New Small Start-ups Dynamics with Endogenous Initial Capital, Bank Loan and Public Aids.

Konstantin Arshakuni*, Thierry Kamionka†

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Abstract

IIn this paper we examine the dynamics of new small firms. The survey SINE 98, performed by INSEE (France), provides information on the new firms that emerged during the first six months of 1998 and their evolution during the following five years. The principal initial characteristics such as initial capital, bank credit and public assistance are likely to be endogenous with respect to the post-entry performance of new enterprises. Therefore, we have estimated two joint dynamics models: a model of employment dynamics and a lognormal survival model. These models were estimated using contemporary simulation-based techniques (GHK-simulator). We find that both financial and human capitals are the main factors that determine the firm's post-entry performance. Our findings indicate that public subsidies and tax exemptions have a significant impact not only on the firm's dynamics, but also on the initial capital and the provision of bank loans. This result has particular importance for the design of public assistance programs for new enterprises, since the initial size of a start-up is a key factor of its post-entry performance (Evans, 1987b; Audretsch and Mahmood, 1995).

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*University Paris 1 Pantheon-Sorbonne (TEAM), E-mail: karshaku@univ-paris1.fr
†CNRS and CREST, Paris. E-mail: kamionka@ensae.fr

1 Introduction

Over the last few years the understanding of the importance of the role of small and medium enterprises in economic development has been growing constantly in many countries. The main reason for the importance of these firms lies in the fact that they are the productive base on which the whole economy runs and develops. The processes of birth, death and renewal of the productive structure occurs more intensively now, when there is internationalization, competition and an accelerating pace of technical progress. In some industries there is an abrupt decrease in the number of enterprises; in others industries there is a steady increase in the number of firms. However, for optimization of regional and industrial policies it is necessary to consider the empirical regularities of industrial dynamics. Undoubtedly, among all the questions that industrial dynamics deals with, research on the demography of new enterprises represents one of the most important subjects, since these new firms generate two main positive economic effects: an increase in competition and an augmentation of total employment.

In France there are numerous public assistance programs aimed at stimulating the creation of new enterprises. One such mechanism is public assistance for different categories of unemployed persons who wish to create their own enterprises. This kind of program is likely to be attractive, because it is related to several positive economic effects. Firstly, it generates a decrease in unemployment; secondly, it produces a reduction in the total amount of unemployment benefits; thirdly, it can generate an increase in the number of hired workers at these emerging enterprises. Nevertheless, such programs are very costly and the problem of evaluating their impact arises naturally. Given that no experimental data is available, this problem can be solved only by modelling the genesis and development of new enterprises while accounting for the existence of selectivity phenomena.

One of the major problems in the analysis of firms' dynamics consists in the potential endogeneity of some of the variables of interest. In this paper, we emphasize the problem of endogeneity of initial capital, bank loan provision and different types of public assistance with respect to the post-entry performance of new small enterprises. A joint estimation approach is used to solve this problem. Using the model of firm emergence developed in Arshakuni and Kamionka (2004), we construct and estimate two joint models of firm dynamics: a model for the employment dynamics of new enterprises and a lognormal survival model. In order to estimate these models with a flexible error term structure we used a simulation-based estimation technique (GHK-simulator). To the best of our knowledge, this paper is the first to adopt this kind of approach in the study of firms' dynamics.

In the second section we present the main aspects of the study and the related literature, along with testable empirical implications. In the third section the data set of the study and the testable hypotheses are introduced. In the fourth and the fifth sections we present a model of employment dynamics and a firm survival model, along with estimation results. Conclusions are given in section six.

2 Post-entry dynamics of new enterprises

Empirical studies on industrial dynamics have become very popular recently. Starting with the work of Gibrat (1931), the relationship between firm size, firm growth and firm survival has been subject to considerable scrutiny. Recent contributions to this literature include the studies of Dunne et al. (1988, 1989), Hall (1987) and Evans (1987a, 1987b). The main goal of these studies in the field of industrial dynamics was the analysis of the principal factors that influence firms' performance, evolution, and especially survival. The studies of Mowery (1983), Bates (1990), Audretsch (1991), Mata and Portugal (1994, 2001), Wagner (1994), Audretsch and Mahmood (1995), Cressy (1996) and Harhoff et al. (1998) have noticeably increased the quantity of empirical results concerning firm survival. However, in this study we introduce a number of novel elements into the empirical analysis of firms' dynamics.

First, we draw an important distinction between the dynamics of different cohorts of enterprises with different categories of entrepreneurs. A number of empirical studies, due to the absence of proper data, considered samples of enterprises that are likely to be heterogeneous with respect to post-entry dynamics. It should be emphasized that the differences in the dynamics of such groups of enterprises can be only partially captured by incorporating dummy variables in the regression model. In this study, the estimations were performed for three subsamples of entrepreneurs, defined according to their status on the labor market before start-up creation: previously employed, short term unemployed (<12 months) and long term unemployed (>12 months).

Secondly, the other problem considered in this paper is related to the endogeneity of the financial variables with respect to the post-entry performance of new enterprises. It should be noted that the problem of endogeneity of financial variables is often highlighted in studies on industrial dynamics. For example, Bates (1990) did not include initial capital as an explanatory variable in the model while analyzing the survival of new small enterprises, since he considered the formation of initial capital to be purely endogenous with respect to survival. He argues: "The ability of owners to raise debt capital is related to the values of other explanatory variables: the financial structure of the small business at the point of startup is therefore endogenous" (p.551). The problem of the interrelatedness of the explanatory variables is handled initially by excluding financial capital variables and by assuming that there is no relationship between the viability of the firm and its financial structure. In our opinion, the idea that the initial financial variables of the start-up are endogenous with respect to its post-entry dynamics is well justified from an economic point of view. One of the main aspects of the endogeneity of the initial financial structure of a new firm is its relation to the problem of liquidity constraints. Whether or not liquidity constraints exist is highly debated in the literature. One possible testable hypothesis for the existence of liquidity constraints consists in considering the influence of initial financial capital variables along with human capital variables in the dynamic equation for firm viability. So, assuming that liquidity constraints are absent, we should not find any impact of financial variables on the post-entry dynamics if appropriate financial capital variables are included. Nevertheless, the incorporation of initial capital structure in the post entry dynamic equation constitutes here the main econometric problem. However, in some studies, for example, in Cressy (1996) this problem does not seem to be treated in a proper manner: the financial variables are included directly in the dynamic equation. As a result, a rather controversial conclusion is obtained: financial variables do not influence the dynamics of new enterprises if human capital is controlled for: ergo there are no liquidity constraints. Nevertheless, in a number of other studies different conclusions have been obtained after analyzing the entrepreneurial dynamics in the framework of liquidity constraints. For instance, Holtz-Eakin et al. (1994), Blanchflower and Andrew (1998), Evans and Jovanovic (1989) support the assumption that the start-up financial capital is endogenous with respect to the start-up's dynamics, and these researchers came to the conclusion that liquidity constraints are present. In our opinion, liquidity constraints while forming the initial capital of new enterprises are likely to be binding, since asymmetric information does not allow banks, using observable characteristics, to provide the same contract scheme as if there was complete information, as noted by Stiglitz and Weiss (1981). Moreover, one should not neglect the expectations of a potential creator about his/her future project—one should not rule out the possibility that two entrepreneurs with the same level of human capital would choose different levels of initial capital due to different expectations about the success of the future business. In order to solve the problem of endogeneity of an explanatory variable, two main methods can be used. One can adopt an instrumental variables approach, or one can perform a joint estimation. The first approach was implemented by Blanchflower and Andrew (1998), Evans and Jovanovic (1989), Holtz-Eakin and Joulfaian (1994), Hurst and Lusardi (2004). The amount of inheritance was considered as an instrument for capital. However, the possibility that the amount of inheritance and the human capital of the recipient are correlated cannot be ruled out. Indeed, we might assume that parents with high human capital leave higher inheritance and that the human capitals of parents and children are correlated. So, *a priori*, we can not be sure of the quality of this instrument. Petrova (2004) considered an extension of the Evans and Jovanovic (1989) model. The month-to-month changes of annual rates in the S&P500 stock market index were taken as the instrument for the wealth of a potential entrepreneur. In spite of the fact that this instrument is not likely to be correlated with the error term in the entrepreneurial propensity equation, the quality of such an instrument is much less obvious. Consequently, due to the problems associated with the choice of an instrument for initial capital, we have decided to solve the problem of endogeneity by using a joint estimation.

The third question we have treated in this study in a original manner is determining the impact of different types of public assistance on the dynamics of new firms and on the initial parameters of the project. It should be noted that this question is very difficult to examine in a proper econometric manner, since in order to model the influence of public assistance on firm performance, one should also take into account not only the selection problems associated with the criteria of eligibility: it is also possible that public assistance may influence the initial conditions of the start-ups' creation (initial capital formation and bank loan provision).

3 Data and testable hypotheses

We have used a French data set collected by The National Institute of Statistics & Economic Studies (INSEE) for analysing the dynamics of new enterprises. The programme "SINE 98" (System of Information about New Enterprises) was designed for collecting information on the creation and functioning of new enterprises. "SINE 98" started in 1998 by circulating a questionnaire among the enterprises that emerged in the first 6 months of 1998. The initial sample is about 30% (30000) of all such enterprises. Information was first gathered in September 1998, and later in September 2001 and in September 2003.

3.1 Determination of firms' dynamics

In studies in industrial dynamics, the concept "dynamics of enterprises" is used to refer to the changes of the key parameters of a firm over time, such as size, market share, interactions with other enterprises and how it is created and liquidated. In this paper, we consider two approaches to firms' dynamics: the evolution of employment at new firms, and the survival of start-ups. The evolution of employment is defined as the change in the total employment in new enterprises over the period from creation (the first six months of 1998) to the September 2003, in other words, over a 5-year period.

The dependent variable for the dynamics will be represented by a categorical variable D, which will take one of the following values:

1 - for enterprises which ceased to be active during the period of observation (liquidation);

2 - for enterprises with a decrease in the total number of employees during the period of observation (decline);

3 - for enterprises with the same total number of employees during the period of observation (stagnation);

4 - for enterprises with an increase in the total number of employees during the period of observation (growth);

Such data fits well in the framework of an Ordered Probit model. The basic assumptions of dependences between the endogenous variables are depicted in Figure 1.

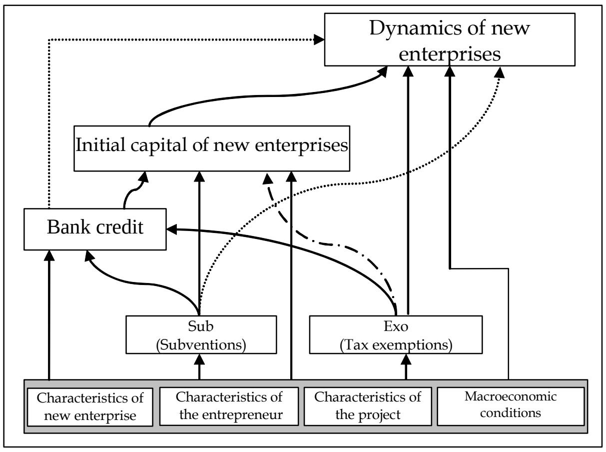

Fig. 1. Dependence pattern of endogenous variables

We assume that some exogenous factors influence the major initial parameters of new enterprises, and that both endogenous and exogenous variables have an impact on the post-entry dynamics of new enterprises. We assume that the initial capital, the bank loan and subventions influence the dynamics due to the existence of liquidity constraints: additional capital can help start a project closer to the minimum efficient scale of production (MES). As shown in the study of Audretsch and Mahmood (1995), the disadvantages of operating at a suboptimal scale for a given industry can be a crucial factor in explaining the viability of new enterprises. Bank loans and subventions are supposed to influence firms' dynamics due to differences in capital structure, which may in turn affect the performance of new enterprises. Tax exemptions are assumed to influence directly the profits of the new enterprises.

In the framework of the dependence pattern of endogenous variables postulated above, we consider two post-entry dynamics of new enterprises: a model of employment dynamics and a model of new firm viability. From one point of view, these models can be considered to be complementary: the first model examines the dynamics in terms of employment generated by the new firm at a qualitative level, and the second model enables us to capture the time pattern of start-ups' survival. From a different standpoint, these models consider related aspects of the post-entry performance of new enterprises and, *a priori*, their qualitative results are likely to be similar.

Table 1: *Discription of the thresholds of the initial capital*

Value	Level of initial capital
1	less than 10 000 F (less than 1524 Euros)
2	from 10 000 to 25 000 F (from 1524 Euros to 3811 Euros)
3	from 25 000 to 50 000 F (from 3811 Euros to 7622 Euros)
4	from 50 000 to 100 000 F (from 7622 Euros to 15245 Euros)
5	from 100 000 to 250 000 F (from 15245 Euros to 38112 Euros)
6	from 250 000 to 500 000 F (from 38112 Euros to 76221 Euros)
7	more than 500 000 F (more than 76221 Euros)

3.2 The subsample of the study

For empirical analysis, as in Crépon and Duguet (2003), only pure creations, where the entrepreneur was active on the labor market prior to the creation of his new business, were taken into consideration. In addition, subsidiaries and French overseas departments were omitted from the study subsample. Econometric analysis was conducted separately for three subsamples of entrepreneurs depending on their status on the labor market prior to the creation of a new firm (employed, short term (<12 months) unemployed, and long term (>12 months) unemployed). Stratified analysis was used in an attempt to alleviate the problems caused by the unobserved heterogeneity of the firms (there is a strong probability that these subsamples are characterized by different post-entry dynamics).

3.3 The particularities of endogenous variables

It should be mentioned that the main variables of the study are presented in the SINE questionnaire as categorical or binary. The endogenous variables are the initial capital K, the presence of bank credit $Credit$, the existence of subventions Sub and tax exemptions Exo, and the firm's performance, measured as the firm's employment evolution (D, described above) and the firm's "life duration" (T, described in section 5). Initial capital is presented as a categorical variable (see Table 1).

The distribution of initial capital for the three types of entrepreneurs is presented in Table 7 in the Appendix. It should be highlighted that according to numerous studies, for instance, Evans (1987b), Mata and Portugal (1994), Wagner (1994), Audretsch and Mahmood (1995), Mahmood and Bruderl

(1996), Mahmood (1997), start-up size is a crucial factor in explaining post-entry performance. This general observation is supported well by the empirical survival functions estimated[1] for the merged three subsamples (see Figure 2): the start-ups with higher levels of initial capital are characterized by a higher probability of survival.

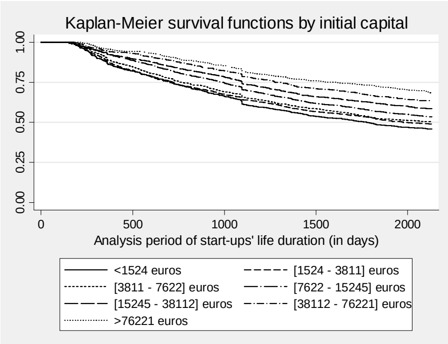

Fig. 2. Survival curves by K

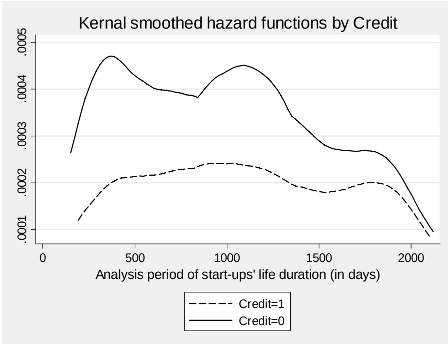

Fig. 3. Hazard curves by Credit

Bank credit is presented as a binary variable: either a bank loan is present or not. Kernel smoothed hazard functions[2] stratified by the presence of a bank loan show that there is a significant difference between the survival pattern of these two groups of start-ups (see Figure 3). New firms which obtained bank credit have a much lower probability of liquidation at any moment of time, especially during the first years of existence.

Different types of public assistances in SINE 98 are also given as binary variables (see Table 2). For the econometric models two aggregate variables of two main types of assistances were created:

1) Direct financial assistance, denoted *Sub* in the model. It assumes the value of 1 if the new enterprise obtained at least one type of assistance of categories '1', '2', '3', '4' or '5', and zero otherwise.

2) An indicator of the presence of a tax exemption, denoted *Exo* in the model. It assumes the value of 1 if the new firm obtained at least one type of assistance of categories '6', '7', '8' or '9', and zero otherwise.

The distribution of bank loan and public assistances is presented in the Table 8 in Appendix. The smoothed hazard functions stratified by the main aggregate public assistances are depicted on the Figure 4 and 5.

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[1] All survival analysis graphs were obtained while taking into account the stock sampling problem.

[2] All smoothed hazard functions are obtained using Epanechnikov kernel.

Table 2: *Categories of public aids in the questionnaire SINE 98*

Category N^o	Description
'1'	Local or regional subvention
'2'	Other types of subvention
'3'	Loans
'4'	Reimbursable advance, interest-free loan
'5'	Dotation in kind (provision of production facilities)
'6'	Tax relaxations related to ACCRE
'7'	Exemption of professional tax
'8'	Other types of tax relaxation
'9'	Other types of exemptions of social payments (different from ACCRE)
'10'	Other types of public assistances (informational and consulting services, etc.)

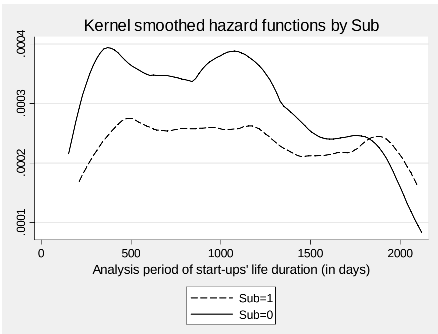

Fig. 4. Hazard curves by Sub

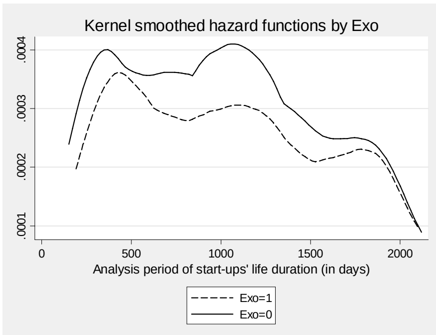

Fig. 5. Hazard curves by Exo

New enterprises which received public assistance are characterized by lower hazard rates. Nevertheless, the criteria for receiving such assistance depend on a number of factors, among them the category of the enterprise, the characteristics of the creator, the sector of activity, as well as regional specifics. Apparently, as mentioned above, public assistance for new enterprises cannot be considered as exogenous, since its allocation depends on certain criteria that can be correlated with the factors that determine the survival of these firms.

3.4 Explanatory variables of analysis

The exogenous variables of the study are presented in Table 3[3].

Table 3: *Exogenous variables definitions*

Single Proprietorship	=1, if enterprise is individual and 0, otherwise
Artisan	=1, if enterprise belongs to the craft industry
Franchise	=1, in the case of franchise contract
Technical School	=1, if entrepreneur has diploma of technical school
High School	=1, if entrepreneur has diploma of high school
Undergraduate	=1, if entrepreneur has undergraduate diploma or higher
[a;b]	=1, if creator's age belongs to interval [a;b]
Other EU	=1, if entrepreneur is foreigner not from EU
Female	=1, if entrepreneur is female
Age	Age of entrepreneur at the moment of creation
Age^2	Age squared
Experience	=1, if entrepreneur has experience in the business of his start-up
Related exp.	=1, if entrepreneur has experience in the business related to his start-up
Entrepreneur	=1, in the case of existence of entrepreneurial entourage
Nb of creations	Number of past enterprises' creations
New Idea	=1, if the case of new idea existence
Taste for	=1, if entrepreneur has high propensity to be self-employed
Opportunity	=1, in the case of favorable situation for creation
Project of couple	=1, if the project is set up with a cohabitee
With family	=1, if the project is set up with a relative (kin)
Previous firm	=1, if the project is set up with a colleague from previous work
Previous employer	=1, if the project is set up with a previous employer

See the next page...

[3]Descriptive statistics for explanatory variables are presented in the Appendix, Table 11.

... continuation of the Table 3

Free premises	=1, in the case of free premises existence

3.5 Existing models of firms dynamics. Testable hypothesis

In the literature there are two main models of firms' survival in the context of liquidity constraints. The model of Evans and Jovanovic (1989), which we will refer to hereafter as the EJ-model, and the model of firm's survival base on human capital of Cressy (1996) (the HC-model). The main differences between these models lie in how human capital and financial variables influence the firm's performance. In the EJ-model it is assumed that the variables dealing with the human capital of the entrepreneur do not directly influence the firm's survival, while the financial variables do have a direct impact on the firm's viability. Here, we consider a *combined model,* referred to hereafter as the *C-model,* which is based on the implications of the model of firm creation considered in Arshakuni and Kamionka (2004). The expected influence of the main factors on the firm's performance is summarized in Table 4. It can be seen that the C-model includes various types of public assistance and regional dummy variables in the analysis. In addition, unlike the EJ- and HC-models, the C-model assumes that both human capital and financial capital variables have a positive impact on the firm's viability. Nevertheless, along with such proxies of human capital as age (which is the key proxy for human capital in the HC-model), the C-model emphasizes the incorporation of human capital proxies such as level of educational, business experience (related business experience), and entrepreneurial entourage. The expected wage from hired workers is not directly included in the C-model, due to the lack of pertinent proxy, but entrepreneurs with *a priori* different reservation levels (the former employed and unemployed individuals) are analyzed; this softens the omitted variable problem. Endogenous initial capital and bank credit provision have a positive impact on the firm's performance due to the entrepreneur's anticipations and credit rationing. Subsidies also help to soften the liquidity constraints. Tax exemptions have a positive impact on the net cash flow of start-ups, thereby increasing the probability of success.

A more extended set of testable hypotheses in the framework of the C-model is given below[4]:

[4] All hypotheses are stated *ceteris paribus.*

Table 4: *Influence of main factors on the firm's performance*

Variables (Proxies)	EJ-model	HC-model	C-model
Human capital	0/?	+	+
Expected wage	0	0	?
Financial assets (initial capital)	+/0	0	+
Bank credit	?	0	+
Public assistance (subventions)	?	?	+
Public assistance (tax exemptions)	?	?	+
Sector dummies	?	significant	significant
Regional dummies	?	?	significant

Legend

+ - have a positive impact	0/? - most likely have a zero impact
0 - have a zero impact	+/0 - have a positive or a zero impact
	? - was not included in the model

Hypothesis $H_1(a)$*: There is a positive concave relation between the entrepreneur's age and the post-entry performance of his start-up*[5] *(variables* Age *and* Age^2*).*

Hypothesis $H_1(b)$*: A high level of education of the entrepreneur enhances the post-entry performance of his start-up (variables* $Technical\ School$, $High\ School$ and $Undergraduate$*).*

Hypothesis H_2*: Specific human capital is directly positively correlated with the entrepreneur's managerial capacities and start-up performance (variables* $Experience$, *Related exp.*, $Entrepreneur$, $Nb\ of creations$*).*

Hypothesis H_3*: The existence of different business partners (entrepreneurial entourage) increases the "group human capital" of the project and enhance the dynamics of new enterprises (variables* $Project\ of\ couple$, $With\ family$, $Previous\ firm$, $Previous\ employer$*).*

Hypothesis H_4*: The existence of innovative elements in the emerging businesses increase competitive advantages, which has a positive effect on post-entry performance (variable* $New\ Idea$*).*

Hypothesis H_5*: The existence of more precise information about the prices*

[5]The entrepreneur's human capital depreciates over time and requires investment to maintain its value, so if at a certain time depreciation (either physical - age, or moral - knowledge becomes obsolete) exceeds investment, the relation between entrepreneur's human capital and age will be concave (see also Cressy, 1996, p. 1256).

of goods (services) of emerging business and a better knowledge of the potential demand reduce the uncertainty and, consequently, enhance the post-entry performance of new firms (variable $Franchise$*).*

Hypothesis H_6*: A high propensity to be self-employed*[6] *and favorable conditions for firm creation have a positive impact on the post-entry performance of such enterprises (variables* $Taste\ for$, *Opportunity).*

Hypothesis H_7*: New firms with limited liabilities*[7] *tend to have better chances of survival and to achieve better performance*[8] *(variable Single Proprietorship).*

Hypothesis H_8*. Existence of liquidity constraints. The liquidity constraints for some projects are binding, so after controlling for human capital variables in the dynamic equation, endogenous financial variables (namely initial capital, bank loan provision and direct financial assistance) can have a significant impact.*

Hypothesis $H_9(a)$*: Public assistance has a direct positive impact on the post-entry performance of new start-ups, and this impact is stronger for the subsample of formerly unemployed entrepreneurs.*

Hypothesis $H_9(b)$*: Public assistance has an indirect positive impact on the post entry performance of new enterprises via their influence on the initial parameters of the project, i.e. the amount of initial capital and the bank loan provision.*

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[6]As shown in the study of Oswald and Blanchflower (1998), self-employment is likely to yield a higher utility level than hired employment. Speaking in terms of this theoretical model, there can exist differences in nonpecuniary utility associated with the independence factor. Consequently, entrepreneurs who get more utility from self-employment are more likely to run their businesses in a more efficient way.

[7]Nevertheless, one might consider the legal form as an endogenous variable, since the legal form is chosen considering a number of initial characteristics of the new enterprises, including initial investment needs. However, it is much less likely to be endogenous in comparison with bank loan provision and public aids. Moreover, this variable is likely to be crucial in explaining the differences of initial capital, and so it was kept in the econometric specification. A solution to the problem of possible endogeneity consists in the exclusion of the legal form dummy variable from the specification. This solution is likely to increase the significance of other explanatory variables, as in this case they would explain more variance of dependent variables.

[8]This hypothesis is well supported by the study of Harhoff et al. (1998).

4 The model of employment dynamics of new enterprises

We consider the system of initial conditions for the firm's creation (Arshakuni and Kamionka, 2004) which accounts for the interaction between initial capital, bank loans and public assistance. We also add an equation for the firm's dynamics:

$$\begin{cases} lnK^* = & X_1\beta_1 + \gamma Credit + \delta_1 Sub + \delta_2 Exo + \varepsilon_1, \\ Credit^* = & X_2\beta_2 + \theta_1 Sub + \theta_2 Exo + \varepsilon_2, \\ Sub^* = & X_3\beta_3 + \varepsilon_3, \\ Exo^* = & X_4\beta_4 + \varepsilon_4, \\ D^* = & X_5\beta_5 + \pi K + \varkappa Credit + \vartheta_1 Sub + \vartheta_2 Exo + \varepsilon_5, \end{cases} \quad (1)$$

where lnK^* is a latent variable, the logarithm of initial capital; $Credit^*$ is a latent variable, the presence of a bank credit for supplying the initial capital; Sub^* is a latent variable for the presence of a public subsidy; and Exo^* is a latent variable associated with the presence of tax exemptions. The choice of vectors X_1, X_2, X_5 was made on the basis of existing models for firm creation and dynamics[9], and on the basis of empirical results obtained in previous studies[10]. The choice of vectors X_3, X_4 was made by considering the eligibility criteria for public assistance. Different sets of regressors were included in each equation containing endogenous variables because of exclusion restrictions.

We assume that the random terms ε_1, ε_2, ε_3, ε_4, ε_5 are distributed jointly as a normal random variable with mean zero and covariance matrix Ω:

$$\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \end{pmatrix} \sim N(0,\Omega), \text{ where } \Omega = \begin{bmatrix} \sigma^2 & \sigma\rho_{12} & \sigma\rho_{13} & \sigma\rho_{14} & \sigma\rho_{15} \\ \sigma\rho_{12} & 1 & \rho_{23} & \rho_{24} & \rho_{25} \\ \sigma\rho_{13} & \rho_{23} & 1 & \rho_{34} & \rho_{35} \\ \sigma\rho_{14} & \rho_{24} & \rho_{34} & 1 & \rho_{45} \\ \sigma\rho_{15} & \rho_{25} & \rho_{35} & \rho_{45} & 1 \end{bmatrix}. \quad (2)$$

The specification of the random terms is likely to be suitable from an econometric point of view, since the joint normal distribution is relatively

[9]See Evans and Jovanovic (1989), Cressy (1996) and an illustrative model of new firm genesis proposed by Arshakuni and Kamionka (2004).

[10]See Evans (1987a,b), Bates (1990), Audretsch and Mahmood (1995), Cressy (1996), Mata and Portugal (1994, 2001).

robust to the specification errors due to its flexible correlation structure[11] (Robinson, 1982).

The initial capital, K_i is an ordered discrete variable[12]. The binary variable $Credit_i$ is a dummy variable associated with the presence of a loan; Sub_i and Exo_i are dummy variables for the receipt of a financial subsidy and for the existence of tax exemptions, respectively[13]. The observed variables K_i, $Credit_i$, Sub_i and Exo_i for the firm i are related to their latent counterparts by[14]:

$$\begin{cases} K_i = & \sum_{k=1}^{7} k\ \mathbf{1}\left[\alpha_{k(i)-\mathbf{1}} < lnK_i^* \leq \alpha_{k(i)}\right], \\ Credit_i = & \mathbf{1}\left[Credit_i^* > 0\right], \\ Sub_i = & \mathbf{1}\left[Sub_i^* > 0\right], \\ Exo_i = & \mathbf{1}\left[Exo_i^* > 0\right], \\ D_i = & \sum_{j=1}^{4} j\ \mathbf{1}\left[\gamma_{j(i)-1} < D^* \leq \gamma_{j(i)}\right]; \end{cases} \tag{3}$$

Here $\alpha_{k(i)}$ denotes the threshold of the initial capital ($\alpha_1 < \alpha_2 < ... < \alpha_6$, $\alpha_0 = -\infty$, $\alpha_7 = +\infty$). The thresholds $\alpha_{k(i)}$ $\{k(i) = 1, \ldots, 6\}$ can be observed (see Table 1). D_i^* is a latent variable associated with employment dynamics D_i, which is described above, and $\gamma_{j(i)}$ $\{j(i) = 1, ..., 4\}$ denotes an unobservable threshold for employment dynamics ($\gamma_1 < \gamma_2 < \gamma_3$, $\gamma_0 = -\infty$, $\gamma_4 = +\infty$).

This type of model can be estimated using simulated estimation methods, namely by means of a GHK-simulator in the framework of the Simulated Maximum Likelihood approach (SML), or by using the Method of Simulated Scores (MSC). As an alternative specification, one might use a Multinominal Logit Model (MLM)[15]. But this kind of specification suffers from the restrictions imposed by the Independence of Irrelevant Alternatives (IIA) hypothesis (see, for example, Weeks (1995) or McFadden and Ruud (1994)). However, some researchers, for example Stern (1997), argue that this kind

[11]The variances of $\varepsilon_2, \varepsilon_3, \varepsilon_4, \varepsilon_5$ are taken to be equal to 1, since latent variables $Credit^*$, Sub^*, Exo^* and D^* are not observable. But the variance of ε_1 can be identified, since the thresholds of the initial capital are observable.

[12]$K \in \{1, 2, \ldots, 7\}$.

[13]The construction of the variables Sub and Exo is described above.

[14]$\mathbf{1}\,[.]$ represents an indicator: $\begin{cases} \mathbf{1}\,[event] = 1, & \text{if the event is true,} \\ \mathbf{1}\,[event] = 0, & \text{otherwise.} \end{cases}$

[15]and assume, consequently, that the random terms are distributed according to the Extreme Value distribution.

of problem can be alleviated by using Nested Logit Models[16], but in this case it would be necessary to set up hypotheses about the nesting structure of the model which are, *a priori*, ambiguous. Moreover, Weeks (1995) and Hajivassiliou (1994) have shown that the econometric specifications similar to (1)-(3) perform very well in Monte-Carlo studies.

4.1 Individual likelihood function representation and estimation method

Based on the model's specification (1)-(3), individual contribution to the likelihood function for the firm i can be written as follows:

$$\begin{aligned} L_i &= L_i\left(\beta_1, \ldots, \beta_5, \gamma, \delta_1, \delta_2, \theta_1, \theta_2, \pi, \varkappa, \vartheta_1, \vartheta_2, \gamma_1, \gamma_2, \gamma_3; \Omega\right) \\ &= \int_{a_{i1}}^{b_{i1}} \int_{a_{i2}}^{b_{i2}} \int_{a_{i3}}^{b_{i3}} \int_{a_{i4}}^{b_{i4}} \int_{a_{i5}}^{b_{i5}} \phi\left(\upsilon_1, \upsilon_2, \upsilon_3, \upsilon_4, \upsilon_5; \Omega\right) d\upsilon_1 d\upsilon_2 d\upsilon_3 d\upsilon_4 d\upsilon_5, \end{aligned} \tag{4}$$

where

$$\begin{cases} a_{i1}=\alpha_{k(i)-1} - \mu_{i1}, & a_{i5}= \boldsymbol{\gamma}_{j(i)-1} - \mu_{i5}, \\ b_{i1}=\alpha_{k(i)} - \mu_{i1}, & b_{i5}= \boldsymbol{\gamma}_{j(i)} - \mu_{i5}. \end{cases} \tag{5}$$

The parameters $\alpha_{k(i)}$ are the levels of initial capital, $\boldsymbol{\gamma}_{j(i)}$ are the thresholds for the latent dynamic variable D^*; $\mu_{i1}=X_{i1}\beta_1+\gamma Credit_i+\delta_1 Sub_i+\delta_2 Exo_i$, $\mu_{i2} = X_{i2}\beta_2 + \theta_1 Sub_i + \theta_2 Exo_i$ and $\mu_{i5}=X_{i5}\beta_5 + \pi K_i + \varkappa_1 Credit_i + \vartheta_1 Sub_i + \vartheta_2 Exo_i$. $\phi\left(\boldsymbol{\nu}; \Omega\right)$ is the probability density function of the multivariate normal distribution $N\left(0, \Omega\right)$, and

$$\begin{cases} a_{i2} = -\infty & and & b_{i2} = -\mu_{i2}, & if & Credit_i = 0, \\ a_{i2} = -\mu_{i2} & and & b_{i2} = +\infty, & if & Credit_i = 1, \\ a_{i3} = -\infty & and & b_{i3} = -X_{i3}\beta_3, & if & Sub_i = 0, \\ a_{i3} = -X_{i3}\beta_3 & and & b_{i3} = +\infty, & if & Sub_i = 1, \\ a_{i4} = -\infty & and & b_{i4} = -X_{i4}\beta_{i4}, & if & Exo_i = 0, \\ a_{i4} = -X_{i4}\beta_4 & and & b_{i4} = +\infty, & if & Exo_i = 1. \end{cases} \tag{6}$$

The individual likelihood function contains a five-dimensional integral that cannot be calculated analytically (see, for example, McFadden and Ruud, 1994), and it is difficult to calculate this integral numerically accurately[17]. For this reason the integrals were approximated using the GHK-

[16] That is to say, by the General Extreme Value assumption.

[17] This problem is also known as the "Curse of Dimensionality".

simulator[18]. The high efficiency of these simulators has been often noted (McFadden, 1989; Christopher, Gregory and Tholl, 1998; Hajivassiliou, 1994).

The logarithm of the approximation of the likelihood function, simulated using the GHK-simulator, can be written as follows:

$$\begin{aligned} &\ln \widehat{L}\left(\beta_1, \ldots, \beta_5, \gamma, \delta_1, \delta_2, \theta_1, \theta_2, \pi, \varkappa, \vartheta_1, \vartheta_2, \gamma_1, \gamma_2, \gamma_3; \Omega\right) \\ &= \sum_{i=1}^{N} \ln \left(\frac{1}{H} \sum_{h=1}^{H} P_{i1} P_{i2}^h P_{i3}^h P_{i4}^h P_{i5}^h \right), \end{aligned} \tag{7}$$

where $P_{i1}, P_{i2}^h, P_{i3}^h, P_{i4}^h, P_{i5}^h$ are the functions of estimating parameters, data and random draws h specific to the firm, given in the Appendix[19]. The simulated log-likelihood function is maximized using standard optimization routines.

4.2 Estimation results of the joint dynamic model

The model (1)-(3) was estimated in STATA 8 by implementing a GHK-simulator algorithm and maximizing the corresponding simulated likelihood function (7) using 200 random draws for each firm. The estimation results for employment dynamics equation are presented in Table 5[20]:

Table 5: Employment dynamics equation estimates

Variable	Employed	Unemployed (< 12 months)	Unemployed (> 12 months)
Single Proprietorship	-0,463***	-0,502**	-0,563***
	(0,105)	(0,199)	(0,145)
Artisan	0,227***	0,273***	-0,042
	(0,055)	(0,095)	(0,100)

See the next page...

[18]The GHK-simulator, developed by Geweke (1991), Hajivassiliou (1990) and Keane (1994), has been found to perform very well in several Monte-Carlo studies that involved the simulation of such integrals (Geweke, Keane and Runkle, 1994; Hajivassiliou, McFadden, and Ruud, 1996).

[19]For a detailed description of the GHK-simulator, see Stern (1997).

[20]In all equations 8 business sector and 21 location dummy variables were included. The estimation results for initial capital and bank loan equations of the model are presented in the Tables 12 and 13 of Appendix.

Location and business sector dummy variable coefficients are not reported for brevity. Estimation results for the public aid equations are not reported for the same reason.

...continuation of the Table 5

Variable	Employed	Unemployed (< 12 months)	Unemployed (> months)
Franchise	0,026*	0,057	0,015
	(0,010)	(0,088)	(0,080)
Free premises	0,043**	0,046	0,120*
	(0,021)	(0,048)	(0,065)
Female	-0,166***	-0,146**	-0,121***
	(0,034)	(0,064)	(0,050)
Other EU	-0,266***	-0,380***	-0,083
	(0,076)	(0,123)	(0,098)
$Age{*}10^{-1}$	0,489***	0,838***	0,051
	(0,100)	(0,197)	(0,236)
$Age^2 * 10^{-2}$	-0,053***	-0,095***	0,006
	(0,013)	(0,026)	(0,030)
Technical school	0,135***	0,068*	-0,054
	(0,041)	(0,039)	(0,074)
High school	0,140***	0,169*	0,032
	(0,048)	(0,082)	(0,106)
Undergraduate	0,172***	0,293***	0,105*
	(0,049)	(0,087)	(0,056)
Nb of creations	-0,133***	-0,014	-0,089
	(0,042)	(0,063)	(0,071)
Experience	0,290***	0,256***	0,097*
	(0,033)	(0,053)	(0,049)
Related exp.	0,155***	0,121**	-0,057
	(0,042)	(0,053)	(0,056)
Entrepreneur	0,056*	0,051**	0,150***
	(0,029)	(0,025)	(0,044)
New Idea	-0,045	-0,104*	0,004
	(0,038)	(0,062)	(0,063)
Taste for	0,060***	-0,002	0,058***
	(0,015)	(0,022)	(0,022)
Opportunity	0,012*	0,067***	-0,003
	(0,006)	(0,016)	(0,020)
Project of couple	0,051	0,136***	0,117**
	(0,033)	(0,048)	(0,057)

See the next page...

...continuation of the Table 5

Variable	Employed	Unemployed (< 12 months)	Unemployed (> months)
With family	0,075**	-0,032	-0,051
	(0,035)	(0,064)	(0,067)
Previous firm	0,028	-0,082	-0,255
	(0,056)	(0,112)	(0,193)
Previous employer	0,029	0,076	0,478**
	(0,076)	(0,147)	(0,232)
Capital	0,038***	0,095	0,093
	(0,014)	(0,135)	(0,105)
Bank loan	0,248*	0,508***	0,407*
	(0,136)	(0,188)	(0,219)
Subsidy	0,123**	0,192*	0,229
	(0,055)	(0,104)	(0,214)
Exemption	0,071	0,114**	0,341*
	(0,142)	(0,051)	(0,175)
Threshold1	1,408***	1,979***	1,151**
	(0,348)	(0,579)	(0,477)
Threshold2	1,598***	2,069***	1,226**
	(0,349)	(0,581)	(0,478)
Threshold3	2,281***	2,806***	2,108***
	(0,352)	(0,597)	(0,491)

It can be seen that the human capital variables have a positive impact on the employment dynamics of new enterprises, i.e. hypotheses H_1 and H_2 are likely to be empirically verified. On the whole, the dynamics of enterprises created by the former employed and the former short term unemployed are influenced by human capital variables to a greater extent. The concave relationship between the entrepreneur's age and the dynamics of his firm (hypothesis $H_1(a)$) is observed for the first two subsamples of the businessmen: the coefficients of the variable *Age* are positive and significant; the coefficients of the variables Age^2 are negative and significant. The maximum effect for entrepreneur's age is reached at the age of about 46 years for the former employed and at the age of about 44 years for the former short term unemployed. For the first two subsamples the coefficients of the dummy variables for the level of education are positive and significant. Moreover, start-ups run by entrepreneurs with a higher level of education demonstrate better performance: the corresponding coefficients for the former employed are respectively 0.135; 0.140; 0.172 and for the former short-term unemployed 0.068; 0.169; 0.293 (reference level - no diploma). The entrepreneur's experience is also one of the key factors for start-up performance: the coefficients of the variable *Experience* are positive and significant (at 1% for the first two subsamples and at 10% for the third subsample). The coefficient of the variable "*Related exp.*" is also positive and significant for the first two subsamples. In addition, the absolute values of the coefficients of "*Related exp.*" variables are about 2 times smaller than the values of the coefficients of the variables *Experience*. Thus, an entrepreneur's experience in his current area is more important for the success of his project than business experience in a related area. An entrepreneurial entourage has a positive and significant (at 10%) impact on the firm's post-entry dynamics for all considered subsamples. However, the influence of this variable is stronger for the subsample of former long-term unemployed individuals; the number of past business creations is only significant in the case of formerly employed individuals. Surprisingly, this variable has a negative impact. This finding can be explained by supposing that the number of past business creations is not a good proxy for entrepreneurial capital, but rather represents the number of failures of past undertakings.

The influence of group human capital (hypothesis H_3) is empirically verified only partially by its proxies: "*project of the couple*" (for the formerly unemployed), "*with the family*" (for the formerly employed), and "*with previous employer*" (for the former long-term unemployed).

Hypothesis H_4 is not empirically verified. On the contrary, for the subsample of the former short-term unemployed, parameters associated with the variable concerning the existence of a new idea is negative and significant. Most likely, this variable is not a good proxy for innovative elements in the emerging business, or alternatively the new firms associated with a new idea turned out to be too risky.

Hypothesis H_5 is empirically verified only for the subsample of the formerly employed. Moreover, the impact of the variable *Franchise* is very modest in comparison with the human capital variables.

A high propensity to be self-employed and favorable start-up conditions (hypothesis H_6) are likely to be important for post-entry dynamics: the corresponding coefficients of the dummy variables are positive and significant for the majority of cases.

Firms with limited liability demonstrate better performance: the dummy variables associated with individual enterprises are significant and negative for all groups of entrepreneurs considered, and so hypothesis H_7 is empirically verified.

It can be seen that tax exemptions are likely to have a stronger effect for formerly unemployed individuals than for the formerly employed (hypothesis $H_9(a)$). The hypothesis of the existence of liquidity constrains is likely to be justified: the financial variables are likely to have an impact on the post-entry dynamics, after properly controlling for the human capital variables (hypothesis H_8).

It can also be seen from the estimation results that in some cases the impact of subventions and tax exemptions on the firms' dynamics is not significant even at a 10% level (exemptions for the former employed businessmen and for subventions for the formerly long-term unemployed). However, the impact of bank credit and initial capital on the dynamics of new firms is significantly different from zero. Public assistance is significant at a 5% level in the equations for initial capital and bank loan[21]. Consequently, we conclude that an indirect influence of public assistance on the performance of new enterprises exists (hypothesis $H_9(b)$). As mentioned above, public assistance can have a direct impact on new enterprises' dynamics, but it can also influence the main initial conditions of the investment projects (such as bank loan and initial capital). Moreover, in the majority of cases these variables have a positive impact on the post-entry dynamics. In addition, the majority of the estimates of the correlation coefficients in the correlation matrix (10) (not reported here) are significant. This result justifies the choice of the flexible correlation structure in error terms.

5 Parametric modeling of the survival of new enterprises

5.1 The lognormal survival model.

In the lognormal survival model, it is assumed that the logarithm of the life duration (t) of the new enterprise[22] is normally distributed:

[21] See Tables 12 and 13 of Appendix.

[22] Annual survival rates for the three considered subsamples are presented in the Table 10 of Appendix.

$$\ln(t) = X\beta + \varepsilon,\ \varepsilon \sim N(0; \sigma^2),$$

where X is a vector representing the firm's characteristics.

The hazard function of the lognormal model can be written as follows:

$$\lambda(t) = \frac{\frac{1}{\sigma t}\phi\left(\frac{\ln(t) - X\beta}{\sigma}\right)}{1 - \Phi\left(\frac{\ln(t) - X\beta}{\sigma}\right)}, \tag{8}$$

where $\phi(.)$ and $\Phi(.)$ are, respectively, the probability density function and cumulative distribution function of the normal distribution.

The lognormal hazard functions for 3 sets of parameters are shown on Figure 6 (from top to bottom $X\beta$=0 σ=1; $X\beta$=0.5; σ=1.3; $X\beta$=1 σ=1.5). This form of hazard function is likely to be appropriate for the analysis of the survival of new enterprises, since this shape corresponds to the usual empirical findings for firms' survival (see, for instance, Evans (1987b)). The hazard rate is very high in the first period of the life of the firm, after which it gradually decreases. This survival pattern for firms is consistent with the main conclusion of the model of Jovanovic (1982): there is an increasing and then decreasing relation between the age of the firm and the liquidation rate. New enterprises acquire the bulk of information about the competitiveness of their projects during the first periods of life, and their mortality rate is very high. Afterwards, however, the start-ups which have survived the infancy period are characterized by a relatively low level of insolvency. The empirical kernel smoothed hazard functions for different types of businessmen are depicted on Figure 7.

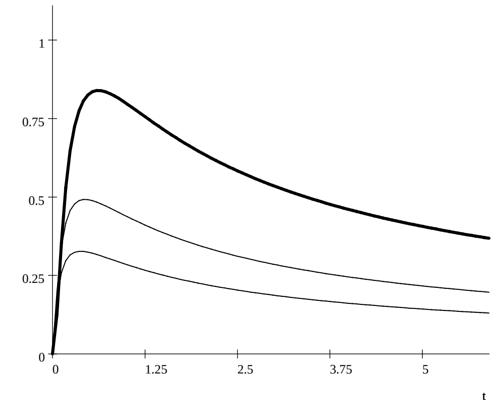

Fig. 6. Lognormal hazard functions

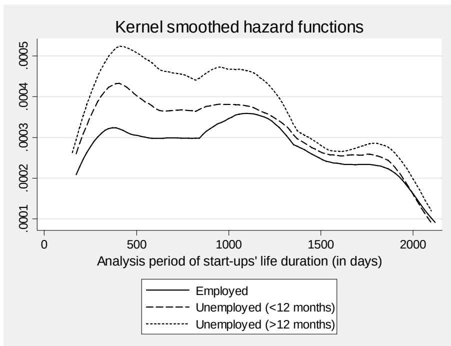

Fig. 7. Empirical hazard curves

As can be seen, the empirical hazard functions can be approximated by lognormal hazard functions: since on the whole they tend to have a skewed inverse U-form. Nevertheless, a certain non-monotonic pattern of hazard rates can be observed. This fact is likely to be related to the seasonal fluctuations of the recording of liquidation rates, which are associated with the fiscal year. However, it should be pointed out that the choice of a parametric lognormal survival approach was also influenced by the fact that this model can be naturally incorporated in the context of endogenous financial variables.

The main advantage of the duration model of survival in comparison with the approach adopted in the previous chapter lies in the possibility to capture the time structure of survival[23]. Moreover, by incorporating the timing of the failure in the model, duration models can account for censoring or other kinds of sample selection issues (Bhattacharjee, 2004): in our case we control for stock sampling and right censoring.

5.2 The joint lognormal survival model

We consider the following joint survival model of new enterprises:

$$\begin{cases} lnK^{*}= & X_1\beta_1+\gamma Credit+\delta_1 Sub+\delta_2 Exo+\varepsilon_1, \\ Credit^{*}= & X_2\beta_2+\theta_1 Sub+\theta_2 Exo+\varepsilon_2, \\ Sub^{*}= & X_3\beta_3+\varepsilon_3, \\ Exo^{*}= & X_4\beta_4+\varepsilon_4, \\ LnT = & X_5\beta_5+\pi K+\varkappa_1 Credit+\vartheta_1 Sub+\vartheta_2 Exo+\varepsilon_5, \end{cases} \tag{9}$$

where

$$\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \end{pmatrix} \sim N(0,\Sigma), \text{ where } \Sigma = \begin{bmatrix} \sigma^2 & \sigma\rho_{12} & \sigma\rho_{13} & \sigma\rho_{14} & \sigma\nu\rho_{15} \\ \sigma\rho_{12} & 1 & \rho_{23} & \rho_{24} & \nu\rho_{25} \\ \sigma\rho_{13} & \rho_{23} & 1 & \rho_{34} & \nu\rho_{35} \\ \sigma\rho_{14} & \rho_{24} & \rho_{34} & 1 & \nu\rho_{45} \\ \sigma\nu\rho_{15} & \nu\rho_{25} & \nu\rho_{35} & \nu\rho_{45} & \nu^2 \end{bmatrix}. \tag{10}$$

As in the previous model (1)-(3), we add an equation for the life duration of a new firm to the system of initial conditions and consider a flexible correlation structure in error terms (10). The vectors X_1, X_2, X_3, X_4, X_5 and the

[23]The questionnaire adopted by SINE 98 contains daily data on firms' creations and liquidations.

definitions of the latent endogenous variables are the same as in the system (1).

5.2.1 Individual likelihood function for complete observations with stock sampling.

A number of enterprises (about 1300) were closed before the first questionnaire and were thus omitted from the sample, since the explanatory variables cannot be observed for these firms. The expression of the contribution of firm i to the likelihood function is given by:

$$\begin{aligned} L_i^{complete} &= \Pr\left[X_{i5}\beta_5 + \varepsilon_5 = \ln(t_i); \varepsilon_1 \in [a_{i1}; b_{i1}]; \varepsilon_2 \in [a_{i2}; b_{i2}]; \right. \\ &\quad \left. \varepsilon_3 \in [a_{i3}; b_{i3}]; \varepsilon_4 \in [a_{i4}; b_{i4}] \middle| X_{i5}\beta_5 + \varepsilon_5 > \ln(t_i^l)\right] \\ &= \Pr\left[X_{i5}\beta_5 + \varepsilon_{i5} = \ln(t_i); \varepsilon \in [a_i; b_i] \middle| X_{i5}\beta_5 + \varepsilon_5 > \ln(t_i^l)\right], \end{aligned}$$

where t_i is the life duration of the firm i, and $t_i^l = t^e - t_i^b$ is the difference between the date the first questionnaire took place (t^e) and the date of the start-up's creation[24] (t_i^b), a_{ij} ($j = 1, ..., 4$) are defined be the formulas (5) and (6), and $\bigcap_{j=1}^{4} \{\varepsilon_j \in [a_{ij}; b_{ij}]\} \equiv \{\varepsilon \in [a_i; b_i]\}$.

Using Bayes' rule and the formulas for conditional multinomial normal density, it can be shown that the contribution to the likelihood function of firm i with a complete period of observation can be written as follows:

$$L_i^{complete} = \frac{\frac{1}{\nu}\phi\left(\frac{\ln(t_i) - X_{i5}\beta_5}{\nu}\right)}{1 - \Phi\left(\frac{\ln(t_i^l) - X_{i5}\beta_5}{\nu}\right)} \int_{c_{i1}}^{d_{i1}} \int_{c_{i2}}^{d_{i2}} \int_{c_{i3}}^{d_{i3}} \int_{c_{i4}}^{d_{i4}} \phi_{cc}\left(z_1, ..., z_4; \Sigma_{1-4|5}\right) dz_1 ... dz_4, \tag{11}$$

where $\phi_{cc}\left(z_1, z_2, z_3, z_4; \Sigma_{1-4|5}\right)$ is the probability density function of the centered multivariate normal distribution with the covariance matrix $\Sigma_{1-4|5}$:

$$\Sigma_{1-4|5} = \begin{bmatrix} \sigma^2(1 - \rho_{15}^2) & \sigma(\rho_{12} - \rho_{15}\rho_{25}) & \sigma(\rho_{13} - \rho_{15}\rho_{35}) & \sigma(\rho_{14} - \rho_{15}\rho_{45}) \\ \sigma(\rho_{12} - \rho_{15}\rho_{25}) & 1 - \rho_{25}^2 & (\rho_{23} - \rho_{25}\rho_{35}) & (\rho_{24} - \rho_{25}\rho_{45}) \\ \sigma(\rho_{13} - \rho_{15}\rho_{35}) & (\rho_{23} - \rho_{25}\rho_{35}) & 1 - \rho_{35}^2 & (\rho_{34} - \rho_{35}\rho_{45}) \\ \sigma(\rho_{14} - \rho_{15}\rho_{45}) & (\rho_{24} - \rho_{25}\rho_{45}) & (\rho_{34} - \rho_{35}\rho_{45}) & 1 - \rho_{45}^2 \end{bmatrix}$$

[24]In the survey conducted by SINE 98, this is the date when the new enterprise actually began real economic activity.

and

$$\begin{cases} c_{i1} = & a_{i1} - \sigma\rho_{15}\left(\ln t_i - X_{i5}\beta_5\right)/\nu, & d_{i1} = & b_{i1} - \sigma\rho_{15}\left(\ln t_i - X_{i5}\beta_5\right)/\nu, \\ c_{i2} = & a_{i2} - \rho_{25}\left(\ln t_i - X_{i5}\beta_5\right)/\nu, & d_{i2} = & b_{i2} - \rho_{25}\left(\ln t_i - X_{i5}\beta_5\right)/\nu, \\ c_{i3} = & a_{i3} - \rho_{35}\left(\ln t_i - X_{i5}\beta_5\right)/\nu, & d_{i3} = & b_{i3} - \rho_{35}\left(\ln t_i - X_{i5}\beta_5\right)/\nu, \\ c_{i4} = & a_{i4} - \rho_{45}\left(\ln t_i - X_{i5}\beta_5\right)/\nu, & d_{i4} = & b_{i4} - \rho_{45}\left(\ln t_i - X_{i5}\beta_5\right)/\nu. \end{cases}$$

5.2.2 Right censored observations with stock sampling

For right censored observations, we only know that these firms still existed at the time of the last questionnaire, denoted as t^r. Therefore, the life duration of the firm i is greater than $\left(t^r - t_i^b\right)$, and in this case the contribution of the firm i to the likelihood function can be written as follows:

$$\begin{aligned} L_i^{censored} &= \Pr\left[X_{i5}\beta_5 + \varepsilon_5 > \ln(t^r - t_i^b); \varepsilon \in [a_i; b_i] \,\middle|\, X_{i5}\beta_5 + \varepsilon_5 > \ln t_i^l\right] \\ &= \frac{\int\limits_{\ln(t^r - t_i^b) - X_{i5}\beta_5}^{+\infty} \int\limits_{a_{i1}}^{b_{i1}} \int\limits_{a_{i2}}^{b_{i2}} \int\limits_{a_{i3}}^{b_{i4}} \int\limits_{a_{i4}}^{b_{i5}} \phi\left(\omega_1, \ldots, \omega_5; \Sigma\right) d\omega_1 \ldots d\omega_5}{1 - \Phi\left(\frac{\ln(t_i^l) - X_{i5}\beta_5}{\nu}\right)}, \end{aligned}$$

where $\phi\left(\omega_1, \ldots, \omega_5; \Sigma\right) = \phi\left(\omega_1, \omega_2, \omega_3, \omega_4, \omega_5; \Sigma\right)$ is the probability density function of a multivariate normal distribution with mean zero and covariance matrix Σ.

5.2.3 Complete likelihood function

Thus, the complete likelihood function is given by:

$$\begin{aligned} L = \prod_{i=1}^{N} & \left[\frac{\frac{1}{\nu}\phi\left(\frac{\ln(t_i) - X_{i5}\beta_5}{\nu}\right)}{1 - \Phi\left(\frac{\ln(t_i^l) - X_{i5}\beta_5}{\nu}\right)}\right]^{d_i} \times \\ \times & \left[\int\limits_{c_{i1}}^{d_{i1}} \int\limits_{c_{i2}}^{d_{i2}} \int\limits_{c_{i3}}^{d_{i3}} \int\limits_{c_{i4}}^{d_{i4}} \phi_{cc}\left(z_1, \ldots, z_4; \Sigma_{1-4|5}\right) dz_1 \ldots dz_4\right]^{d_i} \times \\ \times & \left[\frac{\int\limits_{\ln(t^r - t_i^b) - X_{i5}\beta_5}^{+\infty} \int\limits_{a_{i1}}^{b_{i1}} \int\limits_{a_{i2}}^{b_{i2}} \int\limits_{a_{i3}}^{b_{i4}} \int\limits_{a_{i4}}^{b_{i5}} \phi(\omega_1, \ldots, \omega_5; \Sigma) d\omega_1 \ldots d\omega_5}{1 - \Phi\left(\frac{\ln(t_i^l) - X_5\beta_5}{\nu}\right)}\right]^{1-d_i}, \end{aligned}$$

where $d_i = \begin{cases} 1, & \text{if } i \text{ is not right censored,} \\ 0, & \text{otherwise.} \end{cases}$ The multivariate integrals

$$I_{i1} = \int_{c_{i1}}^{d_{i1}} \int_{c_{i2}}^{d_{i2}} \int_{c_{i3}}^{d_{i3}} \int_{c_{i4}}^{d_{i4}} \phi_{cc} \left(z_1, z_2, z_3, z_4; \Sigma_{1-4|5} \right) dz_1 dz_2 dz_3 dz_4, \tag{12}$$

and

$$I_{i2} = \int_{\ln(t^r - t_i^b) - X_{i5}\beta_5}^{+\infty} \int_{a_{i1}}^{b_{i1}} \int_{a_{i2}}^{b_{i2}} \int_{a_{i3}}^{b_{i4}} \int_{a_{i4}}^{b_{i5}} \phi \left(\omega_1, \ldots, \omega_5; \Sigma \right) d\omega_1 \ldots d\omega_5 \tag{13}$$

were approximated using a GHK-simulator by the expressions $\frac{1}{J} \sum_{h=1}^{J} \widehat{P_{i1}} \widehat{P_{i2}^h} \widehat{P_{i3}^h} \widehat{P_{i4}^h}$ and $\frac{1}{J} \sum_{r=1}^{J} \widehat{\widehat{P_{i1}}} \widehat{\widehat{P_{i2}^r}} \widehat{\widehat{P_{i3}^r}} \widehat{\widehat{P_{i4}^r}} \widehat{\widehat{P_{i5}}}$ respectively (in the same fasion as for the simulated probabilities, shown in the Appendix), and plugged into the likelihood function. The corresponding simulated log-likelihood was maximized using standard routines.

5.3 Estimation results of the joint survival model

The simulated likelihood function was maximized using programming modules in STATA 8. Each multivariate integral was simulated with 200 random draws (i.e. $J = 200$) for each firm. The estimation results for the survival equation are presented in Table 6[25].

Table 6: Lognormal survival equation estimates

Variable	Employed	Unemployed (< 12 months)	Unemployed (> months)
Single Proprietorship	-0,697***	-0,691***	-0,555***
	(0,075)	(0,235)	(0,175)
Artisan	0,228***	0,221**	0,122
	(0,086)	(0,110)	(0,181)
Franchise	0,094*	0,028	0,045
	(0,050)	(0,328)	(0,248)
Free premises	0,295***	0,106	0,129

See the next page...

[25] Location and business sector dummy variable coefficients are not reported for brevity. Initial conditions are not reported for the same reason.

...continuation of the Table 6

Variable	Employed	Unemployed (< 12 months)	Unemployed (> months)
	(0,085)	(0,245)	(0,185)
Female	-0,298***	-0,306	-0,211
	(0,072)	(0,197)	(0,147)
Other EU	-0,432***	-0,418**	-0,310
	(0,148)	(0,174)	(0,277)
Age$*10^{-1}$	1,214***	1,200***	0,992*
	(0,217)	(0,391)	(0,589)
$Age^2 * 10^{-2}$	-0,121***	-0,178*	-0,091*
	(0,027)	(0,101)	(0,055)
Technical school	0,256***	0,016	-0,008
	(0,088)	(0,244)	(0,183)
High school	0,239***	0,059*	0,051
	(0,100)	(0,030)	(0,218)
Undergraduate	0,317***	0,703**	0,499**
	(0,097)	(0,293)	(0,216)
Nb of creations	-0,281***	-0,329	-0,259
	(0,070)	(0,267)	(0,201)
Experience	0,628***	0,433**	0,325**
	(0,074)	(0,202)	(0,151)
Related exp.	0,324***	-0,368	-0,265
	(0,092)	(0,239)	(0,178)
Entrepreneur	0,083*	0,590***	0,459***
	(0,042)	(0,192)	(0,140)
New Idea	-0,167**	-0,134	-0,084
	(0,080)	(0,247)	(0,186)
Taste for	0,096***	0,291***	0,216***
	(0,034)	(0,094)	(0,069)
Opportunity	0,033***	0,031	0,016
	(0,012)	(0,083)	(0,063)
Project of couple	0,142**	0,481***	0,383**
	(0,071)	(0,210)	(0,158)
With family	-0,052	0,483**	0,326*
	(0,070)	(0,240)	(0,178)
Previous firm	0,065	-0,481	-0,557

See the next page...

...continuation of the Table 6

Variable	Employed	Unemployed (< 12 months)	Unemployed (> months)
	(0,119)	(0,778)	(0,594)
Previous employer	-0,017	1,367**	0,772
	(0,170)	(0,622)	(0,713)
Capital	0,097***	0,329***	0,257***
	(0,021)	(0,075)	(0,054)
Bank loan	0,393***	0,701***	0,556***
	(0,074)	(0,229)	(0,170)
Subsidy	0,209*	0,197*	0,327**
	(0,119)	(0,105)	(0,153)
Exemption	0,172**	0,372***	0,616***
	(0,085)	(0,129)	(0,157)

The results confirm the findings of the employment dynamics model: the human capital variables play a significant role (it is clearer for the formerly employed subsample), but initial capital, bank credit and different types of public assistance, in all three subsamples, have strong, positive and significant impact on the life duration of new enterprises. This fact justifies the presence of liquidity constraints for some projects. Almost all correlation coefficients (not reported here) are significant, so the use of a flexible correlation structure of the model is justified.

As can be seen for all considered subsamples, there is a positive significant concave relation between entrepreneur's age and his business viability (Hypothesis 1a). The maximum effect for the entrepreneur's age is reached at the age of about 50 years for the formerly employed and at the age of about 34 years for the formerly short-term unemployed, and at the age of about 54 years for the formerly long-term unemployed. Therefore, there is evidence that, like physical capital, entrepreneurial human capital tends to deteriorate over time. Nevertheless, it should be mentioned that in this study we do not consider the reasons for the liquidation of new firms. For this reason it is quite natural to assume that part of the start-ups considered were closed due to some quasi-voluntary reasons, such as the entrepreneur's retirement or decease. It can be seen that the firms created by a foreigner who is not from the EU have on average weaker viability. This result can be explained by the additional difficulties a foreigner has in running a business. As in the firm dynamic model, the coefficient of the variable "*Nb of* *creations*" is negative and significant at 10% only for the subsample of the formerly employed entrepreneurs. One of the most important indicators of entrepreneurial human capital, one that positively influences the viability of new enterprises for all three considered subsamples, is the existence of an entrepreneurial entourage. Thus, the entrepreneurial environment of a potential entrepreneur can be considered as one of the key factors for the success of the business, since it can serve as the conduit for the diffusion of some crucial tacit, personified business-related knowledge. The artisan enterprises on average are more viable for the two first considered subsamples. This finding seems to indicate that, taking all other things to be equal, these types of firms are able to find some particular niche for specific goods or services with no equivalent substitutes. On the whole, it can be seen that explanatory variables are more significant for the subsamples of the formerly employed individuals. This finding can be justified by the fact that for the formerly unemployed there are more forced enterprise creations, i.e. the unemployed use the possibility to create their own firms as the last resort to become employed. And for this kind of business, the observable relevant characteristics are likely to be less important: in this case a considerable portion of the variation in the dynamics of start-ups is related to exogenous stochastic components, such as a favorable local business climate. Therefore, this kind of project is more likely to have liquidity constraints: the estimation results show that the initial financial conditions in this case have a stronger impact on post-entry dynamics in comparison with the start-ups created by formerly employed individuals.

6 Conclusions

Our findings support the stylized facts and empirical results of the studies in the field of industrial dynamics: the initial size along with human capital are the main factors that determine the post-entry performance of small enterprises. Thus the existing models of post-entry performance of new enterprises in the context of liquidity constraints, namely EJ- and HC-models, are likely to be complementary. Liquidity constraints are likely to be binding and human capital plays an important role in the post-entry dynamics and in the formation of the principal financial variables of the project. Moreover, liquidity constraints are more important for start-ups run by the formerly unemployed entrepreneurs: the impact of financial variables on their firms' viability is stronger.

The empirical results were obtained assuming that financial variables (such as bank credit, initial capital and public assistances) are endogenous with respect to the post-entry dynamics of new firms. The assumption of endogeneity is likely to hold, since the majority of correlation coefficients are significant in both estimated models.

Our results indicate the existence of various patterns of firms' dynamics according to the category of the creator (previously employed or unemployed). In our opinion, this finding should stimulate studies of firms' dynamics for distinct cohorts of enterprises. The effect of different categories of public assistance on the dynamics of start-ups is much stronger for the subsamples of formerly unemployed individuals. These observations indicate the existence of differences in initial conditions and post-entry performances of start-ups created by entrepreneurs with different labor market histories.

While constructing and evaluating the public assistance programs for start-ups, one should not only take into account the expected direct impact of the particular assistance program, but also the indirect impact of public assistance on the initial financial conditions, such as initial capital formation and bank loan provision. It has been empirically verified that the anticipation of public assistance in the future (i.e. tax exemptions) encourage the entrepreneurs to invest more during the initial stage of the investment project, thus enhancing the probability of the success (Duguet, 1999). The impact of different types of public assistance was also shown to vary due to differences in the economic mechanisms of their influence. Therefore, for the proper evaluation of the impact of public assistance on the performance of new firms, it is necessary to consider multi-treatment problems (and to make pertinent aggregation if necessary).

In this study we have constructed and estimated two models of the post-entry dynamics of new enterprises in the context of endogenous initial creation conditions. The strong points of our approach is the possibility to control for numerous factors that condition post-entry performance of new firms, and a correct econometric approach to the endogeneity problem. Until recently, approaches based on the joint estimation of a multidimensional system with limited dependent variables bundled with a dynamics equation was not feasible due to the absence of estimation methods and/or computational limitations. The approach adopted in this paper allows the investigator to obtain a better understanding of the processes of post-entry dynamics of new enterprises in the context of endogenous initial creation conditions. As mentioned above, the understanding of these processes is crucial for the evaluation of the efficiency of public policies for the dynamics of new enterprises.

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Appendix

GHK - simulator and simulated likelihood function

Let $U = \Lambda V$, where $\Omega = \Lambda\Lambda'$ (see (2)) and $V \sim N(0, I_4)$ and Λ is the lower triangular matrix corresponding the Cholesky decomposition of the matrix Ω:

$$\begin{pmatrix} \varepsilon_{i1} \\ \varepsilon_{i2} \\ \varepsilon_{i3} \\ \varepsilon_{i4} \\ \varepsilon_{i5} \end{pmatrix} = \begin{pmatrix} \lambda_{11} & 0 & 0 & 0 & 0 \\ \lambda_{21} & \lambda_{22} & 0 & 0 & 0 \\ \lambda_{31} & \lambda_{32} & \lambda_{33} & 0 & 0 \\ \lambda_{41} & \lambda_{42} & \lambda_{43} & \lambda_{44} & 0 \\ \lambda_{51} & \lambda_{52} & \lambda_{53} & \lambda_{54} & \lambda_{55} \end{pmatrix} \begin{pmatrix} u_{i1} \\ u_{i2} \\ u_{i3} \\ u_{i4} \\ u_{i5} \end{pmatrix}.$$

- $P_{i1} = \quad Prob\left(u_{i1}^h \in \left[\frac{a_{i1}}{\lambda_{11}}; \frac{b_{i1}}{\lambda_{11}}\right]\right) = \Phi\left(\frac{b_{i1}}{\lambda_{11}}\right) - \Phi\left(\frac{a_{i1}}{\lambda_{11}}\right),$

  where $\Phi(\cdot)$ denotes hereafter the standard normal distribution function;

- $P_{i2}^h = \quad \Phi\left(\frac{a_{i2}}{\lambda_{22}} - \frac{\lambda_{21}}{\lambda_{22}} u_{i1}^h\right) - \Phi\left(\frac{b_{i2}}{\lambda_{22}} - \frac{\lambda_{21}}{\lambda_{22}} u_{i1}^h\right),$
  where $u_{i1}^h \in \left[\frac{a_{i1}}{\lambda_{11}}; \frac{b_{i1}}{\lambda_{11}}\right]$;

- $P_{i3}^h = \quad \Phi\left(\frac{a_{i3}}{\lambda_{33}} - \frac{\lambda_{31}}{\lambda_{33}} u_{i1}^h - \frac{\lambda_{32}}{\lambda_{33}} u_{i2}^h\right) - \Phi\left(\frac{b_{i3}}{\lambda_{33}} - \frac{\lambda_{31}}{\lambda_{33}} u_{i1}^h - \frac{\lambda_{32}}{\lambda_{33}} u_{i2}^h\right)$
  where $u_{i2}^h \in \left[\frac{a_{i2}}{\lambda_{22}} - \frac{\lambda_{21}}{\lambda_{22}} u_{i1}^h; \frac{b_{i2}}{\lambda_{22}} - \frac{\lambda_{21}}{\lambda_{22}} u_{i1}^h\right]$;

- $P_{i4}^h = \quad \Phi\left(\frac{a_{i4}}{\lambda_{44}} - \frac{\lambda_{41}}{\lambda_{44}} u_{i1}^h - \frac{\lambda_{42}}{\lambda_{44}} u_{i2}^h - \frac{\lambda_{43}}{\lambda_{44}} u_{i3}^h\right)$
  $\qquad - \Phi\left(\frac{b_{i4}}{\lambda_{44}} - \frac{\lambda_{41}}{\lambda_{44}} u_{i1}^h - \frac{\lambda_{42}}{\lambda_{44}} u_{i2}^h - \frac{\lambda_{43}}{\lambda_{44}} u_{i3}^h\right),$
  where $u_{i3}^h \in \left[\frac{a_{i3}}{\lambda_{33}} - \frac{\lambda_{31}}{\lambda_{33}} u_{i1}^h - \frac{\lambda_{32}}{\lambda_{33}} u_{i2}^h; \frac{b_{i3}}{\lambda_{33}} - \frac{\lambda_{31}}{\lambda_{33}} u_{i1}^h - \frac{\lambda_{32}}{\lambda_{33}} u_{i2}^h\right]$;

- $P_{i5}^h = \Phi\left(\frac{a_{i5}}{\lambda_{55}} - \frac{\lambda_{51}}{\lambda_{55}}u_{i1}^h - \frac{\lambda_{52}}{\lambda_{55}}u_{i2}^h - \frac{\lambda_{53}}{\lambda_{55}}u_{i3}^h - \frac{\lambda_{53}}{\lambda_{55}}u_{i3}^h\right)$
$-\Phi\left(\frac{b_{i5}}{\lambda_{55}} - \frac{\lambda_{51}}{\lambda_{55}}u_{i1}^h - \frac{\lambda_{52}}{\lambda_{55}}u_{i2}^h - \frac{\lambda_{53}}{\lambda_{55}}u_{i3}^h - \frac{\lambda_{53}}{\lambda_{55}}u_{i3}^h\right),$
where $u_{i4}^h \in \left[\frac{a_{i5}}{\lambda_{55}} - \frac{\lambda_{51}}{\lambda_{55}}u_{i1}^h - \frac{\lambda_{52}}{\lambda_{55}}u_{i2}^h - \frac{\lambda_{53}}{\lambda_{55}}u_{i3}^h - \frac{\lambda_{53}}{\lambda_{55}}u_{i3}^h;\right.$
$\left.; \frac{b_{i5}}{\lambda_{55}} - \frac{\lambda_{51}}{\lambda_{55}}u_{i1}^h - \frac{\lambda_{52}}{\lambda_{55}}u_{i2}^h - \frac{\lambda_{53}}{\lambda_{55}}u_{i3}^h - \frac{\lambda_{53}}{\lambda_{55}}u_{i3}^h\right].$

And the random draws are generated using the following recursive scheme:

- $u_{i1}^h = \Phi^{-1}\left(\left[\Phi\left(\frac{b_{i1}}{\lambda_{11}}\right) - \Phi\left(\frac{a_{i1}}{\lambda_{11}}\right)\right]\widetilde{u}_{i1}^h + \Phi\left(\frac{a_{i1}}{\lambda_{11}}\right)\right),$
- $u_{i2}^h = \Phi^{-1}\left(\left[\Phi\left(\frac{b_{i2}}{\lambda_{22}} - \frac{\lambda_{21}}{\lambda_{22}}u_{i1}^h\right) - \Phi\left(\frac{a_{i2}}{\lambda_{22}} - \frac{\lambda_{21}}{\lambda_{22}}u_{i1}^h\right)\right]\widetilde{u}_{i2}^h + \right.$
$\left. + \Phi\left(\frac{a_{i2}}{\lambda_{22}} - \frac{\lambda_{21}}{\lambda_{22}}u_{i1}^h\right)\right),$
- $u_{i3}^h = \Phi^{-1}\left(\left[\Phi\left(\frac{b_{i3}}{\lambda_{33}} - \frac{\lambda_{31}}{\lambda_{33}}u_{i1}^h - \frac{\lambda_{32}}{\lambda_{33}}u_{i2}^h\right) - \Phi\left(\frac{a_{i3}}{\lambda_{33}} - \frac{\lambda_{31}}{\lambda_{33}}u_{i1}^h - \frac{\lambda_{32}}{\lambda_{33}}u_{i2}^h\right)\right] \times \right.$
$\left. \times \widetilde{u}_{i3}^h + \Phi\left(\frac{a_{i3}}{\lambda_{33}} - \frac{\lambda_{31}}{\lambda_{33}}u_{i1}^h - \frac{\lambda_{32}}{\lambda_{33}}u_{i2}^h\right)\right),$
- $u_{i4}^h = \Phi^{-1}\left[\left(\Phi\left(\frac{b_{i4}}{\lambda_{44}} - \frac{\lambda_{41}}{\lambda_{44}}u_{i1}^h - \frac{\lambda_{42}}{\lambda_{44}}u_{i2}^h - \frac{\lambda_{43}}{\lambda_{44}}u_{i3}^h\right)\right.\right.$
$\left. - \Phi\left(\frac{a_{i4}}{\lambda_{44}} - \frac{\lambda_{41}}{\lambda_{44}}u_{i1}^h - \frac{\lambda_{42}}{\lambda_{44}}u_{i2}^h - \frac{\lambda_{43}}{\lambda_{44}}u_{i3}^h\right)\right] \times \widetilde{u}_{i4}^h$
$\left. + \Phi\left(\frac{a_{i4}}{\lambda_{44}} - \frac{\lambda_{41}}{\lambda_{44}}u_{i1}^h - \frac{\lambda_{42}}{\lambda_{44}}u_{i2}^h - \frac{\lambda_{43}}{\lambda_{44}}u_{i3}^h\right)\right),$

where the random variables $\widetilde{u}_{ik}^h$ are $i.i.d. \sim U(0,1)$, for $k = 1, ..., 4$ and $h = 1, ..., H$.

Table 7: *Distribution of initial capital of new enterprises*

Initial	Employed		Unemployed (< 12 months)		Unemployed (> 12 months)	
Capital	Freq.	Percent	Freq.	Percent	Freq.	Percent
1	1484	17.0%	636	16.8%	691	21.9%
2	876	10.1%	620	16.4%	574	18.2%
3	741	8.5%	597	15.8%	476	15.1%
4	3036	34.9%	1084	28.6%	815	25.9%
5	1313	15.1%	557	14.7%	387	12.3%
6	622	7.1%	177	4.7%	133	4.2%
7	636	7.3%	115	3.0%	77	2.4%
Total	8708	100.0%	3786	100.0%	3153	100.0%

Table 8: *Distribution of bank loan and public aid*

	Employed		Unemployed (< 12 months)		Unemployed (> 12 months)	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Credit	2734	31.5%	1217	32.2%	753	23.9%
Sub	445	5.1%	292	7.7%	239	7.6%
Exo	1 108	12.7%	1 983	52.5%	1 602	50.9%

Table 9: *Dynamic variable (D) distribution of new enterprises*

D	Employed		Unemployed (< 12 months)		Unemployed (> 12 months)	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
1	3949	45.26%	1925	50.8%	1788	56.64%
2	615	7.05%	126	3.33%	90	2.85%
3	2037	23.35%	924	24.39%	840	26.61%
4	2124	24.34%	814	21.48%	439	13.91%
Total	8725	100%	3789	100%	3157	100%

Table 10: *Annual survival rates of new firms*

Years after creation	Employed	Unemployed (< 12 months)	Unemployed (> 12 months)
1 year	90.10%	85.53%	84.22%
2 years	80.53%	74.36%	70.46%
3 years	70.38%	63.85%	58.27%
4 years	62.94%	56.59%	50.80%
5 years	57.41%	51.38%	45.81%

Table 11: *Descriptive statistics of the exogenous variables*

Variable	Employed		Unemployed (< 12 months)		Unemployed (> 12 months)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Single Proprietorship	0,522	0,500	0,708	0,455	0,735	0,442
Artisan	0,336	0,472	0,446	0,497	0,368	0,482
Franchise	0,082	0,274	0,071	0,258	0,071	0,258
Free premises	0,125	0,330	0,137	0,344	0,143	0,351
Technical school	0,345	0,476	0,423	0,494	0,385	0,487
High school	0,181	0,385	0,174	0,379	0,181	0,385
Undergraduate	0,325	0,468	0,245	0,430	0,248	0,432
Age	37,37	9,415	34,67	8,781	36,96	8,868
[17;25]	0,086	0,281	0,147	0,354	0,078	0,268
[26;29]	0,142	0,349	0,189	0,391	0,154	0,361
[29;36]	0,248	0,432	0,258	0,438	0,257	0,437
[36;40]	0,175	0,380	0,145	0,352	0,171	0,377
[41;45]	0,136	0,343	0,115	0,319	0,138	0,345
[46;50]	0,109	0,312	0,094	0,292	0,121	0,326
[50;70]	0,102	0,303	0,052	0,222	0,080	0,272
Female	0,223	0,416	0,247	0,431	0,314	0,464
Other EU	0,039	0,195	0,042	0,201	0,062	0,240
Nb of creations	0,298	0,457	0,117	0,321	0,132	0,339
Experience	0,627	0,484	0,602	0,490	0,424	0,494
Related exp.	0,155	0,362	0,161	0,367	0,215	0,411
Entrepreneur	0,713	0,452	0,711	0,453	0,649	0,477
New Idea	0,199	0,399	0,124	0,329	0,151	0,358
Taste for	0,586	0,493	0,583	0,493	0,465	0,499
Opportunity	0,384	0,486	0,211	0,408	0,140	0,347
Project of couple	0,217	0,412	0,234	0,424	0,219	0,413
With family	0,243	0,429	0,182	0,386	0,179	0,384
Previous firm	0,063	0,242	0,036	0,186	0,011	0,106
Previous employer	0,028	0,166	0,017	0,128	0,007	0,083

Table 12: Initial capital equation (dynamics system)

Variable	Employed	Unemployed (< 12 months)	Unemployed (> months)
Single Proprietorship	-1,269***	-1,222***	-1,109***
	(0,039)	(0,064)	(0,089)
Artisan	0,024	0,228*	0,288***
	(0,060)	(0,117)	(0,102)
Franchise	0,115***	0,263***	-0,002
	(0,053)	(0,081)	(0,091)
Free premises	-0,221***	-0,227***	-0,249***
	(0,040)	(0,052)	(0,060)
Female	-0,166***	-0,307***	-0,154***
	(0,035)	(0,051)	(0,049)
Other EU	-0,073*	0,109	-0,055
	(0,041)	(0,136)	(0,104)
[17;25]	0,074	-0,121*	0,015
	(0,057)	(0,069)	(0,100)
[26;29]	-0,002	-0,020	-0,027
	(0,046)	(0,056)	(0,075)
[36;40]	0,050	0,170***	-0,018
	(0,043)	(0,058)	(0,071)
[41;45]	0,029**	0,219***	0,044
	(0,012)	(0,067)	(0,077)
[46;50]	0,077*	0,219***	0,175***
	(0,042)	(0,073)	(0,081)
[50;70]	0,036*	0,235**	0,100
	(0,021)	(0,106)	(0,108)
Technical school	0,067	0,036	0,267***
	(0,046)	(0,079)	(0,070)
High school	0,206***	0,189**	0,509***
	(0,051)	(0,088)	(0,084)
Undergraduate	0,277***	0,199**	0,516***
	(0,049)	(0,101)	(0,082)
Nb of creations	0,316***	-0,034	0,259***
	(0,035)	(0,066)	(0,066)

See the next page...

...continuation of the Table 12

Variable	Employed	Unemployed (< 12 months)	Unemployed (> months)
Experience	-0,014	-0,052	-0,055
	(0,035)	(0,052)	(0,051)
Related Exp.	0,019	0,019	-0,010
	(0,044)	(0,065)	(0,058)
Entrepreneur	0,053*	0,110**	0,052
	(0,030)	(0,045)	(0,046)
New Idea	0,176***	0,097*	0,210***
	(0,037)	(0,054)	(0,058)
Taste for	0,064***	0,045**	0,042**
	(0,015)	(0,019)	(0,022)
Opportunity	0,045***	0,033**	0,024
	(0,010)	(0,015)	(0,020)
Project of couple	0,155***	0,128***	0,237***
	(0,032)	(0,041)	(0,051)
With family	0,186***	0,211***	0,288***
	(0,033)	(0,047)	(0,056)
Previous firm	0,242***	0,185**	-0,183
	(0,054)	(0,094)	(0,186)
Previous employer	0,155**	0,187	0,294
	(0,078)	(0,131)	(0,247)
Bank loan	1,690***	0,334**	1,512**
	(0,248)	(0,162)	(0,702)
Subsidy	0,734**	1,858***	0,725***
	(0,332)	(0,214)	(0,176)
Exemption	0,353*	0,799*	0,346***
	(0,208)	(0,474)	(0,112)
Constant	2,098***	2,067***	1,628***
	(0,089)	(0,125)	(0,130)

Table 13: Bank loan equation (dynamics system))

Variable	Employed	Unemployed (< 12 months)	Unemployed (> months)
Single Proprietorship	-0,268***	-0,241***	-0,324***
	(0,035)	(0,058)	(0,073)
Artisan	0,505***	0,353***	0,292***
	(0,049)	(0,108)	(0,083)
Franchise	0,203***	0,107	0,183*
	(0,053)	(0,089)	(0,103)
Female	-0,107***	-0,167***	0,049
	(0,038)	(0,055)	(0,060)
Other EU	-0,591***	-0,040*	-0,165
	(0,098)	(0,021)	(0,124)
Nb of creations	-0,153***	-0,154**	-0,007
	(0,038)	(0,074)	(0,086)
Age	0,047***	0,037*	0,061**
	(0,012)	(0,022)	(0,028)
Age2	-0,0007***	-0,0006*	-0,0008**
	(0,0002)	(0,0003)	(0,0004)
Technical school	0,137***	-0,073	0,046
	(0,047)	(0,074)	(0,080)
High school	-0,036	-0,044	-0,021
	(0,054)	(0,086)	(0,102)
Undergraduate	-0,064	-0,190**	-0,088
	(0,053)	(0,090)	(0,097)
Experience	0,082**	-0,020	0,068
	(0,038)	(0,056)	(0,062)
Related Exp.	-0,020	-0,066	0,062
	(0,050)	(0,072)	(0,074)
Entrepreneur	0,088***	0,143***	0,056
	(0,033)	(0,049)	(0,057)
Subsidy	1,185***	1,413***	0,568*
	(0,215)	(0,235)	(0,321)
Exemption	0,144	0,954***	0,469*
	(0,171)	(0,329)	(0,245)