Appendix

I. Tables not included in main text

Table A-1: Description of all models

Model	*region*	*samurdhi*	*asset*	*community*	*head*	*member*	*ownership*	*housing*	*Selection by significance*	*Others*
Model 1	Y	Y	Y	Y	Y	Y	Y	Y	Medium[1]	
Model 2	Y	D	Y	Y	Y	Y	Y	Y	Medium	
Model 3	Drop province dummies	D	Y	Y	Y	Y	Y	Y	Medium	
Model 4	Drop province dummies	D	Y	Y	Y	Y	Drop landown dummies	Y	Medium	
Model 5	Drop province dummies	D	D	Y	D	D	D	Y	Medium	
Model 6	Drop province dummies	D	Y	D	Y	Y	Y	Y	Medium	
Model 7	Drop province dummies	D	Y	Y	Y	Y	Y	Y	High[2]	
Model 8	D	D	Y	Y	Y	Y	Y	Y	High	
Model 9	Drop non-urban dummy	D	Y	Y	Y	Y	Y	Y	Medium	Regress OLS for urban and rural separately.
Model 10	Drop non-urban dummy	D	Y	Y	Y	Y	Y	Y	Medium	Two Stage[3]
Model 11	Drop non-urban dummy	D	Y	Y	Y	Y	Y	Y	Medium	Regress OLS for the bottom 80 % of expenditure groups[4]

Notes: * "Y" refers to "variables in a category are included before stepwise regressions. "D" refers to "all variables in a category are dropped before stepwise regressions." Furthermore, we select variables using stepwise procedure: In the first step, we execute an OLS regression with all variables of categories included, and then keep variables with a certain level of significance for the next step. We continue this procedure until all estimated coefficients of variables have a certain level of significance (the p-value is either lower than 0.2 or 0.01, see below).

1. After stepwise regressions, only reasonably significant variables (their p-value<0.2) are selected.
2. After stepwise regressions, only highly significant variables (their p-value<0.01) are selected.
3. At the first stage regression, we regress model 7 and keep sample if the predicted per capita expenditure is smaller than 70 percentile of actual per capita expenditure. At the second stage, regress model 7 for the remaining sample. Using the estimated coefficients, compute the predicted per capita expenditure for the regression sample.
4. Regress model 7 using sample of the bottom 80 percent of per capita expenditure. Then using the estimated coefficients, compute the predicted per capita expenditure for the whole sample.

Table A-2: Regression results from OLS estimations

(Dependent variable: Log of actual per capita monthly consumption expenditure of household)

Variable	Description of variable	Model 2	Model 7	Model 8
prov2	1 if province=Central 0= otherwise	-0.180 (10.47)**		
prov3	1 if province=Southern 0= otherwise	-0.052 (3.05)**		
prov5	1 if province=North Western 0= otherwise	-0.029 (1.63)		
prov6	1 if province=North Central 0= otherwise	0.155 (6.93)**		
prov7	1 if province=Uva 0= otherwise	0.029 (1.37)		
prov8	1 if province= Sabaragamuwa 0= otherwise	-0.078 (4.06)**		
non_urban	1= lives in Rural/Estate 0= lives in urban area	-0.071 (4.49)**	-0.098 (6.11)**	
car_van	1= hhold has Car/van 0= otherwise	0.404 (16.80)**	0.402 (16.33)**	0.403 (16.32)**
cooker	1= hhold has Cooker (kerosene /gas/ electric); 0= otherwise	0.137 (7.11)**	0.147 (7.58)**	0.166 (8.68)**
cycle	1= hhold has Bicycle/Tricycle 0= otherwise		0.040 (3.68)**	0.036 (3.27)**
fan	1= hhold has Fan 0= otherwise	0.092 (5.83)**	0.108 (6.77)**	0.114 (7.15)**
fridge	1= hhold has Refrigerator 0= otherwise	0.112 (6.05)**	0.112 (5.92)**	0.118 (6.20)**
gen_pump	1= hhold has Pump/generator 0= otherwise	0.134 (2.40)*		
m_cycle	1= hhold has Motorcycle/Scooter 0= otherwise	0.074 (4.56)**	0.089 (5.39)**	0.083 (5.01)**
radio	1= hhold has Radio/CD player/Cassette player; 0= otherwise	0.050 (3.75)**	0.044 (3.21)**	0.043 (3.12)**
sew_mach	1= hhold has Sewing Machine 0= otherwise	0.078 (6.48)**	0.073 (5.93)**	0.073 (5.95)**
tractor	1= hhold has Tractor 0= otherwise	0.109 (2.91)**	0.149 (3.87)**	0.149 (3.88)**
tv_vcr	1= hhold has TV/VCR 0= otherwise	0.075 (5.88)**	0.072 (5.68)**	0.075 (5.87)**
bank_com	1= Public/Private bank in community 0= otherwise	0.056 (4.27)**	0.073 (5.59)**	0.083 (6.46)**
ds_com	1= Divisional Secretariat in community; 0= otherwise	0.112 (5.27)**	0.083 (3.88)**	0.091 (4.24)**
wid_f	0= Head is female and widowed /separated /divorced; 1= otherwise	0.055 (3.51)**	0.056 (3.49)**	0.053 (3.25)**
ageHcat4	1= hhold head Age: 70-79 0= otherwise	-0.041 (2.03)*	-0.055 (2.69)**	-0.054 (2.61)**
ageHcat5	1= hhold head Age: 80 + 0= otherwise	-0.116 (3.45)**	-0.134 (3.95)**	-0.133 (3.89)**
edulevH4	1= hhold head Passed OL or Grade 11 0= otherwise	0.065 (4.22)**	0.065 (4.16)**	0.065 (4.16)**
edulevH5	1= hhold head Passed AL/GAQ/GSQ 0= otherwise	0.102 (4.41)**	0.103 (4.32)**	0.103 (4.33)**
edulevH6	1= hhold head Has Degree /PG /Diploma; 0= otherwise	0.190 (4.41)**	0.169 (3.86)**	0.163 (3.71)**

activH34	1= hhold head in Salaried employment or business; 0= otherwise	0.043 (3.41)**	0.049 (3.80)**	0.050 (3.89)**
landown2	1=Cultivable land owned by household: 1<Acres<=2; 0= otherwise	0.053 (2.52)*	0.075 (3.48)**	0.069 (3.19)**
landown3	1=2<Acres<=4 0= otherwise		0.084 (3.31)**	0.079 (3.09)**
landown4	1=Acres>4 0= otherwise	0.158 (3.63)**	0.166 (3.74)**	0.159 (3.58)**
lstk	1=hhold has Livestock (any) 0= no livestock	0.071 (3.76)**	0.084 (4.39)**	0.082 (4.24)**
dhsize2	1= hhold size: 3-4 members 0= otherwise	-0.209 (7.25)**	-0.220 (7.49)**	-0.227 (7.71)**
dhsize3	1= hhold size 5-6 members 0= otherwise	-0.362 (11.86)**	-0.387 (12.67)**	-0.393 (12.84)**
dhsize4	1= hhold size 7-8 members 0= otherwise	-0.483 (14.03)**	-0.512 (15.30)**	-0.516 (15.36)**
dhsize5	1=hhold size 8 + members 0= otherwise	-0.537 (13.04)**	-0.587 (15.02)**	-0.586 (14.94)**
rsch5_16	1=All children in hhold of age 5-16 attend school; 0=otherwise	0.064 (3.63)**	0.065 (3.67)**	0.062 (3.45)**
ndep	# of dependents age<=16 or age>60	-0.010 (2.06)*		
dwellten1	1=Dwelling owned by hhold 0= not owned by hhold	0.024 (2.00)*	0.038 (3.09)**	0.035 (2.82)**
flrtyp3567	1= type of floor: cement terrazo tiles brick; 0=other	0.029 (1.97)*		
fuel1	1=Fuel for cooking: Gas/electricity 0= other	0.131 (5.86)**	0.122 (5.37)**	0.126 (5.53)**
latrtyp1	1=Toilet: Private and flush type 0= other	0.164 (10.01)**	0.163 (9.93)**	0.162 (9.80)**
rmsmem	No. of Rooms (excl. kitchen/bath) *per* hhold member	0.160 (11.21)**	0.165 (11.50)**	0.159 (11.05)**
walltyp137	0=Walls: cabook/mud/plank/cadjan 1= other	0.071 (5.32)**	0.062 (4.77)**	0.063 (4.80)**
Constant		7.162 (172.46)**	7.145 (175.16)**	7.071 (181.02)**
#Observations R-squared		5257 0.58	5257 0.56	5257 0.56

Table A-3: 95% Confidence Intervals for undercoverage rates

Cutoff percentile	*Model 7*	*Model 8*
25	[0.48 ,0.57] (0.022)	[0.48 ,0.57] (0.021)
30	[0.40 ,0.47] (0.019)	[0.39 ,0.46] (0.019)
35	[0.33 ,0.40] (0.018)	[0.33 ,0.40] (0.018)
40	[0.25 ,0.32] (0.016)	[0.25 ,0.31] (0.017)

Notes: All calculations for poverty line same as the eligibility cutoff; confidence intervals are in square brackets; standard errors are in parentheses

Table A-4: 95% Confidence Intervals for leakage rates

Cutoff percentile	*Model 7*	*Model 8*
25	[0.34 ,0.44] (0.027)	[0.34 ,0.44] (0.027)
30	[0.31 ,0.40] (0.022)	[0.31 ,0.39] (0.022)
35	[0.29 ,0.37] (0.020)	[0.30 ,0.38] (0.020)
40	[0.27 ,0.34] (0.018)	[0.27 ,0.34] (0.018)

Notes: All calculations for poverty line same as the eligibility cutoff; confidence intervals are in square brackets; standard errors are in parentheses

Table A-5: Models 7a, 8a and Samurdhi after addressing "overfitting"*

	Split (1)		Split (2)	
	Undercover	Leakage	Undercover	Leakage
Model 7a	0.33 (0.28)	0.32 (0.31)	0.28 (0.28)	0.31 (0.31)
Model 8a	0.32 (0.28)	0.32 (0.31)	0.28 (0.28)	0.32 (0.31)
Samurdhi*	(0.42)	(0.43)	(0.42)	(0.43)

Notes: 1) To split the sample in half, households were sorted first by province, then by sector, and then by per capita consumption. In split (1), the even numbered observations were used for estimating predicted consumption level, and error rates were computed using the set of odd numbered observations. Split (2) reverses the roles of the odd and even numbered observations.
2) The numbers in parentheses are the error rates using the corresponding models *without* addressing overfitting
3) * Samurdhi error rates are computed for the entire sample
4) All error rates are calculated for a target group of bottom 40 percent and a cutoff of 40th percentile of actual per capita consumption

II. Notes to the main text

Clarifying the consumption measure

The consumption measure used for the exercise *includes* the transfers received by the household from the government, in various forms that include Samurdhi foodstamps as well as benefits from other programs. Since the objective of the Welfare reform is to *replace* the existing system of targeting (particularly, Samurdhi), it can be argued that what should matter for gauging welfare of a household is consumption *net* of Samurdhi foodstamps. However, such a net measure of consumption, in our judgement, should not be used in this case for a number of reasons.

Firstly, the Samurdhi foodstamps variable is reported in the data with some error, which primarily stems from the fact that a part of the transfers actually do not enter into the household's consumption, but is deposited in the Samurdhi Banks as "forced savings" of the household, or deducted in some cases as premiums for social insurance. This would not matter, if it was known for sure how much is held back from the households as savings. However, this is difficult to determine in practice, particularly since households – in response to the question posed in SLIS – have sometimes reported amounts received *net* of these deductions, and sometimes in *gross* terms, depending on their own interpretation of the question.

Secondly, even if the actual value of foodstamps *received* by the household last month were known, there is no way to determine how many of those were actually used to buy foodstuff last month, and the value of foodstuff bought last month (since the price of food from the Samurdhi cooperative store where these stamps are accepted may be different from the market price). Moreover – a more subtle point – it is not known to what extent the Samurdhi foodstamp would have *substituted* for purchases that would be made even without the foodstamps. All these problems make it very unlikely that a naive calculation of consumption net of the value of Samurdhi foodstamps received last month will yield a true measure of the relative welfare status of households *in the absence of Samurdhi*, which is the objective of such an exercise.

Thirdly, the Welfare reform is eventually meant to cover all welfare programs for targeting purposes. Thus deducting *only* Samurdhi foodstamps from the consumption of households to determine their relative welfare status will not be enough, and consistency will demand that welfare of households be calculated net of *all* welfare transfers. However, detailed information on the other programs – particularly which benefits were received in cash and entered the consumption bundle of last month – are not available from the SLIS.

For all the above reasons that would introduce various kinds of measurement error, it was considered best to measure welfare by consumption – without netting out any transfers received. However, a sensitivity test was conducted by comparing the results from our "best" model with a similar model where the dependent variable was per capita consumption net of the reported Samurdhi foodstamp receipts. The results show an extremely high degree of overlap between the predictions of the two models under the two different measures of consumption – the models "agree" on more than 90 percent of the predictions. These results imply that how consumption is defined as a dependent variable in these models actually matters little – and using either definition one arrives at PMTFs whose predictions are quite similar in terms of identifying the poor.

Defining the Foster-Greer-Thorbecke (FGT) measure for welfare[a]

The formula for the FGT index is given by: $P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{Z - y_i}{Z}\right)^\alpha$

Where Z = poverty line; y_i = income of the ith person; q = the number of poor; n = total population; α = parameter that determines sensitivity to distribution of welfare among the poor. The n people in the population are ranked by welfare from poorest to richest: i = (1, 2... q..n).

When α = 0, the FGT measure collapses to the Headcount ratio or the percentage of the population that is below the poverty line. This measure can give estimates of how many of the poor should be served by poverty programs, but is insensitive to differences in the depth of poverty. Suppose the poverty line is Rs. 100, there are ten people in the economy and two are poor. The Headcount index will give the same result ($P_0 = 0.2$) if there are two poor people with welfare (measured by, say, consumption expenditure) of Rs. 95 as it would with two incomes of Rs. 5; yet clearly, in the latter case poverty is more severe.

When α = 1, the FGT index becomes the Poverty Gap, a measure of the depth of poverty. This measures the total consumption shortfall as a percentage of the poverty line. Thus, in the case of the two poor people with consumption expenditure of Rs. 95, $P_1 = 0.01$. With two poor people earning Rs. 5, P_1 would be 0.19. This implies that P_1 will increase *even if* the number of the poor is the same, if there is a welfare reduction in one poor household.

The drawback to the Poverty Gap measure is that it will estimate the poverty to be the same when one poor person has an income of Rs. 90 and the other an income of Rs. 10 as it would when both have an income of Rs. 50. Yet many would argue that the former situation represents lower welfare if the *distribution* of welfare among the poor is a concern. This is overcome for α > 1. For instance, when α=2, the first case gives $P_2 = 0.082$ and the second gives 0.025. In other words, P_2 will register an increase *even if* the average welfare of the poor is the same, if there is a transfer from one poor household to another poor household that is relatively better off. The drawback to using α = 2 is that the measure is hard to interpret.

[a] Based largely on Grosh (1994), Box 3.1, p. 25