

INITIAL CAPITAL CONSTRAINTS HINDER ENTREPRENEURIAL VENTURE PERFORMANCE: AN EMPIRICAL ANALYSIS

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Abstract

A novel method is applied to evaluate the effect of capital constraints on entrepreneurial performance on a panel of 1,000 Dutch entrepreneurs. We find that initial capital constraints hinder entrepreneurs in their performance, even when we control for various human capital and other factors that might affect both performance and credit scoring outcomes. We use a direct individual indicator variable for initial capital constraints. Previous research with the same objective used indirect indicators of wealth, inheritances or windfall gains, where it remains unknown whether the entrepreneur indeed suffered from capital constraints. This drawback is not attached to our (neither perfect) approach so that policy implications will become more evident.

Keywords: entrepreneurship, small business founders, success, venture performance, wealth/capital/borrowing constraint.

JEL Code: G3, J2, L2.

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1. INTRODUCTION

The observation of resource spending by governmental institutions for the sake of increasing numbers of higher qualified entrepreneurs is explained by the social benefit pertaining to entrepreneurial endeavor that far exceed the entrepreneur's private benefit. The population of entrepreneurs is held accountable for searching profit opportunities through the introduction of new products, the implementation of lower cost production processes, or through the tapping of new markets. By doing so, they play an undeniable important role in creating employment and economic growth. Another explanatory factor of this observation is the perceived existence of undesirable impediments to the supply of entrepreneurs. These factors therefore also explain the (academic) research activity focusing on the number and performance of entrepreneurs and the factors hindering these. A lack of capital or wealth is one of these factors. It is the focus of this study.

The objective of this paper is to answer the question: To what extent is the performance of a small business founder's entrepreneurial venture, once started, affected by the experience of initial capital constraints? And, what part of the effect on performance can be attributed to a *real* capital constraint, lack of opportunity to make appropriate investments at the right moments, and what part of the effect might be explained by *spurious* factors that both affect access to capital and performance directly, such as screening based on perceived abilities? The distinction between these two types of factors is crucial since policy implications diverge. In the first case supplying more capital, one way or the other, to entrepreneurs who are hindered to follow the optimal investment scheme would improve performance. In the second case, it will not because the capital constraint itself is not the binding restriction, but the factors underlying it that affect performance.

Much (empirical) research effort has been put into measuring the effect of capital constraints on the selection of individuals into entrepreneurial positions (Evans and Jovanovic, 1989; Evans and Leighton, 1989; De Wit 1993; Holtz-Eakin et al., 1994b; Van Praag and Van Ophem, 1995; Lindh and Ohlsson, 1996; Blanchflower and Oswald, 1998; Dunn and Holtz-Eakin, 2000). The general conclusion from this type of research is that capital constraints bind: a significant proportion of individuals willing to enter the entrepreneurial population is hampered by a lack of sufficient

capital. Blanchflower and Oswald (1998) present survey evidence that many employees would prefer to be self-employed, thereby indicating the existence of impediments at large. They also show that self-employed appear to be much more (work-) satisfied than are their wage-working counterparts, though the latter earn significantly higher and more secured incomes (Hamilton, 2000). Blanchflower and Oswald provide evidence that the significant impediments to entrepreneurship as indicated by these results are in 50% of cases due to lack of capital. Capital markets are no doubt not efficient nor market clearing for the segment of new firms. (Fazzari, 1988). Personal savings and loans from friends and relatives is by far the largest source of capital in newly started firms (as appears from our data and from Evans and Jovanovic, 1989, Blanchflower and Oswald, 1998).

The common theoretical explanation for credit rationing vis a vis newly founded firms is a severe lack of observable and verifiable information about the entrepreneur's type, her plans and the riskiness associated with these plans. Moreover, the entrepreneur, financing her venture by means of borrowed capital, might have intentions conflicting with these of the supplier of the loan. The asymmetry of information on the entrepreneur's type and behavior will potentially lead to agency problems: adverse selection and moral hazard. (LeRoy and Singell, 1987; Boadway et al., 1998; De Meza and Webb, 2000). The foresight of these problems prevents the start of a significant proportion of ventures. A negative correlation results between access to capital and entrepreneurship *entry*.

Research effort has also been devoted, though to a lesser extent, to measuring the correlation between access to capital and entrepreneurship *performance* once the stage of startup has been successfully completed (Fazzari et al, 1988; Evans and Jovanovic, 1989; Bates 1990, Cooper et al. 1994; Holtz-Eakin et al., 1994a; Cressy, 1996; Lindh and Ohlsson, 1996; Van Praag, 2002). This paper aims to contribute to this category of research. What happens to some common measures of performance when an entrepreneur has insufficient capital to reach the optimal investment level or the optimal timing of investments? Financial capital constraints might prevent entrepreneurs from creating buffers against random shocks, thereby affecting the timing of investments in an unfavorable way. Moreover, capital constraints might debar entrepreneurs from the pursuit of more capital-intensive strategies. Especially the more able entrepreneurs might be hindered in this way, as capital and ability are complementary resources for entrepreneurs. (Cf. Boadway 1998, De Meza and Webb,

2000, Evans and Jovanovic, 1989). Research in this area has been performed by means of various empirical methods, all with their specific data requirements, advantages and, unfortunately, drawbacks.

Section 2 summarizes and categorizes the research base measuring the extent to which entrepreneurs' performance is hindered by capital constraints. Section 3 then elaborates on our method, its contribution and its weaknesses. We employ a self-reported measure of having experienced binding capital constraints in the first year after the start of the venture and we relate this to various performance measures of the venture: survival, profit, and labor demand. The empirical analysis is based on a representative panel survey amongst almost 1,000 new business founders in the Netherlands in the years 1994-1997. We use these new business founders as the empirical equivalent of entrepreneurs. In order to measure the effect of capital constraints on the firm's performance due to the impossibility of an optimal investment scheme correctly, the effect of our self-reported measure on performance should be corrected for various factors turning up in the literature. First of all the screening of capital suppliers based on human and social capital factors should be taken into account. Moreover, unobserved heterogeneity on which redlining might be based is to be considered. Finally, time constraints and the motivation to perform by the entrepreneur are considered too. Our unconventionally rich database enables these corrections. After having discussed how we approach these issues in section 3, we discuss the dataset in section 4. Section 5 is devoted to the estimation results and section 6 concludes: Capital constraints affect performance significantly.

2. LITERATURE: POSITIONING AND OVERVIEW

A lively theoretical debate has existed about the relationship between access to capital and investment decisions of entrepreneurs, ever since entrepreneurship has become a topic of study. The first stream of thought assumes capital markets to be perfect. External funds provide a perfect substitute for internal capital in this full information case. An entrepreneur's financial conditions are irrelevant to investment: investment decisions are independent of whether one needs to "pay" the opportunity cost of capital ownership, or the interest rate of borrowing money. Proponents of this view can be traced back to Richard Cantillon (1755) who was the earliest scholar of whom we know that he paid considerable attention to the entrepreneur. He implicitly

assumed perfect(ly accessible) capital markets. Later classic influential economists agreeing with this view were Schumpeter (1934;1911) and Kirzner (1973).

The second stream of research in entrepreneurship assumes less than perfect capital markets due to the existence of imperfect and asymmetric information. The latter makes it very costly and sometimes even impossible for providers of external finance to evaluate the quality of an entrepreneur's investment opportunities. This might debar (some) entrepreneurs from sufficient access to external capital. As a consequence, internal and external capital sources are not perfectly substitutable. This view has a history in economic thought of entrepreneurship, too. The performance of the entrepreneur in the Classical and Neoclassical theories of Say (1971;1803) and Marshall (1930;1890) respectively is hindered by a lack of own capital since borrowed capital requires a reputation (Say) or a risk premium (Marshall). Knight (1971; 1921) held the same view: investment decisions may depend on capital ownership. Interestingly, before this debate regained interest in the entrepreneurship research society in the late 1980's, the same debate took place among researchers active in the area of finance and the study of investment at large (all company sizes included) in the late 1950's and early 1960's. As Fazzari et al. (1988) adequately summarize, especially the work of Meyer and Kuh (1957) emphasized the importance of financial considerations in business investment. This work initiated other contributions to such internal funds theories of investment in the late 50's and early 60's. However, most research since the middle 1960's has isolated real firm (investment) decisions from purely financing factors. Modigliani and Miller (1958) provided the theoretical basis for this second school of thought. Their key insight was that a firm's financial structure (read: entrepreneur's own wealth) would not affect its market value (read: the entrepreneur's firm performance) under certain conditions. Applied to a firm's investment decisions, this finding by Modigliani and Miller provided a foundation for the neoclassical theory of investment in which firms are assumed to face a cost of capital, set in securities markets that does not depend on the firm's particular financial structure. Fazzari (1988) establishes convincing empirical evidence for the existence of a capital constraint, especially in the small firm case: access to external (borrowed) capital is difficult or at least more costly than is investment by means of internal capital.¹

¹ Jensen and Meckling (1976) had already put the Modigliani Miller result into the perspective of asymmetric information.

The continuation of the debate in the entrepreneurship research area, starting in the late 1980s, was largely empirical. Please note that most empirical research, including our own, is based on the view, as expressed by De Meza and Webb (2000) that asymmetric information applies at least to the type of entrepreneur (hidden type problem potentially leading to adverse selection) but may extend to the behavior of the entrepreneur (hidden action problem potentially leading to moral hazard). Furthermore, to prevent adverse selection in the credit market, the point of departure is not credit rationing in response to the hidden type problem but “redlining” or screening instead. Redlining, screening, or credit scoring, as applied in almost all real life cases, (De Meza and Webb 2000) involves suppliers of money to use some selection procedures based on a set of indicator variables for the expected performance and riskiness of entrepreneurs and their projects. Those failing to score sufficiently high on the criteria used are denied credit for whatever interest rate they might be willing to pay. As a consequence, several indicators of entrepreneurship potential performance such as education and experience might moreover turn out to be indicators of access to capital (Bates, 1990; Scherr et al. 1993). This clarifies part of the discussion below as to whether human (sometimes also social) capital variables have been included into the empirical models. To discriminate between the full information and asymmetric information case, several categories of empirical research have been performed.² An overview is given in Table 1.

Relationship between assets and performance

Evans and Jovanovic (EJ, 1989) test the extent to which wealth constraints are binding for entrepreneurs in the US. They relate the size of family assets to earnings from the venture. They thereby test the implication emerging from their model that the correlation between entrepreneurial earnings and initial assets is positive since wealthier people will have started businesses with more efficient capital levels. Conditional on the values of some common human capital variables, their reduced form estimates indeed support a positive correlation between initial assets and earnings.

Cooper et al. ((CGW)1994) find the same positive correlation between initial assets and performance (survival and growth) of new ventures in The US. Their result is

² The same categorization might be applied to research into the relationship between the probability of becoming an entrepreneur and access to capital. At least all approaches discussed here have been

obtained while controlling for a rich set of human capital variables. Van Praag (2002) also relates financial variables, i.e. assets and a dummy for home ownership (frequently used as collateral), to survival of young entrepreneurs in the United States. The effect of these variables on the hazard out of entrepreneurship is insignificant. Van Praag uses a rich dataset too.

Cressy (1996) explicitly aims at testing the hypothesis that the positive relationship between assets and survival generally found is spurious as a result of the underlying effect of human capital on both asset accumulation and survival. His empirical result on a sample of British entrepreneurs supports this hypothesis. He attributes his (superior) result to the availability of a rich dataset. His dataset is, however, certainly not richer than is Coopers' et al (1994). He concludes that provision of finance is demand driven. Entrepreneurs self-select for funds on the basis of their human capital: more talented entrepreneurs would demand more loans. This conclusion contradicts most other conclusions from this empirical approach.

Taylor (1999) estimates the effect of a rich set of potential determinants of the hazard out of self-employment, also for a sample of British entrepreneurs. One of the variables included was a dummy indicating whether the respondent had received interest or dividend payments exceeding £100 in a year prior to the start. This variable is interpreted as an indicator of asset ownership. Its negative effect on the hazard indicates a positive effect on survival.

Several general disadvantages are attached to this method. First of all, the possibility of obtaining external finance remains unconsidered: it is assumed that the "external route to obtain finance" is totally inaccessible. Secondly, a monotone relationship is assumed between assets and performance, while in reality it might well be the case that up to a certain point more access to capital might help in enhancing performance, but "enough is enough". This possible discontinuity in the relationship is not taken into account in this approach. A third drawback of the method in general is that family assets might well be the result of the entrepreneur's "earning power": without binding capital constraints, a correlation could still exist between assets and performance because of the entrepreneur's ability affecting both quantities. A fourth drawback, finally, is that assets in general are badly reported in individual survey research and therefore unreliable figures, plagued with measurement error.

applied to the analysis of that research question.

Table 1Empirical evidence of conditional $\text{Corr}(\text{access to capital, firm performance}) > 0$

<i>Lack of access to capital measure /Performance measure</i>	<i>Assets</i>	<i>Inheritance</i>	<i>Windfall gains</i>
Earnings	EJ: +	HJR: +	
Survival	CGW:+; T:+; vP:0; C:0	HJR: +	LO: +
Growth	CGW: +		

CGW: Coopers, Gimenogason, and Woo (1994); C: Cressy (1996); EJ: Evans and Jovanovic (1989); HJR: Holtz-Eakin, Joulfaian, and Rosen (1994); LO: Lindh and Ohlsson (1996); T: Taylor (1999); vP: Van Praag (2002).³

Relationship between inheritance receipt and performance

As was noted already, one of the major drawbacks of the approach of merely relating assets, as a measure of access to capital, to new venture performance is the possible endogeneity of this measure. An interesting alternative might be the receipt of an inheritance. Blanchflower and Oswald (1998) noted the particular appeal of such a variable: “The receipt of an inheritance is about as close to a “natural experiment” as one is likely to get in this area, which reduces potential endogeneity problems.”⁴ Holtz-Eakin et al. (HJR, 1994a) were the first to estimate the relationship of this inheritance variable with firm performance instead of entry. They find a positive effect of receiving an inheritance on firm survival and earnings in the United States.

This innovative approach however only solves the third of the four drawbacks attached to the first approach. One better than that, if not applied in an adequate fashion, an additional disadvantage is evoked by the inheritance approach. Dunn and Holtz-Eakin (2000) analyzing transitions into self-employment formulate their finding as: “We find that young men’s own financial assets exert a statistically significant but quantitatively modest effect on the transition to self-employment. In contrast, the capital of parents exerts a large influence. Parents’ strongest effect runs not through financial means, but rather through human capital, i.e. the intergenerational correlation in self-employment”.⁵

³ Bates (1990) is excluded from the literature overview because he has unfortunately not been able to establish the conditional correlation of interest due to problems of multicollinearity.

⁴ Blanchflower and Oswald introduced this approach in their 1990 NBER working paper version of their 1998 article.

⁵ However, HJR seem to have dealt with this issue in a neat way: by controlling for (i) whether the inheritance donor is an entrepreneur too and (ii) a measure of firm performance prior to the receipt of the inheritance.

Relationship between windfall gains and performance

Lindh and Ohlsson (1996) estimate the effect of windfall gains on the probability of *being* self-employed on a sample of Swedish individuals. They thereby assess the effect of this unique variable on some hybrid combination of the transition into self-employment and survival.⁶ They consider windfall gains as a dummy variable indicating whether people have ever won in lotteries as well as personal and spousal inheritances. They find significant effects on self-employment of both inheritances and lottery prizes. However, upon inclusion of additional control variables (specific and general human capital) the significant effect of inheritance receipts vanishes whereas the effect of lottery prizes remains significant. This supports the finding by Dunn and Holtz-Eakin (2000) about the intergenerational correlation of entrepreneurship.

The windfall gains approach, as ingenious as it is, does not solve the majority of the drawbacks associated with the first approach, though it somehow solves the problem of endogeneity.⁷ The contribution and drawback of our approach are set out in the sequel.

3. ANALYTICAL FRAMEWORK

Theory

Consider the entrepreneurial performance measure gross receipts, as in Holtz-Eakin et al. (1994) and in line with Evans and Jovanovic (1989):

$$(1) P_i = \theta_i f(k_i) \varepsilon$$

where θ_i is individual i 's ability or business acumen as an entrepreneur, $f(\cdot)$ is a production function with one input, capital (k_i), and ε is a random factor to the production process. Individuals know their ability, unlike the analyst or banker who observes an indicator function of ability, $\tilde{\theta}_i$ only. Ability varies across individuals. It is assumed that ε has mean 1 and finite variance and that $f(0) > 0$: the firm can produce output even in the absence of any inputs, other than the entrepreneur's individual business acumen. The professional services industry is an example in which this is conceivable.

⁶ See Van Praag 2002 for a formalization of the relationship between being, becoming and survival as an entrepreneur.

A_i is defined as the value of the individual's personal assets, hence $A_i - k_i$ is the sum of money on which the entrepreneur earns capital income at rate r . By definition, $k_i - A_i$ is the amount of capital financed by borrowing. The (risk neutral) entrepreneur maximizes total income:

$$(2) \quad y_i = \theta_i f(k_i) \varepsilon + r(A_i - k_i)$$

The optimal investment level of capital into the production process of the entrepreneur's venture is therefore defined by:

$$(3) \quad \theta_i f'(k_i^*) = r$$

Hence, k_i^* is an increasing function of θ_i : entrepreneurial ability and capital are complementary factors of production; more talented entrepreneurs run larger scale firms. We assume that A_i is a non-decreasing function of θ_i : entrepreneurial ability is an indicator for general "earning power" from which assets might have resulted. The relationship between entrepreneurial ability and the amount of money that one wants to borrow in the money market at rate r , $k_i^* - A_i$, is therefore ambiguous. Access by individual entrepreneurs to the most desirable amount of external capital, $l_i = k_i^* - A_i \geq 0$ at price r is constrained by the factor β_i , where $0 \leq \beta_i \leq 1$. $\beta_i = 1$ represents the fully constrained entrepreneur, unable to obtain a single additional euro of external capital. $\beta_i = 0$ represents the unconstrained. The amount of external capital obtained is $(1 - \beta_i) * l_i = (1 - \beta_i) * (A_i - k_i)$ for all entrepreneurs. The value of β_i depends on "borrowing power", which is dependent in turn on collateral and $\tilde{\theta}_i$.

The central question of our analysis is to what extent β_i creates performance losses, i.e. the effect of β_i on the expected (constrained) performance:

$$(4) \quad P_i = \theta_i f(k_i^* - \beta_i(k_i^* - A_i)) = \theta_i f(A_i + (1 - \beta_i)(k_i^* - A_i))$$

The formula shows that a higher value of β_i would create, if any, more (absolute) damage to a high ability entrepreneur than to a low ability entrepreneur. This effect should not be mixed up with the idea that β_i itself will usually be higher for low ability entrepreneurs than for high ability entrepreneurs. In order to get rid of the

⁷ Though both participation in a lottery and selection into entrepreneurship are significantly related to risk attitude and therefore to each other (See Cramer, Hartog, Jonker, and Van Praag, 2002)

intruding effect of ability on the relationship between absolute performance and capital constraints, we consider relative performance in the sequel:

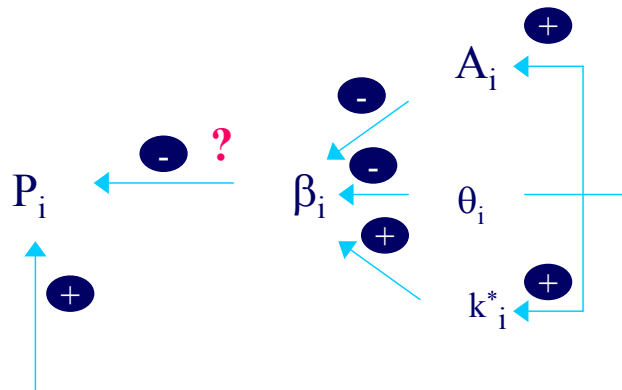
$$(5) \log P_i = \log \theta_i + \log f(k_i^* - \beta_i(k_i^* - A_i))$$

Equations 4 and 5 immediately show a drawback of all approaches as discussed in the previous section: Simply looking at how a change in A_i affects performance does not measure the effect of capital constraints on performance. This would only be true for the subset of entrepreneurs with insufficient opportunity to obtain capital.

Figure 1 shows the complex theoretical interrelationships between entrepreneurial performance, human capital, assets, capital constraints, and investment.

Figure 1

Interrelationships between performance, human capital, assets, investment and capital constraints



In the following we shall temporarily assume that the positive effects of q_i on A_i and k_i^* just cancel out: Capital need $(k_i^* - A_i)$ is independent of q_i and does not affect β_i or P

Measurement issues

The centerpiece of our analysis is β_i . Our empirical equivalent is a dummy variable indicating whether an entrepreneur has experienced capital constraints subsequent to the start of her venture. It is formed by the answer to the following question:

“Did you experience problems in obtaining sufficient (external) capital at the start of your venture?”

Yes, and I didn't solve the problem	7%
Yes, but I solved the problem	17%
No	76%

We consider the 7% of entrepreneurs who experienced these problems but did not solve them as being capital constrained ($\beta_i=1$).⁸ The other 93% is characterized by $\beta_i=0$: they are in a position to operate their business at the optimal level, k_i^* .

However, to find an as unbiased as possible estimate of the conditional effect of β_i on performance, i.e. $\frac{\partial P_i}{\partial \beta_i}$ we should still solve a couple of measurement issues:

A $\frac{\partial P_i}{\partial \beta_i}$ might seem too severe, i.e. be biased upwards, due to screening or redlining by external capital suppliers based on $\tilde{\theta}_i$. This $\tilde{\theta}_i$ has also direct (positive) impact on performance thereby generating this bias. We solve the upward bias resulting from issue A by means of three measures:

We include a vector of human capital variables, $\tilde{\theta}_i^{HC}$, into the equation that are known to affect entrepreneurship performance⁹.

We include a vector of social capital variables, $\tilde{\theta}_i^{SC}$, into the equation that are known to affect entrepreneurship performance.¹⁰

We include variables that we use as additional signals for entrepreneurial ability, θ_i , based on the known result of credit scoring by external capital suppliers: we know whether banks, family/friends, and business partners have contributed to k_i . We consider the assignment of a loan by family/friends, and in particular by business partners as informative about unobserved heterogeneity.

⁸ We considered the 7%+17% of the sample who answered yes as an alternative indicator of capital constraints. This weakened the result considerably. The same holds for the alternative specification where the first answer is translated into $\beta_i=1$, the second into $\beta_i=0.5$ and the third is equivalent to $\beta_i=0$. This rendered much weaker results too.

⁹ Empirical support can be found in for instance Bates, 1990; Bosma et al. 2002; Cooper et al., 1994; Cressy, 1996; De Wit and Van Winden, 1993; Le, 1999; Lindh and Ohlsson, 1996; Taylor, 1999; Van Praag and Cramer 2001; Van Praag, 2002; Pennings et al 1998.

¹⁰ Empirical evidence on which the choice of $\tilde{\theta}_i^{SC}$ is based can be found in Bosma et al., 2002; Brüderl and Preisendorfer, 1998 and Pennings et al., 1994.

B $\frac{\partial Pc_i}{\partial \beta_i}$ might seem too weak, i.e. be biased downwards, due to

Time hypothesis People who spend a considerable proportion of their time on other paid activities will probably show weaker performance and simultaneously face lower capital constraints. Without any additional corrective measures, this spurious effect would be included in an estimate of the coefficient for β_i leading to a downward bias.

Motivation hypothesis Financial independence from the venture might be a cause for lower capital constraints and might simultaneously result in a weaker motivation. Without correction, this spurious effect would again be mistakenly included in an estimate of the coefficient for β_i and lead to a downward bias.

A third hypothesis that would cause a downward bias of the estimated effect of β_i is the over-investment / *overconfidence hypothesis*. Overconfident entrepreneurs might aim at larger than efficient amounts of startup capital. When they cannot get access to the large amount they desire, they feel constrained and report so. Unfortunately, we are unable to test this hypothesis that would again lead to an underestimate of the effect of the capital constraint on performance: the overconfident entrepreneur will perform better given a lower and thereby more optimal amount of capital.

We try to correct the potential downward bias resulting from the first and second issue headed by B by means of the inclusion of additional variables:

Time hypothesis: a dummy variable indicating whether the entrepreneur spends more than twenty hours per week on other paid activities.

Motivation hypothesis: (1) A categorized variable “amount of other income available”, and (2) A dummy variable indicating whether the entrepreneur is financially dependent on the stream of income generated by her venture.

We conclude this subsection by a comparison of the distinctive (potential) (dis)advantages of this approach to the problems and favorable features attached to the empirical approaches as described in the previous section. First and foremost, our estimate of β 's coefficient show the effect on performance of being capital constrained for the group of entrepreneurs who are capital constrained. Other approaches generate an estimate of the effect of an increase in assets on performance for all entrepreneurs at the same time, whether they face capital constraints or not.

Secondly, our estimate of β 's coefficient embodies the effect of capital constraints that remain after the possibility of obtaining external finance has been explored. The other approaches assume that the “external route to obtain finance” is totally inaccessible.

A third, though rather limited, relative advantage of the current approach is that we try to cope with the causality issue in a more elaborate way. We embody many controls, also for access to capital from lenders who presumably have more information about the type and intentions of the entrepreneur than we as researchers do. In this manner, we try to disentangle the real effect of insufficient capital from the spurious effect. We cannot conceive of a better way of doing this, since instrumental variable methods and other methods that cope in a more fashionable way with possible endogeneity of access to capital are all inappropriate in this case. Identifying variables or instruments are lacking by definition since access to capital is a function of ownership of capital and perceived business acumen.

A potential drawback of our approach finally is that we rely on the self-reported subjective answers of individual entrepreneurs as to whether they started their venture with or without significant capital constraints. Over or underreporting of this variable would lead to biased results.

Estimation models

Let Π_i be the profit (P_1) for respondent i in 1997, and x_{ij} respondent i 's value of determinant j in 1994. We specify the logarithm of profit as the dependent variable rather than profit itself, so that changes in the determinants influence relative profit rather than absolute profit (in e.g. euros). The estimated model is the following:

$$\ln \Pi_i = \alpha^\Pi + \sum_{j=1}^J \beta_j^\Pi x_{ij} + \varepsilon_i^\Pi, \quad \text{where } \varepsilon_i^\Pi \sim N(0, \sigma_\Pi^2).$$

The model for employment is analogous to the model for profit. Let L_i be the cumulated employment (in fte) generated by respondent i between 1994 and 1997, and x_{ij} respondent i 's value of determinant j in 1994. The regression equation then reads:

$$\ln L_i = \alpha^L + \sum_{j=1}^J \beta_j^L x_{ij} + \varepsilon_i^L, \quad \text{where } \varepsilon_i^L \sim N(0, \sigma_L^2).$$

Both the profit and the employment measures have zero as the lower bound. Negative profits are not observed, while negative employment is non-interpretable. Therefore, both equations are estimated using tobit regressions. For duration, we apply a log-logistic survival model. (See Lancaster, 1992, p. 44).

4. DATA

Sample

The panel results from annual questionnaires conducted on a sample taken from all newly registered firms in the first quarter of 1994 as reported in the database of the Dutch Chamber of Commerce. Firms were included in the sample upon meeting several conditions. They had to be founded in the first quarter of 1994. Firms reregistering due to a change in Chamber of Commerce district or some other change in location, activities or legal status were excluded. Firms that used to be part of a previously existing firm were also excluded. The agricultural and mining sectors remain unconsidered as well.

The initial 10,627 firms were contacted by telephone. A total of 3,000 firm founders agreed to participate in the survey. 1,939 firm founders finally completed the 1994 questionnaire. Our base sample however is somewhat smaller because we discarded entrepreneurs from this database for several reasons. 250 firm founders appeared to be hardly more than “hobbyists”: they had an additional simultaneous employment contract of more than forty hours per week. We furthermore discarded 53 observations whose businesses appeared to have existed for less than 2 months in total. Twenty-eight observations were deleted because they didn’t complete the vital question concerning capital constraints. Of the remaining 1,608 firm founders, 1,323 answered all subsequent annual questionnaires of 1995-1997. This implies an attrition rate of 18% (285 observations). The firm size and industry distributions of the 1994 and 1997 respondents were comparable to those of the initial sample.

The first questionnaire consisted of 90 questions divided in the categories general, firm, work experience, motives, founding situation, capital and investments, problems encountered, control and subcontracting, environment and market, sales and vulnerability, targets and strategy, performance and expectations as well as a rich set of background variables. The questionnaire in 1997 contained a total of 44 questions, in approximately the same categories.

The information from the first questionnaire is used for the construction of potential determinants of performance, the independent variables in the analysis. Entrepreneurial performance itself is exclusively measured by means of variables constructed from the subsequent questionnaires. In this manner, we avoid problems of serially reversed causality.

Measures of entrepreneurial performance

We employ three performance measures: P_1 , P_2 and P_3 . The first considers profit given survival and is equated to the profit level of 1997. The entrepreneur has then been active for three years. In particular, profit levels of the first two years might be somewhat misleading due to initial (sunk) investments that are written off at the expense of profit levels. For entrepreneurs that are known to have ended their businesses, the profit variable is equated to zero. The second measure used is the cumulative employment created in the period 1994-1997¹¹. We consider the employment created (in fulltime equivalents) by an entrepreneur as a measure of social performance in contrast to profit that can be seen as a measure of individual performance. The third performance measure is survival duration. Is the firm still in business in 1997? And if not, how many months has the entrepreneur survived?

Table 2 shows descriptives of the performance measures and their intercorrelations. The table distinguishes entrepreneurs with and without capital constraint.

The total sample size of 1,323 refers to the number of entrepreneurs for whom at least one of the dependent variables is available. The number of valid observations for analyses on P_1 , P_2 and P_3 are 1,168, 989, and 1,073 respectively. These samples include entrepreneurs who haven't survived until 1997: their profit level is equated to zero, their cumulative employment has been cumulated up until their exit.

The average entrepreneur earned an annual profit level of € 20,200. Exclusively considering the group of entrepreneurs that has survived the first 42 months, the maximum possible within the panel, this number increases to € 28,000. To relate this to for instance the income of a Dutch wage earner, we mention that the (gross)

¹¹ Other employment measures that have been investigated are employment growth and the 1997 employment level. Both alternatives showed results that did not differ significantly from cumulated employment.

average income in the same year amounted to € 22,000¹². There is a huge variance in this income, as is well known for entrepreneurial positions.

Table 2

Descriptive statistics and correlations of performance measures

Performance measures, P _j	Total sample (N=1323)		With capital constraint: $\beta=1$ (N _c =93)		Without capital constraint: $\beta=0$ (N _n =1230)		Correlations		
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	P ₁	P ₂	P ₃
P ₁ : Profit (10 000 Dfl)	4.46	8.5	3.42	7.2	4.53	8.6	1		
P ₂ : Cumulated employment (fte)	3.56	15.9	2.25	5.7	3.64	16.3	0.41**	1	
P ₃ : Survival (months)	36.78	11.2	34.15	13.9	36.98	10.9	0.26**	0.11**	1

** Significant at 5 percent level.

The average cumulated employment over the past three years is more than 3.5 fulltime equivalents, with a large variance and a very skewed distribution. Considering the group of active entrepreneurs in 1997, the average cumulated employment amounts to even 4.8 fte. The median active entrepreneur has no employees (66% actually has no employees), whereas 72% of the sample has generated cumulative employment levels of less than 1 fulltime equivalent. Ten percent has more than 10 fte employees, five percent more than 20 fte. Considering the distributions and averages of annual employment levels over the years 1994-1997, we see the average increasing from 0.41 in 1994, to 0.57 in 1995, 0.74 in 1996 to 0.99 in 1997. At the same time, the percentage of entrepreneurs without any personnel decreases from 86% in 1994 to 38% in 1997. This growth is different for capital constrained entrepreneurs: their average firm size increases from 0.22 in 1994 to 1.27 in 1997, whereas 25% of this group of entrepreneurs has no personnel in 1997.

The average (truncated) survival duration is slightly more than 3 years: most entrepreneurs (65%) have survived 42 months, the entire period from the start of the panel till the last interview in 1997. Six percent has not survived their first year, another 6% “died” within their second year, whereas 4% exited within their third year. The first year hazard rate out of entrepreneurship among capital constrained entrepreneurs is almost twice as high: 12% of these entrepreneurs do not survive their first year.

¹² Source: Central Bureau of Statistics (CBS) Netherlands

The average scores on the three performance measures are all lower for the group of capital constrained entrepreneurs than for their unconstrained counterparts: the differences however are all statistically insignificant. Table 2 finally shows that the three measures of performance used are (unsurprisingly) positively correlated with each other.

Determinants of entrepreneurial performance

Table 3
Descriptive statistics of potential determinants of small business performance

Descriptive Statistics	ALL ENTREPRENEURS: N=1382		CAPITAL CONSTRAINED ENTREPRENEURS: $\beta=1$ and $N_C=93$:	
	Mean	Std. Deviation	Mean	Std. Deviation
CAPITAL CONSTRAINT	0.07	0.26	1.00	0.00
HUMAN CAPITAL				
Experience in business ownership	0.07	0.26	0.05	0.23
Experience in activities relevant to business ownership	0.72	0.45	0.71	0.46
Experience in industry	0.66	0.47	0.66	0.48
Age divided by 10	4.18	0.92	4.05	0.86
Age divided by 10, then squared	18.31	8.03	17.17	7.22
High education	0.29	0.45	0.19	0.40
Experience as an employee	0.93	0.25	0.91	0.28
SOCIAL CAPITAL				
Contact with entrepreneurs in networks	0.28	0.36	0.27	0.37
Way of information gathering:				
- General channels	0.00	1.00	-0.15	0.96
- Direct business relations	0.00	1.00	0.04	1.00
- Commercial relations	0.00	1.00	-0.28	0.64
- Fellow entrepreneurs	0.00	1.00	0.05	1.01
Emotional support from spouse	0.73	0.44	0.68	0.47
Presence of spouse	0.84	0.37	0.80	0.41
FINANCIAL SCREENING				
Share own capital in start capital	0.65	0.41	0.56	0.43
Fin. also by bank	0.34	0.47	0.31	0.47
Fin. also by loan from family	0.17	0.38	0.29	0.46
Fin. also by business partner(s)	0.10	0.30	0.06	0.25
TIME CONSTRAINT				
Spent 20+ hours on other paid activities	0.21	0.40	0.19	0.40
MOTIVATION				
Other income available (categories)	2.65	1.99	2.06	1.91
Dependent on profits from business	0.26	0.44	0.33	0.47
CONTROL VARIABLES				
Gender	0.71	0.45	0.75	0.43
No affiliations with other businesses	0.94	0.24	1.00	0.00
Goal: employment growth	0.42	0.35	0.49	0.35
Motive: higher income	0.40	0.39	0.41	0.38
Hours worked at the start (categories)	3.17	0.95	3.31	0.88

Table 3 shows descriptive statistics of the potential (and hypothesized) determinants of entrepreneurship performance. In order to obtain an unbiased estimate of the effect of capital constraints on performance, we distinguish the following categories of variables: human capital, social capital, financial screening, time constraint, and motivation variables. Descriptives of control variables have been included too. These categories are discussed presently.

Human capital The vector of human capital variables that is included in the model has the following elements. *Professional experience* of the business founder is measured with respect to several dimensions: experience in business ownership itself, experiences associated with business ownership (e.g. experience in leadership) and experience in the sector in which the founded business is active. Only seven percent of the entrepreneurs have previous experience in entrepreneurship; more than seventy percent claims to have experience in “leadership” associated activities. Two third of the entrepreneurs have gathered experience in the industry of their business choice before starting up their businesses. More than 90% of the entrepreneurs has experience in wage employment. These figures are no different for the group of capital-constrained entrepreneurs exclusively. The average starting *age* is 42. The effect of age on performance will be analyzed by the inclusion of age and age squared into the regression equations. *Education* enters the analyses as a dummy variable, differentiating the high-educated business founders (academic/higher vocational formal education) from the less educated ones. There are obviously fewer higher educated entrepreneurs within the group of capital constrained entrepreneurs (19% versus 29%) than average.

Social capital As was mentioned, a vector of social capital variables, $\tilde{\theta}_i^{SC}$ is included in the model. The vector consists of the following variables. A dummy variable measures whether the business owner had (planned) contacts with other entrepreneurs through an entrepreneurs’ network in the first year of operation. 28% of the entrepreneurs has such network contacts. This percentage is no different for capital constrained entrepreneurs.

We also derived information on initial(ly planned) strategies used by business owners to keep up with (environmental) developments relevant for their businesses. Respondents rated the activity on ten possible actions. They indicated whether they

frequently, sometimes or never used certain information gathering channels, of which some are closely related. Factor analysis revealed four major strategies of channel usage:

- Focus on the branch (main indicators: keep up with literature; attending congresses, courses and branch exchanges)
- Focus on direct business relations (main indicators: information from customers and information from suppliers)
- Focus on commercial relations (main indicators: information from banks; commercial cooperation; advise from experts)
- Focus on fellow entrepreneurs.

Using information channels is closely related to social capital, though it is usually not considered as such. It reflects the strategy used to retrieve relevant information from relationships. Since the relationships themselves do not occur naturally and since the information retrieval within each relationship somehow indicates the intensity of the relationship, we label the resulting factors as elements of social capital. The factors resulting from factor analysis are standard normally distributed.

Finally, a partner and especially an emotionally supportive partner are considered potentially valuable social capital. 84% of the entrepreneurs have spouses of whom 73% is considered emotionally supportive.

Descriptives for **Financial screening** variables, used as additional signals for entrepreneurial ability, θ_i , are shown in Table 3. We consider whether banks, family and friends, and business partners have contributed to k_i . The assignment of a loan by family members and friends, and in particular by business partners is considered as informative about unobserved heterogeneity. The average percentage of own capital in the actual total amount of start capital is 66%, and (remarkably) slightly lower for capital constrained entrepreneurs (56%). However, since the distribution is quite skewed, Table 4 is informative: it shows that 47% of the total number of entrepreneurs starts while exclusively relying (willingly or not) on their own capital. This percentage is somewhat lower, 42%, for capital constrained entrepreneurs.

Furthermore, one third of all capital constrained entrepreneurs gets loans from banks, thereby not diverging from the average. Capital constrained entrepreneurs

however get financial means from friends and family almost twice as frequently. Trust (and capital) by business partners is obtained by 10% of all entrepreneurs, whereas capital constrained entrepreneurs obtain this kind of capital in 6% of the cases.

Table 4
Share of own capital in total amount of start capital

Share	All observations	apital constrained entrepreneurs: $\beta=1$
.00	10.4	17.4
.05	6.5	10.5
.15	4.8	7.0
.25	5.4	4.7
.35	3.9	3.5
.45	3.6	4.7
.55	3.6	1.2
.65	1.6	4.7
.75	1.7	2.3
.85	1.1	0.0
.95	1.4	2.3
1.00	46.8	41.9

Time constraint Entrepreneurs who spend more than twenty hours per week on other paid activities are considered as time constrained: they are hypothesized to have lower entrepreneurial performance. One fifth of the sample has time constraints. This share is not different among the capital constrained entrepreneurs.

Motivation The extent to which the entrepreneur is motivated to perform well might be negatively affected by a lack of financial dependence on the receipts of the business: we therefore measure whether the entrepreneur is dependent on the profits from the business and whether other income is available. 28% of all entrepreneurs is totally dependent on the receipts from the business, whereas 37% of the capital constrained entrepreneurs has the same dependent position.

Control variables The commonly used set of control variables, including industries, gender, and startup motivation, is finally added to the regressions

5. ESTIMATION RESULTS

Profits

The first column of Table 5 shows the result from the Tobit estimation with (log) profit as the dependent variable and only the capital constraint and some control variables as the independent variables. The estimation result is consistent with binding capital constraints: entrepreneurs who suffer from a lack of capital for their initial business investments have 63% lower profits. However, as was expected, column II in Table 5 shows that the effect of capital constraints on profit diminishes to 59% when controlling for human capital effects, the capital constraint still being significant.

Human capital, as was assumed, appears to simultaneously affect performance positively and the capital constraint itself negatively (making its effect less severe). The main determinants of performance within the category of human capital factors are various sorts of experience and education. The most valuable type of experience is within-industry experience: having worked (as an employee) in the industry to which the business belongs, increases profit, *ceteris paribus* by 70%. Experience in business ownership increases profits by 50%, whereas general work experience as an employee increases profit by 40%.¹³ Higher educated entrepreneurs earn a 20% return to their education.¹⁴

Controlling for social capital factors (column III) has the same expected diminishing effect on the capital constraint as was the case for human capital: the coefficient further decreases from 59 to 52% and remains significant. The most important social capital factor for expected profits is a spouse's emotional support. Other social capital factors of influence are the usage of certain information gathering channels. Having and exploiting commercial contacts and contacts with fellow entrepreneurs seem to pay off.

Our third hypothesis, that the capital constraint diminishes when correcting for financial screening factors, is not validated in this exercise (column IV). The capital constraint decreases from 52 to 51% only, and remains significant. Moreover, financial screening factors have no additional significant effect on profits, suggesting

¹³ The latter effect of general work experience on profit does not confirm expectations based on previous empirical research (cf. Van Praag 2002)

¹⁴ This is of course an overestimate of the unbiased effect of education on performance: a probably considerable selection bias has not been corrected for.

that these factors do not reveal any unobserved heterogeneity in addition to human and social capital factors that are influential for profit potential.

Table 5
Estimation results: Capital Constraints and Profits (P_1)

PROFIT	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
CAPITAL CONSTRAINT	-0.63 **	-0.59 **	-0.52 **	-0.51 **	-0.49 **	-0.51 **
Human capital						
Experience in business ownership		0.50 **	0.50 **	0.49 **	0.54 **	0.54 **
Experience relevant to business ownership		0.12	0.12	0.12	0.13	0.12
Experience in industry		0.71 **	0.67 **	0.67 **	0.66 **	0.65 **
Age divided by 10		0.30	0.11	0.14	0.11	0.05
Age divided by 10, then squared		-0.03	-0.01	-0.01	-0.01	0.00
High education		0.20 *	0.19 *	0.18	0.20 *	0.22 **
Experience as an employee		0.39 *	0.36 *	0.35 *	0.41 **	0.40 *
Social capital						
Contact with entrepreneurs in networks			-0.08	-0.08	-0.10	-0.10
Way of information gathering:						
- General channels			0.04	0.04	0.04	0.04
- Direct business relations			0.05	0.05	0.06	0.06
- Commercial relations			0.10 **	0.10 **	0.10 **	0.09 *
- Fellow entrepreneurs			0.11 **	0.11 **	0.11 **	0.10 **
Emotional support from spouse			0.51 **	0.52 **	0.49 **	0.49 **
Presence of spouse			-0.21	-0.21	-0.17	-0.11
Financial screening						
Share own capital in start capital				0.00	0.03	0.04
Fin. also by loan from family				0.00	-0.02	-0.02
Fin. also by bank				-0.01	0.00	-0.01
Fin. also by business partner(s)				0.23	0.24	0.25
Time constraint						
Spent 20+ hours on other paid activities					-0.35 **	-0.30 **
Motivation						
Other income available						-0.01
Dependent on profits from business						0.19
Control variables						
Gender	0.49 **	0.38 **	0.39 **	0.39 **	0.40 **	0.39 **
No affiliations with other businesses	0.58 **	0.49 **	0.58 **	0.61 **	0.62 **	0.61 **
Goal: employment growth	0.37 **	0.34 **	0.29 *	0.28 *	0.25	0.23
Motive: higher income	0.40 **	0.35 **	0.33 **	0.33 **	0.35 **	0.34 **
Hours worked at the start	0.45 **	0.37 **	0.35 **	0.34 **	0.30 **	0.28 **
Constant	-2.06 **	-3.39 **	-3.07 **	-3.16 **	-2.97 **	-2.81 **
# obs.	1168	1168	1168	1168	1168	1168
Log Likelihood	-1643.2	-1610.9	-1599.2	-1598.2	-1594.6	-1593.1

* sign. at 10% level ; ** sign. at 5% level

The addition of the next two blocks of variables (columns V and VI in Table 5) serves to correct for the potential downward bias in the estimate for the capital constraint due to time and motivational constraints (see section 2). It appears that the inclusion of indicators for time and motivational constraints into the regression equation does not, contrary to expectations, increase the absolute value of the coefficient pertaining to

the capital constraint, although the time constraint has the expected negative effect on profit. The remaining as “unbiased” as possible effect of the capital constraint on profit is a disadvantageous 51%.

Duration

Table 6
Estimation results: Capital Constraints and Duration (P₂)

Duration	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
CAPITAL CONSTRAINT	-0.63 **	-0.53 *	-0.47 *	-0.47 *	-0.47 *	-0.48 *
Human capital						
Experience in business ownership		0.17	0.17	0.17	0.19	0.19
Experience relevant to business ownership		0.38 **	0.29	0.29	0.30	0.30
Experience in industry		0.58 **	0.53 **	0.54 **	0.53 **	0.52 **
Age divided by 10		0.68	0.77	0.77	0.77	0.75
Age divided by 10, then squared		-0.05	-0.07	-0.07	-0.07	-0.06
High education		-0.01	-0.08	-0.09	-0.08	-0.08
Experience as an employee		0.51 *	0.43	0.44	0.45	0.45
Social capital						
Contact with entrepreneurs in networks			0.10	0.09	0.09	0.09
Way of information gathering:						
- General channels			0.29 **	0.29 **	0.29 **	0.29 **
- Direct business relations			-0.08	-0.08	-0.08	-0.08
- Commercial relations			0.09	0.09	0.09	0.09
- Fellow entrepreneurs			0.07	0.07	0.07	0.07
Emotional support from spouse			0.40	0.40	0.40	0.40
Presence of spouse			-0.47	-0.47	-0.46	-0.43
Financial screening						
Share own capital in start capital				0.05	0.05	0.07
Fin. also by loan from family				0.07	0.06	0.07
Fin. also by bank				-0.01	-0.01	-0.02
Fin. also by business partner(s)				0.01	0.01	0.02
Time constraint						
Spent 20+ hours on other paid activities					-0.07	-0.05
Motivation						
Other income available						-0.01
Dependent on profits from business						0.07
Control variables						
Gender	0.38 **	0.27	0.37 **	0.38 **	0.38 **	0.37 **
No affiliations with other businesses	0.77 **	0.77 **	0.92 **	0.91 **	0.91 **	0.91 **
Goal: employment growth	-0.07	-0.05	-0.05	-0.05	-0.06	-0.06
Motive: higher income	-0.18	-0.24	-0.17	-0.16	-0.16	-0.17
Hours worked at the start	0.35 **	0.27 **	0.26 **	0.26 **	0.26 **	0.25 **
Constant	3.29 **	0.81	0.75	0.71	0.73	0.80
# obs.	1073	1073	1073	1073	1073	1073
Log Likelihood	-1303.3	-1285.1	-1275.0	-1274.9	-1274.8	-1274.7

* sign. at 10% level ** sign. at 5% level

Table 6 shows determinants of duration in business (P₂). It shows numbers for the capital constraint in the same order of magnitude: ranging from 63% without

correction for potential biases (first column) to 48% including these corrections (sixth column).

Column II shows that the inclusion of human capital factors diminishes the effect by 10 percent points, whereas column III shows that social capital factors account for a decrease of another six percent points. The other corrections have no effect. The effect on performance of human capital is almost invariant to the performance measure used: the same indicators of labor market experience affect duration and profit. Duration is affected by within-industry experience, by experience in business ownership as well as by experience as an employee. Education, however, plays no role as a determinant of survival. Moreover, it should be noted that the significance of the effects established partly vanishes upon inclusion of additional regressors into the equation (column III and further).

Hardly any other factors affect entrepreneurial performance according to the current definition: the only remaining determinant of duration is the social capital variable indicating to what extent entrepreneurs have available and utilize general channels of information. The remaining as “unbiased” as possible effect of the capital constraint on duration is a disadvantageous 48%.

Employment

Table 7 shows that the third performance measure is not at all affected by capital constraints: the first column shows an unconditional negative but insignificant effect of 30%, whereas the sixth column shows an insignificant effect of zero.

Though these effects are insignificant, to our surprise, they develop according to expectations: the absolute value decreases from column I to V and increases afterwards.

The effect of human capital on employment or labor demand is comparable to the effect of this type of capital on the other performance measures, profit and duration. Previous experience in business ownership, within-industry experience and experience as an employee all affect labor demand in a positive manner. Education and other human capital factors do not play a significant role for the determination of employment levels.

The accumulation of social capital is also informative of performance prospects in terms of employment. Being a member of a formal network through which one is in touch with fellow entrepreneurs is helpful. Having and utilizing (commercial)

contacts for information gathering also has a positive association with employment potential.

Table 7
Estimation results: Capital Constraints and Employment (P₃)

Employment	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
CAPITAL CONSTRAINT	-0.30	-0.28	-0.07	0.03	0.05	0.00
Human capital						
Experience in business ownership		1.07 **	0.91 **	0.82 **	0.86 **	0.86 **
Experience relevant to business ownership		0.08	-0.04	-0.05	-0.06	-0.10
Experience in industry		0.69 **	0.61 **	0.63 **	0.63 **	0.58 **
Age divided by 10		0.49	0.26	0.62	0.60	0.32
Age divided by 10, then squared		-0.07	-0.05	-0.08	-0.08	-0.05
High education		-0.20	-0.30	-0.25	-0.24	-0.19
Experience as an employee		1.12 **	0.86 *	0.82 *	0.84 *	0.79 *
Social capital						
Contact with entrepreneurs in networks			0.74 **	0.72 **	0.71 **	0.67 **
Way of information gathering:						
- General channels			0.28 **	0.24 **	0.25 **	0.26 **
- Direct business relations			0.05	0.05	0.05	0.06
- Commercial relations			0.28 **	0.24 **	0.24 **	0.22 **
- Fellow entrepreneurs			-0.01	0.01	0.01	0.01
Emotional support from spouse			-0.07	-0.09	-0.11	-0.14
Presence of spouse			0.41	0.36	0.39	0.61
Financial screening						
Share own capital in start capital				0.03	0.05	0.10
Fin. also by loan from family				0.18	0.16	0.19
Fin. also by bank				0.65 **	0.65 **	0.63 **
Fin. also by business partner(s)				0.83 **	0.83 **	0.90 **
Time constraint						
Spent 20+ hours on other paid activities					-0.25	-0.07
Motivation						
Other income available						-0.05
Dependent on profits from business						0.54 **
Control variables						
Gender	0.70 **	0.68 **	0.65 **	0.60 **	0.61 **	0.54 **
No affiliations with other businesses	-0.54	-0.56	-0.38	-0.21	-0.20	-0.23
Goal: employment growth	2.95 **	2.86 **	2.66 **	2.50 **	2.48 **	2.43 **
Motive: higher income	0.01	-0.11	-0.05	-0.06	-0.05	-0.11
Hours worked at the start	1.07 **	0.93 **	0.86 **	0.73 **	0.70 **	0.62 **
Constant	-6.20 **	-8.04 **	-7.32 **	-8.09 **	-7.94 **	-7.12 **
# obs.	989	989	989	989	989	989
Log Likelihood	-870.09	-856.78	-837.92	-827.39	-826.94	-821.69

* *sign. at 10% level* ** *sign. at 5% level*

The set of financial screening variables finally turns out to show the expected effects: although the financial screening by a family member does not seem to discriminate between groups with more and less favorable otherwise unobserved characteristics. However, banks and especially business partners seem to be selective

in an effective way: they select entrepreneurs with more than average growth potential of human resources. Some final comments with respect to Table 7 (columns V and VI) are that time constraints remain insignificant whereas motivational constraints have the expected negative effect.

Discussion

Table 8 shows an overview of the estimation results. Several patterns pop up, together with some irregularities. Entrepreneurs who acknowledge unsolvable initial capital constraints experience lower profits, conditional upon survival, whereas their survival rate compares unfavorably to those who are not capital constrained. Capital constraints apparently generate imperfectness of investment opportunities in terms of size and/or timing.

Table 8
Overview of estimation results

	<i>Profits</i>	<i>Survival time</i>	<i>Employment</i>
CAPITAL CONSTRAINT	-0.51**	-0.48*	0.00
Human capital			
Experience in business ownership	0.54**	0.19	0.86**
Experience relevant to business ownership	0.12	0.30	-0.10
Experience in industry	0.65**	0.52**	0.58**
Age divided by 10	0.05	0.75	0.32
Age divided by 10, then squared	0.00	-0.06	-0.05
High education	0.22**	-0.08	-0.19
Experience as an employee	0.40*	0.45	0.79*
Social capital			
Contact with entrepreneurs in networks	-0.10	0.09	0.67**
Way of information gathering:			
- General channels	0.04	0.29**	0.26**
- Direct business relations	0.06	-0.08	0.06
- Commercial relations	0.09*	0.09	0.22**
- Fellow entrepreneurs	0.10**	0.07	0.01
Emotional support from spouse	0.49**	0.40	-0.14
Presence of spouse	-0.11	-0.43	0.61
Financial screening			
Share own capital in start capital	0.04	0.07	0.10
Fin. also by loan from family	-0.02	0.07	0.19
Fin. also by bank	-0.01	-0.02	0.63**
Fin. also by business partner(s)	0.25	0.02	0.90**
Time constraint			
Spent 20+ hours on other paid activities	-0.30**	-0.05	-0.07
Motivation			
Other income available	-0.01	-0.01	-0.05
Dependent on profits from business	0.19	0.07	0.54**
# obs.	1168	1073	989
Log Likelihood	-1593.1	-1274.7	-821.69

* *sign. at 10% level* ** *sign. at 5% level*

Employment is not affected by this imperfectness of investment opportunities. The size of the effect of capital constraints decreases when correcting for human and

social capital factors, but it remains significant and relatively large as compared to other factors of influence. Financial screening, time and motivational constraints do not consistently show the expected effects, neither directly on performance, nor indirectly by changing the coefficient of the capital constraint. However, the direction of both the indirect and direct effects is as expected in all cases, and significant in the case of at least one of the performance measure equations. Apparently, human and social capital factors generate and explain most of the relevant heterogeneity in the sample.

It could be concluded from theory that, in the case that specific production functions would apply, a complementarity between human/social and financial capital might show up. We shall therefore now relax the assumption that the positive effects of q_i on A_i and k_i^* just cancel out, i.e. that the need for capital ($k_i^* - A_i$) depends on ability and thereby affects β_i .

In that case, capital or wealth constraints might generate more damage, the more human capital the entrepreneurs has. In order to discriminate between the effect of capital constraints on performance for higher and lower human capital levels, we stratified the sample into two subsamples according to education and experience in the industry (two relevant human capital variables). We re-estimated the equations as shown in Tables 5 to 7 on the subsample of entrepreneurs with more than average human capital (with experience and or higher education) and with less than average human capital (without experience and without higher education) separately. It turned out that the effects of capital constraints are indeed much larger for entrepreneurs with higher levels of human capital.

Table 9
The effect of capital constraints for lower and higher human capital levels

	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>
CAPITAL CONSTRAINT ALL						
<i>Profits</i>	-0.63**	-0.59**	-0.52**	-0.51**	-0.49**	-0.51**
<i>Survival time</i>	-0.63**	-0.53*	-0.47*	-0.47*	-0.47*	-0.48*
<i>Employment</i>	-0.30	-0.28	-0.07	0.03	0.05	0.00
CAPITAL CONSTRAINT: HC+						
<i>Profits</i>	-1.12**	-1.09**	-1.03**	-0.99**	-0.99**	-1.03**
<i>Survival time</i>	-1.05**	-0.95	-0.85	-0.83	-0.82	-0.79
<i>Employment</i>	1.15	1.14	0.69	0.75	0.75	0.96
CAPITAL CONSTRAINT: HC-						
<i>Profits</i>	-0.44*	-0.42*	-0.44*	-0.46*	-0.40	-0.41
<i>Survival time</i>	-0.47	-0.43	-0.40	-0.40	-0.39	-0.40
<i>Employment</i>	-0.05	-0.03	0.19	0.30	0.35	0.37

* *sign. at 10% level* , ** *sign. at 5% level*

However, the separate results lose some of their significance, apparently due to the lower number of remaining observations. Table 9 shows an overview of the effect of capital constraints on the three performance measures for the two strata in the sample.

6. CONCLUSION

We have applied a novel method to evaluate the effect of (perceivably) experiencing capital constraints on entrepreneurial performance. The performance measures used are profit, duration in business and employment generated. We evaluate the effect of capital constraints for 1,000 valid observations from a panel of Dutch entrepreneurs who started their business in 1994. We control for human capital factors, social capital, and indicators of financial screening, time and motivational constraints. We quantify to what extent these controls affect the effect of capital constraints as well as to what extent they affect performance directly. We find that initial capital constraints and the implied suboptimal investment possibilities significantly hinder entrepreneurs in their performance as measured by profits (1997) and survival duration.

The novelty, if any, lies in the fact that we use a dummy indicator for whether people have experienced initial capital constraints without finding a solution for their financial problems. Previous research with the same objective always made use of variables indicative of wealth, inheritances or windfall gains. The major drawback of these alternative approaches is that it is unknown whether the entrepreneurs who for instance obtain an inheritance indeed suffered from capital constraints and/or whether they could also obtain external capital. This drawback is not attached to the current approach.

A couple of issues, however, remain to be solved. Our results are indicative of the effect on performance of whether an entrepreneur has experienced capital constraints. Future research based on a survey that quantifies the extent to which someone is capital constrained, i.e. β could be anything in between zero and one, might give further insight in the effects on performance of capital constraints. Data on the individual demand and supply of external capital might be informative to this end. Further research might moreover give additional insight in the effect of capital constraints on performance per human capital stratum; our results indicate that physical capital needs have a positive association with human capital, *ceteris paribus*.

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