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Growth processes of Italian manufacturing firms☆

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ABSTRACT

This paper presents a multidimensional empirical analysis of firm growth. Exploiting census data on Italian manufacturing firms, 1989–1997, we estimate a reduced-form VAR to analyze the co-evolution of employment growth, sales growth, growth of profits and labour productivity growth. Our main findings suggest that (i) employment growth precedes sales growth; (ii) productivity growth lacks any strong association with subsequent growth of the other indicators; (iii) profits growth represents the 'absorbing dimension' of the growth processes. This picture contrasts with 'accelerator models', predicting sales are the driver of the growth process, and is also at odds with theories of firm-industry evolution assuming productivity or profits advantages to be the driver of strong market selection/reallocation mechanisms. Instead, the findings reveal the existence of (weak) Penrose and (strong) Kaldor–Verdoorn effects, and more generally convey the view that employment growth is the key driver of firm expansion, while profits, once made, are not reinvested.

1. Introduction

Conventional empirical work on firm growth, it would appear, has come to something of a dead end. A very large literature investigating Gibrat's law has not provided conclusive results on whether firm size is in fact a determinant of firm growth. While many studies detect a statistically significant negative influence of size on growth (although often insignificant in practical terms), many others find no such relation. Other works have investigated what one might call 'augmented Gibrat's law' regressions, which usually involves appending other variables in levels on a Gibrat regression equation, and seeing if these are associated with firm growth. Although coefficients for these additional variables are often statistically significant (especially with large samples) the main conclusion that appears to emerge is that firm growth is a random process, and that its determinants are difficult to find (see Coad, 2009, for a survey). Most of the variance of firm growth rates over time is within-firm variance, rather than between-firm variance (Geroski and Gugler, 2004). Geroski even goes as far as to say: "The most elementary 'fact' about corporate growth thrown up by econometric work on both large and small firms is that firm size follows a random walk" (Geroski, 2000, p. 169).

This paper aims at providing new insights by taking a different approach. While previous work has typically focused on a single dimension of firm growth, taking either 'physical growth' (measuring size in terms of employment or capital) or 'growth on the market' (with size proxied

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through sales or value added) as almost interchangeable aspects of the firm growth processes, our central contribution is to offer a multifaceted description of firm growth. We analyze the coevolution of employment growth and sales growth, and also consider how they change in relation to each other as well as in relation to two further dimensions, i.e. growth of profits and growth of labour productivity.

Perhaps surprisingly, the empirical literature on firm growth has paid very little attention to provide a detailed analysis that is able to consider, at the same time, the many and complex dynamics possibly relating the different dimensions of firm growth we encompass in this work. The multidimensional approach we present here is a suitable test bed. We apply a reduced-form vector autoregression model, which is suited to analyze the associations among the growth variables without making a priori assumptions on the underlying lead–lag structure. In this methodological respect, our study is similar to the recent work by Coad (forthcoming-a) on French manufacturing firms.[1]

We find that employment growth precedes sales growth and growth of profits, and that sales growth is very strongly associated with subsequent growth of profits and mildly associated with subsequent productivity growth. There is negligible feedback of growth of sales or profits with subsequent employment growth, however, while employment growth seems to have some more sizeable and negative effect on productivity growth. Further, no clear association is found between profits growth and subsequent changes in labour productivity, while sales growth has an effect. Productivity growth, in turn, has a sizeable association with subsequent growth of profits, while very weak relationship with subsequent growth of either employment or sales. As a result, growth of profits tends to represent the absorbing dimension of the overall processes of firm growth.

This picture is substantially robust with respect to disaggregated analysis conducted by firm size classes and sector of activity, while it exhibits some correlation with time or cycle effects when we allow coefficient estimates to vary over two sample sub-periods. In addition, quantile regressions reveal asymmetries between the growth processes of growing and shrinking firms.

The work is organized as follows. In Section 2 we discuss the theoretical background and formulate some hypotheses. In Section 3 we present the database. In Section 4 we discuss our baseline regression methodology, while Section 5 presents our main results. Section 6 explores alternative specifications including profitability and a measure of fitness in the VAR model. An extended analysis of the baseline framework is then explored in Section 7, where we show results disaggregating by firm size, sector of activity and different sample sub-periods, and also apply quantile regressions techniques to investigate variation of results in different quantiles of the growth rates distributions. We conclude in Section 8.

2. Theoretical background

Theoretical work on firm growth has often viewed the ability of firms to improve efficiency and increase profitability as the two dimensions of performance inherently related to the process of growth. An example among classical studies is the work by Penrose (1959) who suggests a negative relationship between firm growth and productivity growth, because expansion projects are a distraction for managers and divert their attention from keeping operating costs down (the so-called 'Penrose effects').[2]

In more recent times, the idea that re-allocation of market shares, i.e. growth of size, occurs in favour of the more efficient and more profitable (incumbent or entrant) firms, has become the standard interpretative framework in models of firm-industry evolution (among the many, see Jovanovic, 1982; Ericson and Pakes, 1995; Melitz, 2003; Asplund and Nocke, 2006). Similarly, other influential theorists (such as Nelson and Winter, 1982; Metcalfe, 1994; Dosi, 2000), posit a positive association between productivity or profits growth and subsequent growth in the market, according to the evolutionary principle of 'growth of the fitter'.

In these models the timing structure underlying the sequence of growth patterns typically identifies technological considerations as the first driver: increases of productivity will tend to bring about, for instance via lower prices, increases in profits and market shares. Profits, in turn, allow the disposal of resources needed to invest and pursue further growth, especially in presence of financial market imperfections. Of course, one can imagine (at least) two orders of considerations which might make this seemingly consistent picture on the time structure of multidimensional growth much less clearcut. First, it is plausible that feedback effects are in place, leading to an opposite lead–lag structure. The working of a microversion of the Kaldor–Verdoorn law would imply a positive effect of growth of output on productivity, due to increasing returns, adoption of new vintages of capital, and learning effects.[3] In this view growth of sales would be a means to gather the needed resources for subsequent efficiency enhancing or innovative investments, which eventually lead to higher profits. Second, it is not clear how growth of employment is placed within the temporal/logical chain defining the growth process. Theories tend to refer to growth on the market, which does not need to coincide with growth of employment. One conjecture, put forward by theories identifying demand shocks as the main driver of the growth processes, is that growth of sales acts as an anticipatory variable leading to adjustments in labour (see for instance Delmar, 1997). However, whether growth of employment precedes or follows adjustments of productivity, profits and sales tends to depend on both cost of labour and technical/organizational adjustments related to changes in productivity, as well as on flexibility of labour markets.

[1] See below for direct comparison of results. Another work sharing a similar multidimensional approach is Bottazzi et al. (2008), who however only provide descriptive evidence on pairwise relationship among sales growth and *levels* of both productivity and profitability.

[2] See also Little (1962) and Baumol et al. (1970), who consider the growth of profits not only as a measure of performance, but also as a measure of firm growth in itself.

[3] See McCombie (1987) for an introduction to the Kaldor–Verdoorn law.