The determinants of regional distribution of IPOs: the case of Italy

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ABSTRACT

The aim of the paper is to shed some light on the determinants of IPO regional distribution .A first part of the paper analyses the effects of geographical proximity in the context of financial markets. A firm located far away from the most important financial centre of a country is disadvantaged with respect to firms that are nearer it in accessing to venture capital or to the equity market. This being true, it follows that the distance from financial markets is a factor that contributes to an uneven distribution of high growth firms in a country. We estimated a probit model such that the probability of going public is related to the distance of each firm from the most important Italian financial centre, that is Milano, and a set of control variables. Preliminary results show that both size and profitability affect positively, as expected, while distance from metropolitan areas of Milano affects this decision negatively.

The second part of the paper analyses the impact the economic structure of a region on the number of IPO in ICT sector for four large European countries, that is France, Germany, Italy and United Kingdom. Our work shows that variations between regions in the IPO in ICT industry are related to two specific factors which are the degree of specialization in computer and related services industry and the stock of knowledge in ICT.

1. Introduction

An old economic tradition dated back to the work of Schumpeter links the growth of a country to the industry structure and the skills of the entrepreneurs. Most of theoretical and empirical studies (Evans-Leighton 1989) have analyzed the probability of entering self-employment but, as Baumol (1988) hypothesizes, while the total supply of entrepreneurs varies among countries or regions, the productive contribution of the society's entrepreneurial activity varies much more. More in details, some authors argue that differences in the distribution of high growth firms may be responsible for the different economic performances among areas within a country (Storey, 1994). Some preliminary evidence seems to support this conjecture. Moreover, as it emerges by looking at the regional distributions of firms in Italy and UK high growth firms are more clustered than low growth ones (Del Monte, 2003; Storey, 1994). Thus, it is very important for public policy to focus the attention on the fastest growing firms. The number of Initial Public Offerings (IPOs), that is new firms listed on the Stock Exchange, is regarded, in this article as a proxy for the number of fast growth firms in a country Yet, one of the most important perceived constraints for firms in backward regions relates to the availability and cost of financing. Therefore, while admissions to the stock exchange could be considered as a very important source of capital for dynamic small firms, this is a less exploited opportunity by small firms localised in backward areas.

The aim of this paper is to shed some light on the determinants of IPOs regional distribution .

Economic structure determines size and profitability of the firms in a given region and, therefore, it indirectly affects IPO regional distribution, that is the numbers of firms that satisfies economic and legal requirements in order to be listed (see Figure 1). Still, many of the firms that satisfy such requirements will never go public[1]. Therefore the analysis of IPOs regional distribution could be

[1] An important factor that could affect the regional distribution of IPO is a cultural one. If we assume that utility function of the main shareholder is a positive function of the true values of the shares he owns and a negative function of the decrease in the degree of control of the firm, regional differences in such utility function could affect IPO regional distribution.

divided in two steps. First step analyses the determinants of the number of firms that satisfies the requirement to go public. A background literature concerns the determinants of firm size distribution of firms. Lucas (1978) shows that firm size distribution depends from the distribution of entrepreneur skill , amount of capital stock and of labour. If the elasticity of substitution between capital and labour is less than unity, average size of the firm is a function of the wealth of the economy. Therefore in backward regions will be localized firms of smaller size and a lower number of firms that satisfies the requirement to go public. Besides these variables underlined by Lucas, other variables that characterize economic structure of a region could be introduced in the analysis such as specialization index and human capital stock. If the number of the firms that satisfies legal and economic requirements to go public is not known, it will be possible to consider the number of IPO as a dependent variable and estimate a reduced form with variables that characterize the regional economic structure of a region, such as number of large firms, availability of human capital, sector specialization and so on.

In the second step we will analyse the determinants of the probability that a firm will go public. Our analysis starts from the number of firms that shows, in a given region, at least a minimum probability to go public and, subsequently, one could estimate a probit model (see Figure 2). Financial literature has not explicitly considered variables related to regional economic structure, but is possible (Figure 2) to estimate a model where IPOs determinants are firms' financial and structural variables and variables that characterizes the region where each firm is localized.

Recent literature has analyzed the role played by the proximity to financial centre on the firm's probability to go public .There are a number of reasons why *distance from financial market* is a factor that contributes to uneven distribution of new firms. Finance literature has singled out different kind of costs to go public (flotation cost; on-going financial cost; disclosure requirements; loss of control, agency costs; to cite a few) and different benefits (such as acquisition, organic growth, repay debt, new finance for increased opportunities for future equity offers, greater

publicity/better company images, increased liquidity of share, outside monitoring, etc)[2]. Zook (2001) found that the regional distribution of venture capital investing played a central role in determining the location of new Internet start-up in USA. Aghion *et al.* (2004) argue that the likelihood of converging to the US growth rate increases with financial development. Malloy (2005) investigates the effect of distance on the accuracy of equity analyst's forecast . He gave evidence that geographically proximate analysts are more accurate than other analysts. An implication of this finding is that there is an inverse relationship between the accuracy of information and distance. On the other hand Coval and Moskowitz (2001) maintain that geographic proximity is inversely related to the cost of information acquisition. Therefore a firm located far away from the most important financial centres is in worst position to have access to venture capital or to the equity market than firms that are nearer.

In our paper .we will look ,first, at the regional distribution of firms that went public in Italy during 1995-2004 period. In particular, we intend to address the questions if regional dummies or if the distance from the main Italian financial centre could affect the decision of a firm to go public. To this aim, we compare firms which decided to list to the Italian stock exchange with those not listed despite meeting the listing requirements. Finally, in the last section of the paper we extend our analysis to four countries, Germany, Italy, France, and UK[3]., estimating a reduced form to individuate the factors that affect regional distribution of IPOs in those countries. The comparison is

[2] There are many papers (Pagano et al.,1998; Ritter, 1997; Lelland and Pyle, 1977) that have examined theoretically and empirically the factors that affect the decision of a firms top go public. Such papers show the costs and benefits for a firm to go public.
The main costs are :
1) Legal and administrative costs
2) Information costs
3) Transparency costs
4) Virtual costs due to a lower degree of control of the management of the firm
5) Costs linked to the distance to the main financial centre

The main benefits are :
1) Diversification and differentiation in the sources of funding
b) Increase in the resources necessary to support the growth of the firm
c) Improvement in the financial structure
d) Lower credit cost
e) Improvement in firm's image and prestige
f) Profits increase due to a change in the property control of the firm

[3] ICT sector is characterized by a high growth firm and therefore is important to understand what determines regional distribution of IPO .

confined to the ICT industry, this being a sector which has recorded a very high number of IPOs in the very recent years and is characterized by an high number of high growth firms, as well.

2. Regional distribution of IPOs in Italy in the period 1995-2004

In this paragraph we will examine the regional distribution of IPOs in Italy . IPOs have been assembled for six sectors: manufacturing, public utility services (gas, water, electricity, etc), ICT (services of telecommunication, software and other services bound to information technology), financial and insurance services (banks, insurances, etc), transports, others[4]. Table 1 shows substantial territorial differences in the distribution of IPOs: Manufacturing industry predominates in the North East area, in North West regions predominates finance, ICT, Public Utility Services and other services.

In the table 2 we made a distinction for periods and sectors with regard to both the percentage of IPOs and the percentage of produced value added. In the 1995-1998 period, the prevailing typology of IPOs is manufacturing, that represents the 73% of the total. With regard to the geographic distribution, North West area prevails in all the sectors and especially in the manufacturing Industry. Manufacturing IPOs are present in all the geographic areas, included Southern Italy. In the subsequent years the manufacturing sector loses weight with respect to the total, with 28,6%, even if the number of the manufacturing IPOs does not change substantially. The sector whose weight substantially grows after 1998 is that of ICT (telecommunications, software etc) which represents the 25% of all IPO in the 1999-2004 period. North West confirms its relevance with the 49,5% of the total IPO (it was equal to 48% in the previous period). In manufacturing industry, the leading area becomes North East, while North West keeps the leadership in the service sectors.

The "Mezzogiorno" regions instead, with only three IPOs, of Southern entrepreneurial groups, further loses weight in comparison to the rest of the country.

[4] For Campania region we have included two companies, Finmatica and Grandi Navi Veloci, whose registered office is in the North but both are owned by local entrepreneurial groups

Our hypothesis is that the geographic distribution of IPO is linked to regional specialization. We have used for this purpose the value added.

IPO and value added have been grouped in three big sectors:

a) Industry in a narrow sense including manufacturing enterprises, public utility firms (gas, water, energy);

b) Service sector (Commerce enterprises, tourism, transports and communication, other services);

c) Monetary brokerage, financial, estate firms.

The percentage distribution of IPO and value added, for the various geographic areas, on the national total are shown in the table 2.

The IPO index of specialization of region r ($IPORI_{i,r}$) have been calculated dividing the percentage of the number of IPOs in sector i by the percentage of the value added of the region r in sector i.

$$IPORI_{i,r} = \frac{N_{i,r}}{N_i} / \frac{V_{i,r}}{V_i}$$

Where:
i = sector;
r = region;
V_i = Value added of the country in sector i;
$V_{r,i}$ = Value added of region r in sector i;
$N_{r,i}$ = Number of IPOs in region r in sector i;
N_i = Number of IPO in the country in sector i .

An index value bigger than one shows a specialization of region r in IPOs of sector i, while an index less than one signals despecialization.

If variables which affect IPOs fairly distribute themselves in all the areas, we should expect a value of the index equal to the unity in all the geographic areas and for all the sectors. Actually index values range between 0 and 2,78 showing that the distribution of the variables which affect IPOs is very different among the various geographic areas[5].

The North West index values are greater than 1 in the two periods in the service and financial sector, in particular the value of the index in the financial sector is 2,38 in the period 1995-1998.

[5] Values assembled in Table 2 have been built considering two periods 1995-98,amd 1999-2004 because the dynamic of the IPO is different.

Thanks to the specialization in these two sectors, the North West has an IPO share much higher than his share on the value added. North East instead looks with a specialization that is specular to that of North West, with values much higher than the unity in the sector of the industry in narrow sense, and especially in the manufacturing, but lower than the unity in the two last sectors. Thanks to the high specialization of IPOs in the sector of the industry in narrow sense, North East has a weight for the total of IPOs at the national level higher than that of the gross output. The most interesting aspect for the Centre area is the passage from a situation of despecialization in the period 1995-1998, to one which for all the sectors highlights a narrow proportionality between share of IPOs and share of the value added.

Different situation is that of Mezzogiorno characterized by a poor IPO presence, shown by index value definitely lower than 1. In the Mezzogiorno regions index values worsen in the period 1999-2004 with respect to 1995-98.

These various territorial industry specializations of IPOs reflect the different characteristics of Italian regions. North West plays a big role in industries other than manufacturing while North East is the area where manufacturing is more important. The Centre does not show any IPOs specialization. Finally, IPOs distribution show a big gap between Southern Italy and the other areas of the country .

We have built a location quotient for the three sectors:

$$LQ_{i,r} = \frac{V_{i,r}}{V_i} / \frac{V_r}{V}$$

Where:
i = sector;
r = region;
V_i = Value added of the country in sector i;
$V_{r,i}$ = Value added of region r in sector i;
V = Gross output;
V_r = Gross output in region r.

We assume that there is a positive correlation between location quotients $LQ_{i,r}$ and specialization indexes $I_{i,r}$. Figure 3 shows the positive correlation between these two indexes. A possible

interpretation of Figure 3 is that the more an area is specialized in a given sector, the higher will be external economies and higher the variables that incentive a firm to go public[6].

3. Geographical proximity and the decision of firms to go public

In this section we intend to test the hypothesis that distance from the main Italian financial centre, Milano, and dummies for the regions, could affect the decision of a firm to go public. We will estimate a probit model of the probability of going public and we use as control variables size, age and the profitability of the enterprisesFirms' size is considered very important as determinant in the decision to go public for two reasons: a) the fixed costs necessary to support an IPO (Ritter, 1997); b) the cost necessary for producing the information to be passed on the market (Chemmanur and Fulghieri, 1999).

Firms' age is often considered as a variable which affects the decision to go public because is difficult for the market to give a correct estimation of young enterprises as Leland and Pyle (1977) point out; therefore there is an a high degree of uncertainty about the correct evaluation of their shares (Ritter, 1986). Moreover, the empiric analysis to test a positive correlation between age and decision to go public has often not given significant results (Cassia *et al*., 2004).

Theory forecast a positive correlation between the decision to go public and profitability because enterprises which show a high profitability can also obtain favourable conditions as regards the issue price of shares (Pagano *et al*.,1998). In table 3 we summarize the expected effect of the above variables on the firm decision to go public.

The Italian Stock Exchange is in the town of Milano, that has the main features of a financial centre (number of financial businesses, legal bank seats, capital circulation, number of employees in financial sector etc.). The hypothesis that costs change with the distance determines that the net

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[6] Such hypothesis could be written as $IPORI_{i,r} = a + b\, LQ_{i,r}$ $\frac{IPO_{i,r}}{IPO_{i,c}} = a\frac{V_{i,r}}{V_{i,c}} + b(\frac{V_{i,r}}{V_{i,c}})^2 / \frac{V_r}{V_c}$

Where i is the sector r is the region, and c is the whole country.
The percentage of IPOs of region r in sector i is affected in a positive and more than proportional way by the percentage of value added of sector i of region r on the total of sector i. This could be explained by the influence of external and agglomeration economies that affect positively the specialization of region r in IPOs of sector i .

benefit to be listed will change with distance, as well. If listing costs are zero or very low for short distances from financial centre (Figure 4 - dashed line) and start growing after a threshold there will be a negative effect which affects listing benefits. Therefore, *coeteris paribus*, only from a certain minimum distance from financial centre the probability of a firm to go public will decrease with raising distances (Figure 5 - dashed line).

Our sample is formed by 454 observations of which 66 are IPOs and 388 are firms that have all the characteristics to be listed but are not publicly traded companies listed. All these companies belong to the manufacturing sector.

The reference period for the quoted companies goes from 1995 to 2004 and in this time span there were listed 67 IPOs belonging to the manufacturing sector. From these IPOs we removed Eni as it is not directly a privatization operation comparable with the group of the other companies. Therefore the final sample includes 66 IPOs.

Data for the quotable companies are extrapolated by the Capitalia sample[7], that includes only companies belonging to the manufacturing sector. From this sample, have been selected companies with turnovers higher than 25 mln of euros. Even though such minimum threshold does not represent a requirement for the quotation in the Italian stock exchange, is considered an essential feature for the access to the Stock Exchange market, as all IPOs of the period taken into consideration have a turnovers higher than the 25 mln of euro. Therefore the distinction among quotable and not quotable enterprises has been led with reference to the turnover dimension. The Capitalia sample takes back the variable values referred at the year 2000 and therefore also for the quoted companies values refer at this year or the year preceding the quotation if this happens before the 2000. Table 4 shows the descriptive statistics of the variables for the IPOs, quotable and not quotable companies.

[7] The Each Capitalia survey covers the population of large firms (>500 employees).

Sales and the number of employees (mean and median values) are higher for the IPOs than for the not quoted enterprises ;Net asset and operating profit of IPOs have greater values, as well.

Instead the age does not seem to give univocal indications. The average age of IPOs turns out in fact superior of 17% with respect to the average age of the not quoted firms but such enterprises difference is not confirmed if we compare the median variable values. We find the same results for the distance: the average distance of the quoted enterprises turns out lower of the average distance of the not quoted enterprises but the relation turns over if we consider the values as median. It is also interesting that standard distance deviation of the not quoted enterprises is higher than the standard deviation of IPOs.

There are two proxies for firms' size, sales and number of employees. The two variables obviously have a narrow correlation, therefore we choose to use only sales[8]. We have two proxies of firms' profitability: the ratio between operating profit and sales and the relationship between operating profit and net asset. In our estimation we use the relationship between profit and sales since in calculating the second relationship we lose 60 observations.

The estimated model of the probability to go public is the following

$$Pr(Q_i=1) = F(\beta_0 + \gamma_1 S1_i + \gamma_2 S2_i + \beta_1 N_i + \beta_2 LFATT_i + \beta_3 RDEF_i + \beta_4 DIST_i)$$

Where:

- Q_i is a variable equal to 1 if the enterprise stays private and equal to 0 if it goes public;
- N_i is the enterprises age; it is calculated as a difference between the year of quotation and year of firm birth for the IPOs, and as difference between 2000 and year of firm birth for the not quoted enterprises;

[8] The choice is justified by the fact that 60 not quoted companies have omitted to show the number of employees ,and therefore we would lose 60 observations

- $LFATT_i$ is the natural logarithm of enterprise turnover expressed in millions of euros. It is calculated in the year preceding the quotation, for the IPOs and the year 2000 for the not quoted enterprises;
- $RDEF_i$ is the ratio between net profit and sales. Also this variable has been calculated in the year preceding the quotation for the IPOs and in 2000 for the not quoted companies;
- $DIST_i$ is the enterprise distance calculated as kilometric distance between the company's registered office and Milano. In alternative to the variable DIST, we have used a variable called T which measures the time necessary for covering the physical distance from the enterprise to the financial center. Estimate results have been substantially the same given the high degree of correlation among the two variables. Therefore we have considered only the results concerning the variable DIST.

Other explanatory variables are industry dummies;. $S1_i$ is equal to 1 if the enterprise belongs to Traditional Sectors and is 0 otherwise. In the traditional sectors are included food, wood, ceramics, clothing, textiles, etc.;

$S2_i$ is equal to 1 if the enterprise belongs to Sectors with large economies of scale and is 0 otherwise. Such sectors are: rubber, steel, chemistry, etc;

$S3_i$ is equal to 1 if the enterprise belong to the Specialized Sectors (i.e. machinery electric and not electric) or to High Technology (pharmaceutical ,data processing, etc).

We have also introduced regional dummies in our estimates but the coefficients are not significant.

The correlation matrix (table 5) indicates that there is no correlation among between the explanatory variables.

4 Econometric Results

Table 6 shows that important determinants of IPOs are profitability and company's size. Neither age or distance have a significant coefficient. As regards to the last ones, the sign of the coefficients are the expected ones but they are not statistically significant. The total observations get down to 444 since we lose 10 observations concerning not quoted companies for whom we do not have information on the age.

The results of the model with the industry dummies, are shown in table 7. Estimates do not substantially modify as size and profitability remain significant, on the contrary of the age and the distance; coefficients concerning the sectors are significant. Enterprises belonging to traditional economies of scale industries show a lower probability to become an IPO than enterprises belonging to specialized and high technology sectors.

Our estimates do not support our hypothesis of an inverse relationship among distance of the enterprises from the main Italian financial center (Milano) and the probability to go public.

It is however possible that distance exerts an effect on the costs to become an IPO but the quotation costs start growing only after a certain kilometric threshold has been exceeded. Therefore we have removed from the sample the IPOs and not quoted firms located in the metropolitan area of Milano, where for metropolitan area we assume an area with ray of 50 kilometres extent. The new sample is now composed of 354 total observations of which 55 (the 15.54% of the sample) are IPOs and 299 not quoted firms (the remaining 84,46).

The results (table 8) show that distance is statistically significant at 5% level.

Introducing also the dummies for the sectors we find that the dummies of the firms belonging to traditional and with large economies of scale have negative coefficients (Table 9).

However we notice that distance become statistically significant at 10% level and not at 5% level as in Table 8. This could happen because the dummies for the sectors could be a proxy for distance indicator, and therefore could exist multicollinearity.

As matter of fact new estimates (Table 10) show that if we do not include distance the significance of the coefficients of the dummies for the sectors improves with respect to the model containing also the distance.

The following conclusions could be drawn from the above results. Firms' age is not statistically significant in any of our estimates. Size and profitability are always significant and with the sign that empirical and theoretical literature forecast. Industries dummies are significant and show that firms operating in specialized and high tech sectors have an higher probability to go public. Distance becomes a significant variable at 5% only if we consider firms with a distance higher than a threshold of 50 km from the financial centre of Milano

5. The determinants of initial public offerings of ICT firms

In this section we will estimate a reduced form of the model of the determinants of IPO in the ICT sector .ICT is a sector where external economies are quite high and there are many high growth firms, as well.

It is therefore interesting to examine the determinants of IPOs in the ICT sector.

An high skilled labour force is an important prerequisite for new firms localization of high tech industry mainly because a main characteristic of many ICT industries is that production is performed under increasing returns, as spatial externalities and learning by doing matter. A first kind of externality arises in the labour market. In regions where ICT production is substantial, ICT industries firms benefit from a large market of skilled and experienced people and therefore search, recruitment, and training costs are greatly reduced. ICT firms face a high fluctuating demand both for cyclical factors and because there is a very fast substitution of old products with new one. If there is an outside pool of skilled labour in the geographical area around the firms, these are released from a commitment to a large internal work force that must be laid off or called back as demand fluctuates. When firms require highly specialized skills to solve occasional esoteric problems that go beyond the capabilities of their regulars staff they could easily turn to outside specialists if they are located near the firms. Another kind of externality could arise because geographical proximity facilitates and intensifies transmission of information (knowledge spillovers). ICT industries are both vertically and horizontally linked and therefore share a lot of common knowledge. Information exchange and knowledge spillovers are distinguished features of many technological high tech clusters such as Silicon Valley[9]. Finally, externalities could arise from the reduction of transaction costs. In ICT industries the vertical proximity of suppliers and customers could decrease transaction and transportation costs (Scott and Angel, 1985; Saxenian,

[9] One of the pioneer of Silicon Valley, Nolan Bushnell illustrated this point: There is a tremendous amount of networking here in Silicon Valley, unmatched anywhere else. I recently visited a group of engineers in London who were working on a new product in competition with a group here in Silicon Valley. Both started at the same time, but the Silicon Valley team got the jump by six months. Our group included an engineer that had a friend worked at Intel. He smuggled out a couple of prototypes of a new chip that was just what they needed. The chip was soon to be on the market, but it was not yet in the catalog. "Reported by J.K.Larsen - E.M.Rogers" Silicon Valley fever Unwin paperback 1984.

1994; Del Monte, 1993). In high tech industries transactions costs caused by uncertainty about the evolution of technological progress are very high and such uncertainty could be reduced by proximity between downstream and upstream firms.

When spatial increasing returns determined by externalities are quite strong, it can be the case that outsourcing is profitable only if firms can benefit of very low factors prices. This consideration can justify why ICT industries persist to be concentrated in some regions of a country, even if firms could profit of lower factor prices by shifting their production in other regions. With reference to this point we have computed the Herfhindal index of regional IPOs within the ICT sector for six countries, namely Germany, US, Japan, France, England, UK, and Italy for 1999-2001[10]. The data show (table 11) for the IPOs different coefficient of concentration between industries and countries.. With the exception of Italy, the less concentrated sector of ICT industry is electronic manufacturing and the more concentrated Telecommunication services.

In order to investigate the relationship between IPOs patents and the extent of the ICT sector we restrict our attention to the number of IPOs due to firms in the ICT sector (both Manufacturing and Services firms) at regional levels, during 1999-2001, for four large European countries, that is France, Germany, Italy, and United Kingdom. The total number of observations is 67 distributed as follows: 21 regions in France, 15 regions in Germany, 19 regions in Italy, and 12 regions in UK.

[10] ICT sector is measured according to International Standard Industrial classification (ISIC). Following such classification industries belonging to the ICT sector are:
D30- Office accounting and computing machinery
D313-Insulated wires and cable
D32 –Communication equipment
D321-Electronic valves and tubes and other electronic components
D322 Television and radio transmitters and apparatus for line telephony and line telegraphy
D323 Television and radio receivers, sound or video recording or reproducing apparatus and associated goo
D3312 Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment
D3313 Industrial process control equipment
G515- Wholesale of Machinery, equipment and supplies
I642-Telecommunications
K7123 Renting of office machinery and equipment(including computers)
K72 Computer services;
721 Hardware consultancy;
722 Software consultancy and supply ;
723 Data processing;
724 Data base activities;
725 Repair of office accounting and computing machinery;
729 Other computer related activities.

Roughly two third of the sample, that is 45 observations, is relative to regions with positive values for IPO; in particular, all regions of Germany recorded at least one IPO during the three years we look at.

We relate the number of IPOs to the number of patents during the years up to 1998 and a measure of the extent of the ICT sector. In particular, we refer to the number of patents since 1978 for the following industries which are part of the ICT sector: "Manufacture of office, accounting and computing machinery" (ISIC–D300); "Manufacture of radio, television and communication equipment, and apparatus" (ISIC–D320); "Hardware consultancy" (ISIC–K721). For what attains at the extent of the ICT sector we use the share of employment in ICT–Services (ISIC–K72) relative to total employment in Manufacturing and Market Services sectors[11]. A first look at the data at country levels (table 12) shows that Germany is the country with the highest number of IPOs per capita in the sample, followed by France, UK, and Italy. In particular, the number of IPOs in Germany is roughly three times higher than that in Italy. The same ranking arises when we order the four countries in terms of patents per capita, suggesting that a positive relationship between IPOs and patents can be argued. Looking at the data at regional level, the main point is that the number of IPOs per capita attributed to the region of Hamburg is very much higher than those related to other regions in the sample. We will come back on this point in the following.

We estimates the number of IPOs per head as function of the variables that characterizes the economic structure of a region. We have also tested the hypothesis that concentration of employees working in industries of the ICT sectors is, at least in part, a prerequisite for IPOs, we have performed a simple econometric analysis. We have regressed the regional number of IPOs related to the ICT sector during 1999-01 (per million people) on the number of patents (per million people) and the employment in "Computer and related activities" (ISIC–K72), both before the IPOs[12]. We report OLS estimates of the parameters of interest for the overall sample of 67 regions and for the

[11] We would o thank C reNoS for providing us with the data set on patents.

[12] The number of IPOs are relative to the level of population at 1999, the number of patents are relative to the level of population at 1998, which is the last year covered by the data set on patents. Employment in "Computer and related activities" is entered as percentage value of total employment in Manufacturing and Market Services at 1998.

sample obtained eliminating regions without IPOs (Table 13). Columns labelled "*Yes*" report estimates allowing for country dummies. Under both circumstances, that is with and without country dummies, the two parameters of interest are estimated positive and significative. In order to check the robustness of these results, we augment the set of regressors adding an index of regional productivity, that is the logarithm of value added per employee for the Manufacturing and Market Services Sectors at 1998, the (logarithm of the) share of employment in the Market Services Sector at 1998, and an index of human capital. Again we report results for both the overall sample and the restricted one. In general, by introducing these additional regressors the fit of the regression improves and results confirm the positive relationships between IPO and patents as well as employment in ICT–Services; however, the estimated coefficient for patents is not statistically significant at the 5% confidence level.

Finally, we have re-estimated our model without the region of Hamburg and we obtain that the main results hold.

Thus, our econometric analysis show that variations between regions in the rate of concentration of IPO in ICT sector are also related to two factors, the degree of specialization in computer and related services industry and the stock of knowledge in ICT, which are the main determinants of the externalities in ICT production. Therefore, R&D investments and incentives to promote the software industry and the use of ICT could be seen as the main instruments to foster the start up of new leading firms.

Our results are quite interesting because they show that variations between regions in the rate of new leading firms in ICT industry are related to the degree of specialization in computer and related services industry and to the stock of knowledge in ICT. Both factors, as we have already shown, are the main determinants of the externalities in ICT production. Therefore investments in R&D, in the

development of software industry, and in the use of ICT technology could be seen as the main instruments to promote the start up of new firms.[13]

[13] The two other variables, labour productivity and human capital could be considered as control variables and as expected they have a positive effect.

5. Conclusions

Our paper shows which are the factors influencing the distribution of initial public offerings among regions of a given country. The empirical determinants of the going public decision have been examined by many empirical articles which have shown that size, profitability, age, market–to-book ratio are the main variables that affect the decision of as firm to go public. Obviously the economic structure of a region affects the number of firms that potentially could become an IPO and then the effective number of IPOs. Sector concentration in a given sector determines external economies that create a favourable environment for firms that could more easily could reach larger size and higher profitability, and become a potentially IPO.

Our paper shows that there is a positive relationship between locations quotients of a region and specialization of IPO. We also show that variations between regions in the IPO in ICT industry are related to two specific factors which are the degree of specialization in computer and related services industry and the stock of knowledge in ICT. Both factors are the main determinants of externalities in ICT production. Therefore investments in R&D, in the development of software industry, and in the diffusion of ICT technology could be seen as the main instruments to promote leading new firms. The two other variables, labour productivity and human capital are treated as control variables, they exert a positive effect on IPOs as expected.

If sectorial concentration, through creation of externalities, could affect regional distribution of IPOs, distance from the main financial center could affect such a distribution as well. Two are the main explanations. If the distance of a firm from principal financial centre affects negatively the issue price (due to a lower competition of investment bankers to take the firm on the stock exchange) and positively the unitary cost of share issue, the probability that a firm far away from a financial centre will decide to go public will be lower than that of a firm nearer to a financial centre. According to the second one, if the cost to issue shares increases with the distance from the main financial centre, than the probability that a firm far away from a financial centre will decide to go

public will be lower than that of a firm nearer to a financial centre. The econometric analysis of Italian case shows that distance from Milano, the main financial centre, affects negatively the probability that a firm takes the decision to go public.

Capital issued on the stock market is often the source of financing in crucial stages of growth of firms. Therefore public policy could be interested in reducing the gap in the opportunities that firms of different regions have in going public. Our paper have shown the variables that must be affected by public policies to increase the probability that also in backward regions the number of IPOs increases.

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Appendix A1. Sources:

- D30: Eurostat-New Cronos
- D32: Eurostat-New Cronos
- K72: Eurostat-New Cronos (Germany: Statistiches Bundesamt-IIID2-Beschaftigtenstatistik; UK: Annual Employment Survey: Employee Analysis-ONS Crown)
- Employment in manufacturing and market services, GVA in manufacturing and market services: Cambridge Econometrics.

Appendix A2. Regions and Countries:

BELGIUM
Région Bruxellescapitale/Brussels hoofdstad gewest, Vlaams Gewest, Région Wallonne.
DENMARK
GERMANY
BadenWürttemberg, Bayern, Berlin, Brandenburg, Bremen, Hamburg, Hessen, MecklenburgVorpommern, Niedersachsen, NordrheinWestfalen, RheinlandPfalz, Saarland, Sachsen, SachsenAnhalt, SchleswigHolstein, Thüringen.
SPAIN
Noroeste, Noreste, Comunidad de Madrid, Centro (E), Este, Sur, Canarias (ES)
FRANCE
Île de France, ChampagneArdenne, Picardie, HauteNormandie, Centre, BasseNormandie, Bourgogne, Nord PasdeCalais, Lorraine, Alsace, FrancheComté, Pays de la Loire, Bretagne, PoitouCharentes, Aquitaine, MidiPyrénées, Limousin, RhôneAlpes, Auvergne, LanguedocRoussillon, ProvenceAlpesCôte d'Azur, Corse.
IRELAND
ITALY
Piemonte-Valle d'Aosta, Liguria, Lombardia, Trentino Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna, Toscana, Umbria, Marche, Lazio, Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna.
NETHERLANDS
SWEDEN
Stockholm, Östra Mellansverige, Småland med öarna (NUTS95), Sydsverige, Västsverige (NUTS95), Norra Mellansverige, Mellersta Norrland, Övre Norrland.
UK
Cleveland, Durham (NUTS95), Cumbria (NUTS95), Northumberland,Tyne and Wear (NUTS95), Humberside (NUTS95), North Yorkshire (NUTS95), South Yorkshire (NUTS95), West Yorkshire (NUTS95), Derbyshire, Nottinghamshire (NUTS95), Leicestershire, Northamptonshire (NUTS95), Lincolnshire (NUTS95), East Anglia (NUTS95), Bedfordshire, Hertfordshire (NUTS95), Berkshire, Buckinghamshire, Oxfordshire (NUTS95), Surrey, EastWest Sussex (NUTS95), Essex (NUTS95), Greater London (NUTS95), Hampshire, Isle of Wight (NUTS95), Kent (NUTS95), Avon, Gloucestershire, Wiltshire (NUTS95), Cornwall, Devon (NUTS95), Dorset, Somerset (NUTS95), Hereford and Worcester, Warwickshire (NUTS95), Shropshire, Staffordshire (NUTS95), West Midlands (County) (NUTS95), Cheshire (NUTS95), Greater Manchester (NUTS95), Lancashire (NUTS95), Merseyside (NUTS95), Clwyd, Dyfed, Gwynedd, Powys (NUTS95), Gwent, MidSouthWest Glamorgan (NUTS95), BordersCentralFifeLothianTayside (NUTS95), Dumfries and Galloway, Strathclyde (NUTS95), Highlands, Islands (NUTS95), Grampian (NUTS95), Northern Ireland (UK)(NUTS95).
AUSTRIA
Ostösterreich, Südösterreich, Westösterreich.
PORTUGAL
Norte, Centro (P), Lisboa e Vale do Tejo, Alentejo, Algarve, Açores (PT), Madeira (PT).

FINLAND
Uusimaa (NUTS95), EteläSuomi (NUTS95), ItäSuomi, VäliSuomi, PohjoisSuomi, Åland.
NORWAY

Figure 1: The determinants of regional distribution of IPO

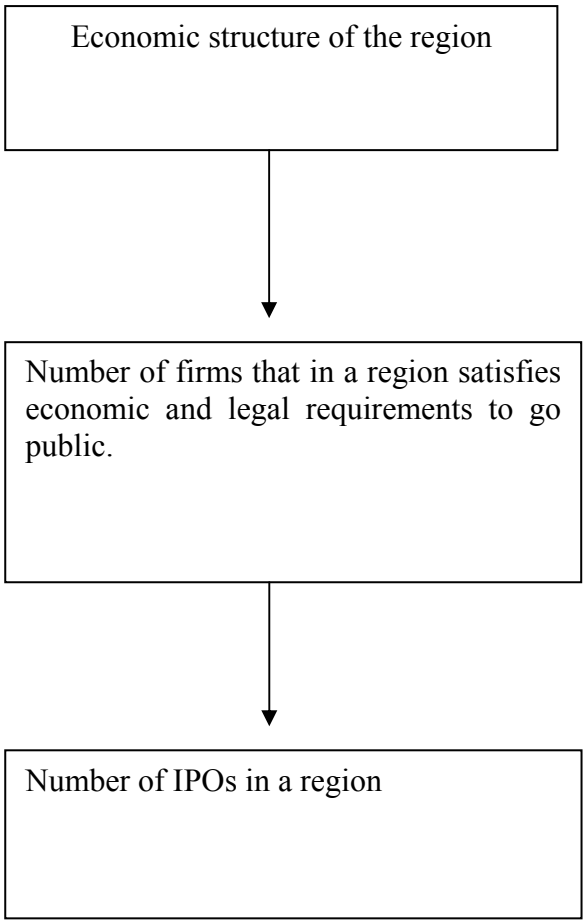


Figure 2: Econometric analysis of the determinants of regional distribution of IPOs

First Step

$N_{i,r} = F(Y_{1,r}, Y_{2r}, Y_{3r}, Yj_{,r}, ...)$

where:

$N_{i,r}$ is the number of companies that has at least a minimal to go public in the period examined in sector i of region r
$Y_{1,r}$, is one of the variable that characterizes the economic structure of region r;
i.e. productivity
$Y_{2,r}$, is one of the variable that characterizes economic structure of region r ;
i.e. size of the market
.
The number of observations is equal to the regions number .

Second Step

a) Sample of companies, N, that have at least a minimal probability to going public in the period examined.

b) Estimate of a model of the probability to go public

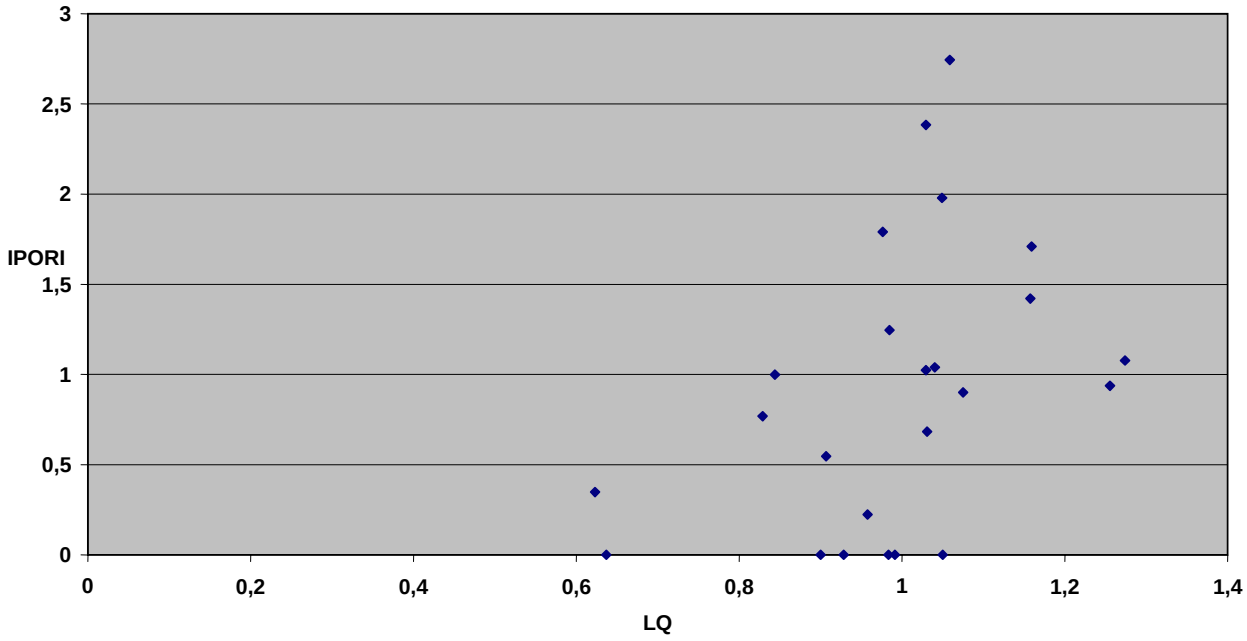
$Pr(IPO_{i,t} =1) = F(X_{i,t} , Y_{r,t},$)

IPO is equal to 0 if company i remains private in the period t and equals to 1 if it goes public.

X_{it} is the vector of variables that characterizes firm i (turnover, age, profitability, etc); $Y_{r,t}$ is the vector of variables linked to the geographical location of firm i

The number of observations is equal to N.

Figure 3: IPO Regional Specialization and Regional Location Quotient



IPORI= IPO Region specialization in a given sector. The index is computed as:

$$IPORI_{i,r} = \frac{N_{i,r}}{N_i} / \frac{V_{i,r}}{V_i}$$

Where:
i the is the sector
r is the region
V_i Value added of the country in sector i
$V_{r,i}$ Value added of region r in sector i
$N_{r,i}$ Number of IPO in region r in sector i
N_i Number of IPO in the country in sector i

LQ= Location quotient of the region. The index is computed as:

$$LQ_{i,r} = \frac{V_{i,r}}{V_i} / \frac{V_r}{V}$$

Where:
i the is the sector
r is the region
V_i Value added of the country in sector i
$V_{r,i}$ Value added of region r in sector i
V Gross output
V_r Gross output in region r

Figure 4: Listing cost and distance

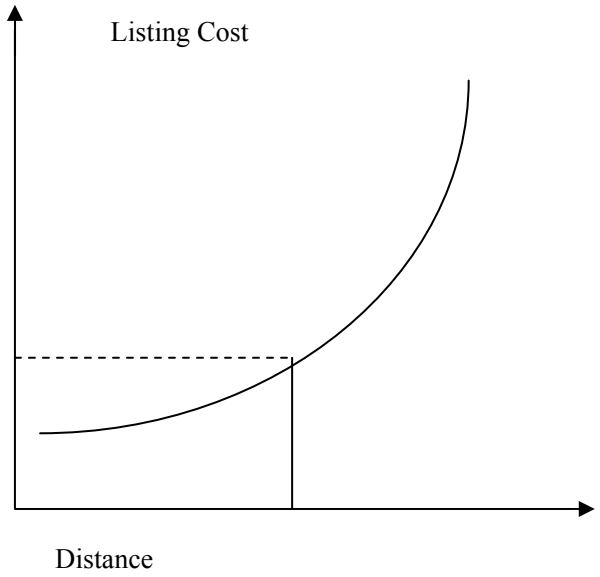


Figure 5: Probability of going public and distance

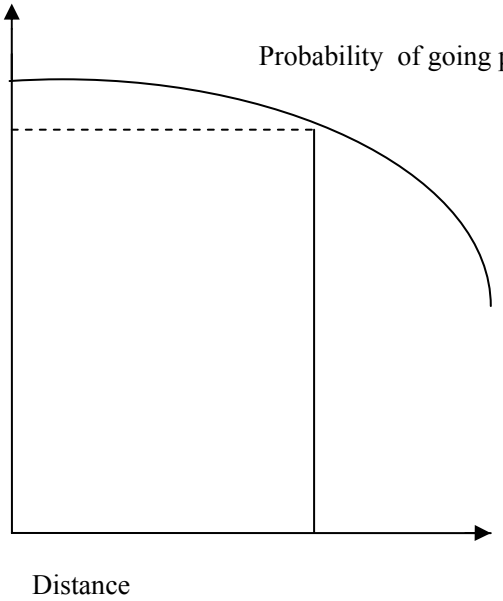


Table 1. IPO distribution in the period 1995-2004 for regions and sectors (percentage values)
IPOs have been assembled for six sectors: manufacturing, public utility services (gas, water, electricity, etc), ICT (services of telecommunication, software and other services bound to information technology), financial and insurance services (banks, insurances, etc), transports, others. The table shows substantial territorial differences in the distribution of IPOs: Manufacturing industry predominates in the North East, in North West predominates finance, ICT, Public Utility Services, other services.

	Manufacturing	Finance Insurance.	SPU	ICT	Transport	Other services	Total
North West	40,3	71,4	43,75	60,7	16,7	57,14	49.06
North East	43,3	7,1	31,25	10,7	33,3	14,29	27,67
Center	13,5	2,1	25	21,4	33,3	28,57	20,13
Mezzogiorno	2,90	0	0	7,1	16,6	0	3,14
Total IPOs	67	14	16	28	6	28	159

Source: Our calculations.
North West (Lombardia, Liguria, Piemonte,Valle d'Aosta); North East (Emilia Romagna,Veneto, Friuli, Trentino); Center (Marche, Toscana, Umbria, Lazio); Mezzogiorno (Abruzzi, Molise, Campania, Basilicata, Calabria, Sicilia, Sardegna).

Table 2. Distribution of the value added and the geographic IPO for area and productive sectors
In this table we made a distinction for periods and sectors both as regards the percentage of IPOs than the percent of produced value added. IPO and value added have assembled in three big sectors: A The industry in narrow sense which includes the manufacturing enterprises and those of public utility, gas, water, energy; B The service sector (Commerce enterprises, tourism, transports and communication, other services); C The enterprises concerning the activity of monetary brokerage, financial, estate etc.The obtained results considering the percents for the various geographic areas on the national value added and on IPO total for the considered sectors are shown in the table 3

		1995-98	1995-98	1995-98	1995-98	1999-2003	1999-2003	1999-2003	1999-2003
		A	B	C	D	A	B	C	D
North West	% V. A	0,4153	0,3210	0,3356	0,3260	0,4031	0,3135	0,3369	0,3211
North West	% IPO	0,4474	0,4000	0,8000	0,4792	0,3778	0,5614	0,6667	0,4955
North West	% IPO/% V. A	1,0772	1,2461	2,3838	1,4698	0,9372	1,7908	1,9788	1,5431
North East	% V. A	0,2593	0,2352	0,2016	0,2240	0,2600	0,2312	0,2034	0,2243
North East	% IPO	0,3684	0,0000	0,0000	0,2917	0,4444	0,1579	0,1111	0,2703
North East	% IPO/% V. A	1,4208	0,0000	0,0000	1,3021	1,7094	0,6829	0,5463	1,2051
Center	% V. A	0,1712	0,2187	0,2221	0,2066	0,1780	0,2194	0,2171	0,2109
Center	% IPO	0,1316	0,6000	0,2000	0,1875	0,1778	0,2281	0,2222	0,2072
Center	% IPO/% V. A	0,7686	2,7435	0,9005	0,9076	0,9989	1,0395	1,0236	0,9825
Mezzogiorno	% V. A	0,1512	0,2253	0,2406	0,2427	0,1569	0,2358	0,2423	0,2464
Mezzogiorno	% IPO	0,0526	0,0000	0,0000	0,0417	0,0000	0,0526	0,0000	0,0270
Mezzogiorno	% IPO/% V. A	0,3481	0,0000	0,0000	0,1717	0,0000	0,2232	0,0000	0,1096

Legend:
A) Industry in narrow sense
B) Commerce, repairs, restaurant hotels, transports and communications
C) Monetary brokerage, financial; estate and entrepreneurial assets
D) Gross output
VA) Value Added

Table 3. Variables that affect the probability that a firms goes public with expected correlation

Variables	Size	Age	Distance from financial centres	Prrofitability
Correlation	Positive	Positive	Negative	Positive

Table 4. Summary statistics for the samples used in estimation

Panel a includes the sample of reference in which both the manufacturing IPOs and the not quoted companies are included; the B Group refers to not quoted companies and panel C to IPOs on the Stock exchange and on New Market. The enterprise age is calculated as a difference in the year of quotation and constitution year of the company; for the companies not quoted the differences is calculated as difference between the year 2000 and year of foundation. The variable turnovers, Net Asset and Operating profits are expressed in mln. The variable distance is expressed in kilometres and represents the physical distance among the legal enterprise seat and the financial center, that is Milano.

Variable	Mean	Median	Std. Dev	Min	Max	Obs.
Panel A: The Whole Sample						
Age	35.78604	30	28.28407	0	263	444
Sales	161.8287	72.56	335.4058	23.81	4465.14	454
Employees	600.9137	330	924.2697	14	8620	394
Net Assets	25.33748	8.16	75.40625	-2.11	802.9	453
Net Profit	2,414207	0.3	10.08888	-26.24	133.07	454
Distance	218.4048	163.4	224.3509	0	1494	454

Sector Dummy Variables	Freq.	Percent
Traditional sectors	176	38.77
Large Economy of scale sectors	87	19.16
Specialized and high tech sectors	454	42.07

Panel B: Not Listing Firms Eligibles to go Public						
Age	34.89418	30	26.08961	2	170	378
Sales	154.6913	67.66	333.4881	25.18	4464.14	388
Employees	530.7104	324.5	808.7528	14	8620	328
Net Assets	17.36729	6.765	50.66092	-2.11	677.15	388
Net Profit	1.064021	0.145	7.072078	-26.24	98.9	388
Distance	220.7186	163.4	232.6926	0	1494	388

Sector Dummy Variables	Freq.	Percent
Traditional sectors	155	39.95
Large Economy of scale sectors	82	21.13
Specialized and high tech sectors	151	38.92

Panel C: IPOs						
Age	40.89394	30.5	39.3779	0	263	66
Sales	203.788	103.05	346.083	23.81	2056.52	66
Employees	949.803	589.05	1313.803	64	5985	66
Net Assets	72.91338	26.6	148.1711	5.8	802.9	65
Net Profit	10.35167	5.505	18.35033	-3.64	133.07	66
Distance	204.803	170.4	167.8949	0	789.7	66

Sector Dummy Variables	Freq.	Percent
Traditional sectors	21	31.82
Large Economy of scale sectors	5	7.58
Specialized and high tech sectors	40	60.61

Table 5. Correlation matrix of the regressors

	N	LFATT	RDEF	DIST
N	1.0000			
LFATT	0.0161	1.0000		
RDEF	0.0753	0.0098	1.0000	
DIST	-0.0375	-0.0249	-0.0226	1.0000

Table 6. Probit model including all sample

We estimate a probit model for the probability of going public. The dependent variable in equal to 1 if the firm is an IPO and equal to 0 if the firm stay private. The independent variables are: age (N), natural logarithm of enterprise turnover expressed in mln of euro (LFATT), the ratio between net profit and sales (RDEF) and kilometric distance between the company's legal seat and the town in Milano.

Dependent Variable	Q
Number of obs.	444
LR χ^2 (4)	128.24
Prob > χ^2	0.0000
Pseudo R^2	0.3435
Log likelihood	-122.52127

Variable	Coeff.	Std. Err.	z	P>|z|
N	0.000398	0.0034713	0.11	0.909
LFATT	0.2292545[a]	0.0890899	2.57	0.010
RDEF	24.40877[a]	2.829521	8.63	0.000
DIST	-0.000557	0.0004815	-1.16	0.247
Cons.	-2.609327	0.4546726	-5.74	0.000

[a] Significantly different from 0 at the 1 percent level or less

Table 7. Probit model including all sample and sectorial dummy variables

The sectorial dummy variables are s1 that is equal to 1 if the enterprise belongs to Traditional Sectors and is 0 otherwise, s2 that is equal to 1 if the enterprise belongs to Sectors with large economies of scale and is 0 otherwise, and s3 that is equal to 1 if the enterprise belong to the Specialized Sectors or to High Technology and is 0 otherwise. The other regressors and the dependent variables are the same.

Dependent Variable	Q
Number of obs.	444
LR χ^2 (4)	137.01
Prob > χ^2	0.0000
Pseudo R^2	0.3671
Log likelihood	-118.13209

Variable	Coeff.	Std. Err.	z	P>|z|
s1	-0.3769637[c]	0.2074226	-1.82	0.069
s2	-0.7800655[a]	0.2998354	-2,60	0.009
N	0.0018368	0.0035875	0.51	0.609
LFATT	0.268946[a]	0.0918848	2.93	0.003
RDEF	23.7747[a]	2.848577	8.35	0.000
DIST	-0.0003302	0.000504	-0.66	0.512
Cons.	-2.636565	0.4667964	-5.65	0.000

[a] Significantly different from 0 at the 1 percent level or less
[c] Significantly different from 0 at the 10 percent level

Table 8. Probit model including only IPOs and not listed firms for which distance from Milano is greater than 50 kilometres.

We have removed from the sample the IPOs and not quoted firms located in the metropolitan area of Milano, where for metropolitan area we assume an area with ray of 50 kilometres extent. The new sample turns out composed of 354 total observations of which 55 is to IPOs and 299 to not quoted firms. The obtained results not only turn out significant for the size and profitability but also for the distance whose coefficient is also statistically significant at the level of the 5 percentage.

Dependent Variable	Q
Number of obs.	354
LR χ^2 (4)	125.88
Prob > χ^2	0.0000
Pseudo R^2	0.4116
Log likelihood	-89.956757

Variable	Coeff.	Std. Err.	z	P>|z|
N	0.0024614	0.0042448	0.58	0.562
LFATT	0.2581716[b]	0.1108595	2.33	0.020
RDEF	32.09382[a]	4.038999	7.95	0.000
DIST	-0.001566[b]	0.0007112	-2.20	0.028
Cons.	-2.678843	0.5525652	-4.85	0.000

[a] Significantly different from 0 at the 1 percent level or less
[b] Significantly different from 0 at the 5 percent level

Table 9. Probit model including only IPOs and not listed firms for which distance from Milano is greater than 50 kilometres and including sectorial dummy variables.
We introduce the dummy variables for industrial sector (s1, s2, s3) and we re-estimate the model whit the same regressors. We notice that distance become statistically significant at 10% level and not at 5% level and this could happen because the dummies for the sectors could be a proxy for distance indicator, and therefore could exist multicollinearity.

Dependent Variable	Q
Number of obs.	354
LR χ^2 (4)	139.67
Prob > χ^2	0.0000
Pseudo R^2	0.4567
Log likelihood	-83.061514

Variable	Coeff.	Std. Err.	z	P>|z|
s1	-0.388794[c]	0.2308459	-1.68	0.092
s2	-1.535474[a]	0.5354669	-2,87	0.004
N	0.0037636	00045089	0.83	0.404
LFATT	0.3713551[a]	0.1209694	3.07	0.002
RDEF	30.97673[a]	4.1209694	7.46	0.000
DIST	-0.0013586[c]	0.0007605	-1.79	0.074
Cons.	-2.966046	0.5923284	-5.01	0.000

[a] Significantly different from 0 at the 1 percent level or less
[b] Significantly different from 0 at the 5 percent level
[c] Significantly different from 0 at the 10 percent level

Table 10. Probit model with sectorial dummy variables and without variable DIST.
The new estimates show that if we take back distance from the model the significance of the coefficients of the dummies for the sectors improves with respect to previous regression.

Dependent Variable	Q
Number of obs.	354
LR χ^2 (4)	135.95
Prob > χ^2	0.0000
Pseudo R^2	0.4446
Log likelihood	-84.920021

Variable	Coeff.	Std. Err.	z	P>|z|
s1	-0.4667774[b]	0.2252424	-2.07	0.038
s2	-1.577392[a]	0.5209228	-3.03	0.002
N	0.0043534	0.0043964	0.99	0.322
LFATT	0.3429148[a]	0.1178167	2.91	0.004
RDEF	29.43427[a]	3.932982	7.48	0.000
Cons.	-3.111503	0.5811803	-5.35	0.000

[a] Significantly different from 0 at the 1 percent level or less
[b] Significantly different from 0 at the 5 percent level

Table 11. Herfhindal index of regional IPOs, 1999-2001
We have computed Herfhindal index of regional IPO, classified in industrial sectors, for France, Germany, Italy, Uk, Japan and Us. The table shows that IPO in sectors that produces ICT services are more concentrated than sectors that produce goods.

Countries	Electronic manufacturing	Telecommunication services	Software and computer services	Total ICT	All Others
France	0.280	0.672	0.432	0.439	0.262
Germany	0.170	0.190	0.22	0.17	0.22
Italy	0.555	0.437	0.240	0.271	0.173
UK	0.265	0.287	0.24	0.228	0.304
Japan	0.290	-	0.76	-	-
US	0.089	0.285	0.232	0.20	-

Source: Our calculations

Table 12. IPOs, patents, and ICT employment
We restrict our attention to the number of IPOs in the ICT sector during 1999-2001 for four large European countires: France, Germany, Italy and United Kingdom. The two variables that we relate to the number of IPOs are the number of patents during the years up to 1998 and the share of employment in ICT. The table show that Germany is the country with the highest number of IPOs per capita, followed by France, UK and Italy. The same ranking arises when we order the four countries in terms of patents per capita.

	IPO/ Pop (1999-01)	Patents / Pop – 1998	ICT Employment – 1998 (%)
Italy	0.521	64.40	1.406
UK	1.148	149.64	2.061
France	1.337	237.37	1.489
Germany	1.674	275.18	0.914

Table 13. Determinants of IPO in a set of European regions

We have regressed the regional number of IPOs related to the ICT sector during 1999-01 (per million people), mainly on the number of patents (per million people) and the employment in "Computer and related activities" (ISIC–K72), both before the IPOs. We report OLS estimates of the parameters of interest for the overall sample of 67 regions and for the sample obtained eliminating regions without IPOs. Columns labeled *Yes* report estimates allowing for country dummies. Under both circumstances, that is with and without country dummies, the two parameters of interest are estimated positive and significative. In order to check the robustness of these results we augment the set of regressors adding an index of regional productivity, that is the logarithm of value added per employee for the Manufacturing and Market Services Sectors at 1998, the (logarithm of the) share of employment in the Market Services Sector at 1998, and an index of human capital. Again we report results for both the overall sample and the restricted one. In general, by introducing these further regressors the fit of the regression is improved and results confirm the positive relationships between IPO and patents as well as employment in ICT–Services.

	Large sample			Restricted sample		
Patents	0.004 (3.76)	0.002 (1.70)	0.001 (0.51)	0.004 (4.21)	0.002 (2.42)	0.001 (1.10)
ICT–Services Employment	0.543 (2.58)	1.138 (3.76)	0.670 (2.77)	0.532 (2.25)	1.167 (3.02)	0.515 (1.94)
Labour Productivity			3.128 (1.81)			3.660 (2.08)
Market Services Employment			2.463 (1.57)			3.526 (1.82)
Human capital			0.714 (1.26)			0.547 (1.22)
Country dummies	No	Yes	Yes	No	Yes	Yes
N ($\overline{R}^2$)	67 (0.30)	67 (0.45)	67 (0.56)	45 (0.27)	45 (0.35)	45 (0.54)