

# The “wisdom of crowds” as an antidote for the “credit crunch”.

## A preliminary analysis of crowdfunding<sup>1</sup>.

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### Abstract

This paper analyses the linkages between the standard lines of credit (financial intermediaries, public sector, private investors) and the recent development of *crowdfunding* phenomenon. We believe that crowdfunding activities, even if yet not significant in terms of volumes, might play a major role in the future, complementing the traditional activities of financial intermediation. In support of our beliefs, we notice the establishment of several crowdfunding platforms operating at world level, particularly in the USA and in UE, and the relevance assigned to crowdfunding procedures in the Obama’s JOBS Act of 2012 and in a recent consultation on crowdfunding launched by the European Commission. At national level, we recognize several peculiarities of crowdfunding activities, mostly related to donation and reward-based schemes, but also the disposals of the so called “Growth Decree 2.0” on the equity-based crowdfunding and the on-line consultation subsequently implemented by the CONSOB. The paper, after an introduction to crowdfunding and academic literature review, is organized as follows: first, we discuss at microeconomic level households’ incentives to lend their saving through crowdfunding procedures, and we sketch a simple IS model to investigate the complementarities among the demand and the supply of funds in a qualitatively heterogeneous framework, where quality depends on the social utility of the investment made. Secondly, we try to single out the (potentially) main determinants of the crowdfunding demand of funds, using the available data at European level, and we develop a Crowdfunding Attractiveness Index (CFA) in the Euro Area, with the aim to rank the crowdfunding potential of different European countries. Finally, we summarize the main topics emerged and we try to highlight some policy issues.

JEL Codes: G21; L15; O16.

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## **1. Introduction: research approach and research questions**

Crowdfunding is a very recent financial (and social) phenomenon all over the world. When we met at the beginning of our research effort, analyzing the different topics and issues arising with reference to crowdfunding, we decided that an interdisciplinary and pluralistic approach was the best path to this phenomenon's understanding, from a theoretical and methodological point of view. The literature about crowdfunding has very few academic contributions at international level, and we find more practitioners' and institutional attention than academician (see **paragraph 2 and 3**). Putting together banking and finance, economics and statistics' perspectives and tools is, in our opinion, a good way to develop the research about crowdfunding in a deeper mood.

In brief, we summarized the main purposes of our research effort in the following questions:

1. Which are the different foundations of crowdfunding in academic literature (paragraph 2)?
2. Which are the main economic agents involved in crowdfunding activities at world and European level? (paragraphs 3)
2. Which issues might drive at rational level households' decision of lending their money through crowdfunding procedures? (paragraph 4)
3. Is it possible to identify a theoretical framework that highlights the trade-offs and the complementarities between the standard and the crowdfunded supply of funds? (paragraph 5)
4. Which might be the main determinants of the crowdfunding demand of funds? (paragraphs 6, 7, 8)

The paper, after a brief review of the academic literature and an introduction to crowdfunding, is organized as follows: first, we discuss at microeconomic level households' incentives to lend their saving through crowdfunding procedures, and we develop an extended IS model to investigate the complementarities among the demand and the supply of funds in a qualitatively heterogeneous framework, where quality depends on the social utility of the investment made. Secondly, we try to single out the (potentially) main determinants of the crowdfunding demand of funds, using the available data at European level, and we develop a Crowdfunding Attractiveness Index (CFA) in the Euro Area, with the aim to rank the crowdfunding potential of different European countries. Finally, we summarize the main topics emerged and we try to highlight some policy issues.

## 2. Literature review

Without any doubt the crowdfunding phenomenon is recent, multidimensional by nature, and analyzed by different perspectives and with different goals.

It's interesting to notice that the crowdfunding concept is very recent, especially in the academic environment focussing on entrepreneurship, consumer behavior, start-up finance (venture capital, above all), but the attention to crowds is quite old, in modern times: among others, see Le Bon (2009), whose psychological contribution, first edited in 1895, is cited in De Buysere et al, 2012, a paper edited in association with European Crowdfunding Network. But while Le Bon underlined many limits of crowds (impulsiveness, irritability, incapacity to reason, the absence of judgement of the critical spirit, the exaggeration of sentiments), in our times we also talk about *wisdom of crowds* (Surowiecki, 2004).

We analyzed a very wide and used data base (Business Source Complete), and we found, with a query (last query on 11<sup>th</sup> July) of crowdfunding in the title field, 259 results from 2008 to 2014. Most of these articles come from magazines (129, the first in 2008, an article published in Time), trade publications (70, the first in 2011), newspapers (24, the first in 2012), product reviews (3, the first in 2012). In academic journals we found only 29 articles, the first published in 2011 (Ley and Weaven, 2011).

Of course we have not only articles, but still books and the web, too, and analyzing a rich body of academic contributions, we discovered that the term crowdfunding first appeared in 2006 (cited in Lawton and Marom, 2010), but it comes from practitioners, as stated by Castrataro (2011): “Michael Sullivan is credited with coining the term crowdfunding back in 2006 with the launch of fundavlog, a failed attempt at creating an incubator for videoblog-related projects and events including a simple funding functionality. This scheme was “based on reciprocity, transparency, shared interests and, above all, funding from the crowd,” but the term crowdfunding only really began to be used by the masses a few years later with the advent of the platform Kickstarter”.

Crowdfunding's roots are linked to the crowdsourcing concept. This concept underlines the mix of contributions (services, ideas, and content) from a large group of people to achieve a task, dividing a complex task into small enough pieces so as to make it more easily achievable: “the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call” (Howe 2008). These kinds of phenomenon are economic in nature, stemming from an industrial organization view (Belleflamme et

al., 2010), but the economic view is not the only relevant in crowdfunding: social and IT perspectives, strictly linked in social networks, are extremely significant, as legal matters are, too.

From economic point of view, we find contributions about crowdfunding in the field of entrepreneurship (Agrawal et al., 2010; Belleflamme et al., 2010 e 2014; Harrison, 2013; Larralde and Schvienbacher, 2012; Lehener, 2013; Ley and Weaven, 2011), of consumer behavior and marketing (Ordanini et al., 2011) and of financial intermediation, with special regard to start-up financing - venture capital and private equity (Mollick, 2014).

The main issues addressed by this kind of literature are:

- by entrepreneurship scholars, the contributions of crowdfunding to new ventures, in different business models (donation, reward, lending, equity based crowdfunding; active and passive role of funders), and the involved agents behavior (founders, family, friends, fans, fools: the so called “love money”, Hemer et al., 2011);
- by marketing scholars, the use of crowdfunding not only for financing business, but for supplying other services to enterprises by consumers and backers;
- by banking and finance scholars, the disintermediation of traditional ways of financial intermediation (banks, other financial institutions, financial markets); crowdfunding as complementary or alternative way to satisfy enterprises’ financing needs; liquidity risk and projects assessment in different kinds of crowdfunding business models.

Other contributors are more difficult to classify in scholarships or strands of literature. Together with general books about crowdfunding (Lawton and Marom, 2010 and 2013), we can find papers with general introduction to crowdfunding and description of crowdfunding platforms (Giudici et al., 2012), articles describing evolutionary scenarios of capitalism and finance (Shiller, 2013) and of crowd-capitalism in emerging economies (Beugrè and Das, 2013).

The social and IT perspectives highlight the relevance of wisdom of crowds (Surowiecki, 2004) that is analyzed and surveyed in social networks and platforms sustaining some types of crowdfunding, i.e. P2P lending. Prediction markets for financial variables produce surprisingly accurate information (Ray, 2006), revealing the wisdom of crowds. This is especially true and evident where you can find peer learning in e-markets, like P2P platforms (Yuma et al., 2012). Of course, wisdom of crowds is influenced by cultural profiles of peer learners, especially the country of origin cultures (Bechter et al.,

2011). From a theoretical point of view, wisdom of crowds as a form of collective intelligence can emerge with naïve updating of individual beliefs in social networks (Golub and Jackson 2010). “Given the relatively high uncertainty in borrower trustworthiness and the lack of lender expertise and information, estimating borrower trustworthiness is a probabilistic problem. So the online P2P lending environment appears to meet the conditions that prior theoretical studies have identified. Thus, we expect the wisdom of crowds approach to work for the online P2P lending platform, and lenders may be able to take advantage of the voting results when they make credit decisions with respect to different borrowers” (Yuma et al., 2012). Maybe that these considerations can be extended to different crowdfunding models.

Summarizing, the academic literature about crowdfunding evolves fast, putting attention at many sides of the phenomenon. In our paper we try to offer some contributions about two aspects that seem underrated: on one side the microfoundations of individuals (households) choices in crowdfunding environments (wisdom of crowds is an evocative word, but we think we need better economic foundations); on the other side the forecasting, at macro level, of the crowdfunding market in different countries.

### **3. Crowdfunding: definition, economic agents, prospective market**

As stated earlier, we have different perspectives and approaches about crowdfunding. The Oxford English dictionary defines crowdfunding as “the practice of funding a project or venture by raising many small amounts of money from a large number of people, typically via the Internet”.

In a very recent paper Shiller (2013) define crowdfunding, as the funding of a company by selling small amounts of equity to many investors, allowing them to be, in effect, venture capitalist.

Recently President Obama signed the Jumpstart Our Business Startups Act (JOBS Act) into law. This provision was designed to increase, private and small and medium enterprises job opportunities, by improving funding for business activity via capital markets. Crowdfunding, by encouraging experimentation and innovation and at the bottom of process, could be a real driver of economic growth. From reading the JOBS act we find out that crowdfunding, the collective process of capital gathering or people pooling their money or resources together, usually via the Internet or social media outlets to support the efforts of others, will allow private investors who were previously shut out of angel and startup funds to participate.

In the same line, De Buysere et al. (2012) report that crowdfunding can be defined as a collective effort of many individuals who use their social network, to pool their small contributions to develop a business idea initiated by other people or organizations. In this way crowdfunding activity facilitates innovation and entrepreneurship using internet as a platform for raising the funds that are necessary for the development of an entrepreneurial project. Internet subject is crucial also for well documented home bias topic, eg. is the trend that transactions are more likely to refine between economic actors, geographically located as neighbors, that is in the same country or state, rather than outside. Internet has become an increasingly important source of financing for social entrepreneurship like click-to-donate sites, online charity auctions and shopping malls, philanthropy directories, or crowdfunding sites (Wei-Skillern et al. 2007).

In Deriv Report (2013) we find that “Social Causes” is the category that has the highest share, 27,4% out of all crowdfunding categories. The World Bank has launched Crowdfund Capital Advisors (CCA) to define crowdfunding’s role in the developed world and developing world. Project aims to identify ways to leverage the new crowdfunding industry, with particular reference to the theme of Web 3.0, where social media and small investor communities create access to capital and seek funding directly and effective from their social relationships.

Mollick (2013), from Wharton Business School, reports that 81 per cent of investors or donors in crowdfunding are connected to the founders of the rump up project at the first or second degree of separation. In this way funders, exploiting in turn their own networks are also potential ambassadors of the project.

An expert group of European Commission for the Directorate General for Enterprise and Industry in 2011 have proposed a framework of best practices for equity crowdfunding The framework of best practices consists of three pillars: Regulation, Education and Research. The former can help correct for market failures such as the presence of asymmetric information and moral hazard. In this light the appropriate amount of regulation can help to improve transparency and security for financial transactions in each way they occur. Education is linked to households’ decisions to invest their money in business and social projects. Research, in Commission document, is mainly interpreted as relationship and knowledge process exchange between academic and industry sector.

Crowdfunding, generally speaking, is a collective contribution of many individuals (or households) who pool their resources to fund business or social projects originated by other economic agents. Usually this happens via Web based platforms. In this way organizations or individual projects and businesses are financed with small contributions from a large number of individuals. Very often, a

large part of the funds provided by funders are part of social networks of innovators, entrepreneurs and business owners at the bottom of the originator process. On the side of funders mostly we have individuals, who want to diversify their portfolio, by inserting new and different assets, quite uncorrelated between them, providing very small amounts of finance to a set of given projects and therefore distributing the total allocation, and risk, over a large number of projects. Otherwise they are happy to fund an initiative of a social nature and therefore are not interested in financial return alone.

To better understand borrowers' decisions it is of the utmost importance to go in depth on the different lines of business in which crowdfunding activity develops itself. One can break the business models down into four basic types of crowdfunding: respectively Donation, Reward, Lending and Equity based.

For Donation-based crowdfunding, basically motivations at the bottom of the funding is social return , that is no legally binding financial obligation incurred by recipient to donor, and this is the most typical way of funding that NGO's have been using to attract donations. Indeed Donation-based crowdfunding typically supports cultural and religious projects, as well as deals in which people are not interested in business affairs involving reward in terms of money . For this kind of crowdfunding activity donors also tend to give recurring donations if the social organizations keep them updated about the progress of the project and making funders satisfied when they see that a project, in which they believed, is going to be realized.

Reward-based crowdfunding can involve types of projects similar to Donation-based funding, but most of all include financial aids to small and medium sized enterprises, or commercial pre-sales of products as well as creative and cultural projects. Project owners provide funder with rewards of a symbolic value. Frequently reward is the product, in terms of standard output of entrepreneurship activity asking to be supported. In fact reward based crowdfunding is increasingly being used for rump up new product or improve existing ones, in partnership with existing or potential customers.

Lending-based crowdfunding can be for social or business purposes. In Social lending, we are in an interest free loans environment. In this way of funding typically we have micro-loans to support development or social aid projects. The motivation from the lender side is in social change similar to what happened in donation-based crowdfunding and also the actors are roughly the same. With lending-based crowdfunding for business purpose, a firm borrows money from a group of people instead of a bank. Here the main motivation for the funder is a financial return according to the specific risk-factors of the company funded. This market segment does exist when lenders hope to receive a higher interest payment than they would receive from an alternative investment, while for borrowers

who are looking for a loan at better conditions than the one they can get from a bank (or even in those cases in which the bank is not going to fund them). Borrowers typically are both companies looking for Small business loans or for project finance activity and household for consumer lending.

Equity crowdfunding is when an entrepreneur wants to attract an investment from a group of people, with the purpose of dividing future earnings, exactly as it happens in every entrepreneurship business. Usually originators of projects supported are Small and medium sized enterprises offering the same benefits and rights as shares and the investee is a creditor who has a contractual right to receive that payoff.

In the middle, that is among funders and actors taking money, there are crowdfunding platforms generally exercising a basic due diligence and business plan screening, when projects involve reward in terms of money, or simply presenting, at a glance, business ideas when main motivations are for social purpose

At present, large part of data pertinent to crowdfunding business (e.g., number of platforms, geographical distribution of participants and number of successful campaigns) are proprietary. This evidence limits further efforts on the research and in this work we can't apply econometrics due to lack of data but we deal with descriptive analysis. Nevertheless, we consider our effort useful, because it can provide a good starting point for further analysis when public data will be available for the academic community.

About market size we have to refer that there is a substantial lack of data making a market analysis quite difficult and incomplete. However, at present day Massolutions Crowdfunding Industry Report provides estimates and extrapolations based on surveys on the most important market players. According to Report content we find that worldwide, 452 crowdfunding platforms active raised \$1.5 billion in 2011, in 2012, that number jumped to \$2.7 and Massolution's 2013 Crowdfunding Industry Report predicts for 2013 the remarkable amount of 5.1 billion. This indicates a significant growth near to 100% year on year. This increase is due in particular to the raise in total value of campaigns while the survey data suggests that the total volume of successful campaigns has remained relatively unchanged.

North America was the largest market for fundraising (over USD \$1.6bn in 2012), however Europe is gaining percentage share within the market in aggregate reaching almost 1 billion dollar of total amount in raising activity. Both continents together account for the vast majority of the market, reaching more than 95% of the total, where South American and African countries are just in the beginning.



In 2012 the majority of these campaigns were in the donation-based category, indeed donations and reward based funds reached a 85% year on year growth corresponding, in value, to an amount of USD \$1.4bn. Equity campaigns were, on average, much larger in size in terms of funds raised (there are also a small number of cases where reward-based models have reached multi-million US Dollar or Euro amounts), while the lending-based category is the smallest in terms of the number of platforms.

European Commission, (2013) Consultation Document Crowdfunding, on the whole confirm evidences for EU, stating that in 2012 crowdfunding in Europe reaches quite 65% growth compared to 2011 and reached a total amount of fundraised equal to € 735 million. This figure is promising compared to the limited supply to innovation projects funding given from European venture capital market, that is € 3 billion, although it stays modest if compared to the European IPO markets (in the range of € 16.5 billion). Results drawn from Crowdfunding Industry Report in Uk, (2013), shows that for UK SMEs in 2013, the alternative finance market (peer-to-business lending, equity-based crowdfunding, invoice trading and revenue/profit-sharing crowdfunding), has supplied £332 million to SMEs in the UK – a more than 12-fold increase in just three years. Number of SMEs have utilized these alternative financing mechanisms in the UK between 2011 and 2013 amount to more than 5,000.

#### **4. A microeconomic perspective on crowdfunding supply**

Personal wealth and income, household production (more in general, the existence of resilient activities), and social capital play a decisive role in determining households' level of participation in the labour market. Then, we introduce these variables in household's budget constraint and we reconsider the choice between labour and leisure in a richer logical framework. Moreover, we assume that money has a value in terms of utility, then liquidity stocks are on the left hand side of the budget constraint. Several reasons support this choice: first of all, money can be considered as a substitute of a complementary bundle of goods with respect to  $C$  that might be consumed during the period of analysis. Secondly, money might be used to manage risk, as in presence of shocks it might help to "absorb" them, making consumption decisions more resilient. Thirdly, money can be a vehicle of intra and intergenerational equity, as it might be used to finance other individuals' consumption, strengthening inter and intra generational relations. Finally, money can be used to increase household's future consumption (it can be used as a reserve of value). For all those reasons we assume that finance is an activity that produces utility by itself, as it allows to transfer risks, and value among the individuals both at spatial and temporal level, rewarding owners with lower levels of risk, great expectations on the

future, “happiness” and sustainability of consumption patterns (consumption smoothing). In the following paragraph we provide a more formal analysis that illustrates these issues.

We begin the analysis by illustrating how investments might substitute paid work in providing households with the necessary income to buy the desired level of  $C$ . The main issues stressed will be, then, integrated in the neoclassical theory of households’labour supply. Assume that  $Y$ , the level of production, is fixed, and it is obtained through an automatic procedure that requires only capital ( $K$ ) as input. If capital is the only income-generating activity and  $I$ , the level of investment, is perfectly elastic to  $r$  (at least until a certain level  $I^{max}$ ), it means that households endow firms only with capital means. On the other hand, they receive income  $r(W - A)$ , where  $W$  is the level of their (financial) wealth, and  $A$  is the level of (financial) wealth that they do not invest on the market. If we assume that households have an exogenous income  $M = pC^\circ$ , we can write household budget constraint as

$$[1] \quad pC' + rA = pC^\circ + rW,$$

Where the second term represents households’ initial endowment of consumption and wealth. Then, by endowing the market with wealth, households reallocate consumption and wealth in order to maximize their utility. Clearly, when  $M$  is sufficiently high to allow households to buy the desired level of consumption, they will not endow the market with  $W$ . Instead, they will use part of their exogenous income to accumulate additional wealth ( $A > W$ ). On the other hand, below a certain threshold of  $M$ , the higher is  $r$ , the higher is the incentive to invest on the market. But, after a certain level of  $r$ , the incentive is reversed, as the endowment effect counterbalances the substitution and the income effect (we assume that  $C$  is a normal good). Then, we expect an investment supply that reverses after a given  $r$ .

But, in a resilient system, there might be also several collateral non-market investments that associate to a monetary dividend a “real dividend” paid in terms of consumption goods, for every unit of capital  $k$  provided. Then, the previous equation might be rewritten as

$$[2] \quad pC' + rA = pC^\circ + r(W - \sum_j k_j) + \sum_j (pc_j + r'_j)k_j,$$

$$[3] \quad p(C' - \sum_j c_j k_j - C^\circ) = r(W - A - \sum_j k_j) + \sum_j r'_j k_j.$$

The term  $\sum_j (pc_j + r'_j)k_j$  indicates a set of complementary investments that households can finance in order to obtain additional sources of income and consumption with respect to the primary consumption  $C$  and the primary dividend  $r$ . It means that households can increase their utility by increasing their consumption, their leisure time and their liquidity stock. Moreover, the level of “net consumption” is obtained as a weighted algebraic sum of  $(C' - C^\circ)$  and of other  $n$  complementary terms. On the other

hand, households' income is obtained as a sum of a primary dividend  $r(W - A - \sum_j k_j)$ , plus  $n$  secondary sources of revenues  $(\sum_j r'_j k_j)$ .

Now we relax the assumption of zero labour in the production process, allowing households to endow firms with this input. Recall that, according to the neoclassical theory of the individual labour supply, household's choice between leisure and consumption can be modelled as

$$[4] \quad pC'' + wL = wT,$$

Where we assumed that  $M = 0^2$ . By adding [3] to [4] we obtain

$$[6] \quad p(C' + C'' - C^\circ - \sum_j c_j k_j) = w(T - L) + r(W - A - \sum_j k_j) + \sum_j r'_j k_j.$$

By imposing that  $C' + C'' = C$ , we rewrite [6] as

$$[7] \quad p(C - C^\circ - \sum_j c_j k_j) = w(T - L) + r(W - A - \sum_j k_j) + \sum_j r'_j k_j.$$

It means that households can finance their net demand of consumption (consumption minus consumption goods obtained through crowdfunding and exogenous income), though paid work, by lending their capital on the market and by investing in resilient activities. Specifically, the term  $\sum_j (pc_j + r'_j)k_j$  can be used to model different categories of *crowdfunding*: donation-based, ( $pc_j + r'_j=0$ ), reward-based ( $r'_j=0$ ), lending-based and equity-based ( $pc'_j=0$ ).

In terms of endowments [7] could be rewritten, alternatively, as

$$[8] \quad pC + rA + wL = pC^\circ + \sum_j (pc_j + r'_j)k_j + r(W - \sum_j k_j) + wT,$$

or

$$[8'] \quad pC - \sum_j (pc_j + r'_j)k_j + r(A + \sum_j k_j) + wL = pC^\circ + rW + wT.$$

Specifically, [8] considers crowdfunding as a revenue that turns wealth into consumption and dividends (resilient activities allow to finance the values on the left hand side). On the other hand [8'] emphasizes how crowdfunding might be part of the expenditure, as it is a good that allows to achieve the same goals that can be reached through liquidity stocks and additional consumption, creating also a field of opportunities. To solve the utility maximization problem, we prefer to adopt [8], as in this way utility has only three arguments. Specifically,

$$[9] \quad U = U(C, A, L).$$

Now, define  $\mathbf{s} = (r, w)$  and  $\mathbf{E} = (W, T)'$ , and rewrite [8'] as

$$[8''] \quad pC - \sum_j (pc_j + r'_j)k_j + r(A - \sum_j k_j) + wL = pC^\circ + \mathbf{sE}.$$

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<sup>2</sup> We assume, also, that there are not resilient activities involving labour, but this assumption can be easily relaxed (see Viganò, Salustri, 2014).

[8''] illustrates how, even if in a three-dimensional space, we might expect that the endowment effect determines a supply function that after a threshold “reverses”, given a fixed level of  $M$ . Indeed, for  $s$  sufficiently high, households can endow firms with less labour and/or capital than when  $s$  is low, as the value of their endowment is sufficiently high to compensate with a small negative change the cost of the excess of consumption with respect to the initial endowment.

Finally, we generalize this result as follows:

$$[8'''] \quad pC - (pc + r)'k + r(A - k') + wL = pC^\circ + sE,$$

where  $pc, r, k$ , are  $(n \times 1)$  vectors of variables (specifically,  $E$  is a  $(n \times 1)$  identity vector).

In brief, independently from the exact value of the endowments, we expect that several factors play an important role in the choice between leisure and paid work. Among them, we highlight the role of wealth, non wage income and the existence of crowdfunding activities. Specifically, we might expect that in a resilient system households will invest part of their wealth in complementary investments through crowdfunding procedures, as, especially during crises, they might be interested in opening a field of opportunities.

More in general, when  $S > I$ , resilient activities might allow households to increase their income by an amount equal to the monetary dividends paid on crowdfunded investments  $\sum_j r'_j k_j$  plus the real dividends paid in terms of consumption good  $\sum_j c_j k_j$ . On the other hand, when  $S < I$ , crowdfunding might allow investors to search for funds on the standard financial market and on other  $j$  complementary sources. In both cases, it seems that crowdfunding might play a major role in the next future, facilitating the achievement of an equilibrium between consumption and expenditure, and between saving and investments. In the next paragraph, we analyse the role of crowdfunding in facilitating the equilibrium on the IS market.

## 5. The IS market of crowdfunding: supply and demand of funds

Provided that households can endow directly with funds (or with a moderate level of intermediation) those firms that are interested in participating to crowdfunding processes, it is of main interest to analyse more in detail the interaction between the demand and the supply of funds on the financial markets accounting for the existence of complementary sources of funds. The analysis is developed in a  $R^3$  space involving quantities, prices and qualities. Indeed, by considering quality as an endogenous variable, it is possible to account for horizontal rotations of the quantity-price plan, obtaining a more

complete framework of analysis. Specifically, it is well known that the indirect demand of a good can be rewritten as

$$[9] \quad p(y) = p |MRS|,$$

where the  $MRS$  is computed with respect to a bundle involving all goods but  $y$ . If we assume that  $y$  is a homogeneous good, we have all the information that we need to compute the indirect demand given a fixed price  $p$ . But, if  $y$  is a heterogeneous good, we miss a piece of the puzzle. Indeed, assume that

$$[10] \quad y = y(x, q),$$

where  $x$  indicates quantity and  $q$  indicates quality. If we don't know [10], we don't know how the indirect demand of  $y$  would react to a change in  $p$  in quali-quantitative terms, as part of the answer depends on the implicit trade-off between  $x$  and  $q$  illustrated in [10]. Clearly, the result in terms of  $y$  is the same if households have well-behaved preferences, but solution refers to a different quantity and quality of  $y$ , and might be not unique in terms of  $(x, q)$ .

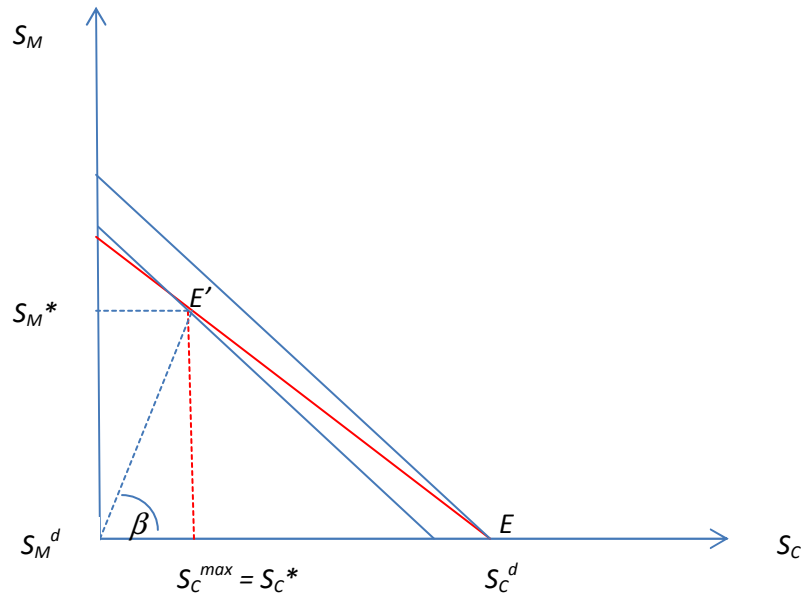
Applied to the  $IS$  market, assuming that the level of total investment depends on the choice of a single firm, this very simple framework implies that for a certain real interest rate  $r$ , the equilibrium  $E$  will be in  $I^* = S^*$ , in correspondence of a certain mix of crowd-funded and intermediated funds. But a change in  $r$  implies both a quantitative and qualitative change in  $E$ , meaning with "qualitative" the fact that the ratio between crowd-funded ( $S_C$ ) and intermediated supply ( $S_M$ ) will change. The total indirect supply of funds ( $S$ ) will correspond to the value  $dS/dr$ , but, the underlying optimal bundle  $(S_C, S_M)$  will change. Specifically, assume that the supply of funds  $S$  can be written as

$$[11] \quad S = S(S_C, S_M),$$

while the level of investments is rigid and equal to  $I = I^*$ . Laying on this assumptions, we try to represent what happens to the bundle  $(S_C, S_M)$ .

To begin, we assume that a representative firm  $F$  considers  $S_C$  and  $S_M$  as perfect substitutes (we assume that the coefficients in the utility function are equal to one, so that  $I^* = S(S_C, S_M) = S_C + S_M$ ). If we assume that the relative price of  $S_C$  is lower than  $S_M$ , then  $F$  buys only  $S_C$ . But if we assume that  $S_C$  is severely rationed with respect to  $S_M$ , then  $F$  rapidly exhausts  $S_C$  and buy  $S_M$  (see Figure 1).

**Figure 1 – Crowdfunded and intermediated funds: perfect substitutes**

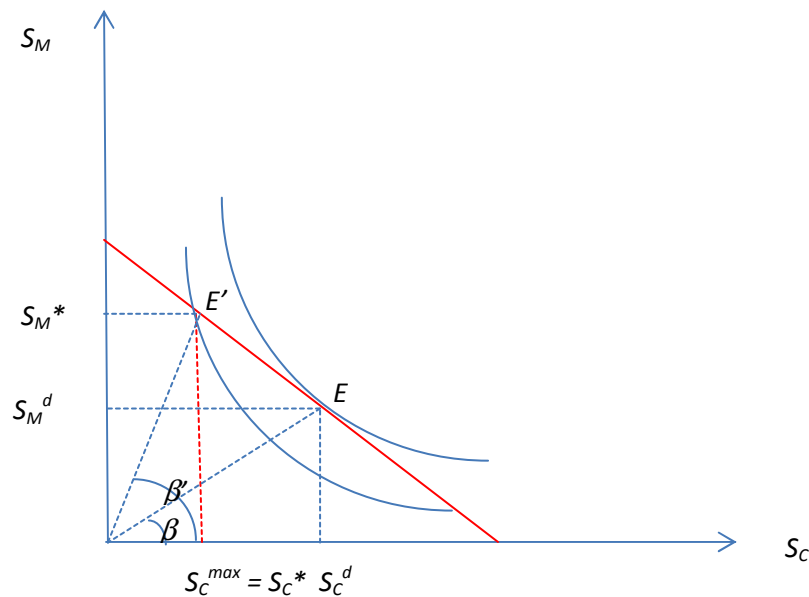


The equilibrium  $E = (S_C = 0, S_M = 0)$  is associated to  $\beta = 0$ . As  $S_C$  is rationed, the equilibrium shifts in  $E'$ .  $E'$  is associated to  $\beta = S_M^* / S_C^* > 0$ , and to a lower level of investment ( $I < I^*$ ).

Indeed, the trade-off between  $S_C$  and  $S_M$  underlines a continuum of qualitative approaches to fundraising activities, that “reveal” different preferences of  $F$  for efficiency and efficacy. Specifically, we expect that wealthy crowds are more interested than financial intermediaries in qualitative issues (i.e., the investment must have a positive real impact, in terms of environmental sustainability, innovation, welfare, social justice...), while financial intermediaries are more interested than crowds in accountability issues (i.e. the project must generate a positive financial impact). Then, the parameter  $\beta = S_M / S_C$  measures how  $F$ 's optimal choice between  $S_C$  and  $S_M$  implicitly reveals  $F$ 's concerns on the trade-off between efficiency and efficacy, in the absence of rationing effects.

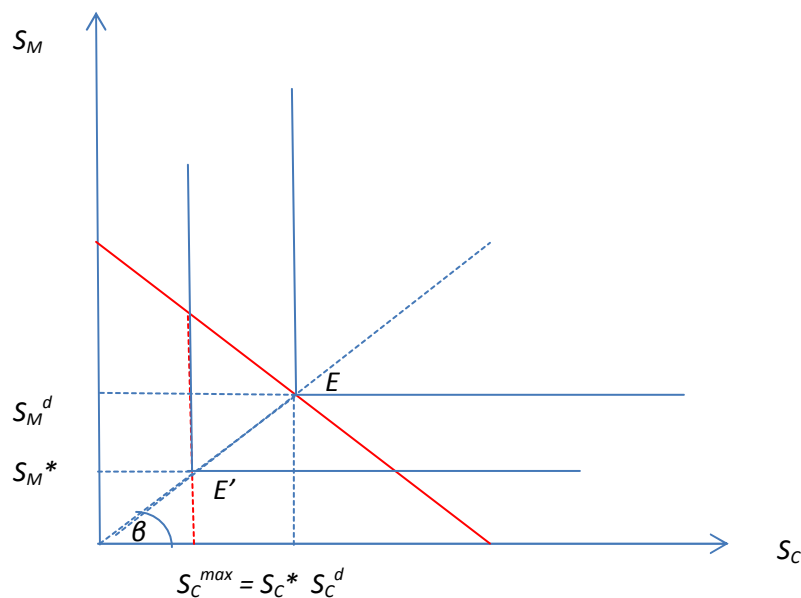
As the choice between efficiency and efficacy in absolute terms has a poor meaning, it might be more realistic to consider  $S_C$  and  $S_M$  as imperfect substitutes, in order to avoid corner solutions. In this case, it emerges how  $F$  demands a certain amount of  $S_C$  and  $S_M$ , but if  $S_C$  is rationed,  $F$  is forced to buy a higher level of  $S_M$  to compensate the under provision of  $S_C$ . Then  $F$ 's social concerns shift from efficacy toward efficiency (see Figure 2). It is worth noticing how the indifference set adopted reflects the preference of a socially-responsible firm, while more efficiency-oriented firms would have flatter indifference curves. In this case, there might be no rationing effect.

**Figure 2 – Crowdfunded and intermediated funds (imperfect substitutes)**



Finally, we consider those projects for which efficacy and efficiency are complements (Figure 3). Specifically, several investments might require some sort of social consensus due to the long term of realization, or due to the significant impact on everyday life, and more in general on social equilibria. In this case,  $S_C$  and  $S_M$  are complements, indirectly reflecting the complementarity between efficacy and efficiency. Again, if  $S_C$  is rationed, there might be an increase in the demand of  $S_M$ , but, instead of shifting her social concerns,  $F$ 's optimal choice provides a suboptimal level of investments. Due to the assumption made, the process of underinvestment is more pronounced for socially responsible firms rather than for efficiency-oriented firms, as it depends on the slope of the line that indicate the complementarity relation between  $S_C$  and  $S_M$ .

**Figure 3 – Crowdfunded and intermediated funds: complements**



Finally, we want to investigate what happens when an efficiency-oriented firm (Appendix 1) faces a rationing on  $S_M$ . When  $S_C$  and  $S_M$  are substitutes (perfect or imperfect), an efficiency-oriented firm for which  $S_M$  is rationed demands a positive quantity of  $S_C$ , shifting her social concerns for efficiency toward efficacy, providing a suboptimal level of investment. Finally, if  $S_C$  and  $S_M$  are complements, there is only underinvestment.

Crowdfunding might play a major role in the next future, and several factors might influence households' choice of investing through crowdfunding processes. Specifically, they are: the availability of financial wealth and of other non-wage incomes, rationing on the demand of funds in the  $IS$  market (i.e. a low level of investments), the awareness of the real dividends offered by crowdfunding activities (rewards, status, self esteem...), and a higher consideration for happiness (to be intended in terms of inter and intra generational equity).

As regards the  $IS$  market, we have used a simple framework to sketch how  $S_C$  and  $S_M$  might be either substitutes or complements, depending on firms' preferences. As the impact of crowdfunding is still marginal with respect to the market supply of funds, we have analysed more in depth what happens when only  $S_C$  is rationed. Specifically, we have illustrated how, if  $S_C$  and  $S_M$  are substitutes, in case of rationing a socially responsible firm might shift her optimal choice toward a higher demand of  $S_M$ , therefore shifting also her social concerns for efficacy toward efficiency. Instead, if  $S_C$  and  $S_M$  are complements, in case of rationing a socially responsible firm might decide to provide a suboptimal



level of investments, keeping constant the complementarity relation between  $S_C$  and  $S_M$ , and therefore her social values. When both  $S_C$  and  $S_M$  are rationed, we expect a mix of the two effects (underinvestment and shift of social concerns toward efficiency). Due to a credit crunch, an efficiency –oriented firm might act similarly, i.e. shifting her social concerns for efficiency toward efficacy, and providing a suboptimal level of investment.

## **6. Crowdfunding drivers**

Crowdfunding appears as a mix of innovation, technology, and entrepreneurship to create opportunities for job creation and poverty reduction. Specifically, crowdfunding is a function of all of these socio-economic trends and we want to define an indicator of crowdfunding activity which takes account of these drivers.

About centrality of Technology, Crowdfunding Industry Report in Uk, (2013), states that crowdfunding platforms are themselves technology start-ups. In their survey 80% of the platforms refers that they had created and developed the technology used on their platforms and 60% indicated that they would continue to develop their platform technical features. Another 10% of all platforms surveyed aims at the development of new or complementary services to increase or extend the capacity or functionality of their existing service. In Derev Report (2013) Communication and Technology projects counts for 14,9% of total amount of equity crowdfunding. Definitely advancement and availability of web and mobile-based applications facilitated the access to this new form of business idea funding.

Moreover, exploiting another crucial components of crowdfunding world, there is no question that the rise of the crowdfunding industry in last years is directly linked to the failure of the financial services industry , to answer demand for small business and project financing, since banks' lending activity is reduced and access to finance is more difficult (credit crunch and  $S_M$  rationed). Last Survey on the Access to Finance of Small and Medium-Sized Enterprises in the Euro Area (2013), realized in the period from April to September 2013, reports that in Euro area level, on balance, 5% of the SMEs reported an increase in their need (demand) for bank loans. SMEs in Italy and France contributed most to the net increase in the need for bank loans. In the same period, the net percentage of euro area SMEs reporting a deterioration in the availability of bank loans increased marginally. This mainly resulted from the strong deterioration signaled by Italian SMEs. About the success of bank loan applications increased in most euro area countries, except in the Netherlands, France and Italy. The percentage of SMEs reporting a fully successful application was highest in Germany (87%) and Finland (81%) and

lowest in Greece (33%) and the Netherlands (32%). About cost of funding in euro area, mainly SMEs in Spain and Italy reported an increase in interest rates. In the lights of this critical financing scenario crowdfunding could represent a new fundamental chance for access funding to a wide range of entrepreneurship activities, ranging from innovative and creative micro-enterprises to small and medium-sized enterprises (SMEs).

Consequently, we propose an index to measure the attractiveness of different European countries for the development of Crowdfunding procedures. In our opinion, this is the first step to understand the complexity of the real world situations in Europe with regard to crowdfunding. In the concluding remarks, we offer some suggestions for further research steps and for positive action, at micro and macro level, to sustain Crowdfunding procedures all over Europe.

## **7. Crowdfunding Attractiveness Index**

The Crowdfunding Attractiveness Index (CFA) should be interpreted as a fundamental indicator of the criteria that affect Crowdfunding activity, drawing part of funds S as established from Eq. 11 in Section 1. According to Groh (2012) the ability of countries to attract business activity is a function of many criteria, basically socioeconomic country characteristics, combining together by some weighting and aggregation technique. We have decided to focus on a little group of Euro Countries, so to easy understand the impact of our basic measures via graphic and table inspection. Indeed we concentrate our analysis on 11 countries made up the euro area when the euro was introduced in 1999 plus Uk because influence of this country as international crowdfunding player.

The index structure, as proposed in Table 1, is based on two levels. The first is the level of the five key driving forces The criteria of lowest orders are grouped and aggregated to the next superior level. Overall these key driving forces include 53 variables.

We considered annual data from Eurostat, European Central Bank and World Bank database with yearly data ranging from 2003 to 2013; in most cases we refer to the average value of last 3 years (eg. 2010-2013) or, due to impossibility to compute a mean value, to last data record. Rationale behind choice to consider just this three data providers is related to willingness to provide all readers and researchers with a very sound and easy to run, dataset. Not all data series are raw data, but represent sometimes ready-made index (see the Table 1, where we report comprehensive definitions and descriptions of the data series that we have used to calculate our index, their units and sources), e.g. the Strength of legal rights index.

We follow part of procedure showed in Nardo et al. (2005a) and divide the task into three steps: consistency analysis, normalization and standardization, weighting, and aggregation. If data-points are missing, we apply the third method suggested by Nardo et al. (2005a) consisting in using the latest available data.

In order to study the relationship between Crowdfunding activity and a set of socio-economic drivers we can consider the following crosssectional model:

$$[12] CFA_{i,t} = \beta_1 CI_{i,t} + \beta_2 IE_{i,t} + \beta_3 LE_{i,t} + \beta_4 HIS_{i,t} + \beta_5 CM_{i,t}$$

Where  $CFA_{i,t}$ , is Crowdfunding Atractiveness Index for country  $i$  at time (year)  $t$ ,  $CI_{i,t}$  is Corporate index for country  $i$  at time (year)  $t$  as resultant of  $\frac{\sum_i^n x_i}{n}$  components (with  $n$  equal to eleven),  $IE_{i,t}$  is Innovation Environment index for country  $i$  at time (year)  $t$  as resultant of 14 components summation,  $LE_{i,t}$  is Legal Environment index for country  $i$  at time (year)  $t$  as resultant of 11 components summation according to Table 1;  $HIS_{i,t}$  stand for Household and Internet Skill, including 8 sub-components and finally  $CM_{i,t}$  represent Credit Market index.

The sub-index Corporate index include variables related to relationship between Corporate and internet dimensions, mainly in term of business opportunities and hardware equipment. By reading, from Table 1, the list of variables comes out clear that we have variables trying to capture the effect of economic impact in corporate turnover of economic chance given from World Wide Web, that at present days represents the main way of financing for corporations ( or organizations) dealing with crowdfunding activity.

The presence of the index related to innovation environment is related to importance that innovation assuming in Crowdfunding world as also stated from European Commission, (2013). This index is composed of four sub-index, capturing different aspect of Innovation phenomenon. Indeed we have variables traditionally linked to innovation activity (eg. those included in Patent Activity Sub Index and in R&D activity). About Patent activity, we have included Community design (CD) applications variable, because Commission of the European Communities, in Commission Staff Working Document namely “Design as a driver of user-centered innovation” 2009 at page 14 report that Design “is increasingly considered a strategic tool for user-centred innovation. As such, it is a holistic and

multidisciplinary problem-solving approach that takes user needs, aspirations and abilities as its starting point and focus. The potential of design to make products, services and systems correspond better to environmental and social needs has also received increasing attention in recent years.”

We have also considered a figure showing country strength in labor market as underlined for presence of smart employment offer, as well as we have taken account of the total level of the activity of innovation, for national economy on the whole, in sub index related to macroeconomic factors.

Legal Framework and Administrative Burdens sub-index typically includes a number of variables associated with the presence of sound legal structures, with the protection of property rights and with the administrative burden of doing business that are all variates that are considered to directly affect the operational efficiencies of any kind of investment activity. This set of variables is typically present in other studies (Groh 2012, Groh et al.2008, Lieser et al.2010). In an Open survey, released at the end of 2013, by European Crowdfunding Network, there is a question “Do we need a European Crowdfunding regulation?”, results providing evidences that market player prefer to improve regulation on this new kind of funding.

Household and Internet Skill, includes eight sub-components describing typically what one needs to perform something throw a web applications both in terms of entertainment or other activities. We think that this set of variables are fundamental to take into account the evidence that, everything connected to Crowdfunding activity starts from a subject operating somewhere in the world; typically quite near to project founder, he uses internet to propose his own idea, seeking to fund it, whether he is self-employment or one-person company, or to put his offer in favor of other Crowdfunding propositions. About entrepreneurship topic, Deutsche Bank AG DB Research, (2013) report that in the past decade the number of employees and the number of self-employed persons have risen sharply. In the early stage, crowdfunding platforms can provide to self-employed start-up capital to make investments also because their difficulties to give collateral or regular income streams, as guarantee in an application for traditional banking overdraft.

Variables grouped in the Credit Market sub-index are more specifically related to the conditions and trends of demand and offer of loans, both for household and non financial corporations, since from previous evidences (Crowdfunding Industry Report in Uk, 2013) rise of the crowdfunding industry in recent years is also related to the failure of the financial services industry to answer demand for small business.

Despite the importance of social networks topic, both in Eurostat and Worldbank Data System there isn't any updated figures regarding this theme. Therefore, in the construction of Crowdfunding activity

index we have not included variables dealing with social relationship. As we recognize the importance that, social media connections have in raising money directly from web of relationships for growth SMEs or start-ups, we hope that in near future, we will be able to include this fundamental component. For instance at first glance, we think that for a better understanding of social components as determinants of specific Crowdfunding segments, we should consider primarily both, number of economic agents, eg Number of NGOs or people making donations in a certain year, and funding flow connected with donations and charity. Crucial it will also consider variables taking into account the extension of the social network of households. In this sense, in Italy, Istat (eg. National Statistic Department) provides variables related to number of friends in social network and time spent for religious, cultural or social affairs. While we're writing this paper, we have not data about social phenomenons at European level: in fact, the last updated data by Eurostat were collected in 2000 (Time Use Survey).

All variables need to be normalized to a common scale before they are aggregated into composite indicators. In order to aggregate the index, all data points need to be normalized to a common scale. An overview of various methods and a discussion about the particular advantages and disadvantages can be found in Freudenberg (2003), Jacobs et al. (2004), and Nardo et al. (2005a). Ranking is the simplest normalization technique and is not affected by outliers and is defined as:

$$[13] I_{qc}^t = \text{Rank}(x_{qc}^t)$$

where  $x_{qc}^t$  is the value of the indicator  $q$  for country  $c$  at time  $t$ . Usually this measure is compared with a reference indicator. This reference point can be an external benchmark country, a sample's average country or any aimed target. This method is defined by the following formula:

$$[14] I_{qc}^t = \frac{x_{qc}^t}{x_{qc=\bar{c}}^t} \quad \text{or} \quad I_{qc}^t = \frac{x_{qc}^t - x_{qc=\bar{c}}^t}{x_{qc=\bar{c}}^t - x_{qc=\bar{c}}^t}$$

where  $x_{qc}^t$  is the value of the indicator  $q$  for country  $c$  at time  $t$ .  $x_{qc}^{t_0}$  is the value of the indicator  $q$  for country  $c$  at time  $t_0$ .  $\bar{c}$  is the reference country. According to this method countries receive scores

depending on their distance relative to the bottom of the list, for a certain variable. The score of twelve would be given to the best in class, since we have 12 countries for each single measures.

Weights can have a significant effect on the overall composite indicator and the country rankings. A number of weighting techniques exist in literature. Nardo et al. (2005a) propose factor analysis, and data development analysis. Kaufmann et al. (1999 and 2003) use an unobserved component model. Other weighting techniques are derived from analytic hierarchy processes, as described in Forman (1983), or Saaty (1987), or from conjoint analysis, as in Green and Srinivasan (1978), Hair et al. (1998), and McDaniel and Gates (1998).

According to Berlage and Terweduwe (1988) we use approach with equal weights among both all the sub-index items and superior index levels. Equal Weighting implies an equal contribution of all sub-indicators to attractiveness, which is arguable. According to Nardo et al. (2005a), most composite indices rely on equal weighting. Overall, the benefit of this method is that the construction and allocation of level 2 constructs to each key drivers is fully neutral due to a fully equal weighting scheme. Indeed this implies an equal contribution of all level-1 variables to the Crowdfunding AttractivenessIndex (CFA), which could be arguable. The weight of the variables forming the first level of the index, that is each key drivers, depends on the number of data series included in each one. For example, Innovation Environment consists of 16 variables, while Corporate sub-index consists of twelve. Overall, we use 50 data series to construct the CFA index, and hence, each data series in Innovation Environment section receives a weight of 1/16, which is 0.0625, while the weight of a figure in Corporate is 1/12 – 0.083. Equal weighting, as discussed by Nardo et al. (2005a), can be the result of insufficient knowledge about causal relationships, ignorance about the correct model to apply or even stem from the lack of consensus on alternative solutions.

There also exist various procedures for the index aggregation Nardo et al (2005a and 2005b) distinguish additive, or linear, methods, geometric and non-compensatory multi-criteria analysis. Various author (Groh et al. 2008, Lieser et al. 2010, Groh et al. 2012) focus on linear and geometric aggregation. In particular, linear aggregation is an additive method and is defined as:

$$[15] \bar{x} = \sum_i w_i x_i, \text{ where } 0 \leq w_i \leq 1, \text{ and } \sum_i w = 1$$

while Geometric aggregation is defined as:

$$[16] \bar{x} = \prod_i w_i x_i, \text{ where } 0 \leq w_i \leq 1, \text{ and } \sum_i w = 1$$

Ebert and Welsch (2004) recommend that the linear aggregation method is useful when all sub-indicators have the same measurement unit, and geometric aggregation is better suited, if non-comparable and strictly positive sub-indicators are expressed in different ratio scales. Nardo et al. (2005a) highlight that linear aggregation assigns base indicators proportionally to the weights, while geometric aggregation rewards those countries or those sub-indicators with higher scores. Overall, a shortcoming in the value of one variable or sub-index can be compensated by a surplus in another. Compensability is constant in linear aggregation, while it is smaller in geometric aggregation for the sub-indicators with low values. Therefore, countries with low scores benefit from linear aggregation. We use linear aggregation methods because, in our data sample, we have some missing values that we have threaded as zero values. In this way the geometric aggregation may lose statistical meaning.

## **8. Crowdfunding Attractiveness Index in the Euro Area**

### **8.1. Data Sample**

The focus in this paper is building an attractiveness index of the Euro 11 plus Uk for Crowdfunding activities. This group is formed on by: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and United Kingdom.

The first step in constructing the index is to specify appropriate data series and the sample of countries to be included. The task is to find adequate measures which share common characteristics with one of the five key drivers identified for our country sample.

We focus on Eurostat and World Bank Indicator Database, as they are considered as an example of the most sound publicly available database, also in order to achieve reproducible and unbiased results. In Table 1 (see Appendix 2) we present our final selection of 50 individual raw data series, their units and sources, that allow coverage all of the countries grouped in Euro 11 plus Uk country group. Of course, the selection remains arguable: we might include additional data series, or exchange some of them for alternative series, or we could have excluded some figure in order to avoid an over-determining of the index.

## 8.2. Country Ranking

By applying the aforementioned procedure, using normalization and linear aggregation, we calculate the CFA Index. We obtain a global country ranking as shown in Figure 1 (see appendix 2). Below, spider charts and bar charts, allow comprehensive comparisons of all our sample countries.

Figure 1 presents the index rankings for the Euro 11 plus Uk countries. The graphs confirm that there are quite substantial differences Euro countries, indeed United Kingdom Netherland, Finland and Germany doubled the overall CFA measure of Italy.

About general CFA index, the best performer with a value equal to 7.5 is United Kingdom, followed by Netherland and Finland with 7.1 and Germany with 7.0.

Looking at Histograms showed in Figure from 2 to 6, representing strength and weakness in each of five subcomponents of general CFA index, it comes out that 4 country best in class, introduced just before, are the best performing country in four of the five key drivers: Corporate, Credit Markets, Innovation Environment and Household and Internet Skill. For last one key drivers, that is Legal Environment, best performer is Spain.

Countries like Italy and Portugal, which share (with Spain) the last positions of the overall ranking, suffer mainly in terms of their bad performance about capability of Household to interact with smart technologies together with low competence of local enterprises in doing business via internet.

In this framework, in which every original variables and every sub index is aggregated in a linear model, ranking figures shows that final performance is mainly due to Index Credit Market and Index Legal Environmental (despite top performer for Spain). Visual analysis is also endorsed by a robustness analysis (here not showed) of rank difference minimization. Closing this section we want, once again, underline that we are awake on limits of this preliminary analysis, due to the lack of real interactive terms between variables (and sub index) and real target dependent variable, represented from crowdfunding activity, as typically emerge from a structured econometric model (even in the simple form of a multivariate regression specification). This, as introduced at the beginnings of this section is due to lack of public data. More about linear aggregation, we can understand, at first glance what real works in a quite straightforward way. Another main critical point is the total lack of variables representative of social action typically connected to forms of charity and reward based crowdfunding. Nevertheless, it seems a worthwhile work, in particular for introducing a framework of public variables useful for more complex analysis when crowdfunding business data will be available. Nonetheless, we think that it exists an essential robustness check of intuitions and of the related proxy at the bottom of our CFA Index, coming directly from a remarkable market analyst. For our knowledge at present,



Massolution is the only industry analyst, producing more complete and sound research about international firm specializing in the crowdsourcing and crowdfunding industries. Massolution tracks Crowdfunding Platforms (CFPs) worldwide, focusing on different segment of this activity. Looking at 2012 Crowdfunding Industry Report comes out that first 3 best country performer in Europe, for number of market players in Crowdfunding Industry, United Kingdom (the best) Netherlands, and Germany, are also 3 of 4 best performer for our CFA index. Spain is in Europe the fifth market as number of working platform; it's also best performer of one of our 5 sub indexes. These evidences clearly states that some correlation exists between state of the art and our measure. We think that CFA Index and, most of all, its drivers, can represent a good starting point for more performing and informative proxy of Crowdfunding world.

## 9. Summary and concluding remarks

In this paper we have briefly illustrated the linkages between the standard lines of credit (financial intermediaries, public sector, private investors...) and the recent development of *crowdfunding* phenomenon. Specifically, we have reviewed the main streams of literature on crowdfunding in order to identify which are the main actors involved, and which are the most relevant theoretical and empirical issues developed. Then, we have highlighted how “*productiveness*” substitutes productivity in households’ accountability. Finally, we have built an indicator of crowdfunding awareness (CFA), and we have used it to measure in a selected group of countries (including Italy) which might be the major drivers of a potential crowdfunding expansion.

More in detail, in paragraph 2 and 3 we provide an answer to the first issue presented.

In paragraph 4 we provide an answer to the second issue presented.

Specifically, we highlight how personal wealth and income, household production (or, more in general, the existence of resilient activities) and social capital play a decisive role in defining the level of labour and capital supply to the economic system.

In particular, we “enrich” the standard neoclassical household’s budget constraint obtaining the following equation:

$$pC + (pc + r)'k + r(A - k) + wL = pC^o + sE,$$

where  $pc$ ,  $r$ ,  $k$ ,  $s$ ,  $E$ , are  $(1 \times n)$  vectors of variables and  $I$  is a  $(n \times 1)$  identity vector. According to this microfoundation, we expect that in a resilient system households will invest part of their wealth in

complementary investments through crowdfunding procedures, as, especially during crises, they might be interested in opening a “field” of new income opportunities. More generally, when  $S > I$ , resilient activities allow households to increase their income by an amount equal to the monetary dividends paid on crowdfunded investments  $\sum_j r'_j k_j$ , plus the real dividends paid in terms of consumption good  $\sum_j c_j k_j$ . On the other hand, when  $S < I$ , the existence of complementary investments allow firms to obtain additional funds with respect to those ones available on the standard financial market. In both cases, it seems that crowdfunding can play a major role in facilitating the achievement of an equilibrium between households’ consumption and expenditure, and between investments and saving. In paragraph 5 we provide an answer to the third research issue by developing a framework that we use to illustrate the trade-offs and the complementarities between the standard and the crowdfunded supply of funds. Indeed, for a given real interest rate  $r$ , the equilibrium ( $I^* = S^*$ ) is obtained for a certain mix of crowdfunded and intermediated funds, and a change in  $r$  implies both a quantitative and a qualitative change in the equilibrium, meaning with “qualitative” the fact that there is a change in the ratio between crowdfunded ( $S_C$ ) and intermediated supply ( $S_M$ ). We have assumed that the supply of funds is a function of ( $S_C, S_M$ ), while the level of investments is rigid and equal to  $I^*$ . Laying on these assumptions, we have illustrated what happens to the bundle ( $S_C, S_M$ ) according to several firms’ preferences and several rationing effects.

As the impact of crowdfunding is still marginal with respect to the market supply of funds, we have focused on what happens when only  $S_C$  is rationed. Specifically, we consider a socially responsible firm and an efficiency-oriented firm. Then, we illustrate how, if  $S_C$  and  $S_M$  are substitutes, a socially responsible firm demands a certain amount of  $S_M$ , therefore shifting also her social concerns for efficacy toward efficiency. Instead, if  $S_C$  and  $S_M$  are complements, a socially responsible firm provides a suboptimal level of investments, keeping constant the complementarity relation, and therefore her social concerns. When both  $S_C$  and  $S_M$  are rationed, as it is happening since the beginning of the recent financial crisis, we expect a mix of the two effects (underinvestment and shift of social concerns toward efficiency). Something similar happens to an efficiency-oriented firm when  $S_M$  is rationed. Specifically, when  $S_C$  and  $S_M$  are substitutes, an efficiency-oriented firm demands a positive quantity of  $S_C$ , shifting her social concerns for efficiency toward efficacy. If also  $S_C$  is rationed, a mix of shifting concerns and underinvestment is at work. Instead, if  $S_C$  and  $S_M$  are complements, there is only underinvestment. Finally, we illustrate how the parameter  $\beta = S_C/S_M$  measures firms’ concerns on the

trade-off between efficiency and efficacy, and how rationing effects can modify the value assumed by this parameter.

After having provided a microeconomic *rationale* for the existence of crowdfunding processes, we focus on the answer to the fourth research issue, and namely on the empirical analysis of the main determinants of crowdfunding processes (paragraphs 6,7,8). Specifically, the awareness of crowdfunding is measured by adopting an attractiveness index for Crowdfunding activities (CFA) of the Euro 11 countries plus UK, obtained by a set of 50 variables accounting for the major crowdfunding drivers.

The CFA algorithm is a function of five main drivers, as explained in the following equation:

$$CFA_{i,t} = \beta_1 CI_{i,t} + \beta_2 IE_{i,t} + \beta_3 LE_{i,t} + \beta_4 HIS_{i,t} + \beta_5 CM_{i,t}$$

where every components underlines a subset of indicators, representing the strength in specific background, namely; “*Corporate*”, “*Credit Markets*”, “*Innovation Environment*”, “*Household & Internet Skill*” and “*Legal Environment*”, Each of these elements is coupled to a score obtained by ranking the data collected for each observation. The first step in constructing the index has been that of specifying the time series and the sample of countries to be included. Then, as regards data, we have focused on Eurostat and on the World Bank Indicator Database, as they are considered the most sound publicly available database, also in order to achieve reproducible and unbiased results. In Table 1 we present our final selection of 50 individual raw data series, while Figure 1 shows the global country ranking obtained through the CFA index. It is worth noticing how the best performer country with a value equal to 7.5 is United Kingdom, followed by Netherland and Finland with 7.1, and Germany with 7.0. By looking at each of the five subcomponents of general CFA index, it comes out that the four country best in class are also the best performing countries in four of the five key drivers: “*Corporate*”, “*Credit Markets*”, “*Innovation Environment*” and “*Household & Internet Skill*”. For the last key driver, that is “*Legal Environment*”, the best performer is Spain.

Countries like Italy and Portugal, which share with Spain the last positions of the overall ranking, suffer an underdevelopment of the crowdfunded supply mainly due to households’ scarce capability to interact with smart technologies and due to the low competences of local enterprises in doing business via internet. Finally, ranking figures show that the overall country’s performance is mainly due to the “*Credit Market Index*” and the “*Legal Environmental Index*” (despite top performer for Spain).

We conclude this research trying to highlight some policy issues. Specifically, it emerged how crowdfunding is a “financial novelty” introduced also in the JOBS Act by the US Government, but still at work as an independent activity. Moreover, crowdfunding is a phenomenon that presupposes an

active role of households in selecting and financing specific projects or activities of interest. Then, its development seems to be strictly related to a process of households' awareness of the economic processes and participation to the economic life. In this perspective, crowdfunding might be both a driver of better life conditions and a consequence of them. As regards industrial policy, it emerges how crowdfunding might facilitate the definition of an exit strategy from the crisis, as households might endow firms with additional capital at lower prices in exchange of higher social and environmental concerns. Specifically, households' voice might support firms' commitment to their mission, when socially responsible, determining a shift in strategic management's concerns toward efficacy rather than efficiency<sup>3</sup>. Finally, empirical evidence suggests that innovation and ICT are important requirements in driving crowdfunding expansion. Then, banks might facilitate crowdfunding processes in those countries where the microeconomic operators (households and firms) are lagging behind instead of participating to the new economy, by promoting the widespread diffusion of crowdfunding platforms and the start-up processes of new intermediaries in the crowdfunding sector. Moreover, banks might "reward" crowdfunded firms with additional credit, as implicitly crowdfunding signals a loyalty to consumers' commitments, and a certain merit of credit, that, even if not related to financial parameters, depends on the efficacy of the economic activity developed. Specifically, when firms' activities are effective, capital stocks (human, social, economic, environmental) increase, and with them the wealth of a nation. Moreover, due to additional information available on the firm and on its "crowd", the bank reduces the level of uncertainty and therefore of risk. For these reasons (an expected improvement in financial stability, a higher level of deposits, and a reduction of the risk premium), banks might provide with credit crowdfunded firms asking for a lower interest rate. According to this view, households, firms and banks might participate to a common process of cooperation, growth and development, under the legal framework provided and enforced by the public sector, revitalizing the European economy, and allowing for more employment and better real wages, obtained through a higher labour productivity. Specifically, Southern Europe, as it has been more hit by the crisis, might be the right place to invest through equity-based crowdfunding, and this might facilitate also the standard provision of funds. Indeed, capital revenues might be obtained by sustaining those firms that prove to be able to produce a real impact in terms of higher social benefits, innovations, and better welfare. In this way, a mix of European solidarity, accountability and innovation might

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<sup>3</sup> How it has been explained in Paragraph 5 by efficacy we mean the achievement of an expected positive impact in terms of environmental sustainability, innovation, welfare, social justice... according to the objectives explicitly stated in a strategy. We refer to efficiency, instead, to indicate standard firm's accountability concerns (profit must be greater or equal than zero).

successfully counterbalance those “bail out” effects that put at risk the sustainability of the European Monetary Union and of the European Single Market, recalling the major issues written in the European Treaty and too often postponed due to fiscal and monetary emergencies.

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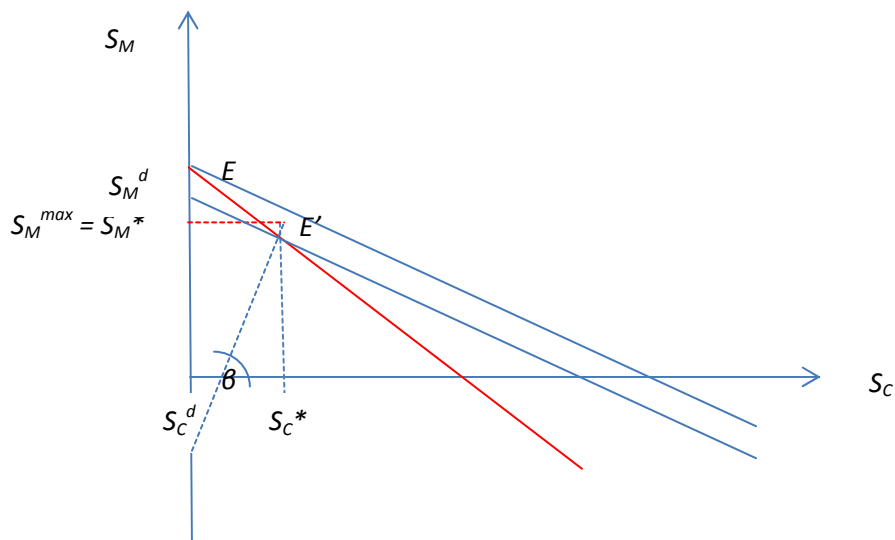
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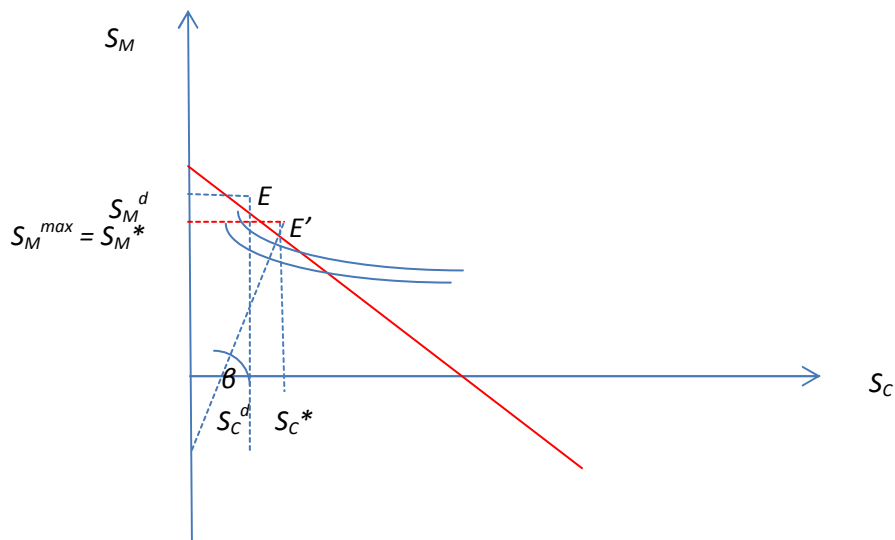


**Appendix 1. The optimal choice for an efficient firm.**

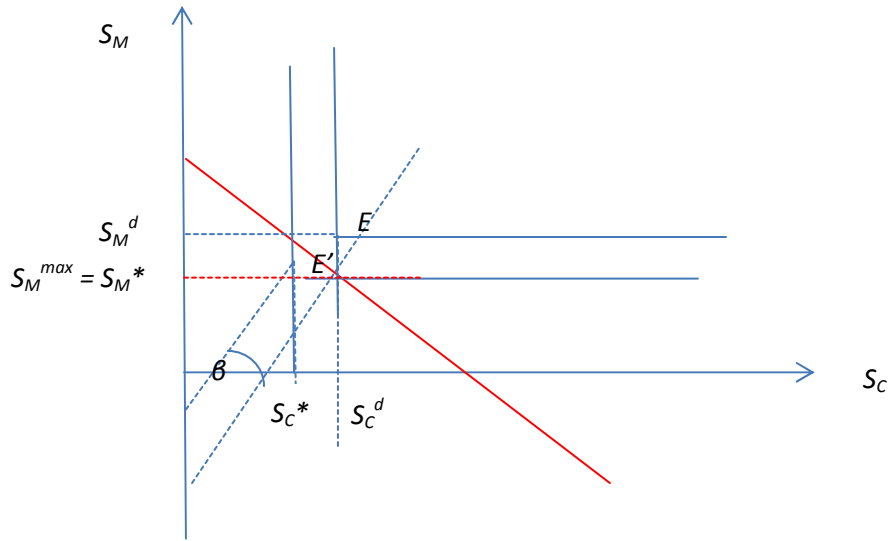
**Figure 1 – Crowdfunded and intermediated funds: substitutes**



**Figure 2 – Crowdfunded and intermediated funds (imperfect substitutes)**

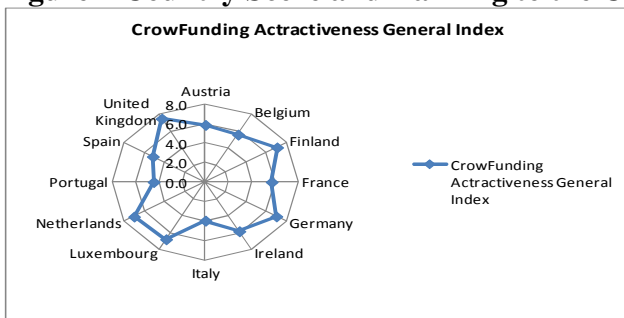


**Figure 3 – Crowdfunded and intermediated funds: complements**

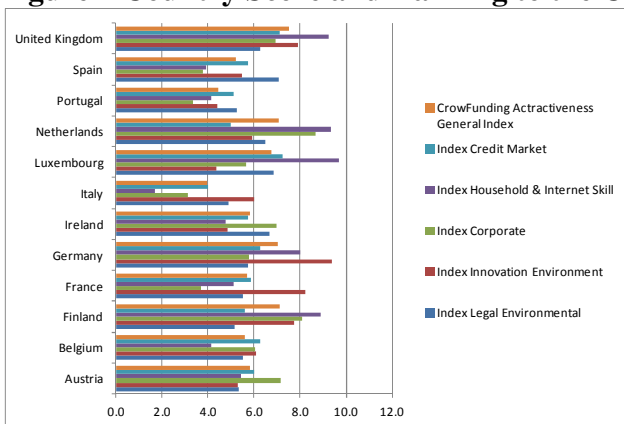


**Appendix 2. Figures and table**

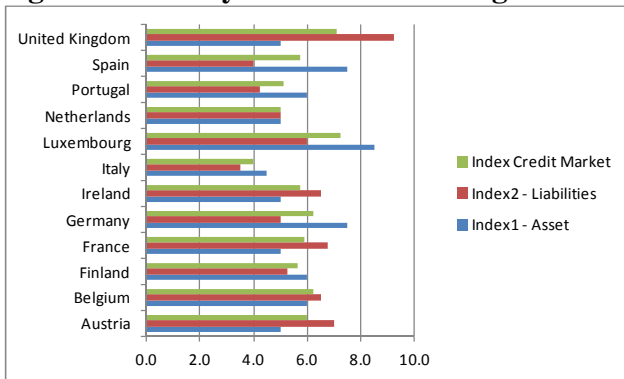
**Figure 1 Country Score and Ranking to the CFA Index 2013**



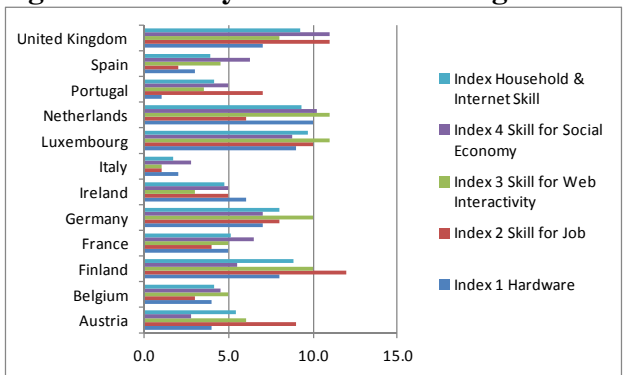
**Figure 2 Country Score and Ranking to the CFA Index 2013- Strengths and Weaknesses**



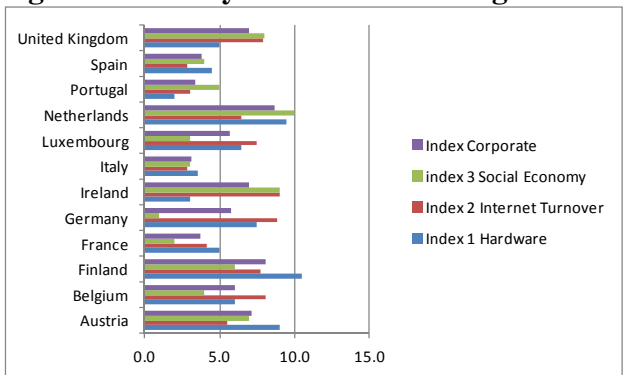
**Figure 3 Country Score and Ranking to the CFA Index 2013- Credit Market**



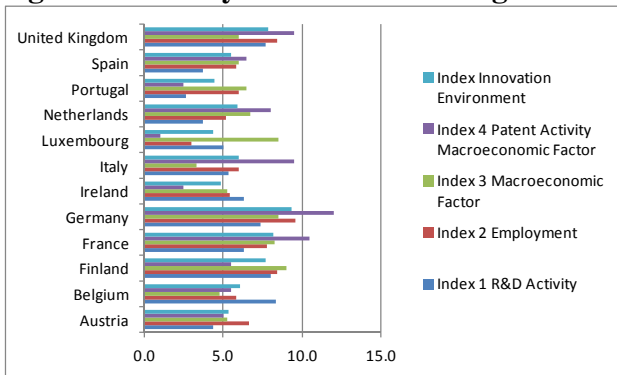
**Figure 4 Country Score and Ranking to the CFA Index 2013- Household & Internet Skill**



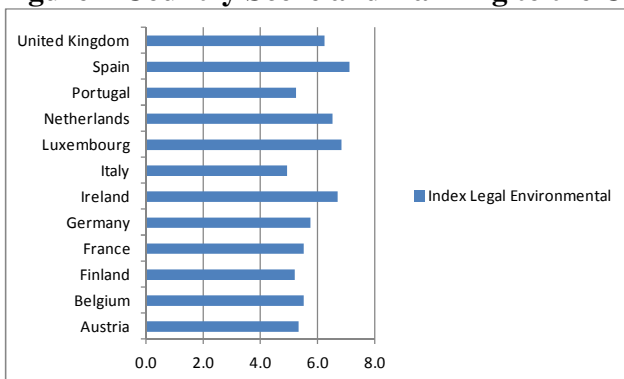
**Figure 5 Country Score and Ranking to the CFA Index 2013- Corporate**



**Figure 6 Country Score and Ranking to the CFA Index 2013- Innovation Environment**



**Figure 7 Country Score and Ranking to the CFA Index 2013- Legal Environment**



**Table 1. Raw Data Sample and Sources**

#	Name	Unit	Source
<b>1</b>	<b>Corporate</b>		
	<b>Hardware</b>		
1.1.	Enterprises - level of Internet access	Percentage of enterprises	Eurostat
1.2	Enterprises - computers: devices and communication systems	Percentage of enterprises	Eurostat
	<b>Internet Turnover</b>		
1.3	Digital single market - promoting e-Commerce for businesses	Percentage of enterprises	Eurostat
1.4	Internet purchases by individuals	Percentage of individuals	Eurostat
1.5	Share of enterprises' turnover on e-commerce	%	Eurostat
1.6	Enterprises sending and/or receiving e-invoices	Percentage of enterprises	Eurostat
1.7	Enterprises having received orders online (at least 1%)	Percentage of enterprises	Eurostat
1.8	Enterprises' turnover from e-commerce	Percentage of turnover	Eurostat
1.9	Enterprises purchasing via Internet and/or networks other than Internet	Percentage of enterprises	Eurostat
1.10	Enterprises having purchased online (at least 1%)	Percentage of enterprises	Eurostat
	<b>Social Economy</b>		
1.11	Purpose of social media use	Percentage of enterprises	Eurostat
<b>2</b>	<b>Innovation Environment</b>		
	<b>R&amp;D Activity</b>		
2.1	Percentage of the ICT sector on GDP	Percentage of the ICT sector value added	Eurostat
2.2	Percentage change of value added by ICT sector at current prices	Percentage change of value added of the ICT sector	Eurostat
2.3	Total intramural R&D expenditure	Euro per inhabitant	Eurostat
	<b>Employment</b>		
2.4	Percentage of the ICT personnel on total employment	Percentage of the ICT personnel on total employment	Eurostat
2.5	Total researchers, by sectors of performance	Head count	Eurostat
2.6	Doctorate students in science and technology fields - Total	% of the population aged 20-29 years	Eurostat
2.7	Total R&D personnel and researchers as % of total labour force	Percentage of active population	Eurostat
2.8	Self-employment	Head count	
	<b>Macroeconomic Factor</b>		
2.9	High-tech exports - Exports of high technology products as a share of total exports	Percentage	Eurostat
2.10	Share of government budget appropriations or outlays on research and development	% of total general government expenditure	Eurostat
2.11	Turnover from innovation	% of total turnover	Eurostat
2.12	Venture capital investments	% of GDP	Eurostat
	<b>Patent Activity</b>		
2.13	High-tech patent applications to the EPO	Number	Eurostat
2.14	Community design (CD) applications	Number	Eurostat
<b>3</b>	<b>Legal Environment</b>		
3.1	Time to import	days	World Bank (WDI)
3.2	Time required to enforce a contract	days	World Bank (WDI)
3.3	Procedures to register property	number	World Bank (WDI)
3.4	Start-up procedures to register a business	number	World Bank (WDI)
3.5	Procedures to enforce a contract	number	World Bank (WDI)
3.6	Cost of business start-up procedures	(% of GNI per capita)	World Bank (WDI)
3.7	Time to resolve insolvency	years	World Bank (WDI)
3.8	Time to prepare and pay taxes	hours	World Bank (WDI)
3.9	Strength of legal rights index	(0=weak to 10=strong)	World Bank (WDI)
3.10	Time required to register property	days	World Bank (WDI)
3.11	Time required to start a business	days	World Bank (WDI)
<b>4</b>	<b>Household &amp; Internet Skill</b>		
	<b>Hardware</b>		
4.1	Households with access to the Internet at home	Percentage of households	Eurostat
	<b>Skill for Job</b>		
4.2	Way of obtaining e-Skills	Percentage of individuals	Eurostat
	<b>Skill for Web Interactivity</b>		
4.3	Individuals using the Internet for finding information about goods and services	% of individuals aged 16 to 74	Eurostat
4.4	Individuals using the Internet for downloading software	% of individuals aged 16 to 74	Eurostat
	<b>Skill for Social Economy</b>		
4.5	Individuals using the Internet for uploading self-created content	% of individuals aged 16 to 74	Eurostat
4.6	Individuals using the Internet for participating in social networks	% of individuals aged 16 to 74	Eurostat
4.7	Individuals using the Internet for selling goods or services	% of individuals aged 16 to 74	Eurostat
4.8	Individuals using the Internet to buy or order online content	% of individuals aged 16 to 74	Eurostat
<b>5</b>	<b>Credit Market</b>		
	<b>Asset</b>		
5.1	Short-Term Loans to Non Financial Corporations	Eur Billion - Current Prices	ECB Euro Area Accounts
5.2	Long-Term Loans to Non Financial Corporations	Eur Billion - Current Prices	ECB Euro Area Accounts
	<b>Liabilities</b>		
5.3	Short-Term Loans to Non Financial Corporations	Eur Billion - Current Prices	ECB Euro Area Accounts
5.4	Long-Term Loans to Non Financial Corporations	Eur Billion - Current Prices	ECB Euro Area Accounts
5.5	Short-Term Loans to Households	Eur Billion - Current Prices	ECB Euro Area Accounts
5.6	Long-Term Loans to Households	Eur Billion - Current Prices	ECB Euro Area Accounts