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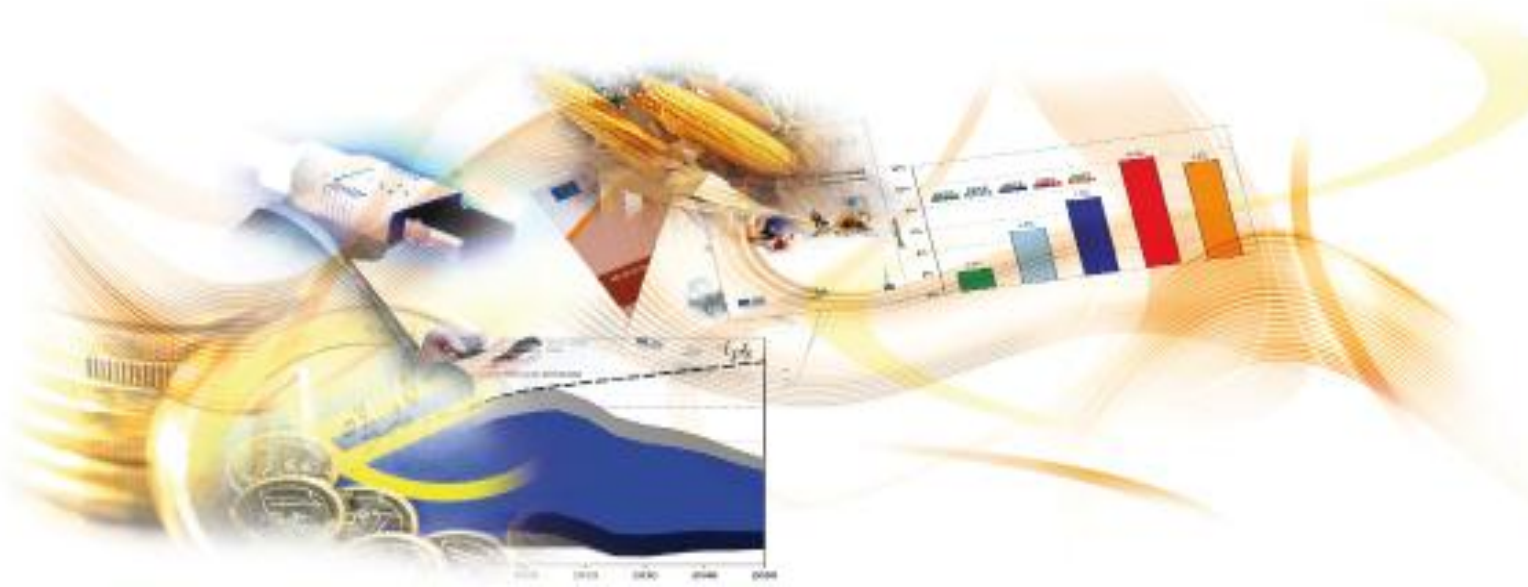

J R C T E C H N I C A L R E P O R T S

How do companies 'perceive' their intangibles? New statistical evidence from the INNOBAROMETER 2013

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Abstract

This report provides a statistical analysis of the way European companies perceive their **Intangible Assets** according to the recent **Innobarometer-2013** survey. The report complements the evidence presented in the Flash Eurobarometer, *Investing in Intangibles: Economic Assets and Innovation Drivers for Growth* (No 369), and presents the results from a deeper investigation of both the characteristics of the available micro-data in the Flash Eurobarometer and the regularities emerging from their statistical analysis. Special focus is placed on the extent to which companies perceive their intangible assets as strategic and, accordingly, on the relationship between investment in intangible assets and their innovation projects. Also, the role that context conditions play in motivating their investments in intangible assets is compared to the role of business incentives.

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1. Introduction

The advent of the "knowledge economy" has led to the recognition of *intangible assets* as the main value creators for companies and key growth drivers for most countries. The evidence of this is abundant. At the macro-level, the "new-economy" literature of the beginning of the century (e.g. Jorgenson and Stiroh, 2000; Oliner and Sichel, 2000) has been supplemented by an increasing number of studies reporting growth-accounting exercises, where, for example, a greater share of labour-productivity growth in the US and the UK is attributed to intangible capital rather than tangibles, as well as a more rapid increase of this growth over time (Corrado et al., 2009; Marrano et al., 2009; Dal Borgo et al., 2012). At the micro-level, the productivity impact of R&D as shown in a number of econometric studies (see Mairesse and Sassenou, 1991; Hall et al., 2009) has been recently detected also for a wider array of intangible assets including, just to mention a few, information technologies, human capital, organisational capital, and customer capital (e.g. Black and Linch, 2001; Bontempi and Mairesse, 2008; Marrocu et al., 2013).[1]

In spite of the vast evidence demonstrating their economic relevance, the design of policy actions to help companies benefit from their intangible assets lags behind. Two problems in particular are hampering this process: (i) the lack of clear-cut definitions of the firm's resources that constitute intangibles and a standard theoretical model of describing them; and (ii) inconsistent accounting recognition of intangibles and the heterogeneity of non-standard accounting measurements applied as a consequence of this.

In order to deal with these issues and to provide policymakers with more straightforward evidence on intangibles, a number of research projects have been carried out recently at both the national and the international level. The most pertinent example at the country level is research commissioned by NESTA to measure the UK's investment in innovation and its impact on productivity growth, namely, the *NESTA's Innovation Index* (Field and Franklin, 2012; Haskel et al. 2009, 2011; Awano et al., 2010b). At the EU level, the harmonisation of definitions, data collection, and evaluation procedures for assessing intangible assets across different European countries has been funded through Framework Research Projects such as INNODRIVE, COINVEST, INDICSER and IAREG (EU Flash-it, 2012; Piekkola, 2011; Corrado et al., 2012). Important results have also been obtained by intensive research activities at the OECD (e.g. OECD, 2006, 2007, 2011a), with a recent focus on "Knowledge-Based Capital" (KBC) (OECD, 2013).

This high degree of institutional and academic research has generated a higher level of understanding of the issue at stake and opened up new lines of investigation. For example, special attention has been dedicated to the analysis of the strategic role that companies attribute to their intangible assets, by dedicating internal rather than external resources to their development. Related to this is the specific role that intangible assets have in a company's innovation projects and the general role they have in day-to-day business performance and competitive advantage (Ciriaci, 2011a, 2011b). In all these respects, as well as in the analysis of more "standard" issues on intangible assets (e.g. their identification, accountability, and service

[1] For a recollection of these studies see, amongst others, Hunter et al. (2005).

life), reference to a large sample of companies, in Europe and in the rest of the World, is desirable for ensuring heterogeneity, in particular in terms of size and sector.

An important step ahead in this direction is provided by the recent Flash Eurobarometer, "*Investing in Intangibles: Economic Assets and Innovation Drivers for Growth*" (No 369); in brief, the Innobarometer 2013 (EC, 2013, p. 3). In particular, as this report aims to show, its results can substantially contribute to the open issues identified above.

The rest of the report is structured as follows. Section 2 provides a summary of the existing literature on intangibles and highlights how the 2013 Innobarometer report can contribute to the current debate. Section 3 focuses on the insights that the Innobarometer report offers on the strategic role of intangibles and on their value for a company's innovation projects. Section 4 presents the conclusions from this study and suggests some research and policy implications, including areas where potential further research would be warranted.

2. Capturing the intangibles

The economic relevance of intangible assets is, by and large, widely accepted; however, what makes them so relevant and how this can be accounted for is definitively less understood. On the one hand, several definitions and classifications of what constitutes an intangible asset have been put forward, along with different theoretical accounts of their economic role. On the other hand, many new measurement methodologies are also being developed and leading to different figures, whose reconciliation then requires additional research effort. For both of these reasons, "capturing" the intangibles, i.e. capturing what they are and how to fully account for them, is paradoxically making them more "intangible" and requires further work to do so effectively. In this respect, analysis of the Innobarometer-2013 can provide a significant contribution.

2.1 Defining intangibles: classifications and theoretical conceptualisations

What intangible assets look like – that is, non-physical and thus non-touchable – is self-evident and does not require any other special definition for setting them apart from tangible assets. In this broad meaning, even a company's added value or the loyalty of its customers, for example, may be deemed as intangible. Instead, what requires attention, is the identification of intangibles related to resources or assets that can provide a company with substantial future benefits, irrespective of the enforceability of their control (Kim, 2007; Zambon and Marzo, 2007). In brief, "intangibles" are resources that share the durable impact proper of "assets", irrespective of a company's capacity and/or willingness of covering them in the normal accounting practices required by the relevant standards: technically speaking, of "capitalising" them.[2]

[2] A commonly used definition of "asset" is that provided by paragraph 49 of the IASB's "Framework for the Preparation and Presentation of Financial Statements" (issued in 1989 and still valid): "a resource controlled by the enterprise as a result of past events and from which future economic benefits are expected to flow to the enterprise". According to accounting standards, these assets should be "capitalised", so that their value affects the

Although their capitalisation should not be binding to identify intangible assets with a durable impact, the requirements posed by accounting standards for a subject (i.e. a company) to recognise an intangible asset helps us in selecting those which should be investigated. In accounting terms, namely that of the International Accounting Standard 38 (IAS 38/IFRS), as well as being a source of future economic benefits (like revenues or cost decreases), an intangible asset must also be "identifiable" and "controllable" (IAS 38.8). In turn, an intangible asset is considered "identifiable" when it is "separable (capable of being separated and sold, transferred, licensed, rented, or exchanged, either individually or together with a related contract) or arises from contractual or other legal rights, regardless of whether those rights are transferable or separable from the entity or from other rights and obligations" (IAS 38.12).

Although in the basic formulation required by a "flash" survey, such as the Innobarometer 2013 (on which we will say more later), the definition of intangible assets was given in a statement at the beginning of the survey (see Box 1).[3]

Box 1 – Innobarometer 2013: definition of intangibles

"Intangible assets are non-financial, non-physical assets. They are created over time and through investment, and are identifiable as separate assets. They may add value to the company."

In accounting, a crucial distinction is made between intangible assets that are *internally* generated – for example, through R&D efforts, marketing research, or investments in organisational capital – and *externally* acquired – as could happen with patents, copyrights, and trademarks (Ashton, 2005). A related classification refers to the ease of establishing rights of control over intangibles for which markets exist to a different extent (Blair and Wallman, 2000). For tacit knowledge generated by R&D, business secrets, and reputational capital, for example, legally-enforceable property rights hardly exist, but a company can be assumed to have control over them. Conversely, with respect to human and organisational capital for which markets still do not exist, a company may have little, if any, control, with respect to "its" workers and stakeholders, respectively. Ultimately, intangibles that can be both owned and bought or sold in the market[4] are indeed few in number (e.g. software, patents, copyrights, trade names, databases, licences and the like).

Although a company has the option to sell or rent intangibles when they are generated in-house for its own use, intangibles are usually unlikely to be traded as distinct and separate assets in the future. Because of this "inferior marketability", these intangibles incur difficult monetary evaluations.[5] For this reason, accounting recognition of the intangibles' values can end up biased

current income only through the relevant periodic amortisation, rather than "expensed" when they are incurred, so that they are fully written off against the current income.

[3] For a review of other intangibles definitions provided from different perspectives see, for example, Kaufmann and Schneider (2004) and Choong (2008).

[4] In this last respect, notable exceptions can however be identified in both the "trade" of workers' rights (e.g. non-compete covenants) and of the organisational capital (e.g. in the company's takeover).

[5] In particular, these evaluations must be verifiable, free from manipulation and consistent across different companies (Ashton, 2005).

towards the externally acquired ones.[6] Similarly, the accounting focus on assets that are "controlled" (IAS 38.8) makes their value biased against assets for which problems of "partial-excludability" could exist (Lev, 2001), such as, for example, a company's human capital. Both of these issues are quite problematic, especially in the analysis of the strategic role that companies attribute to their portfolio of intangibles by devoting internal resources to their development. For this reason, as well as for other reasons connected to their measurement (discussed in the following section), the Innobarometer 2013 survey adopted a wider approach than a pure accounting one.[7]

Even if moving away from pure accounting metrics, looking at "spending data" represents a compelling starting point for identifying different kinds of intangibles and for quantifying their magnitude. Drawing on the works by Nakamura (1999) and Brynjolffson and Yang (1999), amongst others, this approach was established at the macro-level by Corrado et al. (2005), who suggested to "pull together disparate pieces of spending data and related evidence to gauge the plausible magnitude of the additional business investment […] on intangibles, or knowledge capital" (ibid., p. 14). The distinction of intangibles that they established, including *computerized information*, *innovative property*, and *economic competencies* has become standard in the macroeconomic literature and also a point of reference for microeconomic studies.[8]

This kind of spending approach is also followed by the Innobarometer 2013, although with a broader objective. In particular, the classification of intangibles submitted to its respondents is a "disaggregated" version of that by Corrado et al. (2005), developed for NESTA's *UK Investment in Intangible Asset Survey*. This is unique in the field, and takes stock of both the "intangibles-augmented" growth-accounting literature and of previous surveys on intangibles expenditure related to innovation.[9] The strong background of competencies and the focus placed on key intangible issues – such as the amount of internal and external investment in intangibles, and their useful life – have made the UK survey an exemplar model of data collection for future surveys (more on this survey can be found in Section 2.2). Accordingly, the Innobarometer 2013

[6] In this last respect, it should be considered that in order to obtain figures on the cost-related value of internally generated intangibles, specific assumptions are made on occupational data (namely, on wage-bills of some specific occupation): for example, software production costs include bills of software engineers, software designers and the like, adjusted for overhead costs and a working-time fraction.

[7] Still with respect to internally generated intangibles, a more general criticism observes that investment in intangible capital is ultimately investment in human-capital, generating a double-counting of human capital, in particular for the asset organisational capital (Arrighetti et al., 2013).

[8] In brief, *computerised information* refers to "knowledge embedded in major component, computer programs and computerised databases", *innovative property* to "knowledge acquired through scientific R&D and non-scientific inventive and creative activities", and *economic competencies* to "knowledge embedded in company-specific human and structural resources including brand names" (Corrado et al., 2005, Table 1.2, p. 23). As Corrado et al. illustrate, these intangibles can be measured by drawing on different sources of macro- and micro-spending data and their accounting status is heterogeneous (in particular, as far as their capitalisation is concerned) (OECD, 2010).

[9] For example, the Kauffman survey in the US, the Community Innovation Survey (CIS) in the EU, and, with respect to the useful-life issue, the survey of the Israeli Statistics Bureau (Peleg 2008a, 2008b).

focuses on the same categories as the UK survey, although with a slightly different phrasing (Box 2).[10]

Box 2 – Innobarometer 2013: categories of intangibles

(i) Training; (ii) software development, excluding research and development and web design; (iii) research and development; (iv) design of products and services, excluding research and development; (v) company reputation and branding; (vi) organisation or business process improvements.

Definitions and classifications are of course important in order to define the conceptual boundaries of intangibles and to set the guidelines for their measurement. However, their actual evaluation requires a consistent theoretical underpinning of their functioning. Unfortunately, such a theoretical foundation has not yet been fully formed and can at best be built up by drawing eclectically from the economic theory of the firm.

A useful starting point is recognition of the economic characteristics of intangibles. Intangibles can be (and often are) partly excludable, scalable (low marginal costs), and indivisible (high initial investments). They can (and often do) benefit from economies of scale, joint consumption, imperfect substitution and network effects (for an illustration of these properties, see Cohen, 2005, Chapter 3). These microeconomic features of intangibles expose the market to possible failures in driving their allocation and make of the firm a more efficient locus for their development and governance.

These considerations make the intangibles fit in the resource-based theory of the firm and its most recent knowledge-, capability- and competence-based versions (Molloy et al., 2011; Arrighetti et al., 2013). Companies develop intangibles internally, through production and organisational processes that are idiosyncratic and that aim to guarantee them a competitive advantage (Barney, 1991). Furthermore, given that markets usually do not exist, or do not work efficiently in trading these intangibles, companies are able to withstand competition for them and can use their intangibles to build up a sustained competitive advantage over time (Dierickx and Cool, 1989).

This theoretical underpinning has some important implications for the economic analysis of intangibles. First of all, given that "intangibles contribute to define the firm as a specific economic environment (i.e. a firm-specific environment) that is different and not replicable by the market" (Biondi and Rebérioux, 2012, p. 283), the distinction between externally acquired and internally developed intangibles becomes a crucial one, well beyond pure accounting implications. Indeed, this is also and above all a strategic distinction between a firm's choice of

[10] Although a broad classification, the present one is not exhaustive and rather limited to intangibles with respect to which companies are expected to be capable of identifying separated investments efforts. Other classifications, such as the standard distinction in the intellectual capital literature between *human assets*, *structural assets*, and *relational assets* are harder to get implemented (Meritum Project, 2002).

"making" rather than "buying" its intangibles, with all the implications that the debate on vertical integration and outsourcing has stimulated, both in transaction costs economics and more recently in capabilities theories (e.g. Williamson, 1973; Mahnke, 2001). The Innobarometer-2013 questionnaire placed a focus on the distinction between "internal and external resources and capacities" dedicated to intangibles in order to capture this argument of investments taking place within and outside the company's boundaries, respectively (Box 3).

Box 3 – Innobarometer 2013: distinction between internally developed and externally acquired intangibles

For each intangible category, companies were asked:

"*What percentage of its total turnover did your company invest in the following activities:*

… using internal resources (i.e. relying solely on internal resources and capacities);

… using an external provider for which the company paid (i.e. relying solely on external resources and capacities)?"

A second implication follows from the focus that a resource-based view of the firm places on the *use* that the firm makes of it rather than on the *existence* of (tangible and intangible) resources as such (Foss et al., 2008). Following the seminal idea by Edith Penrose (1959), what is important for the growth of a firm is the "service" that a "resource" unfolds, rather than its stock or flow measurement. On this basis, it becomes critically important to ascertain whether companies use their intangible investments to innovate – as R&D and innovation surveys aim to show – rather than for increasing their economic performance overall, for example, by contributing to the efficiency of their production process. Consistent with this last implication, the Innobarometer 2013 puts an original focus on the portion of intangible investments dedicated to a company's innovation projects (Box 4).

Box 4 – Innobarometer 2013: innovation related intangible investments

For each intangible category, companies were asked:

"*On average what proportion of the investments you made … is related to innovation projects?*"

A last, but not least, implication for the empirical analysis of intangibles stems from the "complementarities" that link intangibles amongst themselves and with other tangible resources within a company. These complementarities – leading to a "super-modular" outcome from their combined use – have been empirically detected in several other cases than just the most direct one of teamwork (e.g. Lynch and Black, 1998; Bresnahan et al., 2002; Zamora, 2006). Their role is generally pivotal in economics. Not only in the resource-based view of the firm, where it drives the process through which resources are transformed into organisational competencies

(e.g. divisional and cross-divisional); but also in more standard theories of the firm, such as those developing the idea of "team production" by Alchian and Demsetz (1972) (see, for example, Antonelli, 2001).

In the case of intangibles, complementarities are of even greater significance. Their knowledge-intensity makes them dependent on a firm-specific set of synergies, which makes a pure accounting framework (based on the assumptions of separability and marketability of individual resources) unsuitable for dealing with them. A wider approach is thus required. In particular, "accountability for the related investments should include the actual expenditures and deliberate initiatives in which management has been investing to position the business firm over time to leverage special circumstances on its behalf" (Biondi and Rebérioux, 2012, p. 283).

As already stated, this is also consistent with the approach that the Innobarometer 2013 adopted for the measurement of intangibles, an approach to which we refer more extensively to in the next section.

2.2 Measuring intangibles: accounting, disclosing and surveying

In the analysis of intangibles, their measurement is a "hot issue". Both managers and policymakers require "tangible" monetary values for "intangibles" in order to draw up corporate strategies and public interventions to improve competitiveness and to foster economic growth.[11]

Company accounting practices represent one of the most important sources for setting up these monetary values, or at least a first basis for the economic measurement of intangibles. The increasing convergence of international accounting rules and standards, mainly based on the diffusion of the International Financial Reporting Standards (ex-IAS), has in fact made companies "disclose" increasingly more information from which consistent values can be worked out for each class of intangible assets (IAS 38.118 and 38.122).[12]

However, the accounting treatment of intangibles is still subject to a number of conditions – and associated with both incentives and disincentives – which inevitably impact on the relative accounting choices. On the one hand, the distinction between *identifiable* and *unidentifiable* intangibles, and that between *acquired* and internally *developed* ones, introduces a first evaluation bias (Section 2.1); on the other hand, a crucial issue for any company is the assessment of the costs associated to its intangibles and the relative choice of treating them as *capital expenditures* rather than *current expenses*. This is a decision that concerns three nested issues for each intangible: (i) its "service life", that is the period of time over which the output of an intangible activity is expected to contribute to the company's performance (e.g. to its future cash flows); (ii) its amortisation, that is the way in which the output of any intangible is consumed and/or used up over its service life;[13] and (iii) the actual decision to "capitalise" it – so that its value affects the

[11] For a review of the reasons for and functions of measuring intangibles at the company level, see Hunter et al. (2005).

[12] To be sure, standards still differ in the extent to which companies have recognised some rights to classify intangibles rather than doing it on the basis of legal criteria.

[13] This service life can also be "infinite" – like for brands – and thus an annual impairment test replaces the amortisation process. It should be noted that, from the point of view of the company, the amortisation decision is

current income only through the relevant periodic amortisation – rather than "expense" it – so that it is fully written off against the current income, at the time when the relative expense is incurred.

All these three issues have crucial measurement implications (for a discussion of these, see Cohen, 2005, Chapter 4). However, point (iii) has received the most attention, being the point of a critical clash between a company's' incentives and capitalisation requirements. As already stated, the capitalisation of intangibles is a fundamental requirement for a measurement consistent with the nature of the assets. Furthermore, the capitalisation of intangibles is stimulated by direct fiscal benefits in most countries and by the likely increase that, under specific conditions, it produces in the company value. On the other hand, there may also be incentives for companies to expense their intangibles, in order not to generate expectations of growth in the associated future earnings (Lev, 2001). Although in a different sphere, the "conservatism principle" of valuation in accounting – whereby "a higher degree of verification [is required] to recognize good news as gains than to recognize bad news as losses" (Basu, 1997, p. 7) – also provides companies with a justification for not capitalising intangible-related expenses. More generally, "the accounting standards impose, for the accounting of intangibles, conditions that are so restrictive, that only few investments can appear in the assets of organizations" (Zéghal and Maaloul, 2011, p. 264)[14].

As a result of this tension, most of the intangibles are usually "expensed when incurred" and are thus understated in standard balance sheets[15]. Furthermore, intangible-related expenses are hard to identify even in the profit/loss account, as they are usually split among the standard expenses items. This bias towards the expense of intangibles, along with the aforementioned bias towards the external acquisition of intangibles (vs. internal creation) and their full (vs. partial) control, represents an important shortcoming of the accounting process in providing an effective measurement of the intangible activities[16].

This shortcoming has reinforced the need to collect more accurate and detailed "intangible data" by means of an extra-accounting reporting of intangibles at the corporate level. This need has been fulfilled to date by different stakeholders in different ways, leading to the creation of

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mostly driven by tax incentives and might not correspond to an amortisation evaluation driven by economic considerations (like the actual obsolescence of the asset).

[14] Beyond a general awareness about how it can be challenging for a company to account for its intangible expenses as assets, it has to be pointed out that several intangible assets (mostly internally generated) are excluded by definition from capitalisation (as for scientific research). When allowed, the process is still highly dependent on specific country and sectorial conditions: see Oswald (2008) on R&D accounting by UK companies; Cazavan-Jeny et al. (2011) on R&D accounting by French companies; Markarian et al. (2008) on R&D accounting by Italian listed enterprises.

[15] In accounting, this represents a Type-I error that occurs more often than a Type-II error, in which companies incur when expenses are misclassified as investments (Hunter et al., 2005).

[16] Far from representing a simple problem of evaluation accuracy, this shortcoming has been shown to have a number of negative consequences, amongst others, on the utility of company financial information (such as, earnings, cash flows and book value) to the company's investors, on the efficiency of the company's resource allocation in the capital market (in particular, between inside and outside investors), and on the market value of the company. Less conclusive is the evidence of a negative effect on the growth of intangible investments. For a review of these analyses, see Zéghal and Maaloul (2011).

"hybrid metrics", from which it is difficult to get oriented, so that there is now recognition of the need to converge efforts.

First of all for this, companies themselves voluntarily disclose extra-accounting information about their intangible resources, either by means of factual information – for example, on the training of their employees, the costs to acquire their customers, and their internet activities – or, more importantly, by integrating their official financial statements with both financial and non-financial information. Under the stimuli of the international organisations responsible for the relative standards, companies often provide specific disclosure on specific intangibles or more general stand-alone reports on them (Beattie et al., 2004), albeit not new "accounting taxonomies" for their measurements (such as the famous example of the Skandia navigator). These initiatives are however irregularly diffused at the international level (with a certain polarisation in the US). Furthermore, the evidence about their role in solving the accounting inefficiencies addressed above is still unclear (Abdolmohammadi, 2005; Zéghal and Maaloul, 2011), if not even negative in some cases.[17]

Second, mixed or non-purely accounting metrics for handling intangibles have also been developed by a number of academics and service agencies under consultancy. Some "branded" examples are the "Balanced Scorecard" (Kaplan and Norton, 1992) and "IC-3 dimensional scaling", just to mention two. In addition to their multitude and limited comparability, a critical survey of these metrics reveals how their actual contribution to resolving the measurement issue is limited. While they help in making several intangible components more "visible", these metrics fail to provide what is actually required for the evaluation, that is, an accurate measure of the monetary allocations that companies make to them and their relative rate of returns (Hunter et al., 2005).

A third option for a more comprehensive evaluation of intangibles is provided by business surveys – mostly run by statistical offices, research institutes or consultancies – through which companies are asked to reveal information about the asset nature of their intangible investments. Among the different types, surveys run for commercial purposes often have a restricted scope and target selected groups of companies.[18] Accordingly, for transparency, independence, and reliability, usually only official (public) surveys can be trusted.

One example survey worth highlighting is a pilot survey launched by INSEE (the French National Institute for Statistics and Economic Studies) in 2004, in co-operation with the French Ministry of Economy, on the "management of intangible investments" (*Moyens et modes de gestion de l'immatériel*). The survey aimed to collect data for the year 2003 and deliberately focused only on selected intangible activities; namely, marketing and advertisement, management of

[17] With respect to the information on intangible resources voluntarily disclosed in the annual report by companies, Macagnan (2009) finds evidence, among Spanish companies, of a statistically significant negative correlation between such a disclosure and the following year stock profitability.

[18] Examples include the survey recently launched by the global organisation of tax advisory companies, Taxand, among a number of multinational enterprises (http://www.taxand.com/taxands-take/thought-leadership/taxand-global-intangibles-survey-2013), or a similar survey managed by the global consultancy company Deloitte (http://www.deloitte.com/assets/Dcom-UnitedKingdom/Local%20Assets/Documents/UK_Audit_GraspingtheIntangible.pdf).

intellectual property (such as patents, trademarks, designs, copyrights, etc.), research and development, and innovation. However, the survey was extremely advanced for its methodology. Based on a stratified sample of more than 20000 independent enterprises and groups, the survey used a range of different data collection techniques and largely exploited both accounting and fiscal data in order to reduce the burden on respondents (Kremp and Tessier, 2006).

A subsequent follow up survey was not carried out until 2009, when NESTA (formerly, the National Endowment for Science, Technology and the Arts, recently turned into an independent charity: 'NESTA') proposed to the UK Office for National Statistics (ONS) to develop a national survey on companies' "Investment in Intangible Assets" (IIA). The survey, launched by ONS in October 2009, was a "new and unique survey" (Awano et al., 2010a), greatly profiting from the contribution of some leading economists in the UK. Its aim was to collect fresh evidence on the activities that, in 2008, British companies carried out with respect to the following intangibles: employer funded training, software, research and development (R&D), reputation and branding, design, and organisation or business process improvement. The sample was drawn from the British business register and included around 2,000 enterprises with 10 employees or more (the final rate of response was 42%).[19] A key feature of the IIA survey was that of having channelled into a single survey the needs of a number of users: from scholars undertaking macroeconomic research on the determinants of growth, to industrial economists dealing with innovation-related issues, as well as national accountants and policymakers looking for insights on the processes improving business productivity and competitiveness.[20] Its approach was unique and brand new in at least three respects: (i) the surveying of a wider range of spending on intangibles, compared to traditional sectoral surveys (like those on R&D, ICTs, etc.); (ii) the inclusion of both purchased and in–house intangible spending; and (iii) the aim of estimating depreciation rates for intangibles, by asking companies about the length of time they expected to benefit from their investments in intangibles.

The approach of the IIA survey was defined by taking into account the most recent developments in the economic research on intangibles. This contributed to making the IIA survey a benchmark for similar exercises to be developed in other countries. As stated above, the Innobarometer 2013 was also inspired by it.

2.3 Designing an Innobarometer on intangibles: opportunities and challenges

Following the decision to launch an Innobarometer survey on investments in intangibles by companies, an intensive development activity was initiated to design the survey, involving the multi-disciplinary team in charge of the survey, the users (on both the research and policymaking sides) and the data collectors. The process went through four main steps: (i) a stock-taking exercise of the most relevant scientific contributions on the topic and of the other survey experiences undertaken so far; (ii) a detailed analysis of the NESTA-sponsored IIA survey and of

[19] The second wave of the survey was carried out in 2011, by collecting data for the year 2010 from a sample of about 2,500 enterprises (Field and Franklin, 2012).

[20] The main reason behind the development of the new IIA survey was actually that of providing additional data to calculate a new "innovation index" for the British economy (Haskel et al. 2009).

the potential adaptation of its concepts and methodologies to a "flash" CATI (Computer-Assisted Telephone Interviewing) survey; (iii) integration in the draft questionnaire of the additional questions requested by the users (the link between intangibles and innovation projects, for instance); and (iv) the design of the questionnaire according to the needs of the data collectors.

During the process, potentially conflicting conceptual and technical needs were resolved and systematically accommodated, with the survey questionnaire being finally agreed incorporating a number of innovative features. First, although aimed at collecting almost exclusively "qualitative data", the questionnaire introduced the notion of using a percentage of a company's turnover as a proxy for intangible-related costs and to produce indicators which could be relevant for both policymakers and analysts. Another unique feature was the distinction between "internal" and "external" intangible activities. As stated, this distinction is deeply rooted in the scientific literature on intangibles. Furthermore, it was considered essential to collect the Innobarometer-2013 data in such a way that it could be compared with national accounting data, at least in some countries, and contrasted with data from alternative measurement methods. Finally, and for the first time ever, innovation related data on intangibles were collected after having identified intangible investments as such, for the purpose of shedding new light on the role they play in technological and non-technological innovation processes.

As a whole, the Innobarometer 2013 can be seen as a multi-purpose survey, designed to fill a range of different needs. As a general rule, this kind of survey cannot provide reliable information on every single covered topic; for instance, it cannot be expected to produce R&D expenditure estimates comparable to those regularly gathered in official business R&D surveys. However, in the case of the Innobarometer – as for the IIA survey in the UK – this is not a shortcoming as its main objective is in fact different. Its purpose is to understand the companies' strategies for managing their intangible investments, by looking at the "mix" of different intangible activities they invest in (either internally or externally).

The main risk, in this context, is rather a potential "systematic" reporting bias by the respondents, as random under- and over-reporting are assumed to compensate each other. Such a risk can be associated with mistakes in the translation of the questionnaire, as well as with structural differences in the business organisations across countries. On a more practical level, the potential bias could be due to the problem of identifying the "right respondents" within a sampled company. However, this is a key challenge for all multi-purpose surveys. There is always a general risk of contacting a company official, who could be expert in just one or a few of the topics in question, and may be unable to provide consistent information about the company's overall strategy.[21]

To contrast this, data collectors encouraged the respondents to check their level of knowledge about their employers' strategies before returning the requested data. In addition, we performed a statistical analysis on the final data-set, in order to identify potential outliers.[22] As a result of

[21] In our specific case, the manager responsible, for instance, of R&D or training activities, could lack specific knowledge about the corporate activities involving design, marketing or organisational costs.

[22] More precisely, a cluster analysis has been performed following the method of "non-hierarchical" clustering (k-means clustering, FASTCLUS procedure in SAS), which is highly sensitive to outliers and – when asking for the

this analysis, it can be argued that: (i) the highest risk of a possible distortion in the calculation of the variables' scores mainly concerns the highest values and the observations that apparently perform better than others; (ii) overall, the influence of potential outliers on the results of the survey is negligible, and there is no need to exclude observations from the data-set to prevent biases in the variables' estimates; and (iii) the distribution of potential outliers by country, macro-sector or size class does not suggest any major bias with respect to the calculation of variables' scores for the groups defined by these criteria.[23]

3. Digging into the Innobarometer 2013

Conducted at the request of the Directorate-General for Enterprise and Industry, the Flash Eurobarometer, "*Investing in Intangibles: Economic Assets and Innovation Drivers for Growth*" (No.369) – in brief, the Innobarometer 2013 – was carried out by TNS Opinion & Social network, under the coordination of the Directorate-General for Communication ("Research and Speechwriting" Unit) and with the contribution of the Joint Research Centre of the European Commission. In the period between January and February 2013, a sample of companies in the EU-28[24], plus a number of other non-EU countries, were surveyed, mainly with respect to the year 2011.[25]

The survey covered enterprises with at least one employee, operating in both manufacturing and services, and was designed to investigate: "The kinds of intangible assets companies invest in; companies' use of internal or external resources when investing in intangible assets; why companies invest in intangible assets, and what barriers they perceive when making such investments; the perceived length of benefit from investing in intangible assets; and the links between innovation projects and investment in intangible assets" (EC, 2013, p.3).

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identification of a quite large numbers of clusters (50 clusters in this analysis) – should be able to include outliers in the smallest clusters and in those which are most distant from the nearest cluster. This approach is often recommended for outliers detection, because it is quite easy to apply and is able to manage large quantitative data-sets. On the other hand, this approach is also criticised by arguing that outliers' detection might not be a proper use of k-means clustering (which has not been designed for such a purpose). Indeed, the outliers themselves affect the location of "cluster centres" and might not permit the method to perform properly in the case of complex data-sets (for a general discussion, see Hodge and Austin, 2004).

[23] After having converted all the categorical variables into quantitative discrete variables, 50 clusters have been produced by running FASTCLUS procedures on a selected number of the Innobarometer variables. The relative distribution of clusters allows for the identification of those which are most distant from the centre and with a small number of observations, as including potential outliers. After ranking the clusters by frequency, the smallest clusters have been selected to check for their impact on estimates of the main variables. Two groups of observations have been taken into consideration: 40 "extreme outliers" and 502 "moderate outliers" (respectively, 0.35% and 4.45% of all observations). In both cases, the outliers are those observations with very high values for all the variables. Nevertheless, by comparing the average score of the whole population with and without outliers, in both cases outliers do not influence these scores more than 7-8% of the value. This is quite irrelevant considering their average confidence intervals.

[24] Croatia joined the European Union as the 28th member state on 1 July 2013. Therefore, when performing the analyses, we have included Croatia in the EU-28 group.

[25] For a more detailed illustration of the survey, see the Technical Specifications at http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innobarometer/.

As a flash kind of survey, carried out with a CATI methodology, its results should be interpreted taking into account some idiosyncrasies of this approach. Compared to standard structural business surveys, mainly adopting paper – or more recently, electronic/web – questionnaires, a "business" CATI survey is shorter (ideally, between 10 and 15 minutes), with no more than ten questions, and, even more important, concepts and definitions have to be explained to respondents in a clear and concise way. Overall, according to the technical reports from the data collectors, the questions in the Innobarometer-2013 survey proved to be understandable and, in general, the degree of acceptance for the survey was noted as "good".[26] Consequently, a similarly good level of understanding about the concepts used in the survey and reliability in the information provided by the respondents can be expected.

From a statistical point of view, the distribution of a (realised) sample of 11 317 companies, from a population of several million companies in 36 countries, does not allow for high sampling rates (with the exception of the smallest EU countries) or for a very detailed industry/size stratification. Nevertheless, in order to define nine strata for each country, three macro-sectors (Construction & Utilities, Manufacturing, and Services) and three size groups ('1 to 9 employees', '10 to 49 employees' and '50 employees or more' employees) were identified, although, the number of sample strata by country needed to be adapted to the sample size. As strata with a too low number of potential/actual respondents collapsed, the number of strata actually applied ranged from four to nine by country, according to the size of the reference population and of the sample. The rates of response – ranging from 6% to 69% - were, as expected, systematically lower than those achieved in official business surveys.[27] As a general rule, a low sampling rate or a low response rate, in principle, does not affect the robustness of the survey's results, which is almost totally dependent on the sample size.[28] However, in surveying a population of companies, rather than individuals, there is a risk that high sectoral and size heterogeneity could lead – without a proper stratification of the sample, as carried out in this survey – to a low level of precision of the results, mostly at a sub-national level.

These considerations suggest the need to apply caution in interpreting the results obtained on the basis of the Innobarometer 2013 alone (for example, confidence intervals should be carefully considered). However, they do not prevent us from digging a bit more into the results and going beyond just the descriptive statistics that the relative synthesis (http://ec.europa.eu/enterprise/policies/innovation/facts-figures-analysis/innobarometer/) provides for the answers to the ten questions (plus another eight on basic company information) of the questionnaire (available in the Technical Annex I).

[26] In some countries, the R&D-related concepts turned out to be not so well known by respondents (probably, mostly small enterprises), but it can be assumed that this was largely due to translation problems.

[27] By comparing the national rates of response, the pattern is the same as for surveys like the EU Community Innovation Survey. However, the actual rates for the Innobarometer-2013 are, on average, 50-70% lower than standard business statistics. In this last respect, it should be noted that the data collectors for the Innobarometer-2013 stopped contacting new enterprises after having achieved the minimum requested number of respondents by country.

[28] This is true, providing that the assumptions of a low variability within each stratum of the observed phenomena and of the equal probability for all the units in the stratum to be sampled are respected.

In particular, through a slightly more advanced statistical investigation that makes use of the structural features of the surveyed companies (mainly, their size, sector and country-area), three important aspects were addressed: (i) the strategic role they attribute to their intangibles (Section 3.1); (ii) the relationships with their innovation projects (Section 3.2); and (iii) the context conditions and business incentives that accompany their investments (Section 3.3). Far from representing a comprehensive analysis of the Innobarometer-2013, this investigation is intended to be the basis for further research using its data.

3.1. The strategic role of intangibles

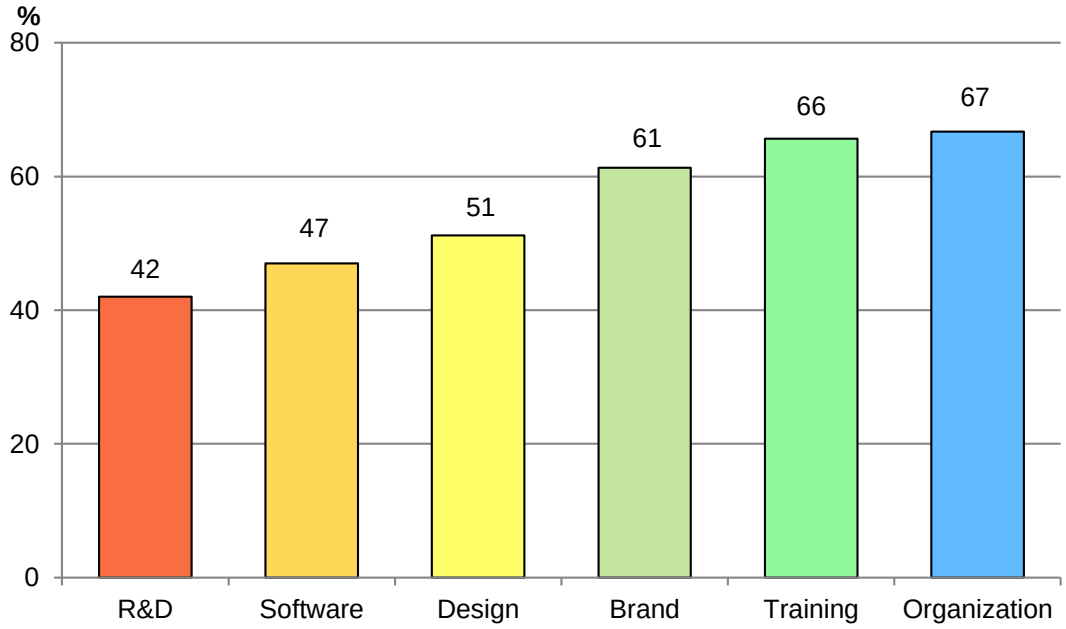
The first aspect that merits consideration is the role that intangibles play in companies that invest in them. While it is evident that intangibles have a positive impact on a company's economic performance, the extent to which companies exploit such an impact varies, especially with regards the importance, priority and role they recognise for them. Of course, this is not easy to ascertain. However, some company behaviours can help illustrate the perception of intangibles within companies. In particular, the amount of resources and competencies companies employ for "making" rather than "buying" their intangibles, the length of time along which they expect to benefit from them, and the accounting treatment they accordingly reserve to them, are three informative indicators of the strategic role companies attach to their intangible assets.

3.1.1 Internal vs external resources and competencies for investing in intangibles

Using internal rather than external resources for investing in intangibles is not just an accounting issue, but also an important strategic choice. Resorting to external providers could be a convenient choice in certain circumstances, for example, in the presence of low transaction costs and/or a lack of internal competencies. But, on the other hand, by applying a consistent internal effort to build up their intangibles, companies can commit to a strategy that places these intangibles at the core of their competitive advantage.

The Innobarometer 2013 provides interesting insights on this issue. At the outset, let us observe that the share of interviewed companies that have invested (at least some of their turnover) in the six categories of intangibles given in Box 2 in Section 2.1 above, either internally or externally, is appreciable and spans from about 40% – in the case of R&D – to about 65% – in the case of organisation or business process improvements (Figure 1). Still without distinguishing between internal and external resources and competencies, the number of companies investing is relatively larger for training, branding and reputation (along with organisation), than for software and design (along with R&D), pointing to a distinction between intangibles, on which we will return later.

Figure 1: Firms reporting intangible investments using internal or external resources (weighted share)



Looking at the question of the internal or external development of intangibles, the Innobarometer 2013 seems to confirm that the respondent companies attached a strategic role to their investments, relying more on the internal development than on external in 2011. Although relatively few companies spent more than 15% of their turnover on internal resources for investing in any of the six categories of intangibles, as many as 60% of them, on average, actually used internal resources for the same purpose, with a certain variance looking at specific intangibles (EC, 2013, p.7).

A standard Principal Component Analysis (PCA) was carried out for questions Q2 and Q3 – which companies were asked to answer for each of the six categories of intangibles (see the Questionnaire in Technical Annex I)) – to reduce the dimensionality (i.e. 6 x 2 = 12 variables) of the strategic approach to their development that these questions reveal.[29] Such an analysis actually looks for the lowest number of components (meta-variables) that explain most of the variance of the original set of variables. The resulting components can then be semantically labelled on the basis of the sign and weights that the original variables have with respect to them.

Table 1 reports the results of this PCA, showing the three components that account for most of the variation in the strategic role of intangibles in the respondent companies, and their relationships with the underlying question-variables.[30]

For this issue, most of the variance is explained by what we could call the company's "*intangible intensity*" (Component 1 in the PCA). Indeed, this component appears associated with each and

[29] Although PCA is not the most appropriate technique with categorical variables, the presence of as many as seven classes for each variable allows us to use it, instead of a Multiple Correspondence Analysis (MCA), in order to better illustrate the basic features of the underlying data.

[30] As is standard in the empirical applications, these are the components with an eigenvalue greater than 1. In our case, they "explain" about 64% of the variance of the original variables.

every variable (i.e. the % of turnover invested in each and every intangible) significantly and with a positive sign. In brief, the first dimension that identifies the strategic role of intangibles depends on a company's' commitment to invest in them.

Component 2 of the PCA can be taken to represent the company's "*internal intangibles intensity*", as it is positively (negatively) associated with a higher use of internal (external) resources for supporting the relative investments.

Component 3 of the PCA, possibly the most interesting one, refers to the different nature of the investigated intangibles. On the one hand, it is positively associated with investments in intangibles that can be typically identified in a company's organisation and separated from it, such as with software, R&D and design, as they can be located in specific departments and/or with individuals. On the other hand, the same component is negatively associated with investments in intangibles that, unlike the former, cannot be easily separated from the organisation in which they are embedded, such as training, reputation & branding, and organisation or business process improvements.[31] Accordingly, Component 3 can be classed as a company's "*intensity of (organisationally) separable intangibles*".

[31] It should be noted that this is different from the more standard idea of market separability, to which accounting criteria refers. Following this last criterion, R&D would not be separable at all, while it is relatively more so from an organisational point of view. In the same respect, it should be clarified that the negative contribution at stake is only used to interpret the identified component and it does not entail that companies have a negative return from investing in non-organisationally separable intangibles.

Table 1: Principal Component Analysis of the intensity of intangible investments using internal and external resources (% of total turnover)

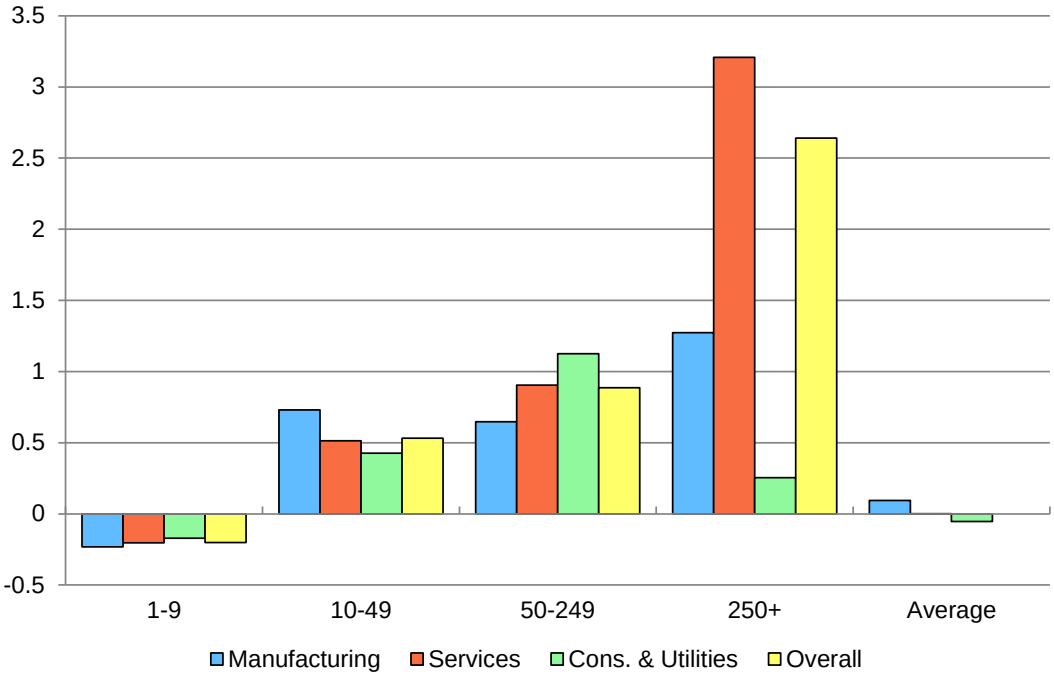
	Component 1	Component 2	Component 3
Internal resources (Q2)			
Training	0.295***	***0.297*****	***-0.381*****
	(0.000)	***(0.000)***	***(0.000)***
Software	0.269***	***0.295*****	***0.243*****
	(0.000)	***(0.000)***	***(0.000)***
Reputation & brand	0.276***	***0.200*****	***-0.343*****
	(0.000)	***(0.000)***	***(0.000)***
R&D	0.294***	***0.259*****	***0.376*****
	(0.000)	***(0.000)***	***(0.000)***
Design	0.257***	***0.377*****	***0.389*****
	(0.000)	***(0.000)***	***(0.000)***
Organization & business	0.282***	***0.343*****	***-0.272*****
	(0.000)	***(0.000)***	***(0.000)***
External providers (Q3)			
Training	0.300***	***-0.220*****	***-0.344*****
	(0.000)	***(0.000)***	***(0.000)***
Software	0.280***	***-0.261*****	***0.144*****
	(0.000)	***(0.000)***	***(0.000)***
Reputation & brand	0.300***	***-0.283*****	***-0.178*****
	(0.000)	***(0.000)***	***(0.000)***
R&D	0.303***	***-0.297*****	***0.264*****
	(0.000)	***(0.000)***	***(0.000)***
Design	0.299***	***-0.312*****	***0.248*****
	(0.000)	***(0.000)***	***(0.000)***
Organization & business	0.306***	***-0.274*****	***-0.097*****
	(0.000)	***(0.000)***	***(0.000)***
Eigenvalues	4.796***	1.367***	1.040***
	(0.001)	(0.000)	(0.000)

Note: *Standard errors in parenthesis - *** p<0.01, ** p<0.05, * p<0.1 – Weighted estimation (reported to the universe).*

Once the main factors explaining the strategic role of intangibles have been identified, it is interesting to see whether size- and industry-specific patterns emerge with respect to them. Figures 2-4, which plot the average scores of the three components across companies of different size-classes and macro-sectors,[32] confirm that this is actually the case.

[32] Given their idiosyncratic features, construction and other utilities have been extracted from services and investigated as a separated macro-sector.

Figure 2: Average scores of intangible intensity by firm size and macro-sector (weighted)



From the figures it can be seen that the component represented by a company's intangible intensity (Component 1) scores progressively higher for higher size-classes, suggesting that scale economies can have a role in augmenting their incidence (Figure 2). Furthermore, both in manufacturing and, to a greater extent, in services, large companies (greater than 250 employees) show with respect to medium ones (in-between 50 and 249) a more substantial increase in the intensity score than the medium companies show with respect to small ones (less than 50 employees). The possible existence of fixed costs and indivisibilities in taking stock of a higher intangible intensity can account for this sort of shift.

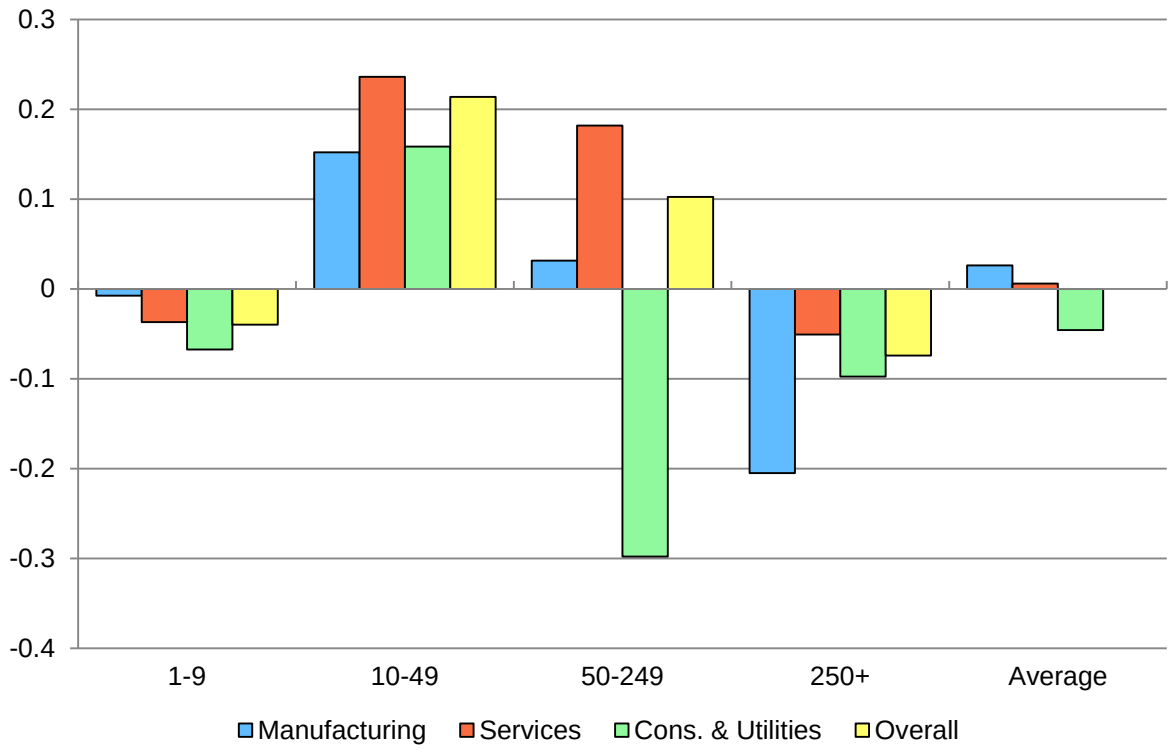
On average, manufacturing companies score slightly more than service companies on Component 1, pointing to the importance of the complementarity with their higher intensity of tangible assets. This is an interesting result that also emerges from the IIA-UK survey (on whose parallel we will return in the conclusions) and that suggests, along with that on the role of size (see below), that the degree/patterns of specialisation of the different industries can be important in accounting for intangibles. Apart from medium-sized companies, which appear more reliant on intangibles than small and large ones, companies in the construction and utilities macro-sector show instead the lowest average intensity.

Concerning Component 2, Figure 3 shows that, with the partial exception of the medium-sized companies in construction and utilities, the internal intangible intensity of companies demonstrate positive scores only for SMEs (small to medium-sized enterprises, i.e. <249 employees), and for small companies in particular (between 10 and 49 employees). On the contrary, micro (below 10 employees) and large (above 250 employees) companies score negatively along the same dimension. This is an interesting result. This suggests that relying on external providers for investing in intangibles could be "exceptionally" explained either by the

lack of a sufficient business scale for doing it internally (e.g. for micro companies), or by a sufficiently large business scale for benefiting from its outsourcing (e.g. for large companies).

As before, on average manufacturing companies have only slightly higher scores of internal intangible intensity than service companies. However, this average results from the combination of different outcomes for different size-classes. In particular, SMEs, and medium-sized companies above all, show a higher internal intangible intensity in services than the manufacturing companies in the same size-classes. This is another interesting result, which hints at the importance of internal investments for small and medium-sized service companies to be knowledge business intensive[33].

Figure 3: Average scores of internal intangible intensity by firm size and macro-sector (weighted)



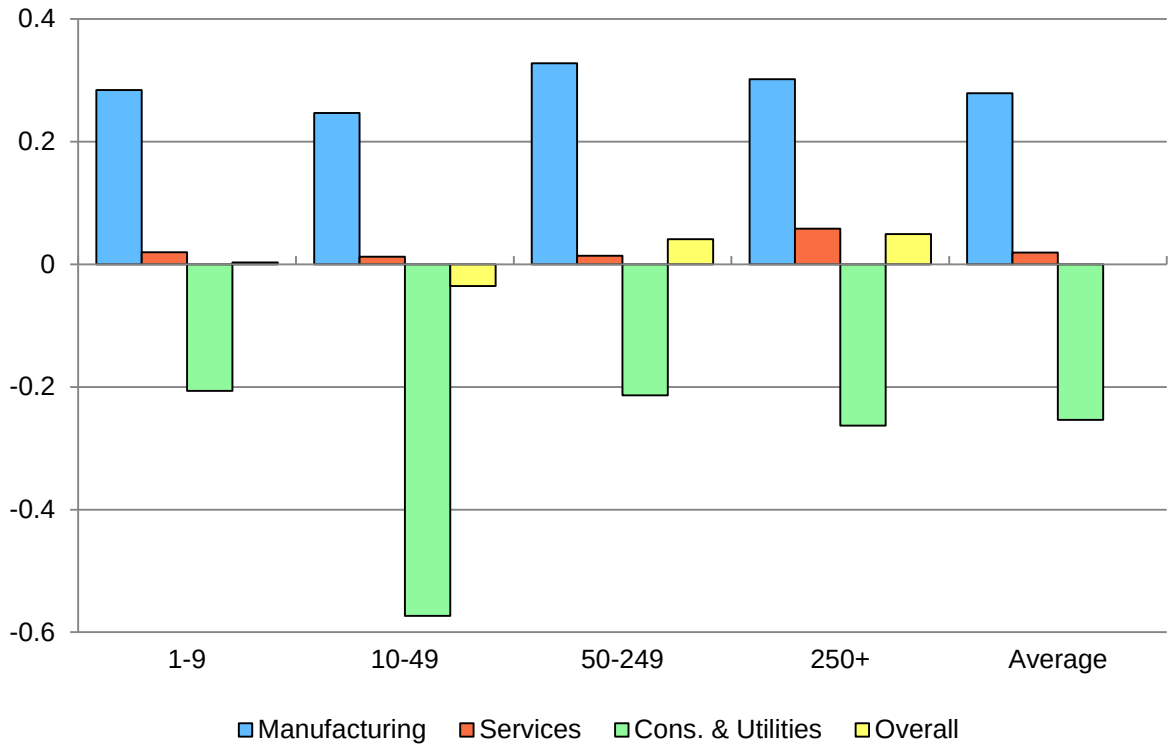
With regards to Component 3 (Figure 4), let us first observe that companies in construction and utilities are the only ones that score negatively with respect to the intensity of separable intangibles, showing their unique greater reliance on non-separable intangibles. Manufacturing and service companies demonstrate an opposite pattern. However, manufacturing companies display systematically higher scores than service companies in the intensity of software, R&D,

[33] Such evidence does suggest that the intangibles' intensity could be interpreted as an indicator of the relevance of knowledge creation and use in the enterprises' management. The traditional view of identifying the "knowledge intensive" businesses – mostly among service enterprises – only on the basis of their R&D expenditure or the level of qualification of the workforce has been already challenged by recent research projects, like the OECD/EU KNOWINNO-INNOSERV, dealing with the multi-faceted nature of service innovation and knowledge management in the service sector.

and design. Given the different nature of their respective production outcomes and processes, this result is somewhat expected. Service companies, which are typically less hierarchical and formally organised than manufacturing companies, appear to rely more strategically on those assets that are transversal with respect to their organisation – that is, training, reputation and branding, organisation or business process improvements – and that can help the managers in the governance of the company.

Quite interestingly, apart from construction and utilities, the scores relating to Component 3 do not show large changes with company size. For services, the intensity of separable intangible assets increases in score only slightly and irregularly with size, that is, after having decreased from micro to the small companies. A similar pattern can be observed for manufacturing, but only up to a certain level (represented by medium companies), after which the same intensity decreases. As for micro-companies, large companies also appear to benefit more extensively (than medium-sized ones) from organisationally embedded intangibles.

Figure 4: Average scores of separable intangible intensity by firm size and macro-sector (weighted)



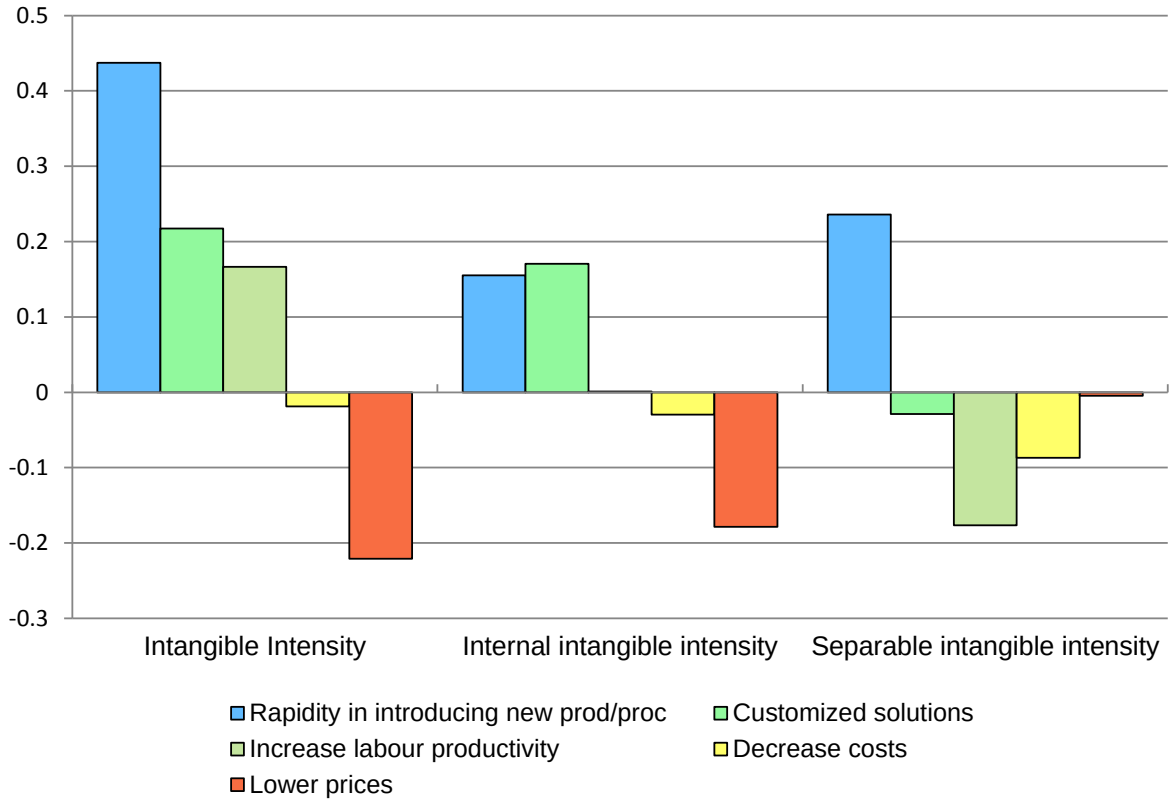
In addition to the size- and sector-specificities revealed by the three components of the PCA, other aspects could be investigated by making use of the interpretative power of the PCA analysis of the six intangibles categories. For example, their average scores could be analysed by distinguishing the priorities that the interviewed companies declared at the beginning of the questionnaire (Q1 in Technical Annex I).

Figure 5 shows that, quite consistently, the score of intangible intensity (Component 1) is the highest for companies that prioritise a rapid development of new products and services, while it

is the lowest for those pursuing lower prices. For the same two groups of companies, the scores are, respectively, among the highest and the lowest also with respect to the internal intangible intensity (Component 2). Still consistently, the two extreme scores of the first two components are accompanied, albeit by different distances, by those companies that prioritise customised solutions for their clients and decreasing production costs, respectively. In general, intangibles appear more relevant for companies searching for a "differentiation advantage" rather than a "cost advantage". On the other hand, while companies targeting increases of productivity also seem to benefit from intangible investments, they do not look to do so with respect to internal ones; unlike innovative priorities, productivity ones could apparently also be accomplished with some degree of intangibles "externalisation".

The average scores of Component 3 are also quite interesting. Those companies that declared innovative behaviour among their priorities are those that scored the most for the separable kind of intangibles, whose investments have the most distinguishable innovative outcomes; namely, R&D, design, and software. For the others, including those targeting customised solutions, the highest scores are instead for intangibles whose innovative outcome is more indirectly identifiable; namely, branding and reputation, training, and organisation or business process improvements.

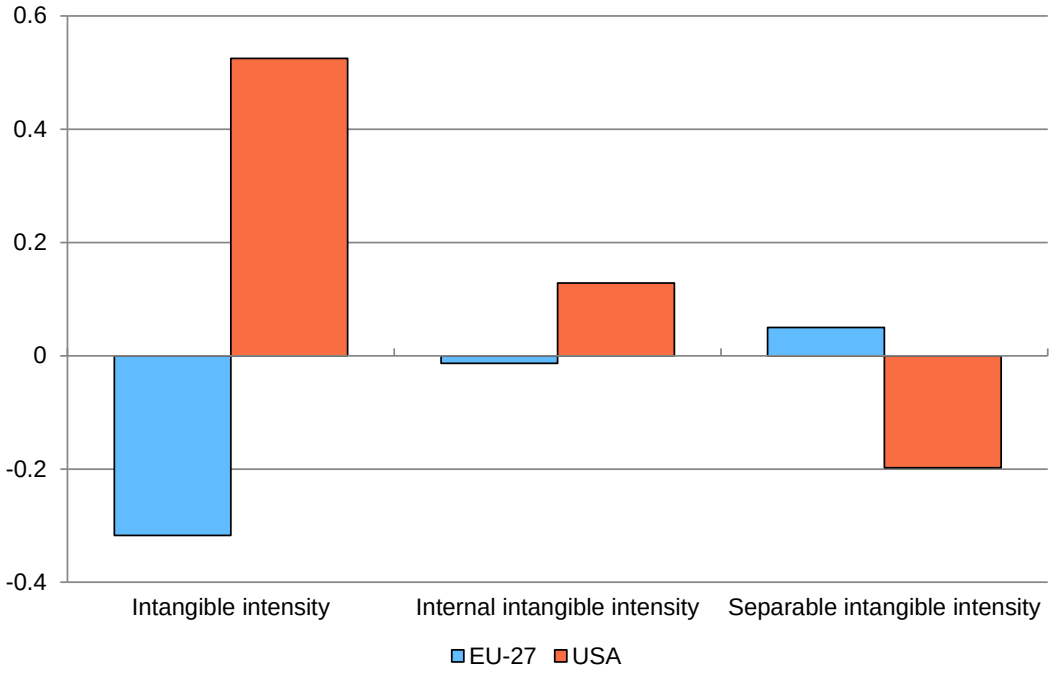
Figure 5: Firms priorities and intangible investment intensity (weighted)



In concluding the analysis of the strategic role of intangibles, it is interesting to see whether its three identified dimensions show different scores for companies located in different geographical areas; in particular, between the EU and US, as current evidence already suggests in other respects.

Figure 6 shows these differences in the average scores of the components and confirms that they are remarkable. European companies have far lower scores of intangible and internal intangible intensities than the US companies, but a higher score for separable intangible intensity (that is, R&D, software, and design).

Figure 6: Average scores of the factors: EU and US (weighted)



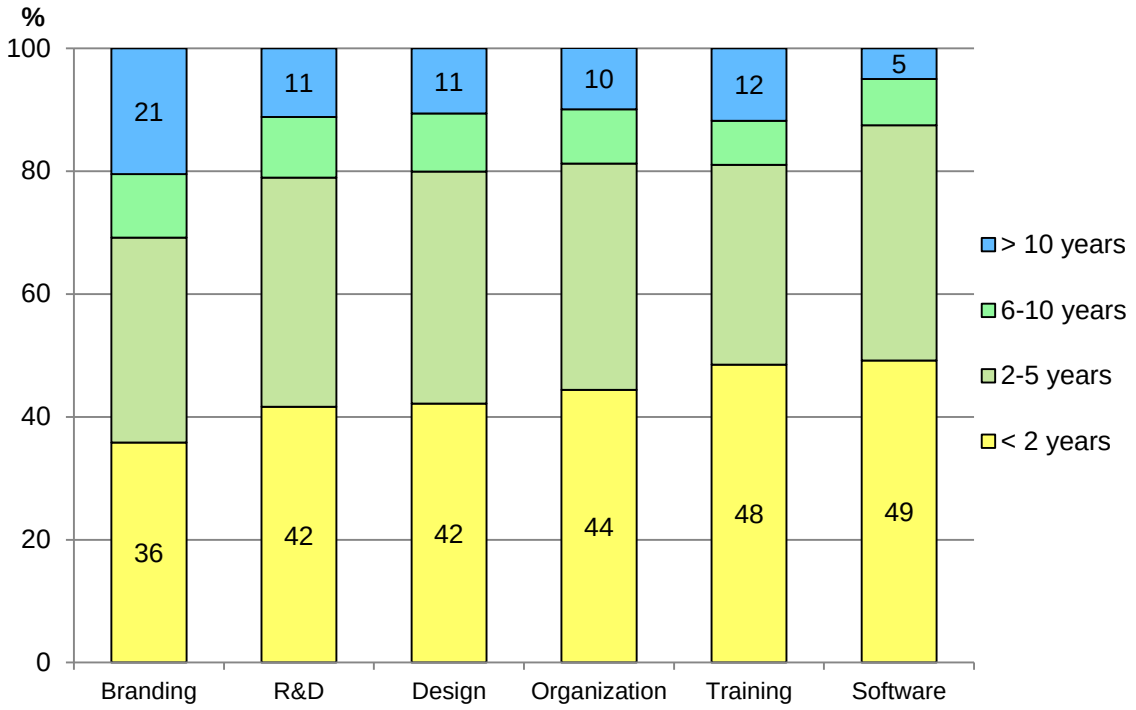
In other words, not only do intangibles account for different shares of GDP growth in the two areas (as is reported in the existing literature), but they may also play a different role in them; seemingly, a more strategic role in the US compared to the EU. Whether this could help explain the so-called transatlantic productivity gap is of course an interesting future research line to address.

3.1.2 Expected benefits and the useful life of intangible assets

A further indicator of the strategic role of intangibles is the period of time over which they are expected to contribute to the investing company. The longer the "useful life" of an intangible asset, the more strategic it can be considered, as it contributes to the company's competitive advantages and growth opportunities over time. As will be seen, this has important implications on how companies report their intangibles in their accounts.

Quite interestingly, some heterogeneity emerges with respect to the kind of intangibles that, for the Innobarometer firms, yield the longer-term benefits (Figure 7). For example, an expected benefit of more than ten years has been declared by the largest share of investing companies (21%) in reputation and branding intangibles category, with this figure being 10 percentage points more than in the other five intangible categories. At the other extreme, in the case of software, nearly 50% of investing companies expect to benefit from it for less than two years (and only 5% expect to benefit from their investment for more than ten years). Branding and software thus appear to be the intangibles to which companies attach the highest and lowest strategic value, respectively. For other intangible assets, the shares of companies reporting the shortest impact (i.e. less than two years) is lower than in the case of software, but increasingly appreciable, in the case of R&D (42%), design (42%), organisation (44%), and training (48%). With respect to these same assets, a benefit of more than ten years is expected by about only 10% of the investing companies.

Figure 7: Useful life of intangible assets (conditional on a positive spending on the particular asset); share of firms (weighted)



In order to identify the factors underlying the variance of the companies' responses about the expected benefits of their intangibles, a PCA of question Q4 (for each of the six intangibles, see Technical Annex I) was run for those companies with at least one positive value for intangible investments; the results are displayed in Table 2.

Of the two components that explain most of the variance,[34] Component 1 can be identified with the "*intangibles' expected life*", as all the variables contribute significantly and positively to it. It should be noticed that, in spite of the impossibility of direct comparisons, the simple descriptive picture provided by the Innobarometer-2013 survey about the timing of expected benefits is only partially confirmed by the scoring coefficients of Table 2. R&D and design - rather than branding and reputation - now contribute more to Component 1, with training also lagging behind in terms of scores. However, the lowest score is now that of software, whose higher rate of obsolescence with respect to the other assets, as suggested in Figure 7, is somewhat further confirmed.

Table 2: Principal Component Analysis of the expected benefits of intangibles

Years of expected benefits (Q4)	**Component 1**	**Component 2**
Training	0.406***	***-0.490******
	(0.000)	(0.000)
Software	0.344***	***0.543*****
	(0.000)	(0.001)
Reputation & brand	0.410***	***-0.194*****
	(0.000)	(0.001)
R&D	0.448***	***0.363*****
	(0.000)	(0.000)
Design	0.439***	***0.265*****
	(0.000)	(0.000)
Organization & business	0.394***	***-0.474*****
	(0.000)	(0.000)
Eigenvalues	2.620***	0.936***
	(0.001)	(0.000)

Note: *Standard errors in parenthesis - *** p<0.01, ** p<0.05, * p<0.1 – Weighted estimation (reported to the universe).*

Component 2 of this further PCA basically replicates the distinction between the two different kinds of intangibles observed in the previous PCA exercise (Section 3.1.1). On the one hand, the useful life of R&D, software, and design contributes positively to Component 2; whereas, on the other hand, that of training, reputation and branding, and organisation or business process improvements contribute negatively to the same component. The relevance of the useful life of separable intangibles in accounting for the variance of the intangibles' expected benefits is an extremely interesting result. Indeed, it confirms that the organisational separability of the intangibles is actually one of the most relevant factors in accounting for their different strategic

[34] In this case, we selected the first two components. Although the eigenvalue of the second one is slightly lower than one, its contribution to the explanation of the total variance is not negligible (15.6%) and provides interesting insights.

role. Among the various classifications that have been provided in the literature, that based on organisational separability should thus be carefully retained in future studies on intangibles.

The overlap between one of their components (Components 2 or 3, respectively), and that of their underlying rationales, provides an opportunity to check for the consistency between the two PCAs that were carried out and for the robustness of the companies' answers to the respective questions. The correlation between their respective set of factors, reported in Table 3, confirms this consistency and suggests that the respondent companies replied coherently about the strategic role of their intangibles.

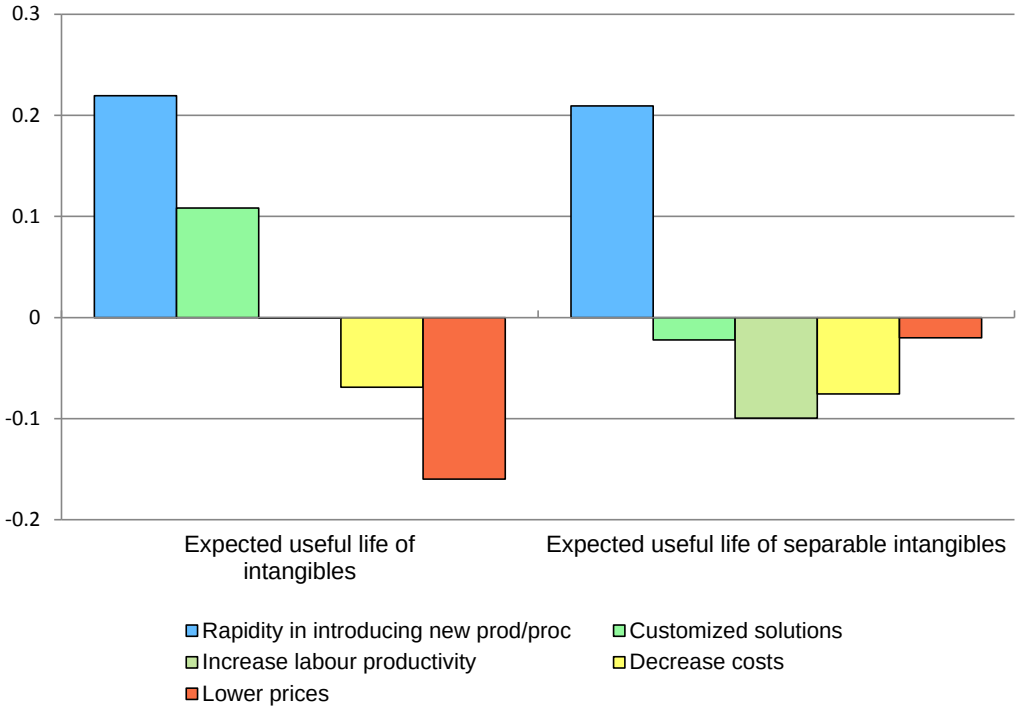
First, the score of the expected useful life of intangibles strongly and positively correlates (0.649) with that of the intensity of intangible investments and, though relatively less (0.205), also with their internal intensity. In other words, companies that expect longer benefits from their intangibles invest more intensively in them and make a more intensive use of internal resources for this. Second, this consistent strategic behaviour with respect to the investments in intangibles is confirmed for the separable ones, i.e. Component 3 of the first PCA and Component 2 of the second are also strongly and positively correlated (0.616).

Table 3: Correlation between the components of the PCAs for intensity of intangible investments (columns) and expected benefits (rows)

	Component 1: Intangible Intensity	Component 2: Internal intangible intensity	Component 3: Separable intangible intensity
Component 1: Expected useful-life of intangibles	***0.6487***	*0.2051*	0.0179
Component 2: Expected useful-life of separable intangibles	0.036	-0.0403	***0.6162***

Similarly to that shown in the previous section, the two components that were identified to explain the variance of the expected benefits deriving from intangibles can be used to address size-, sector- and country-specific effects. Among the possible options to assess, for example, could be to see whether and how companies with different priorities (Q1 in Technical Annex I) score the two components differently. Figure 8 shows this, and also highlights interesting specifications for companies with at least a positive intangible expenditure.

Figure 8: Firm priorities and intangibles' expected benefits (weighted)



Quite interestingly, companies that prioritise a rapid development of new products and services are those with the higher scores for the expected useful life of their intangibles (Component 1), and of their separable ones (Component 2), that is R&D, design and software. Companies that aim for an innovative profile also see their intangibles as longer lasting and contributing to their benefits. Conversely, other business priorities appear to score negatively with respect to the expected useful life of intangibles. In other words, for companies with other business targets, and for those aiming to lower prices and decrease costs in particular, intangibles are not seen as strategic in terms of duration, but are rather conceived as assets whose impact is exhausted in the short term. A special case is represented by companies that prioritise customised solutions for their clients. While the expected useful life of their intangibles is higher than those of the remaining priorities (though still less than rapid development), they share with the latter a higher score for the expected life of non-separable intangibles. In brief, and as expected, organisational-wide assets, such as reputation and branding, are seen as longer lasting in economic terms by companies for which interaction with customers is pivotal.

3.1.3 Intangible assets and accounting reports

Strictly connected to the useful life of the company's intangibles is their reporting in formal accounting practices. In particular, the decision to actually "capitalise" them is an explicit indication of the strategic role that companies attach to their intangibles.

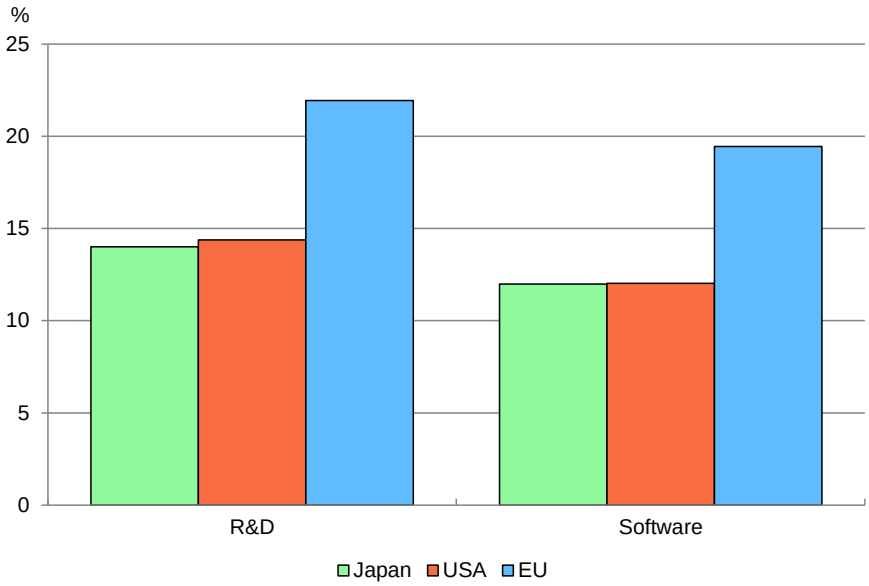
As is well known, the propensity to report intangibles in accounting is largely affected by the financial standards and regulations of the countries in which companies operate. Moreover, software development and acquisition, and R&D are quite different activities in terms of

purposes, implementation, and volume of spending; for example, the use of software is much more common than the implementation of R&D.

On the other hand, the percentage of companies "capitalising" R&D is, according to the Innobarometer-2013 results, higher than for software (Figure 9). This can be explained by considering the conditions under which the respective costs can be capitalised, in the context where the identification of software (either internally developed or provided by external sources) as an "asset" may be less straightforward than for R&D, even though the criteria to allow for capitalisation are more restrictive for the latter.

With respect to both the R&D and software intangibles, important differences emerge, in particular between EU and non-EU countries. In particular, the share of EU companies reporting R&D (23%) is higher than those of the US and Japan, which both show similar shares (about 14%). Differences are even more marked with respect to the propensity of software accounting, for which Europe still shows higher shares compared to the other countries.

Figure 9: Firm reporting intangibles in their balance sheets – by type and country (weighted shares)



In terms of other specificities, some can be seen at the sectoral level (Table 4). Regarding the totals, the shares of reporting companies are not dissimilar between manufacturing and services, or between them and construction and utilities. In all the cases, shares are quite low, ranging from 15.1% to 22.5% of the total of interviewed companies. At first sight, the strategic role that companies attach to their intangibles, as suggested in other questions of the Innobarometer 2013, is only limited confirmed in accounting terms.

Table 4: Share of firms reporting intangibles in their balance sheets – by size and sector

	1-9	10-49	50-249	250+	Total
R&D					
Manufacturing	19.9%	24.2%	34.1%	32.2%	22.5%
Service	16.5%	27.1%	41.0%	54.4%	19.6%
Construction & Utilities	16.5%	19.7%	24.5%	14.2%	17.1%
Software					
Manufacturing	19.7%	23.1%	24.4%	37.4%	21.4%
Service	14.5%	28.2%	41.5%	57.0%	18.1%
Construction & Utilities	13.2%	23.3%	29.8%	18.7%	15.1%

However, the picture changes when we consider size specificities. The shares of companies that report intangibles in general increases progressively from micro to small, through medium and to large ones. Given that accounting requirements typically increase and become more compelling with company size, this could have been expected. More interestingly, such an increase appears more discontinuous in the service sector, in which large companies report both R&D and software in more than 50% of cases. For large companies, belonging to a certain industry seems to make a larger difference in terms of intangibles reporting.

3.2. Intangible assets and innovation

Intangible assets can benefit an investing company in different ways. Not only do they constitute a stock of resources, which enter into the company's production function and allow it to gain static and dynamic returns from their combined use with other production inputs (mainly tangible capital). But they are also and above all knowledge-intensive resources that have been proven in many studies to be the main input of a company's "knowledge production function" and to contribute to its propensity to innovate. R&D was the first kind of intangible asset whose innovation role was identified (Griliches, 1990). But a similar role has been subsequently found also for other intangibles, which are currently regarded as important, though "softer" components of the innovation process (den Hertog et al., 1997).

The role of intangibles as innovation drivers has stimulated a consistent amount of research work and data collection, the most notable example of which is the Community Innovation Survey in Europe. In this research, it is assumed that companies take a different approach to their intangible assets than just building up a stock of assets which provide substantial benefits over an extended temporal horizon (Kim, 2007; Zambon and Marzo, 2007). Instead, intangibles are rather seen as inputs in which companies invest in order to develop and implement their contingent innovation projects, irrespective of their asset value.

Of course, these two approaches are not mutually exclusive, but rather complementary. The innovative use of intangibles typically represents a way for companies to benefit from their returns over time. Still, disentangling the extent to which companies investing in intangibles rely

on one or the other of the two approaches is extremely important for the policy-making purposes. In particular, it would suggest if priority should be given to "contextual" kind of policies - for example, with the aim of making the accountability of capital expenses (or at least some of them) easier - rather than to more "focused" policies - with the aim of making their use more efficient for innovation (for example, by improving the enforcement of intangibles-related property rights).

The previous argument has motivated the final part of the Innobarometer 2013, where companies were surveyed about their innovations and about the contribution their intangible investments made to them. Here, the descriptive statistics given in the synthesis of the Innobarometer (EC, 2013) can be extended through some interesting analysis.

3.2.1 Innovative companies and their intangible intensity

Looking at the innovation profile of the surveyed companies, provides some interesting insights. As a response to question Q9 of the Questionnaire (Technical Annex I), "more than 42% [of them] introduced new or significantly improved products, services or processes, 28% introduced new or significantly improved organisational structures and management methods, while 27% introduced new or significantly improved marketing strategies or distribution methods." (EC, 2013, p.14).

Important additional insight is provided by looking at the extent to which the numerous innovative companies in the sample were also "manifold" innovators, combining innovations in their products/services and processes (ProdProc-Inno), with those in their organisation (Org-Inno) and marketing (Mkt-Inno) methods (Schmidt and Rammer, 2007; Evangelista and Vezzani, 2010). The complementary development of these different types of innovations could actually make the resort to intangibles more important.

Table 5, reporting the conditional probabilities of introducing the three types of innovation types defined in the questionnaire, given the introduction of one of the others, shows that these "multiple-innovators" are actually present. On the one hand, 49.1% of the detected ProdProc-innovators have also introduced a marketing type of innovation, while 47.9% of them have also introduced an organisational one. On the other hand, those companies that introduced a marketing or organisation innovation show a much higher probability of having also introduced a product-process one (71.9% and 70.9%, respectively).

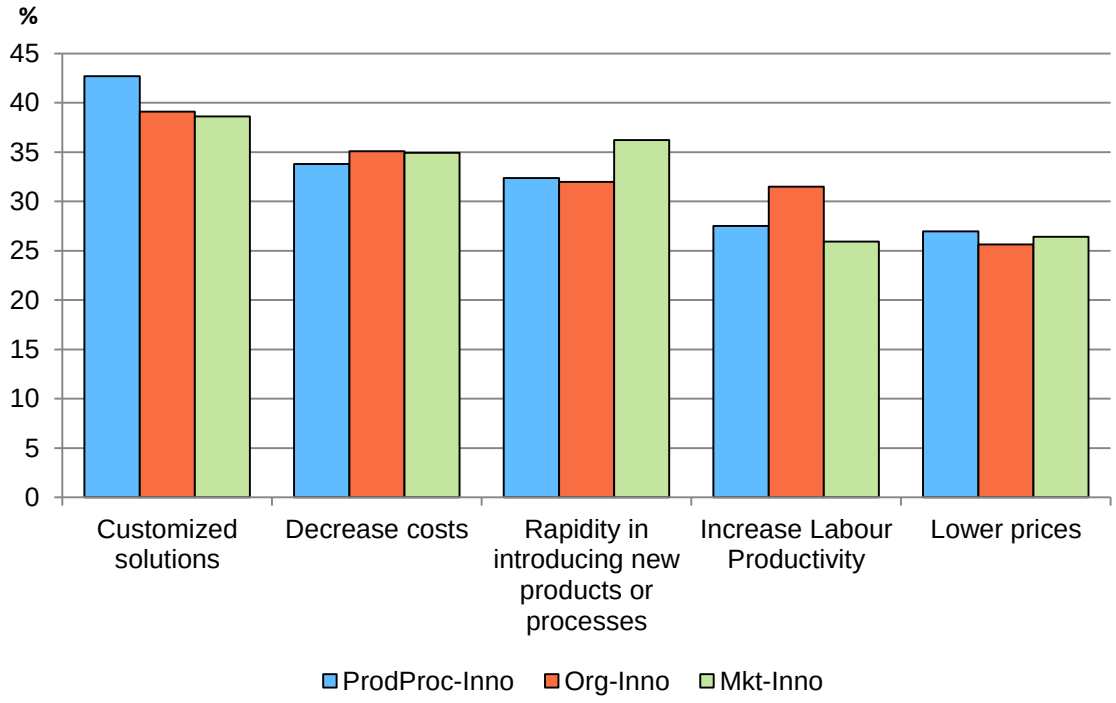
Table 5: Conditional probabilities for the innovation introduced

	Conditional probabilities		
	ProdProc-Inno	Mkt-Inno	Org-Inno
ProdProc-Inno		49.1%	47.9%
Mkt-Inno	71.9%		59.9%
Org-Inno	70.9%	60.2%	

All in all, this evidence suggests further analysis is needed of the role intangibles play in companies that mix different kinds of innovations (on this point, with a focus on financial innovations, see Tufano (1998) and Haskel and Pesole (2011)).

An additional specification about the surveyed innovative companies can be obtained by looking at the priorities they declared at the outset (Q1 in Technical Annex I). As expected, Figure 10 shows that innovative companies mainly recognised themselves as prioritising customised solutions and the rapid development of new products and services. However, interestingly, innovation also seems to be an important leverage for companies aiming to decrease costs. Also interestingly, while the share of ProdProc innovators is the highest (about 40%) for prioritising customised solutions, Mkt-innovators are the most frequent (about 35%) for the rapid development of new products/services, and Org-innovators (about 30%) for enhancing labour productivity.

Figure 10: Share of innovative firms by priority and type of innovation (weighted)

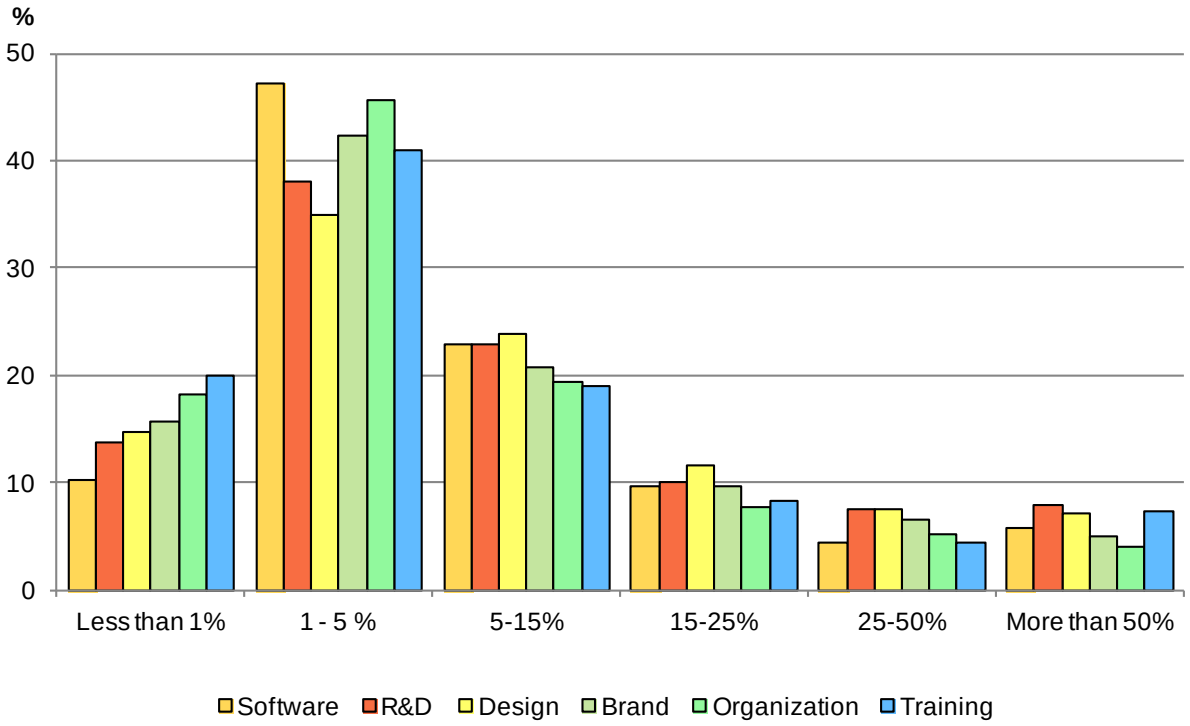


Although the differences are not great, the role of different intangibles for innovators with different business objectives is a research issue that deserves special attention. In this respect, some insights can be obtained by looking at the intensity of intangible investments carried out with internal resources (Q2 in Technical Annex I) by innovators of different kinds.

As Figures 11, 12 and 13 show,[35] the largest shares of the surveyed innovators (roughly between 35% and 45%) invested between 1% and 5% of their turnover in their intangibles, with the second largest shares being those between 5% and 15%, irrespective of the kind of innovation. However, the share of companies investing between 5% and 15% of their turnover is larger for Mkt- and Org-innovators than for ProdProc innovators (Figures 12 and 13), pointing to a possible higher need of intangible resources for marketing and organisational innovations. All in all, whether these turnover shares act as "golden-shares" for intangibles to turn into innovation is an interesting issue to investigate.

Interesting differences also emerge when we look at the investment intensity of different innovators with respect to different intangibles. As expected, the highest share of companies (roughly, between 85% and 90% of the total) with a significant investment intensity (more than 1% of turnover) can relate to, in the case of ProdProc-innovators (Figure 11), software, R&D and design, i.e. the intangibles identified above as separable and strategic ones.

Figure 11: Intangible intensity of ProdProc-innovators by type of asset, conditional on a positive spending on the particular asset (weighted share of firms)



[35] These figures report, in ascending order, the shares of companies that invest in the different intangibles among those that have a negligible internal intangible intensity (lower than 1%). Accordingly, a smaller share of investing companies for a certain intangible in this group corresponds to a larger share for the same intangible in the other groups, with a significant intensity.

Figure 12: Intangible intensity of Mkt-innovators by type of asset, conditional on a positive spending on the particular asset (weighted share of firms)

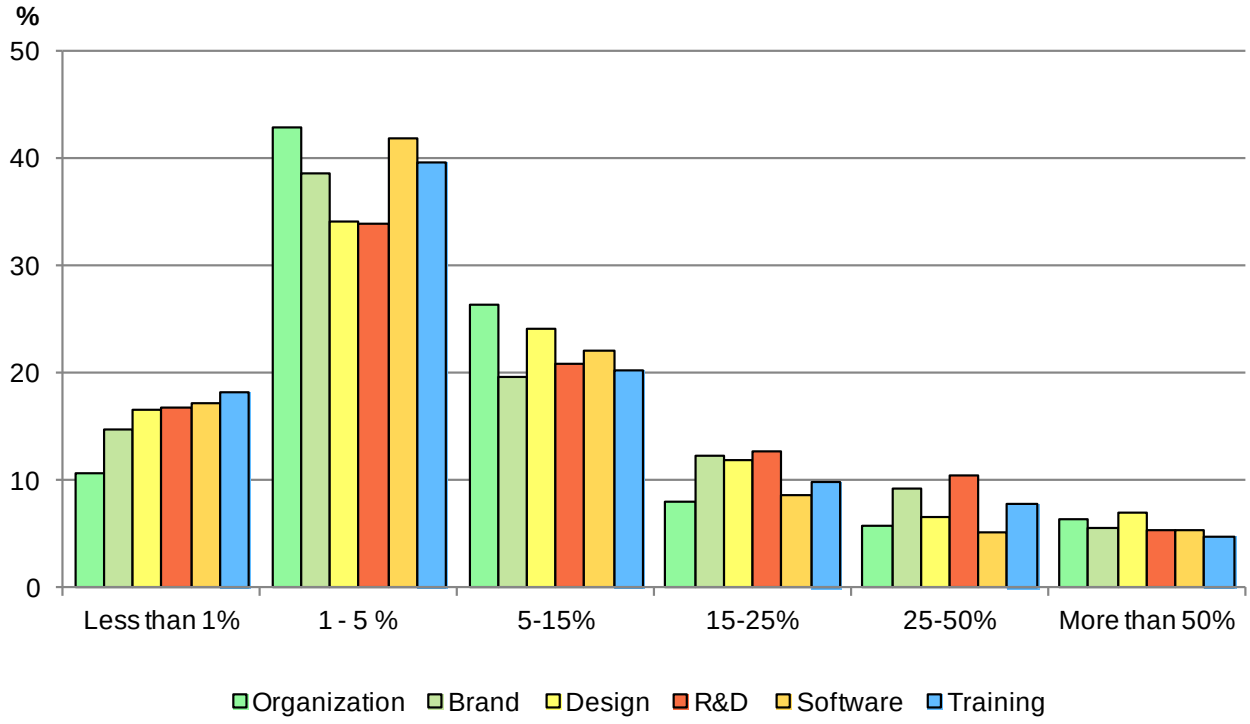
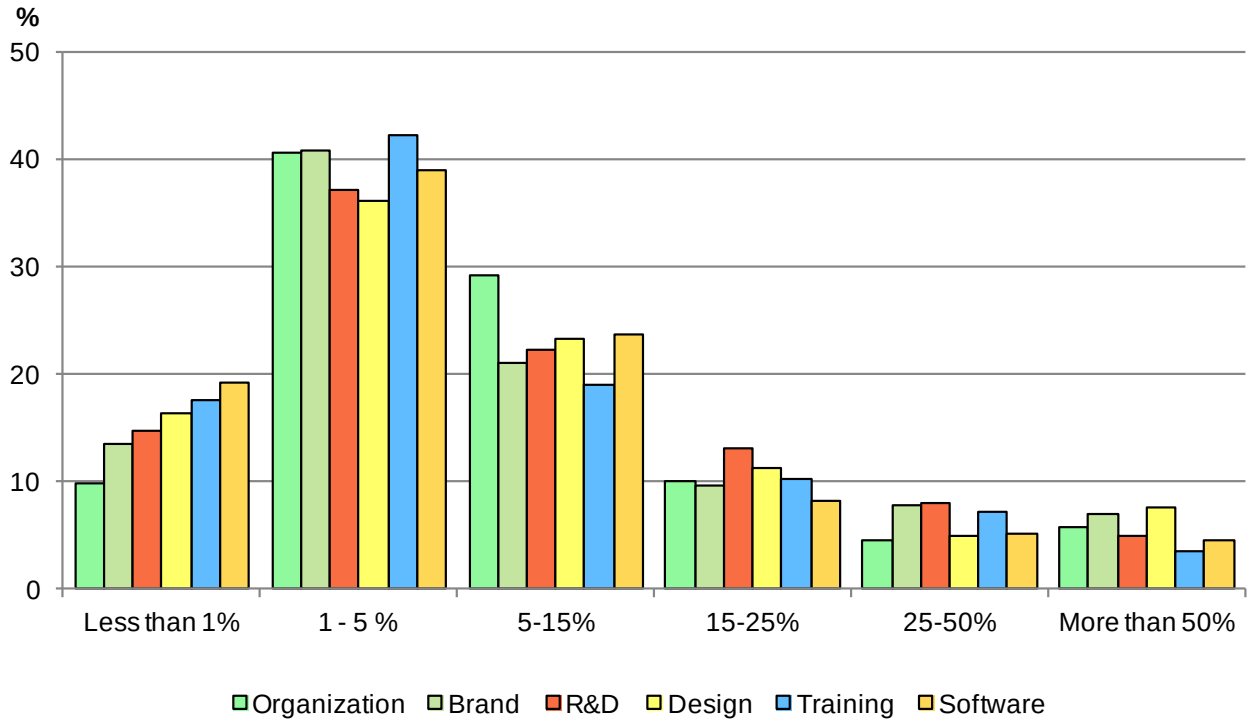


Figure 13: Intangible intensity of Org-innovators by type of asset, conditional on a positive spending on the particular asset (weighted share of firms)



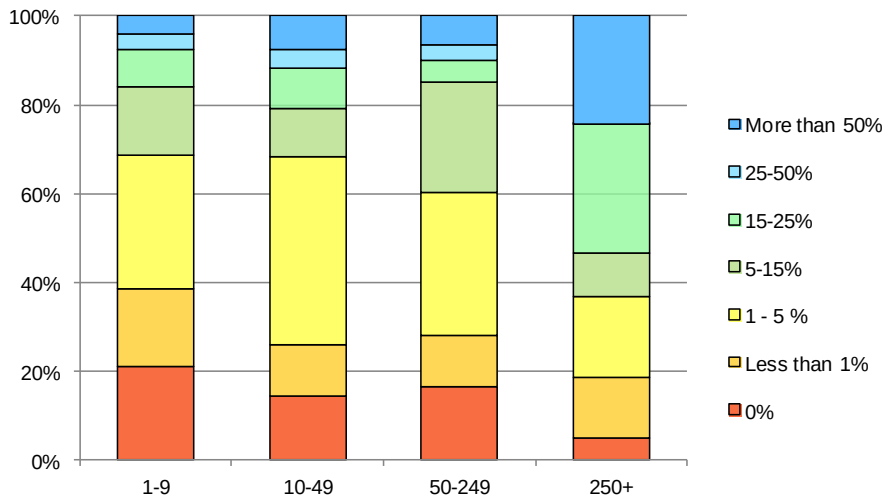
Conversely, though still expectedly, in the case of Mkt-innovators (Figure 12) and Org-innovators (Figure 13), the share of significant investors is the highest for organisation or business process improvements and for reputation and branding, followed by design and R&D, respectively. This further supports the search for a possible mapping between different kinds of innovators and different kinds of intangibles.

3.2.2 Intangibles and company innovation projects

Although somewhat illustrative, the analysis of the previous section is not entirely accurate for investigating the use that companies make of their intangibles for the purpose of innovation. The extent to which the introduced innovations can be actually linked to their intangibles can only be indirectly presumed. A more direct scrutiny of their innovation projects and of the share of intangible investments they dedicated to these projects would be more informative. This is the rationale of question Q10 of the Innobarometer 2013 (Technical Annex I). From the responses, the use of intangibles in innovation projects appears heterogeneous, but in general not very intense. As expected, R&D is the intangible used most in innovation projects, as 5% or more of the relative investments were directly related to innovation projects by 26% of the surveyed companies. At the opposite extreme, training appears the least innovation-related of the intangibles, as the same share (5% or more) of their investments is reached by only 19% of the companies (EC, 2013 p.15).

Before concluding on the low use of intangibles in innovation however, the incidence of size-, sector-, and country-specificities should be carefully considered. As far as R&D is concerned, for example, Figure 14 shows that, while in general the largest shares of the investigated companies (roughly, between 30% and 40%) dedicate only from 1% to 5% of the relative investments to their innovative projects, there is a significant exception for large companies, where nearly a quarter of them devote more than a half of their R&D investments to innovation, while nearly 30% of them have innovative shares of the same investments between 15% and 50%. In brief, R&D is highly used for innovation by large companies, presumably in part due to the presence of formal R&D departments and projects in the surveyed companies.

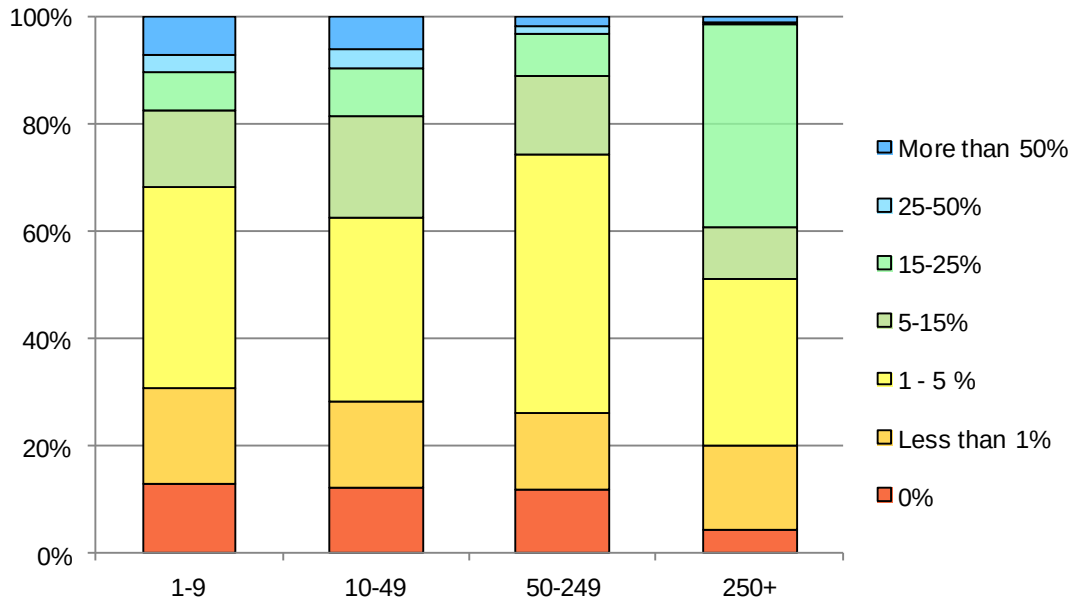
Figure 14: R&D expenditures related to an innovation project by size: share of firms per shares of turnover (weighted)



Conversely, in the case of a non-separable kind of intangibles, such as reputation and branding (Figure 15), a size-effect does not emerge, as even micro-companies benefited substantially from it (more than 50% of their turnover), although in only around 5% of respondents).

Once again, the specific type of intangibles makes a difference in establishing an explicit link between the investment and its direct use in innovation. Furthermore, the size and the sector of the investing companies also matter. While companies' intangibles investments appear "associated" to innovative companies - with different associations for different intangibles (separable and non-separable) and innovations (technological, organisational and marketing) - a direct, input-like connection is detected only in the case of R&D (and for large companies).

Figure 15: Branding expenditures related to an innovation project by size: share of firms per shares of turnover (weighted)



A hypothesis could be put forward to account for this result. In a similar vein to macro growth-accounting exercises – where direct effects are distinguished from indirect ones under Total Factor Productivity (TFP) methodologies - non-R&D intangibles could play a more indirect role for innovation, such as that of increasing a company's absorptive capacity.

3.3 Intangibles between context conditions and business incentives

In addition to the two core issues that we addressed above, the Innobarometer 2013 also deals with the drivers and the obstacles of companies' intangible investments, and with their impact on the companies' economic performance.

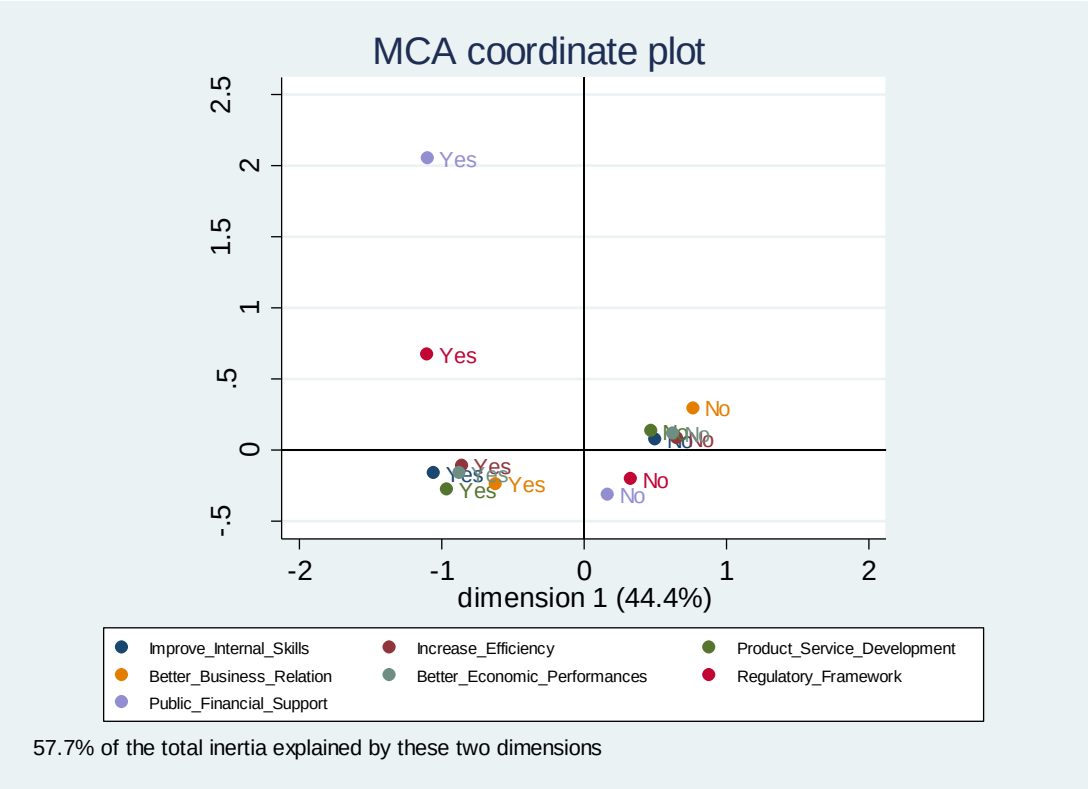
In both respects, the synthetic report (EC, 2013) provides interesting insights that are worth further investigation, according to the issues discussed in the following sections.

3.3.1 The economic (and non-economic) drivers of intangibles

As far as the drivers of intangibles are concerned (Q6 in Technical Annex I), economic motivations, that is related to the business sphere, according to the synthesis report appear to be more pervasive than those related to the institutional set-up. For example, the search for better relationships with business partners (55%) and for higher efficiency of the business processes (43%) were selected by more than twice as many companies than those who referred to their industry's regulatory framework (23%) or to the receipt of public support (13%) (EC, 2013, p.11).

To investigate this further a Multiple Correspondence Analysis (MCA) was ran on the responses to the seven motivations for investing in intangibles, presented to surveyed companies in the questionnaire in a non-mutually exclusive fashion. The results of this MCA are shown in Figure 16.

Figure 16: Multiple correspondence analysis of the firms' motivations for investing in intangibles



In the MCA, the first dimension (Dimension 1, i.e. along the horizontal axis) simply distinguishes between those companies that have not recognised the seven proposed motivations as relevant, from those which have. More interesting is the second dimension (Dimension 2, i.e. along the vertical axis), which allows us to observe how the answers clusters among them, by taking into account the possibility of multiple responses. Interestingly, this dimension distinguishes between companies that have invested in intangibles for institutional reasons and

declared economic ones as not important (the zone with positive-values), and those to which the opposite holds true, i.e. that have relevant economic motivations and not relevant institutional ones (the zone with negative-values). The possibility that the two kinds of motivations were actually perceived as mutually exclusive by the surveyed companies is an interesting hypothesis to investigate. In particular, also for the purpose of policy intervention, it becomes interesting to identify what are the distinguishing features of the companies driven by economic motivations and of those which are instead sensitive to institutional conditions.

Further insights emerge by looking at the relative distance among the responses' specifications (i.e. the Yes and No points) that the MCA identifies. From this analysis, a group of companies appears to emerge that could be highly influenced by the provision of public financial support in order to encourage investment in intangibles. These companies expressed few other complementary motivations, so a policy intervention would be decisive to encourage them to dedicate resources to intangible assets; indeed, in its absence, they might not actually do it. A similar consideration holds true for the companies that pointed to the role of the regulatory framework of their industry. On the other side, it is worth noting the group of companies that, with little or no relevance for institutional motivations, selected the whole chunk of economic motivations as relevant for their investing in intangibles. For this group, intangibles appear highly functional to their business, and hence inherently strategic, so that a policy intervention is less critical. Once again, research on the structural features of these different groups of companies can be highly revealing.

In this last respect, Table 6 reports the average scores of Dimension 2 from the MCA performed on the motivations and obstacles for investing in intangibles, across companies of different size-classes and macro-sectors. From the table, it can be seen that SMEs invested in intangibles mainly for institutional reasons, whereas micro and large-companies decisions to invest in intangibles were mainly driven by economic motivations. Looking for sectoral specificities, it can be seen that service companies are more consistently driven by economic motivations, whereas manufacturing companies, and those operating in construction and utilities, show a higher propensity to invest in intangibles deriving from institutional motivations.

Table 6: Average scores of Dimension 2 of the MCA on motivations (Fig. 16) and obstacles (Fig. 17) by size and sector

	1-9	**10-49**	**50-249**	**250+**	***Average by Industry***
Motivations					
Manufacturing	0.0374	0.0469	0.0813	-0.0042	*0.0422*
Service	-0.0302	-0.0105	0.2015	0.0314	*-0.0174*
Construction & Utilities	0.0646	0.1075	0.0282	-0.1476	*0.0651*
Average by size	*-0.0109*	*0.0138*	*0.1590*	*0.0057*	
Obstacles					
Manufacturing	0.0332	0.0281	0.0424	-0.0113	0.0314
Service	0.0092	-0.0386	-0.0167	-0.0647	0.0000
Construction & Utilities	-0.0159	-0.0522	0.0077	0.0557	-0.0186
Average by size	*0.0071*	*-0.0310*	*-0.0028*	*-0.0439*	

Further insights can be obtained by looking at the differences across different types of motivations. Some simple cross-tabulations can be illustrative in this last respect. For example, by comparing the relevance by size of an institutional motivation – such as public financial support – and of an economic one – such as greater efficiency of an internal business process – we can observe that the latter is much more size-dependent than the former (Table 7). The share of large companies that pointed to efficiency issues for their intangible investments is 6.1 percentage points greater than that of the medium-sized companies, which is in turn 6.3 percentage points greater than that of small companies, and 16.5 percentage points greater than that of micro-companies. In the case of a public intervention, although still increasing with size, its relevance for investing in intangibles is more uniformly distributed; the correspondent increases are 0.7, 2, and 6 percentage points, respectively. In brief, it seems that size considerations are more useful for detecting economically driven intangible investors than institutionally driven ones.

Table 7: Intangible drivers by firm size (shares of firms)

	Employees				
	1-9	**10-49**	**50-249**	**250+**	**Total**
Public financial support					
No	87.1%	83.1%	81.1%	80.4%	84.2%
Yes	12.9%	16.9%	18.9%	19.6%	15.8%
Greater efficiency of internal business process					
No	61.1%	50.9%	44.6%	38.5%	52.9%
Yes	38.9%	49.1%	55.4%	61.5%	47.1%

As far as the sectoral disaggregation is concerned, operating in manufacturing, rather than in another macroeconomic sector, does not seem to largely affect a company's determinants for investing in intangibles. However, an interesting pattern seems to emerge with respect to size, when we look at the relevance of institutional and economic motivations by sector. Indeed, a motivation of the former group, like the presence of a regulatory framework, is here more sector dependent than that of the latter group, such as, for example, an improvement of internal skills (Table 8). A similar picture emerges when public financial support and greater efficiency of internal business processes are compared. Although expected, this is another interesting result, which suggests that the motivations for investing in intangibles that pertain to the business sphere are not dissimilarly relevant in different sectors, in spite of their idiosyncratic techno-economic features.

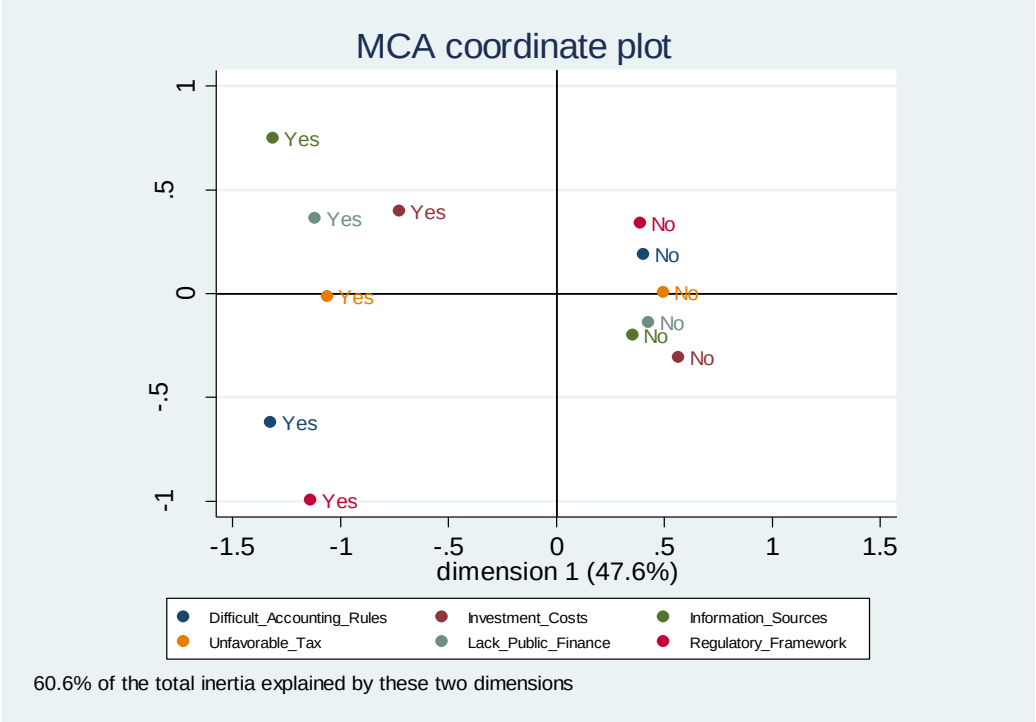
Table 8: Intangible drivers by macro-sector (shares of firms)

	Macrosector			
	Manufacturing	**Services**	**Construction & Utilities**	**Total**
Regulatory framework of your industry				
No	76.2%	77.7%	71.9%	76.3%
Yes	23.8%	22.3%	28.1%	23.7%
Improvement of internal skills on intangible assets				
No	65.0%	64.8%	64.7%	64.8%
Yes	35.0%	35.2%	35.3%	35.2%

As discussed above, the analysis of the intangibles' drivers appears promising for detecting potential areas for policy intervention. Further implications of this can be obtained by looking at the factors that companies perceive as obstacles to their relative investments (Q7 in Technical Annex I). As the Innobarometer synthesis reveals, these are mainly represented by the costs associated with the investments in intangibles (45%), and by the limited availability of monetary resources for supporting them, that is: limited public financial support (35%) and unfavourable tax treatment of intangible assets (33%) (EC, 2013, p.12).

Performing a MCA of the six factors that companies were presented with as possible obstacles, still in a non-mutually exclusive way, can help elicit further insights on their incidence (Figure 17).

Figure 17: Multiple correspondence analysis of the firms' obstacles to investing in intangibles



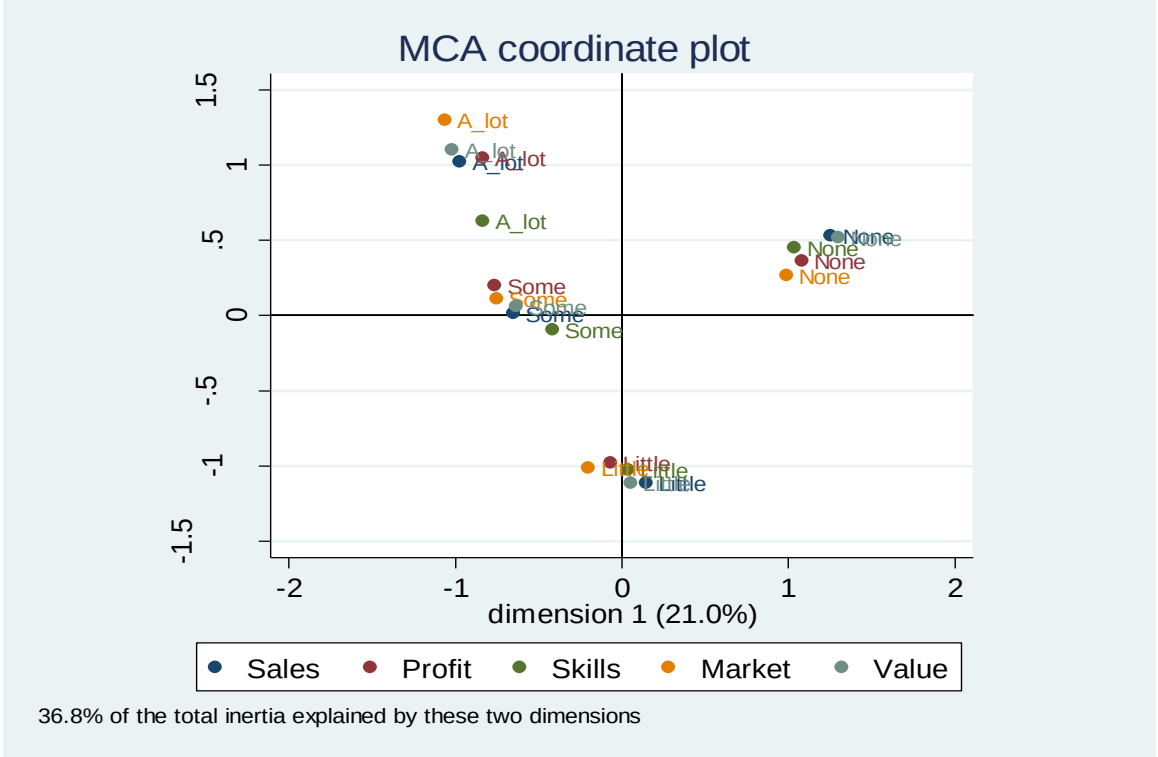
As in the previous case, Dimension 1 simply helps in splitting the respondent companies into those who did and those who did not recognise the proposed items as obstacles. Dimension 2 instead, seems to divide the companies into those pointing out the relevance of a monetary kind of barriers (i.e. costs, tax, and public finance) and those concerned with the relevance of non-monetary ones (i.e. regulatory, accounting, and information barriers). Possibly, more than for determinants, the characterisation of these two groups of companies appears of upmost importance for policy purposes.

Looking at the distance between the responses' specifications (that is the Yes and No points), it seems that limited public financial support is reported as an obstacle, along with the non-monetary obstacles. More evidently, a group of companies emerges for which regulatory and accounting barriers are combined factors in hampering their investments, and this group is isolated from the others. For these companies, whose characteristics are also worth further investigation, the policy actions that are most discussed in the current literature are, thus, particularly relevant. Looking at Table 6, companies who perceive regulatory and accounting barriers as the main obstacles operate mainly in the construction and utilities sectors. Monetary barriers are perceived as particularly important in the manufacturing sector. Finally, micro-companies and SMEs operating in the manufacturing sector, report monetary obstacles as the most important binding factors.

3.3.2 The economic impact of intangibles

An additional piece of information collected through the Innobarometer 2013 concerns the benefits perceived by the surveyed companies as an effect of their previous intangible investments. Before commenting on the relative results, a short methodological disclaimer is needed. On the one hand, it should be pointed out that, in business surveys, any answer to questions on "effects/impacts/benefits" of previously undertaken actions (unless linked to some quantitative evidence) may be strongly affected by respondents' biased perceptions (often influenced by external or more recent factors). On the other hand, it may be extremely difficult to make a distinction between a number of "perceived benefits" which share the same economic nature, as respondents usually consider all of them equally relevant. These caveats are fully applicable to the Innobarometer-2013 results; all the potential benefits the survey asked about were seen by respondents as highly correlated (i.e. benefits on "sales", "profit margin", "market share", or "value of the company") except for the improvement of skills, which was identified as a specific advantage of investing in intangibles (actually, the most relevant one).

Figure 18: Multiple correspondence analysis of the firms' expected benefits from investing in intangibles



Also in this case, a MCA analysis on the companies' expected benefits provides interesting insights. The two identified dimensions (Figure 18) discriminate between companies which do, and do not, expect (or report) particular benefits from their intangible investments (Dimension 1, along the horizontal axis), and companies which perceive intangible investments as playing an important, rather than marginal, role in contributing to the company's performance (Dimension 2, along the vertical axis). The higher the score, the more important intangibles are perceived.

In Table 9, the average scores of Dimension 2 of the MCA on benefits by industry and size are compared. As expected, the economic impact of intangibles scores higher for large companies – that presumably take a longer-term perspective in managing their assets – compared to small and medium-sized companies, that may be mainly concerned with the short-term effects of their intangible activities.

Table 9: Average scores of Dimension 2 of the MCA on types of benefits - by size and sector

	1-9	**10-49**	**50-249**	**250+**	***Industry***
Manufacturing	-0.0907	-0.0187	-0.1114	0.1294	*-0.0684*
Service	-0.0002	0.0018	0.0625	0.3493	*0.0104*
Construction & Utilities	-0.1292	0.1304	-0.1390	-0.5184	*-0.1026*
Size	*-0.0262*	*0.0165*	*0.0071*	*0.2163*	

This is particularly true for companies operating in services, who are the only ones that score positively for this component overall. Furthermore, in services the economic impact of intangibles appear positive (in terms of scores) across all company sizes, whereas in

manufacturing it is positive only in large companies. This would seem to suggest that intangibles could actually provide an economic premium in sectors where knowledge intensity has a higher relevance.

4. Conclusions and policy implications

In closing this technical report we can conclude that, from a first exploration, the data collected through the 2013 Innobarometer survey appear suitable to address a number of research questions on the analysis of intangibles. Although the flash nature of the survey (e.g. a limited number of questions, and mostly of a qualitative nature) constrains the array of aspects that can be investigated, it has the advantage of being based on a "pool of opinions of businesses", offering significant opportunities for systematic comparisons and analyses. In brief, by looking at how companies "perceive" their intangibles, and not only at how much they invest in them, the analysis of the subject can be substantially enriched.

The exercises we have carried out in this report provide interesting results for re-assessing the ongoing debate on intangibles and contributing to its open issues.

The wide geographical spread of respondents has enabled us to extend the set of measurements collected through country-specific surveys, which have been so far dominant with respect to systematic cross-country work at the EU and/or international level. With respect to the last release of the *UK Survey of Investment in Intangible Assets* (Field and Franklin, 2012), for example, the Innobarometer 2013 provides results that, although only indirectly comparable, can nevertheless offer a useful, complementary point of view. A short description of consistencies/inconsistencies between the two surveys may be interesting before presenting the key findings of the Innobarometer.

The key role of a company's internal intangible assets, which clearly emerges from the Innobarometer 2013, is consistent with the higher volume of expenditures that UK companies invest in-house rather than purchase externally (with evidence also emerging for each and every one of the six intangible assets under consideration) (Figure 5, ibid.).

Indirect elements of consistency also emerge in terms of expected useful-life. Differences between the questions' layout in the two surveys do not allow us to argue (nor to exclude either) that, as in the UK, all of the intangibles assets are expected to be used for more than one year. However, for every asset category, nearly half of the Innobarometer companies envisage benefits will be enjoyed for more than two years. Also worth highlighting, is the relatively high consistency between the UK intangibles' ranking in terms of useful lives and the ranking of the shares of Innobarometer companies reporting average useful lives of between two and five years (very close to the results of the UK survey). The actual breakdown in shares is: 37% for R&D, 34% for software and training, as well as for organisation and economic business processes, 33% for reputation and branding, 32% for design, and 31% for training.

Of course, it cannot be neglected that significant discrepancies also exist between the UK IIA survey and the Innobarometer-2013 results.[36] However, this could stimulate further work to define a common methodological platform, which could then be used as a reference for future general surveys on intangibles.

By focusing on the Innobarometer 2013, the analysis of its results can enrich the ongoing debate on intangibles, in particular, with respect to the relationship between the macroeconomic studies of a growth-accounting nature and the microeconomics studies based on business accounting. The Innobarometer's findings reinforce a capability-based view of intangibles and confirm the key role that "internally produced and managed" resources can play in turning intangible assets into a source of competitive advantage. The **internal intangible intensity** turns out to be pivotal for SMEs, irrespective of their economic activity. A higher level of internal investments can also be found in companies prioritising the development of new products/services and customised solutions for their clients. More broadly, it significantly correlates with the expected useful life of intangibles assets (i.e. the higher the internal intangible intensity, the longer the assets' useful lives). Finally, the EU-28 lags behind the US on internal intangible intensity, adding evidence of the well-known transatlantic gap.

This evidence has important policy and research implications, on which future analyses should concentrate (Ciriaci and Hervas, 2012). In terms of policy, stimulating companies to invest more in internal intangibles resources - for example, by providing them with dedicated fiscal incentives – could be more effective than enabling their interactions with external providers. Furthermore, policies targeted at increasing the internal intangible intensity of European companies could help address the aforementioned gap with US competitors and, possibly, even the correspondent transatlantic productivity gap.

On another level – though still relevant in policy terms – the results on the internal intangible intensity highlight the urgent need to address the underestimation issues that entail with accounting measurements of in-house developed intangibles. It would be highly desirable for international accounting standards to develop or evolve towards a harmonised approach to the capitalisation of intangibles, which helps, rather than preventing, companies exploit their intangible assets.

Finally, as far as both research and policy implications are concerned, the treatment of intangibles in macroeconomic studies (and also their use in the National Accounts framework) needs to achieve higher levels of transparency and accountability. This process could be driven, over the coming years, by the availability of data from an increasing number of surveys and administrative micro-data on intangibles.

Important implications can also be drawn from the "dichotomy" emerging in the Innobarometer between **organisationally separable** intangibles – that is, R&D, design and software – and **non-separable** intangibles, namely training, reputation and brand, and organisation or business process improvements. With respect to both kinds of intangibles, investments are more intense,

[36] A relevant one, whose explanation should be searched in the different methodologies of the two surveys, concerns the substantially higher percentages of companies investing in intangibles according to the Innobarometer than in the UK case, irrespectively from the concerned kind of intangibles.

when their expected useful life is higher. On the other hand, the intensity of the "separable" intangibles could be adopted as an effective criterion to identify companies with a technological base rooted in manufacturing, and to distinguish them from "service companies", more oriented to invest in "non-separable" intangibles assets. Similarly, "separable intangibles" feature differently in innovation-targeting companies (higher intensity) than in companies with alternative (e.g. cost-based) priorities (lower intensity). Furthermore, companies innovating in products/services and processes appear to be more concerned with the effectiveness of R&D and software activities, than those companies who have only introduced organisational and/or marketing innovations.

As the distinction between organizationally separable and inseparable intangibles has emerged endogenously from the companies' perception, it requires further and careful consideration in both the policy and research realms. In the former case, policymakers should consider that incentives to R&D and software investments could reinforce companies' own orientation towards product/process innovation; while, although more difficult to be implemented, supporting companies' investments in intangibles of an organisational nature (e.g. economic business processes) can be pivotal for their non-technological innovations. In terms of research, the exclusive attention that business accounting practices dedicate to separable intangibles could be the source of a number of biases against those cases in which inseparable intangibles count more; for example, in the case of companies providing services (or of those targeting priorities other than innovation).

A final group of implications arise from the results on the **use of intangibles in the framework of innovation projects**. As expected, given its most traceable nature of innovation input, out of all the intangibles activities taken into consideration in the survey, only for R&D did we find remarkable shares of investments in innovation projects. The overwhelming role of R&D in innovation, amongst other intangibles, was confirmed, especially with respect to innovations in products/services and processes. On the other hand, there are areas of innovation – such as those with a lower technological intensity - where R&D is not such a direct innovation input. From a policy point of view, these results– in addition to what has been already discussed – suggest that support for innovation projects could be largely translated into either direct or indirect support to R&D. This is nothing new. But what the Innobarometer has made clear is that this pattern is confirmed only for large (mostly manufacturing) enterprises.

The division of questions on intangibles from those on innovation has allowed an assessment of the actual contribution of the former to the latter. At the outset, no more than 5%, on average, of intangible-related expenses by companies are to undertake innovation projects. Furthermore, only 20% to 25% of the companies investing in intangibles are concerned about the use of their intangible "knowledge-base" for innovation purposes. This evidence suggests that increasing companies' capabilities to master and/or absorb the knowledge outcomes of their intangible activities could be made a specific policy target. This is particularly true if we follow the recent view, according to which companies invest in their ability to "capture" and "managing" knowledge as much as they do so in pursuing specific improvements of their output or of their internal organisation. In this last respect, specific measurements to support innovation in an

"open" perspective should be developed.[37] The implications of such a "change of paradigm", both in business management and economic policy, are far too vast to be discussed here. However, it is clear that the Innobarometer-2013 can contribute to a look at the relationship between intangibles and innovation, as well as to the nature of business innovation itself, especially in a broader context of knowledge creation and diffusion.

[37] Over the last ten years, Henry Chesbrough and other scholars have produced a number of books and articles to develop the concept of "open innovation" (see Chesbrough, 2006), which emphasises the role of the interaction between companies' internal and external technology bases (with the associated in-flows and out-flows of knowledge) in the business processes and, most important, in improving productivity and competitiveness. Examples of companies adapting their innovation strategies to incorporate the principles of "open innovation" are already widespread (Enkel, Gassmann and Chesbrough, 2010).

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Technical annex

Questionnaire

Socio-economic questions

Let me start with a few basic questions about your company. For all questions, please limit your responses to your company's activities IN [YOUR COUNTRY] only.

D1 **Is your company part of a group?**
(READ OUT – ONE ANSWER ONLY)

Yes	1
No	2
DK/NA	3

D2 **In which country is the head office of your group located?**
(READ OUT – WRITE THE ANSWER)

	1
DK/NA	2

If your company is part of a group, please answer the remaining questions only for your company in (OUR COUNTRY). Do not include results for subsidiaries or parent companies outside of (OUR COUNTRY).

D3 **How many employees (full-time equivalent) does your company currently have?**
(READ OUT – ONE ANSWER ONLY)

1 – 9	1
10 - 49	2
50 - 249	3
250 or more	4
DK/NA	5

IF D3=5 THEN STOP INTERVIEW

D4 **When was your company established?**
(READ OUT – ONE ANSWER ONLY)

Before 1 January 2007	1
Between 1 January 2007 and 1 January 2012	2
After 1 January 2012	3
DK/NA	4

D5 **What was the turnover of your company in 2011?**
(WRITE DOWN THE ANSWER and RECORD THE INFORMATION – IF "DK/NA" CODE 9)

__ __ __ __ __ __ __ __ __ __ __ __

Refuse/DK/NA	9
Less than 100 000 euros	1
From 100 000 to 500 000 euros	2
More than 500 000 to 2 million euro	3
More than 2 to 10 million euro	4
More than 10 to 50 million euro	5
More than 50 million euro	6
DK/NA	8

IF D5=9 'DK' THEN STOP INTERVIEW

D6 **Compared to 2010, did your company's turnover in 2011…?**
(READ OUT – ONE ANSWER ONLY)

Rise by more than 25%	1
Rise by 5 – 25%	2
Remain approximately the same	3
Fall by 5 – 25%	4
Fall by over 25%	5
DK/NA	9

D7 **Has your company been taken over, merged with another company or sold off any part of the business since 1 January 2011?**
(READ OUT – MULTIPLE ANSWERS POSSIBLE)

The company has been taken over or has merged with another company	1
The company has sold off a part of the business	2
Neither of these	3
DK/NA	9

D8 **Approximately what percentage of your company's turnover in 2011 came from sales in each of the following markets?**
(READ OUT - WRITE THE ANSWERS IN PERCENTAGES)

Locally, in the area or region where your company is located	%
In your own country outside the area or region where your company is located	%
In other EU countries, or in Switzerland, Norway, Iceland, Liechtenstein	%
In other countries outside the EU	%
DK/NA	999

Section: Investment in intangible assets

Q1 **Thinking about the priorities for your company, please tell me which two of the following are the most important?**
(ROTATE - READ OUT –MAX 2 ANSWERS POSSIBLE)

Rapid development of new products or services	1
Tailored, customised solutions	2
Ensuring lower prices	3
Increasing labour productivity	4
Decreasing the production costs	5
Other (SPONTANEOUS)	6
DK/NA	7

Q2 **In 2011, what percentage of its total turnover did your company invest in the following activities using internal resources (i.e. relying solely on internal resources and capacities)?**
(ONE ANSWER PER LINE)

	READ OUT - ROTATE	0%	Less than 1%	1 - 5 %	More than 5-15%	More than 15-25%	More than 25-50%	More than 50%	DK
1	Training	1	2	3	4	5	6	7	8
2	Software development, excluding research and development (R&D) and web design	1	2	3	4	5	6	7	8
3	Company reputation and branding	1	2	3	4	5	6	7	8
4	Research and development (R&D)	1	2	3	4	5	6	7	8
5	Design of products and services (excluding research and development (R&D))	1	2	3	4	5	6	7	8
6	Organization or business process improvements	1	2	3	4	5	6	7	8

Q3 **In 2011, what percentage of its total turnover did your company invest in the following activities using an external provider for which the company paid (i.e. relying solely on external resources and capacities)?**
(ONE ANSWER PER LINE)

	READ OUT - ROTATE	0%	Less than 1%	1 - 5 %	More than 5-15%	More than 15-25%	More than 25-50%	More than 50%	DK
1	Training	1	2	3	4	5	6	7	8
2	Software development, excluding research and development (R&D) and web design	1	2	3	4	5	6	7	8
3	Company reputation and branding	1	2	3	4	5	6	7	8
4	Research and development (R&D)	1	2	3	4	5	6	7	8
5	Design of products and services (excluding research and development (R&D))	1	2	3	4	5	6	7	8
6	Organization or business process improvements	1	2	3	4	5	6	7	8

ASK Q4.1 IF CODES 2TO 6 IN Q2.1 OR Q3.1

ASK Q4.2 IF CODES 2TO 6 IN Q2.2 OR Q3.2

ASK Q4.3 IF CODES 2TO 6 IN Q2.3 OR Q3.3

ASK Q4.4 IF CODES 2TO 6 IN Q2.4 OR Q3.4

ASK Q4.5 IF CODES 2TO 6 IN Q2.5 OR Q3.5

ASK Q4.6 IF CODES 2TO 6 IN Q2.6 OR Q3.6

GO TO Q9 IF ALL CODES ARE 1, '0%' IN ALL Q2.1 TO Q2.6 AND Q3.1 TO Q3.6

Q4 **On average, for how long does your company expect to benefit from its investments in the following activities?**
(ONE ANSWER PER LINE)

	READ OUT - ROTATE	Less than 2 years	2-5 years	6-10 years	More than 10 years	DK
1	Training	1	2	3	4	5
2	Software development, excluding research and development (R&D) and web design	1	2	3	4	5
3	Company reputation and branding	1	2	3	4	5
4	Research and development (R&D)	1	2	3	4	5
5	Design of products and services (excluding research and development (R&D))	1	2	3	4	5
6	Organization or business process improvements	1	2	3	4	5

Intangible assets are non-financial, non-physical assets. They are created over time and through investment, and are identifiable as separate assets. They may add value to the company. Examples of intangible assets include training, software development, reputation and branding, research and development, the design of products and services or business process improvements.

Q5 **Have the following investments been reported as "intangible assets" in your company's 2011 balance sheet?**
(READ OUT – ONE ANSWER ONLY)
(ONE ANSWER PER LINE)

	READ OUT - ROTATE	Yes	No	Not applicable (SPONTANEOUS)	DK
1	Research and development (R&D)	1	2	3	4
2	Software development	1	2	3	4
3	Other (training, design, reputation and branding, organization or business process improvements)	1	2	3	4

Section: Reasons for investing in intangible assets

Q6 **Did any of the following motivate you to invest in the intangible assets mentioned previously?**
(ROTATE - READ OUT – MULTIPLE ANSWERS POSSIBLE)

Improvement of internal skills on the intangible assets	1
More rapid development of new company services or products	2
Better economic returns or larger market shares	3
Better relationships with customers and business partners	4
Greater efficiency of internal business process	5
Public financial support (grants, loans and support for recruiting new staff etc.) for intangible assets	6
Regulatory framework of your industry (environmental regulations, technical standards)	7
DK/NA	8

Q7 **Did any of the following, if any, discourage you from investing in the intangible assets mentioned previously?**
(ROTATE - READ OUT – MULTIPLE ANSWERS POSSIBLE)

Accounting rules for reporting capital expenditure are difficult to understand	1
High costs of the investment	2
Limited external sources of information or expertise	3
Unfavourable tax treatment of intangible assets	4
Limited public financial support (grants, loans, support for recruiting new staff etc.) for intangible assets	5
Regulatory framework of your industry is difficult to understand (environmental regulations, technical standards)	6
DK/NA	7

Section: impact of investments in intangible assets

Q8 **Has the previous investment in intangible assets benefited your company in terms of?**
(ONE ANSWER PER LINE)

	READ OUT - ROTATE	A lot	Some	Little	None	DK/NA
1	Sales	1	2	3	4	5
2	Profit margin	1	2	3	4	5
3	Skills and qualifications of employees	1	2	3	4	5
4	Market share	1	2	3	4	5
5	Overall value of the company	1	2	3	4	5

ASK ALL

Q9 **Between 2009 and 2011, did your company introduce any innovations, such as …?**
(ONE ANSWER PER LINE)

	READ OUT - ROTATE	Yes	No	DK/NA
1	New or significantly improved products, services or processes	1	2	3
2	New or significantly improved marketing strategies and distribution methods	1	2	3
3	New or significantly improved organisational structures and management methods	1	2	3

ASK Q10.1 IF CODES 2TO 6 IN Q2.1 OR Q3.1 AND CODE 1 IN Q9.1 OR Q9.2

ASK Q10.2 IF CODES 2TO 6 IN Q2.2 OR Q3.2 AND CODE 1 IN Q9.1 OR Q9.2

ASK Q10.3 IF CODES 2TO 6 IN Q2.3 OR Q3.3 AND CODE 1 IN Q9.1 OR Q9.2

ASK Q10.4 IF CODES 2TO 6 IN Q2.4 OR Q3.4 AND CODE 1 IN Q9.1 OR Q9.2

ASK Q10.5 IF CODES 2TO 6 IN Q2.5 OR Q3.5 AND CODE 1 IN Q9.1 OR Q9.2

ASK Q10.6 IF CODES 2TO 6 IN Q2.6 OR Q3.6 AND CODE 1 IN Q9.1 OR Q9.2

Q10 **On average what proportion of the investments you made between 2009 and 2011 in each of the following intangible assets related to innovation projects?**
(READ OUT - WRITE THE ANSWERS IN PERCENTAGES)
(INT: IF RESPONDENTS ASKS WHAT ARE INNOVATION PROJECTS: '**A project whose expected outcome is a new or significantly improved product, service, process, marketing strategy or distribution, organizational or management method')**

	READ OUT - ROTATE	0%	Less than 1%	1 - 5 %	More than 5-15%	More than 15-25%	More than 25-50%	More than 50%	DK
1	Training	1	2	3	4	5	6	7	8
2	Software development excluding research and development (R&D) and web design	1	2	3	4	5	6	7	8
3	Company reputation and branding	1	2	3	4	5	6	7	8
4	Research and development (R&D)	1	2	3	4	5	6	7	8
5	Design of products and services (excluding research and development (R&D))	1	2	3	4	5	6	7	8
6	Organization or business process improvements	1	2	3	4	5	6	7	8

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Abstract

This report provides a statistical analysis of the way European companies perceive their **Intangible Assets** according to the recent **Innobarometer-2013** survey. The report complements the evidence presented in the Flash Eurobarometer, *Investing in Intangibles: Economic Assets and Innovation Drivers for Growth* (No 369), and presents the results from a deeper investigation of both the characteristics of the available micro-data in the Flash Eurobarometer and the regularities emerging from their statistical analysis. Special focus is placed on the extent to which companies perceive their intangible assets as strategic and, accordingly, on the relationship between investment in intangible assets and their innovation projects. Also, the role that context conditions play in motivating their investments in intangible assets is compared to the role of business incentives.

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