Land under contract (in acres)	9.914	(7.625)	-		
	Own land (in acres)	6.202	(12.81)	4.821	(5.519)	**
	Land under cultivation (in acre)	17.27	(10.47)	9.410	(5.794)	***
	% of land with rights to sell and use as collateral (0–1)	0.251	(0.364)	0.453	(0.460)	***
	% of land with rights to use as collateral	0.0520	(0.186)	0.0880	(0.245)	*
Socio- demographic characteristics	Education of household head (years)	8.25	(5.120)	6.938	(4.602)	***
	Gender of household head (1= female)	0.222	(0.416)	0.186	(0.389)	
	Age of household head	52.110	(11.243)	47.007	(12.56)	***
	Not Akan (different ethnicity)	0.374	(0.484)	0.353	(0.478)	
	Migrant	0.314	(0.465)	0.139	(0.347)	***
	Household head is married	0.827	(0.380)	0.814	(0.389)	
	Household member ill (last 2 w.)	0.408	(0.492)	0.183	(0.387)	***
	Household size	6.041	(2.844)	4.054	(2.09)	***
Wealth characteristics	Subjective income	3.278	(1.218)	3.317	(0.994)	
	HH aggregated assets (in GH Cedi)[+]	1,126	(24,274)	732	(3,673)	***
Village level characteristics	Large village (>5,000)	0.255	(0.436)	0.232	(0.423)	
	Small village(>1,000)	0.294	(0.456)	0.289	(0.454)	
	Traditional area: Bosome	0.0229	(0.150)	0.0387	(0.193)	
	Traditional area: Kotoku	0.463	(0.499)	0.407	(0.492)	

Note: Significance levels at: *** $p<0.01$, ** $p<0.05$, * $p<0.1$; for dummies: yes = 1, no = 0; subjective income: 1= very high, 5= very low; two sample tests of proportions for dummies, otherwise Wilcoxon rank-sum tests are applied. [+]As assets are strongly skewed to the right, medians are more informative than means. The exchange rate for Ghana is at 1 October 2010: 1 GHS = 0.70 USD.

If we compare the independent variables in Table 3 we see that the two groups have quite similar time-invariant socio-demographic and village level characteristics. However, asset accumulation seems more prevalent for outgrowers than for independent farmers. Contractual arrangements could have led the two groups on different development paths over the years. In particular, contractors own more land and have more land under cultivation than the independent farmers, and their aggregated assets are roughly one third higher. Independent farmers depend more heavily on cash income for investment during the planting season and have more need to accumulate savings to mitigate shocks than contract farmers do, since the latter access inputs and credit through GOPDC. It seems likely that outgrowers use their cash income to access and cultivate additional land and improve their livelihood by purchasing new assets. In line with this idea, descriptive analysis reveals that outgrowers obtained roughly 75% of their independently farmed food or cash crop plots after they entered into

contract farming. Thus, the "land gap" between outgrowers and independent farmers accrued after contractual treatment.

4.3. Regression Analyses

As Table 4 shows, we find that holding an outgrower contract has a highly significant positive effect in all four models. Confirming our hypothesis, the outgrower dummy has a strong effect, increasing overall life satisfaction by roughly 1.5 points on a scale of 0 to 10 (models 1, 3 and 4). The size of the land under outgrower contract, however, has only a small effect. The coefficient of 0.175 for the logarithm of contracted land in model 2 implies that a farmer would need an increase in land under contract of over 30,000% to achieve a one point increase in overall life satisfaction. It therefore seems likely that spillover effects of plots under contract enhance life satisfaction for contract famers independently of the size of the land under contract and that size-independent effects, like increased security or improved access to credit, account for the major part of the effect. Consequently, we concentrate on the dummy variable in the subsequent regressions. The outgrower dummy remains significant and similar in size when we only control for exogenous socio-demographic and village level characteristics (model 1) and also when we add further socio-demographic-, land- and wealth-related controls (model 3 and 4).

The adjusted r-squared for the models with additional controls (models 3 and 4), 0.336 and 0.354 respectively, is higher than for the net effects models, where it is only just above 0.2 (models 1 and 2). Among other things, this is caused by a significant positive effect of property rights on overall life satisfaction. While a 100% increase in land with the property rights to use it as collateral adds 1.8 points on the life satisfaction scale (model 3), a 100% increase in land with the property rights to use it as collateral and to sell adds 2.2 points (model 3). Thus, the difference between the two bundles is rather small. Interestingly, the absolute size of own land as well as the size of average land owned by neighbours turns out insignificant.[17] The size of own land holdings thus does not seem to matter, whereas having a higher share of one's land with secure rights adds positively to subjective well-being. This is fully in line with our hypothesis that secure property rights matter for overall life satisfaction. Moreover, the size of the land under cultivation makes a positively significant contribution to overall life satisfaction (models 3 and 4). Although the effect is rather small, a doubling of the acreage of land under cultivation adds 0.43 points on the life satisfaction scale (model 3).

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[17] Land owned does also not turn significant if we exclude land under cultivation.

Table 4. Estimations of overall life satisfaction

VARIABLES	(1)	(2)	(3)	(4)
Outgrower dummy	1.418***		1.438***	1.591***
	(0.305)		(0.330)	(0.337)
Acres of land under outgrower contract (log)		0.175***		
		(0.0360)		
Years under outgrower contract	0.00687	-0.000602	-0.00247	-7.60e-05
	(0.0194)	(0.0212)	(0.0206)	(0.0208)
Own land in acres (log)			-0.00547	-0.000753
			(0.0145)	(0.0151)
Average own land of others (log)			7.987	8.490
			(7.444)	(6.545)
Cultivated land in acres (log)			0.436***	0.442***
			(0.120)	(0.116)
% of land with property rights to sell and to use as collateral (0-1)			2.207***	2.811***
			(0.433)	(0.420)
% of land with property rights to use as collateral (0-1)			1.814***	2.659***
			(0.373)	(0.289)
Outgrower dummy * % of land with property rights to sell and to use as collateral				-2.962***
				(0.777)
Outgrower dummy * % of land with property rights to use as collateral				-2.143***
				(0.568)
Socio-demographic & village level controls	yes	yes	yes	yes
Wealth-related controls	no	no	yes	yes
Observations	824	824	824	824
R-squared	0.209	0.215	0.357	0.376
R-squared adjusted	0.198	0.204	0.336	0.354
Test of joint significance	$F(11, 46) =$ 16.31***	$F(11, 46) =$ 19.26***	$F(26, 46) =$ 54.56***	$F(28, 46) =$ 112.40***
Standard error of regression	1.6441	1.6382	1.4963	1.476
Schwarz information criterion	3226.31	3220.305	3156.415	3145.261

Note: The estimator is OLS. Clustered standard errors at village level in parentheses; significance levels at: *** $p<0.01$, ** $p<0.05$, * $p<0.1$; full estimations are reported in Appendix A.

Holding an outgrower contract and possessing bundles of property rights to land (to use as collateral, or to use both as collateral and to sell) are ways to gain security. Thus, we want to know whether these two effects are in an additive or substitutive relationship. Introducing two interaction terms with the outgrower dummy reveals that both bundles of property rights no longer have an effect on outgrowers' subjective well-being as both terms turn out negatively significant. According to F-test statistics, coefficients of the property rights bundles (2.8 and 2.7) and the interaction terms (-2.9 and -2.1) add up to zero (p-value= 0.00 for model 4). Consequently, this hints at a substitutive effect.

A plausible explanation is this: while independent farmers rely on property rights to reach a level of security which has a positive effect on their subjective well-being, outgrowers access

security via the contract and do not gain additional overall life satisfaction from secure property rights. A comparison of different model selection criteria between models 3 and 4 shows a higher adjusted r-squared (0.336 vs 0.354), a higher F-value in the test for joint significance (54.56 vs 112.40), a smaller standard error of regression (1.4963 vs 1.476), and a smaller Schwarz information criterion (3156.415 vs 3145.261) for model 4, hinting at a better fit of this model.

Furthermore, our regression analyses corroborate earlier research by showing positive significant effects for the first and second highest subjective income quintiles, whereas increasing household size and belonging to an ethnic minority have significant negative effects on overall life satisfaction (models 3 and 4 in Table 5 in Appendix A). Aggregated assets have a significant positive effect, whereas being female is, in contrast to findings in the literature, weakly negatively significant in model 3 but turns insignificant in model 4 (Appendix A).

Our results hold for all model specifications when we replace the outgrower dummy with the logarithm of land size under contract (assuming that a percentage increase in the size of land under contract has a constant effect) and when we include the outgrower dummy together with the size of land under contract (correcting for the spike at a value of zero).[18] Using the logarithm of absolute land size with different bundles of property rights instead of percentages produces also similar results. The same holds true for replacing average own land of neighbours with average cultivated land of neighbours and for replacing subjective income with actual household income or agricultural expenditure. Moreover, our results remain robust if we reduce the scale of our dependent variable to seven (by collapsing categories 0, 1, 2 and 3 and categories 9 and 10) as well as to five (by collapsing categories 0, 1, 2, 3 and 4 and categories 8, 9 and 10), which are also commonly used in the literature.[19]

Table 6 in Appendix B presents further robustness tests based on the specification of model 4 in Table 4. First, we estimate an ordered logit model to test for the effect of the estimation procedure (model 1). The logistic estimator confirms our findings from the OLS regression. In the second model specification we exclude 'extreme' landowners (more than 30 acres) from our sample to avoid possible bias (model 2). The coefficients of the outgrower dummy, the two property rights variables, and their interactions are all highly significant and keep the

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[18] The outgrower dummy remains highly significant and the size of land under contract becomes insignificant in this specification. Thus, it confirms the on-off-effect of contract farming.

[19] Results are available upon request.

same direction. Finally, we estimate overall life satisfaction separately for landowners (model 3) and for landless farmers (model 4). Again, the outgrower effect is positive and significant in both models. Bundles of property rights show a significant positive sign and their interaction with the outgrower dummy shows a significant negative sign in the model for landowners. Hence, various robustness checks reveal that results hold for different model specifications and different estimation techniques.

5. CONCLUSION

In this paper we use a setting where outgrower contracts were allocated in a quasi-natural experiment to analyse the causal effect of contract farming on subjective well-being in the sphere of a large-scale investment in land in Ghana. Studies which try to identify the causal effect of contract farming are rare, and hampered by methodological difficulties: those using instrumental variables often face problems caused by weak instruments and those using panel data can only control for time-invariant unobserved factors. To the best of our knowledge this is the first documented setting where contractual treatment took place as a quasi-natural experiment.

Corroborating the findings of the panel data analysis by Dedehouanou *et al*. (2013), we find that contract farming has a positively significant effect on subjective well-being. Using a life satisfaction scale of 0 to 10, we find that subjective well-being is on average roughly 1.5 points higher for contract than for independent farmers. This effect is not limited to monetary aspects but also comprises non-monetary benefits. In particular, we believe that contracts help smallholder farmers to overcome market imperfections and reduce their vulnerability to shocks by mitigating production and marketing risks. Thus, holding an outgrower contract contributes to satisfaction in the security domain encompassed in multi-dimensional concepts of overall life satisfaction (e.g. Cummins, 1996).

Further supporting this view is our finding that secure property rights to land enhance overall life satisfaction for non-contract farmers but cannot increase it for outgrowers. In rural areas secure property rights to land fulfil an important security function and therefore also influence overall life satisfaction through the security domain. Rojas (2006) finds that additional gains in life satisfaction from increases in one domain, such as security, tend to perish with enhanced satisfaction in this domain. This is in line with our finding that holding a contract and gaining security through property rights show a substitutive relationship: outgrowers can satisfy their security needs through a well-defined contract whereas non-contract farmers lack

this source of security and thus rely on property rights for their security. Moreover, in an environment where clearly documented land use rights are rare, the outgrower contract might by itself serve as a document recording land use right.

In the context of large-scale land acquisitions, well-designed outgrower contracts are believed to benefit both local farmers and the investor. Our research supports this idea. However, our results must be treated with caution and may be only applicable to similar settings. In our setting, farmers' bargaining position is strong due to excess demand for the contracted crop, high monitoring costs for side selling, and the lack of specified quality standards. In addition, we cannot ensure that property rights are exogenous in our setting. Moreover, we do not claim that outgrower contracts can replace secure property rights to land; we rather claim that contract farming can increase subjective well-being, especially through security gains in a setting where existing local land rights are respected. Nevertheless, in order to promote sustainable development, accompanying measures will be necessary to include the poorest population groups.

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APPENDIX A: ESTIMATIONS OF OVERALL LIFE SATISFACTION

Table 5. Full estimations of overall life satisfaction from Table 4.

VARIABLES	(1)	(2)	(3)	(4)
Outgrower dummy	1.418***		1.438***	1.591***
	(0.305)		(0.330)	(0.337)
Size of land under outgrower contract (log)		0.175***		
		(0.0360)		
Years under outgrower contract	0.00687	-0.000602	-0.00247	-7.60e-05
	(0.0194)	(0.0212)	(0.0206)	(0.0208)
Own land in acres (log)			-0.00547	-0.000753
			(0.0145)	(0.0151)
Average own land of others (log)			7.987	8.490
			(7.444)	(6.545)
Cultivated land in acres (log)			0.436***	0.442***
			(0.120)	(0.116)
% of land with property rights to sell and to use as collateral (0-1)			2.207***	2.811***
			(0.433)	(0.420)
% of land with property rights to use as collateral (0-1)			1.814***	2.659***
			(0.373)	(0.289)
Outgrower dummy * % of land with property rights to sell and to use as collateral				-2.962***
				(0.777)
Outgrower dummy * % of land with property rights to use as collateral				-2.143***
				(0.568)
Years of schooling			-0.00221	-0.00289
			(0.0131)	(0.0123)
Gender (1= female)	-0.308*	-0.279*	-0.283*	-0.252
	(0.167)	(0.165)	(0.158)	(0.156)
Age	0.0129	0.0106	0.0355	0.0297
	(0.0317)	(0.0323)	(0.0300)	(0.0285)
Age squared	-9.06e-05	-7.15e-05	-0.000393	-0.000344
	(0.000311)	(0.000319)	(0.000295)	(0.000284)
Ethnic minority	-0.415***	-0.411***	-0.232**	-0.235**
	(0.116)	(0.113)	(0.110)	(0.109)
Migrant	-0.191	-0.203	-0.146	-0.143
	(0.147)	(0.142)	(0.127)	(0.130)
Married			-0.0539	-0.0581
			(0.156)	(0.159)
Ill in last 2 weeks			0.152	0.152
			(0.107)	(0.109)
Household size			-0.0777***	-0.0773***
			(0.0272)	(0.0269)
Big village (> 5,000)	0.148	0.149	0.0533	0.0664
	(0.120)	(0.128)	(0.141)	(0.142)
Small village (< 1,000)	-0.158	-0.173	-0.127	-0.118
	(0.143)	(0.144)	(0.145)	(0.144)
Bosome (trad. area)	0.810***	0.814***	3.896	4.418
	(0.210)	(0.205)	(3.850)	(3.340)
Kotoku (trad. area)	0.223**	0.219*	0.0275	0.109
	(0.106)	(0.112)	(0.175)	(0.171)
1. subjective income quintile			0.985***	0.975***
			(0.255)	(0.253)
2. subjective income quintile			0.655**	0.559**
			(0.259)	(0.258)
3. subjective income quintile			0.103	0.0436

APPENDIX B. ROBUSTNESS CHECKS

Table 6. Further estimations of overall life satisfaction

VARIABLES	(1)	(2)	(3)	(4)
	Ordered logit full sample	OLS excluding extreme landowners	OLS landowners only	OLS land less only
Outgrower dummy	1.857***	1.565***	1.201***	2.025***
	(0.452)	(0.346)	(0.425)	(0.508)
Years under outgrower contract	0.00118	0.00315	0.0255	-0.0243
	(0.0267)	(0.0213)	(0.0231)	(0.0283)
Own land in acres (log)	0.00113	-0.00191	-0.103	
	(0.0162)	(0.0154)	(0.0709)	
Average own land of others (log)	8.769	9.057	7.033	
	(9.678)	(7.412)	(7.150)	
Cultivated land in acres (log)	0.479***	0.445***	0.507***	0.439**
	(0.145)	(0.114)	(0.118)	(0.191)
% of land with property rights to sell and to use as collateral(0-1)	3.193***	2.850***	2.877***	
	(0.494)	(0.413)	(0.445)	
% of land with property rights to use as collateral (0-1)	2.922***	2.689***	2.743***	
	(0.399)	(0.282)	(0.318)	
Outgrower dummy * % of land with property rights to sell and collateral	-3.820***	-2.924***	-3.337***	
	(0.812)	(0.753)	(0.745)	
Outgrower dummy * % of land with property rights to use as collateral	-2.155***	-2.083***	-2.174***	
	(0.827)	(0.623)	(0.624)	
Years of schooling	-0.00257	-0.00187	-0.00689	0.00533
	(0.0163)	(0.0125)	(0.0161)	(0.0172)
Gender (1= female)	-0.277	-0.289*	-0.0361	-0.689**
	(0.196)	(0.162)	(0.212)	(0.256)
Age	0.0341	0.0357	0.0304	0.0588
	(0.0387)	(0.0320)	(0.0295)	(0.0562)
Age squared	-0.000395	-0.000412	-0.000343	-0.000661
	(0.000389)	(0.000321)	(0.000293)	(0.000575)
Ethnic minority	-0.240*	-0.227**	-0.204	-0.171
	(0.132)	(0.112)	(0.169)	(0.192)
Migrant	-0.116	-0.173	-0.0136	-0.377**
	(0.161)	(0.134)	(0.181)	(0.186)

Married	-0.0430	-0.0576	-0.0648	-0.00421
	(0.184)	(0.164)	(0.217)	(0.266)
Ill in last 2 weeks	0.103	0.140	0.252*	-0.0104
	(0.134)	(0.112)	(0.143)	(0.167)
Household size	-0.0831**	-0.0846***	-0.0844**	-0.0747*
	(0.0367)	(0.0260)	(0.0342)	(0.0386)
Big village (> 5,000)	0.0754	0.0440	0.0653	0.0680
	(0.184)	(0.144)	(0.173)	(0.238)
Small village (< 1,000)	-0.0903	-0.133	-0.0633	-0.301
	(0.187)	(0.146)	(0.210)	(0.194)
Bosome (trad. area)	4.743	4.631	4.329	-0.0541
	(4.934)	(3.708)	(3.332)	(1.378)
Kotoku (trad. area)	0.209	0.0820	0.219	-0.0132
	(0.213)	(0.183)	(0.225)	(0.481)
1. subjective income quintile	1.297***	0.904***	1.366***	0.176
	(0.330)	(0.256)	(0.234)	(0.449)
2. subjective income quintile	0.753**	0.536**	0.671**	0.514
	(0.332)	(0.263)	(0.270)	(0.347)
3. subjective income quintile	0.0426	0.0128	0.171	-0.0418
	(0.238)	(0.190)	(0.267)	(0.237)
4. subjective income quintile	0.242	0.0960	0.238	0.0664
	(0.229)	(0.179)	(0.210)	(0.314)
Average subjective income of others	7.171	6.600	6.530	-2.082
	(7.905)	(6.057)	(5.187)	(3.477)
Aggregated assets (log)	0.160*	0.118*	0.136*	0.146
	(0.0835)	(0.0693)	(0.0789)	(0.0986)
Constant	37.08	-34.41	-31.01	9.351
	(42.42)	(32.50)	(28.94)	(11.21)
Observations	824	809	483	341
R-squared		0.374	0.457	0.300

Note: Clustered standard errors at village level in parentheses; significance levels at: *** $p<0.01$, ** $p<0.05$, * $p<0.1$; reference categories: main ethnicity: Akan, traditional area: Abuakwa, village: small, subjective income: poorest quintile. In model (2) extreme landowners with own land > 30 acres are excluded. In model (3) landless farmers are excluded, whereas model (4) excludes landowners.