Family finance and new business start-ups

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Abstract

After bank finance, borrowing from family and friends is the chief source of funds for new business start-ups in many countries, including the UK. Yet there has been virtually no treatment of this issue in the literature to date. We rectify this omission by developing a model of lending behaviour in which family members may have selfish or altruistic motives. We identify the key determinants of family lending using a unique data set on Asian entrepreneurs in Britain.

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1 Introduction

In recent years there has been growing awareness of the importance of new business start-ups for long term economic growth and employment creation. This is reflected in the active role many governments play in promoting small business start-ups. It is widely recognised that a key element of successful start-ups is adequate financing. In most countries, most new business finance takes the form of bank loans. The next largest source of funds is family members. In contrast, equity finance tends to be of relatively minor importance. Despite this, previous research has concentrated attention on bank debt and equity financing of new enterprises, whilst family finance has been largely overlooked. The aim of this paper is to rectify that omission by developing a theoretical model of family finance, and conducting an empirical analysis to identify its determinants.

The following illustrates the importance of family finance. According to Curran and Blackburn (1993), family loans account for some 15 per cent of start-up finance amongst ethnic-owned businesses in the UK, making it the largest source of funds after bank loans. In the US, Bates (1997) reported that family borrowing amongst Asian immigrant entrepreneurs was both more frequent than bank borrowing and more important than membership of credit associations.[1] In this paper, we present evidence that over half (55 per cent) of Asian-owned UK business start-ups requiring external finance had some reliance on family loans.[2] Not only is family finance substantial, it has also been shown to significantly increase entry into entrepreneurship in Britain (Basu, 1998). It is therefore something of a puzzle that whilst literature has begun to emerge on some sources of 'informal' finance such as network/peer group lending and credit clubs,[3] there remains very little theory or evidence

[1]Bates also noted that 21 per cent of bank loan recipients also borrow from their family. See also Yoon (1991), who studied US-based Korean entrepreneurs. Some 27 per cent of Yoon's sample utilised loans from banks, and the same proportion used rotating credit associations; but family loans were used by 35 per cent.

[2]See also Sowell (1981), who found that most businesses, regardless of ethnicity, started with their own capital and that supplied by family members and friends. Using a similar data set to us, Basu (1998) reports that family capital is the largest single source of funds in her sample, even dominating bank loans.

[3]See, e.g., Bruderl and Preisendorfer (1998), Wydick (1999), and the October 1999

relating to family finance.

One possible reason for the literature's neglect of family finance is the sparseness of reliable data on the issue. In this paper we overcome that problem by utilising an unusually rich data set constructed by one of the authors (see Basu, 1999, for more details). Although the data relate specifically to British entrepreneurs of South Asian origin, it is known that the utilisation of family finance is fairly similar across different ethnic groups, at least in Britain.[4] Thus it is reasonable to suppose that our findings could generalise to the population of British entrepreneurs as a whole.

Of course, the fact that the data set pertains to Asian-UK entrepreneurs may also be of interest in its own right. This is because of the growing literature on ethnic entrepreneurship,[5] and the numerical importance of Asian entrepreneurship in the UK in particular. For example, using 1991 British Census data, Clark and Drinkwater (1999) report that around 20 per cent of South Asians in Britain are entrepreneurs. This compares with 12 per cent for the UK population as a whole. Moreover, the number of Asian entrepreneurs is expected to increase given the projected growth in the size of the Asian community in the UK. Thus our paper also adds to the literature on ethnic entrepreneurship.

A central motive of the paper is to understand the determinants of family lending. Because of its unique nature, it is not possible to adapt existing models of bank lending. A separate model of family finance is needed. We propose a new model and show that, while altruism amongst family members is sufficient to account for family lending, it is not a necessary condition.

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[4]Thus, contrary to perceptions that Asian business start-ups have an advantage in securing family finance, Curran and Blackburn (1993), Jones *et al* (1994) and Aldrich *et al* (1984) find that Asians have similar reliance on family lending to the population as a whole. See also the Bank of England (1999), who concluded that the financing problems faced by ethnic minority businesses in the UK are similar in nature to those encountered by new small businesses generally; and that there was little evidence of discrimination against ethnic minority businesses by financial providers. However, this does not preclude the existence of differences *within* the Asian community, and US evidence from Bates (1997) suggests that such 'within-ethnic' differences can be significant.

[5]See, for example, Borjas (1986), Fairlie and Meyer (1996, 1998) and Fairlie (1999) in the US; and Basu (1998), Basu and Goswami (1999) and Clark and Drinkwater (1999) in the UK.

Family lending can also occur if family members are selfish, because such lending may entitle them to a valuable option to 'call in the favour', and turn entrepreneur themselves at a later date. Our empirical study provides evidence about the strength of these different behavioural motivations, and other determinants of family lending. We find that a mix of altruistic and selfish motives underlies family lending; other key explanatory variables include age, hours worked, the use of other sources of start-up finance, within-group Asian ethnicity, and the use of family labour in the enterprise.

The paper is organised as follows. Section 2 sets out the model, which considers different motives for family lending. Section 3 describes the data and the empirical methodology. Section 4 reports the results, and Section 5 concludes.

2 The model

The following stylised model is designed to capture the main features of the family finance problem. For simplicity, we assume there are just two family members.[6] Here, the term 'family' may be interpreted more broadly than just the nuclear family. Indeed, in the theoretical development it could be taken to refer also to (unrelated) friends, though the empirical application later will deal only with related family members.[7]

We commence by considering a single planning horizon. Entrepreneur i undertakes one project, which requires him to borrow an exogenous capital sum. Without loss of generality, this sum is normalised at unity, and i has no remaining initial assets. Borrowing can be from a bank and/or a relative. The relative is denoted by j. Projects are risky: i receives positive returns z_i at the end of the period with probability $0 < p_i < 1$. If successful, he also repays at this time the principal plus interest to the lender (bank and/or j). If unsuccessful, i receives a subsistence payment $s > 0$, and the lender (j

[6]This assumption obviates the need for discussion of how family lending is shared between more than one lending relative. Another paper might investigate the bargaining aspects of such a problem and the optimal number of family lenders (perhaps using the theory of clubs) – but this is beyond the scope of the present study.

[7]This seems reasonable in view of Bates's (1997) US evidence that, in contrast to family lending, loans from friends are a minor source of new business finance.

and/or the bank) loses their capital altogether. Agent j has initial assets of $\mu > 0$. He may or may not be an entrepreneur, and receives $w > s$ with certainty. Both i and j have the same form of instantaneous utility function $U(\cdot) : \mathbf{R}^+ \mapsto \mathbf{R}$, whose argument is the agent's end-period wealth. These are stochastic variables denoted by a_i^1 and a_j^1 (the purpose of the superscript will become apparent later). We therefore abstract from consumption or labour supply decisions. We assume $U'(\cdot) > 0$, $U''(\cdot) < 0$, with $U(0) = 0$, $U'(0) = \infty$ and $U'(\infty) = 0$. In general $a_i^1 \neq a_j^1$.

The interest rate charged on family loans is denoted r_F, that on bank loans is r_B, where $\{r_B, r_F\} \in \mathbf{R} \times \mathbf{R}$. In the following, both interest rates are taken to be certain, fixed, and exogenously determined: r_B by banks, and r_F by family custom and tradition. The latter assumption is suggested by the fact that almost all of the respondents in our data set (over 90 per cent) reported that they faced a zero family interest rate. Not only is it highly unlikely for this particular outcome to have emerged with such a high frequency from a continuous decision problem; but, as shown below, our assumption avoids unrealistic equilibria that occur if r_F is a choice variable. In the following, we will generally work with the restriction $0 \leq r_F < r_B$ in accordance with the evidence; but we will also consider throughout the implications for our theoretical analysis of relaxing this restriction.

It is assumed that there is no hidden information within the family, or between borrowers and banks.[8] This symmetric information framework rules out credit rationing, which is sometimes suggested as a reason for family finance (i.e., as a loan of last resort). Empirical support for the absence of credit rationing is provided by our data, which show that less than 10 per cent of respondents reported *any* problems in raising *any* bank finance.[9] However for completeness, we shall indicate in the text where our results

[8] In this framework debt will be preferred to equity finance if, as is commonly observed, entrepreneurs express a preference for complete 'control' over their business (Dow, 1992).

[9] In addition, 94 per cent of sample respondents described the relationship with their bank manager as 'friendly' or 'very friendly'. Note also that the Bank of England (1999) reports that Asians have been found to be the most successful ethnic group for obtaining bank loans. The group for whom credit rationing can most strongly be made (see Bates, 1991), namely blacks, have *lower* levels of family finance than Asians, further rebutting the argument that family finance is a response to credit rationing.

could be affected by possible credit rationing.

2.1 Both family members are selfish: the one-period case

Let $\theta_i \in [0,1]$ be the proportion (and amount) of required funds that i is willing to borrow from j; the rest is borrowed from a bank. Agent i's choice problem is $\max_{\theta_i} EU\left(a_i^1\right)$ subject to $E(a_i^1) = p_i\Omega(\theta_i) + [1-p_i]s > w$, where[10]

$$\Omega(\theta_i) := z_i - [\theta_i[1+r_F] + [1-\theta_i][1+r_B]]$$

is i's net return if successful. Likewise, let $\theta_j \in [0,1]$ be the funds that j is willing to lend to i. Agent j's choice problem is $\max_{\theta_j} EU\left(a_j^1\right)$ subject to $E(a_j^1) = R(\theta_j) + p_i\theta_j[1+r_F]$, where

$$R(\theta_j) := [1+r_B][\mu - \theta_j] + w\,.$$

We also define

$$\Upsilon(\theta_j) := R(\theta_j) + \theta_j[1+r_F]\,.$$

The short end prevails: in equilibrium, the proportion lent within the family is $\theta := \min\{\theta_i, \theta_j\}$.

The equilibrium in this problem is summarised by the following proposition; the proofs to this and all subsequent propositions are collected in the Appendix.

Proposition 1 (Absence of family lending). *In a one-period problem with selfish family members, agents are indifferent between bank and family loans when bank and family interest rates are the same; when these rates are different, no family lending can occur.*

The intuition behind Proposition 1 is straightforward. Selfish agents will not borrow from relatives at an interest rate higher than that charged by banks; but selfish relatives will not lend at an interest rate lower than that

[10] This inequality ensures that i wishes to become an entrepreneur.

obtainable from banks. Because the overwhelming majority of respondents in our data set faced a zero family interest rate (i.e., $r_F < r_B$), Proposition 1 implies that a one-period selfish model cannot explain family finance in practice.

Note also that if credit rationing exists, Proposition 1 must be relaxed, since a possible solution then becomes $\theta^* > 0$ (provided $r_F > r_B$). But as above, this case is not consistent with our sample data.

2.2 A selfish borrower with an altruistic relative

In this case, i's problem is unchanged from the previous sub-section, but now j's objective becomes $\max_{\theta_j} E\big(U(a_j^1) + \zeta_j U(a_i^1)\big)$, where $\zeta_j > 0$ is a weight indicating the strength of j's altruism toward i. If $\zeta_j < 1$, j cares for i's welfare, but not as much as his own; $\zeta_j > 1$ is the case where j cares for i's welfare more than his own.

Proposition 2 (One-sided altruism). *(i) Altruism by a relative towards a borrower can account for the existence of family lending, and (ii) the stronger the degree of altruism, and/or the lower i's gross return if successful, and/or the greater j's initial wealth, the greater the size of the family loan.*

The family's interest rate must be lower than the bank's if family lending is to exist (otherwise the selfish borrower would not ask for funds). The relative earns less from lending within the family than by investing in a bank; but this may be optimal if he values sufficiently the borrower's expected utility gain from enjoying the low family interest rate.[11]

In general, and as shown by the proof, Proposition 2 permits solutions where family loans cover only a fraction of i's overall required capital investment. This reflects limited altruism: e.g., if a relative is insufficiently

[11] As shown in the proof of Proposition 2, j's expected marginal utility has two components: a selfish and an altruistic one. θ_j^* equates the two components of j's expected marginal utility. An increase in i's gross return z_i increases the altruistic component, so the loan amount θ_j must be reduced to reduce that component and increase the selfish component until equilibrium is restored in j's allocation. Likewise, an increase in j's initial wealth μ increases j's selfish component: this is reduced, and the altruistic component increased, by increasing θ_j until equilibrium is restored.

altruistic to fund projects in their entirety, then $\theta^* < 1$, i.e., some projects may be funded with a mixture of family and bank finance. This story of limited family finance 'topped up' with bank finance is a novel one, contrasting with the common presumption that family finance is used to 'top up' limited credit extended by banks, perhaps because of credit rationing.[12]

2.3 Other forms of altruism

We briefly consider here two other forms of altruism. The first is one-sided altruism where the borrower is altruistic and the relative is selfish.

This case is analogous to the foregoing one, except that the roles and outcomes are reversed. The lender will be prepared to lend if $r_F > r_B$ (i.e., if he makes an expected profit from lending), and borrowers may be prepared to accept this if they are altruistic enough towards their relatives, i.e., if they value sufficiently the lending profits they generate for them. Family lending can exist; and it is also possible for borrowers to ration relatives' lending, rather than *vice versa*, if their altruism is not 'strong enough'. However, this form of one-sided altruism appears at variance with the facts, because as noted above, most family loans in practice are provided at lower, rather than higher, interest rates than r_B.

The second case is two-sided altruism, where both relatives care about each other. This yields similar results to the one-sided cases, depending on which family member evinces the strongest altruism to the other. Letting ζ_i denote the strength of i's altruism toward j, the analysis is straightforward,

[12]It may be instructive to consider at this point the effects of changing the model assumption that r_F is determined exogenously by custom and tradition. Suppose instead that r_F as well as θ_j is a choice variable of j (an alternative, that i and j *bargain* over r_F is qualitatively similar). Then j has an additional first order condition (for r_F) to that given in the proof to Proposition 2, namely $\zeta_j U_{\Omega(\theta_j)} - U_{\Upsilon(\theta_j)} = 0$. But in conjunction with the other FOC, it can be readily seen that this implies that $\theta_j^* = 0$, i.e., no family lending will take place. The reason is that once r_F has been adjusted in the FOC above to balance the competing claims of altruism and selfishness, j would always wish to reduce his exposure to downside risk, i.e., reduce θ_j to zero. Thus not even altruism could account for family lending if r_F were a choice variable. This does not seem like an attractive or realistic feature, and adds theoretical support to the existing empirical support for our model assumption of an exogenous r_F.

assuming that $\zeta_i \zeta_j < 1$.[13] However, this extension does not provide any new qualitative insights, and is suppressed for brevity.

2.4 Both family members are selfish: the two-period case

The purpose of this sub-section is to demonstrate that, under certain conditions, family lending can exist, even when both agents are totally selfish. The main results are provided in Propositions 3 to 5; we commence by describing how the model is extended to derive them.

There are now two time periods. As before, j earns w in period 1, and any repayment is made from i to j at the end of period 1. Now, however, j knows at the start of period 1 that a new entrepreneurial opportunity will appear for him at the start of period 2, with probability π: $0 < \pi \leq 1$. The project yields a gross return of $z_j > 0$ with probability p_j: $0 < p_j < 1$, where $\text{cov}(p_j, p_i) = \text{cov}(p_j, \pi) = 0$. If unsuccessful, j receives the subsistence payment $s < w$, and makes no repayments to the lender (i and/or the bank). Without loss of generality, it is assumed that z_j is sufficiently great that j would wish to quit his current job or enterprise in order to undertake it if the opportunity did appear. If it does not appear, j earns w as before. The project's indivisible capital requirement is m: whatever the outcome $\tilde{a}_j^1$ from the first period (either $\tilde{a}_j^1 = \Upsilon(\theta^*)$ or $\tilde{a}_j^1 = R(\theta^*)$), if j turns entrepreneur he must borrow the positive amount $m - \tilde{a}_j^1 > 0$ in the second period. Agent i remains in entrepreneurship earning z_i again in period 2 if he was successful in period 1, else he becomes a worker earning w. Whatever i's occupation, he knows he may be called upon in period 2 to return the favour to j and apportion his assets between the bank (earning the safe return r_B) and his relative (earning the risky return r_F).

At the start of period 1, both family members know that they may seek funds from the other, i from j in the first period, and j from i in the second. Knowing this, and being selfish, both members must draw up an implicit or explicit contract ensuring lending reciprocity.[14] Obviously, such a contract

[13] See Kimball (1987) for a full analysis of two-sided altruism in an infinite-horizon context.

[14] Otherwise, there would be nothing to prevent i refusing to return the favour in period

could be drawn up in a number of different ways. We consider two important possibilities below, to illustrate the sort of different outcomes that can emerge; we do not claim that the two cases exhaust the set of possibilities.

The first possibility is that agents lend a common *proportion* of their initial wealth in the period it is sought. Denote this proportion by $v(\theta)$. Letting $\delta_j \in (0,1)$ denote j's inter-temporal discount factor, j's problem at the start of period 1 is:

$$\max_{\theta_j} \quad E\big(U(a_j^1) + \delta_j U(a_j^2)\big)$$

subject to $E(a_j^1)$ as before and

$$\begin{aligned} E(a_j^2) \;=\; & [1-\pi]\{[1+r_B]E(a_j^1)+w\} + p_j\pi z_j + [1-p_j]\pi s \\ & -p_i p_j \pi \left[[m-\Upsilon(\theta)]\left[v^+(\theta)[1+r_F]+[1-v^-(\theta)[1+r_B]\right]\right] \\ & -[1-p_i]p_j\pi \left[[m-R(\theta)]\left[v^-(\theta)[1+r_F]+[1-v^-(\theta)[1+r_B]\right]\right] \end{aligned}$$

where

$$v(\theta) = \begin{cases} v^+(\theta) := \frac{\theta\Omega(\theta)}{\mu[m-\Upsilon(\theta)]} & \text{with probability } p_i \\ v^-(\theta) := \frac{s\theta}{\mu[m-R(\theta)]} & \text{with probability } 1-p_i \end{cases}.$$

The expression for $v(\theta)$ follows from equating j's first-period loan: wealth ratio θ_j/μ with i's loan: wealth ratio $v(\theta)[m-\tilde{a}_j^1]/\tilde{a}_i^1$. If $\theta_j^* < \theta_i^*$, then $v(\theta^*) = v(\theta_j^*)$. Note that $v(\theta)$ may take either of two different values because a_j^1 and a_i^1 are stochastic, each taking either of two outcomes, depending on the success or failure of i in period 1.[15]

At the start of the first period i chooses θ_i, as before. If $\theta_i^* < \theta_j^*$, then $v(\theta^*) = v(\theta_i^*)$. Letting $\delta_i \in (0,1)$ denote i's inter-temporal discount factor

2. Anticipating this, j would not lend to i in the first period so there could be no family lending at all. In practice, it seems that families favour implicit or unwritten family lending contracts over explicit ones. For example, in some cultures the sanction of family ostracism deters agents from breaking the contract. In the words of Sanders and Nee (1996), *"free-riding is constrained by a dense web of mutual expectations and obligations."* (p. 233).

[15]Note also that the capital requirement m is assumed to be sufficiently large that $v(\theta)$ is guaranteed to lie on the unit interval (see also the proof of Proposition 3 below).

(with $\delta_i \neq \delta_j$ in general), θ_i^* is the solution to the problem

$$\max_{\theta_i} \quad E\big(U(a_i^1) + \delta_i U(a_i^2)\big)$$

subject to $E(a_i^1)$ as before and

$$\begin{aligned} E(a_i^2) &= p_i[1+r_B]z_i + p_i\pi v^+(\theta_i)[m - \Upsilon(\theta_i)][p_j + p_j r_F - 1 - r_B] \\ &\quad + [1-p_i]w + [1-p_i]\pi v^-(\theta_i)[m - R(\theta_i)][p_j + p_j r_F - 1 - r_B] \end{aligned}$$

Proposition 3 (Proportional lending contract). *In a two-period problem where family members are selfish, a proportional lending contract is in place, and $r_F < r_B$, a family lending equilibrium can exist.*

Proposition 4. *Under the proportional lending contract, with $r_F < r_B$, and if $m > \Upsilon(\theta^*) + \mu[1+r_B]$, (i) the greater i's gross return if successful, and (ii) the lower j's initial wealth, the greater the size of the family loan.*

Proposition 3 shows that it is not necessary to rely on altruism to explain the existence of family lending at interest rates below bank rates: it could also be the outcome of selfish behaviour. The intuition behind the two Propositions is straightforward. The more successful the borrower is in the first period, the greater the sum he is obliged to lend to his relative in the second period. This expectation may motivate the selfish relative to lend to the borrower in the first period. This is especially likely if the first period lender's initial wealth is low or his capital requirement m is high, since then his need of funds if he turns entrepreneur will be greater. A selfish first-period borrower finds it optimal to borrow from the relative if he discounts sufficiently his obligation to lend in the second period. For example, this can occur if the first-period borrower has a relatively high inter-temporal discount rate, or if the probability of being called on in the second period is sufficiently low.

Even in close families, it may be impossible to monitor precisely the wealth levels of each member. An alternative, informationally less demanding, contract specifies that agents must be prepared to lend as well as borrow

a common *loan sum*. Thus if j loans i a given sum in period 1, i must be prepared to loan j the same sum in the second period, if j requests it. However, as the next Proposition shows, this circumscribes the set of possible family lending equilibria.

Proposition 5 (Fixed sum lending contract). *In a two-period problem where family members are selfish, a fixed loan sum contract is in place, and* $0 \leq r_F < r_B$*, a family lending equilibrium cannot exist.*

The intuition behind this proposition is as follows. With $r_F < r_B$, the selfish family lender could do better by investing his money in the bank and using these returns to reduce his second period borrowing. Unlike under the proportional lending contract, relatives who lend do not benefit from first-period borrower success, because only a common sum (rather than a proportion of the first period borrower's wealth) will be loaned back. Hence the selfish lender will not instigate a family lending market.[16]

Finally, while it is possible in principle to augment the selfish two-period model with altruistic preferences, this adds no new insights over and above the previous analysis, and so is omitted for brevity.

2.5 Policy implications and testable predictions of the models

One reason for wanting to discover whether family lending is motivated predominantly by altruism or selfishness, or a mixture of both, is that the policy implications are different. For example, consider a social decision maker (SDM) who believes that family lending for small business start-ups is desirable.[17] If the selfish motive is dominant, the SDM might consider policies

[16]Relaxing the restriction $0 \leq r_F < r_B$ permits the existence of family lending under a fixed sum contract. First, if r_F is sufficiently large and negative (formally, $r_F < -1$), then j may sufficiently value the expected *gain* from family lending to wish to lend to i. If the latter also discounts sufficiently the expected *loss* from lending at the negative family rate in the second period, then a family lending equilibrium can exist. Second, if $r_F > r_B$, both family members can benefit from lending to each other, j from lending profitably in the first period, and i if he makes a sufficiently large profit from his second period loan. As before, however, both cases can be ruled out on the grounds of lack of empirical realism.

[17]The case for this belief has not been established in this paper, but follows easily if family lending is free from problems caused by asymmetric information in the formal lending market: see, e.g., Stiglitz and Weiss (1981).

such as offering tax relief on family loans. This is not an obvious policy instrument if family lending is motivated primarily by altruism.

At the macro-economic level, there are two ways of discriminating empirically between the two hypotheses. Under proportional lending contracts, the selfish hypothesis predicts that family lending will become increasingly important over time if wealth follows a secular upward trend; the altruistic hypothesis predicts the opposite. Also, if the returns to successful new start-ups z_i are pro-cyclical, Proposition 4 implies that family lending will be pro-cyclical if the selfish motive dominates, whereas Proposition 2 implies that family lending will be anti-cyclical if the altruistic motive dominates.[18] We know of no time series data that could be brought to bear on either on these two predictions at the present time.

Table 1 summarises the predictions of the selfish and altruistic hypotheses, in terms of the effects of various explanatory variables on the family loan fraction (i.e., the proportion of start-up capital the borrower obtained from family members), θ. These explanatory variables are the strength of lender altruism, ζ_j, initial lender wealth, μ, and the gross return from successful start-ups, z_i.[19]

[INSERT TABLE 1 AROUND HERE]

The empirical section uses econometric methods to estimate the effects (i.e., sign and significance) of these explanatory variables on θ^*, in order to discriminate between the two models. Because some of the explanatory variables are unobservable, proxies must be used in their place. Also, in recognition that many other factors are also likely to affect the use of family finance in practice, several other variables are also included.

[18] In contrast, wealth tends to be much less cyclically sensitive than new business success.

[19] Note that the predictions for Model S assume that the restrictions specified in Proposition 4 hold. If they do not, empirical tests of the predictions will fail to establilsh significant effects – see Section 4 below for empirical evidence.

3 The data and empirical methodology

3.1 The data set

Our data are drawn from a primary survey of British Asian entrepreneurs who migrated from the Indian subcontinent and East Africa and established businesses in the UK.[20] South Asians are the largest and most researched ethnic minority in the UK, whose total turnover in 1992 was estimated as between 5bn and 8bn. The survey respondents were identified from a range of sources, including Dunn and Bradstreet, FAME and ICC databases, lists obtained from various regional Asian Business Associations, High Commissions of Bangladesh, India and Pakistan, and an Asian-owned bank in the UK. The respondents were interviewed face-to-face at their premises on the basis of a detailed, structured questionnaire. Although most respondents were fluent in English, they were interviewed by South Asians and the interviewers were ethnically matched whenever possible to encourage frank responses. All the interviews, which lasted about one hour on average, were conducted between August 1996 and June 1998. Of the 195 entrepreneurs surveyed, 145 started their business from scratch, and 82 of them relied on some form of outside finance. The latter is the sample used here.[21]

The mean age of the respondents at the time of interview was 47 years; the mean age when they started their businesses was 30. On average, they were born in 1950, migrated to the UK in 1971 and established their own business in the UK in 1980. Today, a majority of them (52 per cent) own businesses that have recorded current sales of 5 million or more.[22] Table 2 provides further details about the sample. All but three respondents (96 per cent) are house owners. While the mean average start-up capital was 144,610 more than half (54 per cent) of the sample started their businesses with an initial capital outlay of 25,000 or less.[23] Over half of the respondents

[20] See Basu (1999) for a detailed description of the survey.

[21] Although this sample is smaller than we would like, it is larger and richer than those used in previous studies of ethnic start-ups, e.g., Curran and Blackburn (1993).

[22] This highlights a peculiar strength of this survey: the inclusion of high net worth entrepreneurs who typically do not respond to government surveys such as the *Family Expenditure Survey*.

[23] The lowest quartile started with 5500 or less. The upper quartile started with over

(55 per cent) relied at least to some extent on family funds at start-up. Some 61 per cent invested at least some of their own personal savings into their new business venture. The latter was made possible by the fact that nearly two thirds of respondents worked prior to entering business, either in a family or non-family concern or as qualified professionals. At the same time, a little under two-thirds of them borrowed start-up funds from banks. Of the 60 entrepreneurs who approached a bank, 53 (88 per cent) succeeded in securing a loan, even if in some cases they had to approach more than one bank. The seven respondents who were unable to obtain bank loans stated that the main reason why their application was rejected was the lack of adequate security. In other words, less than 10 per cent of the total sample being considered is composed of entrepreneurs who were willing but unable to raise bank finance at start-up. All the rest were either able to secure bank loans or were reluctant to explore this source of finance.

[INSERT TABLE 2 AROUND HERE]

3.2 The explanatory variables

This sub-section discusses proxies for the key 'behavioural' explanatory variables ζ_j, μ and z_i, and describes additional variables used to control for other possible influences on family lending.

Of the behavioural variables, the most difficult one to proxy is the strength of lender altruism, ζ_j. This is because of the absence of information about who the family lenders are, let alone their preferences. The best available proxy in the data set was felt to be whether the presence of family members already in business was an important reason for business entry by the borrower. The influence of other family members can be expected to reflect close family ties; and altruism can be expected to be stronger in close families. It is reasonable to suppose that altruism manifests itself in stronger lender-to-borrower altruism than in borrower-to-lender altruism, since the latter was shown above to have implausible theoretical implications. The

95,000 and 5 entrepreneurs started with 500,000 or more.

dummy variable ZETAJ takes the value unity if the presence of family members in business was cited by the entrepreneur as an important reason for business entry, and zero otherwise. Of course, given the indirect nature of this proxy, some caution must be exercised when interpreting results based on it.

The most direct proxy for μ in the data set is the occupation of the respondent's father. The dummy variable MU takes the value unity if the father is in a high status job,[24] and zero otherwise. This proxy must be treated with caution as well, since occupation is not always well correlated with wealth. Finally, the gross return from start-up, z_i, was measured as sales turnover recorded in 1996-97, scaled by the age of the enterprise to control for the fact that surviving businesses grow over time. This variable is referred to as ZI.

Table 2 also lists a range of other human capital, financial capital, business sector, ethnicity, cultural, and miscellaneous characteristics. Human and physical capital, and hours worked at the time of the start-up, can all be expected to increase family finance. This is because they may increase the attractiveness of projects in the eyes of family lenders, while equipping the borrower with skills and confidence to negotiate loans with family members and outside agencies. In contrast, the entrepreneur's use of other types of finance, including bank loans and personal savings can be expected to act as a substitute for involvement in family finance. Dummy variables indicating the business sector of the start-up were also included, reflecting the importance of such variables on the Asian self-employment decision (Rafiq, 1992; Clark and Drinkwater, 1999). It is also known that participation in self-employment in the UK shows substantial variation amongst Asians by ethnicity, so it interesting to ask whether this carries over to differences in family finance. Bates (1997) suggests it does in the US, reporting significant differences amongst ethnic Americans in terms of reliance on family loans and loan sizes. Religion may also play a role in family finance following Rafiq's

[24]These were defined as excluding factory workers, farmers, agricultural workers, or members of the armed forces. The latter was relevant given the low army ranks of all respondents' fathers in the sample.

(1992) finding that some ethnic groups appear to enter self-employment because of religious reasons. The variable CUS (which measures the proportion of customers who are Asian) allows us to test whether a 'niche market' effect has any role in explaining family finance. According to this hypothesis, family members may be more willing to lend if the loan is to be used for setting up a business with a well-known customer base. We can also investigate whether use of family labour, having self-employed relatives in the UK, and geographical location affects the use of family finance. Finally, the dummy variable DISC indicates whether family finance was used because of perceived discrimination in the labour market. British evidence suggests that discrimination may increase entry into self-employment (Metcalf *et al*, 1996; Clark and Drinkwater, 1999), but it is less obvious whether it should affect the use of family finance, especially since broadly defined racial groups appear to make similar use of family finance in Britain.

In short, a comprehensive set of variables is used to help explain family finance, including counterparts to many of the variables considered by Clark and Drinkwater (1999) in their study of ethnic British self-employment participation. But building on our theoretical model we have also included additional ones that are specifically relevant to family finance.

3.3 Econometric methodology

Of the 82 new business start-ups reliant on some form of outside finance in the sample, 45 used family finance. This immediately raises the following question: are the factors affecting the decision to *participate* in family finance qualitatively different from those determining the *extent* of family finance? This issue is investigated empirically using Heckman's two-stage sample selection model. Although details about this estimator can be found in standard texts (e.g., Greene, 1993), it is helpful to briefly explain the regression specification for our particular application.

Let D_i^* denote the decision to participate in family finance by person i in the sample. This variable depends on a vector of explanatory variables y_i, whose elements were discussed in the previous sub-section (and include ZE-

TAJ, MU and ZI). They are linked to D_i^* via a parameter vector γ. However, the complete set of values of D_i^* are not observed, only whether participation occurred ($D_i = 1$) or not ($D_i = 0$). That is,

$$\begin{aligned} D_i^* &= \gamma' y_i + u_i \\ D_i &:= \begin{cases} 1 & D_i^* > 0 \\ 0 & D_i^* \leq 0 \end{cases} , \end{aligned} \tag{1}$$

where u_i is a normally distributed disturbance term. It follows that

$$\begin{aligned} \Pr(D_i = 1) &= \Phi(\gamma' y_i) \\ \Pr(D_i = 0) &= 1 - \Phi(\gamma' y_i) \quad , \end{aligned}$$

where $\Phi(\cdot)$ is the distribution function of the standard normal variate.

If participation occurs, what is the proportion of required capital financed by the family (i.e., the family loan fraction)? This is denoted by

$$PROP_i := \ln\left(\frac{\theta_i}{1-\theta_i}\right) .$$

The use of the logistic transformation is designed to change the unit interval domain of the family loan fraction θ_i to the entire real line, to match the domain of the normally distributed disturbance term ϵ_i in the regression

$$PROP_i = \beta' x_i + \epsilon_i \, . \tag{2}$$

This regression, which is only observed if $D_i = 1$, has the transformed loan proportions depending on a vector of variables x_i via parameter vector β.

Estimation of (2) by OLS is known to produce potentially biased and inconsistent coefficients. This motivates the use of Heckman's two-step estimator. The first step involves estimating γ in (1) by maximum likelihood. Then for each observation in the selected sample compute

$$\hat{\lambda}_i := \frac{\phi(\hat{\gamma}' y_i)}{\Phi(\hat{\gamma}' y_i)} ,$$

where $\phi(\cdot)$ is the density function of the standard normal variate. The second step involves using least squares to estimate β and β_λ in the regression

$$E[PROP_i|D_i = 1] = \beta' x_i + \beta_\lambda \hat{\lambda}_i \,. \tag{3}$$

Standard errors for the β estimates can also be obtained, as described in Heckman (1979).

4 Results

Table 3 provides estimates of the determinants of participation in, and the extent of, family finance.[25] The first column provides estimates of the participation equation (1). Given the relatively few degrees of freedom, we tested down the specification sequentially, discarding the variables with the smallest absolute t-ratios until only variables were left with t-ratios greater than unity. The resulting, more efficient specification appears in column 2. A likelihood ratio test indicates that column 2 constitutes an acceptable restriction: $\chi^2(18) = 22.536$. Column 3 provides estimates of the transformed family loan fraction conditional on participation, (3).

Comparing the results in column 2 with the predictions of Table 1, the insignificant effect from ZETAJ and the negative significant effect from MU provide support for the selfish but not the altruistic motive. In contrast, the results in column 3 are consistent with a mix of motives in the population of Asian entrepreneurs. The effect from ZI is significant and positive, in accordance with the altruistic hypothesis; but the effect from MU remains negative and significant, in accordance with the selfish hypothesis.

[INSERT TABLE 3 AROUND HERE]

The results also cast light on other important determinants of family finance. As predicted, age is significant in the loan fraction regression in column 3, with a dominant positive effect, and the number of hours worked at the time of start-up also significantly increases both the likelihood of obtaining family funds, and the family loan fraction itself. Unsurprisingly,

[25] All results are obtained using LIMDEP Version 7.0.

entrepreneurs who approached banks for finance and who obtained it, and entrepreneurs who invested a greater proportion of their personal savings at start-up, are less likely *cet. par* to participate in family finance. Also, those who were unsuccessful with a bank but who obtained family finance received a greater family loan fraction. It is harder to explain the significance of the various business sector and ethnicity dummies. For example, migrants from Africa appear to participate more in family finance but receive smaller family loan fractions, whilst entrepreneurs from India and Bangladesh rely less on family funds than Pakistanis (the ethnic base group).[26] Interestingly, having a spouse employed in a new start-up significantly increases the family loan fraction, whereas having children employed in the start-up significantly decreases it. The reasons for this are unclear, but one possibility is that in the former case the entrepreneur has access to two sets of families. One puzzling finding is the significant negative effect of perceived labour market discrimination on the loan fraction. This may be capturing other effects, e.g., if an entrepreneur is prone to blame others for his own shortcomings, this may act as a poor signal, reducing the perceived probability of success of his project in the eyes of other family members.

Finally, none of required start-up capital, geographical location, training, education, business experience, possession of self-employed relatives in the UK, or an Asian customer base appear to play any role in explaining participation in family finance or the family loan fraction. Also, λ is insignificant, suggesting insubstantial selection effects between participation in family finance and the loan fraction. This supports our modelling approach (which did not emphasise selection effects within the optimising framework) while also permitting an empirically useful distinction to be made between participation in family finance and the family loan fraction itself.

[26]These results are consistent with Metcalf *et al* (1996), who reported that African Asians and Pakistanis *"had more support from their families than Indians"* (p. 58). However, our results contradict their assertion that Muslims rely more on family funds than non-Muslims. The proportion of Muslims who relied on family funds at start-up (44 per cent) is almost the same as the proportion who did not rely on this source of finance (43 per cent); and being a Muslim appears, *cet. par*, to significantly *decrease* the family loan fraction.

5 Conclusion

This paper has attempted to fill gaps in our knowledge about the nature and extent of family financing of new business start-ups. A simple two-agent optimising model was developed in order to understand the motives for family finance, and a unique data set on British entrepreneurs of South Asian origin was used to identify the determinants of participation in, and the extent of, family finance. Selfish motives were found to be dominant for explaining participation in family finance, while a mix of selfishness and altruism were found to motivate the proportion of required funds provided by family members conditional on participation itself. In addition, key explanatory variables were found to be age, the number of hours worked at start-up, the use of other sources of finance, within-group Asian ethnicity, industrial sector, and the use of family labour in the enterprise. There was no evidence in our data set of family loans being motivated by credit rationing by banks.

Future research might seek to relax some of the assumptions made in the theoretical model. This could involve replacing perfect within-family information with bargaining under uncertainty; exploring the issue of multiple family lenders; and investigating the effects of moral hazard on family loan behaviour. It would also be helpful to find out more about the form of family loan contracts in practice, who precisely the lenders are, and to what extent family members are actually called upon to 'return the favour' of providing finance to relatives.

6 Appendix: proofs

6.1 Proof of Proposition 1

By inspection of i's choice problem, $\theta_i^* = 1$ if $r_F \leq r_B$, else $\theta_i^* = 0$ (no demand for family loans). Hence there will only be a demand for family lending if $r_F \leq r_B$. But by inspection of j's choice problem, $\theta_j^* = 1$ if $r_F \geq r_B$, else $\theta_j^* = 0$ (no supply of family loans). Hence $\theta^* = 1$ is only possible if $r_F = r_B$; but then both agents are indifferent between bank and family loans. ‖

6.2 Proof of Proposition 2

(i) From the proof of Proposition 1, there can only be a demand for family lending if $r_F \leq r_B$. Then $\theta_i^* = 1$ and any rationing of funds is imposed by j. It is sufficient for this proof to consider an interior solution to j's problem, the first order condition (FOC) for which is:

$$\zeta_j U_{\Omega(\theta_j)} = U_{\Upsilon(\theta_j)} - \left[\frac{1-p_i}{p_i}\right] . \left[\frac{1+r_B}{r_F - r_B}\right] U_{R(\theta_j)} \ , \tag{4}$$

where subscripts on $U(\cdot)$ denote derivatives. The second order condition indicates a maximum as required. From inspection of (4), it follows that the strict inequality $r_F < r_B$ is a necessary restriction. Then the positivity of both sides of this equation implies that an interior solution $\theta^* \in (0, 1]$ is possible, i.e., family lending can exist.

(ii) To determine the effects of altruism, i's gross return, and j's initial wealth, implicit differentiation of (4) yields:

$$\begin{aligned}
\frac{d\theta_j^*}{d\zeta_j} &= \frac{[r_F - r_B]\, U_{\Omega(\theta_j^*)}}{[r_F - r_B]^2 U_{\Upsilon(\theta_j^*)\,\Upsilon(\theta_j^*)} + \frac{1-p_i}{p_i}.[1+r_B]^2 U_{R(\theta_j^*)\,R(\theta_j^*)} + \zeta_j [r_F - r_B]^2 U_{\Omega(\theta_j^*)\,\Omega(\theta_j^*)}} \\
\frac{d\theta_j^*}{dz_i} &= \frac{\zeta_j\,[r_F - r_B]\, U_{\Omega(\theta_j^*)\,\Omega(\theta_j^*)}}{[r_F - r_B]^2 U_{\Upsilon(\theta_j^*)\,\Upsilon(\theta_j^*)} + \frac{1-p_i}{p_i}.[1+r_B]^2 U_{R(\theta_j^*)\,R(\theta_j^*)} + \zeta_j [r_F - r_B]^2 U_{\Omega(\theta_j^*)\,\Omega(\theta_j^*)}} \\
\frac{d\theta_j^*}{d\mu} &= \frac{[1+r_B]\left[p_i [r_B - r_F] U_{\Upsilon(\theta_j^*)\,\Upsilon(\theta_j^*)} + [1-p_i][1+r_B] U_{R(\theta_j^*)\,R(\theta_j^*)}\right]}{p_i [r_F - r_B]^2 U_{\Upsilon(\theta_j^*)\,\Upsilon(\theta_j^*)} + [1-p_i][1+r_B]^2 U_{R(\theta_j^*)\,R(\theta_j^*)} + \zeta_j p_i [r_F - r_B]^2 U_{\Omega(\theta_j^*)\,\Omega(\theta_j^*)}}
\end{aligned}$$

Given $r_F < r_B$, the first and third derivatives are positive, and the second is

negative, as required. ‖

6.3 Proof of Proposition 3

It is sufficient for this proof to analyse the FOC for an interior solution to j's two-period problem. The most general case is where $\theta = \theta_j$, for which the FOC is:

$$\begin{aligned}
&p_i[r_F - r_B]U_{\Upsilon(\theta_j)} - [1-p_i][1+r_B]U_{R(\theta_j)} \\
&+\delta_j p_i[1-\pi][1+r_B][r_F - r_B]U_{[1+r_B]\Upsilon(\theta_j)+w} \\
&-\delta_j[1-\pi][1-p_i][1+r_B]^2 U_{[1+r_B]R(\theta_j)+w} \\
&+\delta_j \pi p_i p_j \left\{[r_F - r_B][1 + r_B + r_F v^+(\theta_j) - r_B v^+(\theta_j)]\right. \\
&\left.+[r_B - r_F].[m - \Upsilon(\theta_j)].v^+_{\theta_j}\right\} U_{\Psi(\theta_j)} \\
&-\delta_j \pi [1-p_i] p_j \left\{[1 + r_B][1 + r_B + r_F v^-(\theta_j) - r_B v^-(\theta_j)]\right. \\
&\left.+[r_F - r_B].[m - R(\theta_j)].v^-_{\theta_j}\right\} U_{\Sigma(\theta_j)} \quad = 0
\end{aligned} \tag{5}$$

where

$$\begin{aligned}
\Psi(\theta_j) &:= z_j - [m - \Upsilon(\theta_j)].[1 + r_B + r_F v^+(\theta_j) - r_B v^+(\theta_j)] \\
\Sigma(\theta_j) &:= z_j - [m - R(\theta_j)].[1 + r_B + r_F v^-(\theta_j) - r_B v^-(\theta_j)] \\
v^+_{\theta_j} &= \frac{\Omega(\theta_j)}{\mu[m - \Upsilon(\theta_j)]} + \left[\frac{\theta_j[r_B - r_F]}{\mu[m - \Upsilon(\theta_j)]}\right]\left[1 - \frac{\Omega(\theta_j)}{[m - \Upsilon(\theta_j)]}\right] \\
v^-_{\theta_j} &= \frac{s}{\mu[m - R(\theta_j)]}\left[1 - \frac{\theta_j[1 + r_B]}{[m - R(\theta_j)]}\right]
\end{aligned}$$

With $r_F < r_B$, the first four of the six terms of (5) are unambiguously negative, measuring the expected utility loss from j lending to i at a low interest rate. The other two terms both have ambiguous signs. Provided that j's borrowing requirement m is not too small (formally, $m > \max\{\Upsilon(\theta_j) + \theta_j[r_B - r_F], R(\theta_j) + \theta_j[1 + r_B]\}$), then $v^+_{\theta_j} > 0$ and $v^-_{\theta_j} > 0$, so the second parts of the last two terms of (5) are positive. These can balance the negative terms and so generate an interior solution, $\theta^*_j > 0$ (i.e., a supply of family finance). However, this result cannot hold if $\theta^* = \theta^*_i$, for then the FOC is

as (5) but with $v^+_{\theta_j} = v^-_{\theta_j} = 0$, and all terms in (5) are negative, implying a corner solution, $\theta^*_j = 0$. Hence any family lending equilibrium must have j rationing i.

The second part of the proof involves showing that there may be a demand for family loans whilst a supply exists. Again, it is sufficient to state the FOC for an interior solution to i's problem; setting $\theta = \theta_j$ as is required above, the FOC is:

$$\begin{aligned}
&p_i[r_B - r_F]U_{\Omega(\theta_i)} - \delta_i p_i p_j \pi \left[[r_F - r_B]^2 v^+(\theta_j)\right] U_{A_1(\theta_i)+A_2(\theta_i)} \\
&-\delta_i p_i[1-p_j]\pi \left[[r_B - r_F][1+r_B]v^+(\theta_j)\right] U_{A_1(\theta_i)} \\
&-\delta_i[1-p_i]p_j \pi \left[[r_B - r_F][1+r_B]v^-(\theta_j)\right] U_{B_1(\theta_i)+B_2(\theta_i)} \\
&-\delta_i[1-p_i][1-p_j]\pi \left[[1+r_B]^2 v^-(\theta_j)\right] U_{B_1(\theta_i)} = 0
\end{aligned} \tag{6}$$

where

$$\begin{aligned}
A_1(\theta_i) &:= \left[z_i - v^+(\theta_i)[m - \Upsilon(\theta_i)]\right][1+r_B] \\
A_2(\theta_i) &:= v^+(\theta_i)[m - \Upsilon(\theta_i)][1+r_F] \\
B_1(\theta_i) &:= w - \left[v^-(\theta_i)[m - R(\theta_i)]\right][1+r_B] \\
B_2(\theta_i) &:= v^-(\theta_i)[m - R(\theta_i)][1+r_F]
\end{aligned}$$

The FOC (6) has five terms. The first term is positive and the last four terms are negative, indicating that an interior solution, $\theta^*_i > 0$ is possible. Moreover, such a solution requires only that $r_F < r_B$, which is of course consistent with there being a supply of family loans. Hence together with $\theta^*_j > 0$, this proves the possibility of family lending, as required. ‖

6.4 Proof of Proposition 4

(i) As was shown in Proposition 3, a family lending equilibrium requires that j rations i, i.e., $\theta^* = \theta^*_j$. Hence it is sufficient to analyse the sign of the derivative $\partial\theta^*_j/\partial z_i$. The FOC (5) at the maximum can be written as $f_{\theta^*_j}(\theta^*_j, z_i) = 0$. By implicit differentiation, $\partial\theta^*_j/\partial z_i = -f_{\theta^*_j z_i} f^{-1}_{\theta^*_j \theta^*_j}$. But $f^{-1}_{\theta^*_j \theta^*_j} < 0$ for a maximum, so sgn $\partial\theta^*_j/\partial z_i =$ sgn $f_{\theta^*_j z_i}$. Only terms involving

$\Omega(\theta_j^*)$ are (positive) functions of z_i. When the restriction on m stated in the proof of Proposition 3 holds (as is required for a family lending equilibrium), all terms of $\partial\theta_j^*/\partial z_i$ are positive. Hence $f_{\theta_j^* z_i} > 0$, which implies $\partial\theta_j^*/\partial z_i > 0$.

(ii) Using the same method and notation as in (i), $\operatorname{sgn} \partial\theta_j^*/\partial\mu = \operatorname{sgn} f_{\theta_j^*\mu}$. Denote the six terms of (5) by $f_{\theta_j^*}^\eta$, $\eta = 1, \ldots, 6$. From $R_\mu(\theta_j), \Upsilon_\mu(\theta_j) > 0$, we have $f_{\theta_j^*\mu}^\eta < 0$, $\eta = 1, \ldots, 4$. Now provided $m > \Upsilon(\theta_j) + \mu[1 + r_B]$ (needed to ensure that the derivatives $d/d\mu[\mu[m - \Upsilon(\theta_j)]]^{-1}$ and $d/d\mu[\mu[m - R(\theta_j)]]^{-1}$ are negative), and $v_{\theta_j^*}^+, v^-(\theta_j^*) > 0$ (as required for a supply of family finance: q.v. Proposition 3) then the remaining derivatives $f_{\theta_j^*\mu}^\eta$, $\eta = 5, 6$ are also both negative. Then $f_{\theta_j^*\mu}^\eta < 0$, $\forall\eta$, which implies $\partial\theta_j^*/\partial\mu < 0$. $\|$

6.5 Proof of Proposition 5

With a common loan sum of $\theta = \min\{\theta_i, \theta_j\}$, and ignoring the possibility of $\theta_j^* = 1$ w.l.o.g., j's FOC is:

$$h_{\theta_j} \leq 0 \qquad \theta_j \geq 0 \qquad \text{and} \quad \theta_j h_{\theta_j} = 0\,,$$

where $h(\cdot)$ is a continuous function containing six terms. The first four terms are the same as the first four terms of (5). Depending on whether the family loan θ_j finances all or part of j's capital requirement $m - \Upsilon(\theta_j)$, the fifth term of $h(\cdot)$ is:

$$\begin{aligned} -\delta_j p_i p_j \pi[1 + r_F] U_{\Gamma_1(\theta_j)} \qquad & \text{if } m - \Upsilon(\theta_j) \leq \theta_j \quad \text{or} \\ \delta_j p_i p_j \pi r_B[r_F - r_B] U_{\Gamma_1(\theta_j)+\Gamma_2(\Upsilon(\theta_j))} \qquad & \text{if } m - \Upsilon(\theta_j) > \theta_j\,, \end{aligned}$$

where

$$\begin{aligned} \Gamma_1(\theta_j) &:= z_j - \theta_j[1 + r_F] \\ \Gamma_2(\Upsilon(\theta_j)) &:= -[m - \Upsilon(\theta_j) - \theta_j][1 + r_B]\,. \end{aligned}$$

The sixth term of $h(\cdot)$ is:

$$\begin{aligned} -\delta_j[1-p_i]p_j\pi\, U_{\Gamma_1(\theta_j)} \qquad & \text{if } m - R(\theta_j) \leq \theta_j \quad \text{or} \\ -\delta_j p_i p_j \pi r_B[1+r_B^2+r_B+r_F]U_{\Gamma_1(\theta_j)+\Gamma_2(R(\theta_j))} \qquad & \text{if } m - R(\theta_j) > \theta_j\,. \end{aligned}$$

Because every term of $h(\cdot)$ is negative when $0 \leq r_F < r_B$, the FOC implies a corner solution of $\theta_j^* = 0$, i.e., no family lending. This obviates the need to consider i's decision problem (including any restrictions on the parameters of the problem required to ensure that $\tilde{a}_i^1 \geq \theta_i$). $\|$

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