# Using national statistics to increase transparency of large land acquisition: Evidence from Ethiopia

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***Abstract:*** Almost a decade after the rise in land demand triggered by the 2007/08 commodity price boom, most potential target countries still lack access to relevant information on a routine basis. This has reduced their ability to effectively regulate, monitor and attract responsible investors rather than speculators in their effort to increase agricultural productivity and have benefits accrue to the host communities. The example of Ethiopia shows how building on existing data collection efforts allows to address this challenge and help formulate policies that guide the path forward. Using the 2013/14 nationally representative smallholder and commercial farm surveys, we find that (i) for most crops commercial farms' yields are higher than smallholders', with a peak in the 10-20 ha bracket; (ii) commercial farms create few permanent jobs (with just one permanent job per 20 ha) and use only 55% of the land transferred to them; and (iii) after a peak in 2008, formation of new commercial farms is down to the pre-2007 levels. These findings imply that having reliable data on commercial farms, collected on regular intervals, could generate feedback loops for policy formulation and also provide vital information to assess and take regulatory actions aimed at improving the performance and attracting higher levels of investment to the sector.

*JEL Classification*: Large land acquisition; commercial farms; productivity; Africa; Ethiopia

*Keywords*: Q12; Q15; Q16; Q24

## 1. Introduction

Nearly a decade after the 2007/08 commodity-price boom triggered a global 'rush' for agricultural land by investors, a number of stylized facts regarding this phenomenon seem agreed. First, weak or fragmented institutions compromised countries' ability to channel such demand towards areas where it would yield the highest returns or to reject non-viable proposals from inexperienced investors. As a result, benefits have often been below expectations and a sizeable share of investors either went out of business or failed to fully utilize all the land allocated to them. Second, though land demand retreated from 2008 levels, experts expect it to continue, albeit at lower levels than those observed at the height of the 'land rush'. In fact, efforts such as the principles of responsible agricultural investment (Committee for World Food Security 2014) depart from the belief that, if guided by a coherent and enforceable policy, 'responsible' agricultural investment can provide countries that continue to depend on agriculture with capital and opportunities to add value and generate local benefits. Yet there is little doubt that, to realize such benefits while minimizing the potential for negative effects in a way that takes account of local conditions, a clear and enforceable regulatory environment is needed.

Without reliable data on the performance of different types of farms, it will be difficult to discover new technologies, quantify risks, and identify ways to structure and enforce incentive compatible contracts. Regular and up-to date information is needed on (i) how well land transferred to investors is utilized and if not what remedial action (e.g., canceling of licenses) may be appropriate; (ii) the extent to which there is a level playing field between local producers of different sizes and outside investors and how their productive performance compares; and (iii) where in the value chain, either up-stream in agro-processing, in mixed nucleus estate models with out-growers, or fully own production, investment would be most desirable and what complementary public inputs may encourage such investment. Beyond helping government to design and implement policy, reliable data on these issues will also help the investors by increasing transparency of technology options, allowing to quantify and insure against risks, and providing a basis for documenting compliance with global standards. Up to now, few countries where large scale investment is an issue have

developed systems to regularly provide the data needed and much of the empirical literature is still based on case studies the representativeness of which is difficult to establish and that are more suited to describing contextual and process-related issues than making causal inference.

To explore ways of satisfying such information needs in an effective and sustainable way, we draw on a nationally representative 2013/14 commercial farm survey in Ethiopia. Doing so allows us to document changes in levels and nature of land-based agricultural investment over time, the direct transfers to local communities it involved, and the extent to which land transferred is actually utilized. Ethiopia is of interest not only as a country that has recently attracted significant interest from investors but also because of a long tradition of collecting systematic data on large (state) farm performance which, due to poor data quality, were often not reported or even stopped intermittently. It also has an extensive national small farm survey which we can combine with large farm data to compare yield and input use between large and small farmers.

A number of interesting conclusions emerge. First, even at the peak of the 'land rush', the amount of land transferred to investors in commercial farms, most owned by Ethiopians rather than foreigners, was much less than claimed in some widely quoted reports (Oakland Institute 2011). In fact, after 2011, levels of annual land transfers reverted more or less to the levels reached before 2007. Second, largely due to technology and labor constraints, about 55% of land transferred remains unutilized. Third, with one permanent job per 20 ha, in addition to some temporary jobs, commercial farms do not generate large amounts of direct employment. Finally, for most crops, commercial farms' yields (on area cultivated) are roughly 50% more than those by smallholders with yields highest in the 10-20 ha category. If this difference can be attributed to efficiency rather than more intensive input use or better endowments (e.g., irrigation, soil quality, or location close to infrastructure), it would increase the plausibility of positive spillovers from commercial to neighboring smallholder farms complementing their direct effects. The extent to which such spillovers materialize and the entry and exit dynamics in the farm sector merit further study.

The paper is structured as follows. Section two provides background information on the 'global land rush' discusses Ethiopia's context and data collection efforts as well as improvements made and our approach.

Section three presents survey evidence on commercial farms including ownership structure, levels of land utilization, cropping patterns, perceived constraints. Section four compares commercial and small farmers' productive performance and draws out implications for future data collection. Section five concludes with implications for policy and research.

## 2. Background and literature

Although the volume of new land deals globally has declined from its 2007/08 peak, most experts agree that large scale land acquisition will not disappear. To identify opportunities where different business models might make sense and adopt regulations to attract capable investors who can make effective use of transferred land, reliable information is essential. This requires complementing global or case study evidence with nationally representative figures. The case of Ethiopia provides lessons in this respect.

### 2.1 The global land rush (nearly) a decade on

After decades of stagnant or declining commodity prices when agriculture was considered a 'sunset industry', increased levels and volatility of commodity prices and a concomitant rise in global land demand led to what some view as a 'grab' for land (Pearce 2012) or water (Rulli *et al.* 2013) that risks depriving farmers and communities of resources rather than providing them with development opportunities. The size of land demand took many country governments by surprise. Without the infrastructure to check investors' business plans, provide information or assistance with negotiation to communities where land demand had surfaced, document impact and verify compliance with contract terms, many transfers indeed failed to lead to increased productivity use or generate local benefits (Deininger and Byerlee 2011).[1] In light of a historically high failure rate of such investments (Tyler and Dixie 2013) and welfare effects depending on the labor intensity of new farms and the opportunities open to displaced land users (Kleemann and Thiele 2015), the fact that many investments failed to not only live up to the high and possibly exaggerated expectations by their proponents but also to enhance local welfare should not come as a surprise.

At the same time, it is argued that in developing countries where land is relatively abundant, there is a need to go beyond the dichotomy of large vs. small and look at new ways of harnessing synergies between the two (Collier and Dercon 2014). While principles for doing so have been developed,[2] countries face two challenges. First, they need to separate 'pioneers' who have technical know-how and financial means to increase productivity and generate local benefits from 'speculators', including urban elites (Sitko and Jayne 2014), who may acquire large tracts of land without using it productively in the hope of benefiting from future price appreciation (Collier and Venables 2012). Attracting the former requires clear regulations (including taxes), protection of existing rights, and strong negotiating and monitoring capacity. Second, as agricultural investment is risky and not all ventures will succeed, strategies to discover and deal with failed ventures, including ways for them to exit without imperiling local people, are needed. This is of relevance as in many of the concerned countries land markets that could otherwise be relied upon to transfer land to better uses are outlawed. Historical experience demonstrates that large land owners who are unable to compete in the market may use political channels to affect factor prices, e.g., by trying to keep down labor cost or constrain access to capital, with potentially very unfavorable long-term consequences.[3]

While the 2007/08 surge in land-related investment prompted efforts at systematic data collection (Anseeuw *et al.* 2012), global databases suffer from weaknesses including a lack representativeness (Cotula 2014) and a failure to reflect nuances in local legal and physical environments (Hall 2011). Studies relying on these data can help identify broad challenges for natural resources such as water (Rulli and D'Odorico 2013) and land transfers' association with weak governance (Arezki *et al.* 2015) or corruption (Bujko et al. 2015) but not inform national policy. Case studies often find land deals to have ambiguous or negative effects (German *et al.* 2013) due to gaps at the negotiation or enforcement stage, i.e., lack of transparency, limited disclosure, and failure to adhere to legally required processes of local consultation (Nolte and Voget-Kleschin 2014) or failure to monitor contract implementation (Cotula 2014). While they can fill a gap, they often give little thought to representativeness or replicability (Schoneveld 2014).[4]

To inform policy, data with broader coverage are often needed. Though use of representative data is still evolving for land-based investment,[5] the extractives literature illustrates how household or administrative data can help assess impacts of investment on gender wage gaps and female empowerment (Aragon *et al.* 2015; Kotsadam and Tolonen 2015), agricultural productivity (Aragon and Rud 2013), local labor demand (Aragon and Rud 2012), and long-term economic development (Hornbeck and Keskin 2015).

**2.2 Ethiopia's context**

Large farm investment is not new to Ethiopia; in fact in the pre-revolutionary period, the state used large subsidies to attract commercial investment in agriculture for mechanized cash crop production in so-called 'model farms' the establishment of which was often associated with tenant evictions. After the 1974 revolution, the Derg converted most of these into state farms for food production. Although yields were above peasants', their efficiency and contribution to national agricultural output (2%) remained low (Abebe 1990).

After 1990, a strategy of market liberalization and agriculture-led industrialization focusing on small-scale producers, defined as those with a size below 10 hectares, was adopted.[6] To assess its effect, Ethiopia's Central Statistical Agency (CSA) started collecting annual data on smallholders' productive performance using a survey administered by resident enumerators to a representative sample of 40,000 farmers nationally. Information has been collected on inputs application with a crop cutting exercise for a minimum number of plots per crop and enumeration area.

The transition to a market oriented economy was followed by higher private investment in commercial farms whose share of the country's gross agricultural output increased to about 7%. In fact, reference to potential benefits in terms of food security, job creation, technology transfer, capital accumulation, export promotion, and environmental sustainability led the Government's latest 5-year Growth and Transformation Program (GTP) to put considerable focus on investment in commercial farms. A 'State Farms Survey' that involved complete enumeration of the country's universe of commercial farms had been part of Ethiopia's annual agricultural sample survey from the very beginning. Yet, data were based on

farms' administrative records rather than actual enumeration and often bore little relationship to field realities.[7] To reduce such reliance on secondary sources, CSA included a complete enumeration of commercial farms using a sample frame assembled from information provided by zonal investment offices,[8] in its 2001/02 agricultural sample enumeration. Quality was, however, reduced by high non-response rates and weak supervision. Although large and medium commercial farm surveys were conducted on a regular basis in subsequent years, results were not published and underlying data not disseminated. Eventually, CSA's program of large and medium scale commercial farm surveys was suspended in 2005/06, just before investor interest in large scale land-based investment peaked.

In 2007/08, such surveys were resumed, with a number of modifications, namely (i) use of a smaller number of more highly qualified field staff to gather information; (ii) a reduction of the sample size by only covering the universe of farms above a certain cut-off point (50 ha) and a sample of commercial farms below this size; (iii) streamlining the survey instrument to focus on essential information first with the option of expanding as experience accumulates; (iv) collaboration with other agencies, in particular the Investment Agency, to update the sample frame; and (iv) area measurement by GPS to get a point of reference that makes it more difficult for respondents to intentionally provide mis-information. Still, when policy makers required information on the contribution of different types of commercial farms to the national economy and on regulatory measure to maximize such impact, survey data proved insufficient to provide answers beyond simple output estimates for national production statistics.

To remedy this, a technical cooperation with the World Bank's research department was initiated starting with the 2013/14 survey focusing on two aspects. First, the questionnaire was expanded to include time and amount of original land receipt, basic data on labor use, investment, and markets, and perceived obstacles to further expansion. Second, efforts were made to link data over time and use the frame to obtain an estimate of the amount of land transferred to commercial farms that is entirely unused and to link different survey rounds over time to measure changes in performance over time by any given farm (Beyene 2015). The demonstration effect of these changes, including the ability to better appreciate the nature of Ethiopia's

large farm sector as described below, led CSA to further modify the instrument for the 2014/15 season to collect data on inputs and outputs at the plot rather than the farm level.[9]

### 2.3 Approach and data sources

If, as argued above, large scale land-based investment will not disappear quickly and wide availability of quantifiable information will affect not only governments' ability to formulate and enforce regulation but also the type of investor that can be attracted, it will be important to explore the extent to which case studies and costly one-off surveys can be contextualized and complemented with routine and systematic data collection that is fully integrated with countries' regular farm and household survey program. We use the case of Ethiopia to explore the extent to which doing so can generate nationally representative evidence to complement available evidence. Particular interest is in the rate of large farm establishment over time and the role of foreigners vs. Ethiopian nationals; the extent to which land been transferred to large commercial farms is productively utilized; and the amount of direct benefits accruing to local communities via job creation or rental payments; and the yields obtained by large farms in comparison to those by smallholders.

To provide policy-relevant evidence on large farm performance, we rely on the 2013/14 round of CSA's commercial farm survey that covers the universe of farms cultivating more than 50 ha and a sample of those cultivating between 10 and 50 ha with an instrument as discussed above. Note that, while this survey makes provision for intensive livestock operations, farms focusing on flowers and horticulture are excluded. To compare with smallholders, we use the 2013/14 round of CSA's smallholder survey that covers a sample of 44,993 agricultural households in 2,226 enumeration areas nation-wide (Central Statistical Agency 2014).[10] Mapping the location of kebeles corresponding to the sampled enumeration areas and commercial farms above 50 ha in figure 1 illustrates the location of large farms in Ethiopia.

[Figure 1 about here]

## 3. Descriptive evidence

Survey data on operational farms allow us to characterize overall land transfers and large farm performance in a way that disposes of some common myths. First, with some 200 ha per farm, mean area initially transferred to large farms is below what has been reported in other databases or studies. Second, direct benefits from such investment on neighboring smallholders may be limited by the fact that most investment focuses on farm-level infrastructure, less than 5% of large farms have credit outstanding and the amount of lease fees paid seems modest. Third, with one permanent employee per 20 ha, job creation is below the amount of labor absorbed by smallholder agriculture, in line with the notion that job creation by large farms remains limited. Finally, disputes and lack of technology as well as manpower prevent some 43% of commercial farms' land from being fully utilized, suggesting that tighter screening in the pre-investment phase or monitoring once ventures started may help increase efficiency of resource use.

### 3.1 Scale and use of lands transferred

Starting from 1991, some 1.33 million ha had been allocated to 6,600 commercial farms with the rate of transfer having peaked in 2008 but since then fallen to pre-2007 levels.[11] As large farms' plots were geo-referenced and we know the start date for each sample farm, we can map the evolution of commercial farms over time.[12] Results show an initial cluster of sesame and sorghum farms comprising transformed state farms in the North-West, followed by expansion of commercial farming for maize and wheat in the center, and eventually a movement towards the border regions of Benishangul-Gumuz and Gambella (see figure 2).[13]

[Figure 2 about here]

Table 1 provides information on total land area allocated to commercial farms in different regions by time of establishment, owner's nationality, main crop, and the main negotiating partner (direct negotiation with locals, woreda, region, or Federal Government). While this suggests commercial farms acquired sizeable amounts of land over time, neither total nor average amounts of land transferred are close to figures reported

in some of the literature (Oakland Institute 2011).[14] Based on our data, a total of 1.33 million hectares was transferred to 6,612 commercial farms operational in 2013/14, while 13.7 million hectares cultivated by smallholder farms (Central Statistical Agency 2014), compared to 1.42 million hectares contracted as per the latest revision of the land matrix (Rulli et al. 2013; Land Matrix 2015). Average farm size varies across regions: it is highest in Oromia (549 ha per farm) and Gambella (491 ha per farm),[15] followed by Benishangul (293 ha per farm), and that of SNNP and Afar regions (174 and 140 ha, respectively). Average commercial farm size in Tigray and Amhara regions is roughly a fifth and a sixth of what is observed in Oromia, and the lowest in Somali region with just 27 ha per farm.

[Table 1 about here]

Of the 6,612 commercial farms, most (28%) are located in Amhara, followed by SNNP (25%), Tigray (16%), Benishangul (12%), Oromia (11%), and Afar, Gambella, and Somali (together 8%). The highest share of land area initially transferred to investors was in Oromia (29%), followed by SNNP (22%), Benishangul (18%), Amhara (13%) and Tigray (9%). Gambella (excluding land transferred to Karuturi Global Limited) and Afar contributed about 6% and 3% of the total land transferred, and Somali region 0.12%. On average, they received land areas between 20 and 500 ha with only 6% being above 500 ha. Similarly, of the farms who provided information on owner nationality, 97% are purely Ethiopian owned and only 134 or 36 farms are, respectively, held purely by or jointly with foreigners. In line with post-1991 policy changes, most commercial farms are owned and operated by private owners (93% of the farms holding about 78% of initial land transfers) while some 2% of farms with 15% of initially awarded land are owned by government and the remainder owned and operated by producer cooperatives. Government owned farms are primarily located in Oromia where they account for 93% of initial land transfers to such type of farms and 83% of them had been established before 1991.

A total of 302 farms were established before 1991, mainly in Oromia and SNNP, with a mean initial land allocation of 698 ha per farm. Subsequently, the number of farms established per year reached 315 in 2002-06, peaked at 793 during the 2007/08 commodity price boom, and fell to 546 and 371, respectively, in the

2009/10 and 2011/13 period. In other words new commercial farm establishment in 2013 had dropped to the level attained before the 2007 food price boom. Mean size of initial land transfer was, with some 80 ha, smallest in 1991/2, gradually increasing to 223 ha during the 2011-13 period.

Regionally, the location of newly established farms shifted from the central highlands (Tigray, Oromia, Amhara, and to some extent SNNP) to the periphery (Benishangul and, a lesser extent, Afar, Gambella, and Somali regions). Across crops and regions, farm and area shares are highest for sesame (38% of farms and 27% of area, with an average farm size of 142 ha primarily located in Amhara, Tigray, and Benishangul regions), followed by coffee (15% of farms and 12% of area, with a farm size of 167 ha mainly in SNNP and Oromia), maize (13% of farms and 12% of area, with a farm size of 183 ha mainly in Oromia and SNNP), sorghum (13% of farms and 7% of area with a mean farm size of 116 ha in Tigray, Amhara, and Benishangul), cotton (6% of farms and 9% of area, with a mean farm size of 324 ha focused on Afar region), wheat (4% of farms and 9% of area, with a mean farm size of 498 ha mainly in Oromia and SNNP regions), and all other crops (12% of farms and 23% of the area, with a mean farm size of 389 ha). As labor and capital intensity vary by crop, commercial farms' crop mix allows to infer criteria for implicitly guiding land transfers. Given its limited need for capital or labor input, predominance of sesame may indicate limited screening of investment proposals to select those with the highest potential for generating local benefits.[16]

Ethiopian law, similar to that in many other countries, allows land transfers below a certain size to be processed locally with cascading thresholds, which were adjusted over time, requiring approval at woreda, regional, or national level. A total of 380 farms with an average size of 114 ha, mainly in Afar and SNNP, had been acquired through direct negotiation with farmers with little effective government intervention. With 32% of area transferred, the majority of land acquisitions were negotiated at woreda level (3,499 or 56% of farms with a mean size of 115 ha) or the region (34% of farms with a mean size of 241 ha accounting for 41% of area). The Federal Government accounted for 252 land transfers (4% of the total) although larger land sizes (average farm size of 1,155 ha) imply that these accounted for 23% of total area transferred.

### 3.2 Structural characteristics

Farms in our sample expanded from 1.33 million ha to 1.77 million ha, though only some 57% of this area (1.01 million ha or 153 ha per farm) is actually utilized (table 2). Levels of land utilization are highest for farms established before 1991 (72%) and those cultivating wheat (72%) and cotton (62%). Contrary to anecdotal evidence of larger farms utilizing less of the land transferred to them, we find that farms with a size above 1,000 ha use 64% of their land, compared to below 55% for the farm size group below 100 ha.

[Table 2 about here]

Discrepancies between the size of land originally allocated and what is currently cultivated point towards dynamics that would be worth exploring in their own right. Farms with initial allocations of less than 500 ha expanded significantly so that they now hold areas that are, on average, much larger than what had been originally transferred to them. By contrast farms in the above 500 ha group cultivate much less than what they received initially. As Ethiopia does not allow land sales, it will be of interest to find out how expanding farms received their land from and what happened to land transferred but no longer used.

The average size of utilized land ranges from 25 ha in Somali region to 318 ha in Gambella and the time profile of land transfers illustrates that, in most regions, average utilized area per farm peaked in 2007/8 and decreased thereafter. Data on average used land by size of initial land transfer point towards some interesting dynamics by farm size. For example, in all regions except Benishangul (or Somali and SNNP), commercial farms that had initially been allocated less than 20 ha (or 20-50 ha) expanded, in some cases quite significantly. At the same time, farms initially allocated between 500 and 1000 ha or above 1000 ha cultivated less than this amount in 4 of the 8 regions. While detailed analysis of farm dynamics, sources of additional land acquired, and underlying factors (e.g., productivity) will be of interest, opening up options for a gradual increase in farm size for investors who prove to be successful may thus be a better strategy than giving large initial amounts of land to relatively unproven investors.

Average land size transferred and utilized is larger for foreign than for national investors throughout, being largest in Gambella (2,212 ha) and Tigray (1,441 ha). It is larger for farms approved at higher levels, although, with the exception of Tigray, Amhara, and SNNP, area currently used by farms acquired by direct negotiation exceeds that of farms established through negotiations at woreda level. Cultivated farm size is higher for government owned farms—predominantly located in Oromia (1,509 ha/farm) and SNNP (220 ha/farm)—and for cotton in Benishangul (1,126 ha) and Gambella (1,070 ha), followed by wheat in Oromia (671 ha).

To allow a first assessment of the extent to which commercial farms generate benefits for locals, table 3 tabulates key parameters in this respect (land acquisition, investment, credit market participation, use of improved inputs, and job creation) overall and by main crop. In 30% of cases, land had been cultivated by others prior to its transfer to commercial farms.[17] At the same time, less than half the land area acquired (95 of 197 ha) was utilized during the first year of operations, increasing to 153 ha in the 2013/14 growing season. Only some 37% (close to 60% for maize, wheat, coffee and 'others') report either lease length or annual lease fee. For those who do so, average lease length is 32 years at a fee of B 474 per ha (about USD 24 at the current exchange rate), although it is more than double this amount for wheat and 'other' crops. Most of the farms acquired their land through allocation by woreda authorities (56%) and regional state governments (34%).

[Table 3 about here]

With the exception of wheat farms, more than 90% of the farms reported to have made investments amounting to an average of B 13,000 per ha (USD 650 at today's exchange rate), from B 8,000/ha for coffee to B 34,000/ha for others. While there are differences across crops, most investment was for tractors and other machinery (39%), followed by land clearing (37%), buildings (18%), and roads/infrastructure (6%). In future surveys, ways to better capture investment in plant material including coffee trees may be needed.

Contrary to the perception of investors having ample working capital access, most of the initial investments seem to have been made out of own equity rather than by tapping into credit markets: in fact, less than 20%

of commercial farmers indicated having taken a loan during the last 5 years with a mean loan size close to B 14,000. Only 5% of commercial farms had outstanding credit (B 11,500 or less than USD 600). Incidence of outstanding loans was lowest for Sorghum (3.6%) and highest for maize (8.1%) with mean outstanding loan amounts of less than B 7,000 for sesame and cotton and more than B 25,000 for 'others'. Establishing commercial farms is unlikely to increase credit market access for neighboring small-scale farmers.

While some 50%, 60%, and 25% of commercial farms overall applied fertilizer, crop protection chemicals and improved seeds, incidence and magnitude of the use of these inputs varied by crop and farm size.[18] Fertilizer use averaged 205 kg/ha, with an incidence between 13% for cotton and coffee (using 17 and 60 kg/ha, respectively), 52% for sesame (33 kg/ha), 65% for 'others' (785 kg/ha), and 80% or 82% for maize and wheat (with 215 and 187 kg/ha, respectively). Incidence of crop protection chemical use ranged from 20% for coffee to 91% for cotton while, for crops where improved seeds are important, incidence of their use ranged between 57% for 'others' and 81% for maize.

The notion that large farms fail to create large amounts of permanent employment is supported by the fact that, with an average of 0.05 permanent jobs per ha or one permanent worker per 20 ha farmed (plus 4.9 temporary workers, most of them male), commercial agriculture generates much less gainful employment than smallholder agriculture. Interpreting these figures is made difficult by the fact that the survey does not provide information on number of days worked and failed to indicate whether such employment was during the startup phase or during regular operations. Also, as smallholders may grow crops similar to those cultivated by commercial farms, seasonality will be an issue.

### 3.3 Constraints to expanding operations and interactions with smallholders

As large amounts of land are transferred but not fully utilized, assessing perceived constraints to better land utilization may help identify areas to be strengthened in the pre-transfer review process. Indeed, as illustrated in table 4, some 50% of commercial farms, from 17% in Tigray to of 88% in Benishangul and some 70% in Gambella and SNNP indicate that they do not effectively utilize all of the land received. Key constraints to full use of available land relate, in descending order, to technology, manpower, land disputes,

infrastructure access, and lack of resources for land clearing or credit. Regional differences are, not surprisingly, considerable: delayed availability of machinery, possibly due to import regulations, comes top in Gambella, followed by manpower which is a top issue in Benishangul and the second most important one in SNNP. Capital needs for land clearing need are important in Amhara and marketing in Afar.

[Table 4 about here]

While earlier figures suggest limited credit market access, almost two thirds of farms, from 80% in Tigray, 78%, 68%, and 67% in SNNP, Oromia, and Gambella, respectively, to 33% in Afar and Somali regions, reported having given advice or other support to neighboring smallholders. If true and if no countervailing negative effects (e.g., from monopolizing access to resources) exist, one would expect commercial farm establishment to generate positive spillover for smallholders. Testing existence or magnitude of such effects empirically, though beyond the scope of this paper, would be of interest.

## 4. Assessing large farm performance

To assess relative productive performance, we pool data on commercial farm with those from smallholders. Overall yields by commercial farms' are 50% more than those by smallholders most often achieved by farms in the 10-20 ha category. Lack of input data makes it impossible to assess how this translates into productivity or to compare performance over time. We thus identify ways in which nature, quality, and periodicity of data could be improved to allow regular and more systematic assessment of performance in dimensions on which no information is available currently.

### 4.1 Descriptive evidence

While there has been a large literature on the relationship between farm size and productivity (Ali and Deininger 2015), most analyses use data from smallholders or commercial farms separately which can yield biased estimates (Muyanga and Jayne 2014). To overcome this, we pool smallholder and commercial farms to explore the farm size-productivity relationship using data for the entire farm size spectrum. Table 5

reports summary statistics of cultivated area and yield for selected major crops, together with incidence and intensity of chemical fertilizer and improved seeds use by crop.[19]

[Table 5 about here]

The top panel highlights the marked differences in area cultivated between smallholders who use less than one hectare on average for each of the crops and commercial farms, the largest group of which use 1,650 ha for wheat and about 1,200 and 1,000 ha for cotton and sesame. Comparing yields between smallholders and commercial farms suggest that, except for teff and coffee,[20] the latter obtain about 50% more than the former with cultivated land as denominator. Information on access to specific inputs, including land improvements, labor, and conventional inputs will be required to translate this into productivity.[21]

Among commercial farms, those between 10 and 20 ha obtain the highest yields for most crops (maize with 4.2 t/ha, sorghum with 3.1 t/ha, teff with 0.9 t/ha, wheat with 4.2 t/ha, sesame with 1.4 t/ha, and soya beans with 2.4 t/ha). Exceptions are beans and coffee where yields are highest in the 20-50 ha category, and cotton, where they peak in the 50-100 ha bracket. Rather minor improvements in data collection protocols could make these data much more useful as a way of identifying constraints.

Beyond yield differences, incidence of fertilizer use varies by size group. In maize, 37% of smallholders but 53% of commercial farms below 20 ha and 84% of those in the 100-500 ha group use fertilizer (160 to 190 kg/ha throughout). Differences are equally pronounced for sesame, where 11% of smallholders vs. 65% of the largest farms use fertilizer, coffee (4% vs. 60%), or sorghum (16% vs. 45%) but less for wheat (63% vs. 75%) and teff, a typical smallholder crop where fertilizer use is highest for commercial farmers below 20 ha. Subject to the caveats noted above, gaps in improved input use between large and small farms are more pronounced for improved seeds which was used by 23%, 0.2%, 3%, 6%, 0.5% of smallholders in maize, sorghum, teff, wheat, and sesame, respectively, compared to 80%, 42%, 41%, 74% and 60% in these crops for the largest commercial farms.

### 4.2 Implications for future data collection

While the yield data presented above highlight the potential for improvements to existing surveys to provide important pieces of information that cannot be obtained from any other source regularly and at low cost, analysis of the Ethiopian case also points to ways in which improved sampling, establishment of explicit links to administrative and remotely sensed data, and smallholder questionnaire design can further enhance this potential and thus establish feedback links to policy. These will be of relevance not only in Ethiopia but also hold important lessons for other countries where large scale land-based investment is an issue.

First, sampling-related issues concern definitions and treatment of non-operational farms. As definition of commercial crop farms is based on area cultivated rather than output value, horticulture and flower farms are excluded, their contribution to employment generation and exports notwithstanding. This can be rectified easily by expanding the sample frame, ideally by involving relevant associations. The sample frame used currently also excludes farms that received land but do not operate it. Although justifiable from a statistical perspective—as non-operational farms concerned contribute nothing to agricultural output—concern about efficiency of resource use or monitoring of compliance with contractual obligations provides a strong argument for inclusion of such farms. Acquiring information on actual land use for non-operational farms through physical inspection can be very costly. CSA has already recognized that rapid advances in availability of free or low-cost imagery at resolutions that allow reliable identification of cultivated area and possibly even crops imply that use of remotely sensed imagery can enhance efficiency of sampling, significantly reduce survey costs, and improve inter-institutional coordination. Pilots in this direction can have a high payoff and in due course also allow incorporation of additional data layers.

Second, as the smallholder survey used in our analysis focuses exclusively on production, we are unable to provide evidence on broader socio-economic aspects of large scale investment, including gendered access to individually or communally held resources, (subjective) welfare, and risk perceptions. There are many examples of multi-purpose household surveys to show how basic information along these lines can be included in the smallholder instrument without making it unwieldy (Deininger *et al.* 2015).

Finally, use of administrative data readily available with the Agricultural Investment Agency will also allow to go beyond averages to explore how large farms' outcomes vary with the extent of local consultations, clarity of business plans, profit sharing arrangements, and corporate social responsibility (CSR) activities. This could help inform policy on issues such as criteria to qualify investors, minimum business plans requirements, and level, destination, and time profile of lease payments, in addition to increasing transparency in the process and supporting an evidence-driven analytical policy agenda.

## 5. Conclusion and policy implications

This paper was motivated by the notion that large scale land-based investment is unlikely to disappear but that, almost a decade after the commodity price spike that triggered a precipitous rise in such investment, most potential target countries in Africa still lack the data systems to provide relevant information on a routine basis. This reduces their ability to put large scale land acquisition in perspective and to effectively regulate and monitor such transfers in ways allowing them to attract qualified responsible investors rather than speculators. We use the case of Ethiopia to explore if there is scope for routine and systematic data collection efforts that are fully integrated into countries' statistical system to provide information on this important phenomenon on a regular basis and in a way that can complement and potentially generalize results from costly one-off surveys and case studies. Beyond our substantive results, the fact that Ethiopia's statistical agency has already initiated experiments to link survey to administrative and remotely sensed data and explore options for land use and yield monitoring highlights the potential of such approaches for capacity building.

Although the evidence reported here is only descriptive, it demonstrates that modest improvement to survey instruments can provide insights that are essential for policy makers and not available from other sources. Overall, this includes information on the increase and subsequent drop in new large farm formation, the predominance of Ethiopian nationals; the fact that only 55% of land transferred to operational farms is used, and the limited amount of job creation or rent payments to directly benefit local land users. With less than 15% of commercial farm area devoted to coffee, most of the area is devoted to crops such as sesame and

sorghum that are capital intensive but require little labor. While commercial farms obtain yields above those achieved by smallholders for all crops except teff, yields normally peak in the 10-20 ha size group. The fact that smallholders use often less inputs than commercial farms who in many cases leave parts of their land fallow implies that examination of productivity differences based on improved data will be of great interest. Other research topics to be explored include the dynamics of entry and exit in the commercial farm sector and nature and extent of spillovers between commercial and neighboring small farms, including channels through which they may materialize.

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## Notes

[1] The land available for expansion in Africa, most of it is concentrated in few countries (Deininger and Byerlee 2012), with poor access to infrastructure and low levels of profitability (Chamberlin *et al.* 2014), and often also very weak governance (Arezki *et al.* 2013).

[2] In addition to the principles of responsible agricultural investment (Committee for World Food Security 2014), the reader is referred to OECD (2013), UNCTAD (2012), and OECD (2014).

[3] The importance of this issue is demonstrated by the many historical examples where accumulation of large tracts of land by large but relatively inefficient farms led to rent-seeking behavior and, using their locally dominant position,

to monopolize input or output markets (Binswanger *et al.* 1995), subvert provision of public goods such as education (Nugent and Robinson 2010; Vollrath 2009), undermine financial sector development (Rajan and Ramcharan 2011), or restrict political participation (Baland and Robinson 2008).

[4] A review of the enormous body of case studies dealing with large scale land acquisition is beyond the scope of this paper. Zoomers (2011), De Schutter (2011), Borras *et al.* (2011) and Borras and Franco (2012) provide leads to the early literature, Hall *et al.* (2015) highlight local responses, and Pistor and De Schutter (2015) discuss some of the broader legal issues involved.

[5] Notable exceptions include studies exploring competition for land between investors and local smallholders (Messerli *et al.* 2014), compliance with contractual commitments (Burnod *et al.* 2013), and indirect land use effects of land based investment (Andrade de Sa *et al.* 2013).

[6] All farms above 10 ha fall into the 'commercial' category.

[7] Information obtained included area and production of temporary and permanent crops; land use, i.e., total cropland area, fallow land, grazing land; agricultural practices, such as use of various inputs, quantity and cost of inputs used; number of livestock and poultry by type, purpose, age and sex; number of farm machineries used by type and market value of each; number of permanent and temporary employees by type of profession.

[8] In principle, the most immediate candidate for a sample frame is the list of potential investors who either applied for or obtained an investment license. This would include those who proceeded to invest and those who did not, thus allowing to obtain information on obstacles encountered throughout the process. Unfortunately, although a list of more than 10,000 investors was available, it was not a viable strategy due to limited documentation gathered in the process and the fact that most of the phone numbers provided could not be reached.

[9] For 2016/17, it is planned to (i) have plot boundaries recorded to allow yields to be cross-checked against independent estimates obtained from satellite imagery; and (ii) link the survey frame more clearly to data from other sources, especially the Agricultural Investment Office's list of investment licenses to determine what types of projects were abandoned and possibly probe into reasons why this happened.

[10] While input information is collected at the field (crop) level from all the sampled agricultural households in each enumeration area, yield data are based on crop cuts of randomly selected fields among the fields operated by the sampled agricultural households in each enumeration area.

[11] Note that the sampling strategy implies that, subject to non-response, the survey provides a reliable measure of the area transferred to farms that were fully or partly operational. A simple check of land transferred by the Investment agency against those that have been identified by CSA as operational on the ground could provide information on land area under non-operational farms. In terms of non-response, information on 300 farms with size 50 and above, who did not respond to the detailed survey, is not included. The total farm size of these farms (excluding Karuturi Global Limited with 100,000 ha), based on administrative information, is about 117,000 ha.

[12] Although GPS was used to determine plot area, the waypoints generated in this way were not saved and instead only one point was recorded per plot. While this allows us to locate farms, it makes it impossible to obtain precise plot boundaries.

[13] In interpreting these figures, it is important to note that there will be survivor bias, i.e., farms that have gone out of business are no longer included.

[14] "Our research shows that approximately 3,619,509 ha of land have been awarded, as of January 2011" (Oakland Institute 2011: p. 18). This is in line with the August 8, 2015 version of the land matrix that reports demand for 3.14 million ha in Ethiopia of which 1.42 million ha had been contracted and production started only on 39,528 ha (see http://www.landmatrix.org/en/get-involved/) versus on one million ha in the CSA survey. By April 2016, the contracted area had been revised downward to slightly less than 1 million ha in 64 cases (i.e., an average farm size of 15,000 ha). Using the 200 ha cut-off used by the land matrix, we find 1489 farms with 977,574 ha of initial transferred area (i.e., an average size of 656 ha per farm), respectively, in the CSA database.

[15] Note that Karuturi Global Limited, a company that acquired 100,000 ha of farmland in Gambella in 2008 and that is now deemed to be bankrupt, is not included in the computation of total area and average farm size.

[16] Having detailed production data for both large and small farmers would allow testing of alternative explanations, e.g., technological advantages of large farmers over smallholders in terms of timely harvesting to reduce the incidence of seed shattering.

[17] While data on compensation payments was not collected, evidence of negative effects of such displacement even if the compensation mandated by law had been paid (Harris 2015), suggests that follow up on this would be desirable.

[18] As farm or household surveys will provide reliable estimates of improved variety uptake only if enumerators have access to a list of relevant varieties and are trained to probe about the use of improved open-pollinated varieties that need to be re-purchased only every 3-5 years (Walker *et al.* 2015), the level of adoption of improved seed varieties is

likely to be underestimated. Adoption of a more rigorous data collection protocol is likely to produce higher estimates and is one area for potential improvement.

[19] The number of observations in each of the cells is reported in the bottom panel of table 5.

[20] For coffee, ensuring comparability would require more specific data collection protocols with respect to inputs to cover in particular number and age of trees as well as output e.g., cherry coffee harvest vs. washed and dried coffee beans.

[21] For example, much of the yield advantage of commercial cotton farms may be attributable to the fact that more than half of them have access to irrigation while the advantage of large coffee farms could be due to differences in the maturity of trees.

**Table 1: No of large farms in Ethiopia and land area initially transferred to them**

| | Farms No. | Area ha | Avg. ha | Tigray | Afar | Amhara | Oromia | Somali | Benish. | SNNP | Gambella |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Number of farms | | | | |
| **Total**[1] | 6,612 | 1,328,883 | 200.99 | 1,028 | 295 | 1,857 | 701 | 60 | 811 | 1,686 | 169 |
| **By Year of establishment** | | | | | | | | | | | |
| Before 1991 | 302 | 211,074 | 698.41 | 17 | 1 | 36 | 103 | 46 | 1 | 86 | 10 |
| 1991-1992 | 394 | 31,431 | 79.72 | 372 | | 14 | 1 | | | 6 | |
| 1992-2002 | 1,234 | 206,587 | 167.46 | 372 | 30 | 342 | 175 | 1 | 18 | 265 | 30 |
| 2002-2006 | 1,261 | 168,211 | 133.40 | 93 | 39 | 694 | 124 | 4 | 54 | 242 | 10 |
| 2007-2008 | 1,586 | 314,775 | 198.47 | 105 | 93 | 280 | 173 | 6 | 289 | 587 | 53 |
| 2009-2010 | 1,093 | 231,651 | 211.99 | 39 | 66 | 287 | 72 | | 324 | 254 | 51 |
| 2011-2013 | 742 | 165,154 | 222.62 | 30 | 66 | 204 | 53 | 3 | 125 | 246 | 15 |
| **By Size** | | | | | | | | | | | |
| < 20 ha | 431 | 4,940 | 11.45 | 165 | 59 | 57 | 35 | 46 | 2 | 63 | 4 |
| 20 - 50ha | 1048 | 32,533 | 31.03 | 475 | 61 | 243 | 110 | 8 | 20 | 122 | 11 |
| 50 - 100 ha | 2268 | 140,260 | 61.84 | 113 | 93 | 1027 | 138 | 4 | 150 | 719 | 24 |
| 100 - 500 ha | 2465 | 495,104 | 200.89 | 234 | 76 | 509 | 336 | 1 | 503 | 724 | 82 |
| 500 - 1000 ha | 256 | 147,966 | 578.24 | 27 | 1 | 16 | 39 | 1 | 109 | 35 | 28 |
| > 1000 ha | 135 | 508,079 | 3,756.31 | 13 | 6 | 5 | 43 | | 25 | 24 | 20 |
| **By owner's nationality** | | | | | | | | | | | |
| Ethiopian | 6,287 | 1,085,593 | 172.67 | 1018 | 296 | 1824 | 566 | 60 | 786 | 1570 | 160 |
| Foreign[2] | 134 | 112,363 | 840.60 | 3 | | 10 | 46 | | 18 | 56 | 3 |
| Joint | 36 | 18,368 | 506.28 | | | | 27 | | 5 | 5 | |
| **By ownership type** | | | | | | | | | | | |
| Government[3] | 121 | 203,304 | 1,677.70 | 1 | 1 | 8 | 67 | | 1 | 33 | 10 |
| Private | 6,170 | 1,038,373 | 168.31 | 1001 | 290 | 1797 | 549 | 42 | 738 | 1606 | 143 |
| Cooperatives | 306 | 81,679 | 267.17 | 24 | 5 | 52 | 75 | 18 | 69 | 47 | 13 |
| Others | 15 | 5,526 | 361.67 | 1 | | | 10 | | 1 | | 2 |
| **By main crop cultivated** | | | | | | | | | | | |
| Maize | 885 | 162,063 | 183.09 | | 23 | 89 | 178 | 7 | 94 | 452 | 43 |
| Sorghum | 843 | 97,466 | 115.59 | 429 | 1 | 238 | 30 | 5 | 103 | 31 | 6 |
| Wheat | 242 | 120,497 | 498.21 | 1 | | 10 | 120 | 25 | | 79 | 5 |
| Sesame | 2,494 | 354,688 | 142.19 | 581 | 18 | 1390 | 46 | | 418 | 27 | 15 |
| Coffee | 977 | 162,944 | 166.76 | | | 1 | 202 | | | 749 | 26 |
| Cotton | 373 | 120,959 | 324.29 | | 236 | 41 | 6 | | 17 | 32 | 42 |
| Other | 797 | 310,267 | 389.32 | 16 | 18 | 88 | 120 | 23 | 178 | 317 | 32 |
| **By mode of original land acquisition** | | | | | | | | | | | |
| Direct negot. | 380 | 43,143 | 113.64 | 24 | 223 | 18 | 23 | 4 | 4 | 64 | 17 |
| Woreda | 3,499 | 400,883 | 114.58 | 933 | 4 | 1429 | 297 | 9 | 218 | 580 | 29 |
| Region | 2,162 | 520,603 | 240.75 | 53 | 20 | 372 | 230 | | 571 | 823 | 94 |
| Fed'l Gov't | 252 | 291,533 | 1,155.32 | 1 | 11 | 5 | 66 | 3 | 17 | 130 | 19 |
| **Initial land acquisition by region** | | | | | | | | | | | |
| Area in ha | | | | 114991 | 41201 | 172451 | 384968 | 1610 | 237540 | 293117 | 83005[2] |
| Avg size in ha | | | | 112 | 140 | 93 | 549 | 27 | 293 | 174 | 491 |

*Source:* Own computation from 2013/14 CSA large farm survey

[1]About 299 (excluding Karuturi Global Limited) farms with size 50 ha and above did not respond to the detailed survey, and hence are not included in the analysis. The total area of these farms is 118,000 ha, and of which the total area for those with 1000 ha (24 farms) and above is 57,000 ha.

[2]A notable omission from the data is Karuturi Global Limited that acquired 100,000 ha of farm land in 2008 in Gambella region, but it is now deemed to be bankrupt.

[3]Most of the government owned farms are located in Oromia region accounting about 93% the initially transferred land, and note also that of which 83% of the land was acquired before 1991.

**Table 2: Area transferred to and cultivated by commercial farms in different regions**

| | Area | | Tigray | Afar | Amhara | Oromia | Somali | Benish'gl | SNNP | Gambella |
|---|---|---|---|---|---|---|---|---|---|---|
| | Transferred | Cultivated | Cultivated land | | | | | | | |
| **Total (ha)** | 1,768,540 | 1,008,809 | 200,310 | 70,651 | 186,360 | 284,141 | 1,487 | 70,343 | 142,019 | 53,498 |
| **…**ha/farm | 267.5 | 152.6 | 195 | 239.1 | 100.4 | 405.9 | 24.8 | 86.9 | 84.2 | 317.9 |
| **By Year** | | | **Average cultivated farm size in ha** | | | | | | | |
| Before 91 | 216,278 | 155,873 | 107.5 | 74 | 133.1 | 1333.8 | 22.7 | 22 | 114.8 | 86.3 |
| 1991-92 | 71,703 | 36,369 | 91.1 | | 114.9 | 51 | | | 138.7 | |
| 92-2002 | 492,181 | 254,134 | 339.6 | 191.2 | 123.8 | 244.2 | 3 | 146.3 | 97.9 | 280.8 |
| 02-2006 | 293,027 | 158,101 | 105.7 | 501.6 | 89.4 | 231.3 | 14.5 | 131 | 116.8 | 260.4 |
| 07-2008 | 394,800 | 227,945 | 142.7 | 275 | 132.9 | 276.8 | 3.3 | 124.5 | 65.4 | 526.4 |
| 09-2010 | 180,043 | 104,569 | 275.4 | 132.3 | 85 | 165.4 | | 59.3 | 67.2 | 245.7 |
| 11-2013 | 120,508 | 71,816 | 90.9 | 166.3 | 68.5 | 292.5 | 120.3 | 43.5 | 88.1 | 78.5 |
| **By Size (ha)** | | | | | | | | | | |
| < 20 ha | 45,409 | 23,921 | 29.5 | 166 | 40.4 | 126.7 | 66.9 | 9 | 24.1 | 141 |
| 20-50 | 252,779 | 129,940 | 188.1 | 133.4 | 51.9 | 131 | 16.3 | 85.9 | 43.4 | 51 |
| 50-100 | 329,036 | 176,438 | 90.9 | 131.7 | 76.4 | 306.2 | 51 | 39.2 | 37.3 | 182.3 |
| 100-500 | 682,137 | 396,692 | 264.9 | 489.4 | 161.5 | 319.6 | 179 | 52.1 | 115.8 | 397.3 |
| 500-1000 | 155,970 | 88,106 | 628.1 | 1115 | 498.1 | 916 | 2 | 157.1 | 320.9 | 279 |
| >1000 ha | 303,211 | 193,712 | 1762 | 514.7 | 1497.3 | 3633.1 | | 697 | 382.3 | 577 |
| **By owner's nationality** | | | | | | | | | | |
| Ethiopian | 1,570,323 | 859,211 | 192 | 238.7 | 98.3 | 304.6 | 24.8 | 87 | 79.4 | 292.7 |
| Foreign | 80,445 | 47,677 | 1441 | | 476.5 | 497.7 | | 57.2 | 143.4 | 2,212.3 |
| Joint | 11,989 | 7,087 | | | | 198 | | 148.4 | 200 | |
| **By ownership type** | | | | | | | | | | |
| Government | 175,760 | 120,658 | 31.0 | 15,638.1 | 320.8 | 1,509.3 | | 21.5 | 220.9 | 101.4 |
| Private | 1,495,524 | 833,108 | 194.0 | 202.7 | 97.4 | 298.5 | 31.7 | 89.8 | 78.2 | 337.8 |
| Cooperatives | 87,440 | 49,276 | 232.1 | 519.0 | 170.8 | 243.8 | 8.9 | 56.7 | 191.4 | 60.0 |
| Others | 9,815 | 5,767 | 483.8 | | | 177.1 | | 102.0 | | 1,593.7 |
| **By main crop cultivated** | | | | | | | | | | |
| Maize | 165,995 | 93,493 | | 41.6 | 182.5 | 209.8 | 9.1 | 73.3 | 70.1 | 6.9 |
| Sorghum | 117,612 | 62,316 | 71.9 | 58 | 74.2 | 163.7 | 8.6 | 76 | 29 | 13.3 |
| Wheat | 118,816 | 85,419 | 41 | | 262.2 | 670.7 | 15.1 | | 23.9 | 0.8 |
| Sesame | 607,417 | 314,268 | 290.1 | 18.9 | 83.1 | 160.8 | | 51.4 | 28.4 | 18.4 |
| Coffee | 209,152 | 124,579 | | | 204 | 245.1 | | | 92.3 | 219.3 |
| Cotton | 263,526 | 163,442 | | 253.3 | 369 | 326.3 | | 1125.9 | 703.2 | 1,069.8 |
| Other | 286,021 | 165,293 | 57.1 | 528.5 | 216.2 | 854.5 | 43.6 | 84.2 | 47.6 | 69.1 |
| **By mode of original land acquisition** | | | | | | | | | | |
| Direct neg. | 125,118 | 64,669 | 141.7 | 208.2 | 106.7 | 227 | 39.5 | 64 | 51.2 | 235.6 |
| Woreda | 759,636 | 396,857 | 185 | 568.8 | 89.1 | 147.9 | 6.8 | 54.4 | 64.3 | 53 |
| Region | 585,337 | 342,313 | 348.1 | 89.9 | 136.4 | 468.7 | | 93 | 83.9 | 440.3 |
| Fed'l Gov't | 175,203 | 100,952 | 4158 | 1257.4 | 549.2 | 670.8 | 120.3 | 302.7 | 188.8 | 310.3 |
| No. of obs. | 6,612 | 6,612 | 1,027 | 296 | 1,857 | 700 | 60 | 810 | 1,686 | 168 |

*Source:* Own computation from 2013/14 CSA large farm survey

**Table 3: Key production decisions by commercial farms overall and by main crop cultivated**

| | Total | Maize | Sorghum | Wheat | Sesame | Coffee | Cotton | Other |
|---|---|---|---|---|---|---|---|---|
| **Land** | | | | | | | | |
| Area acquired (ha) | 197.29 | 179.93 | 115.59 | 410.66 | 142.19 | 166.69 | 322.86 | 390.14 |
| .. developed first year (ha) | 94.55 | 78.80 | 62.88 | 214.93 | 76.62 | 60.91 | 106.32 | 219.08 |
| Cultivated now (ha; GPS) | 152.59 | 105.62 | 73.90 | 353.39 | 125.99 | 127.50 | 438.19 | 207.42 |
| Has irrigation facility (%) | 13.78 | 19.65 | 6.88 | 9.17 | 5.39 | 3.43 | 66.87 | 30.25 |
| Attempted to expand operation | 38.75 | 27.96 | 39.01 | 27.28 | 45.73 | 42.08 | 35.35 | 28.18 |
| Length of lease reported (%) | 37.65 | 56.36 | 20.97 | 61.67 | 20.72 | 59.50 | 22.56 | 60.52 |
| .. if yes, years | 31.77 | 31.77 | 24.31 | 26.43 | 23.01 | 39.54 | 31.26 | 36.25 |
| Annual lease fee reported (%) | 36.43 | 54.89 | 20.12 | 52.81 | 20.22 | 59.38 | 20.83 | 58.06 |
| . if yes, lease fee (Birr/ha) | 474.07 | 190.44 | 115.56 | 1539.29 | 167.13 | 210.67 | 904.57 | 1202.01 |
| Other annual payments reported (%) | 10.09 | 18.65 | 6.59 | 10.54 | 6.91 | 8.16 | 10.47 | 16.27 |
| . if yes, amount (Birr/ha) | 375.31 | 724.47 | 86.38 | 438.17 | 212.84 | 99.44 | 99.48 | 510.91 |
| **Mode of acquisition** | | | | | | | | |
| Land previously used by others (%) | 30.31 | 38.72 | 27.16 | 33.03 | 31.50 | 11.94 | 48.47 | 33.60 |
| Direct negotiation with farmers (%) | 5.99 | 8.84 | 0.78 | 0.90 | 2.22 | 2.61 | 51.20 | 6.03 |
| Allocated by Woreda (%) | 55.63 | 35.38 | 81.14 | 39.74 | 73.35 | 38.82 | 22.30 | 30.29 |
| Allocated by Regional state (%) | 34.39 | 47.96 | 15.30 | 52.46 | 23.83 | 50.90 | 22.68 | 56.59 |
| Allocated by Federal Gov't (%) | 3.98 | 7.82 | 2.77 | 6.90 | 0.60 | 7.67 | 3.82 | 7.08 |
| **Incidence and type of investment** | | | | | | | | |
| Made any investment (%) | 94.10 | 90.44 | 99.01 | 61.30 | 99.47 | 92.97 | 91.48 | 88.70 |
| If yes, size (Birr/ha) | 13067 | 12,352 | 12,809 | 17,229 | 8,887 | 7,920 | 14,680 | 34,006 |
| … of which on roads (%) | 6.67 | 8.02 | 1.89 | 28.24 | 2.95 | 9.24 | 23.38 | 7.91 |
| … of which on land clearing | 36.51 | 20.49 | 43.86 | 14.16 | 42.82 | 41.30 | 24.20 | 28.28 |
| … of which on buildings | 18.21 | 24.93 | 10.80 | 14.54 | 13.00 | 30.59 | 12.44 | 25.26 |
| … of which on tractors & machines | 30.16 | 40.95 | 33.82 | 30.80 | 33.79 | 10.54 | 24.00 | 28.93 |
| **Credit market participation** | | | | | | | | |
| Took any loans last 5 years (%) | 19.08 | 11.36 | 31.99 | 10.73 | 22.19 | 10.31 | 26.72 | 12.83 |
| .. if yes, amount (Birr/ha) | 13783 | 17,260 | 10,310 | 54,250 | 10,973 | 19,833 | 15,838 | 28,169 |
| Has outstanding loans (%) | 5.05 | 8.06 | 3.63 | 4.20 | 4.63 | 3.84 | 4.89 | 6.36 |
| Outstanding loans (Birr/ha) | 11560 | 10,085 | 15,944 | 14,249 | 6,584 | 9,351 | 6,991 | 25,634 |
| **Input use** | | | | | | | | |
| Used chemical fertilizer (%) | 49.18 | 80.15 | 43.78 | 82.06 | 51.72 | 12.51 | 12.87 | 64.54 |
| .. if yes, amount (kg/ha) | 205.23 | 215.10 | 63.70 | 186.65 | 33.31 | 59.91 | 17.46 | 784.75 |
| Used chemicals (pest/herb/fungic.) | 60.22 | 48.49 | 81.16 | 79.65 | 68.65 | 20.62 | 90.85 | 53.01 |
| Used improved seed | 25.16 | 81.05 | 8.34 | 62.44 | 6.47 | | 15.64 | 57.30 |
| **Job creation** | | | | | | | | |
| Permanent farm workers/ha | 0.05 | 0.02 | 0.03 | 0.03 | 0.04 | 0.03 | 0.05 | 0.15 |
| Male temporary workers/ha | 4.29 | 3.17 | 4.02 | 0.56 | 4.03 | 1.22 | 10.74 | 8.39 |
| Female temporary workers/ha | 1.01 | 0.87 | 0.22 | 0.17 | 0.28 | 0.76 | 5.31 | 2.98 |
| Temporary workers per/ha | 4.86 | 4.03 | 4.25 | 0.73 | 4.32 | 2.14 | 7.35 | 11.40 |
| Total workers on the farm/ha | 5.87 | 8.59 | 4.41 | 1.45 | 4.54 | 2.74 | 7.66 | 12.79 |
| **Crop shares (% of total land)** | | | | | | | | |
| Maize | 11.64 | 74.32 | 1.56 | 1.79 | 1.26 | 0.56 | 0.32 | 7.03 |
| Sorghum | 16.96 | 3.56 | 73.74 | 2.47 | 16.79 | 0.21 | 2.74 | 3.91 |
| Wheat | 3.58 | 0.87 | 0.15 | 87.33 | 0.08 | 0.00 | 0.03 | 1.84 |
| Sesame | 33.48 | 3.32 | 20.25 | 0.05 | 79.37 | 0.11 | 3.23 | 2.53 |
| Coffee | 14.49 | 0.13 | 0.06 | 0.02 | 0.02 | 97.69 | 0.00 | 0.14 |
| Cotton | 5.76 | 0.06 | 0.49 | 0.02 | 0.90 | 0.00 | 92.75 | 0.99 |
| Others | 14.09 | 17.74 | 3.74 | 8.32 | 1.59 | 1.43 | 0.93 | 83.56 |
| No. of obs. (farms) | 6612 | 885 | 843 | 242 | 2494 | 977 | 373 | 797 |

*Source:* Own computation from 2013/14 CSA large farm surveys

**Table 4: Reasons for commercial farms' failure to cultivate all of the area allocated to them**

| | Total | Tigray | Afar | Amhara | Orom | Som. | B'gl | SNNP | Gmbla |
|---|---|---|---|---|---|---|---|---|---|
| **Incidence & reasons for cultivating less than the total allocated area** | | | | | | | | | |
| Cult. <100% of area | 48.22 | 16.62 | 13.51 | 26.95 | 59.71 | 40.52 | 88.22 | 70.88 | 69.54 |
| Technology | 30.91 | 43.73 | 96.55 | 29.48 | 39.74 | 37.76 | 14.57 | 33.55 | 41.01 |
| Manpower | 29.77 | 4.23 | 0.00 | 11.21 | 24.93 | 0.00 | 50.60 | 30.54 | 37.26 |
| Land dispute | 21.09 | 26.33 | 1.90 | 18.76 | 19.80 | 10.32 | 31.57 | 15.83 | 22.95 |
| Land clearing need | 18.07 | 24.12 | 0.00 | 40.25 | 11.82 | 6.87 | 24.05 | 6.97 | 15.15 |
| Infrastructure | 17.79 | 10.20 | 0.00 | 10.23 | 24.22 | 3.46 | 23.26 | 17.50 | 17.74 |
| Credit | 17.71 | 7.46 | 1.90 | 17.85 | 11.25 | 54.09 | 22.24 | 17.38 | 23.92 |
| Delayed machinery | 9.87 | 8.67 | 2.95 | 2.25 | 3.13 | 23.74 | 9.37 | 12.24 | 44.07 |
| Lack of irrigation | 6.26 | 3.75 | 1.56 | 2.15 | 6.55 | 31.47 | 7.07 | 7.44 | 4.31 |
| Lack of skilled workers | 3.88 | 3.88 | 0.00 | 5.67 | 4.84 | 0.00 | 6.04 | 1.11 | 7.61 |
| Input shortage | 3.67 | 0.92 | 0.00 | 2.19 | 5.56 | 7.45 | 7.07 | 0.83 | 13.34 |
| Marketing | 3.47 | 6.53 | 37.20 | 3.16 | 3.85 | 0.00 | 3.39 | 1.26 | 10.08 |
| Foreign exchange | 1.06 | 0.00 | 0.00 | 0.69 | 3.70 | 0.00 | 0.00 | 0.84 | 3.73 |
| **Scope for expansion** | | | | | | | | | |
| Tried to expand | 38.75 | 23.72 | 37.63 | 60.52 | 38.33 | 3.04 | 38.62 | 26.98 | 18.05 |
| If yes, faced problems | 64.50 | 39.49 | 47.30 | 68.82 | 68.61 | 0.00 | 70.01 | 64.40 | 72.01 |
| Gave advice to farmers | 63.79 | 79.54 | 32.99 | 50.20 | 68.13 | 34.16 | 55.40 | 77.84 | 66.72 |

*Source:* Own computation from 2013/14 CSA large farm survey

**Table 5: Productive performance of smallholders vs. commercial farms in different farm size classes**

| | Maize | Sorghum | Teff | Wheat | H. beans | Soya | Sesame | Coffee | Cotton |
|---|---|---|---|---|---|---|---|---|---|
| **Area cultivated** | | | | | | | | | |
| Smallholder | 0.23 | 0.35 | 0.47 | 0.35 | 0.11 | | 0.44 | 0.13 | |
| < 20 ha | 4.96 | 7.08 | 3.90 | 6.00 | 5.81 | 2.87 | 8.57 | 12.66 | 3.28 |
| 20-50 | 14.95 | 13.59 | 6.20 | 15.15 | 4.88 | 13.56 | 24.07 | 32.07 | 23.26 |
| 50-100 | 29.4 | 21.9 | 7.1 | 46.6 | 16.4 | 26.8 | 45.5 | 65.4 | 33.5 |
| 100-500 | 96.2 | 55.5 | 10.0 | 118.7 | 31.3 | 45.3 | 114.4 | 201.7 | 214.5 |
| > 500 ha | 339.0 | 217.1 | 32.3 | 1654.6 | 147.6 | 496.7 | 1008.7 | 672.0 | 1194.3 |
| **Output (quintal/ha)** | | | | | | | | | |
| Smallholder | 28.16 | 22.06 | 14.00 | 21.63 | 13.23 | | 7.82 | 7.60 | |
| < 20 ha | 42.04 | 30.88 | 9.18 | 41.69 | 23.86 | 24.39 | 13.94 | 4.24 | 5.18 |
| 20-50 | 37.42 | 24.52 | 8.79 | 33.68 | 38.31 | 13.91 | 10.74 | 8.43 | 17.75 |
| 50-100 | 36.89 | 25.64 | 8.61 | 26.11 | 20.95 | 18.82 | 8.46 | 6.38 | 30.81 |
| 100-500 | 39.30 | 28.21 | 7.75 | 24.64 | 30.52 | 23.71 | 9.77 | 6.37 | 29.31 |
| > 500 ha | 33.81 | 29.51 | 9.90 | 28.32 | 34.96 | 22.50 | 10.84 | 7.02 | 18.92 |
| **Used chemical fertilizer** | | | | | | | | | |
| Smallholder | 37.28 | 15.75 | 62.00 | 63.45 | 11.98 | | 10.95 | 3.73 | |
| < 20 ha | 52.85 | 19.48 | 85.44 | 65.79 | 30.52 | 23.83 | 12.99 | 0.00 | 0.00 |
| 20-50 | 58.39 | 20.18 | 77.00 | 59.62 | 20.76 | 2.05 | 33.29 | 0.91 | 0.00 |
| 50-100 | 73.79 | 18.28 | 61.34 | 74.22 | 18.26 | 2.88 | 48.19 | 3.13 | 10.46 |
| 100-500 | 84.31 | 33.18 | 62.44 | 64.74 | 25.77 | 27.83 | 51.25 | 14.99 | 12.32 |
| > 500 ha | 82.70 | 44.79 | 48.01 | 74.45 | 31.69 | 40.82 | 64.93 | 59.41 | 15.09 |
| **Quantity of chemical fertilizer used (kg/ha)** | | | | | | | | | |
| Smallholder | 121.20 | 95.66 | 81.07 | 112.47 | 167.52 | | 107.78 | 130.46 | |
| < 20 ha | 165.43 | 84.99 | 122.63 | 363.65 | 32.79 | 340.37 | 171.62 | | |
| 20-50 | 187.22 | 80.60 | 155.68 | 270.65 | 115.41 | 48.33 | 38.53 | 4.68 | |
| 50-100 | 151.59 | 51.86 | 101.79 | 97.74 | 78.08 | 73.85 | 32.33 | 17.99 | 12.04 |
| 100-500 | 187.09 | 63.42 | 89.83 | 118.91 | 127.90 | 129.88 | 40.73 | 96.37 | 51.04 |
| > 500 ha | 163.68 | 82.05 | 64.34 | 72.46 | 163.64 | 32.19 | 59.02 | 88.05 | 64.57 |
| **Used improved seed** | | | | | | | | | |
| Smallholder | 22.96 | 0.20 | 3.04 | 5.69 | 0.50 | | 0.47 | | |
| < 20 ha | 51.99 | 17.58 | 85.44 | 65.79 | 30.52 | 23.83 | 11.18 | | 0.00 |
| 20-50 | 57.87 | 18.66 | 76.23 | 58.25 | 17.03 | 0.82 | 29.67 | | 0.00 |
| 50-100 | 69.57 | 15.88 | 58.66 | 74.22 | 18.26 | 1.44 | 40.22 | | 10.46 |
| 100-500 | 86.21 | 4.21 | 45.86 | 40.32 | 26.84 | 21.19 | 3.72 | | 10.14 |
| > 500 ha | 80.30 | 42.08 | 40.93 | 74.45 | 21.23 | 40.82 | 59.81 | | 12.64 |
| **No. of observations** | | | | | | | | | |
| SH pop.[1] | 8696009 | 4739452 | 6467110 | 4640708 | 1227980 | | 679679 | 4027724 | |
| SH sample[1] | 25840 | 15626 | 16814 | 11702 | 3747 | | 2550 | 10966 | |
| SH Kebeles[1] | 1841 | 1369 | 1518 | 1246 | 732 | | 352 | 901 | |
| < 20 ha | 358 | 295 | 291 | 162 | 46 | 79 | 349 | 87 | 73 |
| 20-50 | 479 | 1122 | 212 | 109 | 40 | 122 | 1207 | 220 | 27 |
| 50-100 | 351 | 833 | 124 | 28 | 100 | 104 | 1000 | 358 | 90 |
| 100-500 | 382 | 724 | 165 | 128 | 142 | 178 | 792 | 315 | 234 |
| > 500 ha | 89 | 103 | 34 | 37 | 29 | 33 | 109 | 39 | 96 |

*Source:* Own computation from 2013/14 CSA large farm and smallholder farm surveys

[1] The total number of smallholder households (SH pop.), computed using the sampling weights, the number of sampled households (smallholder sample), and the number of sampled kebeles (smallholder kebeles) from the 2013/14 agricultural sample survey of smallholder cultivators that grow the respective crops are reported.

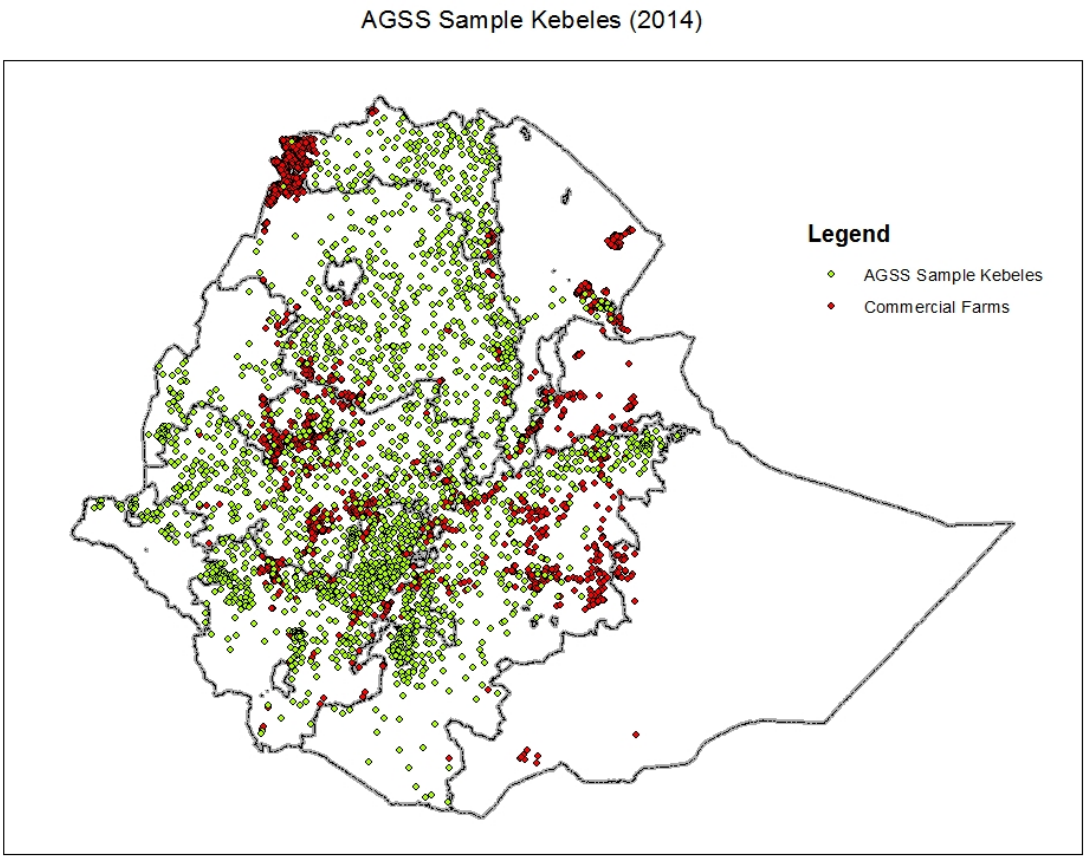


**Figure 1: Location of large farms and sample kebeles for the smallholder survey**

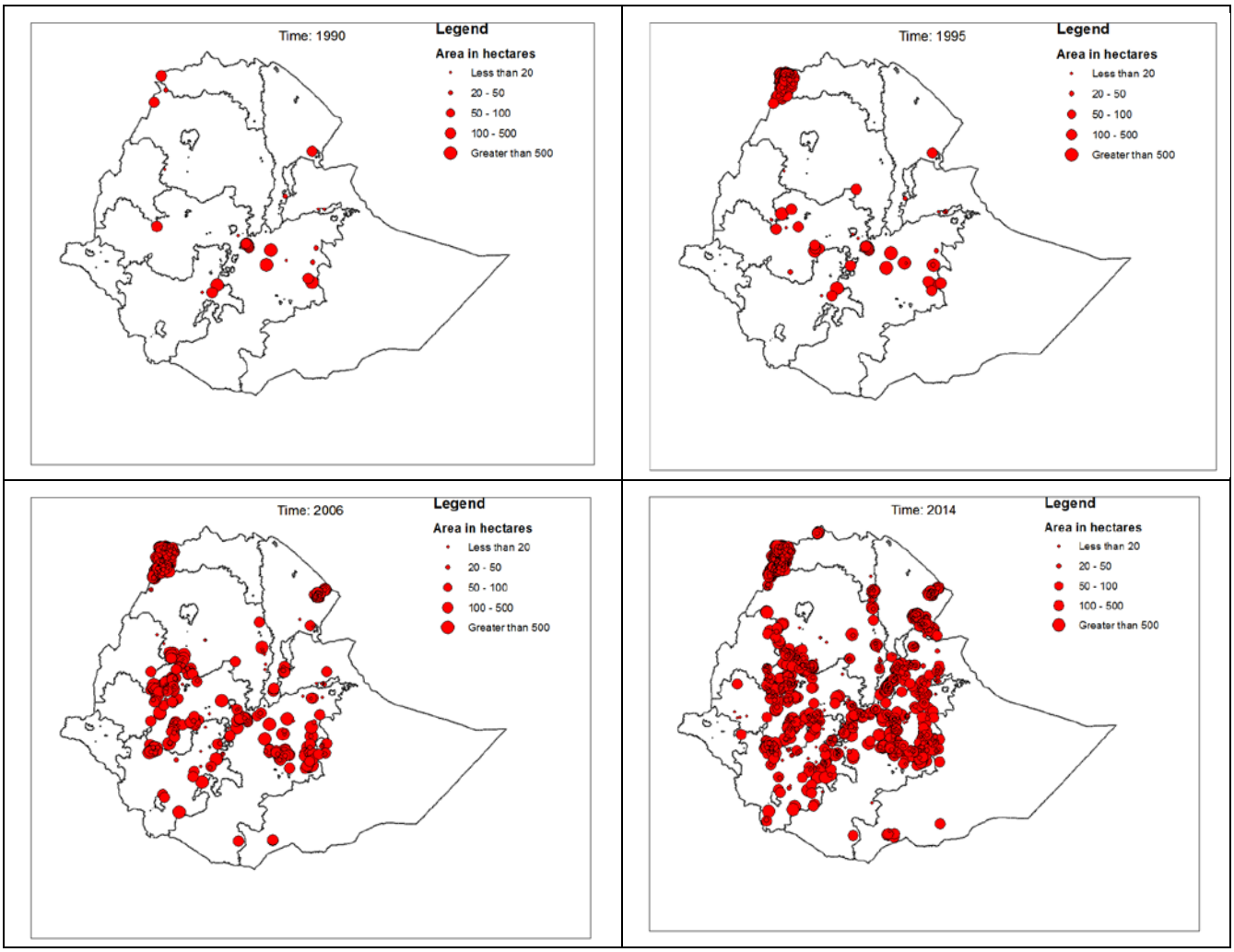


**Figure 2: Changes in coverage with commercial farms over time**