The entrepreneur's mode of entry: Business takeover or new venture start?

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Abstract

We analyse the decision to become an entrepreneur by either taking over an established business or starting a new venture from scratch. A model is developed which predicts the determinants of entrepreneurs' choices of entry mode. The new venture creation mode is associated with higher levels of schooling and wealth, whereas managerial experience, new venture start-up capital requirements and risk promote the takeover mode. Entrepreneurs whose parents run a family firm are predicted to invest the least in schooling, since (costly) schooling reduces search costs and these individuals have the lowest probability of needing to search for a business opportunity outside their family. A sample of data on entrepreneurs from the Netherlands provides broad support for the theory. Implications for policy-makers concerned about the survival of family firms lacking within-family successors are discussed.

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1 Introduction

An extensive literature now treats the decision to become an entrepreneur as an occupational choice. Recent research emphasizes the importance of several variables that may affect this decision, including borrowing constraints (Hurst and Lusardi, 2004; Parker and van Praag, 2006); human capital (Lazear, 2005; van Praag, 2005); geographical location (Acs and Armington, 2006); cognitive biases (Puri and Robinson, 2005); and ethnicity (Fairlie, 2004). This literature focuses on entrepreneurship as a transition into independent business ownership, and usually frames entrepreneurship in terms of new venture creation. Despite this emphasis, starting a new firm from scratch is not the only way individuals can become entrepreneurs. They can also take over an existing firm, including a family business if they come from a business-owning family. One can therefore distinguish the *mode of entry* from the entry decision itself.

There are at least two reasons why policy-makers may be concerned with the mode of entry. First, the population is aging, especially in Europe, thereby increasing the potential for business transfers. According to the European Commission, 'one third of EU entrepreneurs, mainly those running family enterprises, will withdraw within the next ten years. According to estimates this could affect up to 690,000 small and medium sized enterprises and 2.8 million jobs every year' (Commission of the European Communities, 2006, p.3). The importance of business takeovers is also underlined by national data. For example, based on the age distribution of business owners, 20,000 firms per year are expected to seek takeover candidates in the next five years in the Netherlands. In comparison, 70,000 firms are started every year in the Netherlands (data source: The Dutch Ministry of Economic Affairs). At the same time, the proportion of firms being taken over by family members is decreasing sharply in several countries. One reason is that parents are having fewer children, which decreases the probability of finding suitable takeover candidates among one's own offspring. Another is that wider access to education has broadened the career options of younger people, many of whom now have more attractive alternatives to continuing a family firm. Thus research conducted by ING bank reveals that in the period 1994–1999, 35% of Dutch firm owners sold their firm to a family member, whereas the corresponding percentage in 2003 was only 22%. In Canada, four out of ten small business owners are expected to retire within the next five years, and seven out of ten will retire within the next decade, according to evidence given by the Canadian Federation of Independent Business (CFIB) to the Canadian Standing Senate Committee on Banking, Trade and Commerce in June 2006. The CFIB estimates that almost 58% of heads of SMEs anticipate retiring in two years without having identified a successor, with two-thirds failing to start any planning for their future succession. Likewise, the UK Small Business Service identified one third of British SME owners as vulnerable to age-related transfer failure (Commission of the European Communities, 2006).

There are several reasons why economic value can be lost when small family-owned firms

close and seek external successors. First, unlike large firms, many small family-firms lack tangible assets which can be easily redeployed to other uses. Instead, much of the value is embodied in the networks and idiosyncratic expertise of the small firm owner-manager him or herself. A second, related, point is that unlike large incorporated firms, where detailed accounting and operational information is usually available in a highly systemised form, small family firms are prone to less rigorous reporting requirements and tend to be more informationally opaque to outside investors. Outside investors therefore face a classic asymmetric information problem, which can be expected to make them more reluctant to invest in takeovers of small firms when they close. Third, it can be costly and time-consuming for entrepreneurs to find suitable successors from outside the family, implying that aggregate transaction and operation costs are likely to increase as the number of family firms taken over by 'outsiders' rises. For all these reasons, 'a small business owner will tend to sell at a discount to competitors, ... with the associated risk of business closure' — putting as many as two million jobs at risk in Canada, according to CFIB.

Under-investment in taking over small firms might be privately rational but has potentially adverse social welfare implications. This is potentially a serious problem because a substantial amount of economic value is bound up in private (non-publicly traded) firms. Europe's 18 million SMEs employ 66% of the workforce and generate 55% of total turnover (Eurostat, 2000). These figures illustrate an important, but sometimes overlooked, consideration in the entrepreneurship debate: the importance of preserving the economic value of existing entrepreneurial firms as well as creating value via new starts.[1] This provides an important motivation for analyzing the choice of entrepreneurial entry between takeover and brand new starts.

The second reason why the mode of entry is of policy interest relates to the growing trend in public policy towards promoting entrepreneurship. The European Commission Green Paper on Entrepreneurship (2003) is only one of a recent raft of policy initiatives of this kind. As noted there, 'The challenge for the European Union is to identify the key factors for building a climate in which entrepreneurial initiative and business activities can thrive. Policy measures should seek to boost the Union's levels of entrepreneurship, adopting the most appropriate approach for producing more entrepreneurs and for getting more firms to grow' (European Commission, 2003, p. 9). Yet it does not necessarily follow that a set of policies designed to promote new starts will also be suitable for individuals who are contemplating entry by taking over an existing firm that seeks a successor. If targeted policies are to provide the correct incentives, it is necessary to take into account the mode of entry into entrepreneurship as well as the gross entry flow. However, to our knowledge, the entry mode of entrepreneurs has been

[1]The European Commission again: 'In general, family businesses with their long-term orientation provide an important element of stability to our economies and are the source of a wealth of genuine corporate social responsibility-practices ... More successful business transfers will have immediate beneficial effects for Europe's economy. Existing companies conserve on average five jobs whereas a start-up generates on average two jobs' (Commission of the European Communities, 2006, p. 3-4).

little studied to date. In particular, we still know little about which types of individual match with which types of firm (i.e., takeover or start-up) as the owner-manager.

This paper presents a theoretical and empirical analysis of the entrepreneurial entry mode decision, in order to shed light on the following questions: What are the determinants of an individual's decision to start up a business from scratch, or to take over instead an established firm looking for a successor? And, in the case of a takeover, when will individuals take over a family business, and when will they acquire a firm from a third party? Our theoretical model is based on a multi-stage decision process in which individuals choose formal human capital (years of schooling) and entry mode to maximize expected utility. The model is used to explore the characteristics of entrepreneurs choosing between entry modes. In particular, we trace the effects of schooling and family background on the mode of entry, and analyze the role played by several other variables including business risk, required start-up capital, wealth, and previous managerial experience. We include the option of family takeover in our model as well, and by comparing this with the other occupational choices of children of family firms, we shed additional light on the important issue of family firm succession. We then outline some descriptive and econometric evidence from a sample of data from the Netherlands which is subsequently used to test the theory and identify the salient determinants of entry mode in practice.

To anticipate the results, we find that schooling plays a central role in determining the mode of entrepreneurial entry. We find empirical support for the prediction that individuals whose parents operate a family business obtain fewer years of schooling and are also more likely to take over a non-family firm than entrepreneurs who do not. Furthermore, we find that, even after controlling for family background, years of schooling is associated with a higher propensity for new venture starts than takeovers, while industry-wide capital start-up requirements and risk diminish the probability of new venture starts relative to takeover. We believe these findings are important because they provide valuable evidence on a little researched issue, and inform the public policy debate with respect to the preservation of value tied up in well established firms looking for successors outside the family.

The existing economics literature on entrepreneurs´ modes of entry is rather limited.[2] Holmes and Schmitz (1990) investigate the circumstances under which entrepreneurs decide whether to continue operating a venture or transfer it to a possibly less able entrepreneur in order to release time and resources to explore new opportunities. Holmes and Schmitz deal more with entrepreneurs' decisions about how to dispose of existing ventures than with their decisions about how to enter. Others have identified borrowing constraints as barriers to takeovers (Caselli and Gennaioli, 2005), though this too does not consider alternative entry modes. Nor does the literature analyzing whether family firm founders decide to appoint either

[2]There is some descriptive work in the business management literature relating to family succession as well as different modes of entry, e.g., Cooper and Dunkelberg (1986). This literature has focused more on the family succession problem from the departing founder's perspective rather than the potential successor's.

a family or an external CEO (Burkart *et al*, 2003; Bennedsen *et al*, 2006). Yet another strand of literature focuses exclusively on intergenerational linkages in the propensity to become an entrepreneur, including the inheritance of family firms. It turns out that there is a strong link between having self-employed parents and becoming an entrepreneur (Lentz and Laband, 1990; Dunn and Holtz-Eakin, 2000; Fairlie and Robb, 2007). Interestingly, these studies find that relatively little of the observed intergenerational linkages turn out to be attributable to parents transferring the family business to offspring; instead, the acquisition of business knowledge, experience and possibly correlated tastes among parents and children seem to be more important. As with the other strands of research discussed above, however, none of this literature bears directly on the fundamental question that motivates the present paper, which is what distinguishes business owners who have become so by takeover from those who started brand new ventures.

The remainder of the paper is structured as follows. Section 2 presents a theoretical perspective on the entry-mode decision of entrepreneurs, where a distinction is made between entrepreneurs born into families owning a family business (f-types) and entrepreneurs born into families without a family business (g-types). Section 3 describes our sample data, and outlines the modes of entrepreneurial entry observed in the sample. Section 4 contains the empirical results, including tests of the assumptions and predictions of the theoretical model. Section 5 concludes with a discussion of implications for policy-makers, and suggestions about possible directions for future research.

2 The model

There are two types of entrepreneur and three types of firm. The two entrepreneur types are f and g: f types are born into a family with parents who are entrepreneurs, and g types are born into non-entrepreneurial families. The three firm types are family firms looking for successors who belong to the family, F; family firms seeking a successor from outside the family, T; and new start-ups, N.[3] The last two types of firms can be operated by anyone, but by definition only f type entrepreneurs can operate the first type. Hence the strategy set of f type entrepreneurs is $\Sigma_f := \{\text{F,T,N}\}$, comprising three available firm types, while the strategy set for g types is $\Sigma_g := \{\text{T,N}\}$, comprising two available firm types. We will only analyze the entry strategies of individuals who have chosen to be entrepreneurs; the decision to enter entrepreneurship in the first place will not be analyzed below.[4]

[3]We are aware that this does not exhaust the set of possible entry modes. Franchising and management buyouts are two other possibilities. We lack the data to explore the determinants of these choices in the present paper.

[4]This choice has been extensively treated elsewhere: see e.g., Parker (2004) for a survey. As we discuss below in footnote 10, ignoring the decision to enter entrepreneurship makes no difference to the central results while simplifying the theoretical analysis. It also avoids the need to identify an occupational sample selection structure in the empirical work, and is consistent with our data sample which relates only to entrepreneurs.

Section 2.1 outlines the assumptions of the model. This is followed in Section 2.2 by a description of the multi-stage decision process. Theoretical results relating to schooling choices appear in Section 2.3, while those relating to entry mode choices and firm purchase prices are collected in Section 2.4. Some extensions to the model are considered in Section 2.5.

2.1 Assumptions on technology and preferences

A Assumptions on technology

- A1. Entrepreneurs and firms make heterogeneous matches, in the sense that there is only one firm *within* each given firm type that a given entrepreneur can successfully match with (the identity of this firm can vary from entrepreneur to entrepreneur). This firm is called the 'most favorable' firm. Even then, the probability that the match between an entrepreneur and her most favorable firm within each type is successful is only p, where $0.5 < p < 1$; p is the same across each firm type within the entrepreneur's strategy set. A successful match generates positive gross profits for the entrepreneur, while an unsuccessful match does not. There is a unique p which assumes the same exogenously determined value for all individuals. All entrepreneurs know p in advance.

- A2. Entrepreneurs first select a given firm type to explore, and then search to identify the most favorable firm within that type to try out a match. No search is needed for f types who try the F firm type, as there is only one firm to consider.[5] However, the probability that the parent's business ever becomes available to the entrepreneur when they reach adulthood is q, where $0 < q < 1$ recognizes that the parent's business may have closed or been sold to another person, inside or outside the family, before the entrepreneur reaches maturity. Like p, the unique value of q is exogenously determined. For all other firm types (i.e., N and T) search is always performed. Individuals searching for the first time incur search costs. But they learn how to search from this experience, so any subsequent searching for the most favorable firm within another firm type occasioned by a bad match previously is cheaper. For simplicity, subsequent search costs are set to zero. General human capital h (namely schooling) reduces initial search costs $s(h) > 0$, i.e., $s'(h) < 0$. Hence all individuals with a given level of education have the same search costs, irrespective of whether the individuals are searching among existing (T) or new firm (N) opportunities (this assumption will be relaxed below). Search identifies the most favorable firm of its type with probability 1: hence search intensity is the same for everyone. However, even having searched for and identified this most promising firm of a given type, entrepreneurs still face a probability $1 - p$ that the match will be bad.

[5] This assumption could easily be relaxed to allow for multiple family firms, as long as there are fewer of these businesses to search among than outside firms — which seems plausible.

- A3. No entrepreneur can know whether they will make a good match with the most favorable firm within a firm type until they try it. If they do not make a good match with the most favorable firm of a given type, they will not match with any other firm within that type (by A1) so they must try another firm type altogether. If they still fail to make a good match after exhausting all available firm types within their strategy set they receive an outside wage in paid employment that exceeds the cost of human capital acquisition by an amount $w(h) > 0$, with $w'(h) > 0$, as in the human capital literature.

- A4. The cost of acquiring h is $c(h)$, which is an increasing and convex function; $c(0) = 0$.

- A5. N firms offer riskier payoffs than F or T firms.[6] In the case of a good match, F firms taken over by f types generate a certain profit of $\pi > 0$. An entrepreneur who makes a good match with a T firm generates certain profits of $\pi(h)$, where $\pi(h) := \pi - s(h)$. An entrepreneur who makes a good match with a N firm generates profits of $\pi(h) + \tilde{\epsilon}$, where $\tilde{\epsilon}$ is a random variable with $E(\tilde{\epsilon}) = 0$ and $V(\tilde{\epsilon}) = \sigma^2$: the distribution of $\tilde{e}$ is the same for all N firms. Any particular realization of $\tilde{\epsilon}$ is denoted by ϵ. In the event of a good match, π incorporates a valuation of the future sale of the business.

- A6. In the event of a bad match, individuals make a zero return, but they are able to wholly reclaim the assets invested in the firm. These investments are as follows. All new firms require an exogenous amount of capital $k \geq 0$ to set up. In contrast, the purchase prices of existing firms, denoted by θ^F and θ^T for F and T businesses respectively, are endogenous (see below). All of these values are known to all entrepreneurs at the outset, as are p and the returns conditional on good match realizations. Entrepreneurs commence with the common exogenous capital endowment A. All entrepreneurs can borrow if they cannot self-finance the initial investment (i.e., if $A < k$, θ^F or θ^T), at a gross interest rate of unity.

B Discussion

The restriction on p in assumption A1 is made to ensure that deterministic choices dominate stochastic variations. Of course, one could instead argue that fs have a greater likelihood of a good match with their family firm than with a non-family firm. That could be handled by making the probability of a good match with F ϑ instead of p, where $p < \vartheta < 1$; but that modification would change none of the results that follow. In A2, schooling is taken to reduce search costs because this dimension of human capital is most closely associated with analytical skills which increase an individual's information processing power and so reduce the

[6] This is the only source of differential risk across firm types as the matching probability p is the same for all.

time spent searching.[7] In fact, we will extend the analysis later to consider another dimension of human capital, namely experience of managing others, to also affect entry mode choices. The matching assumption in A2, whereby entrepreneurs either do or do not match perfectly with a firm, is deliberately simplified. It could be relaxed by allowing elements of imperfect matching without implications for the results, but at the expense of complicating the analysis.

A3 recognizes that not everyone is cut out to be an entrepreneur. This is consistent with independent evidence that a large proportion of 'nascent entrepreneurs' who consider starting a new business fail to actually launch a venture, and end up quitting the start-up process altogether (Wagner, 2006). It is implicitly assumed that search costs in paid employment are zero for those individuals who fail to match with any firm; this assumption is inessential and can easily be relaxed. A4 is of course a standard assumption in the human capital literature.

A5 is consistent with evidence that on average new firms have more variable growth and profit rates and lower survival rates than established firms do (Astebro and Bernhardt, 2003; Parker, 2004, Chap. 9; Van Praag, 2005, Chap. 6; and see below for evidence based on our data sample). Gross of search costs, profits π are assumed to be the same in all firms, to avoid arbitrarily predisposing particular entrepreneurs to particular types of firm.[8] A5 also recognizes that (a proportion q of) f types have an innate advantage over g types by avoiding search costs if they match successfully with F. All g-type entrepreneurs, as well as all unmatched fs must however subtract search costs $s(h)$.

By allowing individuals making a bad match to wholly retrieve their up-front investments, A6 ensures that banks lending to individuals to finance entry will always receive their money back. Hence lending is risk free, with a gross interest rate of unity.[9]

C Assumptions on preferences

- A7. Business owners sell their business at the market price to the highest bidder, but give the right of first refusal to their offspring.

- A8. Entrepreneurs have a common utility function $U(\cdot)$ which exhibits decreasing absolute risk aversion.

[7] This assumption is consistent with British evidence from, for instance, Boheim and Taylor (2001) that formal education enhances job search intensity, job search effectiveness as well as 'the ability to identify potential business opportunities' (p. 18).

[8] Also, one could argue that competition among entrepreneurs will tend to equalize rates of profit across different firm types. Note that although risk averse individuals would seem to prefer certain F or T to risky N, this is only true *gross* of entry costs; these costs will play a central role in allocating individuals to firm types below.

[9] This assumption contrasts with other literature, commencing with Evans and Jovanovic (1989), which posits the existence of credit constraints in entrepreneurship (see, e.g., Paulson *et al*, 2006). Other work, however, casts doubt on the notion that there is limited access to credit in developed countries (Hurst and Lusardi, 2004; Parker, 2004, Chap. 7) and suggests instead that funds are widely available. For completeness, however, we will also consider below alternative interpretations of our results allowing for the possibility of borrowing constraints.

- A9. There is no time discounting between any stages of the decision process outlined below.

Assumption A7 allows for a relatively weak form of parental altruism. A8 is standard and has been widely used in microeconomic analyses of entrepreneurship (see e.g., Carroll, 2002). A9 simply removes an inessential parameter from the analysis; nothing is lost by it.

2.2 Timing

An entrepreneur's decision process can be divided into the following stages:

1. Based on her knowledge of: p; q; the costs of search and human capital; the required investment injections [endogenous purchase costs for F and T (θ^F and θ^T, respectively), and start-up capital k for N]; and the payoffs of the available options, the entrepreneur chooses her optimal years of schooling h and incurs $c(h)$.

2. Type f entrepreneurs now learn whether their family firm, F, is available. The q for whom it is optimally try F first since this gives them a chance of avoiding search costs; they pay θ^F to purchase it. Those for whom it is a good match remain in F, paying off any bank loan out of π; those for whom it is not a good match retrieve their investment and proceed to stage 3.

3. Type g entrepreneurs, and the $1-pq$ unmatched f types from the previous stage identify their preferred firm type from Σ_g, search and locate the most favorable firm within that type, and pay k (if it is N) or θ^T (if it is T) to operate it. If a match between an entrepreneur and their chosen firm type is good the entrepreneur remains in that firm, obtains her (possibly stochastic) payoff, and repays the bank any loan. If it is a poor match, the entrepreneur invests in the other firm type. If they make a good match there, the entrepreneur remains in that firm, obtains her (possibly stochastic) payoff, and repays the bank any loan.

4. Remaining f and g type entrepreneurs who are unmatched with any firm are forced to give up on entrepreneurship and receive the net return $w(h)$ in paid employment.

The remainder of this section derives the results. Section 2.3 analyses stage 1 of the decision problem: the optimal human capital acquisition of entrepreneurs. The exogenous influence of parental business ownership is found to impart systematic differences in the schooling choices of individuals. Section 2.4 analyses the remaining stages of the decision process for both types of entrepreneur, deriving the entry strategies for each type and the prices of acquiring existing firms. Section 2.5 considers several extensions of the model, which incorporate managerial experience and an additional productive role for human capital that differs across firm types.

2.3 Schooling choices

At the start of stage 1, each individual chooses h and incurs the cost $c(h)$ to maximize expected future returns, taking into account the possibilities of both successful and unsuccessful matches in various entry modes in entrepreneurship. As noted earlier, our focus in both the theoretical and empirical parts of this paper is on individuals who have decided at the outset to become entrepreneurs, rather than individuals in general: hence we treat returns from paid employment as the payoff that is received if all attempts to match with various firms fail.

Consider g type entrepreneurs first. If they choose T first at stage 3, they obtain returns $\pi(h)+A-c(h)-\theta^T$ with *ex ante* probability p [and obtain it with *ex ante* probability $p(1-p)$ if they try T as a second choice at stage 3 — i.e., conditional on not matching with N]. Note that θ^T is the *actual* purchase price of T, whose value is determined below. If they choose N first at stage 3, they obtain stochastic returns $\pi(h)+A-c(h)-k+\tilde{\epsilon}$ with *ex ante* probability p [and obtain it with *ex ante* probability $p(1-p)$ if they try N as a second choice at stage 3 — i.e., conditional on not matching with T]. In the case of no matching with any firm type, which occurs with probability $(1-p)^2$, the individual receives the payoff in paid employment of $w(h)+A$. So the g type entrepreneur's *ex ante* expected utility (i.e., as of the start of stage 1) is

$$\begin{aligned} V_g &= pU[\pi(h)+A-c(h)-\theta^T][\delta+(1-\delta)(1-p)]+pEU[\pi(h)+A-c(h)-k \\ &\quad +\tilde{\epsilon}][(1-\delta)+\delta(1-p)]+(1-p)^2U[w(h)+A]\,, \end{aligned} \tag{1}$$

where $\delta=1$ if T is chosen first at stage 3 and $\delta=0$ if N is chosen first instead (δ is determined endogenously below). The f type entrepreneurs have an identical decision at stage 3, but have the additional exogenous opportunity of matching with the family firm at stage 2 with probability pq, obtaining the return $\pi+A-c(h)-\theta^F$, where θ^F is the market price of F whose value is also determined endogenously below. Hence the f type entrepreneur's *ex ante* expected utility is

$$V_f = pqU[\pi+A-c(h)-\theta^F]+(1-pq)V_g\,. \tag{2}$$

At stage 1, each entrepreneur chooses human capital, anticipating returns as outlined in (1) and (2) above. The first order conditions for type g and f entrepreneurs respectively are:

$$\begin{aligned} \frac{\partial V_g}{\partial h} &= p[\pi'(h)-c'(h)]\left\{U'[\pi(h)+A-c(h)-\theta^T](1-p+p\delta)+EU'[\pi(h)+A-c(h)\right. \\ &\qquad \left.-k+\tilde{\epsilon}](1-p\delta)\right\}+(1-p)^2w'(h)U'[w(h)+A]=0 \end{aligned} \tag{3}$$

$$\frac{\partial V_f}{\partial h} = (1-pq)\frac{\partial V_g}{\partial h}-pqc'(h)U'[\pi+A-c(h)-\theta^F]=0 \tag{4}$$

So if h_g^* satisfies (3) it cannot satisfy (4). Indeed, because $\partial V_f/\partial h<\partial V_g/\partial h$ for $q>0$, it must

be that the h_f^* which satisfies (4) is such that

$$h_g^* > h_f^* \qquad \text{with} \qquad \pi(h_g^*) - c(h_g^*) > \pi(h_f^*) - c(h_f^*)\,. \tag{5}$$

Eq. (5) is the first key result. It shows that f type entrepreneurs acquire less formal human capital than g types. The reason is that fs face a smaller expected benefit from their costly investment in h given the possibility that they take the unique intra-family opportunity, whose net payoff does not depend on costly human capital-enhanced search. The logic of the net income ordering in (5) is that unmatched f types after stage 2 have sub-optimal human capital stocks for stage 3 onwards compared with g types who did not have the F option.[10]

2.4 Entry mode choices and firm purchase prices

Having chosen their human capital as above, all g-type entrepreneurs and the $1 - pq$ f-type entrepreneurs who do not match successfully with F at stage 2, have to make the entry choice at the start of stage 3 between T or N. As noted above, the benefit of entering via T rather than via N is that T is less risky. On the other hand, a T firm has to be purchased for a higher market price than the cost of starting N — as we show in Lemma 1, the proof of which appears in Appendix 1.

Lemma 1. $\theta^T = \max\{\theta_f, \theta_g\} = \theta_f^* > \theta_g^* > k$, *where* θ_j^* *are type* j*'s offer prices for T, for* $j \in \{f, g\}$.

The intuition for Lemma 1 is that the unmatched f types are willing to pay more to take over a business at stage 3 than g-types are because they have lower human capital and hence income (by (5)) — and so are more risk averse.[11] Thus at stage 3, sellers of family businesses that do not pass on their firm to offspring in a good match sell to the highest bidders — who are (unrelated) fs. Hence we arrive at the following three additional results:[12]

[10] Note that we do not consider the possibility of 'returning to school' in this model. This could be ruled out by high adjustment costs, or penalties to breaks in experience acquisition, for example. Also, note that it is easy to extend the model to allow for uncertainty about whether the individual will try entrepreneurship when they choose h at stage 1. For example, if individuals believe their subjective probability of trying entrepreneurship is $\xi \in [0, 1]$, then each term on the RHS of (1) except the last is multiplied by ξ, while the last term becomes $[\xi(1-p)^2 + (1-\xi)]U[w(h) + A]$; while the first term on the RHS of (2) is multiplied by ξ and the last is unaltered. Clearly, this adjustment makes no qualitative difference to any of the results that follow. Selection into entrepreneurship is irrelevant in stages 3 onwards (and the empirical work which tests propositions from this stage onwards) since the choices analyzed there are only defined for those who are engaged in entrepreneurship.

[11] An alternative mechanism that could generate this outcome is that human capital serves as a hedge, making it possible to undertake projects occupying a higher point on the risk-return trade-off (Polkovnichenko, 2003; Cocco *et al*, 2005; and Gomes and Michaelides, 2005). We do not have a similar effect in our model because paid employment is always available at the final stage irrespective of the entrepreneur's choice at stage 3: hence the latter does not depend on paid employment returns. Thus, even though more educated entrepreneurs have the more valuable hedge of returns in paid employment if it comes to it, this does not affect the purchase decision at stage 3.

[12] These results are evidently insufficient to ensure a steady-state outcome whereby the number of family

1. $\delta^* = 0$ in (1)

2. $\delta^* = 1$ in (2)

3. $\theta^F = \theta^T = \theta_f^*$ in (2)

These results have revealed the full occupational preference ordering of entrepreneurs. The first preference of f type entrepreneurs is to try F, because although they have to pay θ^F they face no search costs: $\pi > \pi(h_f^*) = \pi - s(h_f^*)$. If an f is among the $1 - pq$ offspring of entrepreneurs who do not match with F, their next best choice is to try T, because their (optimally) lower human capital makes them willing to pay a risk premium to purchase one. Their least preferred option in entrepreneurship is N. And, as we have just seen, gs' first choice is N. If this does not yield a good match, they would seek to take over an existing firm, T.

A proportion p of these f and g choices at stage 3 make successful matches. These entrepreneurs obtain the payoffs $U[\pi(h_f^*) + A - c(h_f^*) - \theta^T]$ and $U[\pi(h_g^*) + A - c(h_g^*) - k + \epsilon]$ respectively. Because $p > 0.50$, a disproportionate number of f types, with relatively low levels of schooling, will take over existing firms; while g types, who possess relatively high levels of schooling, are more likely to start new firms than to take over existing ones. We summarize these predictions in the following testable proposition:

Proposition 1. *Compared with entrepreneurs who start new firms, entrepreneurs who take over existing ventures are more likely to be born into business-owning families and will, as a consequence, have pursued lower levels of schooling because the presence of a family-firm diminishes their expected returns from education.*

Finally, note that the model generates a mixture of entrepreneur types in each of the takeover and new start firm types (though with the characteristics stated in Propositions 1 and 2 — see below). This, arguably realistic, aspect of the model is attributable to imperfect matching, parameterized by p.

2.5 Extending the model

The model can be extended naturally in several ways. Extensions might allow for structural differences in firm types and heterogeneous entrepreneurs in terms of k and A. For example, it follows from (10) and (11) in the proof of Lemma 1 that the greater the capital requirement for new starts, k, the greater the price the seller of an existing business can command in the market place. This reflects the reduced attractiveness of N firms, and the greater willingness to bid for a T firm. For similar reasons, the price of the latter will be higher the greater the risk (σ^2) in N and the lower is A, as less wealthy individuals are more risk averse and less willing

businesses is stable over successive generations. Further assumptions would be needed to characterize the dynamics of business ownership and transfer rates over time.

to start a risky N. Hence in a sample of entrepreneurs with heterogeneous values of k and A, entrepreneurs (of any given type) who face the highest start-up capital entry requirements and risk will outbid entrepreneurs *of the same type* for the right to take over an existing firm. The opposite is the case for wealthier entrepreneurs.[13] It therefore follows that:

Proposition 2. *Entrepreneurs facing higher start-up capital requirements and risk are more likely to take over an existing firm than to start up a new one, while personal wealth makes them more likely to start up a new firm than to take over an existing one.*

A second extension might recognize that established firms are larger on average than new starts, being more likely to employ large workforces. In which case, it is possible that entrepreneurs who take over these firms would benefit from a specific aspect of human capital associated with managing people. We identify this with managerial experience, denoted by x.[14] Extending the model by writing the probability of a good match between F and T as $p(x)$, where $0 < p(x) < 1$ is continuous and twice-differentiable with $p''(x) < 0 < p'(x)$ we obtain the next proposition, whose proof appears in Appendix 2:

Proposition 3. *Entrepreneurs with greater managerial experience will bid more to take over an existing firm and so are more likely to take over a firm than to start one up, compared with otherwise identical entrepreneurs with less managerial experience.*

A third extension recognizes that entrepreneurs seeking to identify new opportunities have to search in a broader domain than those seeking to take over firms whose existence is known. Search costs for N firms may therefore be greater and more elastic with respect to h than for T, as better educated entrepreneurs *of both types* are likely to be more efficient at processing large amounts of information. In which case, better educated entrepreneurs face lower costs of adopting an N strategy than a T strategy compared with their less educated counterparts. By the earlier logic, it follows that more educated entrepreneurs of any type will therefore pay less to take over a firm and so, *even after controlling for entrepreneurs' family types*, those entrepreneurs with more education will on average be more likely to start up a new firm and less likely to take over an existing one. Thus we would predict that schooling has an additional effect on entrepreneurs' entry strategies over and above its correlation with entrepreneur type, which is attributable to its greater productivity in searching for new firms to operate. Of course, we acknowledge that this is not the only reason why higher levels of education might

[13] It may appear surprising that wealthier entrepreneurs prefer the cheaper option of start-up compared with poorer entrepreneurs. Because borrowing constraints in which loans are wealth-dependent might work against this, we will explore empirically the role of wealth below to take account of this possibility.

[14] We acknowledge that skill at managing a workforce might not only be obtained by past managerial experience, but also by informal business experience that f types may have obtained by working for the family firm in their youth (see Fairlie and Robb, 2007). This would then provide an additional reason why f types are more likely to take over a firm (even if they are not matched with their family firm) than to start up a new one. However, we cannot measure the empirical validity of this mechanism since no measure of the extent of informal business experience of f types is available in our dataset.

favor a new start over a takeover: others might include the greater degree of difficulty in establishing a new start-up in which routines and organizational structures have to be created from scratch. However, we would still expect a similar additional role from education on entrepreneurial entry mode, regardless of the precise mechanism by which this occurs. We state this as:

Proposition 4. *More educated entrepreneurs are more likely to start a new firm than to take over an existing one, even after controlling for the entrepreneur's family (business) background.*

3 Data

The dataset used in the empirical analysis is a random cross-section sample of Dutch entrepreneurs. Entrepreneurs are defined as individuals who started their own business from scratch or who took over an existing firm.[15] The dataset contains a wide range of economic and demographic variables including ones related to family background, entry mode, and human and financial capital.[16]

In fall 1994, a questionnaire was sent to 1,069 entrepreneurs who had already indicated their willingness to participate in the research. Of these, 709 responded. Owing to non-response rates on some questions, most of the regression analyses below are based on between 600 and 640 observations.[17]

As documented in Brouwer *et al* (1996), the sample is broadly representative of the Dutch population of entrepreneurs in terms of industry, company size, legal form, and age of companies and entrepreneurs. The sample contains a slightly larger proportion of highly educated respondents than is found in the general Dutch population, reflecting the fact that one of the commissioners of the research project (the General Advisory Council of the Dutch Government) was particularly interested in the business outcomes of this group.

The remainder of this section outlines the variables used in the empirical analysis.

[15] The sample was generated as part of a private-public joint venture undertaken by the University of Amsterdam, The Erasmus University of Rotterdam, and the GfK market research company. The research for which the sample was gathered was commissioned by RABO, a large Dutch co-operative bank, and the General Advisory Council of the Dutch Government.

[16] Parker and van Praag (2006, Appendix B) provide additional details about the variables contained in the dataset.

[17] When financial capital variables are included this number is reduced to 566. This is partly attributable to non-response for these items, and partly to the fact that we dropped observations whose (absolute) values exceeded the mean by more than ten times the standard deviation — in order to limit the influence of outliers on the estimates.

Table 1: Descriptive Statistics

	N	Mean	Family Background		t-value
Entry mode			f types	g types	
New start, N	705	83.1%	70.3%	94.0%	8.12
Takeover	705	16.9%	29.7%	6.0%	8.12
of family firm, F	705	9.5%	20.7%	0.0%	9.38
of non-family firm, T	705	7.4%	9.0%	6.0%	1.52
Family background					
f type	709	45.7%	100%	0%	
g type	709	54.3%	0%	100%	
Human capital					
Formal education (years)	703	14.7	14.1	15.2	4.63
General track (dummy)	703	0.53	0.52	0.55	0.79
Prof. Track (dummy)	703	0.47	0.49	0.46	0.79
Labor experience (years)	686	10.6	10.2	10.9	0.98
Industry experience (years)	686	4.60	4.30	4.90	1.18
Previous business expr (dummy)	686	0.14	0.17	0.12	2.02
People management expr. (dummy)	686	0.41	0.41	0.41	0.07
Age at entry (years)	686	33.90	33.20	34.40	1.75
*Financial capital**					
Initial capital invested **	515	81.18	99.85	66.48	1.89
Initial capital required **	515	101.57	136.22	74.26	2.93
Initial personal equity invested **	515	27.53	33.89	22.51	1.92
Extent of initial capital constraint	515	17.81	19.12	16.79	0.89
Initially capital constrained (dummy)	515	0.33	0.35	0.31	1.04
Other variables					
Female (dummy)	709	0.18	0.18	0.17	0.28
Siblings	685	3.24	3.85	2.75	5.81
Number of elder siblings as % of total	685	0.54	0.74	0.39	9.30
Father's education (years)	674	11.41	10.88	11.87	3.50
Entry year (19..)	698	87.15	83.95	89.79	8.04
Industries					
Capital intensve	709	0.121	0.130	0.119	0.62
Agriculture	709	0.059	0.111	0.016	5.37
Production/building	709	0.107	0.114	0.101	0.55
Trade	709	0.096	0.108	0.086	1.00
Retail-food	709	0.058	0.083	0.036	2.67
Retail-non food	709	0.049	0.056	0.044	0.70
Repair/transport	709	0.035	0.040	0.031	0.64
Financial services/housing	709	0.025	0.025	0.026	0.11
Professional services	709	0.398	0.296	0.483	5.06

Notes

The first column shows the available sample size, N, for each variable. The second column provides the mean for the available sample; the third and fourth columns distinguish entrepreneurs who come from families owning a business (f types) and those who do not (g types); and the fifth column shows the t-statistic resulting from testing whether the differences between f and g types are statistically different. For dummy and proportional variables, an equality of proportions test is used, resulting in a Z statistic.

* The observations that reported (required) entry capital levels or personal equity levels that exceeded the mean levels by more than ten times the standard deviation were dropped from the analysis.

** In thousands of 1994 Dutch guilders.

3.1 Variables

A Entry mode

In terms of the survey questionnaire, we coded entrepreneurs' entry strategies based on responses to the following question: *"Did you start up the firm yourself or did you take over the firm?"* There were three possible categorized answers: (i) "I have taken over a family firm", F; (ii) "I have taken over a firm from a non-family member", T; and (iii) "I have started the firm myself from scratch", N. Table 1 shows that of the 705 entrepreneurs who answered this question, 9.5% took over a family firm, 7.4% took over another firm and 83.1% started a firm from scratch. Hence in total 16.9% of the firms were started through a takeover of some kind.

B Entrepreneurial family background

The theoretical analysis distinguished between individuals born into families in which there is a probability q that a F business becomes available later. Thus we can take as the set of f types all individuals who had at least one parent mainly engaged in entrepreneurship during the respondent's youth.[18] All other individuals were coded as g types. On this basis, Table 1 shows that 45.7% of the entrepreneurs in our sample come from entrepreneurial families. This compares with a figure of 51% identified in the US Characteristics of Business Owners (CBO) Survey by Fairlie and Robb (2007); and with Lentz and Laband's (1990) figure of 52% based on US National Federation of Independent Businesses (NFIB) data. Also, in our sample 9.5% of businesses are inherited or taken over from the family. Lentz and Laband (1990) reported that 14.2% of the businesses in their NFIB sample were inherited or acquired from family members, while Fairlie and Robb (2007) reported a lower figure of at most 8.2%

[18] The precise question in the survey was: *"Which professional status applied to your parents (or those who fulfilled this role for you) during the longest period in your youth?"* Eight possible categories were given, including ones for self-employed (non-incorporated) and fully incorporated businesses — both of which are taken to be entrepreneurs. We acknowledge that we might define erroneously as g types instead of f types respondents whose parents did not own a business while a member of the extended family (e.g., an uncle) did. In that case our empirical definition of f types could be too narrow. In fact, the dataset contained no respondents claiming to have taken over a family firm neither of whose parents was classified an entrepreneur.

(=1.6% inherited plus an upper bound of 6.6% gifted or transferred) from the CBO database. It is also noteworthy that f types are significantly less likely to start a new firm from scratch (70.3%) than g types are (94.0%). Although f types are slightly more likely to take over a non-family firm (9.0%) than g types are (6.0%), this difference is not statistically significant in a simple univariate comparison.

C Human capital variables

Education is measured in terms of the number of years of schooling rather than the highest schooling level attained. On average, the entrepreneurs in the sample have 14.7 years of formal education. In accordance with the predictions of the model (e.g., (5)), f types have significantly less education on average than g types do (14.1 versus 15.2 years). In contrast, a higher proportion of f types (17.3%) had business experience prior to operating the current venture than g types (11.9%); this difference is also statistically significant. Other characteristics, including whether the entrepreneur's schooling was general or followed a professional track; years of previous experience in the labor market, industry, or management; and their age when they began operating the current venture, are similar for the two entrepreneurial groups.[19] These are only univariate comparisons, however: testing based on multivariate analysis will be performed in the next section.

D Financial capital variables and risk

Proposition 2 states that entrepreneurs facing higher start-up capital requirements and risk are more likely to take over an existing firm than to start up a new one, while personal wealth makes them more likely to start up a new firm than to take over an existing one. Our data set contains rich information about financial capital variables, some of which are summarized in Table 1. This includes initial capital invested by the entrepreneur; initial capital claimed by the entrepreneur to be required to commence the business; and initial personal equity invested in the business at the outset. Data on initial personal wealth are unavailable, but following previous work (e.g., Parker and van Praag, 2006), we proxy it by the personal wealth that individuals invested in their business at the time they commenced their current venture. While this is an imperfect proxy for an individual's total net wealth, we expect it to be positively correlated with it.

Finally, to test the possible impact of borrowing constraints on entrepreneurs' entry strategies and thereby the validity of one of our assumptions (A6), we use two measures of initial constraints. First, following Parker and van Praag (2006), the extent of borrowing constraints is measured directly as $BC := 100 \times (1 - r) \geq 0$, where r is the ratio of initial capital invested

[19] Note that our theoretical model explicitly took account of entrepreneurs having previous experiences of other businesses (in the form of non-lasting matches); therefore we include this variable rather than sampling only on individuals with or without previous experience. In fact, this variable turns out to be insignificant in all analyses of entry mode.

and initial capital required. Also, a dummy variable for having experienced capital constraints is defined as equal to one if $BC > 0$ and equal to zero if $BC = 0$. This second constraint measure reflects whether entrepreneurs face *any* constraint or not.[20] We observe no significant differences between the groups in terms of apparent borrowing constraints; and this does not change if particular modes of entry are considered separately.

Turning to the descriptive statistics on financial capital, Table 1 shows that on average f types run businesses that require and deploy significantly more financial capital, including personal equity, than g types. On the face of it, this is consistent with the analysis of the previous section. But when it comes to comparing both average start-up capital requirements and risk between firm types, as is required to test Proposition 2, individual-level data face an important limitation. Start-up capital requirements and risk can only be measured at the individual level for entrepreneurs who started up a business from scratch. However, we need to measure these variables for *all* entrepreneurs in the sample. For this reason we define both variables at the industry level; 9 industries are distinguished for this purpose. Capital entry requirements at the industry level are measured as the mean value of the capital that entrepreneurs who start up from scratch initially invested in their business operating in the industry. This is the start-up capital required in the industry and the same value is attributed to all entrepreneurs in the sample who operate in the industry, i.e., including those who take over existing businesses. Likewise, the business risk of a new venture is defined as the within-industry standard deviation of profits (incomes) that are generated in the industry, based on new start-ups only. Again, the same value is attributed to all entrepreneurs in the sample who operate in the same industry, whether through takeover or through a new start-up.[21]

E Other variables

Other variables used in the empirical work include gender, the number of siblings and the number of years of schooling of the entrepreneur's father. 18% of the entrepreneurs in the sample is female. This percentage is broadly consistent with other European studies (Parker, 2004, Chap. 4) and is similar for f types and g types. Previous researchers have found the number of siblings and father's education to be strongly correlated with determinants of entrepreneurs' schooling levels (see Parker and Van Praag, 2006). Moreover, the number of siblings as well as the rank of the respondent in the group of siblings is likely to affect the probability, q, that an f type has a family firm available: the more (older) siblings a respondent has, the lower the respondent's likelihood of taking over the family business, all else equal. The modal number of siblings in the sample is 3. f types have significantly more siblings than g types. The average age rank of the entrepreneurs within the group of sibling is 0.54; it is significantly higher for f types than for g types, partly because the rank is 0 if

[20] Ideally, a borrowing constraint measure should compare actual with *optimal* (rather than requested) start-up capital; but data on optimal capital is unavailable.

[21] For brevity, the values of these variables for each industry are not shown in Table 1.

an individual has no siblings; and more g types lack siblings than f types do. The average number of years of schooling of the entrepreneur's father is 11.4; the number is significantly lower for f types than for g types.

To control for time trends, we also include the year of entry into our analyses. The year in which the venture was started or taken over is significantly earlier for f types than for g types. We control for industry effects too: industry dummies are used in all analyses except those which use industry-wide measures of business risk and entry requirements (see the earlier discussion). The bottom part of Table 1 shows the descriptive statistics of these variables. Agriculture is a significantly more important sector of activity among f types than among g types. The same holds for the retail (food) sector and the opposite is true for the professional services sector.

4 Empirical results

Section 4.1 first tests empirically the validity of two testable model assumptions, A5 and A6. The subsequent subsections then test the four propositions emerging from the theoretical model. Section 4.2 brings data to bear on the first two stages of the model: human capital acquisition and matching of f types with family firms. Section 4.3 then analyzes the third stage of the model, to shed light on entrepreneurs' choice of entry via new start or takeover as a function of individual and business characteristics. Throughout, we stress that our results only signify conditional correlations: we make no claims about causality.[22]

4.1 Model assumptions

Assumption A5 of the model states that new firms offer riskier payoffs than established firms. The veracity of this assumption can be assessed by comparing the coefficient of variation (as a measure of risk) of payoffs pertaining to start-ups and takeovers.[23] We define payoffs as the income entrepreneurs report earning from their businesses (in 1994). Income from businesses is measured comprehensively, including wages paid to entrepreneurs as well as returns to capital for unincorporated entrepreneurs. Table 2 shows the mean and median incomes, as well as their standard deviations and coefficient of variation for the entire sample, and for start-ups and takeovers separately. Because the coefficient of variation of payoffs among new start-ups exceeds that among takeovers, the data appear to be consistent with A5.

Assumption A6 states that external capital can be acquired for any venture at the time of entry. Put another way, the model does not recognize a role for capital constraints. The

[22] In part, this reflects the limited availability of identifying instruments and the cross-section nature of the data.

[23] As opposed to other measures of risk, such as the standard deviation, the coefficient of variation is independent of the mean value of the variable whose risk is measured. This is relevant because of the different mean net payoffs shown in Table 2.

Table 2: Testing assumption A5

Income	All	New start-ups, N	Takeovers, T and F
Mean	70.97	67.68	87.25
Median	52.16	48.00	72.00
St. Dev	79.98	81.10	74.62
C. V.	1.14	1.20	0.86
N	541	450	91

Notes

All values are in thousands of 1994 Dutch guilders. The first column provides values for the entire sample; the second and third columns distinguish start-ups from takeovers. The smaller sample size than in Table 1 reflects missing income data. St. Dev is standard deviation and C. V. is the coefficient of variation. The results are qualitatively unchanged if cases in the agricultural sector are excluded.

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validity of this assumption is partly evident from the data tabulated in Table 1. Table 3 provides a clearer picture of the incidence of capital constraints in the sample. Less than 33% of the entrepreneurs experienced any capital constraint at the time of entry, while only 12% claimed to be constrained by 60% or more of their required capital. Across the sample, the average extent of capital constraints BC (defined above) is only 17.8%. This suggests that capital constraints are indeed not an issue for the majority of respondents.[24] Nevertheless, to err on the side of caution, we re-ran all of the regressions reported below for all respondents apart from the 12% claiming to be severely credit constrained. The results, which are available from the authors on request, remained qualitatively unchanged.

4.2 Schooling choices and f-F matching: First and second stages of the model

The second stage of the model generated a key result, summarized in Proposition 1: that f types optimally choose lower levels of education than g types. The logic was that because f types have a probability of taking over the family firm they need less human capital to help identify business opportunities elsewhere. Indeed, as noted in Section 2, one could easily extend this reasoning to argue that other human capital-intensive aspects of business formation, such as searching for new opportunities, and establishing completely new routines, organizational structures and customer and supplier networks, are also less important for successors of family businesses than for entrepreneurs initiating new venture starts.

Table 1 has already demonstrated that f types have significantly fewer years of school-

[24] We acknowledge however that our sample pertains to surviving entrepreneurs, who might, on average, have experienced less severe initial capital constraints than an average cross-section of recent start-ups.

Table 3: Testing assumption A6

Extent of constraint BC	% of observations	Cumulative %
No capital constraint: $BC = 0$	67.2	67.2
$0\% < BC \leq 20\%$	3.9	71.1
$20\% < BC \leq 40\%$	8.5	79.6
$40\% < BC \leq 60\%$	8.4	88.0
$60\% < BC \leq 80\%$	5.8	93.8
$80\% < BC$	6.2	100.0
N	596	

Notes

The measure of capital constraints, BC, is self-assessed and defined in the text. The results are qualitatively unchanged if cases in the agricultural sector are excluded.

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ing than g types, 14.1 years compared with 15.2 years. However, these are simple averages, which might be explained by different characteristics of the f and g sub-samples. Previous researchers have identified several variables that affect schooling choices, including age (negatively: capturing cohort effects), female gender (negatively: possibly reflecting different historic expectations about labor force participation rates), parental education (positively: reflecting both nature and nurture), and the number and rank of siblings (negatively: suggesting a trade-off between the quality and quantity of children, and greater investment by parents in older children).[25] For example, according to Table 1, f types are significantly older than g types, as they have an earlier entry year and a similar age at entry compared with g types. Also, the fathers of f types have lower levels of education, and f types have more siblings, on average, than g types do. These differences alone might explain the difference in mean number of years of schooling between the entrepreneur types. Offsetting this, f types rank higher in the sibling rank than g types do on average, which might partly compensate for the differences just described. We run OLS regressions to control for all of these variables together. Nevertheless, we acknowledge that there may still be some unobserved heterogeneity between f types and g types that is associated with different education levels. We continue to include entrepreneurs in all industry sectors (including agriculture) to avoid possible sample selection biases entailed by studying the schooling decisions of only those who subsequently chose to enter particular sectors.

Table 4 reports the empirical results. The dependent variable is the number of years of education.[26] The results are shown for f and g types together and separately, to highlight the potentially different mechanisms underlying the education investment decision of the different

[25] See, e.g., Black *et al* (2005) and Parker and Van Praag (2006).

[26] A log-transformation of this variable generated similar results.

Table 4: Determinants of years of schooling

Variable	All		f type		g type	
f type (d)	-0.533^{**}	-0.382^{*}				
	(2.46)	(1.77)				
Female (d)	-0.389	-0.400	-0.747^{*}	-0.921^{**}	-0.104	0.006
	(1.50)	(1.57)	(1.88)	(2.41)	(0.30)	(0.02)
Age	-0.135^{***}	-0.088^{***}	-0.153^{***}	-0.096^{***}	-0.118^{***}	-0.081^{***}
	(13.25)	(7.64)	(10.90)	(5.39)	(7.88)	(5.22)
Father's ed. (years)		0.251^{***}		0.286^{***}		0.233^{***}
		(8.60)		(5.81)		(6.47)
No. siblings		-0.158^{***}		0.169^{***}		-0.123^{*}
		(2.94)		(2.09)		(1.68)
Prop. older siblings		-0.025^{***}		-0.022^{***}		-0.312
		(5.12)		(3.89)		(0.89)
Constant	20.56^{***}	16.28^{***}	20.85^{***}	15.99^{***}	19.84^{***}	16.18^{***}
	(49.69)	(25.88)	(34.33)	(15.57)	(33.77)	(20.47)
R^2	0.24	0.33	0.26	0.34	0.17	0.27
F	66.21^{***}	87.10^{***}	61.13^{***}	127.02^{***}	31.08^{***}	22.21^{***}
N	691	638	318	286	371	352

Notes

Absolute t statistics in parentheses, based on the Huber-White sandwich variance estimator. d denotes a dummy variable. * denotes a 10% significance level; ** denotes a 5% significance level; and *** denotes a 1% significance level.

entrepreneurial types. For all three cases, two sets of results are presented. The first set excludes the variables that differ largely across f types and g types (i.e. father's education, the number of siblings and the individual's rank in the row of siblings), whereas the second set includes these variables.

The first entry in column 1 of Table 4 shows that f types do indeed have, ceteris paribus, lower levels of education than g types. This difference is large compared with other effects even after controlling for other covariates of schooling, though it is only just statistically significant in this case. Age, father's education, and the number and rank of siblings all significantly affect entrepreneurs' years of education, and carry the expected signs. That is, younger people with highly educated fathers and fewer siblings are significantly more likely to have more years of schooling. Together these variables account for a large part of the cross-sectional variation in the number of years of schooling, as demonstrated by the R^2 value of 33%.

The other columns of Table 4 reveal that the education choices of f and g type entrepreneurs are structured in somewhat different ways. In particular, female entrepreneurs and entrepreneurs with more older siblings obtain significantly and substantially less education on

average if they come from business owning families compared with non-business owning families. In terms of our model, this suggests that later-born and female offspring are more likely than others to anticipate the prospect of family business succession, possibly in cases where their older siblings have revealed themselves to be unsuitable for succession. Alternatively, it is possible that these differences reflect some deeper unobserved heterogeneity between family types. One possible source of unobserved heterogeneity is intergenerational correlation in preferences and talents, as emphasized by Charles and Hurst (2003). Indeed, it might be thought that this source of unobserved heterogeneity could in fact explain why f types have lower levels of education than g types, since their parents also have low levels of education and tend to work in agriculture and retail with large family sizes (see Table 1). However, we do control for several of the factors associated with these types of family background, and even so the (marginally) significant difference by entrepreneur type remains.

We followed up this investigation with a probit analysis, *among f type entrepreneurs only*, asking whether these entrepreneurs took over a family firm (dependent variable = 1 if so), or became an entrepreneur via a non-family takeover or a new start (dependent variable = 0 for either). In terms of the model, this probit analysis can be thought of as estimating the latent unobserved joint probability pq (full results are available from the authors on request). We conducted this analysis for entrepreneurs in all industry sectors, although the results were qualitatively unchanged when agriculture was excluded. The only significant explanatory variables we could identify were the number of siblings, with a negative effect which possibly reflects greater competition among offspring to be the successor; the year the entrepreneur entered (with a negative sign, indicating a decline in the phenomenon of offspring taking over family businesses); and whether the entrepreneur operates an agricultural business (with a positive sign). Perhaps surprisingly, later-born and female offspring were found to be slightly more likely to take over the family firm, but these effects were not significant (see the discussion in the preceding paragraph). This is not inconsistent with the model, which did not load much structure on to the matching probability of f entrepreneurs with F firms, i.e., pq. So we can now turn our attention to what happens to unmatched f types and g types who both have to choose between a non-family takeover or a new venture start.

4.3 Entry modes: Third stage of the model

In the third stage of the model, the f type entrepreneurs who have not matched with their family business as well as all g type entrepreneurs choose between takeover (T) and new start-up (N). The theory suggested that the benefit of taking over an existing firm rather than starting a new one is that it is less risky: consequently, entrepreneurs face a higher price of entry by takeover than by a new start-up. The evidence from our sample is consistent with this notion. Table 2 illustrated the greater risk of new start-ups in terms of more variable payoffs; with regard to capital investment, the average initial capital required for takeovers of

family and non-family firms is 126,680 DFl (in 1994 prices), whereas for new start-ups it is only 56,600 DFl (in 1994 prices). This difference is significant at the 1% level. Very similar results are observed if family takeovers are excluded.[27]

With decreasing absolute risk aversion, and based on predictions that (i) f types invest less in schooling and having lower incomes than g types are therefore more risk averse; and (ii) new start-ups are riskier than takeovers, Proposition 1 stated that entrepreneurs who start up new ventures will have higher levels of schooling and are more likely to be born into non-business owning families than entrepreneurs who take over existing firms. Whereas Proposition 2 stated that entrepreneurs facing higher capital entry requirements and risk are more likely to take over an existing firm than to start up a new one, while personal wealth makes them more likely to start up a new firm than to take over an existing one. We now test both propositions using a simple probit model in which the dependent variable equals one if a start-up is chosen, and takes the value zero if a takeover is chosen.

Table 5 presents a sequence of results including progressively greater numbers of explanatory variables, in order to check the robustness of the results with respect to the inclusion of additional variables. Results are again reported for all industries; industry dummies are excluded from the final two columns for the reasons given earlier. Column I estimates a basic specification containing variables representing entrepreneur type and education achievement. There are two key findings. First, f type entrepreneurs turn out to be significantly more likely to take over a non-family business than to start up a business from scratch, compared with g type entrepreneurs. Second, highly educated entrepreneurs are more likely to start up a new firm instead of entering entrepreneurship through takeover. These results are supportive of Propositions 1 and 4, the latter being consistent with the notion that education has a productive role in new venture starts by reducing search costs and enhancing success in managing high risk and high return projects. The other columns of Table 5 indicate that these results appear to be broadly robust to the inclusion of other relevant covariates, although the significance and size of the education effect is slightly attenuated as more explanatory variables are added and the sample size drops (owing to incomplete responses for some of the added variables).

Column II adds the covariates 'entry year', 'female' and 'age at entry'. The 'entry year' variable is insignificant and so is gender. Column II also shows that younger entrepreneurs are more inclined to start up a business than to take one over. The effect is quite small and turns out not to be robust to the inclusion of additional covariates (see the other columns of the table). We therefore conclude that there is no robust effect of gender or age on entrepreneurial entry mode.

Column III adds to the specification other forms of human capital, in the form of various kinds of general and specific labor-market experience. The only variable in this category that is

[27] These results exclude outliers from the sample as defined in the note to Table 1.

Table 5: Determinants of new start-up versus takeover

Variable	Marginal effects				
	I	II	III	IV	V
f type (d)	-0.040 *	-0.038 *	-0.039 *	-0.038 *	-0.047 **
	(1.83)	(1.82)	(1.87)	(1.85)	(2.18)
Education (years)	0.014 ***	0.011 ***	0.011 ***	0.008 **	0.009 **
	(4.29)	(2.92)	(2.88)	(2.16)	(2.42)
Entry year (19..)		0.001	0.001	0.001	0.000
		(0.94)	(1.02)	(0.42)	(0.18)
Female (d)		0.040	0.034	0.028	0.035
		(1.57)	(1.26)	(1.05)	(1.25)
Age at entry		-0.003 ***	-0.002	-0.002	-0.004 **
		(2.68)	(1.13)	(1.21)	(1.98)
Gen labor exp (years)			-0.001	-0.001	-0.000
			(0.50)	(0.42)	(0.04)
Industry exp (years)			0.001	0.001	0.001
			(0.86)	(0.91)	(0.80)
SE experience (years)			0.001	0.002	0.007
			(0.02)	(0.06)	(0.22)
Management exp (years)			-0.036*	-0.039 *	-0.045 *
			(1.67)	(1.82)	(1.92)
Entry cost in industry				-0.0004 **	-0.0004 **
				(2.02)	(2.11)
Income risk in industry				-0.0004 *	-0.0004 *
				(1.71)	(1.78)
Personal equity					-0.000
					(0.32)
Pseudo R^2	0.06	0.09	0.10	0.11	0.12
Wald χ^2	23.91***	27.77***	29.72***	34.16***	34.19***
N	636	616	605	605	566

Notes

Dependent variable: binary, = 1 if entry mode is a new start, and = 0 if entry mode is a takeover of an existing firm. Absolute t statistics in parentheses, based on the Huber-White sandwich variance estimator. d denotes a dummy variable: marginal effects are computed for discrete changes of the dummy variable from 0 to 1. For continuous explanatory variables the effects are given in terms of quasi-elasticities. Asterisks as in Table 4.

marginally significant in all equations is a dummy for previous experience of managing people, which is associated with a higher probability of becoming an entrepreneur through takeover instead of start-up. This is consistent with Proposition 3, although the size and significance of this effect are modest. It is noteworthy that the impact of the schooling variable drops slightly upon inclusion of these other human capital variables.

Column IV includes controls for (industry-specific) entry capital requirements and risk, as defined in the previous section. These are added in order to test Proposition 2, which stated that greater risk and start-up capital requirements decrease the probability entrepreneurs will start a new firm rather than take over an existing one. The results show that takeover becomes relatively more attractive when industry entry is more risky and/or more expensive. These findings are consistent with this proposition, though the entry risk variable is only marginally significant.

Column V adds a measure of wealth when the entrepreneur commenced with their venture. As noted in the previous section, the sample does not contain data on assets, so we have to proxy it with personal equity injected into the venture at the outset. Recall that Proposition 2 stated that wealthier individuals will opt for a new start-up instead of takeover because they are less risk averse. However, the coefficient estimate on wealth is economically and statistically indistinguishable from zero: this prediction of the model is therefore not validated. It is unclear whether this is because our proxy for wealth is a poor one, or because of other reasons. Running the regression for the sub-sample of entrepreneurs who claimed not to have experienced severe initial capital constraints (i.e. capital constraints were below 60%, see Table 3) does not alter this result. So the insignificance of the wealth measure is apparently not attributable to the presence of capital constraints.

4.4 Robustness checks

One robustness check dropped all observations relating to agriculture in Table 5. The results are qualitatively unchanged, with two exceptions. One is that the effect of f type on entry mode choice becomes more significant in the first two columns when agricultural entrepreneurs are dropped; the other is that education becomes marginally less significant.

We also checked whether there is a potential problem of survivorship bias. Our cross-section of data includes only entrepreneurs who are still in business. The danger is that N entrepreneurs are more prone to failure than T and F entrepreneurs: hence we might over-sample abler (better educated) entrepreneurs who are disproportionately found in the N mode. This could impart an upward bias to the estimates on the role of education in Table 5. Put another way, interacting education with the duration of time spent in the current business should enter with a positive coefficient if survival bias is a salient issue. Consequently we re-ran each probit in Table 5, including this interaction term together with years of education and duration entered separately. In all cases the interaction term was insignificant, taking a

maximum value (columns III and V) of 0.66.

Another consideration is that some self-employed parents run businesses which cannot be passed on or sold — for example, window cleaners, lawyers and doctors. Despite their children being unable to inherit a business in the conventional sense, they are nevertheless classified as f types. We could not control for parental occupation in sufficient detail to test the robustness of our results to the omission of these cases; but we doubt this consideration affects the results in a material way. If anything, it is likely to increase the degree of imprecision of our results, making the significant relationships which are uncovered more noticeable.

5 Discussion and conclusion

All in all, the empirical results provide some support for the propositions derived from the theoretical model. Entrepreneurs who come from business-owning families are more inclined to take over an existing firm than to start-up a new one, whereas education increases the probability of brand new venture starts. Furthermore, required start-up capital and risk diminish the probability of new venture starts as well.

What are the implications of our results for policy makers, practitioners and entrepreneurship researchers? To the extent that one can generalize from one set of —- sometimes marginally significant — results, based on a small sample, we would argue that practitioners and policy-makers should start to recognize that entrepreneurs can and do choose between multiple modes of entry, and incorporate this insight in the design of public policy programs. For example, entrepreneurship education programs often focus on new start-ups, neglecting the important entry route of takeovers. As we have seen, takeovers seem to attract individuals with different skill sets to new starts, combining less formal education with greater levels of managerial experience. In view of the current scarcity of takeover candidates in Europe and parts of North America it may be advisable to extend these programs to educate aspiring entrepreneurs about takeovers as well. More generally, this information might also help policy-makers target participants in business support programs. Furthermore, if takeover candidates really are more readily found among the offspring of entrepreneurs, practitioners might be able to use this information to foster closer networks of family firms which can organize markets to match supply and demand of firm takeovers across families to make the succession process smoother. Since the process of firm takeover no longer takes place automatically within the family, various families could be brought together in such markets where people coming from business owning firms from different generations meet as potential buyers and sellers.

We believe that future research can usefully build on our initial work. At present, the literature contains many studies which conflate the different modes of entry. This can introduce an aggregation problem, leading for example to lower estimated effects of education on new venture creation if takeover starts are mistakenly included in the sample of venture starts.

Arguably, greater consistency about the treatment of different entry modes might clarify research findings across studies and reduce the incidence of inconsistent or contradictory results. There can be policy benefits from this as well. For instance, our results suggest that higher costs of starting a new firm will lead to fewer new starts but more takeovers. This opportunity to substitute entry into a different mode can be overlooked by traditional research methods which focus purely on new venture creation. The danger is that the importance of borrowing constraints on entrepreneurship as a whole will be overstated (Hurst and Lusardi, 2004) with the consequence that policy recommendations will be distorted.

Clearly, more research is needed to broaden the findings and extend the analysis in several novel and important directions. The most obvious empirical question is whether our results also hold in countries other than the Netherlands, and whether there are important differences between and within EU states vis-à-vis the US. It would also be interesting to determine whether there are important differences in entrepreneurial performance between the three entry modes, and what the determinants of performance are. This issue was glossed over in the current paper. Also, on a conceptual level, we need to study the family firm succession issue in more detail. That might recognize the potential for conflicts within families at the same time as taking account of entrepreneur-financier frictions. More generally, we believe that there are substantial potential gains to be made by building on the approach of this paper, and analyzing succession from the viewpoint of successors, rather than just that of existing founders — which is where most research has focused to date.

6 Appendix 1

At the start of stage 3, a type f individual not operating an F firm and who offers to pay θ_f to take over a T firm gains (if their offer is accepted) the following expected utility from trying T first:

$$pU[\pi(h_f)+A-c(h_f)-\theta_f]+p(1-p)EU[\pi(h_f)+A-c(h_f)-k+\tilde{\epsilon}]+(1-p)^2U[w(h_f)+A]\,, \quad (6)$$

and obtains the expected utility from trying N first of

$$pEU[\pi(h_f)+A-c(h_f)-k+\tilde{\epsilon}]+p(1-p)U[\pi(h_f)+A-c(h_f)-\theta_f]+(1-p)^2U[w(h_f)+A]\,. \quad (7)$$

Equating these expressions yields the (maximum) purchase prices, θ_f, that f type entrepreneurs are willing to pay to take over a firm. Applying the same logic to g types and simplifying yields the following expressions for θ_f and θ_g:

$$U[\pi(h_f)+A-c(h_f)-\theta_f] = EU[\pi(h_f)+A-c(h_f)-k+\tilde{\epsilon}] \quad (8)$$

$$U[\pi(h_g)+A-c(h_g)-\theta_g] = EU[\pi(h_g)+A-c(h_g)-k+\tilde{\epsilon}] \quad (9)$$

That is, they equate certain utility derived from purchasing a T firm with the expected utility derived from a risky N firm. Using (8) and (9), and recalling A7, the maximum payments θ_f^* and θ_g^* can be derived from the Arrow-Pratt risk premium formula as

$$\theta_f^* \approx k+\sigma^2 r[\pi(h_f^*)+A-c(h_f^*)]/2 \quad (10)$$

$$\theta_g^* \approx k+\sigma^2 r[\pi(h_g^*)+A-c(h_g^*)]/2\,, \quad (11)$$

where

$$r[\pi(h_f^*)+A-c(h_f^*)] := -\frac{U''[\pi(h_f^*)+A-c(h_f^*)]}{U'[\pi(h_f^*)+A-c(h_f^*)]} \quad > 0$$

is Pratt's absolute risk aversion measure (see, e.g., Nicholson, 1995, Chap. 9). Hence required investments in takeovers are higher than for otherwise similar start-up firms, owing to the takeover risk premium. With decreasing absolute risk aversion, and given (5) above, it is easy to see from (10) and (11) that $\theta_f^* > \theta_g^*$. Finally, by A7 it follows that $\theta^T = \theta_f^*$.

7 Appendix 2

Writing experience as x, denote 'average' experience by $\overline{x}$ and write $p(\overline{x}) = p$, where plain p is now only the probability of a good match with N. Then $p(x) \gtreqless p$ as $x \gtreqless \overline{x}$. The corresponding

expressions to (1) and (2) therefore become

$$\begin{aligned} V_g &= p(x)U[\pi(h) + A - c(h) - \theta^T][\delta + (1-\delta)(1-p)] + pEU[\pi(h) + A - c(h) - k \\ &\quad + \tilde{\epsilon}][(1-\delta) + \delta(1-p(x))] + (1-p)[1-p(x)]U[w(h) + A] \\ V_f &= p(x)qU[\pi + A - c(h) - \theta^F] + [1 - qp(x)]V_g \,. \end{aligned}$$

Obviously, for any given x, schooling decisions follow the same ordering $h_f^* < h_g^*$; and $\theta^T = \theta^F = \theta_f^* > \theta_g^*$ as before. The remaining question is how x affects the choice between T and N (for f types, the choice between F and T is obviously unaffected by the introduction of x). To answer this question notice that, conditional on stage 1 and 2 decisions having been already taken, the certainty equivalent can be written as

$$pEU[\pi(h_j^*) + A - c(h_j^*) - k + \tilde{\epsilon}] = p(x)U[\pi(h_j^*) + A - c(h_j^*) - \theta_j]$$

for both $j \in \{f, g\}$. From this it is possible to derive using a second-order Taylor expansion the expression

$$\theta_j = \left[1 - \frac{p}{p(x)}\right] \frac{U[\pi(h_j^*) + A - c(h_j^*)]}{U'[\pi(h_j^*) + A - c(h_j^*)]} + \frac{p}{p(x)} \left\{k + \frac{\sigma^2}{2} r[\pi(h_j^*) + A - c(h_j^*)]\right\} .$$

Therefore

$$\frac{\partial \theta_j}{\partial x} = \frac{pp'(x)}{[p(x)]^2} \left\{ \frac{U[\pi(h_j^*) + A - c(h_j^*)]}{U'[\pi(h_j^*) + A - c(h_j^*)]} + k + \frac{\sigma^2}{2} r[\pi(h_j^*) + A - c(h_j^*)] \right\} \quad > 0 \,.$$

The proposition follows directly from this inequality and assumption A7.

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