



Intangible assets and firm heterogeneity: Evidence from Italy



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ARTICLE INFO

Article history:

Received 6 October 2011

Received in revised form 17 July 2013

Accepted 26 July 2013

Available online 22 August 2013

JEL classification:

D22

L21

L25

O32

Keywords:

Intangibles

Firms heterogeneity

Human capital

Asset accumulation

Organisational capabilities

ABSTRACT

The positive impact of intangible assets on several measures of economic performance is well documented in the literature. Less clear is what initially leads firms to invest in intangible assets. The latter is particularly important because, at least for the Italian manufacturing sector, firms exhibit strong heterogeneity in their investments in intangible assets. In line with the capability-based theory of the firm, we argue that the firm's propensity to invest in intangible assets can be explained by factors that are internal and specific to the firm. Making use of a rich dataset, we test and provide support for our hypotheses. In particular, we find that the propensity to invest in intangible assets increases with the firm's size, human capital, and historical intangible asset base. This points towards the existence of a cumulative process of intangible asset accumulation, which may account for most of the heterogeneity observed in the data. The paper adds to the previous literature in two ways: first, it highlights the existence of strong intra-industry heterogeneity in intangible asset investments, and second, it offers an explanation for such heterogeneity.

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1. Introduction

Intangible assets consist of the stock of immaterial resources that enter the production process and are necessary for the creation and sale of new or improved products and processes. They include both internally produced assets – e.g., designs, blueprints, brand equity, in-house software, and construction projects – and assets acquired externally – e.g., technology licenses, patents and copyrights, and the economic competencies acquired through purchases of management and consulting services. In recent years an increasing effort has been devoted to find suitable measures of intangible assets, with two approaches that have emerged as predominant. The first one is based on aggregate estimates derived from firm expenditures on “intangibles” such as R&D, training and innovation (e.g., Corrado et al., 2005). The second one uses direct measures based on stocks originally reported as assets on companies' balance sheets (e.g., Marrocu et al., 2012). In both cases the empirical evidence is unanimous in pointing at intangible assets as resources of key importance in the modern knowledge economy.

Using an expenditure-based approach, for instance, Corrado et al. (2009) estimate that the total value of intangible assets in the US was already near \$3.6 trillion by the early 2000s, suggesting that intangible assets accounted for over 10–20% of US output growth during that period. Similarly, Nakamura (2003) shows that in the last 40 years, intangible assets as a proportion of US GDP have more than doubled, increasing from 4.4% to 10%, and in the year 2000, intangible assets represented almost one-third of US corporate assets. At the firm level, Hulten and Hao (2008) show that for US firms, the value of total assets increases by 57% when R&D expenditure and intangible capital are considered in addition to conventional financial accounts. Similar trends have been shown to exist in other countries, such as Japan (Miyagawa and Kim, 2008; Fukao et al., 2009), UK (Marrano et al., 2009), Finland (Jalava et al., 2007), the Netherlands (van Rooijen-Horsten et al., 2008) and Italy (Bontempi and Mairesse, 2008).

In addition to the quantitative dimension of intangible assets, various works have also stressed a link between intangible assets and firm performance. Marrocu et al. (2012), Oliner et al. (2007), and O'Mahony and Vecchi (2009), for example, find a positive contribution of intangible assets to both firm- and industry-level productivity. Hall et al. (2005), Greenhalgh and Rogers (2006) and Sandner and Block (2011) show intangible assets to significantly contribute to market value. Denekamp (1995), Braunerhjelm (1996), and Delgado-Gómez and Ramírez-Alesón (2004) provide

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evidence for a positive relationship between intangible assets and internationalisation.

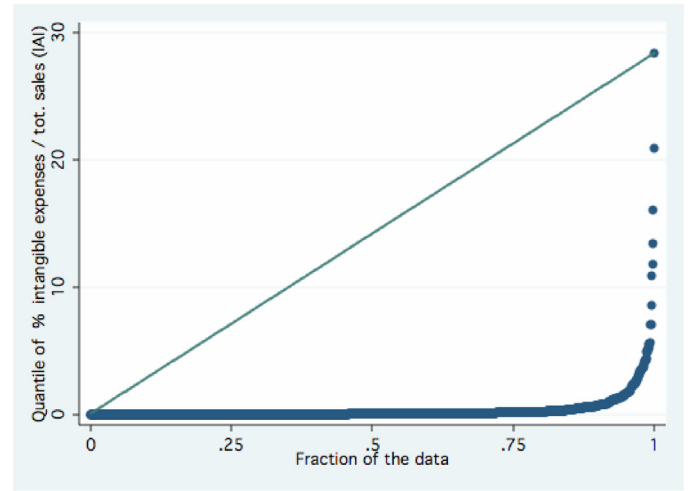
In spite of this extensive, growing literature, however, little research has been so far conducted on the determinants of firms' investments in intangible assets. Although it is widely accepted that intangible assets are becoming a critical source of competitive advantage (Barney, 1991), few empirical studies have actually investigated the factors that may lead firms to undertake this type of technological investment in the first place. In the majority of cases, on the contrary, the level of intangible assets has been taken as given and treated more as an explanatory variable rather than as a variable to be explained. From the point of view of both managers and policy makers, however, gaining a clear understanding of what determines firms' propensity to invest in intangible assets can be of crucial importance, especially if it helps to identify the variables that discriminate between high- and low-performing firms. Moreover, such a perspective is interesting for research in that it may offer a test for alternative theories of the firm. For these reasons, this paper will take some first steps in filling such a gap.

The first striking evidence that emerges from the data is that, at least for the Italian manufacturing sector, intangible asset investments appear to vary considerably across firms. On this subject, Panel A of Fig. 1 reports the quantile distribution of yearly expenses on intangible assets as a proportion of total sales in 2008 for the sample of Italian manufacturing firms included in our dataset. The value of intangible expenses is derived from the company' balance sheet, combining information on research and advertisement expenditures, patents, licenses and trademarks (see Section 3). Total sales are instead taken from the firms' profit and loss statements. On average, expenses on intangible assets account for only 0.3% of total sales. A more detailed analysis, however, reveals that there exists high heterogeneity in the population of firms. The median of this ratio, in fact, is barely above 0%, and for over 75% of the firms, intangible expenses count for less than 0.2% of total sales. Meanwhile, the top decile of firms invests significantly in intangible assets, with intangible expenses representing 1% to 28% of total sales among these firms.

The evidence resulting from panel A of Fig. 1 is even more interesting if one considers that the observed heterogeneity in intangible asset investments remains high even within industries. To this end, panel B reports the quantile distribution of the same variable reported in Panel A after normalising the ratio by the sample (right) and the industry mean (left). In particular, the Eurostat NACE Rev. 1 classification (NACE) has been used for the industry. The shape of the distribution clearly remains practically unchanged between the two cases, with the top decile of firms investing in intangible assets 3–60 times more than their industry average. Such a distribution clearly reveals that there exists a degree of heterogeneity that extends well beyond what could be reasonably explained by inter-industry structural differences alone. The main aim of the present paper is thus to investigate the factors that, in addition to industry differences, can effectively explain this heterogeneity.

In line with the capability-based view of the firm, we argue that the heterogeneity in intangible asset investments ought to be studied by focusing on firm-specific traits, such as size, organisational structure, human capital, and the historical intangible asset base. In this sense, we see the firm's propensity to invest in intangible assets more as a product of the unique bundle of resources and capabilities that the firm has evolved over time than as a consequence of exogenous technological contingencies. Intangible assets, in fact, represent a form of technological investment that (a) requires a certain set of internal resources to be carefully identified, planned, and managed and (b) may be made to address needs that are purely organisational in nature (e.g., to facilitate the management of a complex organisation). Among firms that lack such internal resources or have internal structures that do not require this type of

Panel A



Panel B

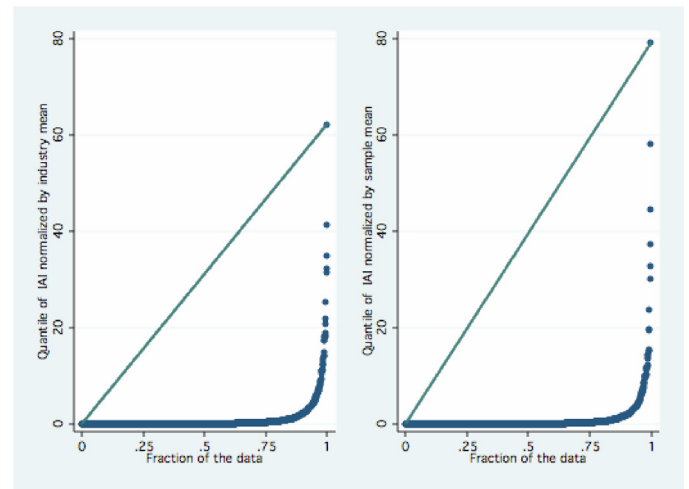


Fig. 1. Quantile distribution of the ratio intangible expenses over total sales before (Panel A) and after the normalisation by the sample and industry mean (Panel B). Legend: Panel A reports the quantile distribution of the ratio intangible expenses over total sales for the sample of firms included in our dataset. Panel B reports the quantile distribution of the same variable after normalising the ratio by the sample (right) and the industry (left) mean. As it is easy to see the shape of the distribution does not change significantly after the normalisation. This suggests the existence of high heterogeneity at the industry level.

specific investment, intangible assets are less likely to be included in the firm's business strategy and thus are less likely to be accumulated. Moreover, for a given distribution of intangible assets in the population of firms, the existence of complementarities among different components of the intangible stock may generate a sustained process of accumulation, leading to the permanence of heterogeneity over time. Making use of a rich dataset in terms of firm-specific characteristics, we test and provide support for our hypotheses.

Overall, the paper contributes to the previous literature on intangible assets and industrial dynamics in two ways. First, it highlights the existence of great heterogeneity in intangible asset investments. This dimension of the problem has so far received little attention in the literature, and it has certainly not been documented with respect to the Italian manufacturing sector. Second, the paper utilises the capability-based view to suggest an explanation for the firm's propensity to invest in intangible assets and provides an empirical test of this hypothesis. In this way, the paper can make sense of the observed heterogeneity and offer some

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