Forced Gifts: The Burden of Being a Friend

Online Appendix

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Appendix A: Proofs

Welfare loss of gift competition

To prove the propositions, we first check the first-order derivative of $\bar{y}_{-i}$ on utility.

$$\begin{aligned} U_i &= \left(z_i - py_i + \bar{y}_{-i}\right)^{\gamma}\left(y - \theta\bar{y}_{-i}\right)^{\beta} \\ &= \left(z_i - p\cdot\frac{1}{p(\gamma+\beta)}\cdot\left[\beta z_i + \left(p\gamma\theta+\beta\right)\bar{y}_{-i}\right] + \bar{y}_{-i}\right)^{\gamma} \\ &\quad \left(\frac{1}{p(\gamma+\beta)}\cdot\left[\beta z_i + \left(p\gamma\theta+\beta\right)\bar{y}_{-i}\right] - \theta\bar{y}_{-i}\right)^{\beta} \end{aligned} \tag{A1}$$

From this, we get

$$\begin{aligned} \frac{dU_i}{d\bar{y}_{-i}} &= \gamma\left(z_i - py_i + \bar{y}_{-i}\right)^{\gamma-1}\left(y_i - \theta\bar{y}_{-i}\right)^{\beta}\left(-\frac{p\gamma\theta+\beta}{\gamma+\beta}+1\right) \\ &\quad +\beta\left(z_i - py_i + \bar{y}_{-i}\right)^{\gamma}\left(y_i - \theta\bar{y}_{-i}\right)^{\beta-1}\left(\frac{p\gamma\theta+\beta}{p(\gamma+\beta)}-\theta\right) \end{aligned} \tag{A2}$$

As long as $\theta > \frac{1}{p}$, the following holds:

$$\frac{dU_i}{d\bar{y}_{-i}} < 0 . \tag{A3}$$

Note that $\theta > \frac{1}{p}$ is a sufficient condition, rather than a necessary one.

Heterogeneity of welfare loss

When we take the optimal y_i back to the solution of $\frac{dU_i}{d\overline{y}_{-i}}$, we can prove that the negative welfare effect of gift competition is heterogeneous over income groups: compared with rich people, poor people will suffer more from gift competition. We can illustrate the idea by proving

$$\frac{d^2U_i}{d\overline{y}_{-i}dz_i} > 0, \tag{A4}$$

since

$$\begin{aligned}\frac{dU_i}{d\overline{y}_{-i}} &= \gamma\left(z_i - py_i + \overline{y}_{-i}\right)^{\gamma-1}\left(y_i - \theta\overline{y}_{-i}\right)^{\beta}\left(-\frac{p\gamma\theta+\beta}{\gamma+\beta}+1\right) \\ &\quad +\beta\left(z_i - py_i + \overline{y}_{-i}\right)^{\gamma}\left(y_i - \theta\overline{y}_{-i}\right)^{\beta-1}\left(\frac{p\gamma\theta+\beta}{p\left(\gamma+\beta\right)}-\theta\right), \\ &= \gamma\Delta^{\gamma-1}\nabla^{\beta}\left(-\frac{p\gamma\theta+\beta}{\gamma+\beta}+1\right)+\beta\Delta^{\gamma}\nabla^{\beta-1}\left(\frac{p\gamma\theta+\beta}{p\left(\gamma+\beta\right)}-\theta\right)\end{aligned} \tag{A5}$$

where $\Delta = z_i - py_i + \overline{y}_{-i}$ and $\nabla = y_i - \theta\overline{y}_{-i}$.

We calculate the derivative with regard to agent i's income,

$$\begin{aligned}\frac{d^2U_i}{d\overline{y}_{-i}dz_i} &= \gamma\Delta^{\gamma-2}\left(\gamma-1\right)\left(1-\frac{p\gamma\theta+\beta}{\gamma+\beta}\right)\nabla^{\beta}\left(1-\frac{\beta}{\gamma+\beta}\right) \\ &\quad +\gamma\Delta^{\gamma-1}\left(1-\frac{p\gamma\theta+\beta}{\gamma+\beta}\right)\nabla^{\beta-1}\cdot\beta\cdot\frac{\beta}{\left(\gamma+\beta\right)p} \\ &\quad +\beta\gamma\Delta^{\gamma-1}\left(\frac{p\theta+\beta}{p\left(\gamma+\beta\right)}-\theta\right)\nabla^{\beta-1}\left(1-\frac{\beta}{\gamma+\beta}\right) \\ &\quad +\beta\Delta^{\gamma}\left(\frac{p\theta+\beta}{p\left(\gamma+\beta\right)}-\theta\right)\nabla^{\beta-2}\cdot\left(\beta-1\right)\cdot\frac{\beta}{\left(\gamma+\beta\right)p}\end{aligned}. \tag{A6}$$

As long as $\gamma + \beta \leq 1$, we find that:

$$\frac{d^2U_i}{d\overline{y}_{-i}dz_i} > 0 \tag{A7}$$

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Proof of Proposition 1

The proposition shows that in equilibrium, people increase their gift expenses as the average gift expenses rise. Given the equilibrium condition,

$$G=\sum_{i=1}^{N}y_i=\frac{1}{p\left(\gamma+\beta\right)}\cdot\beta\cdot\sum_{i=1}^{N}z_i+\frac{p\gamma\theta+\beta}{p\left(\gamma+\beta\right)}\cdot\sum_{i=1}^{N}\bar{y}_{-i}\ . \tag{A8}$$

We obtain G in equilibrium, which is a function of total income in the community.

$$G=\frac{\beta}{p\left(\gamma+\beta\right)-p\gamma\theta-\beta}\cdot\sum_{i=1}^{N}z_i=\frac{\beta T}{p\left(\gamma+\beta\right)-p\gamma\theta-\beta}, \tag{A9}$$

where $T=\sum_{i=1}^{N}z_i$. Since $p\theta>1$, we can prove[1]

$$y_i=\frac{\beta z_i+\left(\gamma p\theta+\beta\right)\cdot\left(\frac{\eta T-y_i}{N-1}\right)}{\left(\gamma+\beta\right)\cdot p}, \tag{A10}$$

where $\eta = \dfrac{\beta}{p(\gamma + \beta) - p\gamma\beta - \beta}$;

therefore,

$$y_i=\frac{N-1}{\left(N-1\right)p\left(\gamma+\beta\right)+p\gamma\theta+\beta}\cdot\left(\beta z_i+\frac{\left(p\gamma\theta+\beta\right)\cdot\beta T}{\left(N-1\right)\left(p\gamma+p\beta-p\gamma\theta-\beta\right)}\right). \tag{A11}$$

Thus, if $i\neq j$,

$$\frac{dy_i}{dz_j}=\frac{1}{\left(N-1\right)p\left(\gamma+\beta\right)+p\gamma\theta+\beta}\cdot\frac{\left(p\gamma\theta+\beta\right)\cdot\beta}{\left(p\gamma+p\beta-p\gamma\theta-\beta\right)}>0\ . \tag{A12}$$

When others' gift expenses rise as income increases, one must follow and spend more on gifts. This proves the existence of "forced" gifts.

Q.E.D

[1] $p\theta>1$ is a sufficient condition rather than a necessary condition.

Proof of Proposition 2

In equilibrium, the loss of utility is smaller for rich people than poor people, by the same mechanism as illustrated in the individual analysis. Bringing G in equilibrium back to the utility function, we have

$$\begin{aligned} \bar{y}_{-i} &= \frac{1}{N-1}\cdot\left[\frac{\beta T}{p(\gamma+\beta)-p\gamma\theta-\beta}-\frac{\beta z_i}{(N-1)p(\gamma+\beta)+p\gamma\theta+\beta}\right. \\ &\qquad \left. -\frac{(p\gamma\theta+\beta)\cdot\beta T}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}\right], \\ &= \frac{1}{N-1}\cdot\psi T-\varphi z_i \end{aligned} \tag{A13}$$

where $\psi=\frac{\beta}{p(\gamma+\beta)-p\gamma\theta-\beta}-\frac{(p\gamma\theta+\beta)\cdot\beta}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}$ and

$\phi=\frac{\beta}{(N-1)p(\gamma+\beta)+p\gamma\theta+\beta}$.

As shown in the proof of **Proposition 1**,

$$U_i=\Delta^{\gamma}\nabla^{\beta}. \tag{A14}$$

Hence we have

$$\begin{aligned} \frac{dU_i}{dz_j} &= \gamma\Delta^{\gamma-1}\nabla^{\beta}\left(-\frac{p(p\gamma\theta+\beta)\beta-p(\gamma+\beta)\beta}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}\right) \\ &\quad +\beta\Delta^{\gamma}\nabla^{\beta-1}\left(\frac{(p\gamma\theta+\beta)\beta-\theta p(\gamma+\beta)\beta}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}\right) \\ &= -\frac{p\beta\gamma^2(p\theta-1)}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}\cdot\Delta^{\gamma-1}\nabla^{\beta} \\ &\quad -\frac{\beta^3(p\theta-1)}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}\cdot\Delta^{\gamma-1}\nabla^{\beta} \end{aligned} \tag{A15}$$

$$\frac{dU_i}{dz_j}<0, \tag{A16}$$

so that

$$\frac{d^2U_i}{dz_j dz_i} = -\frac{(p\theta-1)\beta}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}\cdot$$
$$\left\{p\gamma^2(\gamma-1)\Delta^{\gamma-2}\nabla^{\beta}\Delta'_{z_i} + p\gamma^2\beta(\gamma-1)\Delta^{\gamma-1}\nabla^{\beta-1}\nabla'_{z_i} + \beta^2\gamma\Delta^{\gamma-1}\nabla^{\beta-1}\Delta'_{z_i}\right.$$
$$\left.\beta^2(\beta-1)\Delta^{\gamma}\nabla^{\beta-2}\nabla'_{z_i}\right\}$$
$$= -\frac{(p\theta-1)\beta\Delta^{\gamma-2}\nabla^{\beta-2}}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}\cdot$$
$$\left[\left(p\gamma^2(1-\gamma)\nabla^2-\beta^2\gamma\Delta\nabla\right)\cdot\Delta'_{z_i} + \left(\beta^2(1-\beta)\Delta^2-p\gamma^2\beta\Delta\nabla\right)\cdot\nabla'_{z_i}\right] \tag{A17}$$

because

$$\Delta'_{z_i} = \frac{(N-1+\theta)p\gamma}{(N-1)p(\gamma+\beta)+p\gamma\theta+\beta} - \frac{p\gamma\beta(p\theta-1)}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}, \tag{A18}$$

given the increase in G, which is driven by m,

$$\nabla'_{z_i} = \frac{(N-1+\theta)\beta}{(N-1)p(\gamma+\beta)+p\gamma\theta+\beta} - \frac{\beta^2(p\theta-1)}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}. \tag{A19}$$

Therefore,

$$\frac{d^2U_i}{dz_j dz_i} = \left(p^2\gamma^3(1-\gamma)\nabla^2 - 2p\gamma^2\beta^2\Delta\nabla + \beta^3(1-\beta)\Delta^2\right)\cdot$$
$$\left(\frac{(N-1+\theta)}{(N-1)p(\gamma+\beta)+p\gamma\theta+\beta} - \frac{\beta(p\theta-1)}{\left[(N-1)p(\gamma+\beta)+p\gamma\theta+\beta\right]\left[p(\gamma+\beta)-p\gamma\theta-\beta\right]}\right). \tag{A20}$$

If $\gamma+\beta=1$,

$$\frac{d^2U_i}{dz_j dz_i} \geq 0. \tag{A21}$$

Therefore, if $\gamma + \beta < 1$,

$$\frac{d^2 U_i}{dz_j dz_i} > 0 . \tag{A22}$$

Q.E.D.

Appendix B: Robustness Checks

Table B1: The heterogeneous responses to gift competition: In differenced form

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS Estimation					IV Estimation		
Variable	Total sample	Total sample	Low income	Middle income	High income	Low income	Middle income	High income
Change in mean of log per capita gift expense of other households in natural village	0.639***	0.553*	0.461**	0.471	0.524*	1.024*	1.253**	-0.314
	(0.245)	(0.293)	(0.217)	(0.310)	(0.273)	(0.613)	(0.563)	(1.051)
Change in mean of log per capita gift expense of other households in natural village × belong to middle-income group	-0.338*	-0.243						
	(0.191)	(0.336)						
Change in mean of log per capita gift expense of other households in natural village × belong to high-income group	-0.585***	-0.293						
	(0.173)	(0.338)						
Change in per capita income rank (natural village)		0.176	0.201	0.308	0.310	0.436*	0.527**	0.047
		(0.117)	(0.354)	(0.212)	(0.200)	(0.230)	(0.223)	(0.283)
Change in log per capita income of household		-0.085	-0.069	-0.129	-0.300	-0.227	-0.212	0.221
		(0.113)	(0.459)	(0.242)	(0.273)	(0.252)	(0.230)	(0.338)
Change in log per capita gift Received		0.013	0.023	-0.003	0.033	0.061	0.015	0.023
		(0.017)	(0.051)	(0.018)	(0.027)	(0.044)	(0.031)	(0.037)
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peers' characteristics	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE/RE (household)	FE	FE	FE	FE	FE	FE	FE	FE
AIC	2,686.31	2,229.56	803.45	1,602.90	800.79	377.97	777.10	351.95
Adjusted R-squared	0.017	0.046	0.160	0.060	0.063	-	-	-
Sargan test (p-value)	-	-	-	-	-	0.504	0.136	0.458
Observations	1,091	959	341	651	356	142	280	128

Notes: 1. Dependent variable is *change in gift expense per capita of each household*. 2. Control variables include *change in median log per capita income in natural village, share of cadre in family, marriage status, share of party members in family, share of females in family, education level of household head, share of children (age < 6) in family, share of unmarried sons (age > 12), age of household head, share of registered permanent residents in household, share of family members having local odd jobs, share of family members working out of local county*. 3. We control peers' (mean) characteristics, such as age, ethnicity, political status, and number of unmarried sons in the regression. 4. The bottom 25% of households are defined as the low-income group; the top 25% of households are defined as the high-income group. The rest (50%) are the middle-income group (see details in footnote 13). 5. In Columns (6)–(8), we employ *mean of log land expropriation subsidy of other households in natural village* and *share of households subsidized by land expropriation subsidy in natural village* as instrumental variables of *change in mean of log per capita gift expense of other households in natural village*. 6. We only use the sample of non-beneficiaries in the villages that have land expropriation in Columns (6)–(8). 7. Robust standard errors are reported in parenthesis. 8. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table B2: The heterogeneous squeeze effects of gift competition on consumption: In differenced form

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Change in share of food expenses						Change in share of medical expenses					
	OLS Estimation			IV Estimation			OLS Estimation			IV Estimation		
Variable	Low income	Middle income	High income	Low income	Middle income	High income	Low income	Middle income	High income	Low income	Middle income	High income
Change in mean of log per capita gift expense of other households in natural village	-6.898*	-2.376	4.433	-16.888*	2.294	16.766	2.555	1.657	-2.809	-5.233	-17.612	-9.315
	(3.658)	(4.751)	(6.310)	(9.339)	(8.240)	(22.051)	(5.159)	(5.213)	(7.978)	(15.706)	(10.968)	(22.933)
Change in per capita income rank (natural village)	-1.691	-1.495	3.644	-0.403	0.641	-7.712*	3.081	-0.094	-6.124	2.644	6.296	7.373
	(2.984)	(2.347)	(4.237)	(4.393)	(3.585)	(4.530)	(3.597)	(3.874)	(3.835)	(5.690)	(4.202)	(5.070)
Change in log per capita income of household	1.138	2.477	-4.362	-0.649	-2.225	7.850*	-3.111	-2.628	5.118	-0.650	-6.207	-6.178
	(2.850)	(2.299)	(4.696)	(4.094)	(3.615)	(4.175)	(4.041)	(4.185)	(5.414)	(5.176)	(4.184)	(4.699)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FE/RE (household)	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE	FE
AIC	3,662.41	6,336.68	3,190.28	1,709.30	2,977.55	1,377.29	3,473.03	5,954.02	3,085.94	1,594.37	2,674.76	1,301.84
Adjusted R-Squared	0.189	0.131	0.278	-	-	-	0.068	0.009	0.120	-	-	-
Sargan test				0.682	0.684	0.129				0.543	0.225	0.452
Observations	449	794	405	202	368	186	407	711	373	174	282	152

Notes: 1. The bottom 25% of households are defined as the low-income group; the top 25% of households are defined as the high-income group. The rest (50%) are the middle-income group (see details in footnote 13). 2. Control variables include *change in median log per capita income in natural village*, *marriage status*, *share of females in family*, *education level of household head*, *share of children (age < 6) in family*, *share of unmarried sons (age > 12)*, *share of registered permanent residents in household*, *share of family members having local odd jobs, share of family members working out of local county, change in log per capita gift received*. 3. In Columns (4)–(6) and (10)-(12), we employ *mean of log land expropriation subsidy of other households in natural village* and *share of households subsidized by land expropriation subsidy in natural village* as instrumental variables of *change in mean of log per capita gift expense of other households in natural village*. 4. We only use the sample of non-beneficiaries in the villages that have land expropriation in Columns (4)–(6) and (10)-(12). 4. Robust standard errors are reported in parenthesis. 5. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.