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# Assessment of an outsourced agricultural extension service in the Mutasa district of Zimbabwe

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**Zimbabwe has a pluralistic agricultural extension system. In addition to the public extension service, donors contract private service providers to deliver extension services in specific project areas. This study assesses the impact of an outsourced extension service on rural households in the Mutasa district of Zimbabwe's Manicaland Province, and examines the financial cost and benefit of this service. The extension service was delivered by a local agribusiness firm and funded by USAID. The study analyses survey data gathered from 94 client and 90 non-client rural households. Propensity score matching was used to identify a subset of comparable clients and non-clients. Descriptive statistics were compared across these groups, and the impact of the extension service on each of several outcome variables was estimated using two-stage least squares regression with instrumental variables to account for selection bias. The results show that the outsourced extension service contributed significantly to household crop income, net crop income and expenditure on farm inputs and services. In addition, clients perceived a range of socio-economic benefits such as better diets and health, improved product quality and job creation. An analysis of the financial cost and benefit of the extension service suggests an annual net incremental benefit of US$11,587, representing a 30% return on the investment made by the donor to finance the service. This estimate excludes socio-economic benefits attributed to the extension service.**

**Key words:** Smallholder extension service, impact assessment, net incremental benefit, Zimbabwe.

## INTRODUCTION

Agricultural extension services typically include capacity development through training, strengthening innovation processes, building linkages between farmers and other agencies, and helping to strengthen farmers' bargaining position through appropriate institutional and organisational development (Sulaiman and Hall, 2002). This form of extension service is common in Zimbabwe and is funded largely by the treasury with supplementary funding from donors for specific agricultural programmes (Saravanan, 2008; Oladele, 2011).

The public component of Zimbabwe's extension system is delivered by the Department of Agricultural, Technical and Extension Services (AGRITEX). AGRITEX is the largest public rural intervention agency in Zimbabwe with representatives at the national, provincial, district and village levels (IFPRI, n.d.). Sharp reductions in tax

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revenue and donor funding that followed the introduction of Zimbabwe's controversial 'fast track' land reform programme in 2000 reduced the AGRITEX budget (Government of Zimbabwe and FAO, 2011; Anseeuw et al., 2012) and compromised the effectiveness of its extension service (Hanyani-Mlambo, 2002; Saravanan, 2008; Gwaradzimba, 2011). This encouraged donors to experiment with outsourcing.

Outsourcing is a way of contracting private service providers (including private sector firms, NGOs and farmers' organisations) to deliver information and services characterised largely as public goods (Heemskerk et al., 2008). These service providers are often paid from both public and donor funds. In Zimbabwe, outsourced agricultural extension services are usually a component of projects that are fully funded by donors as most donors stopped channelling funds through the Treasury in 2002. The donors contract private service providers and monitor their performance (Anseeuw et al., 2012). This differs from the approach adopted in Mozambique where private service providers are contracted by the government, but does not imply a lack of collaboration with, or accountability to, the Zimbabwean Government.

Griffith and Figgis. (1997) describe the potential benefits of outsourcing relative to public service delivery. These include cost savings, improved effectiveness and development of the private sector. They also refer to potential challenges such as reduced accountability of government for the quality and quantity of contracted services, and collusive tendering practices. However, there is very little empirical information about the costs and benefits of outsourced extension services or about the impact of these services on small scale farmers in southern Africa (Heemskerk et al., 2008). This study aims to provide stakeholders with objective information about these aspects of an outsourced extension service in Zimbabwe.

Although there are several donor-funded projects operating in Zimbabwe that provide outsourced extension services, this study examined only one project funded by USAID. The study area was located within the Mutasa district in Zimbabwe's Manicaland province where outsourced extension services are well established and private service providers are actively recruiting new farmer clients. The project is managed by a private US-based company, Fintrac Inc. Fintrac contracts several NGO's and agribusiness firms to service different parts of its programme in the target area. The study area is serviced by Favco, a local company that processes fruit and vegetables.

## METHODS

This research examines the impact of an outsourced extension service on small farmers and assesses the financial cost and benefit of this service in the study area. The study area was confined to the Honde valley, an area of 500 $km^2$ located in the Mutasa district approximately 100 km north-east of Mutare, the fourth largest city in Zimbabwe (Mushunje, 2005). The valley is home to an estimated 1177 households located in five villages. Agriculture is the main economic activity. Annual rainfall averages 850-1000mm, but is restricted largely to the summer months from October to April. Crops grown include maize, bananas, coffee, tea, tubers and legumes (Mtisi, 2003; Mushunje, 2005). Topography ranges from steep to gently undulating slopes and most farmers irrigate crops using gravity irrigation. Approximately 600 of the smallholders farming in the study area use the agricultural extension service provided by Favco under contract to Fintrac (Fintrac, 2014). The service includes training and advice on farming practices (especially bananas and subsistence food crops), loans for seasonal farm inputs, and help accessing markets.

### Sampling method and data collection

The methods applied to the study's two key objectives draw on the same primary data gathered from farm households using a rigorous sampling design. Two sample surveys were conducted between April and June 2014. The first was a representative sample of all households in the study area. A two-stage cluster sampling method was used to select these households. At the first stage of sampling, two of the five villages (primary stage units or PSUs) were selected with probability proportionate to an estimate of their size. These estimates were based on a physical count of households (secondary stage units or SSUs) in each village. Households in each of the selected villages were then listed and a simple random sample drawn from each list using a constant sampling fraction (20%). This approach produces a self-weighting sample that can be analysed as if it were a simple random sample. A total of 152 households were surveyed, representing almost 13% of the estimated 1177 households in the study area.

The second survey was a census survey of all 'new' clients serviced by Favco in the study site. New clients were defined as those smallholders who with the firm's assistance, planted tissue culture banana seedlings in 2012 to harvest an improved banana crop between January and June 2014. A total of 32 new clients were surveyed. The samples together yielded 184 respondents. Of these, 94 were households that had been serviced by Favco (including the 32 'new' clients) and 90 were non-clients, i.e. $n_c$=94 and $n_{nc}$=90.

A uniform and structured questionnaire was administered in personal interviews with the *de facto* head of each sample household and with all 'new' project clients. The questionnaire gathered information on, *inter alia*: household and farm characteristics; farm enterprises, seasonal input purchases, and income from products sold in the 2013/2014 season; use of advisory, market and other services provided by Favco and the season in which each of these services were first used by the household. It was intended to solicit information from clients on their willingness to pay for Favco's extension service but this question was removed in case it discouraged farmers from participating in the survey.

### Measuring the impact of Favco's extension service on farmers

To assess the impact of a project in the absence of randomisation, it is important to compare similar households within the client (treatment) and non-client (control) groups (Rosenbaum and Rubin, 1983; Mendola, 2007; Khandker et al., 2010). In this study, propensity score matching (PSM) was used to identify a subset of client and non-client households similar in respect of observed family and farm characteristics that were unlikely to vary in the short-term. These variables included the age and gender of the household head; land and labour endowments per adult

equivalent[1]; dependants per adult equivalent; per adult equivalent value of farm implements and tools owned before project intervention; and village location. A logit model was estimated to predict the probability (*P*i) that the ith household would use the extension service. Clients were then paired with non-clients that had similar *P*i using the PSM procedure available in SPSS version 22 (Field, 2009).

Univariate t-tests for the equality of means across these comparable groups of clients and non-clients were made to reveal significant differences in variables measuring project outcomes. Where significant differences were detected, the 'general treatment model' (Khandker et al., 2010, p.25) was applied to control for the effects of observed and unobserved variables that affect outcomes but which are not related to the project. While the PSM accounted for observed characteristics that are unlikely to vary in the short-term, it excluded variables like prior investment in fencing and irrigation that could also influence participation. Following Khandker et al. (2010), the impact of an extension service on household outcomes can be measured by estimating the general treatment model:

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 X_i + \varepsilon i \quad (1)$$

Where $Y_i$ is an outcome observed for the ith household, T is a variable measuring the level of treatment, X is a vector of observed household and farm characteristics affecting the observed outcome, and ε captures random error and unobserved characteristics influencing the outcome.

Estimating the model by ordinary least squares (OLS) poses a problem because households are not randomly selected for treatment. The project area was selected for physical and climatic conditions that favour agriculture. Within the targeted areas, uptake of the extension service is voluntary for farming households. Client selection was therefore biased by both observed and unobserved attributes resulting in endogeneity of the treatment variable. This problem can be addressed using two-stage least squares (2SLS) and appropriate instrumental variables (Khandker et al., 2010). In the first stage, the treatment variable (T) is regressed on variables (X) and instruments (Z) that influence participation:

$$T_i = \lambda_0 + \lambda_1 Z_i + \lambda_2 X_i + \mu_i \quad (2)$$

Ideally, instruments should be correlated with T but not with factors affecting Y. In this study, Equation (2) was estimated as a logit model as T was recorded as a binary variable scoring 1 for (n=76) clients in the treatment group and zero for (n=76) non-clients in the control group. Household and farm characteristics included in the PSM were omitted from the estimation of Equation (2), and T was regressed on prior ownership of irrigation equipment, fencing and possession of a mobile phone. Fencing was viewed as an instrumental variable. Households that had fenced their cropland were considered more likely to participate in the project but fencing was not expected to influence outcomes of the outsourced extension service.

In the second stage, Y is regressed on $\check{T}$, the predicted value of T in Equation (2), and other variables (X) thought to affect project outcomes. $\check{T}$ excludes the effects of unobserved variables that may influence both participation and outcomes, and thus embodies only exogenous variation in T. The impact of treatment on households is measured by $B_1$, the regression coefficient estimated for $\check{T}$. In this study, a positive and statistically significant coefficient indicates that the outsourced extension service had a positive impact on the outcome. The standard errors of these coefficients were corrected for the two-stage process using the method described by Gujarati (2004).

[1] Adult equivalent = (no. of Adults + 0.5* no. of Children) $^{0.9}$. The power term 0.9 is included to capture size economies (Low, 1986)

**Assessing the financial cost and benefit of Favco's extension service**

An estimate of the 'without project' net cash farm income can be computed for the study area as $\hat{Y}_0 = N(\ddot{y}_C)$, where N is the total number of households counted in the study area and $\ddot{y}_C$ is the mean net cash income computed for households in the control group. The 'with project' net cash farm income can be estimated as:

$$\hat{Y}_1 = N\alpha(\ddot{y}_T.M) + N(1-\alpha)\ddot{y}c \quad (3)$$

Where $\ddot{y}_T$ is the mean net cash farm income computed for client households in the treatment group, M is an estimate of the local economy multiplier, and α represents the estimated fraction of new Favco clients in the study area. If no new clients are identified in the household sample (that is, α = 0) then $\hat{Y}_1 = \hat{Y}_0$ and there is no estimated incremental benefit from Favco's extension service. Clearly, the true value of $Y_1$ would exceed $\hat{Y}_1$ if 'old' clients experienced gains as a result of new information and support provided by Favco in the current season (2013/2014). $\hat{Y}_1$ is therefore a conservative estimate of financial benefits generated by the project as it understates true $Y_1$ in the presence of such dynamic productivity gains. In this study, the fraction of new Favco clients identified in the household sample was 9.9% (that is, α = 0.099) as fifteen of the 152 households in the representative household sample were new clients. The multiplier was taken as M = 1.8, which is consistent with local growth multipliers reported by Hendriks and Lyne (2003) for neighbouring Zambia (1.82), Burkina Faso (1.71) and Senegal (2.07 and 2.42).

It follows that $\hat{Y}_1 - \hat{Y}_0$ provides a conservative estimate of the incremental financial benefit of Favco's extension service in the study area for the 2013/2014 season. Consequently, the net incremental financial benefit of the service can be conservatively estimated as $\Delta_{PB} = (\hat{Y}_1 - \hat{Y}_0) - C$, where C is the cost to the donor of the support that Favco provided in the study area between September, 2013 and August, 2014.

## RESULTS AND DISCUSSION

### Descriptive statistics for the household sample

The descriptive statistics presented in this sub-section were computed from data gathered in the household sample survey ($n_h$=152). These statistics serve to introduce variables used in subsequent analyses and help to describe an average household in the study area.

Table 1 presents the mean value of variables measuring household demographics. Very few adults work off-farm. This reflects the relative importance of farming as a livelihood. The virtual absence of off-farm wage employment is also evident in the high proportion of male-headed households (86%). This contrasts with results from other studies of smallholders in parts of Southern Africa where men become migrant workers in towns and cities (Fenwick and Lyne, 1999; Kassie et al., 2012). Although household heads are relatively young (46.6 years) and reasonably well educated (7.5 years of schooling), they have acquired substantial experience as farmers (13 years). Household composition is similar to that reported in other studies of Zimbabwean smallholders

**Table 1.** Household demographics in the study area, 2014 ($n_h$ = 152).

| Variable | Mean | Standard error |
|---|---|---|
| Size of the household (persons) | 5.3 | 0.24 |
| Number of females | 2.9 | 0.15 |
| Number of children (≤15 years) | 2.3 | 0.15 |
| Number of adults (16-65 years) | 2.8 | 0.14 |
| Number of pensioners (>65 years) | 0.3 | 0.04 |
| Number of adults working off-farm | 0.4 | 0.08 |
| Age of the *de facto* head of the household (years) | 46.6 | 1.22 |
| Formal schooling completed by the *de facto* head of household (years) | 7.5 | 0.25 |
| Farming experience acquired by the *de facto* head of household (years) | 13.0 | 1.03 |
| Households with a male head (%) | 86.0 | 3.00 |
| Households with a male head responsible for farm management (%) | 69.0 | 4.00 |

Source: Household survey (2014).

**Table 2.** Household farming enterprises in the study area, 2013/14 ($n_h$ = 152).

| Variable | Mean | Standard error |
|---|---|---|
| Total revenue from farming operations (US$) | 864.66 | 100.16 |
| Revenue from bananas (US$) | 645.10 | 99.34 |
| Revenue from maize (US$) | 38.77 | 6.00 |
| Revenue from livestock (cattle, goats, chickens & pigs) (US$) | 22.95 | 6.20 |
| Total area cultivated (hectares) | 1.13 | 0.16 |
| Area planted to maize (hectares) | 0.48 | 0.03 |
| Area planted to bananas (hectares) | 0.45 | 0.04 |
| Expenditure on farming inputs, labour and contractor services (US$) | 286.41 | 35.17 |

Source: Household survey (2014).

**Table 3**. Household asset and wealth ownership in the study area, 2014 ($n_h$ = 152).

| Variables | Mean | Standard error |
|---|---|---|
| Total value of household and farm assets (US$) | 779.37 | 95.39 |
| Value of livestock (cattle, goats, pigs and chickens) (US$) | 421.76 | 70.49 |
| Value of cattle (US$) | 253.32 | 67.91 |
| Value of farm improvements (e.g. fencing & irrigation) (US$) | 253.94 | 35.36 |
| Value of irrigation equipment (US$) | 181.36 | 27.19 |
| Value of farm moveable assets (e.g. ox plough and hoes) (US$) | 75.27 | 7.00 |
| Value of household moveable assets (e.g. TV & generator) (US$) | 28.40 | 5.70 |

Source: Household survey (2014).

(Mushunje, 2005; ZimVac, 2013).

Table 2 summarises information about household farming operations including annual cash revenue from crop and livestock sales. These estimates are based largely on recall although many respondents were able to produce receipts and invoices to support their estimates of sales and expenditure. Bananas are by far the most important cash crop, accounting for 75% of farm cash earnings. Many authors view a shift from subsistence staples to high value cash crops (such as bananas) as essential for the improvement of rural livelihoods (Jayne et al., 2001; Davis, 2006; Fan, et al., 2013). Maize accounts for more land than any other crop but is grown largely for subsistence purposes (Kassie et al., 2012) and generates only 5% of farm cash earnings. Livestock do not make a significant contribution to farm earnings. Table 3 presents the mean value of important household assets. Although livestock do not produce significant income, they account for the largest share of the estimated market value of these assets. In Southern

**Table 4.** Comparison of mean outcomes.

| Outcome variables | Treatment (client) group (n=76) | | Control (non-client) group (n=76) | | t-statistic[1] |
|---|---|---|---|---|---|
| | Per adult equivalent | Per household | Per adult equivalent | Per household | |
| Revenue from all crops (US$) | 351.31 | 1154.95 | 143.74 | 503.52 | 3.26*** |
| Net revenue all crops (US$) | 226.74 | 762.63 | 87.62 | 326.12 | 3.46*** |
| Revenue from bananas (US$) | 315.08 | 1031.61 | 84.93 | 323.24 | 3.64*** |
| Cost of inputs & services (US$) | 121.90 | 383.25 | 56.41 | 178.66 | 1.98** |
| Revenue from livestock (US$) | 6.81 | 25.92 | 9.50 | 19.54 | 0.40 |
| Liquidity[2] (US$) | 494.16 | 1572.44 | 251.73 | 841.87 | 2.90*** |

[1]Tests for differences in per adult equivalent means. [2]Liquidity = total revenue from farming operations plus the market value of cattle and goats. ***, **, * significant at 1, 5 and 10% levels of probability respectively.

**Table 5.** Impact of the outsourced extension service on household outcomes (n = 152).

| Explanatory variables | Outcomes (US$/adult equivalent) | | | | |
|---|---|---|---|---|---|
| | Net revenue from all crops | Revenue from all crops | Revenue from bananas | Inputs and services purchased | Liquidity |
| Extension service (Ť) | 209.60*** | 281.66*** | 320.84*** | 75.16[+] | 293.21** |
| Age of farmer | -2.55 | -2.95 | -2.82 | -0.29 | -0.36 |
| Gender (1=male) | -31.67 | -73.84 | -57.59 | -35.86 | 28.41 |
| Education (years) | -2.43 | -3.31 | -6.51 | -0.45 | 11.64 |
| Experience (years) | 6.41*** | 8.15*** | 6.62** | 2.04 | 17.12*** |
| Land/adult equiv. (Ha) | 297.98*** | 726.42*** | 683.54*** | 433.59*** | 975.74*** |
| Labour/adult equiv. (#) | -27.25 | 26.18 | 37.84 | 48.91 | -169.69 |
| Constant | 55.63 | -52.96 | -91.29 | -122.63 | -241.58 |
| F-statistic | 5.01*** | 7.80 *** | 6.89*** | 7.92*** | 10.20*** |
| Adjusted $R^2$ | 0.16 | 0.24 | 0.22 | 0.24 | 0.30 |

***, **, *, [+] significant at 1, 5, 10 and 15% levels of probability respectively.

Africa, smallholders keep cattle largely as a store of wealth (Doran et al., 1979; Bote et al., 2014). Irrigation equipment also accounts for a large share of total asset value. The vast majority of households in the representative sample operated their own gravitational irrigation systems.

## The impact of Favco's extension service on farmers

The logit model estimated as part of the PSM process described in the methods section was statistically significant at the 1% level of probability with a Nagelkerke $R^2$ of 0.25. Land, labour and dependants were statistically significant and positive determinants of participation in the outsourced extension service. Age was a statistically significant but negative determinant of participation. The PSM matched 76 pairs of clients and non-clients. Unmatched cases were excluded from the treatment and control groups. The results of univariate t-tests for the equality of means across these comparable groups of clients and non-clients are presented in Table 4. These results reveal marked differences in variables measuring project outcomes. The t-statistics, which test for differences in per adult equivalent group means (to control for differences in household size and composition), highlight large and statistically significant differences in crop revenue, crop net revenue, banana revenue, expenditure on farming inputs and services, and levels of liquidity between client and comparable non-client households.

While the results presented in Table 4 are encouraging, they could be misleading as univariate tests do not account for observed and unobserved variables that affect outcomes but which are not related to the project. The 'general treatment model' described in the methods section was applied to each of the outcome variables listed in Table 4 with the exception of livestock revenue which did not differ between treatment and control groups. The logit model (Equation 2) estimated in the first stage of the two-stage process was statistically significant at the 1% level of probability, returned a Nagelkerke $R^2$ of 0.40 and correctly classified 78% of the 152 matched households into their known treatment and control groups. All of the explanatory variables, including the instrument, were statistically significant and positive determinants of treatment.

Table 5 presents the results of the second stage

**Table 6.** Additional benefits perceived by clients ($n_c$=94).

| Outcome | Perception | | |
|---|---|---|---|
| | Reduction | No change | Increase |
| Household food security | 0 | 5.0 | 95.0 |
| Quality of family's diet | 0 | 5.0 | 95.0 |
| Family health | 0 | 6.0 | 94.0 |
| Access to support networks | 0 | 6.0 | 94.0 |
| Ability to cope with social setbacks like ill-health and death | 1 | 10.0 | 89.0 |
| Household savings | 0 | 14.0 | 86.0 |
| Child education | 1 | 16.0 | 83.0 |

Source: Household survey (2014).

regressions for each of the five (significant) outcome variables. All of the regression models were statistically significant at the 1% level of probability. There was no evidence of severe multicollinearity as most of the explanatory variables, including the predicted level of the outsourced extension service (Ť), had Variance Inflation Factors (VIFs) close to unity. Age and farming experience exhibited modest collinearity with VIFs of 1.5 and 1.8 respectively (Gujarati, 2004: 362). The impact of Favco's extension service on households is measured by the regression coefficient estimated for Ť. The results indicate that the extension service had a positive impact on household crop income, adding per adult equivalent amounts of US$210 to net crop revenue, US$282 to crop revenue and US$293 to household liquidity. Expenditure on crop inputs and services increased by US$75 (t-statistic = 1.45) per adult equivalent. This bodes well for local economic growth as the local growth multiplier associated with increased agricultural earnings in the district is expected to be in the order of 1.8 (Hendriks and Lyne, 2003). The cash gains generated by the extension services investigated in this study were driven largely by commercial production of bananas.

Only two of the household and farm characteristics that influenced participation (namely, the farmer's experience and the household's land endowment) also influenced the outcomes presented in Table 5. Access to land and the efficiency of the land rental market are clearly important issues in promoting farm incomes and local economic growth. Empirical evidence from southern Africa shows a strong positive relationship between productive use of farmland, the efficiency of the land rental market and measures of land tenure security (Lyne, 2006).

## Additional benefits perceived by clients

Other benefits perceived by client household ($n_c$=94) were also considered. Table 6 presents the incidence of clients that attributed improvements in socio-economic indicators to the outsourced extension service. Clearly the vast majority of clients perceived improvements in household food security, quality of diet, health, access to support networks, ability to cope with social setbacks, savings and child education. In addition, more than 95% of clients perceived improvements in the quality of their produce (appearance, size and storability) and farm inputs, and in yields achieved for their main cash crops. On a Likert-type scale of 1 (poor) to 5 (highly satisfactory), these clients rated their overall satisfaction with Favco's agricultural extension service as 4.4. Almost 60% of the clients claimed that they had spent more on labour since becoming clients, and the mean number of permanent jobs created per client was 2.5.

## Financial cost and benefit of Favco's extension service

Given a total population of N=1177 for households in the study area, and net crop revenue of US$326.12 per household in the control group (Table 4), the 'without project' net cash farm income for the study area is estimated as:

$$\hat{Y}_0 = N(\ddot{y}_C) = 1{,}177(\text{US\$}326.12) = \text{US\$}383{,}843.$$

Cash earned from livestock was excluded from this estimate as livestock revenue was not impacted by Favco's extension service. From Table 4, the mean net crop revenue for client households is $\ddot{y}_T$ = US$762.63. Substituting this value into Equation (3), the 'with project' net cash farm income for the study area is estimated as:

$$\hat{Y}_1 = N\alpha(\ddot{y}_T.M)+N(1-\alpha)\ddot{y}c = [(1{,}177*0.099*\text{US\$}762.63*1.8)]+[1{,}177(1-0.099)*\text{US\$}326.12] = \text{US\$}434{,}707.$$

Following the explanation presented in the methods section, the net incremental financial benefit of Favco's extension service can be conservatively estimated as:

$(\hat{Y}_1-\hat{Y}_0)-C$,

where C is the cost to the donor of the support that Favco provided in the study area from September 2013 to August 2014. Fintrac estimated this cost as US$39,276 (M. Chirima, personal communication, December 09, 2014)[2]. The net incremental financial benefit of Favco's extension service in the study area is therefore conservatively estimated as US$11,588 ([US$434,707-US$383,843]-US$39,276), a return of almost 30% on investment for the 2013/14 crop year. The Global Forum for Rural Advisory Services (GFRAS, 2012) claims that annual returns of 40 to 60% are the norm for investments in agricultural extension. However, the studies supporting this claim do not relate specifically to outsourced extension services or to Southern Africa.

Considering that Favco had serviced only 40% of the households in the study area, with just one quarter of these clients added during the 2013/2014 season, it is conceivable that this financial benefit could be reaped for several years to come as the service is extended to more households. Moreover, the previous section suggests a host of additional benefits that should be taken into account, such as improvements in food quality, better diets and family health, and pro-poor employment creation.

## Conclusions

Participation in Favco's extension service was positively influenced by the household's land and labour endowment, investment in irrigation and fencing, and possession of a mobile telephone. It was estimated that the extension service added per adult equivalent amounts of US$282 and US$75 to crop revenue and expenditure on crop inputs and services respectively. The data also suggest that the outsourced extension service produced other socio-economic benefits like improved food quality and food security. However, there was no evidence of increased livestock revenue.

While these findings support the view that agricultural extension services play an important role in raising farm incomes and creating employment opportunities in poor rural areas, they also highlight the need for an efficient land rental market to alleviate farm size constraints, for rural health services to alleviate labour constraints, for telecommunication services, and for smallholder access to capital to finance improvements like irrigation and fencing. In turn, secure land tenure is required for an efficient land rental market and to strengthen incentives for investment in improvements. In the absence of these fundamentals, even well-resourced extension services will be less effective and less pro-poor than they should be.

An analysis of the financial cost and benefit of the outsourced extension service in the study area suggests an annual net incremental benefit of US$11,587, representing a 30% return on the investment made by donors to finance the service - even when the socio-economic benefits are disregarded. These results suggest that there is good reason for donors to continue funding effective extension services to small farmers in areas of high agricultural potential such as the Mutasa district.

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## Conflict of interest

The author(s) have not declared any conflict of interest.

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