Allocation and productivity of time in new ventures of female and male entrepreneurs

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Abstract This paper investigates time allocation decisions in new ventures of female and male entrepreneurs using a model that distinguishes between effects of preferences and productivity on the number of working hours. Using data of 1,158 entrepreneurs we find that the preference for work time in new ventures relates to start-up motivation, propensity to take risk and availability of other income. Productivity of work time relates to human, financial and social capital endowments and the prevalence of outsourcing activities. This study also evaluates actual profit effects 1 year after start-up. We find that on average women invest less time in the business than men. This can be attributed to both a lower preference for work time (driven by risk aversion and availability of other income) and a lower productivity per hour worked (due to lower endowments of human, social and financial capital).

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1 Introduction

Human time is one of the most fundamental resources invested in new ventures. Time allocation theory explains how and why individuals allocate their scarce time to different activities. Since Becker's (1965) "A Theory of the Allocation of Time", a substantial amount of research has been done in this area, mostly focusing on wage or contract labor (Juster and Stafford 1991). Hardly any attention has been paid to the time allocation decisions of the self-employed. The distinction between wage- and self-employment is important because the use of time in these occupations is different in at least two respects. First, self-employed individuals tend to spend more time working in the market than wage-employed individuals (Ajayi-Obe and Parker 2005; Lin et al. 2000), which may relate to greater job satisfaction and higher work demands in self-employment (Hamilton 2000;

Ajayi-Obe and Parker 2005). Second, self-employed individuals usually have greater flexibility of working hours than wage-employed individuals (Wales 1973; Hyytinen and Ruuskanen 2007).

Research on time allocation decisions of self-employed individuals usually concentrates on how time is allocated among different activities *within* the firm rather than how it is divided *between* the firm and other activities (McCarthy et al. 1990; Cooper et al. 1997). Studies by Lévesque and MacCrimmon (1997) and Lévesque and Schade (2005) deal with the question of how individuals divide their time between leisure and work (in the new venture and wage-employment), but do not perform empirical tests using data of real entrepreneurs. Lévesque and MacCrimmon adopt an analytical approach and introduce a framework for the optimal time allocation between wage- and self-employment. Lévesque and Schade investigate time allocation decisions of students in economics and business within an experimental setting.

The present study aims at explaining time allocation decisions of entrepreneurs in new ventures by applying time allocation models from wage labor research to the decision world of the entrepreneur. In addition, we take into account several aspects mentioned in the entrepreneurship literature. Our model explains time investments in new ventures by examining the preference for work time in the firm versus leisure time, the expected productivity of work time and other time-consuming activities (assumed exogenous). The latter include wage-employment, family responsibilities, schooling and commute time (all negatively affecting time invested in the firm). Leisure time is the time available after work time and time spent on the other time-consuming activities. This is the first contribution of the paper: empirically disentangling preference and (expected) productivity effects on time investments in new ventures. This is an important distinction because entrepreneurs allocate their time to the business on the basis of their willingness and ability to work in the firm. Our analysis is based on an extensive and rich data set including time allocation decisions by entrepreneurs.

The second contribution lies in the investigation of gender differences with respect to time allocation decisions. Female entrepreneurs are more likely to work in the firm on a part-time basis than male entrepreneurs (Ajayi-Obe and Parker 2005; Cliff 1998; Verheul and Thurik 2001). The part-time nature of female entrepreneurship has often been explained in terms of household and family responsibilities, but has not been investigated in a setup explicitly distinguishing between preference and (expected) productivity effects. We aim to provide insight into the reasons why women invest less time in the business than men by attributing their lower time investments either to a lower preference for work time or a lower (expected) productivity per time unit. These insights are important as they suggest (new) routes for stimulating participation of women in entrepreneurial activity in terms of working hours. We find that female entrepreneurs, on average, invest less time in the business than men, which can largely be attributed to their lower preference for work time (explained by availability of other income and risk attitude) and a lower (expected) productivity per time unit (explained by relatively lower endowments of human, financial and social capital).

The paper is structured as follows. The next section discusses the literature on the preference for and the productivity of work time. Hypotheses are proposed for the antecedents of both preferences and (expected) productivity. Section 3 describes the sample and variables. Section 4 presents the utility model. The results for preference, productivity and gender effects are given in Section 5. Finally, the summary and conclusion of this paper are presented.

2 Preferences and productivity

2.1 Explaining working hours

Douglas and Shepherd (2002) distinguish between four factors that determine utility from a job, including income, work effort, risk involved and independence. The first two factors are the traditional input variables in utility models in economic consumer behavior theory (Varian 1984, p. 216). They are also applied to utility-maximizing entrepreneurs (Auster and Silver 1976) where money income π and leisure time L determine utility $U(\pi, L)$. This will be the basis for our model. We argue that the variation in the number of working hours across entrepreneurs reflects differences in the preference for working hours or the expected productivity of work time. This is in line with the argument of Douglas and Shepherd (2000) that the decision to become an entrepreneur

depends upon both the *ability* to become one and the *attitude* towards entrepreneurship. Entrepreneurial ability encompasses the knowledge and skills needed to be productive. An individual's attitude reflects the utility (s)he derives from a particular job and the amount of work effort devoted to this job.

2.2 Antecedents of preference for work time

This section discusses the determinants of the preference for work time in the newly started venture versus leisure time. Attention is paid to other sources of income, gender, age and intrinsic motivation. Firm-specific factors, having a partner and risk attitude are included in the analysis as controls and will be discussed in the next section.

2.2.1 Additional income

Profit is often the main source of income for self-employed individuals. However, sometimes additional sources of income are available, such as partner income, inheritance and interest received on savings. These sources are not dependent on the number of hours invested in the firm, and there may be an income effect reducing the number of desired working hours. The availability of other income is likely to reduce the preference for working hours (Ajayi-Obe and Parker 2005). Hypothesis 1 is formulated as follows:

H1   The availability of other sources of income (other than that extracted from the business) negatively influences the preference for work time.

2.2.2 Gender of the entrepreneur

The average number of working hours per person has decreased considerably in the last hundred years (Maddison 1982, 1987). However, paid working hours for men have declined, whereas for women they have increased substantially (Killingsworth and Heckman 1986). Contemporary time allocation decisions also show gender differences. Employment rates are still lower for women than for men in most OECD countries (OECD 2002), and within any paid occupation men tend to work longer hours than women (Ajayi-Obe and Parker 2005). Men are more likely to work on a full-time basis in self-employment

than women (OECD 1998). The combination of work and family responsibilities and flexible working hours seems to be an important motive for women to engage in self-employment (Longstreth et al. 1987).[1] In the present study, we control for other time-consuming activities (e.g., wage-employment, family responsibilities, schooling and commute time) and therefore expect no gender difference regarding the preference for work time in the firm. Hypothesis 2 is formulated as follows:

H2   When other time-consuming activities are controlled for, the gender of the entrepreneur does not influence the preference for work time.

2.2.3 Age of the entrepreneur

Time allocation decisions depend on age (Juster and Stafford 1991). Market work of men reaches its peak between the age of 25 and 44 years and decreases afterwards (Blinder and Weiss 1976; Hill 1985). Lévesque and Minniti (2006) argue that as people get older, they attach less value to future earnings, i.e., while wages increase with age, the present value of the returns to entrepreneurship declines. Euwals (2001) presents evidence for this negative effect of age on desired working hours for women on the Dutch labor market. Hypothesis 3 is formulated as follows:

H3   The age of the entrepreneur has a negative effect on the preference for work time.

2.2.4 Intrinsic motivation

There are various motives for starting a business. Besides the main reason of earning a living (extrinsic motivation), there are non-pecuniary benefits to self-employment, such as "being one's own boss" and "the challenge" (intrinsic motivation). Hamilton (2000) suggests that the non-pecuniary benefits of self-employment are substantial. Douglas and Shepherd (2002) refer to independence as a key determinant of the utility derived from a job. Similarly, Hyytinen and Ruuskanen (2007) stress the importance of entrepreneurial independence for job satisfaction of the

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[1] The multiple social roles of women also limit the time they can spend in the business (Nordenmark 2002).

self-employed. It may be expected that entrepreneurs who are intrinsically motivated, e.g., by a desire to be their own boss, work longer hours than entrepreneurs who are largely extrinsically motivated. Hypothesis 4 is formulated as follows:

H4   The start-up motive of being your own boss has a positive effect on the preference for work time.

2.3 Antecedents of productivity of work time

Individuals who start new ventures usually are not able to adequately predict (the drivers of) their productivity. So formally we only analyze the role of *expected* productivity in our utility model. Assuming that individuals are capable of assessing the fruits of their labor and there is at least some overlap between expected and realized productivity, we refer to the literature linking human, social and financial capital to actual productivity to formulate hypotheses on the determinants of expected productivity. In the remainder of this paper, we will just refer to productivity. Firm-specific factors (firm size, sector, innovation, type of firm and outsourcing) are included in the analysis as controls and are discussed in the next section.

2.3.1 Human capital

According to human capital theorists (Becker 1965; Mincer 1974), knowledge increases the cognitive abilities of an individual, resulting in more productive and efficient behavior. Indeed, human capital has been found to positively influence the performance of entrepreneurial firms (Chandler and Hanks 1994, 1998; Cooper et al. 1994; Pennings et al. 1998). A distinction can be made between general and specific human capital (Becker 1993). Castanias and Helfat (1991, 2001) discriminate between generic, industry-specific and firm-specific skills or knowledge.

An entrepreneur's education is likely to enhance learning and increase the problem-solving ability of an individual within a given environment. Indeed, several studies find that (formally) higher educated entrepreneurs perform better than others (Gimeno et al. 1997; Hamilton 2000; Burke et al. 2000).[2] Hypothesis 5 is formulated as follows:

H5   The education level of the entrepreneur has a positive influence on the productivity of work time.

Next to the level of education, the type of education could matter for individual performance. Obviously, there is a difference between acquiring general and more specific (job-related) knowledge and skills. Therefore, we distinguish between two types of education: general knowledge acquired in secondary (high) school or at university, and vocational training (professional education). We hypothesize that vocational training has a positive effect on productivity in the new venture since such training may be more directly applicable in the new small venture. Hypothesis 6 is formulated as follows:

H6   Vocational training has a positive influence on the productivity of work time.

According to Cooper et al. (1994, p. 376), gender "may serve as a proxy for life experiences and access to networks and other resources that bear upon the prospects for success of individual entrepreneurs". Although the level of education is largely similar for female and male entrepreneurs (Birley et al. 1987; Fischer et al. 1993), men tend to have higher levels of entrepreneurial experience (Kalleberg & Leicht 1991; Fischer et al. 1993), financial management experience and industry experience (Fischer et al. 1993; Verheul and Thurik 2001). It has also been argued that women and men do not have equal access to financial and social capital (Fischer et al. 1993; Moore and Buttner 1997). Hence, women may be less productive than men because they had fewer opportunities to acquire different types of capital. Research has shown that women-led firms are outperformed by male-led firms in terms of profits, revenue growth and employment (Rosa et al. 1996; Carter et al. 1997). However, when controlling for the difference in levels of human, social and financial capital (as well as for venture characteristics), we do not expect to

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Footnote 2 continued
they may have higher *expectations* of the results of their efforts. Note that some entrepreneurs (about 25%) have a (part-time) job next to the firm. Hence, human capital may also be deployed as employee, lowering the amount of time available for working in the venture. Still, the large majority of entrepreneurs do not have another job or do not have the opportunity to adjust their working hours in that job.

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[2] Individuals with higher levels of human capital tend to be more self-confident (Davidsson and Honig 2003). Accordingly,

find gender differences regarding the productivity of work time. In general, research indicates that gender differences in performance are negligible when holding other factors constant (Collins-Dodd et al. 2004; Xie and Shauman 1998; Quisumbing 1996). Hypothesis 7 is formulated as follows:

H7　When the levels of human, social and financial capital are controlled for, the gender of the entrepreneur does not influence the productivity of work time.

The age of the entrepreneur may also be considered a proxy for endowments of human capital, such as years of work or life experience (Gimeno et al. 1997; Cowling and Taylor 2001). Younger people have had less of an opportunity to build up relevant human capital for entrepreneurship. On the other hand, the impact of additional experience is likely to diminish with an increase in age. Several studies show that productivity follows an inverted U-shaped relationship with age (Kanazawa 2003; Skirbekk 2003). Within the area of entrepreneurship, van Praag (1996; 2003) finds that there is a U-shaped relationship of an entrepreneur's age with the hazard of compulsory exit, implying an inverse U-shaped relation with survival. Hypothesis 8 is formulated as follows:

H8　The age of the entrepreneur has an inverse U-shaped relationship with the productivity of work time.

Management-specific knowledge of entrepreneurs increases the probability of pursuing profitable strategies and dealing adequately with management issues (Cooper et al. 1994). It is important to distinguish between management and entrepreneurial experience, the latter referring to experience with starting and running a small firm. In general, entrepreneurship studies find that entrepreneurial experience is a relatively important factor when explaining new venture performance (Stuart and Abetti 1990; Gimeno et al. 1997; Evans and Leighton 1989; Reuber and Fischer 1999), although Westhead and Wright (1998) find a limited effect. Hypothesis 9 is formulated as follows:

H9　Entrepreneurial experience has a positive influence on the productivity of work time.

Entrepreneurs who have worked in the same industry in the past are likely to have a network of relationships with suppliers, customers and distributors, providing them with support and credibility (Cooper et al. 1994). Industry-specific knowledge has proven to be important for new venture performance (Lee and Tsang 2001), even in addition to work and entrepreneurial experience (van Praag 2003). Hypothesis 10 is formulated as follows:

H10　Industry experience has a positive influence on the productivity of work time.

Past work experience of the entrepreneur may be relevant for new firm performance, above and beyond industry experience. According to Vesper (1980), entrepreneurs who run firms that are closely related to the activities they did in the past have acquired relevant skills and abilities as well as the appropriate 'prior mental programming.' van Praag (2003) finds that occupational experience has additional explanatory value for new venture performance, in addition to that of industry, work and entrepreneurial experience. Hypothesis 11 is formulated as follows:

H11　The extent to which past work is related to the current activities of the entrepreneur has a positive influence on the productivity of work time.

2.3.2 Financial capital

Financial capital can have a direct effect on productivity through the ability to undertake more capital-intensive or ambitious strategies and to change courses of action. Capital-intensive strategies are relatively well protected from imitation and characterized by increased labor productivity. Indirectly, capital investments may enable training and more comprehensive planning, influencing firm performance (Cooper et al. 1994). Most studies find a positive relationship between initial capital investment and performance (Cooper and Gimeno-Gascon 1992). Hypothesis 12 is formulated as follows:

H12　The amount of start-up capital has a positive influence on the productivity of work time.[3]

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[3] We assume that the search for financial capital and the decision to invest a certain amount of capital in the new venture precedes the time allocation decision (i.e., how many hours an entrepreneur invests in the business). However, the amount of start-up capital may to some extent be endogenous in the determination of the number of working hours. It is difficult to correct for this within the context of our nonlinear framework.

2.3.3 Social capital: networking with other entrepreneurs

Social capital refers to the access of an individual to various resources via interaction with members of a network (Portes 1998; Bourdieu 1986). Such a network may include relationships with family, friends and the community, but also more formal arrangements such as professional or business networks. Interaction and communication within networks of entrepreneurs may contribute to venture performance as it enables the exchange of valuable information and other resources, including customers, suppliers and informal credits (Brüderl and Preisendörfer 1998). Barr (2000) links networks to knowledge flows between firms, influencing firm productivity. Davidsson and Honig (2003) find a strong positive effect of membership in a business network on early stage firm performance. Hypothesis 13 is formulated as follows:

H13   Contact with other entrepreneurs has a positive effect on the productivity of work time.

3 Sample and variable description

To test the hypotheses we use data gathered through a detailed panel survey of EIM Business and Policy Research, commissioned by the Dutch Ministry of Economic Affairs. A representative sample was drawn of independent new ventures registered at the Chamber(s) of Commerce in the first quarter of 1994. Only main establishments were selected. The distribution of firms was representative across sector and size class. Agricultural firms and companies extracting minerals, businesses that changed legal form or activity, and relocated firms were excluded. The main themes covered by the survey questions include firm and owner characteristics, finance and investment, bottlenecks, strategy and goals, market and environment, and realization and expectations.

In 1994 approximately 12,000 firms were approached by telephone, of which about 3,000 participated in the survey. These firms received a questionnaire by mail. A total of 1,938 questionnaires was returned. Because firms were also followed in the subsequent year (1995), information is available on time allocation and profits 1 year after start-up. In

1995, 1,007 questionnaires were sent back, resulting in a response rate of about 58%. In this study we use the information for 1994 to test for *expected* preference and productivity effects, applying a nonlinear model. The information for 1995 is used to test for *real* productivity effects, explaining profits in 1995.

We use a sub-sample of 1,158 Dutch owners or owner-managers (843 male and 315 female) to test for preference and productivity effects on the number of working hours in 1994. This sub-sample includes all observations for which information is available on the number of working hours in 1994 as well as the characteristics of the business and its owner-(manager) relevant for the study. The sample characteristics for the sub-sample of 1,158 entrepreneurs and the total sample of 1,938 entrepreneurs are practically identical. The start-up rate for women is 27% for the total sample as well as the sub-sample. This is also a representative figure of women starting up firms during the 1990s in The Netherlands. To test for effects on actual profits in 1995, we use a sub-sample of 561 out of the 1,007 respondents who returned the questionnaire again in 1995 for whom all relevant information (i.e., working hours, side activities, determinants of productivity in the nonlinear analysis) was available.

We include a number of controls. We include dummy variables for a venture in (business and personal) services as well as a business in trade in both the preference and productivity part of the model. The base category is manufacturing and construction firms. The number of employees (measured in full-time equivalents) is also included in both parts of the model. Although our sample mainly consists of start-ups with no or only a few employees, still the entrepreneur with employees is able to delegate some tasks and responsibilities (Churchill and Lewis 1983; Cooper et al. 1997). This might lead to more leisure time or increased productivity.

For the explanation of the *preference* for work time, we include having a partner and risk attitude. Maintaining a (good) relationship takes time and energy away from the business, but at the same time enables partners to share household tasks resulting in time savings. Because there is no evidence that married men are more productive (Loh 1996), the partner variable is included only on the preference side. We measure risk attitude as the self-reported general willingness of an individual to take risk

(degree of risk tolerance).[4] Because entrepreneurial activities are more risky in terms of their outcome than many other activities, relatively risk averse entrepreneurs may limit their work effort (Kihlstrom and Laffont [1979]). Nevertheless, Parker ([2006], p. 353) argues that risk-averse self-employed workers may have a need for 'self-insurance' and, accordingly, work longer hours.[5]

For the *productivity* of work time, we include the following controls. The variable *ReEntry* captures whether the firm is a restart or take-over of an existing firm as opposed to a newly started business. We expect that restarted firms or takeovers will be (more) productive sooner than newly started firms. A de novo firm needs to be built up from scratch, whereas a restarted firm usually already has valuable business relations and knowledge. Innovativeness, outsourcing and commute time are also included as controls. Innovative firms may be more productive than firms that do not pursue product innovation (Crépon et al. [1998]; Klomp and van Leeuwen [2001]). Nevertheless, Timmons ([1986]) argues that a high failure rate for innovations is the rule rather than the exception. Astebro ([2003]) finds that the return to inventions is relatively low, possibly due the unrealistic optimism of inventors. In this study we include a categorical variable indicating the importance of new technology for the firms' products. Outsourcing activities may positively affect productivity (Bettis et al. [1992]; D'Aveni and Ravenscraft [1994]; Lei and Hitt [1995]; Quinn [1992]). The entrepreneur will contract out those activities that are most time-consuming, of which (s)he has little experience or that do not belong to the core business. Yet, the empirical evidence that outsourcing activities lead to cost advantages remains limited (Gilley and Rasheed [2000]). The variable *Commute* captures whether the entrepreneur travels to and from the business, i.e., whether (s)he works from the home or in separate business premises. The latter may be an indicator of ambition ("think big"), but may also be an expensive necessity, thereby negatively influencing profitability.[6]

Table [1] presents descriptions, means and standard deviations for all variables in the study. The number of working hours per week (n) is categorized from 1 to 7. The maximum number of hours available per week is assumed to be 100 (i.e., excluding time for personal care), which would correspond to a hypothetical category code of 10.[7] We fix the maximum number of N at 10 in the nonlinear analysis. The Hours variable has an average of 3.93, indicating an average number of working hours of about 35 h per week. The mean value for the Hours variable for female and male entrepreneurs is 3.28 and 4.17, respectively.[8] On average, men work longer hours than women do. This becomes clear when looking at the gender divide in the highest categories of the Hours variable. Whereas 27% of all respondents is female, of those who work more than 60 h ($n = 7$) only 14.5% is female. This percentage is 17.6% for the 50–60 h category ($n = 6$) and 19.5% for the 40–49 h category ($n = 5$). Thus, the gender difference increases with the number of working hours.

Table [2] presents correlations between the number of working hours, the independent variables and other time-consuming activities. We see that many variables correlate significantly with working hours, of which *StartCapital* ($r = 0.476$; $P < 0.01$), *OtherJob* ($r = -0.440$; $P < 0.01$), *OtherIncome* ($r = -0.369$; $P < 0.01$) and *Commute* ($r = 0.365$; $P < 0.01$) are most prominent. In general, correlations between the explanatory variables are low.[9]

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[4] This measure is obviously crude, and results for this control variable should be interpreted with care. See also Palich and Bagby ([1995]).

[5] It should be noted that Parker ([2006]) refers to income risk, whereas this study uses a more general measure of risk aversion.

[6] Carree and Verheul ([2004]) find a negative effect of the variable *HomeBased* on expected productivity.

[7] The data source *Permanent Onderzoek Leefsituatie* of Statistics Netherlands (CBS) reports on the time use of Dutch self-employed for 1999 that per day on average 9 h and 48 min are used for personal care (sleeping, eating, hygiene). This corresponds to about 68 h per week. Since a week consists of a maximum of 168 available hours, about 100 h remain for other (work) activities.

[8] Although the data set stems from 1994, the number of working hours has not changed much over the years. As a comparison, data from the (smaller) 2003 EIM panel of Dutch start-ups show that the average score on the question of the number of working hours is 3.95, with a female and a male average of 3.33 and 4.22, respectively.

[9] We see some correlation between Commute and StartCapital ($r = 0.439$; $P < 0.01$); Similarity and IND experience ($r = 0.423$; $P < 0.01$); Gender and Family care ($r = 0.375$; $P < 0.01$).

Table 1 Description of variables

Variable name	Variable description	Mean	SD	Mean	
				Female	Male
Dependent					
Hours	Number of hours invested in the firm in 1994 [1 = <10; 2 = 10–19; 3 = 20–29; 4 = 30–39; 5 = 40–49; 6 = 50–60; 7 = >60]	3.93	2.05	3.28	4.17
Other time-consuming activities					
OtherJob	Do you have another (wage) job besides running the business? [0 = no; 1 = yes]	0.28	0.45	0.26	0.29
FamilyCare	Do you have family responsibilities besides running the business? [0 = no; 1 = yes]	0.10	0.30	0.28	0.03
Schooling	Do you take schooling besides running the business? [0 = no; 1 = yes]	0.06	0.24	0.10	0.05
Commute	Do you have to travel to your work? [0 = no; 1 = yes]	0.21	0.41	0.19	0.21
Independent variables					
OtherIncome	Do you or your partner have other sources of income? [0 = no; 1 = yes]	0.74	0.44	0.84	0.70
Gender	Are you male or female? [0 = male and 1 = female]	0.27	0.44	1	0
Age	Age in categories [1 = <20; 2 = 20–24; 3 = 25–29; 4 = 30–34; 5 = 35–39; 6 = 40–44; 7 = 45–49; 8 = 50–54; 9 = 55–59; 10 = >60]	4.61	1.76	4.48	4.69
OwnBoss	Did the wish to be independent play a role in your decision to start your own business? [1 (no); 2 (yes, to some extent); 3 (yes, very important)]	2.47	0.70	2.52	2.47
RiskAversion	To what extent do you like to take risk [1 = (very high)–5 (very low)]	2.22	0.80	2.33	2.16
Education	What is your highest level of education? [1 = low level of education, i.e., low-level vocational training, average secondary education; 2 = mid-level education, i.e., higher secondary education, mid-level vocational training, Leerlingstelsel[a]; 3 = high level of education, i.e., higher vocational training, university]	2.06	0.75	1.99	2.08
Vocation	Do you have vocational training? [0 = no; 1 = yes]	0.71	0.45	0.75	0.69
ENTexperience	Did you run a business prior to the start-up of this firm? [0 = no; 1 = yes]	0.04	0.19	0.02	0.04
INDexperience	What is the degree of industry experience you have? [1 very weak]–5 (very strong)]	3.89	0.92	3.78	3.93
Similarity	Are your current activities related to past work? [1 (no) to 3 (almost identical)]	2.03	0.76	1.86	2.10
StartCapital	What is the total amount of start-up capital? [1 = <fl.10,000; 2 = fl.10,000–25,000; 3 = fl.25,000–50,000; 4 = fl.50,000–100,000; 5 = fl.100,000–250,000; 6 = fl.250,000–500,000; 7 = > fl.500,000][b]	2.12	1.43	1.83	2.23
Contacts	Do you have contacts with other entrepreneurs in networks? [1 (never) to 3 (regularly)]	1.59	0.71	1.50	1.62
Controls					
Partner	Do you have a partner? [0 = no partner; 1 = partner]	0.81	0.39	0.85	0.80
Employees	How many employees did you have in 1994?[c]	0.33	1.58	0.15	0.40
Services	Do you run a service firm? [0 = no; 1 = yes]	0.50	0.50	0.58	0.47
Trade	Do you run a firm in one of the following industries: wholesale, retail, hotels and restaurants, repair or transport [0 = no; 1 = yes]	0.36	0.48	0.37	0.35
ReEntry	Is your firm a takeover or restart of an existing firm? [0 = no, it is a new firm; 1 = yes]	0.14	0.35	0.13	0.14
Outsourcing	Are certain activities within the firm contracted out? [0 = no; 1 = yes]	0.44	0.50	0.41	0.45
Innovation	Are your products/services based upon new technology not been used until 3 years ago? [1 (hardly)–4 (almost completely)]	1.53	0.87	1.41	1.58

[a] In the 'Leerlingstelsel' students go to school for 1 day a week and work during the rest of the week (that is, a minimum of 20 h)

[b] StartCapital is measured in Dutch guilders (florin). One guilder had an average value of 0.62 US dollars in 1995

[c] Number of employees is measured in terms of full-time equivalents, that is, the number of employees who work more than 32 h per week

Table 2 Correlations between the dependent variable Hours, independent variables and other time-consuming activities

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Hours	1																
2. OtherIncome	−0.369**	1															
3. Gender	−0.192**	0.141**	1														
4. Age	−0.036	0.126**	−0.048	1													
5. OwnBoss	0.135**	−0.092**	0.037	−0.150**	1												
6. RiskAversion	−0.160**	0.125**	0.085**	0.124**	0.187**	1											
7. Education	−0.020	0.062*	−0.057	0.103**	−0.023	0.018	1										
8. Vocation	0.002	0.028	0.057	−0.035	0.007	0.010	0.125**	1									
9. ENTexperience	0.116**	−0.048	−0.048	0.066*	0.030	−0.089**	0.009	0.105**	1								
10. INDexperience	0.213**	−0.090**	−0.073*	0.112**	0.036	−0.068*	−0.078**	−0.040	0.018	1							
11. Similarity	0.269**	−0.096**	−0.140**	0.030	−0.006	0.039	0.105**	−0.001	−0.014	0.423**	1						
12. StartCapital	0.476**	−0.274**	−0.126**	0.042	0.059*	−0.125**	0.010	0.025	0.140**	0.181**	0.218**	1					
13. Contacts	0.117**	−0.016	−0.074*	0.042	0.086**	−0.067*	0.130**	0.044	0.042	0.057	0.051	0.113**	1				
14. OtherJob	−0.440**	0.312**	−0.023	−0.052	−0.077**	0.035	−0.010	0.014	−0.112**	−0.158**	−0.220**	−0.227**	−0.021	1			
15. FamilyCare	−0.230**	0.179**	0.375**	0.101**	−0.068*	0.110**	−0.014	0.002	−0.035	−0.133**	−0.184**	−0.163**	−0.048	0.050	1		
16. Schooling	−0.176**	0.042	0.097**	−0.149**	0.012	0.014	0.065*	0.009	−0.032	−0.120**	−0.099**	−0.104**	−0.016	0.059*	0.187**	1	
17. Commute	0.365**	−0.168**	−0.025	−0.068*	0.051	−0.084**	−0.054	0.028	0.035	0.037	0.076**	0.439**	0.055	−0.182**	−0.120**	−0.080**	1

** Correlation is significant at the 0.01 level (two-tailed). * Correlation is significant at the 0.05 level (two-tailed)

4 Model and data analysis

In this study we argue that the number of working hours depends on the preference for work time and the productivity of work time in the firm, which are both again driven by a range of factors. To explain working hours we follow Carree and Verheul (2004) and propose a nonlinear model that includes parameters representing the preference for work versus leisure time (α) and the productivity of work time (γ). The model is rooted in economic consumer behavior theory where income (consumption) and leisure determine utility. As we will show, a linear model does not enable us to distinguish between such preference and productivity effects because both effects may underlie the overall effect of a factor on time investments. Therefore, we use a nonlinear analysis based on a maximizing utility setup to disentangle preference and productivity effects on the number of working hours. Finally, to test for the robustness of the *expected* productivity results from the nonlinear analysis, we examine the *actual* impact of the productivity antecedents on profits 1 year after start-up. In other words, we compare the outcomes of the nonlinear model (a priori) with the actual impact of the selected variables (a posteriori).

Let N be the total time available per week. We assume that entrepreneurs maximize their utility[10]: $Max_n U(\pi(n), N - n)$. Utility (U) is influenced positively by *expected* profit (π) and leisure time ($N - n$). Profit is dependent upon the number of hours worked (n) and expected productivity. We use a Cobb-Douglas form $U = \pi^\alpha (N - n)^{1-\alpha}$ for utility and a profit function $\pi = \beta n^\gamma$ and have the following (logarithmic) equations[11]:

$$\ln U = \alpha \ln \pi + (1 - \alpha) \ln(N - n) \tag{1}$$

$$\ln \pi = \phi + \gamma \ln(n) \tag{2}$$

Note that $\phi = \ln \beta$. We expect that $0 < \alpha < 1$ and that γ is positive. More working hours result in higher profit. The value of γ is unknown to the entrepreneur. Therefore, the entrepreneur uses his or her expectation of productivity to determine the optimal value of n.

The relation between profitability and number of hours is allowed to be non-linear, assuming a possible interdependence between hours and productivity (Barzel 1973).

After substituting the profit function into the utility function, the first-order condition is: $d \ln U/dn = \alpha\gamma/n - (1 - \alpha)/(N - n) = 0$. The optimal number of working hours for entrepreneur i is therefore:

$$n_i = \frac{\alpha_i \gamma_i}{1 - \alpha_i + \alpha_i \gamma_i} N \tag{3}$$

where α_i is the individual-specific preference for profit versus leisure time and γ_i is the individual-specific hours elasticity of expected profit. The latter can be interpreted as a productivity parameter. Both an increase in α_i and γ_i lead to a higher utility-maximizing number of working hours. The ratio of the first derivatives of the optimal number of working hours to α_i and γ_i equals:

$$\frac{\partial n_i}{\partial \alpha_i} / \frac{\partial n_i}{\partial \gamma_i} = \frac{\gamma_i}{\alpha_i(1 - \alpha_i)} \tag{4}$$

An entrepreneur can also spend time outside the business, thereby limiting the total time available. We correct for the time an entrepreneur spends on other activities, including wage-employment, family care, schooling and commute time.[12] x_i refers to the presence of other (competing) time-consuming activities of an individual. The final model specification is:

$$n_i = \frac{\alpha_i \gamma_i}{1 - \alpha_i + \alpha_i \gamma_i} (N + \delta x_i) \tag{5}$$

where δ is expected to be negative. Our dependent variable n_i is measured in seven categories. This suggests applying a (nonlinear) order probit analysis. However, such an analysis fails to take into account that the categories are equidistant (with the possible exception of the highest category). Therefore, we also present a nonlinear least squares regression analysis.

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[10] This is a departure from Lévesque and Schade (2005) who assume bounded rationality in the choice for number of working hours.

[11] Thornton (1998) uses a Cobb-Douglas specification to investigate the labor supply of self-employed physicians.

[12] Male and female entrepreneurs are likely to differ with respect to the time they spend on side-activities. For example, it is well-known that women spend more time on family care than men, as reflected by the gender differential in the mean of the variable *Family Care* in Table 1. In this study we focus on the preference for, and the productivity of, time invested in the firm that remains after controlling for other time-consuming activities and obligations. Hence, we do not consider the preference or productivity effect of *FamilyCare* or that of other side activities.

Fig. 1 Graphic
presentation of the model
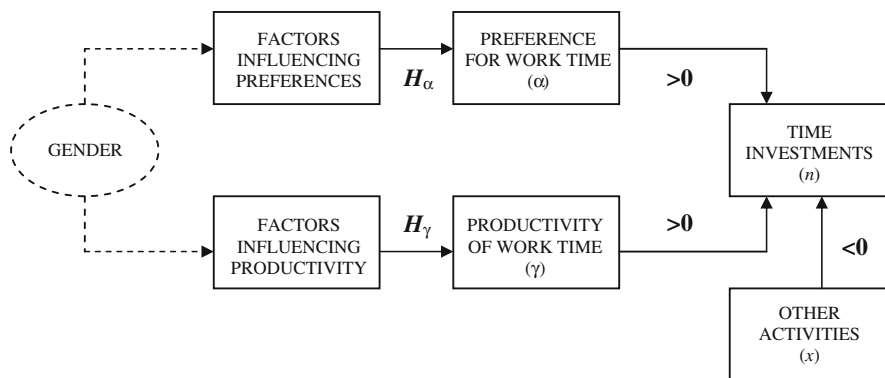
The model predicts a positive productivity effect on the number of working hours.[13] Generally, an increase in wage or revenues per hour (in the case of self-employment) may lead to an increase or decrease of working hours depending upon whether the 'substitution effect' (whereby individuals substitute leisure for work when returns to work increase) or the 'income effect' (whereby individuals respond to their higher earnings by consuming more leisure at the expense of working hours) dominates (Blundell and MaCurdy 1999). In the empirical literature, findings are inconclusive (Grossman 2003). Ajayi-Obe and Parker (2005) show that in response to higher wages both wage-employed and self-employed individuals work fewer hours. However, Thornton (1998) finds that self-employed male physicians have an upward-sloping labor supply curve. For women results appear more clear-cut. Biddle and Hamermesh (1990) find that higher returns per hour lead to more market work for females. Euwals (2001) finds that the hourly wage positively affects desired hours for females in the Dutch labor market. A possible backward-bending labor supply is more likely at higher hourly wage or productivity rates (Parker 2006, p. 352). Because our sample consists of recently started entrepreneurs with no or only a few employees, it is unlikely that there are predominantly high productivity levels.

The individual-specific preferences (α_i) and productivity (γ_i) are influenced by a range of factors. Hypotheses have been formulated for effects on

preferences (H_α in Fig. 1) and effects on productivity (H_γ in Fig. 1). The preference for working in the firm rather than enjoying leisure time depends on the personal situation of the entrepreneur, including other income available (e.g., partner income), gender, age and start-up motivation. The productivity of work time is expected to be influenced by human, social and financial capital invested in the firm. Individual preferences and productivity are determined by adding up the effects: $\alpha_i = a_0 + a_1 \, OtherIncome_i + a_2 Gender_i + \ldots$ and $\gamma_i = c_0 + c_1 Gender_i + c_2 Age_i + \ldots$, respectively.

Our model allows for different types of gender effects on time investments. Women may have a different preference for work time than men, leading to a gender difference in time investments. Also, women and men may differ regarding productivity, also leading to different time investments. Below we will call these effects *indirect* because they run through preference and productivity. Figure 1 assumes that these indirect gender effects are caused by *mediation* (i.e., other explanatory factors mediate the relationship between gender and preferences or productivity). For example, it may be that women have less entrepreneurial experience than men, negatively affecting their productivity and, accordingly, their time investments.

5 Results

In Table 3 we present the results of the different approaches to explaining the number of working hours in the firm (n). In the first two columns we present the results of a *linear* approximation to Eq. 5: $n_i = \lambda_0 + \lambda_1 OtherIncome_i + \lambda_2 Gender_i + \lambda_3 Age_i + \ldots$ First, we show the results of the OLS regression and,

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[13] An alternative to the Cobb-Douglas specification that allows for both positive and negative productivity effects is a Constant Elasticity of Substitution (CES) specification. However, applying this CES specification we find a range of local optima and unreliable estimates, due to the increased complexity of such specification.

Table 3 Different models explaining Hours and profits

Variables	OLS	Order probit	Nonlinear least squares		Nonlinear order probit		Profit
			Preference	Productivity	Preference	Productivity	
Constant	2.881***	–	0.5	0.086	0.5	0.665	0.604**
OtherIncome	−0.609***	−0.380***	−0.070***	–	−0.049***	–	–
Gender	−0.433***	−0.287***	−0.049	−0.036	−0.067**	0.337	−0.182**
Age	−0.031	−0.025	−0.008	−0.028	−0.014*	0.047	−0.128
Age sq	−0.001	0.000	–	0.003	–	0.006	0.014
OwnBoss	0.169***	0.136***	0.016**	–	0.014***	–	–
RiskAversion	−0.142**	−0.104**	−0.015**	–	−0.011**	–	–
Partner	0.138	0.096	0.016	–	0.009	–	–
Employees	−0.010	0.010	−0.013***	0.402**	−0.012*	0.990	0.035**
Services	−0.382***	−0.252**	0.016	−0.066	0.000	−0.231	0.097
Trade	0.064	0.066	0.017	0.026	0.051	−0.330	−0.038
Education	0.083	0.066	–	0.051	–	0.087	0.054
Vocation	−0.045	−0.031	–	−0.070	–	−0.092	−0.098
ENTexperience	0.225	0.132	–	0.134	–	0.198	−0.096
INDexperience	0.103*	0.069*	–	0.051*	–	0.071	0.020
Similarity	0.199***	0.124***	–	0.102**	–	0.150	0.089*
StartCapital	0.252***	0.181***	–	0.160***	–	0.279*	0.035
Contacts	0.138**	0.084*	–	0.064*	–	0.086	−0.033
ReEntry	0.600***	0.434***	–	0.503***	–	0.876	0.336***
Outsourcing	0.437***	0.296***	–	0.226***	–	0.354*	0.000
Innovation	0.036	0.027	–	0.012	–	0.019	−0.036
Commute[a]	0.534***	0.340***	–	1.047**	–	1.644**	−0.056
OtherJob	−1.208***	−0.760***	−2.984***		−1.234***		–
FamilyCare	−0.323*	−0.164	−0.806*		−0.228		–
Schooling	−0.701***	−0.461***	−1.938***		−0.811***		–
Commute[a]	–	–	−1.539***		−0.829*		–
N	1158	1158	1158		1158		561
R^2	0.474	0.152[b]	0.498		0.161[b]		0.260[b]

The dependent variable is Hours for the (non)linear models and the proxy for the logarithm of reported profit in 1995 for the profit model (final column)

*, ** and *** represent significance at the 0.10, 0.05 and 0.01 levels, respectively (two-sided test)

[a] Commute is incorporated both as an effect on productivity and as alternative time-consuming activity

[b] The pseudo R^2 is presented here

subsequently, those for the ordered probit regression. In the third and fourth column we present the results of the much richer *nonlinear* analysis, distinguishing between the preference for work time and the productivity of time.[14] Again we estimate both a (nonlinear)

least squares and an ordered probit regression. We will focus on the least squares results in our discussion.

One can determine the values of the estimated α_i and γ_i by filling in the estimated parameter values for $a_0, a_1, a_2, \ldots$ and $c_0, c_1, c_2, \ldots$ from Table 3. The average (median) values for α_i and γ_i are 0.41 (0.41) and 1.44 (1.02), respectively. For women the average (median) values for α_i and γ_i amount to 0.37 (0.36) and 1.22 (0.88), respectively, whereas for men they

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[14] To ensure identification of the nonlinear regression equation, we fix a_0 at 0.5. Altering this value does not substantially affect the results.

amount to 0.43 (0.43) and 1.53 (1.07), respectively. Hence, on average, female entrepreneurs in the sample have both a lower preference for work time in the firm and a lower productivity of work time than male entrepreneurs. From Eq. 4 we can derive that the effect of α_i on n_i is about six times the effect of γ_i on n_i. This implies that the effect of a gender difference of 0.06 found for α_i is approximately equal to that of 0.31 found for γ_i.

5.1 Linear results

From the first column in Table 3 we see that the (other) time consuming activities *OtherJob*, *Schooling* and *FamilyCare* negatively affect the number of working hours, whereas *Commute* has a positive effect. The positive effect of *Commute* may relate to the fact that firms where the entrepreneur works from home (*Commute* = 0) tend to operate on a smaller scale than those established in separate business premises.[15] The relatively weak effect of *FamilyCare* may be explained by the fact that family responsibilities can also come at the expense of leisure time (instead of work time). We see that gender has a significant negative effect on the number of working hours, which indicates that *ceteris paribus* women invest less time in the business than men. Surprisingly, *Employees* does not influence the number of working hours. Discussing the outcomes of the much richer nonlinear model, we will see that firm size has a *negative* effect on preferences and a *positive* effect on productivity, explaining the absence of an overall effect on the number of working hours. This finding underlines the importance of discriminating between preference and productivity effects when studying time allocation decisions.

5.2 Nonlinear results

5.2.1 Preference for work time

The results of the *nonlinear* model (estimated both as least squares and ordered probit) are presented in the third and fourth column of Table 3. We find that the more an entrepreneur is dependent on revenues from

the firm for subsistence, the higher the preference for work time in the business. In addition, individuals who start a business to be their own boss have a higher preference for work time than others. Hypotheses 1 and 4 are supported. There is no *separate* effect of gender in the nonlinear least squares regression. This would confirm Hypothesis 2. However, the order probit model shows a stronger and significant negative effect of gender on the preference for work time. Apparently, even when controlling for other time-consuming activities, men might more strongly prefer work time over leisure time than women do. The finding that there are fewer 'extremes' among women when it comes to devoting time to their work compared to men is confirmed by research on workaholism (Burke 1999). There is no strong effect of age. Hence, Hypothesis 3 is left with little support. With respect to the controls, we see that the number of employees negatively affects the preference for work time. It appears that entrepreneurs hire more employees to delegate some tasks and responsibilities and, accordingly, work fewer hours themselves. Risk-averse individuals have a lower preference for work time than risk-loving people. New ventures are inherently risky and therefore may be less attractive to risk-averse individuals for investing their time.

5.2.2 Productivity of work time

The variable *StartCapital* has a positive effect on productivity, i.e., investing larger sums of money in the business leads to higher productivity per working hour. In addition, there are positive effects of the degree to which current activities are related to past work (*Similarity*) and, to some extent (at 10% level of significance), contact with other entrepreneurs (*Contacts*) and industry experience (*INDexperience*). Hypotheses 10 through 13 are supported. In accordance with Hypothesis 7 we find no *separate* effect of the gender of the entrepreneur on the productivity of work time. We fail to find significant effects of either entrepreneurial experience or age. Hence, there is no support for Hypotheses 8 or 9. With respect to the controls we find that existing firms (i.e., restarts or takeovers) are characterized by a higher productivity than firms started from scratch. Also, firms that contract out activities are characterized by a higher (expected) productivity than firms that do not engage

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[15] For this reason we include *Commute* as a variable explaining productivity and as a competing time-consuming activity in our nonlinear model.

in outsourcing. A firm with more employees has a higher productivity. It seems that having more employees enables effective delegation of activities. Note that *Commute* is included two times in the model to enable us to disentangle the negative effect of commute time as a competing time-consuming activity, and its positive effect via productivity, possibly reflecting the ambition level of the entrepreneur.

5.3 Explaining actual profitability

In our model it is assumed that entrepreneurs are aware of the influence of the various factors on their productivity. The outcomes of the *nonlinear* model with respect to productivity (a priori) can be compared to the actual impact of the selected variables (a posteriori). This can be done using self-reported profits as the variable to be explained. We perform an ordered probit regression analysis using categorized data on (realized) profits 1 year after start-up (in 1995). Profits are registered as a categorical variable, consisting of 11 categories [numbered 0 to 10: (0) a loss; (1) loss nor profit; (2) profit up to fl. 10,000; (3) profit of fl. 10,000–25,000; (4) profit of fl. 25,000–50,000; (5) profit of fl. 50,000–75,000; (6) profit of 75,000–100,000; (7) profit of 100,000–150,000; (8) profit of fl. 150,000–250,000; (9) profit of fl. 250,000–500,000; (10) a profit of more than fl. 500,000].[16] Fl. (florin) denotes the Dutch guilder, which had an average value of 0.62 US dollars in 1995.[17] The average value for the profit variable in the sample amounts to 2.75 with a standard deviation of 2.08. The average value for women and men amounts to 2.11 and 2.96, respectively. Hence, on average female entrepreneurs had lower profits than their male counterparts in 1995.

Our analysis is based on Eq. 2. We investigate the impact on the categorical profits variable (used as a proxy for $ln\pi$) of all factors included in the nonlinear analysis explaining productivity (γ). We use the number of working hours in 1995 for n. Note that the analysis only gives approximate productivity effects, as a proxy variable is used. Because the profit variable is categorical with different ranges of profit across categories, we apply an ordered probit

regression. Use is made of 561 observations for which data are available on the number of working hours and profits in 1995. Because only a subset of the entrepreneurs answered the profit question 1 year after start-up, there may be some selection bias. Hence, the results should be interpreted as the relationship between hours and profits in 1995 for *surviving* firms. The final column in Table 3 presents the results for the ordered probit analysis explaining profitability, reporting the components of γ_i in the profit equation.

Comparing the outcomes of the *nonlinear* model (estimating expectations of profits) with those of the profit equation (estimating actual profits), we see that entrepreneurial expectations are not completely fulfilled. Although some factors have a relatively similar impact in both models, we identify a difference for others.[18] More specifically, we find that outsourcing and start-up capital have an impact in the *nonlinear* model, but disappear in the profit equation. Both outsourcing and capital investment are costly and may not have strong positive effects on profits in the short run (i.e., 1 year after start-up). We see that the effect of commute time disappears in the profit model. This may be explained by the fact that it is relatively costly (or more costly than expected) to operate from a separate business premises, negatively affecting profits. On the other hand, we see that the negative effect of (female) gender becomes significant in the profit model. This may reflect a difference in ambitions of female and male entrepreneurs, where women are more likely to value quality and pursue other goals, not directly related to financial performance (Rosa et al. 1996; Verheul et al. 2002). In the subsequent section gender effects are discussed in detail.

5.4 Gender effects

On average men work longer hours than women. The mean value for the Hours variable is 3.28 for women

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[16] The category "loss nor profit" implies that actual profitability is close to zero.

[17] Source: www.jeico.com (consulted on 13 March 2008).

[18] We see that entrepreneurial experience has no significant effect in either the nonlinear or profit model. Although most studies in entrepreneurship acknowledge the importance of experience for firm performance, Metzger (2006) argues that not every experience is an indicator of superior knowledge and that experience of failure may be an indicator of incompetence. Westhead and Wright (1998) find that entrepreneurial experience only has a limited effect on performance.

and 4.17 for men in Table 1. We have also seen that the average preference and productivity is lower for women. This indicates that the lower time investments of women are due to a combination of a lower preference for work time and a lower productivity per hour worked. How can we explain these gender differences? We do not find evidence for (direct) gender effects on either side of the nonlinear model, i.e., when controlled for all other relevant factors we see no significant gender effects on preference or productivity.[19] This may be an artifact of the model (multicollinearity) and the estimation technique (least squares versus ordered probit), but it appears that the effects of gender are at least partially mediated by other variables. Comparing the mean values for women and men for the explanatory variables (see Table 1) and using chi-square statistics, we find that, when compared to men, women are more likely to have other income available and are more risk averse, and these factors negatively affect the preference for work time. Furthermore, women have less industry experience and are less likely involved in similar activities as in the past; they invest less financial capital and have less contact with other entrepreneurs. These factors have a positive effect on the productivity of work time. Hence, women work fewer hours than men because of a combination of a lower average preference for work time and a lower productivity per hour worked, which can again be explained by the availability of other income and the risk-averse nature of women (for preferences) and lower levels of human, social and financial capital of women (for productivity).

Although we do not find evidence for a (direct) gender effect on productivity in the nonlinear model, we find a negative effect in the profit model. Indeed, also in the linear analysis we have seen that, when controlling for all other explanatory variables and time-consuming activities, there is a negative *direct* effect of gender on the number of working hours. In these cases gender may serve as a proxy for the effect of an underlying factor that is not included in the

analysis. As discussed earlier, a main candidate for the direct gender effect may be the ambition level of the entrepreneur. It may also reflect the fact that women tend to start in different industries than men. Although we correct for the distinction between service and non-service firms, this is still a relatively crude measure.

6 Summary and conclusion

In this study we test for separate preference and productivity effects on the number of working hours in new ventures of female and male entrepreneurs. We choose a *nonlinear* approach because in a simple *linear* model this separation can not be made. Findings show that individuals have a lower preference for work time if they have other income available, have employees, are more risk-averse and are not motivated to start a business by 'being one's own boss.' Productivity of time is positively related to financial capital invested, industry and relevant experience, contact with other entrepreneurs, number of employees, running an existing firm, having separate business premises and the prevalence of outsourcing activities. The nonlinear nature of our preference-productivity model allows for separating the effects, though at the expense of increased sensitivity of the estimates.

We find evidence for several gender effects. On average, women invest fewer hours in the firm than men because of a lower average preference for work time and a lower productivity per hour worked. The relationship between gender and both preferences and productivity is mediated by some explanatory factors. The lower female preference for work time can be explained by the availability of other income and the risk-averse nature of women, while the lower female productivity is due to lower levels of human, social and financial capital and the fact that women run relatively small firms. In the linear and profit analyses, we find a negative direct effect of gender on working hours and profit. This 'residual' effect may be attributed to omitted variables. Additional variables could be included in the analysis, capturing goals and ambition levels as well as the nature of family responsibilities, to find out whether the effect is driven by persisting traditional gender roles or is in fact a conscientious choice of women.

The expectations of entrepreneurs about the factors that influence their productivity do not completely

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[19] The lack of statistical significance of the gender effects of -0.049 and -0.036 on preference and productivity, respectively, does not imply that the size of the effect for gender is small. In fact, the combined effect is about equal in size as the effect in the linear model. It only indicates that the model cannot precisely discriminate the two gender effects.

coincide with their actual impact on profits. Differences between the time allocation and profit model may be explained by a longer time lag between hours invested and profitability, and overconfidence. Judgments of entrepreneurs in new ventures may be subject to overoptimism (Camerer and Lovallo 1999; Busenitz and Barney 1997). For example, the costs of outsourcing or rental of a business premises may outweigh their expected benefits, negatively affecting realized profits.

There are several limitations to the model and variables used in this study. First, the distinction between service, trade and manufacturing/construction firms is relatively crude, and probably does not fully capture industry differences. In addition, the effect of social capital could be studied more in-depth, expanding networking to include support from significant others (e.g., family, friends). Another limitation is that the model optimizes time invested in two types of activity: work in the business and leisure. The model could be extended to optimize over time invested in a range of activities, though application is restricted by data availability. The large majority of start-ups in the sample do not have employees. Accordingly, we draw conclusions on the preference for work time and the productivity per time unit mainly for owner-managed new ventures. Finally, we measure work effort in terms of the number of hours allocated to the business, neglecting the fact that a high number of hours does not necessarily imply high work intensity. This could be the case when the entrepreneur spends much time in the business, but does not use this time efficiently.[20] However, we do investigate productivity of work time in the nonlinear model.

Our analysis suggests that women invest less time in the business than men because of a lower (expected) productivity and a lower preference for work time. This suggests two routes for policy makers to stimulate time investments of women in the business. The first is to influence women's preferences for investing time in the business, for example, by illustrating the excitement and the challenge to run your own business. Secondly, the productivity of women may be enhanced by creating awareness of the importance of relevant experience and knowledge for

new venture success, advising them to acquire more experience in a wage-job in a similar sector or absorb relevant knowledge and learn from the experiences of successful entrepreneurs. Female entrepreneurs are more likely to ask family members for advice than their male counterparts (Marsden 1987; Greve and Salaff 2003), which may relate to the difficulty of expanding their networks to the male-dominated business circuits (Renzulli et al. 2000).

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[20] Douglas and Shepherd (2000, p. 236) define work effort as the product of working hours and an index of work intensity.

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