a)

Table 1: Pooling model regression results.

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-4.737340	-0.606864	0.056466	0.727930	3.505346

Coefficients:

	Estimate	Std. Error	t-value	Pr(> |t|)
(Intercept)	-4.6742194	1.2981340	-3.6007	0.0003515 ***
income	1.0357785	0.1289442	8.0328	7.935e-15 ***
price	0.4830921	0.2077034	2.3259	0.0204553 *
age	1.5472745	0.2169547	7.1318	3.826e-12 ***
ms	-0.0080364	0.1848487	-0.0435	0.9653411
deps	0.1753681	0.0426421	4.1126	4.629e-05 ***

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares: 809.35
Residual Sum of Squares: 627.66
R-Squared: 0.22449
Adj. R-Squared: 0.21613
F-statistic: 26.8628 on 5 and 464 DF, p-value: < 2.22e-16

Table 2: Individual fixed effects model regression results.

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-3.608066	-0.264850	0.030264	0.310411	2.348169

Coefficients:

	Estimate	Std. Error	t-value	Pr(> |t|)
income	0.838810	0.111267	7.5387	2.976e-13 ***
price	0.366080	0.124294	2.9453	0.003407 **
age	0.102249	0.208039	0.4915	0.623338
ms	0.199833	0.263890	0.7573	0.449322
deps	-0.086352	0.053483	-1.6146	0.107154

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares: 221.58
Residual Sum of Squares: 191.67
R-Squared: 0.13497
Adj. R-Squared: 0.029433
F-statistic: 13.0445 on 5 and 418 DF, p-value: 8.2159e-12

Table 3: Individual random effects model regression results.

Residuals:

Min.	1st Qu.	Median	3rd Qu.	Max.
-3.820238	-0.278886	0.060427	0.371336	2.170378

Coefficients:

	Estimate Std.	Error	z-value	Pr($>\|z\|$)
(Intercept)	-2.370567	1.114863	-2.1263	0.033476 *
income	0.852996	0.108734	7.8448	4.337e-15 ***
price	0.370199	0.125398	2.9522	0.003155 **
age	0.277063	0.201695	1.3737	0.169544
ms	0.199669	0.233954	0.8535	0.393406
deps	-0.036254	0.049289	-0.7355	0.462013

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares: 251.12
Residual Sum of Squares: 217.79
R-Squared: 0.1327
Adj. R-Squared: 0.12335
Chisq: 70.9941 on 5 DF, p-value: 6.3636e-14

c)

Table 4: Oneway (individual) effect Random Effect Model (Swamy-Arora's transformation).

Effects:

	var	std.dev	share
$\hat{\sigma}_\epsilon^2$ (idiosyncratic):	0.4585	0.6772	0.346
$\hat{\sigma}_v^2$ (individual):	0.8666	0.9309	0.654
θ:	0.7758		

Notes:

plm(formula = charity income + price + age + ms + deps, data = df, model = "random")

Balanced Panel: n = 47, T = 10, N = 470

d)

F(5, 464) = 26.8628 > 1.14
F(5, 464) critical value is equal to 1.14 using a 5% level of significance.

e) **********

Breusch-Pagan test for heteroskedasticity (in gretl) -
Null hypothesis: heteroskedasticity not present
Test statistic: LM = 32.2872
with p-value = P(Chi-square(5) > 32.2872) = 5.21172e-06

f) **********

Hausman Test (in R):
data: charity ~ income + price + age + ms + deps
chisq = 19.245, df = 5, p-value = 0.00173
alternative hypothesis: one model is inconsistent

l) (Arelland-Bond linear dynamic panel)

Dynamic panel-data estimation, one-step system GMM

Group variable: **Individual**		Number of obs	= **423**
Time variable : **time**		Number of groups	= **47**
Number of instruments = **175**		Obs per group: min	= **9**
Wald chi2(**6**) = **745.53**		avg	= **9.00**
Prob > chi2 = **0.000**		max	= **9**

charity	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
charity						
L1.	.854326	.0375629	22.74	0.000	.7807041	.927948
price	.2586398	.1346867	1.92	0.055	-.0053412	.5226209
ms	-.3603393	.1682661	-2.14	0.032	-.6901347	-.0305439
income	.2430589	.1062178	2.29	0.022	.0348758	.4512419
deps	.0841384	.0364021	2.31	0.021	.0127916	.1554853
age	.1516874	.1789368	0.85	0.397	-.1990222	.5023971
_cons	-1.33908	1.030025	-1.30	0.194	-3.357891	.6797318

Instruments for first differences equation

Figure 1: Arelland-Bond GMM regression results.