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# **Subcontracting in the Italian industry.**

## **Labour Division, Firms' Growth and North-South Divide<sup>♦</sup>**

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**Abstract** – By making use of a 4000 firms database, this paper analyzes the dynamics of division of labour among Italian manufacturing firms during the '90s, and seeks to assess the impact that subcontracting has on manufacturing firms' growth. In particular, we investigate the relationship between labour division and firms' growth with three specific objectives: a) to understand whether and how subcontracting may have affected firms' growth dynamics; b) to test if larger growth could be due to stronger incentives to innovate for subcontracting firms and c) to study the joint influence of subcontracting and location in Southern Italy on growth. The main results are that i) the propensity to carry out subcontracting activities is relevant for growth, especially when allowing for a nonlinear relationship between growth and subcontracting; ii) more innovative subcontracting firms are also more susceptible to grow and iii) the deep dualism of the Italian industrial structure is once again confirmed, as Southern subcontractors show poorer performances and slower growth.

**Keywords:** subcontracting; growth; location

**JEL Classifications:** D23; L23

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## 1. Introduction

This paper concerns performances and growth of the Italian manufacturing firms involved in the chain of subcontracting and outsourcing. This is a field of research relatively little explored: while, as we will see, the features and the effects of recent changes in the pattern of regional and international labour division among firms have been widely investigated from a macroeconomic perspective, there are only very few firm based studies. Our analysis starts from the half of 90's, when a long period of exogenous and endogenous shocks begins, leading to a profound change in the model of labour division among firms in most of European countries. The geographic fragmentation of the productive activities and the consequent "globalization" in the markets of the intermediates are the most evident and known effects of that process. In Italy this involves a deepening of inter-firm vertical relations and an upgrading of subcontractors' role. These latter, once bound to be "captive suppliers", confined to merely operative tasks in a monopsonistic context crowded by faceless transactions, progressively evolve. Subcontractors often become agents suitable to take part in trans-national productive networks, able to hold complementary rather than subordinate relationships with buyers. Interestingly, despite the deep changes occurring in those years, the geographic duality in the structure of Italian industry remains steadily persisting. Southern industry gets certainly involved in the international process of production scattering; however it proves still to be characterised by poor performances in terms of both productivity and profitability.

In this paper we investigate the relationship between labour division and firms' growth in the Italian manufacturing industry in the second half of 90's. More specifically, the objectives of the paper are: a) to understand whether and how subcontracting<sup>1</sup> may have affected firms' growth dynamics; b) to test if a possible larger growth could be due to the stronger incentives to innovate for subcontracting firms wishing to upgrade along the value chain, consistent with the recent interpretations of the Global Commodity Chain approach; and c) to study the joint influence of subcontracting and location on growth by testing in particular if Southern subcontractors show growth dynamics significantly different from North and Center subcontracting firms.

The literature on firm growth is definitely ample, dating back at least to the Gibrat law of proportionate growth (Mansfield, 1962). The novelty of our approach concerns the focus on the organizational choice as a key element to account for growth. Surprisingly, so far little attention has been devoted to the linkage between labour division and growth, even in countries such as Italy and Japan which have founded much of their competitive advantage on a peculiar pattern of firms' labour division (Yasuda, 2005).

The paper outline is the following. After this introduction, section 2 describes some major features of the current pattern of firms' labour division. Section 3 recalls the basics of the GCC approach as a useful background for the empirical investigation. This latter is the object of section 4, in turn splitted into three subsections: the first presents data and some descriptive statistics; the second describes estimation methods and the third illustrates main results. It has to be highlighted that explanatory variables include a) standard variables such as age, size and past growth; b) organizational variables such as subcontracting, product innovation and ICT investment c) the geographic variable "localization", which assumes a particular relevance with respect to the purpose of detecting possible differences in the growth of Southern and Centre-Northern firms. Section 5 draws out main conclusions.

## 2. The structure and the evolution of the value chain

The last 15 years have witnessed an increasing fragmentation of production activities mainly occurred through outsourcing and offshoring<sup>2</sup>. This process has originated for most industries a worldwide value chain<sup>3</sup> so that competition has taken place not only on the market of final goods but also for intermediates. As a consequence, the role of firms in the international labour division has become increasingly relevant in determining the overall comparative advantage of countries (Feenstra e Hanson, 2001; Hummels *et al.*, 2001).

The reasons of international fragmentation are several. We could first mention the substantial reduction of tariffs and transportation costs which brings brought about a reduction of costs of temporary exportation for outward processing and includes developing countries in the international labour division network as low cost producers of intermediate inputs<sup>4</sup>. Second, the development and diffusion of ICT fosters the widening and spreading of the international subcontracting network. As maintained by Coase (1937), the development of ICT allows to shrink coordination costs among the network's agents and make geographical proximity less relevant. Finally, a substantial role is played by offshoring: FDI contributes to production fragmentation as multinational firms often include subcontractors of different countries in their outsourcing networks<sup>5</sup>. The spatial reorganization of labour division involves a permanent structural change: markets get wider, specialised producers are born and grow up, holdup costs diminish so that the organizational choice based on outsourcing activities to independent input suppliers becomes more efficient (McLaren, 2000).

The Italian industry gets involved in the globalization of intermediate inputs only recently, in the second half of 90's, when the increasing competition by Eastern Europe and Asia producers is made harsher by currency appreciation due to the constraints imposed to join EMU. This leads to

a serious productivity slowdown, and a reduction of exports and market shares<sup>6</sup>. Italian firms react by taking actively part in the international reorganization of labour division. While general industrial statistics do not satisfactorily describe the size and intensity of this phenomenon, a number of case studies witness the effort of Italian firms toward the international delocalization (for example, Tattara *et al.*, 2006 and Mariotti *et al.*, 2008). According to Unioncamere Report (2006), 77% of medium sized firms have suppliers abroad. The changes of organizational choices concern even the Central and Eastern regions of the country, i.e. the areas where the “industrial district model” prevails. Although districts have been traditionally well “self contained”, and founded comparative advantage on local spillovers, today about 2/3 of firms resort to subcontractors localized outside the region and/or country<sup>7</sup>. Unlike, in Southern regions the subcontracting network is still usually organised on a local basis, as 2/3 of firms hinge on provincial suppliers. This evolution points out the marginal position of Southern Italian manufacturing firms in the current international labour division (Giunta and Scalera, 2006 and 2007).

Together with spatial organization, another distinctive feature of the new pattern of labour division is the “geometry” of subcontracting. This is characterised by a pyramid shaped structure: the leader firm is at the top; just below it, there are primary subcontractors, i.e. a selected and restricted number of subcontractors which set up and run direct relationships with the principal. Primary subcontractors carry out specific investments with high switching costs. They have a narrow set of customers and therefore bear a high hold up risk<sup>8</sup>. Leader and primary subcontractors have repeated relationships formalised by renewed contracts. Sometimes subcontractors hold equity; often the leader grants technical assistance. In the layers under primary subcontractors there are several minor level subcontractors which are not directly related to the leader but only to upper stage of the chain. This framework puts together the advantages of a scattered production and a centralised responsibility given that each outsourcer faces a small number of subcontractors. Every agent (but the leader and final subcontractors) play a twofold role of principal and agent<sup>9</sup>. The overall network results to be a complex structure with significant problems of hierarchy and governance for leaders. These latter are usually final good assemblers or distributors (retailers) who manage the functions with the highest added value (R&D, design, engineering, marketing) and have the ability to face international transaction costs.

### 3. Value chain and firms' growth

The effects of the changes in labour division among firms on efficiency and growth (both systemic and of firms involved in the subcontracting/outsourcing chain) have been analysed by literature from different viewpoints<sup>10</sup>. A theoretical approach particularly interesting for our purposes is the

one adopted by the Global Commodity Chain analysis (henceforth GCC) proposed by Gereffi (1994), and then followed by Kaplinsky (2000) and Henderson *et al.* (2002). The peculiarity of this approach is its focus on firms' growth within a context of value chain. In this setting, the location of firms along the chain is crucial in determining their performance and growth. On this point, Gereffi (1999) outlines a distinction between two types of production chains: a buyer driven commodity chain, common among labour intensive industries such as textiles and shoes, and a producer driven commodity chain, typical of industries such as automobile, electronics and civil aviation. In both the kinds of chain, the key players directly carry out only the highest return activities both upward (design, engineering) and downward (marketing, retail). These yield high rents while the simplest manufacturing activities are the most exposed to increasing global competition.

The GCC theory identifies four non mutually exclusive expansion paths for subcontracting firms: a) to increase its x-efficiency; b) to strengthen inter-firm connections with their partners to build up a network more consistent and cooperative than rivals; c) to introduce new products or to widen the range of products supplied and d) to improve the quality of its functions along the chain, or to move to higher quality functions (from production to design, for example). We believe that options a) and b) do constitute requirements to take part in the network but do not warrant *per se* against the risk of a future decline. Conversely, options c) and d) are the key choices leading to higher returns and growth.

This interpretation helps to explain some recent empirical evidence for Italy, like the harsh selection of small and medium sized subcontractors in textile and shoes industries which took place in the 90's through the exit of many marginal producers. Also, the GCC allows to give a rationale to the dynamics of upgrading of many subcontracting firms in Northern and Central regions such as Veneto (Amighini and Rabellotti, 2003) and Marche (Corò and Grandinetti, 1999), or even to the changes in the specialization of some industrial districts moving from the production of final consumption commodities to machinery and equipment employed in the those same industries (De Arcangelis and Ferri, 2005). As we will explain in detail, in our econometric estimation we will seek to take into account the firms' possible upgrading in the value chain by considering variables connected to firms' productive innovation<sup>11</sup>.

#### 4. The empirical investigation

The main objectives of this investigation are three. First, we aim at studying the relationship between subcontracting intensity (i.e. the ratio between subcontracting and total sales) and firm growth (as relative increase of sales or employed). The working hypothesis is that subcontractors, once emancipated from their traditional condition of inferiority with respect to their customer, may

have carried out performances comparable or even better than other firms. This idea is consistent with our considerations above and recent literature bearing out significant positive relationships between subcontracting and respectively survival rates (Mazzola and Bruni, 2000), ROE and ROI (Innocenti, 2003) or input productivity and return (Giunta and Scalera, 2007, for Central and Northern Italy firms)<sup>12</sup>. Second, we intend to test whether the growth of subcontracting firms is due to the ability to innovate to gain an upgrading in the value chain, consistently with the predictions of GCC theories. Finally, the third objective is the evaluation of possible geographic differences in the relationship between subcontracting intensity and growth.

As a by-product, our investigation also tests the relevance of the neutrality result known as “Gibrat law of proportionate growth”. According to this, firm growth rate is stochastic, and therefore independent from its size, uncorrelated to the past values of growth and not linked to other explanatory variables. There is a wide theoretical and empirical literature on Gibrat law. On the theoretical ground, the most relevant criticism comes from models of firm learning inspired to the seminal work of Jovanovic (1982), tracing out a negative relationship between firm growth rate and age. Other contributions, such as Sutton (1997) and Hart (2000), confute the hypothesis of no serial correlation for growth rate by showing the strong persistence of growth. In the same vein, there is a large number of empirical works. A clear inverse relationship between growth rate and size and/or age is highlighted for the United States by Evans (1987a, 1987b) and for UK by Dunne e Hughes (1994) (manufacturing) and Variyam e Kraybill (1992) (primary sector and services). These results are substantially confirmed by Audretsch et al. (1997, 1999) for Dutch firms operating in different industrial sectors and wholesale trade, Harhoff et al. (1998), who consider a sample of German firms, Mac Pherson (1996) for South Africa and Yasuda (2005), who shows the existence of a strong negative correlation between growth rate and age or initial size for a sample of 14000 Japanese manufacturing firms.

#### 4.1. The data

Before proceeding to the description of methods and results, we give briefly account of some salient features of our data and make a short descriptive analysis of the growth performance of our sample firms. Our investigation is based on the dataset made available by the VII and VIII issue of Capitalia “Survey on manufacturing firms”, regularly carried out every three years<sup>13</sup>. Capitalia surveys collect data on a large number of variables. In particular, the VII wave, concerning the period 1995-1997, contains 4497 observations while the VIII wave (1998-2000) supplies 4680 observations. However only 1299 firms are sampled in both issues. The surveys are based on a stratified sample of firms with not less than 11 employed, including the whole population of firms

with more than 500 employed. Every firm answers to a detailed questionnaire which asks to indicate the values of a large number of variables for the current year and in some cases for the previous one or two years. In particular, the question on subcontracting is referred only to the current year. Moreover, each firm supplies 10 year time series concerning a number of balance sheet variables, among which no additional information on subcontracting is included.

Tables 1 and 2 show yearly average growth rates of real sales and employed for the periods 1995-97 and 1998-2000 for a) small (11 to 100 employed), medium sized (101 to 500 employed) and large (beyond 500 employed) firms; b) Centre-North and Mezzogiorno<sup>14</sup> firms and c) absolute subcontractors (firms producing only on order), strong subcontractors (more than 50% of total sales), weak subcontractors (less than 50% of total sales) and non-subcontractors.

*Insert Table 1 about here*

*Insert Table 2 about here*

Tables 3 and 4 record the results of tests on differences ANOVA which turn out to be statistically significant in most cases. Tables supply valuable information. All groups are characterised by positive growth rates (quite high for growth rates of employed). The differences among small, medium sized and large firms are little relevant: medium firms grow slightly more than others, while small firms grow more in terms of employed. About geographical differences, Centre-North firms show higher growth rates of both sales and employed, with the only exception of no subcontractors.

*Insert Table 3 about here*

*Insert Table 4 about here*

When focusing in more detail on subcontracting intensity, the evidence looks mixed. The groups ONSUB and HISUB get the highest growth rates of real sales (but not of employed). In any case, however, each of the middle groups (LOSUB and HISUB) have higher rates than the closer extreme group (respectively NOSUB and ONSUB). This raises the point of a possible non monotonic (i.e. increasing and then decreasing) relationship between growth rate and subcontracting intensity. By looking at the table by rows, one can also notice that this pattern is common to any firm size and to the overall group of firms localized in Central and Northern regions. The only exception concerns Southern firms for which growth rates always shrink with subcontracting intensity<sup>15</sup>.



## 4.2. The estimation method

We estimate the following three equations for growth in terms of both real sales and employed.

$$\Delta y_{it} = \alpha + \theta_1 y_{it-1} + \theta_2 \Delta y_{it-1} + \theta_3 AGE_{it} + \gamma_1 SUD_{it} + \gamma_2 SUB_{it} + \beta_1 AVK_{it} + \beta_2 ICT_{it} + \beta_3 INP_{it} + u_{it}, \quad (1)$$

$$\Delta y_{it} = \alpha + \theta_1 y_{it-1} + \theta_2 \Delta y_{it-1} + \theta_3 AGE_{it} + \gamma_1 SUD_{it} + \gamma_2 SUB_{it} + \beta_1 AVK_{it} + \beta_2 ICT_{it} + \beta_3 INP_{it} + \beta_4 IXS_{it} + u_{it} \quad (2)$$

and

$$\Delta y_{it} = \alpha + \theta_1 y_{it-1} + \theta_2 \Delta y_{it-1} + \theta_3 AGE_{it} + \gamma_1 SUD_{it} + \gamma_2 SUB_{it} + \gamma_3 SUB_{it}^2 + \gamma_4 SXS_{it} + \gamma_5 SXS_{it}^2 + \beta_1 AVK_{it} + \beta_2 ICT_{it} + \beta_3 INP_{it} + u_{it} \quad (3)$$

where  $i$  is the firm,  $t=1,2$  the survey of 1998 or 2001,  $y_{it}$  is the log of real sales SAL or the log of the number of employed EMP; AGE is the log of firm age (years); SOU is a *dummy* taking on value 1 if the firm is localized in Southern regions; SUB subcontracting intensity (as share of subcontracting on sales); AVK is the ratio added value over capital, a typical indicator of productivity; ICT ed INP are two *dummies*, which we consider *proxies* of the firms' attitude to innovate. They take unit value if during the last three years respectively the firm carried out ICT investments and introduced product innovation. The exact definition of these variables together with the main descriptive statistics is reported in Table 5. Finally,  $\Delta y_{it}$  is the first difference  $y_{it} - y_{it-1}$ . A possible significance of parameter  $\theta_1$  indicates the dependence of growth rate from the initial value  $y_{it-1}$ , while significance of  $\theta_2$  would imply growth persistence. According to Gibrat law, both these parameters should not be significantly different from zero.

*Insert Table 5 about here*

Interaction terms IXS and SXS are respectively the products between INP and SUB and between SOU and SUB. In equation (4), IXS is introduced to assess the impact of innovation on the sensitiveness of growth to subcontracting intensity. As shown above, within the set of subcontractors, GCC theories distinguish a group of innovative firms able to upgrade along the value chain and to grow more than others. In this view, the subcontracting firm should substantially benefit from innovation as this allows to gain a leader position in the value chain. For this reason, the expected sign of the IXS parameter is positive. Specification (2) permits to separately evaluate the marginal effect of innovation on growth for non subcontractors (the parameter  $\beta_3$ ) and for absolute subcontractors (the sum  $\beta_3 + \beta_4$ ).

The product SXS and the squared term in equation (3) aim at testing the hypotheses that the relationship between subcontracting intensity and firm growth be a) structurally different between

South and Centre-North and b) non linear. From (3), it is easy to show that the marginal effect of subcontracting on growth rate is  $\gamma_2 + 2\gamma_3SUB$  for Centre-North and to  $\gamma_2 + \gamma_4 + 2(\gamma_3 + \gamma_5)SUB$  for Mezzogiorno. This implies that one can test the hypothesis of geographical structural differences in the relationship between subcontracting and growth by checking the statistical significance of  $\gamma_4$  and  $\gamma_5$ , which in turn correspond to the differences  $(\gamma_2^S - \gamma_2^{CN})$  e  $(\gamma_3^S - \gamma_3^{CN})$ , where *S* and *CN* denote respectively parameters of regressions on subsamples relative to Southern and Centre-Northern firms. Also, we can test non linearity by considering the statistical significance of  $\gamma_3$  and  $\gamma_5$ . Finally, in equation (3), the marginal effect of localization (i.e. the difference in the average growth between South and Centre-North) is equal to a  $\gamma_1 + \gamma_4SUB + 2\gamma_5SUB^2$ . Through specification (3), we can run regressions on the whole sample, with no need of distinct estimates for the two subsamples.

Concerning the estimation method, our choices are strongly constrained by the nature of available data. In particular, since firms are requested to indicate the value of subcontracting intensity only for one year, our data seem suitable to be treated more like a pool than a panel for at least two reasons. First, the number of firms sampled in both the surveys is just above 25% of cases, which would have made the panel strongly unbalanced with a minor informational advantage with respect to a pool, or alternatively imposed to exclude many observations (almost all observations on Southern firms). Second, and most important, a panel would have prevented (at least in a fixed effects specification) from using the time invariant dummy variable *SOU* which in our analysis is crucial.

The likely endogeneity of the variable *SUB* has advised to consider GIV estimates besides OLS, possibly affected by inconsistency. The unavailability of lagged data on subcontracting has brought about the problem of selecting suitable instruments. We chose as instruments some other variables drawn from Capitalia survey, i.e. *ROI*, *AVL* (the ratio added value/employed) and *HUM* (an indicator of human capital, in particular, the share of workers with a secondary school degree). These variables show relatively high correlation coefficients with *SUB* (not less than 0.40)<sup>16</sup>. Also, this set of instruments allows not to reject the hypothesis that sovraidentification constraints hold. Finally, as we will see later, the involved results are quite similar to OLS estimates.

### 4.3. The results

Tables 6 and 7 summarize the results of OLS and GIV estimation of equation (1), (2) and (3), respectively for the growth rates of real sales and employed. A first remark concern the dependence of growth rates on the initial values of real sales and employed. The econometric investigation

shows that in all cases the growth rate is negatively related to the initial value with a significance level not lower than 5%. Theoretical growth rates are considerable for the lowest size (the growth rate of employed is larger than 30% for firms with 11 employed) but much lower as soon as size increases ((17% with 31 employed, 9% with 51 employed and 4% with 100 employed). Estimates of parameter  $\theta_2$  indicate negative statistically significant growth persistence only for employed (and not for real sales), in accordance with previous literature on Italy (Contini and Revelli, 1989). The overall conclusion is that Tables 6 and 7 support the view of most of literature about the empirical lack of validity of Gibrat law.

*Insert Table 6 about here*

Control variables AGE, AVK, ICT and INP show in almost all cases a relation with growth rates consistent with theoretical predictions. In particular, regressions confirm that firm's age negatively affects the propensity to grow (but the link is statistically significant only for sales) while capital productivity, attitude to innovate and propensity to invest in ICT turn out to exert in most cases a positive impact on growth rates. This latter result seems to be particularly relevant, even if theoretically not surprising, as it contrasts recent solid literature (for example, Del Monte and Papagni, 2003 and Oliveira and Fortunato, 2006).

Moving to results more closely connected to subcontracting, we first notice that in equation (1) subcontracting intensity, as well as geographic location, does not have a statistically significant effect on firm's growth. In equation (2) the estimates of the parameters of control variables are almost unaltered with the exception of age, which loses significance in three out of four cases. The introduction of an interaction factor between INP and SUB allows to verify that for innovating firms an increase in subcontracting intensity leads to a larger impact on growth, probably because this type of firm is better positioned in the value chain. In fact the coefficient of the variable IXS is positive and statistically significant (slightly above 5% for the growth of employed). Since the estimate of  $\gamma_2$  in the linear specification does not significantly differ from zero, the only subcontracting firms actually growing are the ones which carry out product innovations. In the same vein, for non subcontracting firms, innovation does not seem to dramatically affect growth (in equation 2, estimated  $\beta_3$  does not significantly differ from zero), while for subcontractors innovation comes out to be a crucial factor for growth ( $\beta_4$  is significantly positive).

When adopting the non linear specification (3), the effect of subcontracting on growth becomes definitely stronger. In fact, in this case the estimates of control variables' parameters remain substantially unaltered while all  $\gamma$  turn out to be now statistically significant. In addition, results describe now a story of a deep geographical differentiation. The estimation of equation (3)

suggest that firms' localization in Southern regions negatively affects growth performances. Moreover, the relationship between outsourcing and growth varies over the geographical areas we consider.

*Insert Table 7 about here*

In the case of Centre-North, this relation takes a reversed U shape with its highest value around 51% of subcontracting intensity for both the cases of real sales and employed. The marginal effect at the average value of subcontracting is always positive, between 0.22 and 0.31 for sales' growth (1% increase in subcontracting intensity involves about 0.25% increase in (the growth) of real sales) and between 0.02 and 1.35 for the growth of employed. The theoretical forecast of sales' growth varies among -4% for non subcontractors, +18% for firms with a 51% ratio subcontracting/sales and +3% for absolute subcontractors. Concerning the growth of employed, the theoretical forecast varies from -9% of non subcontractors to +33% of intermediate subcontractors to go back to -9% for absolute subcontractors.

The reverse U-shaped relation does not hold for Mezzogiorno, where the impact of subcontracting is always negative at any value of subcontracting. At the average subcontracting intensity, the marginal effect is included between -0.18 and -0.57 for the growth of sales and between -0.09 and -0.14 for the growth of employed. The theoretical forecast of growth for both sales and employed is between +8% for non subcontracting firms to +1% for absolute subcontractors.

With respect to the estimates of Tables 6 and 7, we made some robustness checks by using alternative proxies for firm productivity, return and attitude to innovation. These changes bring about minor effects on the coefficient estimates while sign and intensity of the relationship between growth and subcontracting are not significantly affected.

Summarizing, our econometric investigation allows us to draw some relevant conclusions. First, in accordance with most of previous literature, the Gibrat law can be rejected, as variables such as age, initial size and past growth rates seem to be able to account for part of current firms' growth. Second, subcontracting intensity turns out be a determinant factor of growth. Interestingly, our estimates highlight a non linear relationship between subcontracting and growth, for which firms with intermediate values of subcontracting intensity grow more than both absolute subcontractors and non subcontractors. Third, in accordance with previous literature, firms operating in Southern regions show significant peculiarities. For them, the relation between subcontracting and growth is monotonically decreasing. Finally, our results indicate that firms' propensity to innovate and carry out ICT investments have a positive impact on growth rates. Notably, within the subsample of subcontracting firms, we verify that the most innovative firms are

the ones which grow faster. In this case, a larger share of subcontracting involves higher growth rates because they are best located in in the value chain and most able to get a leadership role in the chain.

## 5. Concluding remarks

This paper investigates the role of subcontracting in explaining firms' growth and obtains three main results. First, consistent with most of the literature, the Gibrat law is rejected and the ability of variables such as age and past growth rates to account for current growth rates is recognized. Second, the propensity to carry out subcontracting activities turns out to be relevant for growth, especially when allowing for nonlinear relationships between growth and subcontracting. Despite the poor information available, we have also sought to test how profitable propensity to innovate may be for subcontractors willing to upgrade their position in the value chain. Our results confirm that more innovative subcontracting firms are also more susceptible to grow. Even if not surprising, this result is remarkable as it supports the intuitions of the GCC approach often hinging only on anecdotal evidence.

Finally, it is once again confirmed the deep dualism of the Italian industrial structure. In the Centre-North regions, firms with intermediate subcontracting intensity (close to 50%) emerge as the most dynamic group, showing the highest growth rates in terms of both real sales and employed, while Southern subcontractors show slower growth and poorer performances. These results lead to believe that, in the current pattern of international labour division, Southern subcontracting firms seem bound to play a marginal role and to be increasingly exposed to the risk to be losers in the competition with their rivals of emerging countries.

## Notes

<sup>1</sup> We adopt a wide definition of subcontracting, including procurement of both specific components or services and more complex intermediate inputs.

<sup>2</sup> Here we consider outsourcing (local, national or international) as the relocation of activity outside the firm to an independent input supplier (subcontractor) and offshoring as the relocation of activity to a different country but within a structure belonging to the firm.

<sup>3</sup> A *value chain* is the set of activities for production and sale of commodities. It is *worldwide* when activities are allocated across firms localised in different countries. For a survey on industrial subcontracting networks, see Sacchetti e Sugden (2003).

<sup>4</sup> Heintz (2006) points out that in the 70's industrial export covered a share of 20% of total export. In 2000 that share had risen to 70%. See Hummels *et al.* (2001) on the increasing vertical specialization of countries.

<sup>5</sup> The impact of multinational firms' investments on the local subcontracting network is documented by Dries e Swinnen (2004).

<sup>6</sup> From 1994 to 2005, the yearly labour productivity growth is on average around 0,5%. In the same period, the Italian share on total world exports reduces from 4.5% to 2.9% (2004).

<sup>7</sup> Reasons and features of the process of international outsourcing of Italian industrial districts are analyzed for example by De Propris *et al.* (2008).

<sup>8</sup> Even in the presence of specific investments, uncertainty, contract incompleteness and potentially opportunistic agents, firms more frequently resort to disintegration, outsourcing, market relations as repeated relations, cooperative solutions, reputation and selection of players look good instruments to shelter their specific investments (Holmstrom and Roberts, 1998).

<sup>9</sup> In the Italian wearing-apparel industry "the practice of outsourcing has become more and more common. So manufacturing activity has been progressively replaced by the function of outsourcing management which includes initial agreements with subcontractors, control over their activity, cooperation and continuous monitoring. From the subcontractors' point of view, competition mainly operates through their ability to manage immaterial factors such as: selection and management of outsourcing, engineering and development of production, logistics" (Hermes Lab, 2004). On the point, Kaplinski, 2000, p. 15 concerning Ford Motor Company writes: "Perhaps more significantly, the Ford Motor Company ... has begun to increase its activities over the width of the chain (buying into after-market spare, auto-leasing and marketing) and to reduce the depth of its activities in individual links, particularly in manufacturing (where it is even thinking of subcontracting assembly), previously its core economic rent".

<sup>10</sup> The growth of firms belonging to networks is investigated for example by Riccaboni e Pammolli (2002) and Powell *et al.* (1999). Daveri and Jona-Lasinio (2007) focus on the productivity advantages of outsourcers while Bergin *et al.* (2007) deal with intensity and volatility of growth connected to the increasing labour division.

<sup>11</sup> Humphrey and Schmitz (2002) discuss at length how insertion in global value chains define upgrading opportunities.

<sup>12</sup> However, one should not neglect that some studies (for example, Geroski, 1998) find poor correlation between performance indicators based on accounting measures and growth rates.

<sup>13</sup> In particular, descriptive statistics reported in Tables 1 to 5 are calculated on Capitalia (1998) and (2001) data, while Tables 6 and 7 supply the results of econometric estimations carried out by using data of the same source. When needed, data have been deflated by an ISTAT price index (NIC).

<sup>14</sup> Mezzogiorno is the Southern part of the Italian peninsula. In this work, as it is customary in the literature, it includes the regions Abruzzo, Molise, Campania, Basilicata, Puglia and Calabria plus the islands Sicilia e Sardegna.

<sup>15</sup> The same conclusions hold even when considering median growth rates (in parentheses in tables 1 and 2). At least for the growth of employed, median values are always much lower than mean values so that high average growth rates can be presumably due to a relatively low number of firms which grow very fast.

<sup>16</sup> Following the method suggested by Zivot and Wang (2006), we have regressed the variable presumably affected by endogeneity SUB on instruments and other explanatory variables to test the joint statistical significance of instruments.

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<b>Table 1 – Growth rates of real sales. Mean and median (in parentheses) values</b>					
	NOSUB	LOSUB	HISUB	ONSUB	Total
Small	3.74 (1.04)	3.97 (1.93)	7.14 (3.99)	5.94 (3.08)	5.31 (2.10)
Medium sized	4.43 (3.04)	5.19 (3.21)	7.09 (4.58)	5.66 (3.87)	5.89 (3.78)
Large	5.06 (4.00)	9.19 (6.41)	6.53 (0.30)	5.32 (3.83)	5.36 (2.82)
Centre-North	4.26 (1.73)	4.54 (2.16)	7.23 (4.14)	5.90 (3.40)	5.50 (2.41)
Mezzogiorno	8.16 (3.32)	6.53 (2.70)	0.15 (1.08)	4.02 (0.90)	5.22 (1.76)
Total	4.40 (1.79)	4.66 (2.16)	7.05 (4.04)	5.61 (3.20)	5.46 (2.26)

<b>Table 2 – Growth rates of employed. Mean and median (in parentheses) values</b>					
	NOSUB	LOSUB	HISUB	ONSUB	Total
Small	18.88 (9.09)	25.17 (24.23)	9.98 (3.18)	9.40 (1.44)	17.42 (8.31)
Medium sized	15.83 (11.03)	24.31 (22.76)	11.03 (4.69)	9.24 (3.88)	15.54 (9.87)
Large	19.74 (16.65)	19.53 (23.13)	14.87 (8.68)	9.22 (0.83)	16.01 (10.60)
Centre-North	19.37 (10.53)	25.82 (25.00)	10.30 (7.56)	9.55 (2.02)	16.99 (8.11)
Mezzogiorno	19.74 (18.18)	13.81 (5.88)	8.87 (3.51)	8.45 (1.61)	12.04 (6.14)
Total	19.44 (9.72)	24.86 (23.63)	10.13 (5.63)	9.39 (2.00)	16.59 (7.84)

<b>Table 3 – Growth of real sales. ANOVA tests of mean equality (t and F values)</b>				
	NOSUB	LOSUB	HISUB	ONSUB
NOSUB	–			
LOSUB	0.086 0.007	–		
HISUB	3.873*** 14.997***	2.989*** 8.936***	–	
ONSUB	5.109*** 26.105***	3.059*** 9.359***	3.537*** 12.289***	–
Test on mean equality over all the groups: F=11.709***				

<b>Table 4 – Growth of employed. ANOVA tests of mean equality (t and F values)</b>				
	NOSUB	LOSUB	HISUB	ONSUB
NOSUB	–			
LOSUB	7.216*** 52.069***	–		
HISUB	16.256*** 264.249***	8.380*** 70.224***	–	
ONSUB	29.075*** 845.331***	11.933*** 142.387***	0.174 0.030	–
Test on mean equality over all the groups: F=11.709***				

<b>Table 5 – Descriptive statistics</b>						
	Description	Obs	Mean	Max	Min	SD
EMP	Number of employed	9163	103.85	12630	11	369.18
AGE	Age of firm (in years)	9115	23.57	182	0	18.03
AVK	Ratio added value / invested capital	7713	0.04	2.58	-0.18	0.06
AVL	Ratio added value / number of employed*	7721	24.95	550.88	-35.62	29.90
EXP	Dummy. Takes value 1 if the firm exports	9134	0.69	1	0	0.46
SAL	Real value of sales**	9134	41.30	8645.71	0	221.3
HUM	Share of workers with a with a secondary school degree	8149	0.40	1	0	0.26
ICT	Dummy. Takes value 1 if the firm makes ICT investments	8501	0.78	1	0	0.41
INP	Dummy. Takes value 1 if the firm makes product innovation	9174	0.19	1	0	0.40
ROI	Value of ROI	7721	0.20	5.52	-4.58	0.71
SUB	Share of subcontracting on sales	9107	0.48	1	0	0.47
SOU	Dummy. Takes value 1 if the firm is localized in a Southern region	9177	0.13	1	0	0.34

The number of observations for each estimation changes due to the different number of valid answers to the questionnaire. One asterisk indicates values expressed in million liras; two asterisks values expressed in billion liras.

	(1)		(2)		(3)	
	OLS	GIV	OLS	GIV	OLS	GIV
Log SAL	-0.0057** (0.0020)	-0.0205** (0.0078)	-0.0057** (0.0020)	-0.0408*** (0.0131)	-0.3420** (0.1670)	-0.0267*** (0.0049)
$\Delta$ SAL <sub>t-1</sub>	3.92E-06 (2.86E-06)	4.61E-06 (3.12E-06)	3.92E-06 (2.86E-06)	4.85E-06 (12.9E-06)	-5.86E-05 (5.01E-05)	8.08E-06 (9.01E-06)
Log AGE	-0.0438*** (0.0087)	-0.0474*** (0.0107)	-0.0438*** (0.0087)	-0.0113 (0.0513)	-0.0455** (0.0177)	-0.0377*** (0.0074)
SOU	0.0148 (0.0177)	0.0075 (0.0237)	0.0148 (0.0177)	-0.0252* (0.0136)	-0.09010 (0.5230)	0.1215 (0.4209)
SUB	0.0026 (0.0104)	0.0098 (0.0123)	0.0019 (0.0121)	0.0017 (0.0208)	3.6336** (1.5141)	2.6492*** (0.8710)
SUB <sup>2</sup>	–	–	–	–	-3.5408** (1.4119)	-2.5768*** (0.8484)
SXS	–	–	–	–	-4.6440** (2.2994)	-2.9665*** (0.8841)
SXS <sup>2</sup>	–	–	–	–	4.0087** (1.7570)	2.7327*** (0.8671)
AVK	-4.88E-05 (10.4E-05)	-3.18E-04 (3.30E-04)	-4.90E-05 (10.4E-05)	-2.25E-04 (2.32E-04)	0.0013* (6.81E-04)	3.66E-04** (1.78E-04)
ICT	0.0421*** (0.0101)	0.0494*** (0.0157)	0.0421*** (0.0101)	0.0337** (0.0169)	0.2161** (0.0099)	0.0291* (0.0151)
INP	-3.66E-04 (0.0108)	-0.0078 (0.0136)	-0.0018 (0.0168)	-0.0688 (0.1078)	0.1451 (0.1108)	-0.0076 (0.0135)
IXS	–	–	0.0378** (0.0190)	0.1970** (0.0866)	–	–
Constant	0.2455*** (0.0517)	0.0205*** (0.0078)	0.2458*** (0.0517)	0.4582** (0.2297)	2.8972** (1.4201)	0.1033 (0.0683)
Observations	7047	6919	7047	6919	7047	6917
R <sup>2</sup>	0.0964	–	0.0965	–	0.2521	–
Marginal effect CN	–	–	–	–	0.3052	0.2248
Marginal effect SOU	–	–	–	–	-0.5706	-0.1764
Turning point CN	–	–	–	–	0.5131	0.5145
Turning point SOU	–	–	–	–	1.0797	1.0678
OIR test	–	3.3498	–	4.0073	–	4.3923

OIR test on validity of overidentifying restrictions is carried out by the Newey e West (1987) statistic, which distributes like a  $\chi^2$  with degrees of freedom equal to the difference between the number of instruments (included exogenous variables) and the number of parameters to be estimated.

	(1)		(2)		(3)	
	OLS	GIV	OLS	GIV	OLS	GIV
Log SAL	-0.1499*** (0.0240)	-0.1606*** (0.0250)	-0.1501*** (0.0240)	-0.1974*** (0.0546)	-0.1508*** (0.0240)	-0.1450*** (0.0271)
$\Delta$ SAL <sub>t-1</sub>	-0.8742*** (0.3197)	-0.8013** (0.3173)	-0.8744*** (0.3199)	-1.1202*** (0.1496)	-0.8738*** (0.3202)	-0.9144*** (0.3482)
Log AGE	-0.0177 (0.0137)	-0.0295* (0.0176)	-0.0179 (0.0137)	-0.0400 (0.0612)	-0.0162 (0.0138)	-0.0148 (0.0250)
SOU	0.0640 (0.0490)	0.0365 (0.0659)	0.0643 (0.0492)	0.0625 (0.1115)	0.0416 (0.0480)	0.0707 (0.1579)
SUB	0.0228 (0.0546)	0.0404 (0.0339)	0.0226 (0.0418)	0.0390 (0.1341)	0.2018* (0.1133)	16.4096*** (3.7725)
SUB <sup>2</sup>	–	–	–	–	-0.1935* (0.1054)	-16.0162*** (3.6694)
SXS	–	–	–	–	-0.3429* (0.1943)	-16.6609*** (3.7292)
SXS <sup>2</sup>	–	–	–	–	0.2514* (0.1382)	16.1412*** (3.6551)
AVK	0.0043*** (0.0009)	0.0033*** (0.0012)	0.0043*** (0.0009)	0.0052*** (0.0018)	0.0043*** (0.0009)	0.0068*** (0.0013)
ICT	0.1262*** (0.0233)	0.1477*** (0.0254)	0.1173*** (0.0236)	0.1731** (0.0877)	0.1239*** (0.0227)	0.0312 (0.0463)
INP	0.0995** (0.0399)	0.0792* (0.0427)	0.0558 (0.0583)	-0.1424 (0.2508)	0.0982** (0.0400)	0.0334 (0.0494)
IXS	–	–	0.5302*** (0.0675)	0.4384* (0.2562)	–	–
Constant	0.5439*** (0.0807)	0.8394*** (0.2774)	0.5517*** (0.0779)	0.6408 (0.7507)	0.5446*** (0.0794)	-0.2420 (0.1928)
Observations	7015	6889	7015	6889	7015	6889
R <sup>2</sup>	0.1994	–	0.1995	–	0.1999	–
Marginal effect CN	–	–	–	–	0.0199	1.3544
Marginal effect SOU	–	–	–	–	-0.0867	-0.1372
Turning point CN	–	–	–	–	0.5214	0.5123
Turning point SOU	–	–	–	–	1.2185	1.0052
OIR test	–	4.6366	–	1.2004	–	1.2262

OIR test on validity of overidentifying restrictions is carried out by the Newey e West (1987) statistic, which distributes like a  $\chi^2$  with degrees of freedom equal to the difference between the number of instruments (included exogenous variables) and the number of parameters to be estimated.