Appendix: NOT FOR PUBLICATION

A MFI Loan products

Table A.1 provides information on main loan products offered by the MFI.

Table A.1: Credit products offered by the MFI

Product	Loan Amout		Interest rate (%)	Tenure (weeks)	Frequency	Cost(% loan amount)	Weekly instalment (INR)
	Min	*Max*					
Education	5000	15000	22 (later 18)	52	Weekly	13.4 (later 11.3)	218 (later 214 - loan amount 10000)
Emergency	1000	1000	0	10/11	Weekly	0	100
Festival	2000	2000	22 (later 18)	24	Weekly	22.4 (later 9.2)	102 (later 91)
IGL Pragati Plus (Business)	15000	50000	25 (later 22)	104	Weekly	28.1 (later 24.8)	308 (later 300 - loan amount 25000)
IGL Pragati (Business)	10000	20000	25 (later 22)	52	Weekly	15.1 (later 13.6)	332 (later 328 - loan amount 15000)
Pragati Suppliment Loan	5000	10000	26 (later 22)	52	Weekly	15.4 (later 13.4)	222 (later 218 - loan amount 10000)
Sanitation Loan	10000	15000	22 (later 18)	104	Weekly	24.1 (later 19.9)	179 (later 173)

B Sampling description and study area

The sample was selected from 81 eligible study GPs. An eligible GP was defined as one where (i) the MFI had active lending groups (kendra) and (ii) where sanitation activities had not been undertaken in the past. Through interactions with MFI staff, we identified areas where no sanitation activities were ongoing but they were planned (and/or considered feasible) in the near future. We excluded kendras located in urban areas; and identified GPs with active kendras. This resulted in 81 GPs in five blocks (corresponding to MFI branches) within two districts. Within each GP the following sampling procedure was applied at endline:

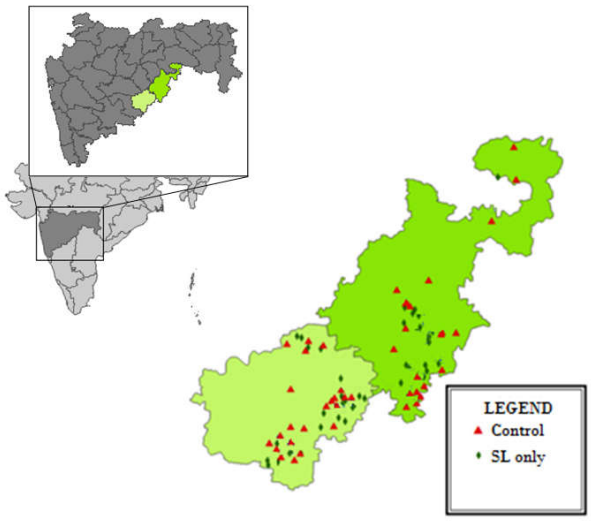
Step 1: in the GPs where only one kendra is present, we sampled all clients in that kendra

Step 2: in the GPs where more than one kendra is present, we retained kendras with at least one client sampled at the baseline, and randomly selected one kendra. All client households from that kendra were included in the sample.

Step 3: As more clients were needed to reach the desired sample size, we further randomly sampled the kendras with at least one client sampled at baseline that were not fully sampled until we reached the desired sample size.

Figure 2 shows location of Latur and Nanded within Maharasthra (left) and of study GPs within the two districts (right).

Figure 2: Study location



Notes: Figure shows location of Latur and Nanded within Maharasthra (left) and of study GPs within the two districts (right).

B.1 Comparing study sample to study context

C Multiple Hypothesis Testing

Given that our analysis conducts several hypothesis tests, it is possible that we may falsely reject the null hypothesis when it is true for some hypotheses since the probability of conducting at least one Type I error increases with the number of hypotheses tested. We therefore verify whether our results hold once we account for multiple hypothesis testing by calculating adjusted p-values according to the procedure of [Romano and Wolf, 2005]. Table C.1 displays the impact estimates and standard errors for all outcomes in the two rows before reporting the original p-values (3rd row) and those adjusted for multiple hypotheses (4th row). The Table shows that the impacts on the key outcomes of interest are robust to multiple hypothesis testing.

D Variable Definition and Additional Tables

D.1 Toilet quality

To measure quality of a toilet's underground structure, we use information on materials used to construct the underground chamber (good quality materials such as cement rings and brick ensure that the underground chamber will not collapse), and also whether the interviewer observes flies or bad smells. Discussions with experts identified the latter two as indicators of poor quality construction of the underground chamber. We aggregate these variables into one measure using polychoric principal components analysis. Only one factor in the polychoric PCA has an eigenvalue greater than 1 (see Table D.1).

To measure quality of the overground structure, we use an indicator based on observations of the toilet made by the survey interviewers at the time of the endline survey. Interviewers made notes on the quality of the super-structure (whether it is temporary, semi-permanent or permanent), ease of access, lighting in the toilet (at day and at night), availability of a lock and a lockable door, whether

Table A.2: Key statistics comparing our sample to our study context

Variables	Our sample (2014-15)	DLHS - 4 (2012-13)		
		Latur and Nanded (rural)	Rural Maharashtra	Rural India
BPL card (%)[b]	41.89	21.39	19.83	18.68
Female headship (%)[l]	9.06	7.66	9.93	14.68
Age HH head[l]	47.76	50.13	50.08	49.36
Education HH head[b]	6.02	4.16	4.11	3.98
HH owns land (%)[b]	44.45	56.59	53.01	46. 25
Caste (%)[l]				
SC	23.53	26.48	18.7	23.97
ST	4.66	8.85	17.15	23.33
OBC	36.77	33.23	40.41	30.05
Other	33.96	20.96	18.42	18.21
Don't know	0.67	10.48	5.32	4.44
Religion (%)[b]				
Hindu	75.77	83.88	86.77	67.64
Muslim	13.69	6.84	5.07	5.78
Christian	0	0	0.22	14.19
Sikh	0	0	0.03	7.1
Buddhist	10.49	9.24	7.25	3.22
Other	0.06	0.04	0.67	2.08
Sanitation				
Toilet uptake (any) (%)[l]	27.50	23.74	37.99	55.82

Notes: Our sample data come from listing survey (l) of our population and household survey pre intervention roll-out (b). For Nanded and Latur districts, rural Maharashtra and India we refer to the District Level Household Survey - 4.

Table C.1: Intervention impact on all outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Sanitation Loan	Own toilet	Own functioning toilet	Toilet quality			Open defecation
		Interviewer observation		Underground	Overground 1	Overground 2	All HH members
SL	0.182***	0.0899**	0.0958***	0.0140	0.0631	0.0519	-0.108***
	(0.0358)	(0.0244)	(0.0232)	(0.0219)	(0.0342)	(0.0272)	(0.0252)
Cluster-robust p-value	[0.0000]	[0.0002]	[0.0000]	[0.5227]	[0.0653]	[0.0566]	[0.0000]
Romano-Wolf p-value	[0.0000]	[0.0050]	[0.0020]	[0.9970]	[0.5065]	[0.4825]	[0.0010]
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control mean	0.0133	0.413	0.372	1.380	2.434	0.369	0.603
N	2821	2821	2821	1281	1281	1281	2821

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Open defecation	Borrowing					
	Any HH member	Sanitation	Business	Education	Emergency	Consumption	Total
SL	-0.105***	2654.4***	988.0	-477.3	107.3	46.89	-465.3
	(0.0249)	(527.4)	(2252.9)	(871.5)	(143.8)	(99.66)	(1845.8)
Cluster-robust p-value	[0.0000]	[0.0000]	[0.6610]	[0.5840]	[0.4559]	[0.6381]	[0.8010]
Romano-Wolf p-value	[0.0010]	[0.0000]	[0.9970]	[0.9970]	[0.9970]	[0.9970]	[0.9980]
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control mean	0.610	199.9	37871.2	8314.7	699.9	362.9	31744.3
N	2821	2821	2821	2821	2821	2821	2793

	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	Borrowing				Benefits	Costs	
	Formal	MFIs	Other formal	Informal		Component 1	Component 2
SL	-99.14	336.5	-435.6	-366.1	0.00837	0.0534	-0.00967
	(1877.3)	(1533.1)	(1578.3)	(399.8)	(0.0488)	(0.0973)	(0.0436)
Cluster-robust p-value	[0.9579]	[0.8263]	[0.7826]	[0.3599]	[0.8640]	[0.5834]	[0.8248]
Romano-Wolf p-value	[0.9980]	[0.9980]	[0.9980]	[0.9850]	[0.9980]	[0.9970]	[0.9980]
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control mean	29379.7	14969.7	14409.9	2364.6	10.88	6.869	-0.557
N	2793	2793	2793	2793	2723	2723	2723

Notes: SL equals sanitation loan arm. Standard errors clustered at the village level are shown in parentheses. *, **, *** indicate significance at the 10, 5 and 1 percent level, referring to Romano-Wolf p-values. Covariates: See Table 3 notes. Data sources: household survey, administrative and credit bureau data. Columns 14 to 18 refer to borrowing activity reported in survey data. To remove the influence of outliers in the dependent variable, we drop households in the top 1 percent of the distribution of total borrowing (column 14). Columns 9 to 13 refer to borrowing activity from partner MFI reported in administrative data.

there is sufficient distance between the toilet pan and the wall, and whether the toilet has cross-ventilation. The polychoric PCA procedure combining these variables generated two components with eigenvalues greater than 1 (see Table D.4). Tables D.2 and D.5 show the impact of the intervention on the single dimensions considered to construct the quality indicators. Tables D.3 and D.6 report impacts separately by whether or not the household had a toilet at baseline.

Table D.1: Quality of underground chamber - Factor loading tables (polychoric PCA)

	(1)
	Component 1
Materials lining the walls of the underground storage chamber	0.0610
No bad smells	0.70640
No flies	0.7052

Table D.2: Intervention impact on quality of the underground chamber

	(1) PCA score	(2) Materials lining walls	(3) No bad smell	(4) No flies
SL	0.0140	0.0730*	0.0194	-0.00591
	(0.0219)	(0.0405)	(0.0186)	(0.0200)
Strata FE	Yes	Yes	Yes	Yes
Interviewer FE	Yes	Yes	Yes	Yes
Household covariates	Yes	Yes	Yes	Yes
Ratio sample clients/GP size	Yes	Yes	Yes	Yes
Control mean	1.380	1.899	0.908	0.883
N	1281	1281	1281	1281

Notes: Sample of households owning a toilet observed by interviewers at endline: 1,281 households. SL refers to sanitation loan treatment arm. Robust standard errors clustered at the village level are shown in parentheses. *, **, *** indicates significance at the 10, 5 and 1 percent level. Covariates: Toilet ownership at baseline, indicator for presence of a child aged 0 - 2 at baseline, ratio of number of sampled clients to village size. Strata and interviewer fixed effects included.

Table D.3: Intervention impact on quality of the underground chamber by toilet ownership at baseline

	(1) PCA score	(2) Materials lining walls	(3) No bad smell	(4) No flies
SL - toilet at BL	0.00319	0.0210	0.0153	-0.0122
	(0.0286)	(0.0465)	(0.0211)	(0.0249)
SL - no toilet at BL	0.0276	0.111**	0.0246	0.00205
	(0.0293)	(0.0474)	(0.0278)	(0.0275)
HH owns a toilet at BL	0.00192	0.0943**	-0.00710	-0.000542
	(0.0273)	(0.0403)	(0.0241)	(0.0224)
Strata FE	Yes	Yes	Yes	Yes
Interviewer FE	Yes	Yes	Yes	Yes
Household covariates	Yes	Yes	Yes	Yes
Ratio sample clients/GP size	Yes	Yes	Yes	Yes
F-test	0.522	0.0908	0.770	0.673
Control Mean (no toilet BL)	1.363	1.877	0.904	0.869
Control Mean (toilet BL)	1.392	1.947	0.912	0.893
N	1281	1422	1281	1281

Notes: Sample of households owning a toilet observed by interviewers at endline: 1,281 households. SL refers to sanitation loan treatment arm. Robust standard errors clustered at the village level are shown in parentheses. *, **, *** indicates significance at the 10, 5 and 1 percent level. Covariates: Toilet ownership at baseline, indicator for presence of a child aged 0 - 2 at baseline, ratio of number of sampled clients to village size. Strata and interviewer fixed effects included.

Table D.4: Quality of overground structure - Factor loading tables (polychoric PCA)

	(1) Component 1	(2) Component 2
Toilet structure - observed by interviewers	0.1913	0.3062
Provision to lock	0.3806	-0.3340
Toilet easy to access	0.4057	-0.3757
Natural lighting during the day	0.3685	-0.2059
The toilet has a door that can be locked	0.4698	-0.1601
Light at night	0.3702	0.2271
Distance between pan and wall sufficient	0.3030	0.5044
Cross-ventilation	0.2618	0.5248

Table D.5: Intervention impact on quality of the overground structure

	(1) PCA score component 1	(2) PCA score component 2	(3) Structure	(4) Lock	(5) Easy access	(6) Light during day	(7) Door	(8) Light at night	(9) Dist. btw pan and wall	(10) Cross-ventilation
SL	0.0604*	0.0511*	0.0816*	0.0393	-0.0094	-0.00269	0.0124	0.0296	0.0488**	0.0116
	(0.0339)	(0.0273)	(0.0451)	(0.0256)	(0.0108)	(0.0204)	(0.0200)	(0.0347)	(0.0206)	(0.0181)
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interviewer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ratio sample clients/GP size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control mean	2.434	0.369	2.303	0.836	0.975	0.908	0.913	0.611	0.711	0.286
N	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281

Notes: Sample of households owning a toilet observed by interviewers at endline: 1,281 households. SL refers to sanitation loan treatment arm. Robust standard errors clustered at the village level are shown in parentheses. *, **, *** indicates significance at the 10, 5 and 1 percent level. Covariates: Toilet ownership at baseline, indicator for presence of a child aged 0 - 2 at baseline, ratio of number of sampled clients to village size. Strata and interviewer fixed effects included.

Table D.6: Intervention impact on quality of the overground structure by toilet status at baseline

	(1) PCA score component 1	(2) PCA score component 2	(3) Structure	(4) Lock	(5) Easy access	(6) Light during day	(7) Door	(8) Light at night	(9) Dist. btw pan and wall	(10) Cross-ventilation
SL - toilet at BL	0.0460	0.0499	0.0646	0.0315	-0.0191	-0.0075	0.0088	0.0365	0.0374	0.0121
	(0.0463)	(0.0306)	(0.0506)	(0.0347)	(0.0144)	(0.0210)	(0.0293)	(0.0395)	(0.0277)	(0.0223)
SL - no toilet at BL	0.0847*	0.0545	0.0993*	0.0511	0.0032	0.0058	0.0192	0.0276	0.0640**	0.0160
	(0.0471)	(0.0354)	(0.0576)	(0.0320)	(0.0168)	(0.0271)	(0.0255)	(0.0460)	(0.0310)	(0.0299)
HH owns a toilet at BL	0.0666	0.0161	-0.0093	0.0243	0.0148	0.0255	0.0216	0.0464	0.0192	0.0405*
	(0.0443)	(0.0274)	(0.0417)	(0.0293)	(0.0169)	(0.0170)	(0.0272)	(0.0358)	(0.0322)	(0.0216)
Strata FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interviewer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ratio sample clients/GP size	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-test	0.545	0.902	0.558	0.648	0.319	0.592	0.783	0.856	0.525	0.919
Control Mean (no toilet BL)	2.429	0.402	2.327	0.819	0.965	0.888	0.912	0.615	0.735	0.285
Control Mean (toilet BL)	2.438	0.346	2.287	0.847	0.981	0.922	0.914	0.609	0.694	0.287
N	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281

Notes: Sample of households owning a toilet observed by interviewers at endline: 1,281 households. SL refers to sanitation loan treatment arm. Robust standard errors clustered at the village level are shown in parentheses. *, **, *** indicates significance at the 10, 5 and 1 percent level. Covariates: Toilet ownership at baseline, indicator for presence of a child aged 0 - 2 at baseline, ratio of number of sampled clients to village size. Strata and interviewer fixed effects included.

Table D.7: Loan-to-new-toilet conversion

	(1) Interviewer observation OLS	(2) IV
Second stage		
Sanitation loan uptake	0.1474***	0.4948***
	(0.0347)	(0.1476)
Covariates	Yes	Yes
r2	0.430	0.394
First stage		
SL - First stage		0.1818***
		(0.0356)
F-stat		25.8029
N	2821	2821

Notes: Notes: SL equals sanitation loan arm. Standard errors clustered at the village level are shown in parentheses. *, **, *** indicate significance at the 10, 5 and 1 percent level. Covariates: See Table 3 Note. Data source: household survey.

D.2 Loan to new toilet conversion

Table D.7 displays the loan-to-new toilet conversion regressions.

D.3 Impacts on business investments and consumption

Table D.8 displays impacts on business ownership and closure. We consider impacts on the likelihood of the household owning any type of business (column 1), an agricultural business[34] (column 3) or whether it went through a business closure (column 2) during the experiment. We do not detect any significant changes of the intervention on these outcomes. Impact estimates on the likelihood of households making a large business investment (column 4) and on reported profits (column 5) are also statistically insignificant from zero, indicating that the sanitation loans did not induce new business investments. Interestingly, all estimated coefficients are negative, suggesting some substitution out of these productive investments, which would be in line with the case highlighted in the model where households are sensitive to loan labels and the sanitation loan does not sufficiently relax liquidity constraints.

Unfortunately, our data does not allow us to get a detailed enough picture on consumption expenditures over the study period, a relevant indicator given that existing evidence suggests that a significant proportion of microfinance loans are used for consumption purposes ([Banerjee et al., 2015b])

[34] Agricultural business covers crop and animal husbandry.

Table D.8: Intervention impact on business investments

	(1) Business ownership	(2) Business closed	(3) Agricultural business	(4) Large investment	(5) Profits
SL	-0.0225	-0.00112	0.000317	-0.0175	-104.4
	(0.0456)	(0.00709)	(0.0360)	(0.0191)	(1127.4)
Cluster-robust p-value	[0.6225]	[0.8742]	[0.9930]	[0.3598]	[0.9263]
Romano-Wolf p-value	[0.9620]	[0.9930]	[0.9950]	[0.7952]	[0.9950]
Covariates	Yes	Yes	Yes	Yes	Yes
Control mean	0.449	0.0286	0.235	0.143	7262.4
N	2821	2821	2821	2821	2764

Notes: SL equals sanitation loan arm. Standard errors clustered at the village level are shown in parentheses. *, **, *** indicate significance at the 10, 5 and 1 percent level, referring to Romano-Wolf p-values. Covariates: See Table 3 notes. Amounts are in Indian Rupees (1 USD = INR 67.5). Data source: household survey. To remove the influence of outliers, we drop households in the bottom and top 1 percent of the distribution of profits.

and households might also rely on microfinance and informal borrowing sources to fund unexpected consumption expenditures following unanticipated shocks ([Besley, 1995, Udry, 1994]). We only have information on total food and non-food expenditures in the week prior to the endline survey, rather than when the loans were taken. For completeness, Table D.9 displays impact estimates on these outcomes in levels, for the whole sample, and excluding the top 1% of the distribution.[35] We do not find any significant impacts of the intervention on these outcomes. Impacts on non-food expenditures in the week prior to the endline survey are significantly negative at the 10% significance level. This does however not survive multiple hypothesis testing.

D.4 Evidence ruling out the information/salience channel

The availability of a sanitation loan from a well reputed MFI could have signalled the importance of sanitation. If this were the case, we would expect clients in the treated communities to be better informed about the costs and benefits of safe sanitation. We use novel data on perceptions of the costs and benefits of safe sanitation of a standardised toilet for a typical household in their village to test the relevance of this explanation. Client households were asked about the degree to which they agreed or disagreed with statements capturing perceived costs and benefits, including improved safety for women, increased household status, and difficulties in emptying the toilet pit when full. Constructing summary measures of perceived costs and benefits using polychoric principal components analysis, we find in Table D.10 that the intervention did not change perceptions of costs or benefits of sanitation, indicating that the intervention did not increase the salience of

[35] We also estimate impacts on log and inverse hyperbolic transformation (since non-food expenditures are zero for 105 households) of expenditures. Results do not change.

Table D.9: Intervention impact on consumption expenditures

	(1) Food exp.	(2) Food exp. (excl. outl.)	(3) Non-food exp.	(4) Non-food exp. (excl. outl.)
SL	45.51	25.56	-30.35	-67.57
	(36.23)	(17.99)	(60.65)	(37.79)
Cluster-robust p-value		[0.1555]		[0.0738]
Romano-Wolf p-value		[0.1638]		[0.1289]
Covariates	Yes	Yes	Yes	Yes
Control mean	884.2	818.9	953.0	830.8
N	2821	2759	2821	2766

Notes: SL equals sanitation loan arm. Standard errors clustered at the village level are shown in parentheses. *, **, *** indicate significance at the 10, 5 and 1 percent level, referring to Romano-Wolf p-values. Covariates: See Table 3 notes. Amounts are in Indian Rupees (1 USD = INR 67.5). Data source: household survey. To remove the influence of outliers, we drop households in top 1 percent of the distribution in columns 2 and 4 (excl. outl.).

sanitation.

Table D.10: Impacts on perceived benefits and costs of a double-pit toilet (combined score of six dimensions)

	(1) Benefits	(2) Costs - comp.1	(3) Costs - comp.2
SL	0.00837	0.0534	-0.00967
	(0.0488)	(0.0973)	(0.0436)
Cluster-robust p-value	[0.8640]	[0.5834]	[0.8248]
Romano-Wolf p-value	[0.9710]	[0.9231]	[0.9710]
Covariates	Yes	Yes	Yes
Control mean	10.88	6.869	-0.557
N	2723	2723	2723

Notes: Sample of households asked about a twin pit toilet: 2,723 households. SL refers to sanitation loan treatment arm. Standard errors clustered at the village level shown in parentheses. *, **, *** indicate significance at the 10, 5 and 1 percent level, referring to Romano-Wolf p-values. Covariates: See Table 3 notes. Dimensions considered for benefit score: improved health and safety for women, household status, and happiness, increases in labour supply and time saving. Dimensions considered for cost score: toilet unhealthiness, missing time with others, getting sick more easily, spending more time fetching water, difficulty and cost of emptying the pit. A small number of clients, mainly in the control GPs, were asked about another toilet. We drop these households from the analysis. Attanasio et al. (2018) shows that the sample is balanced between treatment and control for households shown the picture of the twin pit toilet.

E Proofs

Proof to Proposition 2:

Proposition 2: *When $r_e > r_s$, there exists a label sensitivity threshold, $\kappa^* = \beta(r_e - r_s)$ such that for:*

(i) households with $\kappa < \kappa^*$ will substitute away from the business loan to the sanitation loan, regardless of their investment choices. The lower interest rate also reduces the cost of making either investment , resulting in an increase in both sanitation and business investments.

(ii) households with $\kappa \geq \kappa^*$ will take the sanitation loan only if they intend to make a sanitation investment. If they need to borrow to make any investment, the lower interest rate will reduce the cost of sanitation investments only, especially when they only invest in one good. Thus, they will only increase sanitation investments.

Proof:

We first characterise the conditions under which it is optimal for the household to substitute from the business loan to the sanitation loan for all possible investment choices when borrowing constraints do not bind. The latter condition means that we are assessing the effect of the lower interest rate only. Let $EU_{es}(b^{es}_{s,y_1}, b^{es}_{e,y_1})$ denote the household's payoff when making investment choices e and s and borrowing b^{es}_{s,y_1} and b^{es}_{e,y_1} of the sanitation and business loans respectively to do so when it draws an endowment y_1. We also assume that $\beta = \frac{1}{1+r_e}$. This is done for simplicity, and does not change any of the qualitative predictions of the model.

When the household makes both investments, it will substitute to the sanitation loan if $EU_{11}(b^{11}_{s,y_1}, b^{11}_{e,y_1}) - EU_{11}(0, b^{\tilde{1}1}_{e,y_1}) > 0$, where $b^{\tilde{1}1}_{e,y_1} = b^{11}_{e,y_1} + b^{11}_{s,y_1}$. This is satisfied when

$$EU_{11}(b^{11}_{s,y_1}, b^{11}_{e,y_1}) = y_1 - p_e - p_s + b^{11}_{s,y_1} + b^{11}_{e,y_1} + \beta[E(y_2) + \theta + \gamma - (1+r_s)b^{11}_{s,y_1} - (1+r_e)b^{11}_{e,y_1}] > y_1 - p_e - p_s + b^{\tilde{1}1}_{e,y_1} + \beta[E(y_2) + \theta + \gamma - (1+r_e)b^{\tilde{1}1}_{e,y_1}] = EU_{11}(0, b^{\tilde{1}1}_{e,y_1})$$

This simplifies to $\beta b^{11}_{s,y_1}(r_e - r_s) > 0$. Since $r_e > r_s$, this condition is always satisfied.

When $e = 1$ and $s = 0$, it is optimal to switch to the sanitation loan if $EU_{10}(b^{10}_{s,y_1}, b^{10}_{e,y_1}) - EU_{10}(0, b^{\tilde{1}0}_{e,y_1}) > 0$, where $b^{\tilde{1}0}_{e,y_1} = b^{10}_{e,y_1} + b^{10}_{s,y_1}$. This implies that

$$EU_{10}(b^{10}_{s,y_1}, b^{10}_{e,y_1}) = y_1 - p_e + b^{10}_{s,y_1} + b^{10}_{e,y_1} - \kappa b^{10}_{s,y_1} + \beta[E(y_2) + \theta - (1+r_s)b^{10}_{s,y_1} - (1+r_e)b^{10}_{e,y_1}] > y_1 - p_e + b^{\tilde{1}0}_{e,y_1} + \beta[E(y_2) + \theta - (1+r_e)b^{\tilde{1}0}_{e,y_1}] = EU_{10}(0, b^{\tilde{1}0}_{e,y_1})$$

This simplifies to $\kappa < \beta(r_e - r_s)$.

When $e = 0$ and $s = 1$, it is optimal to switch to the sanitation loan if $EU_{01}(b^{01}_{s,y_1}, b^{01}_{e,y_1}) - EU_{01}(0, b^{\tilde{01}}_{e,y_1}) > 0$, where $b^{\tilde{01}}_{e,y_1} = b^{01}_{e,y_1} + b^{01}_{s,y_1}$. Thus

$$EU_{01}(b^{01}_{s,y_1}, b^{01}_{e,y_1}) = y_1 - p_s + b^{01}_{s,y_1} + b^{01}_{e,y_1} - \kappa b^{01}_{e,y_1} + \beta[E(y_2) + \gamma - (1+r_s)b^{01}_{s,y_1} - (1+r_e)b^{01}_{e,y_1}] > y_1 - p_s + b^{\tilde{01}}_{e,y_1} - \kappa b^{\tilde{01}}_{e,y_1} + \beta[E(y_2) + \gamma - (1+r_e)b^{\tilde{01}}_{e,y_1}] = EU_{01}(0, b^{\tilde{01}}_{e,y_1})$$

which simplifies to $\kappa b^{01}_{s,y_1} + \beta b^{01}_{s,y_1}(r_e - r_s) > 0$. Since $r_e > r_s$, this condition is always satisfied.

When $e = 0$ and $s = 0$, and $\beta = \dfrac{1}{1+r_e}$, it is optimal not to borrow, and to instead consume one's income in each period. However, since $r_s < r_e$, the household can gain more utility by borrowing and consuming more in period 1 than in period 2 (since $\beta < \dfrac{1}{1+r_s}$) when $\kappa + \beta(1+r_s) < 1$. This condition can be rewritten as $\kappa < \beta(r_s - r_e)$.

Combining these conditions, we see that there is a label sensitivity threshold, $\kappa^* = \beta(r_e - r_s)$ such that when $\kappa < \beta(r_e - r_s)$, it is always optimal for the household to switch to the sanitation loan before taking the business loan, regardless of its investment choices. For households with $\kappa > \kappa^*$, it is optimal to take the sanitation loan only if they plan to make sanitation investments

Next, we compare the investment choices households make when the sanitation loan is offered at the interest rate of r_e with those made when it is offered at the interest rate of r_s. The household obtains the following payoffs for each possible combination of investment choices when the interest rate on the sanitation loan is set as r_s:

$$EU_{11}(b^{11}_{s,y_1}, b^{11}_{e,y_1}) = y_1 - p_e - p_s + b^{11}_{s,y_1} + b^{11}_{e,y_1} + \beta[E(y_2) + \gamma + \theta - (1+r_e)b^{11}_{e,y_1} - (1+r_s)b^{11}_{s,y_1}]$$

$$EU_{10}(b^{10}_{s,y_1}, b^{10}_{e,y_1}) = y_1 - p_e + b^{10}_{s,y_1} + b^{10}_{e,y_1} - \kappa b^{10}_{s,y_1} + \beta[E(y_2) + \theta - (1+r_s)b^{10}_{s,y_1} - (1+r_e)b^{10}_{e,y_1}]$$

$$EU_{01}(b^{01}_{s,y_1}, b^{01}_{e,y_1}) = y_1 - p_s + b^{01}_{s,y_1} + b^{01}_{e,y_1} - \kappa b^{01}_{e} + \beta[E(y_2) + \gamma - (1+r_s)b^{01}_{s,y_1} - (1+r_e)b^{01}_{e,y_1}]$$

$$EU_{00}(b^{00}_{s,y_1}, b^{00}_{e,y_1}) = y_1 + b^{00}_{s,y_1} - \kappa b^{00}_{s,y_1} + \beta[E(y_2) - (1+r_s)b^{00}_{s,y_1}]$$

Notice that the household might choose to borrow the sanitation loan when it does not intend to make any investments in order to bring forward consumption to the first period when $r_s < r_e$ and $\beta(1+r_s) < 1$.

Next, we derive the conditions under which each possible combination of investment choices would be made. The household will make the sanitation investment only if $EU_{01} - EU_{00} \geq 0$. This is satisfied when $\beta\gamma \geq p_s + \kappa(b^{01}_{e,y_1} - b^{00}_{s,y_1}) - (1 - \beta(1+r_s))(b^{01}_{s,y_1} - b^{00}_{s,y_1})$. In addition, $EU_{11} - EU_{01} < 0$, which is satisfied when $\beta\theta < p_e - \kappa b^{01}_{e,y_1} - (1 - \beta(1+r_s))(b^{11}_{s,y_1} - b^{01}_{s,y_1})$.

It will choose to make only the business investment if $EU_{10} - EU_{00} \geq 0$, which is satisfied when $\beta\theta \geq p_e + \kappa(b^{10}_{s,y_1} - b^{00}_{s,y_1}) - (1-\beta(1+r_s))(b^{10}_{s,y_1} - b^{00}_{s,y_1})$. In addition, $EU_{11} - EU_{10} < 0$, which is satisfied when $\beta\gamma < p_s - \kappa b^{01}_{s,y_1} - (1-\beta(1+r_s))(b^{11}_{s,y_1} - b^{10}_{s,y_1})$.

Finally, it will choose to make both investments if $EU_{11} - EU_{10} \geq 0$ and $EU_{11} - EU_{01} \geq 0$. This is satisfied when $\beta\theta \geq p_e + \kappa b^{01}_{e,y_1} - (1-\beta(1+r_s))(b^{11}_{s,y_1} - b^{01}_{s,y_1})$ and $\beta\gamma \geq p_s - \kappa b^{01}_{s,y_1} - (1-\beta(1+r_s))(b^{11}_{s,y_1} - b^{10}_{s,y_1})$.

The investment conditions show a trade-off between diverting a labelled loan to a non-labelled purpose (e.g. using a sanitation loan for a business loan only), which increases the cost of making the investment; and the lower interest rate (whose effect comes through the $(1-\beta(1+r_s))$ term), which reduces the cost of making the investment. The direction of the trade-off that prevails depends on the values of κ and $1-\beta(1+r_s) = \kappa^*$. The effect of the lower interest rate will prevail when $\kappa < \kappa^*$, while that of the loan diversion will prevail when $\kappa > \kappa^*$. The positive sign on the term associated with κ is positive, while that on $1-\beta(1+r_s)$ is negative.

Thus when $\kappa < \kappa^*$, the cost of making the either investment is lowered by the lower interest rate on the sanitation loan, leading to an increase in both investments relative to the case when $r_e = r_s$. However, when $\kappa > \kappa^*$, the household cannot take advantage of the lower interest rate on the sanitation loan if it wants to borrow the sanitation loan to make the business investment only. Thus, the lower interest rate on the sanitation loan will encourage sanitation investments among these households when they intend to make one investment only and need to borrow to do so.[36] Thus, there will be a larger increase in sanitation investments among these households relative to those with $\kappa < \kappa^*$.

Proof to Proposition 3

Proposition 3: *Overall borrowing must increase if the sanitation loan relaxes overall liquidity constraints, thereby allowing new investments to be made. It will also increase if the lower interest rate encourages new investments. It will not increase if either (i) $\kappa < \kappa^*$ and households substitute to the lower interest sanitation loan without changing investment decisions, or (ii) $\kappa > \kappa^*$ and the household remains liquidity constrained. In this case, take-up of a specific labelled loan and investment would be accompanied by substitution away from other labelled loans and investments.*Proof:

This proposition characterises possible impacts of the sanitation loan on overall borrowing behaviour. The first part - that overall borrowing must increase if the sanitation loan relaxes overall

[36]Interestingly, this does not hold when the household borrows to make both investments, since the loan diversion penalty would not apply. It can then benefit from the lower interest rate on the sanitation loans even when $\kappa > \kappa^*$.

liquidity constraints - follows

Prior to the introduction of the sanitation loan, the household faced a borrowing limit of b_e^{max}. This increased it to $b_e^{max} + b_s^{max}$ following the introduction of the sanitation loan, allowing households to borrow more in order to make desired investments. For example, when $y_1 + b_e^{max} < p_s + p_e$, $y_1 + b_e^{max} \geq p_s$, $y_1 + b_e^{max} \geq p_e$ and $\beta\theta \geq p_e$ and $\beta\gamma \geq p_s$, the household is unable to borrow enough in the absence of the sanitation loan to make both investments (but can borrow enough to make one investment), even though it is beneficial for it to make both. If, in addition, $y_1 + b_e^{max} + b_s^{max} \geq p_s + p_e$, the introduction of the sanitation loan will relax its borrowing constraint and allow it to make both the investments. In this case, the household will borrow $b_{e,y_1}^{11} + b_{s,y_1}^{11}$, which is greater than the b_{e,y_1}^{10} or b_{e,y_1}^{01} or b_{e,y_1}^{00} it might have otherwise borrowed to make either the business or sanitation investments only, or no investment. Similar conditions can be derived for other cases where binding liquidity constraints are relaxed by the sanitation loan. Thus, the household's overall borrowing must increase if the sanitation loan relaxed liquidity constraints.

Similarly, overall borrowing should increase if the lower interest rate encouraged new investments. As shown in proposition 3, the lower interest rate on the sanitation loan lowers the cost of making both, or only sanitation investments depending on the household's value of κ. It is easy to show that $b_{s,y_1}^{11} + b_{s,y_1}^{11} \geq b_{e,y_1}^{10} + b_{s,y_1}^{10}$, or that $b_{s,y_1}^{11} + b_{s,y_1}^{11} \geq b_{e,y_1}^{01} + b_{s,y_1}^{01}$, or that $b_{e,y_1}^{10} + b_{s,y_1}^{10} \geq b_{s,y_1}^{00}$, or that $b_{e,y_1}^{01} + b_{s,y_1}^{01} \geq b_{s,y_1}^{00}$. Thus, overall borrowing will increase when the lower interest rate encourages new investments.

The second part of the proposition characterises the cases where overall borrowing will not increase. It would not increase if the household chooses not to make any new investments. However, it might also not increase for households with $\kappa > \kappa^*$ for whom $y_1 + b_e^{max} + b_s^{max} < p_s + p_e$ and $y_1 + b_e^{max} \geq p_s$, $y_1 + b_e^{max} \geq p_e$. These households are unable to make both investments if desired even after the introduction of the sanitation loan. Nonetheless, the availability of the sanitation labelled loan would encourage households for whom $(p_s - p_e) < \beta(\gamma - \theta) < (p_s - p_e) + \kappa b_{e,y_1}^{01}$, who previously made a business investment rather than a sanitation investment to make the sanitation investment rather than the business investment. These households would also switch away from the business loan to the sanitation loan. In addition, if $p_s = p_e$, $b_{s,y_1}^{01} + b_{e,y_1}^{01} = b_{e,y_1}^{10} + b_{s,y_1}^{10}$, and so overall borrowing will not increase.