Online Appendix – Labelled Loans, Credit Constraints and Sanitation Investments

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Appendix

A Comparing study sample to study context

Table OA-A.1: 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.

Using data from the most recent District Level Household survey 4 (DLHS-4), collected in 2012-13, we find that our study districts compare to the rural Maharashtra and rural India average in terms of percentage of people owning a BPL card with 21 percent in Latur and Nanded compared to 20 percent in rural Maharashtra and 19 percent in rural India. Somewhat less households are female headed (8 percent) than in the state (10 percent) and significantly less than in the country as a whole (14 percent). Age and education levels are on the other hand comparable across contexts. We note that our study sample, a very specific group of micro-finance clients within the two study districts, are significantly more likely to own a BPL card (42 percent) while at the same time having somewhat more education (6 years compared to on average 4 in rural Maharashtra and rural India). This might be driven by the selected sample but also due to the fact that our data was collected two years after the DLHS-4. The Table further provides information on the distribution of caste and religion. Latur and Nanded have a somewhat smaller percentage of the population classified as either SC, ST or OBC than rural Maharashtra and India as a whole, which is also reflected in our study sample. The distribution of religions followed is comparable in our study states to the Indian context more generally. Our sample on the other hand has a larger percentage of Muslims.

B Appendix - Additional Tables

Table OA-B.1 displays intervention impact on main outcomes (sanitation loan uptake, total household borrowing and toilet uptake) for the sub-sample of households for whom credit bureau data are available. Results are similar to those obtained for the full sample.

Table OA-B.1: Sanitation loan uptake, total borrowing, toilet uptake - credit bureau sample

	(1) Sanitation loan	(2) Total borrowing	(3) Toilet uptake
SL	0.190***	-122.8	0.0874***
	(0.0367)	(1870.9)	(0.0279)
Strata FE	Yes	Yes	Yes
Interviewer FE	Yes	Yes	Yes
Household covariates	Yes	Yes	Yes
Ratio sample clients/GP size	Yes	Yes	Yes
Control Mean	0.0141	32225.6	0.458
N	2514	2491	2514

Notes: Credit bureau information available for 2,514 households. 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. 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 2). 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. Data sources: household survey.

Table OA-B.2 compares characteristics of households in credit bureau sample and not.

Table OA-B.2: Comparison of household characteristics for households in credit bureau and not

	(1) CB	(2) no CB	(3) CB - no CB	(4) P-value	(5) N
HH head religion: Hinduism (%)	66.6	65.9	0.76 **	0.010	2841
	(0.88)	(2.64)	(2.51)		
HH head religion: Islam (%)	20.2	20.8	-6.61**	0.019	2841
	(0.75)	(2.87)	(2.04)		
HH head religion: Buddism (%)	12.4	12.6	-0.56	0.249	2841
	(0.62)	(1.71)	(1.64)		
Nr of HH members	5.04	5.09	4.90***	0.000	2841
	(0.037)	(0.060)	(0.13)		
HH head caste: Backward (%)	32.9	32.4	-0.22	0.133	2841
	(0.88)	(2.79)	(3.05)		
HH head caste: Scheduled (%)	40.9	41.4	1.91	0.163	2841
	(0.92)	(3.06)	(2.91)		
HH head caste: General (%)	25.5	25.6	-0.056	0.754	2841
	(0.82)	(2.98)	(2.70)		
Gender HH head ((%) male)	90.5	95.0	0.48***	0.000	2841
	(0.55)	(0.51)	(3.05)		
Age HH head in years	45.4	45.2	0.53***	0.005	2841
	(0.19)	(0.32)	(0.64)		
Years of education HH head	5.92	6.15	-4.62***	0.000	2841
	(0.088)	(0.14)	(0.25)		
HH head is married (%)	91.9	95.7	-0.47***	0.000	2841
	(0.51)	(0.48)	(3.07)		
Dwelling owned by HH member (%)	96.4	96.3	4.10	0.454	2841
	(0.35)	(0.69)	(0.85)		
Dwelling structure: Pucca House (%)	18.9	18.7	-0.097	0.644	2841
	(0.73)	(1.70)	(2.46)		
Dwelling structure: Semi-pucca house (%)	65.3	65.1	0.85	0.606	2841
	(0.89)	(2.16)	(2.99)		
HH owns BPL card (%)	58.6	58.3	-4.53	0.387	2841
	(0.92)	(1.69)	(2.57)		
HH owns APL card (%)	27.3	27.5	39.3	0.581	2841
	(0.84)	(1.50)	(2.76)		
Primary activity HH: agriculture (%)	53.5	52.3	0.22***	0.001	2841
	(0.94)	(2.80)	(3.11)		
Primary activity HH: Waged employment (%)	26.8	27.6	-1.87**	0.010	2841
	(0.83)	(1.74)	(2.71)		
HH owned a toilet at baseline (reconstructed) (%)	26.6	26.5	-0.24	0.705	2841
	(0.83)	(1.49)	(2.72)		

Notes: Sample size of endline survey: 2,841 households. CB stands for credit bureau data. Robust standard errors clustered at the village level are shown in parentheses. *, **, *** indicates significance at the 10, 5 and 1 percent level. HH stands for household. Column 2 and 3 report variables' mean and standard deviation (in parenthesis) for CB and no CB sample respectively. Column 4 reports differences in variables' mean between CB and no CB sample. Toilet ownership at baseline is reconstructed from toilet construction dates reported at endline. If a toilet was in the dwelling when household moved in we consider number of years HH head lived in the household as a proxy of construction date.

C Proofs

Here we outline the proofs for the predictions on how the introduction of the sanitation loan program would alter households' borrowing and investment decisions, outlined in Section 4 in the paper.

The lower interest rate makes the sanitation loan more attractive, regardless of the household's investment choice. However, this is countervailed by the household's sensitivity to the label. We start by characterising the conditions under which it is optimal for households to switch away from the business loan to the sanitation loan, regardless of changes to investment choices. To do this, we abstract away from any credit constraints and compare payoffs for all possible investment choices from taking a sanitation loan first, and the business loan once the maximum limit on the sanitation loan is reached, with those from taking a business loan only (as was the case prior to the intervention).

Let $EU_{es}(b_s, b_e)$ denote the households payoff when making investment choices e and s and borrowing b_s and b_e respectively to make them. When the household makes both investments, it is optimal to switch to the sanitation loan if $EU_{11}(b_s^*, b_e^*) - EU_{11}(0, \tilde{b_e}) \geq 0$, where $\tilde{b_e} = b_e^* + b_s^*$. This is satisfied when

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

This simplifies to $\beta b_s^*(r_e - r_s) > 0$.

When $e = 1$ and $s = 0$, it is optimal to switch to the sanitation loan first as long as $EU_{10}(b_s^*, b_e^*) - EU_{10}(0, \tilde{b_e}) \geq 0$, where $\tilde{b_e} = b_e^* + b_s^*$. This implies that

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

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

When $e = 0$ and $s = 1$, it is optimal to switch to the sanitation loan as long as $EU_{01}(b_s^*, b_e^*) - EU_{01}(0, \tilde{b_e}) \geq 0$, where $\tilde{b_e} = b_e^* + b_s^*$. Thus

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

which simplifies to give the condition that $\kappa b_s^* + \beta b_s^*(r_e - r_s) > 0$, which is satisfied. Thus, when $e = 0$ and $s = 1$, it is always optimal to switch to take the sanitation loan first before taking the business loan.

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 period 2 (since $\beta < \frac{1}{1+r_s}$) as long as $\kappa + \beta(1 + r_s) \leq 1$. This condition is equivalent to $\kappa \leq \beta(r_s - r_e)$. Thus, as long as this condition holds, the household will have an incentive to take the sanitation loan even if it doesn't plan to make any investments.

Combining these conditions together, we get that when $\kappa \leq \beta(r_e - r_s)$, households will switch to the sanitation loan before taking the business loan, and regardless of any changes in their investment choices. Moreover, for households that intend to invest in sanitation, it is optimal to switch to the sanitation loan regardless of the value of the label penalty. Next, we consider how the sanitation loan program alters investment choices. Responses to this loan program will vary by whether households were previously credit constrained, the value of the loan diversion penalty κ, and the first period income realisation.

Model solution when $\kappa = 0$:

We first obtain optimal values of b_s and b_e under all four possible investment conditions, separately for $y_1 = h$ and $y_1 = l$. We denote the optimal values as b^{es}_{s,y_1} and b^{es}_{e,y_1} respectively. Since $\kappa = 0$, households obtaining $y_1 = h$ will need to borrow either to make both investments, and/or to move consumption to period 1 since $\beta < \frac{1}{1+r_s}$. Given the latter motive, the amount they take of the sanitation loan will be determined by the non-negativity constraint on consumption in each period. In essence, the maximum amount of the sanitation loan that households will take will be either the maximum amount that can be repaid in period 2 allowing for 0 consumption, or b^{max}_s. When the household wants to make both investments, it will take the business loan if the maximum on the sanitation loan is reached. Table OA-C.1 summarises the values of b_s and b_e for every possible investment combination when $y_1 = h$.

Households with $y_1 = l$ will need to borrow to make any investment. In addition, they will also have the incentive to move consumption forward by taking the sanitation loan (regardless of investment choices). Thus, the sanitation loan amount will be determined by the non-negativity constraint on consumption in period 2. If the household can't borrow enough through the sanitation loan to fund its investments, it will take the remainder as a business loan. The exact amounts taken are outlined in the table OA-C.1.

Table OA-C.1: Model predictions on borrowing, $\kappa = 0$

	$y_1 = h$		$y_1 = l$	
	$b_{s,h}$	$b_{e,h}$	$b_{s,l}$	$b_{e,l}$
$e = 0,\ s = 0$	$min\{\frac{E(y_2)}{1+r_s}, b^{max}_s\}$	0	$min\{\frac{E(y_2)}{1+r_s}, b^{max}_s\}$	0
$e = 1,\ s = 0$	$min\{\frac{E(y_2)+\theta}{1+r_s}, b^{max}_s\}$	0	$min\{\frac{E(y_2)+\theta}{1+r_s}, b^{max}_s\}$	$max\{0, p_e - l - b^{max}_s\}$
$e = 0,\ s = 1$	$min\{\frac{E(y_2)+\gamma}{1+r_s}, b^{max}_s\}$	0	$min\{\frac{E(y_2)+\gamma}{1+r_s}, b^{max}_s\}$	$max\{0, p_s - l - b^{max}_s\}$
$e = 1,\ s = 1$	$min\{\frac{E(y_2+\gamma+\theta}{1+r_s}, b^{max}_s\}$	$max\{0, p_e + p_s - h - b^{max}_s\}$	$min\{\frac{E(y_2+\gamma+\theta}{1+r_s}, b^{max}_s\}$	$max\{0, p_e + p_s - l - b^{max}_s\}$

No borrowing constraint binds: When $y_1 = h$, no borrowing constraint will bind under the model's assumptions. Similarly, no borrowing constraint will bind when $y_1 = l$ and $p_e + p_s - l \leq b_s^{max} + b_e^{max}$.

Households will choose to make the business investment if: (i) $EU_{10} - EU_{00} \geq 0$ or (ii) $EU_{11} - EU_{01} \geq 0$.

Condition (i) implies:

$$y_1 + b_{s,y_1}^{10} + b_{e,y_1}^{10} - p_e + \beta[E(y_2) + \theta - (1 + r_s)b_{s,y_1}^{10} - (1 + r_e)b_{e,y_1}^{10}] \geq$$
$$y_1 + b_{s,y_1}^{00} + \beta[E(y_2) - (1 + r_s)b_{s,y_1}^{00}] \quad (1)$$

Since $b_{s,y_1}^{10} = min\{\frac{E(y_2) + \theta}{1 + r_s}, b_s^{max}\}$, $b_{e,y_1}^{10} = max\{0, p_e - y_1 - b_s^{max}\}$ and $b_{s,y_1}^{00} = min\{\frac{E(y_2)}{1 + r_s}, b_s^{max}\}$ and $b_{e,y_1}^{00} = 0$, we will need to consider three different cases: When $\frac{E(y_2) + \theta}{1 + r_s} < b_s^{max}$, the equation 1 becomes $\theta \geq (1 + r_s)p_e$. When $\frac{E(y_2)}{1 + r_s} < b_s^{max} \leq \frac{E(y_2) + \theta}{1 + r_s}$, the equation 1 can be simplified to $\beta\theta \geq p_e - \nu(\frac{1}{1 + r_s} - \beta)$ where $\nu = (1 + r_s)b_s^{max} - E(y_2)$. Finally, when $\frac{E(y_2)}{1 + r_s} \geq b_s^{max}$, the investment condition can be simplified to $\beta\theta \geq p_e$.

Condition (ii) implies:

$$y_1 + b_{s,y_1}^{11} + b_{e,y_1}^{11} - p_e - p_s + \beta[E(y_2) + \theta + \gamma - (1 + r_s)b_{s,y_1}^{11} - (1 + r_e)b_{e,y_1}^{11}] \geq$$
$$y_1 + b_{s,y_1}^{01} + b_{e,y_1}^{01} - p_s + \beta[E(y_2) + \gamma - (1 + r_s)b_{s,y_1}^{01} - (1 + r_e)b_{e,y_1}^{01}] \quad (2)$$

Since $b_{s,y_1}^{11} = min\{\frac{E(y_2) + \theta + \gamma}{1 + r_s}, b_s^{max}\}$, $b_{e,y_1}^{11} = max\{0, p_e + p_s - y_1 - b_s^{max}\}$ and $b_{s,y_1}^{01} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b_s^{max}\}$ and $b_{e,y_1}^{01} = max\{0, p_s - y_1 - b_s^{max}\}$, we will need to consider three different cases: When $\frac{E(y_2) + \theta + \gamma}{1 + r_s} < b_s^{max}$, the equation 1 becomes $\theta \geq (1 + r_s)p_e$. When $\frac{E(y_2) + \gamma}{1 + r_s} < b_s^{max} \leq \frac{E(y_2) + \theta + \gamma}{1 + r_s}$, the equation 1 can be simplified to $\beta\theta \geq p_e - \eta(\frac{1}{1 + r_s} - \beta)$ where $\eta = (1 + r_s)b_s^{max} - E(y_2) - \lambda$. Finally, when $\frac{E(y_2) + \gamma}{1 + r_s} \geq b_s^{max}$, the investment condition can be simplified to $\beta\theta \geq p_e$.

Notice that in the first two cases for each of the conditions, the investment condition is weaker relative to that in the absence of the sanitation loan. This is a consequence of the lower interest rate. Thus, when no borrowing constraint binds, and $\kappa = 0$, the lower interest rate will lead to an increase in business investments.

Next, we consider the conditions under which a sanitation investment will be made. Households will choose to make the business investment if: (i) $EU_{01} - EU_{00} \geq 0$ or (ii) $EU_{11} - EU_{10} \geq 0$.

Condition (i) implies:

$$y_1 + b^{01}_{s,y_1} + b^{01}_{e,y_1} - p_s + \beta[E(y_2) + \gamma - (1+r_s)b^{01}_{s,y_1} - (1+r_e)b^{01}_{e,y_1}] \geq$$
$$y_1 + b^{00}_{s,y_1} + \beta[E(y_2) - (1+r_s)b^{00}_{s,y_1}] \quad (3)$$

Since $b^{01}_{s,y_1} = min\{\frac{E(y_2)+\gamma}{1+r_s}, b^{max}_s\}$, $b^{01}_{e,y_1} = max\{0, p_s - y_1 - b^{max}_s\}$ and $b^{00}_{s,y_1} = min\{\frac{E(y_2)}{1+r_s}, b^{max}_s\}$ and $b^{00}_{e,y_1} = 0$, we will need to consider three different cases: When $\frac{E(y_2)+\gamma}{1+r_s} < b^{max}_s$, the equation 3 becomes $\gamma \geq (1+r_s)p_s$. When $\frac{E(y_2)}{1+r_s} < b^{max}_s \leq \frac{E(y_2)+\gamma}{1+r_s}$, the equation 3 can be simplified to $\beta\gamma \geq p_s - \nu(\frac{1}{1+r_s} - \beta)$ where $\nu = (1+r_s)b^{max}_s - E(y_2)$. Finally, when $\frac{E(y_2)}{1+r_s} \geq b^{max}_s$, the investment condition can be simplified to $\beta\gamma \geq p_s$.

Condition (ii) implies:

$$y_1 + b^{11}_{s,y_1} + b^{11}_{e,y_1} - p_e - p_s + \beta[E(y_2) + \theta + \gamma - (1+r_s)b^{11}_{s,y_1} - (1+r_e)b^{11}_{e,y_1}] \geq$$
$$y_1 + b^{10}_{s,y_1} + b^{10}_{e,y_1} - p_e + \beta[E(y_2) + \theta - (1+r_s)b^{10}_{s,y_1} - (1+r_e)b^{10}_{e,y_1}] \quad (4)$$

Since $b^{11}_{s,y_1} = min\{\frac{E(y_2)+\theta+\gamma}{1+r_s}, b^{max}_s\}$, $b^{11}_{e,y_1} = max\{0, p_e + p_s - y_1 - b^{max}_s\}$ and $b^{10}_{s,y_1} = min\{\frac{E(y_2)+\theta}{1+r_s}, b^{max}_s\}$ and $b^{10}_{e,y_1} = max\{0, p_e - y_1 - b^{max}_s\}$, we will need to consider three different cases: When $\frac{E(y_2)+\theta+\gamma}{1+r_s} < b^{max}_s$, the equation 3 becomes $\gamma \geq (1+r_s)p_s$. When $\frac{E(y_2)+\theta}{1+r_s} < b^{max}_s \leq \frac{E(y_2)+\theta+\gamma}{1+r_s}$, the equation 3 can be simplified to $\beta\gamma \geq p_e - \psi(\frac{1}{1+r_s} - \beta)$ where $\psi = (1+r_s)b^{max}_s - E(y_2) - \theta$. Finally, when $\frac{E(y_2)+\theta}{1+r_s} \geq b^{max}_s$, the investment condition can be simplified to $\beta\gamma \geq p_s$.

Notice that in the first two cases for each of the conditions, the investment condition is weaker relative to that in the absence of the sanitation loan. This is a consequence of the lower interest rate. Thus, when no borrowing constraint binds, and $\kappa = 0$, the lower interest rate will lead to an increase in sanitation investments.

Borrowing constraints bind. By assumption, no borrowing constraint will bind when $y_1 = h$. Thus, we need to consider borrowing and investment choices for the case when $y_1 = l$. The borrowing constraint will bind when $p_e + p_s - l \geq p_e + p_s$. The consequence of the binding borrowing constraint is to make some investment choices infeasible. Thus, we will consider the solution for the optimal borrowing choice and optimal investment choices when the borrowing constraint binds to different extents. Optimal borrowing behaviour will be similar to that above.

Scenario 1: $p_e + p_s - l \geq p_e + p_s$ but $p_e - l \leq p_e + p_s$ and $p_s - l \leq p_e + p_s$. In this case, the household can borrow enough to invest in either good, but not in both goods. It's borrowing decision will be determined by its investment choice. Thus, it will choose to make the business investment if (i) $EU_{10} - EU_{00} \geq 0$ and (ii) $EU_{10} - EU_{01} > 0$.[1] The sanitation investment will be chosen if (iii) $EU_{01} - EU_{00} \geq 0$ and (iv) $EU_{01} - EU_{10} > 0$.

As shown above, the investment conditions under (i) are:

- When $\frac{E(y_2)+\theta}{1+r_s} < b_s^{max}$, make business investment if $\theta \geq (1+r_s)p_e$.
- When $\frac{E(y_2)}{1+r_s} < b_s^{max} \leq \frac{E(y_2)+\theta}{1+r_s}$, make business investment if $\beta\theta \geq p_e - \nu(\frac{1}{1+r_s} - \beta)$ where $\nu = (1+r_s)b_s^{max} - E(y_2)$.
- Finally, when $\frac{E(y_2)}{1+r_s} \geq b_s^{max}$, make business investment if $\beta\theta \geq p_e$.

Condition (ii) implies:

$$\begin{aligned} y_1 + b^{10}_{s,y_1} + b^{10}_{e,y_1} - p_e + \beta[E(y_2) + \theta - (1+r_s)b^{10}_{s,y_1} - (1+r_e)b^{10}_{e,y_1}] > \\ y_1 + b^{01}_{s,y_1} + b^{01}_{e,y_1} - p_s + \beta[E(y_2) + \gamma - (1+r_s)b^{01}_{s,y_1} - (1+r_e)b^{01}_{e,y_1}] \end{aligned} \tag{5}$$

Since $b^{01}_{s,y_1} = min\{\frac{E(y_2)+\gamma}{1+r_s}, b_s^{max}\}$, $b^{01}_{e,y_1} = max\{0, p_s - y_1 - b_s^{max}\}$ and $b^{10}_{s,y_1} = min\{\frac{E(y_2)+\theta}{1+r_s}, b_s^{max}\}$ and $b^{10}_{e,y_1} = max\{0, p_e - y_1 - b_s^{max}\}$, we will need to consider the following cases:

- When $max\{\frac{E(y_2)+\gamma}{1+r_s}, \frac{E(y_2)+\theta}{1+r_s}\} < b_s^{max}$, (ii) holds when $(\theta - \gamma) > (1+r_s)(p_e - p_s)$
- When $\frac{E(y_2)+\theta}{1+r_s} \geq b_s^{max}$ and $\frac{E(y_2)+\gamma}{1+r_s} < b_s^{max}$, (ii) will hold when $\beta(\theta-\gamma) > (p_e - p_s) - \eta(\frac{1}{1+r_s} - \beta)$, where $\eta = (1+r_s)b_s^{max} - E(y_2) - \lambda$.
- When $\frac{E(y_2)+\theta}{1+r_s} < b_s^{max}$ and $\frac{E(y_2)+\gamma}{1+r_s} \geq b_s^{max}$, (ii) will hold when $\beta(\theta-\gamma) > (p_e - p_s) - \psi(\beta - \frac{1}{1+r_s})$, where $\psi = (1+r_s)b_s^{max} - E(y_2) - \theta$
- When $\frac{E(y_2)+\gamma}{1+r_s} \geq b_s^{max}$ and $\frac{E(y_2)+\theta}{1+r_s} \geq b_s^{max}$, (ii) will hold when $\beta(\theta-\gamma) > (p_e - p_s)$

Combining the conditions for (i) and (ii), we see that the household will choose to invest in the business if:

- $\theta \geq (1+r_s)p_e$ and $(\theta-\gamma) > (1+r_s)(p_e - p_s)$ and $max\{\frac{E(y_2)+\gamma}{1+r_s}, \frac{E(y_2)+\theta}{1+r_s}\} < b_s^{max}$
- $\beta\theta \geq p_e - \nu(\frac{1}{1+r_s} - \beta)$ and $\beta(\theta-\gamma) > (p_e - p_s) - \eta(\frac{1}{1+r_s} - \beta)$ when $\frac{E(y_2)}{1+r_s} < b_s^{max} \leq \frac{E(y_2)+\theta}{1+r_s}$ and $\frac{E(y_2)+\gamma}{1+r_s} < b_s^{max}$,where ν and η are as defined above

[1] In the knife-edge case where $EU_{10} = EU_{01}$, we assume that the choice will be made randomly.

- $\beta\theta \geq p_e$ and $\beta(\theta - \gamma) > (p_e - p_s)$ when $\dfrac{E(y_2)}{1+r_s} \geq b_s^{max}$

For sanitation investments, we can combine the conditions under (iii) (derived above), and (iv) (the converse of those derived for (ii)) to say that sanitation investments will be made if:

- $\gamma \geq (1+r_s)p_e$ and $(\theta - \gamma) < (1+r_s)(p_e - p_s)$ and $max\{\dfrac{E(y_2)+\gamma}{1+r_s}, \dfrac{E(y_2)+\theta}{1+r_s}\} < b_s^{max}$
- $\beta\gamma \geq p_s - \nu(\dfrac{1}{1+r_s} - \beta)$ and $\beta(\theta-\gamma) > (p_e - p_s) - \psi(\dfrac{1}{1+r_s} - \beta)$ when $\dfrac{E(y_2)}{1+r_s} < b_s^{max} \leq \dfrac{E(y_2)+\gamma}{1+r_s}$ and $\dfrac{E(y_2)+\theta}{1+r_s} < b_s^{max}$,where ν and ψ are as defined above
- $\beta\gamma \geq p_s$ and $\beta(\theta - \gamma) < (p_e - p_s)$ when $\dfrac{E(y_2)}{1+r_s} \geq b_s^{max}$

Examining these conditions, we can see that the first two conditions for each of the investments allows for more investments to be made relative to the case without sanitation loans. This is due to the lower interest rate.

Scenario 2: $p_e + p_s - l \geq p_e + p_s$ **but** $p_e - l \leq p_e + p_s$ **and** $p_s - l > p_e + p_s$**.** In this case, the household can only borrow enough to make the business investment. It will make the investment as long as $EU_{10} - EU_{00} \geq 0$. The conditions for this, solved above, are:

- When $\dfrac{E(y_2)+\theta}{1+r_s} < b_s^{max}$, make business investment if $\theta \geq (1+r_s)p_e$.
- When $\dfrac{E(y_2)}{1+r_s} < b_s^{max} \leq \dfrac{E(y_2)+\theta}{1+r_s}$, make business investment if $\beta\theta \geq p_e - \nu(\dfrac{1}{1+r_s} - \beta)$ where $\nu = (1+r_s)b_s^{max} - E(y_2)$.
- Finally, when $\dfrac{E(y_2)}{1+r_s} \geq b_s^{max}$, make business investment if $\beta\theta \geq p_e$.

Scenario 3: $p_e + p_s - l \geq p_e + p_s$ **but** $p_e - l > p_e + p_s$ **and** $p_s - l \leq p_e + p_s$**.** In this case, the household can only borrow enough to make the sanitation investment. It will make the investment as long as $EU_{01} - EU_{00} \geq 0$. The conditions for this, solved above, are:

- When $\dfrac{E(y_2)+\gamma}{1+r_s} < b_s^{max}$, make investment if $\gamma \geq (1+r_s)p_s$.
- When $\dfrac{E(y_2)}{1+r_s} < b_s^{max} \leq \dfrac{E(y_2)+\gamma}{1+r_s}$, make investment if $\beta\gamma \geq p_s - \nu(\dfrac{1}{1+r_s} - \beta)$ where $\nu = (1+r_s)b_s^{max} - E(y_2)$.
- When $\dfrac{E(y_2)}{1+r_s} \geq b_s^{max}$, make investment if $\beta\gamma \geq p_s$.

Scenario 4: $p_e + p_s - l \geq p_e + p_s$ **but** $p_e - l > p_e + p_s$ **and** $p_s - l > p_e + p_s$ In this case, the household cannot borrow enough to make any investment. It will borrow the sanitation loan to move consumption forward, so $e = 0$, $s = 0$, $b_s^* = b_{s,l}^{00}$ and $b_e^* = 0$.

Solving the model when $\kappa > 0$:

As shown earlier, households will have the incentive to take advantage of the lower interest rate on the sanitation loan, regardless of changes in investment behaviour, as long as $\kappa \leq \beta(r_e - r_s)$. Given this, we will obtain the optimal borrowing and investment choices separately for those with $\kappa \leq \beta(r_e - r_s)$ and $\kappa > \beta(r_e - r_s)$.

Borrowing choices when $\kappa \leq \beta(r_e - r_s)$ will be similar to those when $\kappa = 0$.

Investment choices when $\kappa \leq \beta(r_e - r_s)$, Borrowing constraints don't bind: The household will make the business investment if (i) $EU_{10} - EU_{00} \geq 0$, or (ii) $EU_{11} - EU_{01} \geq 0$. Condition (i) implies that

$$y_1 + b_{s,y_1}^{10} + b_{e,y_1}^{10} - p_e - \kappa b_{s,y_1}^{10} + \beta[E(y_2) + \theta - (1 + r_s)b_{s,y_1}^{10} - (1 + r_e)b_{e,y_1}^{10}] \geq$$
$$y_1 + b_{s,y_1}^{00} - \kappa b_{s,y_1}^{00} + \beta[E(y_2) - (1 + r_s)b_{s,y_1}^{00}] \quad (6)$$

Since $b_{s,y_1}^{10} = min\{\frac{E(y_2) + \theta}{1 + r_s}, b_s^{max}\}$, $b_{e,y_1}^{10} = max\{0, p_e - y_1 - b_s^{max}\}$ and $b_{s,y_1}^{00} = min\{\frac{E(y_2)}{1 + r_s}, b_s^{max}\}$ and $b_{e,y_1}^{00} = 0$, the condition can be simplified to: $\beta\theta \geq p_e - (b_{s,y_1}^{10} - b_{s,y_1}^{00})(1 - \kappa - \beta(1 + r_s))$. Since $(1 - \kappa - \beta(1 + r_s)) \geq 0$, the investment condition depends on the relative sizes of b_{s,y_1}^{10} and b_{s,y_1}^{00}. Examining the conditions above, we can see that $b_{s,y_1}^{10} \geq b_{s,y_1}^{00}$, so when $b_{s,y_1}^{10} > b_{s,y_1}^{00}$, households can benefit from the lower interest rate on the sanitation loan and face a laxer investment condition.

Condition (ii) implies that

$$y_1 + b_{s,y_1}^{11} + b_{e,y_1}^{11} - p_e - p_s + \beta[E(y_2) + \theta + \gamma - (1 + r_s)b_{s,y_1}^{11} - (1 + r_e)b_{e,y_1}^{11}] \geq$$
$$y_1 + b_{s,y_1}^{01} + b_{e,y_1}^{01} - p_s - \kappa b_{e,y_1}^{01} + \beta[E(y_2) + \gamma - (1 + r_s)b_{s,y_1}^{01} - (1 + r_e)b_{e,y_1}^{01}] \quad (7)$$

Since $b_{s,y_1}^{11} = min\{\frac{E(y_2) + \theta + \gamma}{1 + r_s}, b_s^{max}\}$, $b_{e,y_1}^{11} = max\{0, p_e + p_s - y_1 - b_s^{max}\}$ and $b_{s,y_1}^{01} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b_s^{max}\}$ and $b_{e,y_1}^{01} = max\{0, p_s - y_1 - b_s^{max}\}$, this condition simplifies to: $\beta\theta \geq p_e - (b_{s,y_1}^{11} - b_{s,y_1}^{01})(1 - \beta(1 + r_s)) - \kappa b_{e,y_1}^{01}$. The second term represents the extent to which the household can benefit from the lower interest rate, while the third term relates to the loan diversion disutility averted by making the business investment in addition to the sanitation investment.

Putting these together, we see that business investments will be made as long as only one investment is made, and $\beta\theta \geq p_e - (b_{s,y_1}^{10} - b_{s,y_1}^{00})(1 - \kappa - \beta(1 + r_s))$ or both investments are made and $\beta\theta \geq p_e - (b_{s,y_1}^{11} - b_{s,y_1}^{01})(1 - \beta(1 + r_s)) - \kappa b_{e,y_1}^{01}$.

The sanitation investment will be made if (i) $EU_{01} - EU_{00} \geq 0$, or (ii) $EU_{11} - EU_{10} \geq 0$. Condition (i) implies that

$$y_1 + b^{01}_{s,y_1} + b^{01}_{e,y_1} - p_s - \kappa b^{01}_{e,y_1} + \beta[E(y_2) + \gamma - (1 + r_s)b^{01}_{s,y_1} - (1 + r_e)b^{01}_{e,y_1}] \geq$$
$$y_1 + b^{00}_{s,y_1} - \kappa b^{00}_{s,y_1} + \beta[E(y_2) - (1 + r_s)b^{00}_{s,y_1}] \quad (8)$$

Since $b^{01}_{s,y_1} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b^{max}_s\}$, $b^{01}_{e,y_1} = max\{0, p_s - y_1 - b^{max}_s\}$ and $b^{00}_{s,y_1} = min\{\frac{E(y_2)}{1 + r_s}, b^{max}_s\}$ and $b^{00}_{e,y_1} = 0$, condition (i) simplifies to: $\beta\gamma \geq p_s - (b^{01}_{s,y_1} - b^{00}_{s,y_1})(1 - \beta(1 + r_s)) + \kappa(b^{01}_{e,y_1} - b^{00}_{s,y_1})$.

Condition (ii) implies that

$$y_1 + b^{11}_{s,y_1} + b^{11}_{e,y_1} - p_e - p_s + \beta[E(y_2) + \theta + \gamma - (1 + r_s)b^{11}_{s,y_1} - (1 + r_e)b^{11}_{e,y_1}] \geq$$
$$y_1 + b^{10}_{s,y_1} + b^{10}_{e,y_1} - p_e - \kappa b^{10}_{s,y_1} + \beta[E(y_2) + \theta - (1 + r_s)b^{10}_{s,y_1} - (1 + r_e)b^{10}_{e,y_1}] \quad (9)$$

Since $b^{11}_{s,y_1} = min\{\frac{E(y_2) + \theta + \gamma}{1 + r_s}, b^{max}_s\}$, $b^{11}_{e,y_1} = max\{0, p_e + p_s - y_1 - b^{max}_s\}$ and $b^{10}_{s,y_1} = min\{\frac{E(y_2) + \theta}{1 + r_s}, b^{max}_s\}$ and $b^{10}_{e,y_1} = max\{0, p_e - y_1 - b^{max}_s\}$, condition (ii) simplifies to: $\beta\gamma \geq p_s - (b^{11}_{s,y_1} - b^{10}_{s,y_1})(1 - \beta(1 + r_s)) - \kappa b^{10}_{s,y_1}$.

Putting these together, we see that sanitation investments are made when: (a) $\beta\gamma \geq p_s - (b^{01}_{s,y_1} - b^{00}_{s,y_1})(1 - \beta(1 + r_s)) + \kappa(b^{01}_{e,y_1} - b^{00}_{s,y_1})$ and one investment is made only; or (b) $\beta\gamma \geq p_s - (b^{11}_{s,y_1} - b^{10}_{s,y_1})(1 - \beta(1 + r_s)) - \kappa b^{10}_{s,y_1}$ and both investments are made.

Notice that the presence of the loan diversion utility means that the lower interest rate doesn't alter all investment decisions in the same manner. Sanitation investments are more favoured as a result of the lower interest rate on the associated loan.

Investment decisions when borrowing constraints bind. As above, the borrowing constraints won't bind when $y_1 = h$. Thus, we will consider only the case when $y_1 = l$.

Scenario 1: $p_e + p_s - l \geq p_e + p_s but p_e - l \leq p_e + p_s and p_s - l \leq p_e + p_s$. **Household can borrow enough to invest in each good, but not both goods.** It will make the business investment when (i) $EU_{10} - EU_{00} \geq 0$, and (ii) $EU_{10} - EU_{01} > 0$.

Condition (ii) implies that:

$$y_1 + b^{10}_{s,y_1} + b^{10}_{e,y_1} - p_e - \kappa b^{10}_{s,y_1} + \beta[E(y_2) + \theta - (1 + r_s)b^{10}_{s,y_1} - (1 + r_e)b^{10}_{e,y_1}] \geq$$
$$y_1 + b^{01}_{s,y_1} + b^{01}_{e,y_1} - p_s - \kappa b^{01}_{e,y_1} + \beta[E(y_2) + \gamma - (1 + r_s)b^{01}_{s,y_1} - (1 + r_e)b^{01}_{e,y_1}] \quad (10)$$

We know that $b^{10}_{s,y_1} = min\{\frac{E(y_2) + \theta}{1 + r_s}, b^{max}_s\}$ and $b^{10}_{e,y_1} = max\{0, p_e - y_1 - b^{max}_s\}$, and $b^{01}_{s,y_1} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b^{max}_s\}$, $b^{01}_{e,y_1} = max\{0, p_s - y_1 - b^{max}_s\}$. Condition (ii) is thus satisfied when:

- $p_e - l \leq b_e^{max}$ and $p_s - l \leq b_s^{max}$: $\beta(\theta - \gamma) > (p_e - p_s) + b_{s,l}^{01}(1 - \beta(1 + r_s))$.
- $p_e - l \leq b_e^{max}$ and $p_s - l > b_s^{max}$: $\beta(\theta - \gamma) > (p_e - p_s) + b_s^{max}(1 - \beta(1 + r_s)) - \kappa b_{e,l}^{01}$.
- $p_e - l > b_e^{max}$ and $p_s - l \leq b_s^{max}$: $\beta(\theta - \gamma) > (p_e - p_s) + b_{s,l}^{01}(1 - \beta(1 + r_s)) - b_{s,l}^{10}(1 - \kappa - \beta(1 + r_s))$.
- $p_e - l > b_e^{max}$ and $p_s - l > b_s^{max}$: $\beta(\theta - \gamma) > (p_e - p_s) + b_s^{max}(1 - \beta(1 + r_s)) - b_{s,l}^{10}(1 - \kappa - \beta(1 + r_s)) - \kappa b_{e,l}^{01}$.

Combining these with the conditions derived earlier for making a business investment only, we have that a household will make a business investment if:

- $p_e - l \leq b_e^{max}$: $\beta\theta \geq p_e - (b_{s,y_1}^{10} - b_{s,y_1}^{00})(1 - \kappa - \beta(1 + r_s))$ and $\beta(\theta - \gamma) > (p_e - p_s) + b_{s,l}^{01}(1 - \beta(1 + r_s))$ when $p_s - l \leq b_s^{max}$, or $\beta(\theta - \gamma) > (p_e - p_s) + b_s^{max}(1 - \beta(1 + r_s)) - \kappa b_{e,l}^{01}$ when $p_s - l > b_s^{max}$
- $p_e - l > b_e^{max}$: $\beta\theta \geq p_e - (b_{s,y_1}^{10} - b_{s,y_1}^{00})(1 - \kappa - \beta(1 + r_s))$ and $\beta(\theta - \gamma) > (p_e - p_s) + b_{s,l}^{01}(1 - \beta(1 + r_s)) - b_{s,l}^{10}(1 - \kappa - \beta(1 + r_s))$ when $p_s - l \leq b_s^{max}$, or $\beta(\theta - \gamma) > (p_e - p_s) + b_s^{max}(1 - \beta(1 + r_s)) - b_{s,l}^{10}(1 - \kappa - \beta(1 + r_s)) - \kappa b_{e,l}^{01}$ when $p_s - l > b_s^{max}$

A sanitation investment will be made when:

- $p_s - l \leq b_s^{max}$: $\beta\gamma \geq p_s - (b_{s,y_1}^{01} - b_{s,y_1}^{00})(1 - \beta(1 + r_s)) - \kappa b_{s,y_1}^{00}$ and $\beta(\theta - \gamma) < (p_e - p_s) + b_{s,l}^{01}(1 - \beta(1 + r_s))$ if $p_e - l \leq b_e^{max}$; or $\beta(\theta - \gamma) < (p_e - p_s) + b_{s,l}^{01}(1 - \beta(1 + r_s)) - b_{s,l}^{10}(1 - \kappa - \beta(1 + r_s))$ if $p_e - l > b_e^{max}$.
- $p_s - l > b_s^{max}$: $\beta\gamma \geq p_s - (b_{s,y_1}^{01} - b_{s,y_1}^{00})(1 - \beta(1 + r_s)) + \kappa(b_{e,y_1}^{01} - b_{s,y_1}^{00})$ and $\beta(\theta - \gamma) < (p_e - p_s) + b_s^{max}(1 - \beta(1 + r_s)) - \kappa b_{e,l}^{01}$ if $p_e - l \leq b_e^{max}$; or $\beta(\theta - \gamma) < (p_e - p_s) + b_s^{max}(1 - \beta(1 + r_s)) - b_{s,l}^{10}(1 - \kappa - \beta(1 + r_s)) - \kappa b_{e,l}^{01}$ if $p_e - l > b_e^{max}$

Scenario 2: $p_e + p_s - l \geq p_e + p_s$ **but** $p_e - l \leq p_e + p_s$ **and** $p_s - l > p_e + p_s$**.** In this case, the household can only borrow enough to make the business investment. It will do so when $EU_{10} - EU_{00} \geq 0$. From above, we know this is satisfied when $p_e - l \leq b_e^{max}$ when $p_e - l \leq b_e^{max}$. If $p_e - l > b_e^{max}$, the business investment will be made as long as $\beta\theta \geq p_e - (b_{s,y_1}^{10} - b_{s,y_1}^{00})(1 - \kappa - \beta(1 + r_s))$.

Scenario 3: $p_e + p_s - l \geq p_e + p_s$ **but** $p_e - l > p_e + p_s$ **and** $p_s - l \leq p_e + p_s$**.** In this case, the household can only borrow enough to make the sanitation investment. It will do so when $EU_{01} - EU_{00} \geq 0$. From above, we know that this condition is satisfied when $\beta\gamma \geq p_s - b_{s,l}^{01}(1 - \beta(1 + r_s))$ when $p_s - l \leq b_s^{max}$. If $p_s - l > b_s^{max}$, the household will invest in sanitation as long as $\beta\gamma \geq p_s - (b_{s,y_1}^{01} - b_{s,y_1}^{00})(1 - \beta(1 + r_s)) + \kappa(b_{e,y_1}^{01} - b_{s,y_1}^{00})$.

Scenario 4: $p_e + p_s - l \geq p_e + p_s$ **but** $p_e - l > p_e + p_s$ **and** $p_s - l > p_e + p_s$ In this case, the household cannot borrow enough to make any investment. It will borrow nothing, so $e = 0$, $s = 0$, $b_s^* = 0$ and $b_e^* = 0$.

When the loan label matters, but the effect is small, households will still be able to benefit from the lower interest rate on the sanitation loan when making business investments, and simply moving consumption forward, but at a diminishing rate. But the effects of the lower interest rate will outweigh any countervailing effects of the loan label.

Borrowing choices when $\kappa > \beta(r_e - r_s)$: $e = 0,\ s = 0$: There is no incentive for the household to borrow, so $b^{00}_{s,y_1} = b^{00}_{e,y_1} = 0$.

$e = 1,\ s = 0$: For $y_1 = h$, the household can make one investment without needing to borrow. There is no incentive to move consumption forward, so $b^{10}_{s,h} = b^{10}_{e,h} = 0$. For $y_1 = l$, the presence of the loan diversion penalty means that the household will not take the lower cost loan first. Instead, it will take the loan associated with the investment purpose first, and then top up with the other loan.[2] Thus, $b^{10}_{e,l} = min\{p_e - l, b^{max}_e\}$ and $b^{10}_{s,l} = max\{0, p_e - l - b^{max}_e\}$

$e = 0,\ s = 1$: For $y_1 = h$, the household can make one investment without needing to borrow. However, there is an incentive to move consumption forward, so $b^{01}_{s,h} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b^{max}_s\}$; $b^{01}_{e,h} = 0$. For $y_1 = l$, the presence of the loan diversion penalty means that the household will take the loan associated with the investment purpose first, and then top up with the other loan. This has a lower interest rate, so there is the incentive to borrow as much as one can to move consumption forward to period 1. Thus, $b^{01}_{s,l} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b^{max}_s\}$ and $b^{10}_{e,l} = max\{0, p_s - l - b^{max}_s\}$

$e = 1,\ s = 1$: When $y_1 = h$, the household can make one investment without needing to borrow. It will need to borrow to make the second investment. Since it will be making the sanitation investment, it will not face the loan diversion penalty. Thus, it can also benefit from bringing forward consumption to period 1. Thus, $b^{11}_{s,h} = min\{\frac{E(y_2 + \gamma + \theta}{1 + r_s}, b^{max}_s\}$. If $min\{\frac{E(y_2 + \gamma + \theta}{1 + r_s}, b^{max}_s\} < p_e + p_s - h$, then the household will also take the business loan. In this case, $b^{11}_{e,h} = max\{0, p_e + p_s - h - b^{max}_s\}$. When $y_1 = l$ and the household is making both investments, it doesn't face the loan diversion penalty. Thus, it will take the sanitation loan first, followed by the business loan. Thus, $b^{11}_{s,l} = min\{\frac{E(y_2 + \gamma + \theta}{1 + r_s}, b^{max}_s\}$. If $min\{\frac{E(y_2 + \gamma + \theta}{1 + r_s}, b^{max}_s\} < p_e + p_s - l$, then the household will also take the business loan. In this case, $b^{11}_{e,l} = max\{0, p_e + p_s - l - b^{max}_s\}$.

Next, we consider investment choices when borrowing constraints are not binding, and when they bind.

Borrowing constraints do not bind: For households with $y_1 = h$, the borrowing constraint won't bind.

Households will choose to make the business investment if: (i) $EU_{10} - EU_{00} \geq 0$ or (ii) $EU_{11} - EU_{01} \geq 0$.

Condition (i) implies:

[2]The household will face a loan diversion penalty for the part of the sanitation loan that it diverts. However, if it has very high returns from the business investment, then it is still worthwhile borrowing some of the sanitation loan.

$$y_1 + b^{10}_{s,y_1} + b^{10}_{e,y_1} - p_e - \kappa b^{10}_{s,y_1} + \beta[E(y_2) + \theta - (1+r_s)b^{10}_{s,y_1} - (1+r_e)b^{10}_{e,y_1}] \geq$$
$$y_1 + b^{00}_{s,y_1} + \beta[E(y_2) - (1+r_s)b^{00}_{s,y_1}] \quad (11)$$

Since $b^{10}_{s,l} = max\{0, p_e - l - b^{max}_e\}$, $b^{10}_{e,l} = min\{p_e - l, b^{max}_e\}$; and $b^{10}_{s,h} = b^{10}_{e,h} = 0$ and $b^{00}_{s,y_1} = 0$ and $b^{00}_{e,y_1} = 0$, we will consider investment conditions separately for households with $y_1 = h$ and $y_1 = l$ separately.

When $y_1 = h$, the household makes the business investment as long as $\beta\theta \geq p_e$. When $y_1 = l$, we need to consider the following cases:

- When $p_e - l \leq b^{max}_e$, make business investment if $\beta\theta \geq p_e$
- When $p_e - l > b^{max}_e$, make business investment if $\beta\theta \geq p_e - b^{10}_{s,l}(1 - \kappa - \beta(1+r_s))$. Note that $1 - \kappa - \beta(1+r_s) < 0$ when $\kappa > \beta(r_e - r_s)$, so the right hand side term of that equation is $> p_e$. When this condition does not hold, the right hand side of this equation will be $< p_e$.

Condition (ii) implies:

$$y_1 + b^{11}_{s,y_1} + b^{11}_{e,y_1} - p_e - p_s + \beta[E(y_2) + \theta + \gamma - (1+r_s)b^{11}_{s,y_1} - (1+r_e)b^{11}_{e,y_1}] \geq$$
$$y_1 + b^{01}_{s,y_1} + b^{01}_{e,y_1} - p_s - \kappa b^{01}_{e,y_1} + \beta[E(y_2) + \gamma - (1+r_s)b^{01}_{s,y_1} - (1+r_e)b^{01}_{e,y_1}] \quad (12)$$

Since $b^{11}_{s,y_1} = min\{\frac{E(y_2)+\theta+\gamma}{1+r_s}, b^{max}_s\}$, $b^{11}_{e,y_1} = max\{0, p_e + p_s - y_1 - b^{max}_s\}$ and $b^{01}_{s,l} = min\{p_s - l, b^{max}_s\}$ and $b^{01}_{e,l} = max\{0, p_s - y_1 - b^{max}_s\}$, and and $b^{01}_{s,h} = b^{01}_{e,h} = 0$, we will consider the investment choices by realisation of $y_1 = h$.

When $y_1 = h$, the household will make the business investment choice as long as $\theta \geq (1+r_s)p_e - (1 - \beta(1+r_s))(E(y_2) + \gamma)$ when $\frac{E(y_2)+\theta+\gamma}{1+r_s} < b^{max}_s$. When $b^{11}_{s,h} = b^{max}_s$, the business investment will be made when $\beta\theta \geq p_e - b^{max}_s(1 - \beta(1+r_s))$. When $y_1 = l$. we have that:

- When $p_s - l \leq b^{max}_s$, make business investment if $\beta\theta \geq p_e$
- When $p_s - l > b^{max}_s$, make business investment if $\beta\theta \geq p_e - \kappa b^{01}_{e,l}$

Putting these together, we have the following conditions for making business investments when $\kappa > \beta(r_e - r_s)$:

- When $y_1 = h$, make business investment as long as $\beta\theta \geq p_e$ if this is the only investment to be made. If the household borrows to make both investments, it can benefit from the lower interest rate sanitation loan, and so the investment condition is weaker: $\theta \geq (1+r_s)p_e - (1 - \beta(1+r_s))(E(y_2) + \gamma)$ when $\frac{E(y_2)+\theta+\gamma}{1+r_s} < b^{max}_s$ and $\beta\theta \geq p_e - b^{max}_s(1 - \beta(1+r_s))$ when $b^{11}_{s,h} = b^{max}_s$.

- When $y_1 = l$, $p_e - l \leq b_e^{max}$ and $p_s - l \leq b_s^{max}$, make business investment as long as $\beta\theta \geq p_e$
- When $y_1 = l$ and $p_e - l > b_e^{max}$ and the household is only making the business investment, make business investment if $\beta\theta \geq p_e - b_{s,l}^{10}(1 - \kappa - \beta(1 + r_s))$
- When $y_1 = l$ and the household makes both investments and $p_s - l > b_s^{max}$, make business investment if $\beta\theta \geq p_e - \kappa b_{e,l}^{01}$[3]

Notice that the label introduces different effects relative to the interest rate. Only households expecting high business returns will divert the loan when they plan to make one investment only. When both investments are made, and the loan associated with the investment not being made is diverted, then the loan diversion penalty will make it even more attractive to make both investments. Households with $y_1 = h$ can take advantage of the lower interest rate on the sanitation loan, and this increases their business investments relative to the case where only one investment is made.

Households will choose to make the sanitation investment if: (i) $EU_{01} - EU_{00} \geq 0$ or (ii) $EU_{11} - EU_{10} \geq 0$.

Condition (i) implies:

$$y_1 + b_{s,y_1}^{01} + b_{e,y_1}^{01} - p_s - \kappa b_{e,y_1}^{01} + \beta[E(y_2) + \gamma - (1 + r_s)b_{s,y_1}^{01} - (1 + r_e)b_{e,y_1}^{01}] \geq y_1 + b_{s,y_1}^{00} + \beta[E(y_2) - (1 + r_s)b_{s,y_1}^{00}] \quad (13)$$

Since $b_{s,l}^{01} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b_s^{max}\}$, $b_{e,l}^{01} = max\{p_s - l, b_s^{max}\}$; and $b_{s,h}^{01} = b_{s,y_1}^{11} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b_s^{max}\}$; $b_{e,h}^{01} = 0$ and $b_{s,y_1}^{00} = 0$ and $b_{e,y_1}^{00} = 0$, we will consider investment conditions separately for households with $y_1 = h$ and $y_1 = l$ separately.

When $y_1 = h$, the household makes the sanitation investment as long as $\beta\gamma \geq p_s - b_{s,l}^{01}(1 - \beta(1 + r_s))$. When $y_1 = l$, we need to consider the following cases:

- When $p_s - l \leq b_s^{max}$, make sanitation investment if $\beta\gamma \geq p_s - b_{s,l}^{01}(1 - \beta(1 + r_s))$
- When $p_s - l > b_s^{max}$, make sanitation investment if $\beta\gamma \geq p_s - b_{s,l}^{01}(1 - \beta(1 + r_s)) + \kappa b_{e,l}^{01}$. The second term on the right hand side is the gain from the lower interest rate on the sanitation loan. Whether the right hand side term is $> p_s$ or $< p_s$ depends on the relative sizes of $b_{s,l}^{01}(1 - \beta(1 + r_s))$ and $\kappa b_{e,l}^{01}$. $\kappa > 1 - \beta(1 + r_s)$, but it is likely that $b_{s,l}^{01} > b_{e,l}^{01}$. If a toilet is very expensive, then $b_{s,l}^{01} < b_{e,l}^{01}$ and the condition becomes $\beta\gamma > p_s$.

Condition (ii) implies:

[3] It is likely that, in practice, when households experience $y_1 = l$, households might not be able to borrow enough to make both investments, i.e. that the borrowing constraint will bind.

$$
\begin{aligned}
y_1 + b^{11}_{s,y_1} + b^{11}_{e,y_1} - p_e - p_s + \beta[E(y_2) + \theta + \gamma - (1+r_s)b^{11}_{s,y_1} - (1+r_e)b^{11}_{e,y_1}] \geq \\
y_1 + b^{10}_{s,y_1} + b^{10}_{e,y_1} - p_e - \kappa b^{10}_{s,y_1} + \beta[E(y_2) + \theta - (1+r_s)b^{10}_{s,y_1} - (1+r_e)b^{10}_{e,y_1}]
\end{aligned} \tag{14}
$$

Since $b^{11}_{s,y_1} = min\{\frac{E(y_2)+\theta+\gamma}{1+r_s}, b^{max}_s\}$, $b^{11}_{e,y_1} = max\{0, p_e + p_s - y_1 - b^{max}_s\}$ and $b^{10}_{s,l} = max\{0, p_e - l - b^{max}_e\}$ and $b^{10}_{e,l} = min\{p_e - l, b^{max}_e\}$, and and $b^{01}_{s,h} = b^{01}_{e,h} = 0$, we will consider the investment choices by realisation of $y_1 = h$.

When $y_1 = h$, the household will make the sanitation investment choice as long as $\frac{E(y_2)+\theta+\gamma}{1+r_s} < b^{max}_s$ and $\gamma \geq (1+r_s)p_s - (1-\beta(1+r_s))(E(y_2)+\theta)$. When $b^{11}_{s,h} = b^{max}_s$, the household will make the sanitation investment as long as $\beta\gamma \geq p_s - b^{max}_s(1-\beta(1+r_s))$.

When $y_1 = l$, we have that:

- When $p_e - l \leq b^{max}_e$, make sanitation investment if $\beta\gamma \geq p_s - b^{11}_{s,l}(1-\beta(1+r_s))$
- When $p_e - l > b^{max}_e$, make sanitation investment if $\beta\gamma \geq p_s - b^{11}_{s,l}(1-\beta(1+r_s)) + b^{10}_{s,l}(1-\kappa-\beta(1+r_s))$. The last term on the right hand side will be < 0 as is the middle term. Thus, the right hand side value will be $< p_s$.

Putting these together, we have the following conditions for making sanitation investments:

- When $y_1 = h$, make sanitation investment as long as $\beta\gamma \geq p_s - b^{01}_{s,l}(1-\beta(1+r_s))$ when making one investment only. When making both investments, and $\frac{E(y_2)+\theta+\gamma}{1+r_s} < b^{max}_s$ it will invest in sanitation when $\gamma \geq (1+r_s)p_s - (1-\beta(1+r_s))(E(y_2)+\theta)$. If $b^{11}_{s,h} = b^{max}_s$, the household will make the sanitation investment as long as $\beta\gamma \geq p_s - b^{max}_s(1-\beta(1+r_s))$.
- When $y_1 = l$, $p_s - l \leq b^{max}_s$, and only one investment is being made, invest in sanitation as long as $\beta\gamma \geq p_s - b^{01}_{s,l}(1-\beta(1+r_s))$. If both are made, invest in sanitation as long as $\beta\gamma \geq p_s - b^{11}_{s,l}(1-\beta(1+r_s))$.
- When $y_1 = l$ and $p_s - l > b^{max}_s$ and the household is only making the sanitation investment, make it if $\beta\gamma \geq p_s - b^{01}_{s,l}(1-\beta(1+r_s)) + \kappa b^{01}_{e,l}$
- When $y_1 = l$ and the household makes both investments and $p_e - l > b^{max}_e$, make sanitation investment if $\beta\gamma \geq p_s - b^{11}_{s,l}(1-\beta(1+r_s)) + b^{10}_{s,l}(1-\kappa-\beta(1+r_s))$.

Since the lower interest rate is associated with the loan labelled for sanitation, the two effects interact and increase households' incentives to invest in sanitation. However, if the household needs to take a business loan to cover part of the cost of the sanitation investment, the effects of the lower interest rate on the sanitation loan are reduced by the associated loan diversion penalty.

Borrowing constraints bind. Given the model assumptions, the overall borrowing constraint will not bind when $y_1 = h$. When $y_1 = l$, the overall borrowing constraint will limit the investments that can be made.

Scenario 1: $p_e + p_s - l \geq p_e + p_s but p_e - l \leq p_e + p_s and p_s - l \leq p_e + p_s$. **Household can borrow enough to invest in each good, but not both goods.** It will make the business investment when (i) $EU_{10} - EU_{00} \geq 0$, and (ii) $EU_{10} - EU_{01} > 0$.

Condition (ii) implies that:

$$y_1 + b^{10}_{s,y_1} + b^{10}_{e,y_1} - p_e - \kappa b^{10}_{s,y_1} + \beta[E(y_2) + \theta - (1 + r_s)b^{10}_{s,y_1} - (1 + r_e)b^{10}_{e,y_1}] \geq$$
$$y_1 + b^{01}_{s,y_1} + b^{01}_{e,y_1} - p_s - \kappa b^{01}_{e,y_1} + \beta[E(y_2) + \gamma - (1 + r_s)b^{01}_{s,y_1} - (1 + r_e)b^{01}_{e,y_1}] \quad (15)$$

We know that $b^{10}_{s,l} = max\{0, p_e - l - b^{max}_e\}$ and $b^{10}_{e,l} = min\{p_e - l, b^{max}_e\}$, and $b^{01}_{s,l} = min\{\frac{E(y_2) + \gamma}{1 + r_s}, b^{max}_s\}$ and $b^{01}_{e,l} = max\{0, p_s - l - b^{max}_s\}$. Condition (ii) is thus satisfied when:

- $p_e - l \leq b^{max}_e$ and $p_s - l \leq b^{max}_s$ and $\beta(\theta - \gamma) > (p_e - p_s) + b^{01}_{s,l}(1 - \beta(1 + r_s))$. The lower interest rate on the sanitation loan, combined with the label, would induce investments in sanitation.
- $p_e - l \leq b^{max}_e$ and $p_s - l > b^{max}_s$: $\beta(\theta - \gamma) > (p_e - p_s) + b^{max}_s(1 - \beta(1 + r_s)) - \kappa b^{01}_{e,l}$. The loan diversion disutility countervails the lower interest rate on the sanitation loan.
- $p_e - l > b^{max}_e$ and $p_s - l \leq b^{max}_s$: $\beta(\theta - \gamma) > (p_e - p_s) + b^{01}_{s,l}(1 - \beta(1 + r_s)) - b^{10}_{s,l}(1 - \kappa - \beta(1 + r_s))$. The loan diversion disutility further discourages business investments and encourages sanitation investments
- $p_e - l > b^{max}_e$ and $p_s - l > b^{max}_s$: $\beta(\theta - \gamma) > (p_e - p_s) + b^{max}_s(1 - \beta(1 + r_s)) - b^{10}_{s,l}(1 - \kappa - \beta(1 + r_s)) - \kappa b^{01}_{e,l}$. If $\kappa b^{01}_{e,l} > b^{max}_s(1 - \beta(1 + r_s)) - b^{10}_{s,l}(1 - \kappa - \beta(1 + r_s))$, then the disutility from diverting a business loan for sanitation will be greater than any benefit from the lower interest rate, and loan diversion disutility from diverting a sanitation loan to a business investment.

Combining these with the conditions derived earlier for making a business investment only, we have that a household will make a business investment if:

- $p_e - l \leq b^{max}_e$: $\beta\theta \geq p_e$ and $\beta(\theta - \gamma) > (p_e - p_s) + b^{01}_{s,l}(1 - \beta(1 + r_s))$ when $p_s - l \leq b^{max}_s$, or $\beta(\theta - \gamma) > (p_e - p_s) + b^{max}_s(1 - \beta(1 + r_s)) - \kappa b^{01}_{e,l}$ when $p_s - l > b^{max}_s$
- $p_e - l > b^{max}_e$: $\beta\theta \geq p_e - b^{10}_{s,l}(1 - \kappa - \beta(1 + r_s))$ and $\beta(\theta - \gamma) > (p_e - p_s) + b^{01}_{s,l}(1 - \beta(1 + r_s)) - b^{10}_{s,l}(1 - \kappa - \beta(1 + r_s))$ when $p_s - l \leq b^{max}_s$, or $\beta(\theta - \gamma) > (p_e - p_s) + b^{max}_s(1 - \beta(1 + r_s)) - b^{10}_{s,l}(1 - \kappa - \beta(1 + r_s)) - \kappa b^{01}_{e,l}$ when $p_s - l > b^{max}_s$

A sanitation investment will be made when:

- $p_s - l \le b_s^{max}$: $\beta\gamma \ge p_s - b_{s,l}^{01}(1-\beta(1+r_s))$ and $\beta(\theta-\gamma) < (p_e - p_s) + b_{s,l}^{01}(1-\beta(1+r_s))$ if $p_e - l \le b_e^{max}$; or $\beta(\theta-\gamma) < (p_e - p_s) + b_{s,l}^{01}(1-\beta(1+r_s)) - b_{s,l}^{10}(1-\kappa-\beta(1+r_s))$ if $p_e - l > b_e^{max}$.
- $p_s - l > b_s^{max}$: $\beta\gamma \ge p_s - b_{s,l}^{01}(1-\beta(1+r_s)) + \kappa b_{e,l}^{01}$ and $\beta(\theta-\gamma) < (p_e - p_s) + b_s^{max}(1-\beta(1+r_s)) - \kappa b_{e,l}^{01}$ if $p_e - l \le b_e^{max}$; or $\beta(\theta-\gamma) < (p_e - p_s) + b_s^{max}(1-\beta(1+r_s)) - b_{s,l}^{10}(1-\kappa-\beta(1+r_s)) - \kappa b_{e,l}^{01}$ if $p_e - l > b_e^{max}$

Thus, when the household cannot make both investments, the introduction of the sanitation loan will lead to switching towards the sanitation investment for some households at the expense of the business investment.

Scenario 2: $p_e + p_s - l \ge p_e + p_s$ **but** $p_e - l \le p_e + p_s$ **and** $p_s - l > p_e + p_s$**.** In this case, the household can only borrow enough to make the business investment. It will do so when $EU_{10} - EU_{00} \ge 0$. From above, we know this is satisfied when $p_e - l \le b_e^{max}$ when $p_e - l \le b_e^{max}$. If $p_e - l > b_e^{max}$, the business investment will be made as long as $\beta\theta \ge p_e - b_{s,l}^{10}(1-\kappa-\beta(1+r_s))$.

Scenario 3: $p_e + p_s - l \ge p_e + p_s$ **but** $p_e - l > p_e + p_s$ **and** $p_s - l \le p_e + p_s$**.** In this case, the household can only borrow enough to make the sanitation investment. It will do so when $EU_{01} - EU_{00} \ge 0$. From above, we know that this condition is satisfied when $\beta\gamma \ge p_s - b_{s,l}^{01}(1-\beta(1+r_s))$ when $p_s - l \le b_s^{max}$. If $p_s - l > b_s^{max}$, the household will invest in sanitation as long as $\beta\gamma \ge p_s - b_{s,l}^{01}(1-\beta(1+r_s)) + \kappa b_{e,l}^{01}$.

Scenario 4: $p_e + p_s - l \ge p_e + p_s$ **but** $p_e - l > p_e + p_s$ **and** $p_s - l > p_e + p_s$ In this case, the household cannot borrow enough to make any investment. It will borrow nothing, so $e = 0$, $s = 0$, $b_s^* = 0$ and $b_e^* = 0$.

Putting together the predicted changes for these different cases yields the three sets of predictions on the comparative statics outlined in Section **??**.

D Appendix - Variable definition

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 OA-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 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 OA-D.4). Tables OA-D.2 and OA-D.5 show the impact of the intervention on the single dimensions considered to construct the quality indicators. Tables OA-D.3 and OA-D.6 report impacts separately by whether or not the household had a toilet at baseline.

Table OA-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 OA-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 OA-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 OA-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 OA-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 OA-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.

Perceived Costs and Benefits

Household perceptions on the non-monetary costs of having a toilet were collected by asking respondents the extent to which they agreed, or disagreed with various statements as applied to a specified picture of a twin pit toilet.[4] The statements were chosen based on reasons for not constructing or using toilets that have been mentioned in the academic and policy literatures. These include perceptions such as toilets are unhealthy because they stink, a reduction in social interactions with others due to the toilet, poor health because of the toilet, increases in time to fetch water, concerns about emptying the pit once it is full, including the expense in doing so. Respondents were asked to provide their agreement or disagreement with each statement on a 5 point Likert scale (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). The responses were recoded so that a higher value indicated more agreement with the statement. We combined the responses to six of these statements relating to perceived costs using polychoric principal components analysis. This was done to reduce the number of tests we conduct. The principal components analysis yielded two components with eigenvalues greater than 1. Table OA-D.7 displays the loadings for each component. The loadings for the first component are positive, indicating that it captures higher agreement, and hence perceived costs, on the six dimensions considered, while those for the second component are positive for the first three statements and negative for the remaining three statements, which ask about difficulties in fetching water and emptying the pit. The first three statements capture personal costs of using the toilet (e.g. they stink), while the latter three relate to the costs of maintaining it. Thus higher values of this component indicate more agreement with statements capturing costs related to using the toilet, rather than maintaining it. We retain both of these components.

Similarly, we elicited households' agreement or disagreement (on a Likert scale with 5 points) with six statements addressing potential benefits of a twin pit toilet.[5] The benefits included improved health, improved safety for women, increases in labor supply, improved household status, time saving and overall improved happiness. We combine these into a smaller number of factors using polychoric principal component analysis. This generated only 1 component with an eigenvalue greater than 1. Table OA-D.8 displays the associated factor loadings. The Table indicates that the loadings associated with each factor is positive, indicating that a higher value of this component is associated with more agreement with the statements.

[4] We had originally intended to ask a random half our sample of their perceptions related to a poorer quality toilet, and the other half about their perceptions relating to the twin pit toilet. However, a programming error in the CAPI-based survey led to most households being shown the picture of the twin pit toilet. Around 148 households (98 in the control group and 48 in the SL+A group) were shown the picture of the poorer quality toilet. In what follows, we will display results for the twin-pit toilet.

[5] As with the statements related to perceived costs, we observe these responses for 4,056 households. 148 respondents were shown a different picture and are omitted from the analysis.

Table OA-D.7: Costs - Factor loading tables (PCA)

	Comp1	Comp2
Toilets are unhealthy because they stink	.359693	.5127645
Miss spending time with others because of the toilet	.4113041	.2780906
Get sick more easily when using this toilet.	.383318	.4545337
Spend more time fetching water because of the toilet	.4358944	-.1932324
Find it difficult to empty the pit when it is full	.4314686	-.4375553
Find it expensive to get the pit emptied when it is full	.4223128	-.4736495

Table OA-D.8: Benefits - Factor loading tables (PCA)

	Component 1
Family will be happier with the toilet	.3983839
Family will be healthier with the toilet	.4193999
Family members will be able to work more with the toilet	.4110287
Toilet will increase the family status in the society	.3919309
Women in the family will be safer with this toilet	.4143324
Family will save time because of the toilet	.4137248

E Comparing credit data sources

Tables OA-E.1 and OA-E.2 reveal an interesting caveat of our data: comparison of the household survey data and the credit bureau data reveals some important discrepancies, which warrant further investigation. In particular, household survey data substantially underestimates total formal household borrowing. As shown in Table **??**, while households report having borrowed, on average, just over Rs 31,000 since the start of the intervention, the credit bureau data indicates average borrowing of more than Rs 85,000.

Table OA-E.1: Formal borrowing amounts (control means)

Total formal amount borrowed...	*Data source*	*Control*	*SL*
... during the intervention	CB	85,276	91,441
	Survey (all)	31,744	30,055
	Survey (CB)	32,232	30,291
... during first-year intervention	CB	37,601	40,232
	Survey (all)	10,997	11,304
	Survey (CB)	11,105	11,498
... during second-year intervention	CB	29,103	30,554
	Survey (all)	11,863	10,877
	Survey (CB)	12,101	10,960
... during third-year intervention	CB	18,571	20,655
	Survey (all)	7,263	7,109
	Survey (CB)	7,260	7,042

Notes: SL refers to sanitation loan treatment arm. Average total borrowings from survey data are computed both on the 2,821 households included in the endline household survey and the 2,496 households included in the credit bureau data.

This is in line with other provided evidence of survey respondents' under-reporting when asked about credit and debit activity (**?**; **?**i) and unlikely related to recall error or survey instrument design. Regarding recall error, we see that the percentage of borrowing not reported in the survey data is quite similar over the course of the intervention as shown in the same table. As for survey instrument design, it would be perceivable that the capped number of loans we ask the respondent about lead to an underestimation of total borrowing. However, as can be seen in Table OA-E.2, only 23 percent of respondents, balanced by treatment and control, report on three loans, suggesting that at most a fifth of the sample would have a total borrowing amount that is censored at the top due to asking about a limited number of loans.

Table OA-E.2: Number of loans reported on

	Control		SL	
# loans	Freq.	%	Freq.	%
0	474	30.08	398	31.97
1	376	23.86	323	25.94
2	379	24.05	287	23.05
3	347	22.02	237	19.04

Notes: SL refers to sanitation loan treatment arm.

We believe it unlikely that this under-reporting is driven by the introduction of the sanitation loans, implying that our impact estimates should not be biased by it. We therefore feel confident in our finding that total household borrowing remains unaffected by the introduction and uptake of the newly introduced sanitation loan product.