Research project

**IPOs’ first-day return, underwriters behavior, and equity spatial distribution**

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RESEARCH HEADQUARTER: DEPARTMENT OF MANAGEMENT

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### 1. Scientific relevance of the topic, motivations and implications

Initial public offerings are one of the most debated and investigated topics in academic literature. Researchers focused on several and specific aspects of the phenomenon, sometimes presenting indisputable but still not univocally interpreted evidences, as the systematic positive return on the first day of trading (i.e. underpricing) (Logue, 1973; Ibbotson, 1975), and the negative stock performance in the years following the listing (i.e. long-run underperformance) (Ritter, 1991; Loughran and Ritter, 1995).

Notably, a considerable part of financial literature on IPOs tackles the causes underlying the underpricing, although to date no explanation has been completely accepted. Specifically, several interpretations of the phenomenon rely on market asymmetric information. Among these, the most endorsed focus on agency theory (Brennan and Franks, 1997), issuers’ quality signaling (Rock, 1986; Allen and Faulhaber, 1989, Grinblatt and Hwang, 1989; Chemmanur, 1993), and intermediaries’ risk aversion, which lower securities’ prices to facilitate the placement and to avoid legal actions in case of issuing company’s future bad performance (Baron, 1982; Logue, 1973; Ibbotson, 1975; Tinic, 1988, Hughes and Thakor, 1992). In this context, the common practice of bookbuilding would be an information revelation instrument, allowing underwriters to obtain insights from informed investors, thus reducing uncertainty on new securities’ fair value (Benveniste and Spindt, 1989; Benveniste and Wilhelm, 1990). Other theories refer to investors’ irrational or imitative behavior (Aggarwal and Rivoli, 1990; Welch, 1992), and to fiscal advantages to employees’ wages (Rydqvist, 1997). Empirically, underpricing is function of ex-ante uncertainty on the value of the issuer, a parameter inversely related to age (Ritter, 1984; Megginson and Weiss, 1991; Ljungqvist and Wilhelm, 2003), size (Ritter, 1984), and investors’ protection (Al-Shammari, Bell and Moore, 2008).

The most recent literature on the topic does not consider IPOs as single events to decompose in several and different parts to separately investigate, but rather looks at the phenomena on the whole, as integrated and interacting with the overall economic and financial system of a country. In this sense, Braun and Larrain (2009) show that listings...
generate a pre-IPO price decline in covariant portfolios, with an effect the stronger the bigger is the IPO and the less internationally integrated is the listing market, according to a shock on the supply-side. Similarly, Hsu, Reed, and Rocholl (2010) find that competitors experience negative stock price reactions to completed IPOs, and positive stock price reactions to their withdrawal. Since successful IPOs are followed by a significant deterioration in competitors operating performance, Hsu, Reed, and Rocholl (2010) conclude that there is a competitive advantage behind the decisions to go public, which in turn affects competitors’ profitability and survival probability.

In essence, the above mentioned contributes look at the impact of IPOs on the economic and financial framework in which they are set, and specifically focus on the effect of the offers on other listed firms’ market performance. This research project aims to turn over the perspective of investigation by analyzing the opposite pattern, i.e. the impact of other listed firms on IPO’s performance, with an explicit focus on the spatial distribution of the already listed firms with respect to the listing ones. Never investigated, this approach could open new and significant lines of research for the study of IPOs, especially in light of recent developments of literature on the topic (see Braun and Larrain, 2009; Hsu, Reed, and Rocholl, 2010), and of the growing relevance of the role of geographical location on firm’s performance. In particular, the interest over this latter topic developed considerably in recent years, and related empirical literature has become increasingly sophisticated, as shown by the increasing number of relevant publications. Notably, the significance of investor preference for nearby stocks, i.e. local home bias, is nowadays indisputable (see more recently Becker, Cronqvist, and Fahlenbrach, 2011; Jacobs and Weber, 2012; Kumar, Page, and Spalt, 2012; Shive, 2012), although the debate about its causes, informational (Coval and Moskowitz, 2001; Ivković and Weisbenner, 2005)\textsuperscript{1} vs. behavioral (Grinblatt and Keloharju, 2001; Huberman, 2001)\textsuperscript{2} is still an open issue. However, though basic theoretical considerations suggest that firm location should significantly affect firm market value, very little empirical evidence has been provided regarding local home bias asset-pricing implications. Specifically, from a theoretical point of view, investor preference for local passively defines a dedicated clientele (made up of local investors) for securities issued by local firms, in turn generating a segmentation of capital markets based on proximity. Accordingly, corporate market value is expected to reflect a local-geographical component.

A quite recent and productive strand of literature has focused on the significance of the geographical component of price formation. Afterwards contributions of Loughran and Schultz (2004, 2005) who foresaw the relevance of spatial dimension in asset-pricing, Pirinsky and Wang (2006) first give direct proof of these intuitions, showing that stock returns of US companies headquartered in the same area exhibit strong comovements. Since comovements are stronger for firms in less financially sophisticated regions and with

\textsuperscript{1} Hau (2001), Feng and Seasholes (2004), Orpurt (2004), Malloy (2005), Massa and Simonov (2006), Bae, Stulz, and Tan (2008), Goetzmann and Kumar (2008), Uysal, Kedia, and Panchapagesan (2008), Bodnaruk (2009), Teo (2009), and Baik, Kang, and Kim (2010), provide further evidence supporting the informational root of local home bias.

\textsuperscript{2} Zhu (2003), Karlsson and Nordén (2007), and Seasholes and Zhu (2010), provide further evidence supporting the behavioral root of local home bias.
more individual investors, Pirinsky and Wang (2006) conclude that the geographic component of price formation is at least partly attributable to the trading patterns of local residents. Findings then provided in Barker and Loughran (2007), and Anderson and Beracha (2008) give conclusive robustness to these arguments. However, even if the most recent financial literature supports multiple and different aspects of corporate finance spatial dimension, only a few empirical evidences attesting the significance of the relation between firm geographical location and corporate market value have been produced. Indeed, at first Hong, Kubik, and Stein (2008) provide results consistent with the systemic role exerted by investor preference for local in asset-pricing. Notably, Hong, Kubik, and Stein (2008) theorize and provide empirical evidences that investors’ preference for local implies a spatial segmentation of the equity-market based on proximity, which significantly affects stock market price according to a sort of local rarity/abundance effect. More specifically, the market-to-book ratio of American non-financial firms is found systematically inversely related to the ratio between local supply and local demand for stocks of the area in which the issuing firm is headquartered, meaning that more isolated firms and firms headquartered in richer areas trade at a premium. Within this framework, there is no reason to assume that the pattern between corporate market value and corporate geographic location should not exist also with respect to firms’ initial public offerings.

This research project aims to substantiate this hypothesis, considering the performance of Italian and UK IPOs in a new perspective, i.e. investigating the influence of the issuing firm’s geographical position with respect to both other listed firms and investors’ income on new listings’ first-day return. In particular, the existence of different first-day performances depending on the spatial location of listing companies would confirm the systemic role exerted by investor preference for local in asset-pricing, and would contribute to the understanding of the underpricing phenomenon, whose roots have been so far deeply investigated with not fully conclusive results. Taking into account the evidences so far reported by recent financial literature and making the hypothesis explicit, the expectation is IPOs to have a first-day return the higher the closer the issuing firm is to investors’ income and the farther it is from other listed firms because of the concentration of the unfulfilled demand for local stocks by local investors over the few securities locally available. In other words, in light of local home bias’ asset-pricing implications (Hong, Kubik, and Stein, 2008), IPO’s proximity to other listed firms is expected to negatively affect IPO’s first-day market price (and, in turn, IPO’s underpricing). On the opposite, issuing firm closeness to investors’ income should impact directly on the same variables, because of the consideration of demand-side dynamics.

The study of these dynamics will be developed in both the Italian and UK context upon all listed firms (henceforth just firms) issuing ordinary shares traded at the Milan Stock Exchange (henceforth MSE) and London Stock Exchange (henceforth LSE), and headquartered in Italy and UK, respectively. This research context is not only desirable but even necessary.
On one side, Italy is in fact an ideal setting for the analysis proposed for multiple concomitant reasons. First of all, the high level of clustering of Italian listed firms in a few independent districts, together with the presence of areas in which, conversely, a few isolated firms are headquartered, allows to count on a significant cross-sectional variability in term of local supply for stocks and, in turn, of IPO’s relative proximity to other listed firms. Secondly, the spatial distribution of Italian disposable income is much more uniform over the national territory than the spatial distribution of Italian listed firms. Taken together these two pieces of evidence imply strong imbalances between local demand and local supply for stocks, which should exacerbate the differences in terms of price pressure by local investors on newly issued securities, on the basis of IPO’s relative distance with respect to other listed firms. At the same time, the significant mismatching between the spatial distributions of listed firms and disposable income ex-ante should minimize the alleged correlation between IPO’s relative distance to other listed firms and investors’ income, respectively. Third, the low level of integration and the narrow dimension of MSE with respect to other European stock markets (among the others La Porta, Lopez-De-Silanes, Shleifer, and Vishny, 1997) allows to clearly identify IPOs as supply shocks of considerable size with respect to the reference market (Braun and Larrain, 2009). This, in turn, is expected to strengthen investors’ reaction following a first listing and related asset-pricing implications. Fourth, the MSE is widely recognized as highly informationally opaque (see among others Zingales, 1994), and with a very poorly enforced insider trading law (Bhattacharya and Daouk, 2002). These institutional factors mean that the existence and the subsequent illegal exploitation of valuable informational advantages are respectively very likely. Thus, as long as local home bias has informational roots (see as first Coval and Moskowitz, 2001; Ivković and Weisbenner, 2005) related asset-pricing implications should emerge stronger on the MSE than elsewhere. Finally, the political history of Italy, which for eight centuries before unification (in 1861) hosted numerous kingdoms, often mutually hostile, implied a still persistent cultural geographic segmentation. As long as local home bias has behavioral roots (see as first Grinblatt and Keloharju, 2001), this is expected to further deepen the asset-pricing implications of investor preference for local on the MSE.

From another point of view, the development of the analysis in a country as United Kingdom allows the study of the phenomenon under investigation in an economy which, differently from the Italian one, is deeply market oriented, with a market capitalization on average 10 times bigger (La Porta, Lopez-De-Silanes, Shleifer, and Vishny, 1997). UK’s high development of financial market, its lower level of information asymmetries (La Porta, Lopez-De-Silanes, and Shleifer, 2006) and its deeper historical and cultural integration (Arnstein, 2000) with respect to Italy allows a cross-country comparison of the same issue in two settings deeply divergent from a cultural, economic and financial perspective providing, in turn, a better comprehension on the roots of the phenomenon itself. Moreover, since both information asymmetries (see as first Coval and Moskowitz, 2001; Ivković and Weisbenner, 2005) and behavioral aspects (see as first Grinblatt and Keloharju, 2001) have been identified by pertinent literature as possible determinant of investor preference for nearby stocks, it is rational to expect a different (i.e. lower) effect of
this latter on IPO’s first-day return in UK with respect to Italy. Empirical results could thus highlight different possibilities of exploitation of the phenomenon under investigation in different market contexts, increasing the prestige and the international relevance of the analysis proposed.

Several considerations could emerge from this work’s results. The value of the proposed research is in fact mainly in the theoretical and practical implications that would arise from the project’s obtained evidence.

From the first perspective, academic literature on IPO and local home bias would be greatly enriched by the opening new lines of investigation so far unexplored, that would contribute to close a gap in financial literature with the joining of two fields of research so far never connected. Furthermore, this project’s empirical evidences could bring light over a phenomenon never emerged in the daily debate that characterizes such an important topic for the economic and financial world, providing a useful stimulus for reflection and a new point of view in the dispute. Academic research about IPOs would indeed be enriched by a fundamental contribution potentially able to help the understanding of a still debated phenomenon as the underpricing, at the same time explaining the incompleteness of empirical tests so far conducted to define its roots, which completely ignored the crucial aspect represented by a firm geographical position.

From the second perspective, beyond obvious implications for asset-pricing practices which, in case of confirmation of the research hypothesis, would be required to implement the firm geographical dimension also in the definition of new listings’ offer price, several policy implications would follow, whose recipients are both IPOs’ underwriters and listing firms. At first geographical location would contribute to explain and forecast the success or, alternatively, the failure of a listing because of the consideration of a territorial feature able to define a sort of dedicated demand for newly issued securities. Secondly, this research results would highlight the existence of either fair or opportunistic/unwitting behavior of IPOs’ underwriters in the consideration of the geographical component of corporate market value when defining the offer price. Indeed, the evidence of superior first-day market performance for issuing firms close to investors’ income and far from other listed firms would show that underwriters ignore the presence of a dedicated clientele that would anyhow be available to pay a higher premium to purchase the newly issued local securities. The underwriters’ unawareness of this aspect de facto would imply the setting of an offer price unable to maximize IPO’s proceeds, at least for those issuing firms headquartered in areas not populated by other listed firms, that could instead profitably exploit local home bias’ asset-pricing implications. Since more likely to meet local investor preference, these IPOs could in fact gain from their “isolation” (i.e. a large audience of local and “dedicated” investors) through the definition of an higher offer price, that would minimize the amount of money left on the table, at the same time without an higher risk of offer’s failure. Vice versa, the contradiction of the research hypothesis could show a virtuous behavior of underwriters, that would be aware of local home bias asset-pricing implications as highlighted by financial literature, thus minimizing the underpricing and maximizing the proceeds raised in the offer (and, in turn, their dealing’s fees) through the
setting of a fair offer price. Research recipients, at least as far as concern the empirical implications of this project’s results appear quite obvious. Indeed, the confirmation of this study’s hypothesis would constitute an important aspect not only for underwriters and listing firms, but also for any practitioner and policymaker pointing out the possibility to trigger a virtuous cycle for firms located in “depressed” areas, which would find in the listing the possibility to finance and expand the business with a lower cost of capital. More generally, the results of this study would confirm the importance of spatial location to interpret economic and financial phenomena, as the most recent lines of research on local home bias are progressively indicating. This study’s evidences would perfectly frame in this innovative literature.

2. Research hypotheses

As previously observed, at present the significance of investor preference for nearby stocks is indisputable. However, though basic theoretical considerations suggest that firm location should significantly affect firm market value, little empirical evidence has been provided regarding local home bias asset-pricing implications.

Notably, from a theoretical point of view, investor preference for local passively defines a dedicated clientele (made up of local investors) for securities issued by local firms, in turn generating a segmentation of capital markets based on proximity. Accordingly, corporate market value is expected to reflect a local-geographical component. Although the most recent financial literature supports multiple and different aspects of corporate finance spatial dimension (Loughran and Schultz, 2004 and 2005; Pirinsky and Wang, 2006; Barker and Loughran, 2007; Anderson and Beracha, 2008; Shive, 2012), conclusive evidence strictly consistent with the systemic relevance of firm location and local home bias in asset-pricing have been produced only by Hong, Kubik, and Stein (2008). Notably, Hong, Kubik, and Stein (2008) theorize and provide empirical evidences that investors’ preference for local implies a spatial segmentation of the equity-market based on proximity, which significantly affects stock market price. More specifically, Hong, Kubik, and Stein (2008) find that the market-to-book ratio of non-financial firms is systematically inversely related to the ratio between local supply and local demand for stocks of the area in which the issuing firm is headquartered. In other words, this means that more isolated firms and firms headquartered in richer areas trade, ceteris paribus, at a premium.

Taking into account the evidences so far reported by financial literature and highlighted in the previous section, there is no reason to assume that the pattern between corporate market value and corporate geographic location should not exist also with respect to firms’ initial public offerings. This research project aims to investigate this relation, considering the performance of Italian and UK IPOs in a new perspective, i.e. analyzing the influence of the issuing firm’s geographical position with respect to both other listed firms and investors’ income on new listings’ underpricing. Making the hypothesis explicit, the expectation is IPOs to have a first-day return the higher the closer the issuing firm is to investors’ income and the farther it is from other listed firms because of the concentration of the unfulfilled demand for local stocks by local investors over the
few securities locally available. In other words, in light of local home bias’ asset-pricing implications (Hong, Kubik, and Stein, 2008), IPO’s proximity to other listed firms should negatively affect IPO’s first-day market price. On the opposite, issuing firm closeness to investors’ income is expected to impact directly on the same variable, because of the taking into account of demand-side dynamics.

More explicitly, on the basis of the above reported arguments, it is possible to suggest the following competing hypotheses:

Hypothesis 1. IPO’s spatial dimension affects the newly issued securities’ first-day market price.

Hypothesis 1.a. IPO’s proximity to other listed firms is inversely related with newly issued securities’ first-day market price.

Hypothesis 1.b. IPO’s proximity to investors’ income is directly related with newly issued securities’ first-day market price.

that lead to

Hypothesis 2. IPO’s spatial dimension affects IPO’s underpricing.

Hypothesis 2.a. IPO’s proximity to other listed firms is inversely related with IPO’s underpricing.

Hypothesis 2.b. IPO’s proximity to investors’ income is directly related with IPO’s underpricing.

and

Hypothesis 3. IPOs more close to investors’ income and more distant from other listed firms have, ceteris paribus, a lower risk of failure than IPOs far from investors’ income and close to other listed firms.

The confirmation of the research hypotheses (i.e. the existence – once controlled for the demand – of different first-day performances depending on the spatial distribution of listing companies with respect to the IPO) would confirm the systemic role exerted by investor preference for local in asset-pricing, and would enrich financial literature of a fundamental contribution able to help the understanding of a still debated phenomenon as the underpricing is. At the same time this project’s results would explain the incompleteness of empirical tests so far conducted to define IPO’s first-day return’s roots, which completely ignored the crucial aspect represented by a firm spatial dimension.
In a cross-country comparison, the investigation of the research hypotheses both in the Italian and UK context allows the study of the phenomenon in economies deeply different from a cultural, economic and financial perspective providing, in turn, a better comprehension on the roots of the phenomenon itself. Notably, UK is characterized by a higher development of financial market, a lower level of information asymmetries (La Porta, Lopez-De-Silanes, and Shleifer, 2006), and a deeper historical and cultural integration (Arnstein, 2000) with respect to Italy, that is instead defined by the narrow dimension of MSE (among the others La Porta, Lopez-De-Silanes, Shleifer, and Vishny, 1997), and whose political (and, in turn, cultural) unification came solely in late 1861, implying a still persistent cultural geographic segmentation. Thus, since both information asymmetries (see as first Coval and Moskowitz, 2001; Ivković and Weisbenner, 2005) and behavioral aspects (see as first Grinblatt and Keloharju, 2001) have been identified by pertinent literature as possible determinant of investor preference for nearby stocks, it is rational to expect a lower magnitude of local home bias’ asset-pricing implications on IPO’s first-day return for LSE with respect to the MSE. This finally suggests the following hypothesis:

Hypothesis 4. The impact of firms’ spatial distribution on IPOs’ underpricing is lower in UK than in Italy.

3. Agenda – Research development plan
The vocational training is finalized to the development and improvement of a curriculum strongly oriented toward scientific research. In particular, the research fellow will be required to acquire specific skills that will enable him/her to develop an autonomous capacity to conduct analysis mainly on empirical basis.

This project involves, supports and encourages international collaborations and the participation to conferences of national and international importance and prestige, that favor a dynamic and stimulating research context and, ultimately, the publication of the contributions – output – on academic journals of corresponding importance.

The training will be developed in phases, in turn structured into intermediate goals mainly consequential to each other, which are afterward synthetically described and of which – at the end of the paragraph – is given a summarizing graphical representation (cfr. Figure 1 – Research Development Plan).

Phase 1. Overview of the literature and state-of-the-art
In order to construct an adequate theoretical framework of reference that allows the research fellow to suitably formulate and effectively test the research hypotheses, the first phase of the vocational training will be characterized by an intense education that will develop into several directions (intermediate goals).

The first direction will see the research fellow committed in the acquisition of the "state of the art" in relation to the macro-issues of local home bias, related asset-pricing implications, and IPO performance especially with respect to the first day of trading. These contributions are mainly referable to the studies mentioned in Section 1.
As these lines of research produced conflicting empirical results on the basis of different frameworks of investigation, the research fellow will work to acquire a detailed knowledge of the different approaches, or in other words, an in-depth awareness of the proposed quantitative tools and methods of investigation, in order to select the most appropriate for the research project. Information sources will mainly be published scientific literature and unpublished scientific papers (such as SSRN research papers). Secondly, the candidate will learn how to use both the most important software (e.g. Stata and SPSS) and databases (e.g. Datastream, Bloomberg, Bureau Van Dijk’s databases), as tools and knowledge necessary for a proper implementation of the previously selected methodologies. In this phase the research fellow will be supported by the tutor of the project and by other researchers of the Department of Management. This first phase will end with the formulation of testable hypotheses that will be constructed to show that – given the local home bias’ asset-pricing implication as highlighted by financial literature – firms’ spatial location may impact on IPOs’ underpricing and on the probability of success/failure of the offerings.

In light of the dense and complex empirical content of the research, the candidate must show a quite deep knowledge of econometrics topics before the attribution of the research grant. It is required a good knowledge of English. Furthermore, because of the involvement in the project of two deeply investigated strand of financial literature (i.e. local home bias and IPOs) so far never connected, this phase is expected to absorb a significant part of the research period, and should end after four/five months since the beginning of the research grant.

**Phase 2. Data gathering and database creation**
The second phase of the research will focus on the construction of the database used in the analysis (Sample Selection Process) – which will be composed by Italian and UK listed and listing companies – and on the collection of the variables relevant to the testing of the proposed hypotheses (Data Collection Process). In order to collect the data, two different sources of information require to be matched: on one hand, the spatial and wealth distribution of Italian and English population, on the other hand, accounting data, financial data and the headquarters’ location for the firms listed and listing at the MSE and at the LSE. Data about spatial and wealth distribution of Italian and English population as well as other regional variables will come from the database provided by the National Institute of Statistics (ISTAT) available on the ISTAT’s website – www.istat.it – and from the European Institute of Statistic (EUROSTAT), available on the EUROSTAT’s website, http://ec.europa.eu/index_en.htm. Data about firms will come from the database provided by Consob (i.e. the Italian equivalent of US SEC), London Stock Exchange, Osiris (Bureau Van Dijk’s database), and Datastream (Thompson Financial). Specifically, from Consob and London Stock Exchange databases the list of firms issuing securities at MSE and LSE respectively will be obtained. The location, i.e. Address, City, Province and ZIP code of the headquarters of each firm included in the sample will be collected from Osiris, while all other relevant accounting and financial information will be collected from Datastream.

The Nomenclature for the Statistics Territorial Units (NUTS) is going to be used to split Italy and UK in sub-areas. NUTS codes identify homogeneous statistical units of the European Union on the basis of the resident population. More specifically, the territory of any country member (NUTS0) is divided by NUTS codes in three nested sub-levels. Geographical Macro-Areas are identified as NUTS1, Regions as NUTS2 and Provinces as NUTS3.

The Sample Selection and Data Collection processes will lead to the creation of an unbalanced panel dataset made by firm-year observations that will form the empirical basis of the proposed research. This phase should end after twelve/thirteen months from the beginning of the research grant.

**Phase 3. Statistical analyses**
The third phase of the project verifies the testable hypotheses previously formulated. In this phase the research framework will be tested through the elaboration of the collected data by using statistical methods, including descriptive and multivariate analyses. The empirical analysis will produce three orders of results: 1) a series of descriptive statistics of all the collected data; 2) univariate analysis to highlight in the data the existence of a pattern consistent with the testable hypotheses above described; 3) multivariate analysis to
define the effect of firms’ spatial distribution on IPOs performance (i.e. to verify testable hypotheses from 1 to 4). The last two phases will certainly be the most complex from a computational point of view.

Given the data structure (unbalanced panel dataset) and the link between the different types of variables involved in the testing process (country/regional-level variables and firm-level variables), the standard techniques of panel data analysis (fixed effect estimator, random effect estimator) must be accompanied by other techniques (i.e. GMM) able to exclude the possible endogeneity and correlation among variables, and to verify the accuracy of the model used (e.g. Hausman Test). This phase should end after nineteen/twenty months from the beginning of the research grant.

**Phase 4. Final output**

The fourth phase of the project represents the final point of the research process, and consists in the realization of the research output. In this phase the research fellow will optimize and combine the different results obtained, in order to produce a working paper that will be submitted to international academic journals and international conferences. This phase will end with the possible eventual reopening of the cycle of research on different contexts or complementary sectors of investigation. This phase will end after twenty-four months from the beginning of the research grant.

**Figure 1 - An Analysis of the Effect of Spatial Distribution on Listed Firms’ Value: Research Development Plan**

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<thead>
<tr>
<th>Activity</th>
<th>Months</th>
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<td>Phase</td>
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<tr>
<td>Literature Review</td>
<td>1-10</td>
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<td>Software and Database</td>
<td>11-20</td>
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<tr>
<td>Sample Selection</td>
<td>21-24</td>
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<td>Data Collection</td>
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<td>Statistical Analyses</td>
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<td>Final Output</td>
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**4. Funding**

The funding request for 24 months requires a total financing of €45894,00 deriving from both funds of the Department of Management of the Alma Mater Studiorum University of Bologna and external co-financements of the research project of

- €5000,00 drom Unindustria Bologna (Via San Domenico 4 – Bologna Italy)
- €3000,00 from personal funds got from Physics and Astronomy Department for current joint-research work (see others publications section)
- €2000,00 from Marchesini Group S.p.A. (P.I. 00680201209 - Via Nazionale, 100 - 40065 Pianoro - Bologna Italy)
- €3000,00 from Agri2000 Via Marabini 14/A Castel Maggiore - Bologna Italy)
5. Publications (2009-2013) presented for the Research Grant

   DOI: 10.1111/j.1467-8683.2009.00752.x
   Classe A ANVUR - IF2009: 2.068 - Valutazione VQR: 1 (Eccellente)

   DOI: 10.1111/j.1755-053X.2011.01157.x
   Rivista classe A ANVUR - IF2011: 1.355

   DOI:10.1177/0894486513486343
   http://fbr.sagepub.com/content/26/4/374.full.pdf+html
   Rivista classe A ANVUR - IF2012: 2.622

   DOI:10.1093/icc/dtt001
   http://icc.oxfordjournals.org/content/early/2013/02/14/icc.dtt001.full.pdf+html
   Rivista classe A ANVUR - IF2012: 1.331


6. Others publications (2009-2013)

   http://www.torrossa.it/digital/sam/2012/EGEA/2520678_SAM.pdf
doi: 10.1400/200036 (ISSN 2239-7191)


IF2012: 5.257

errors and organ motion by daily kilovoltage cone beam computed tomography in intensity modulated radiotherapy of prostate cancer”, *Radiation Oncology* 7:56, Issue 1. DOI: 10.1186/1748-717X-7-56

http://www.ro-journal.com/content/pdf/1748-717X-7-56.pdf

IF2012: 2.107

7. Essential bibliography


