

## Appendix C: Power calculations

### Introduction

These power calculations are based on baseline and midline data from the KGFS impact evaluation. Our estimates are discussed below. We define the treatment as being the provision of access to finance over a geographic area associated with each treatment-group KGFS branch, and thus estimate the average treatment effect (ATE) over the study population.

Overall, these power calculations suggest that a change of about 10% of the mean value is detectable for the majority of outcomes, even without fully accounting for the pair-wise matching of service areas. However, some outcomes are detectable only at above a change of 20%. When taking the matching strategy into account, all outcomes can be detected at or below a change of 20% of the control mean. As the later analysis will show, decreasing the number of pairs damages the study's ability to detect key outcomes – especially for those on the margin – but outcomes, generally, remain at similar levels of detectability down until 60 pairs or below. These power calculations assume that the sample is clustered at the service area level, but that a simple random sampling method is used to draw the sample from within the service area. They have been calculated for roughly 50 potential outcomes, although results are only presented for 18 of these outcomes in the table below. Overall, the evidence from using empirical inputs suggests that the study will be capable of detecting changes from the intervention.

### Outcomes – thresholds for economic and statistical significance

The threshold for significance in the evaluation of social programs is typically the point at which a program becomes cost-effective relative to other programs. But in this case, we are evaluating a self-funding banking intervention: any benefit that derives from the intervention is 'free' in the sense that it does not consume assets that could be devoted to another program.

Table C1 presents the minimum detectable effect (MDE) as a percentage of the control mean for outcomes across several categories. Because the cost of this intervention is zero, we define a borderline significant effect as MDE equal to 5% of the control mean for economic outcomes, and MDE equal to 2.5% of the control mean for health outcomes. Outcomes of successful programs are typically larger than these thresholds. The design of this evaluation ensures that, if health outcomes are not medically significant, positive impacts can be ruled out; economic outcomes will be detected at about 20% of the control mean, a threshold regularly met or exceeded in similar evaluations of banking and microfinance programs.

The difference between the two types of MDES has to do with whether we control for pair-wise matching in calculating the intra-cluster correlation. Worst-case MDES are calculated using  $\rho$  without pair demeaning. These are very conservative estimates, as they don't take into account the more sophisticated methods of controlling for pair-wise matching. Best-case MDES are calculated using  $\rho$  that takes into account pair demeaning. The difference between the two values represents, generally, the extent to which the pair-wise matching strategy will likely improve the power of any final analysis. In some cases – such as for value

of business inputs, and the total area cultivated for farming – these differences are quite substantial.

**Table C1: Minimum Detectable Effect Size as % of Mean**

Category	Outcome	Mean	SD	MDES	MDES (pair demeaned)
Consumption	Total Consumption	933	961	12.48%	7.90%
	Amount Spent on School	2125	5628	24.39%	20.70%
Employment	Self-Employment	0.41	0.49	12.74%	10.08%
	Migration of HH Members	0.14	0.34	20.56%	20.02%
	Value of Business Inputs	4455	11741	40.01%	20.52%
Farming	Total Area Cultivated	11.3	22.4	41.83%	19.96%
	Total Farm Costs	11574	13887	11.91%	9.32%
	Fertilizer Expenditure	3115	3617	9.98%	8.82%
	Own Livestock	0.57	0.49	11.11%	6.43%
Financial Access	Loan Amount Outstanding	90339	134342	10.88%	10.88%
	Have Insurance	0.780	0.415	8.32%	4.11%
Other	Average Child Education	5.612	2.123	3.68%	2.67%
	Own Buildings	0.948	0.222	1.96%	1.82%
Well- Being/Health	Happiness Ladder	4.490	2.547	5.71%	4.92%
	People Visited in Gramum	16.61	27.94	13.24%	13.24%
	Days Missed Due to Health	2.06	4.26	24.99%	20.16%