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E SUL NONPROFIT

WORKING PAPER N. 12

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**INDICE**

***Abstract***

*The likelihood of success of grantmaking on large scale projects depends in general on pieces of information widely dispersed and privately held by recipients, public agencies, nongovernmental organizations and other interested parties. In this paper we discuss how philanthropists could exectively make use of suitably designed information markets to help them gathering dispersed knowledge and beliefs on the potential for social impact of innovative projects on the one hand, and in supporting the deliberation process regarding the allocation of grants on the other one.*

**JEL codes**: C53, D64, D80.
**Keywords**: Philanthropy, Grantmaking deliberative process, Information markets, Italian banking foundations

## 1. *Introduction*

In a modern society, knowledge, beliefs and opinions on the socio-economic needs most deserving immediate action, as well as on the most effective ways to solve them, are generally heterogeneous and dispersed among a large number of individuals. As a result, public institutions and private organizations aimed at supplying welfare-enhancing cash or in-kind benefits could take a considerable advantage by having at their disposal a battery of appropriate instruments to retrieve and harness such a dispersed information.

This is particularly true as soon as the scale of operation of grants and programs deployed by grantmaking charitable foundations and venture philanthropists overcome the local dimension, to reach an extent capable to seriously attain the achievement of lasting and decisive social changes. Such an objective, which can be alternatively summarized under the heading of *high-impact philanthropy* (Grace and Wendroff, 2001) or *strategic philanthropy* (Crutchfield *et al*., 2011), requires that the donor becomes engaged in a attentive process of discovering and articulating clear philanthropic values and goals, and to develop a proactive strategy to achieve them, collaborate with dedicated nonprofit organizations and social entrepreneurs, and evaluate grantmaking processes to determine whether desired impacts and goals are being achieved.

The key issue we want to address in this paper consists in exploring some mechanism design issues related to how philanthropic

organizations can obtain valuable information on the likely costs and benefits of different projects, and consequently implement effective grantmaking decisions, given that the relevant pieces of information they need are not only largely dispersed, but in several cases also belong to realms of knowledge quite far from the expertise of their board members. In fact, additional instruments to rationally inform the process through which charitable foundations select projects and make grants may help overcome some of the shortfalls and biases highlighted in the literature, like the difficulties in identifying and assessing the relevance of priorities (Leat, 1995) or the search for legitimacy from academic and elite recipients (Aksartova, 2003).

In recent years an increasing attention has been devoted – both in academic and business circles – to so-called *information* (or *prediction*) markets (Wolfers and Zitzewitz, 2004; Arrow *et al*., 2008), which are (typically web-based) markets where participants trade securities whose payoffs are tied to uncertain future events. While the theoretical motivation for their use resides in the ability of competitive prices to reveal and aggregate pieces of information dispersed among traders, their attractiveness is due to their proved ability to return accurate market-based predictions on future outcomes in a wide range of domains, ranging from political elections to sport events. The actual price of a contract can be interpreted as a statistic associated to the market's expectation of the likelihood the underlying event will occur, the exact metric being

dependent on contract specifications and market design.

We shall argue that two instances of information markets can be usefully applied to help the grantmaking activity of charitable foundations, in particular if their aim is that of promoting and/or funding large-scale projects involving broad geographical areas or wide social groups. The first one – usually called *idea markets* (Hanson, 1992; Spears *et al*., 2009) – is a mechanism for the generation and simultaneous evaluation of brand new projects aimed at attacking and solving social needs, beyond those devised by the managing board of the funding organization. Idea markets use stocks to represent new project ideas, let participants trade shares of those stocks on a virtual marketplace, and exploit the informational efficiency of markets in interpreting prices as indicators of the likely success of the new ideas. The second proposed application deals with *decision* (or *deliberative) markets* (Hanson, 1999; Berg and Rietz, 2003) in which properly designed conditional contracts based on combinations of future events can be exchanged, and use it to elicit and aggregate information to be employed in the deliberative process regarding which project deserves funding among a portfolio of alternative items.

There are three key differences between idea and decision markets. First, while the set of available stocks in decision markets is fixed by the initiator, in idea markets it is variable and dependent upon the number of new suggestions from market participants. Second, in a

decision market the final payoff of a stock depends on the realization of a specific event at a given (possibly distant in time) future date, while in an idea market the underlying objective value of a security is based on the average opinion of traders. Third, given that only a subset of the new creative projects elicited in an idea market will be implemented, while the remaining ones will never be developed, the outcome of the market – represented by the rank-order of contract prices – cannot be externally validated ex-post. These distinctions require a careful examination of the details regarding the market structure and design.

The remainder of the paper is organized as follows. In Section 2 we review the difficulties an endowed foundation encounters in traditional grantmaking deliberation processes, especially if the projects under scrutiny involve a scale which goes far beyond the expertise of its board members. A particular attention will be devoted to the Italian case, in which a prominent role in the philanthropic capital market is played by banking foundations. In Section 3 we discuss the possibility to gather relevant pieces of information through suitably designed information markets, review the available evidence on their performance in academic and business applications, and explore the theoretical arguments justifying their success. Section 4 contains a proposal to use information markets as a device to support grantmaking decisions in two distinct phases of the deliberative process, that is the emergence of innovative ideas for

social improvements deserving funds and the gathering of information on the likely effectiveness of selected projects, respectively. Section 5 deals with several issues in market design and implementation. Section 6 concludes.

## 2. *Grantmaking for large scale projects*

Research conducted over the last fifteen years on the roles and contributions of grantmaking foundations has highlighted that their ability for strategically creating social value passes through four channels (Porter and Kramer, 1999; Rimel, 1999): 1) selecting the best grantees; 2) helping other funders to improve their selection procedures by signalling which grantees deserve support because of their effectiveness; 3) improving the performance of grant recipients; 4) devising and deploying innovative approaches to solve social needs. The last point, in particular, allows us to draw attention on the emphasis several American and British foundations have recently put on the adoption of a creative style in finding solutions to the most pressing social challenges (Ahneir and Leat, 2006), and to act as agents of change in advancing and legitimating new institutional and organizational forms in vital areas like education and environmental protection (Bartley, 2007; Quinn *et al*., 2013).

In fact, endowed foundations who want to experiment innovative initiatives aimed at effectively improving the lives of people on a large scale – that is, to address transformative solutions aimed at

expanding the set of functionings and capabilities people are feasible to achieve at a nation-wide level[1] – find themselves in a peculiar and favourable position, given that their status shields them from contingent political pressures and market constraints. Hence, they can take larger risks and a longer view if compared to public administrations or for-profit corporates, and afford the possible failure of a project without fatal consequences. According to the strategic philanthropy view, making a grant is just one step in a multifaceted process that comprises as additional stages the creation and dissemination of knowledge on how to afford big problems, the introduction and spread of new ideas for solving them, and the arrangement of effective methods for the evaluation of the proposed solutions.

In the absence of the constellation of family-based charitable foundations typical of the Anglosaxon tradition (Barbetta, 1999), in Italy a prominent role in funding social enterprises and nonprofit organizations according to a strategic approach is played by an array of peculiar legal entities called banking foundations.[2] Defined by the law as nonprofit, private and self-determined organizations devoted to the promotion of economic development and social utility, they were created at the beginning of the 1990s through an act of

[1] Clearly, we are referring to a concept of welfare inspired by the capabilities approach developed e.g. in Nussbaum and Sen (1993).

[2] For an introduction to their origin and their evolution during the last two decades we refer to Corsico and Messa (2011) and Zagrebelsky and Pastore (2011), among the others.

institutional engineering designed to facilitate the path of privatization of the Italian banking sector. In 2012 the combined amount of assets reported in their balance sheets was equal to 51 billion euros, an endowment which has allowed them to make grants for 16.6 billion euros over the period 2000-12 (ACRI, 2013). In order to prevent an excessive fragmentation of donations, the banking foundations are required to identify a limited number of "relevant sectors" - to be chosen every three years from a list arranged by the legislator - and to focus on them at least half of the grants (in values) approved annually. At the same time, however, they are required to deliver most of their donations in a geographical area that coincides with the one where the saving bank from which they were spinoffed originally operated.

Regardless of the size of their endowment,[3] the latter requirement clearly limits the possibility to seriously attack social needs whose scope goes well beyond the territorial boundaries in which they are situated, and it calls for the need to activate cooperative agreements among several foundations. However, as shown theoretically by Duncan (2004), the strategic interaction among donors intrinsically motivated to “make a difference” generates a negative gift externality, in that giving by others can make an impact philanthropist feel worse off and induce her to reduce her contribution. This in part explains why in Italy the number of

[3] In 2012, five foundations could count on an endowment higher than 600 million euros each.

collaborative programs targeted at large scale projects has been so far quite limited and has involved small groups of selected banking foundations, the most notable examples being a project to fund basic and applied research in agro-food sciences (Ager), a joint venture to help reducing maternal deaths in four sub-Saharian African countries (Foundations4Africa), a project to foster the development of local communities (Promozione dello Sviluppo del Territorio), and a program aimed at funding young entrepreneurship in cultural and creative industries (fUnder35).

But even if one assumes that the coordination failure just recalled could be somehow overcome, two additional threats to the deliberation process – defined as the weighting of options through open discussion – used by a coalition in assigning impact grants loom large. The first is that in many cases board members taking a final decision on which project deserves funding lack knowledge and expertise in the field of highly innovative solutions, as well as over operating scales on which they possess little or no previous experience. This information gap regards both the breadth of achievement – measured in terms of the likely number of individuals reachable by the grantee – and the cost-effectiveness of prospective alternative projects.

The second threat has to do with the inherent pitfalls hidden in a typical deliberation. Sunstein (2005) provides an articulated discussion of the issues involved, offering two distinctive reasons of

why deliberating groups often fail to make right judgments and to correctly aggregate the information their members have. First, group members may not disclose what they know and may come in the end to believe they were originally wrong because of deference to the signal publicly announced by others, especially if they are in a largely minority position on a particular subject or the members expressing an opposite view enjoy public prestige out of their proved competence. Second, social pressures may force members who disagree with a prevalent opinion to silence themselves if they fear that public dissent could force sanctions of various sorts by the others. Due to these informational and social influences, deliberative processes may be plagued by distortions like an amplification of the cognitive biases affecting the pivot members of the group,[4] information cascades leading deliberators to inefficiently discard their private information, a polarization towards a more extreme version of predeliberation positions, and a tendency to endorse an inferior option after discussion even if individual members would have chosen a superior one had they acted in isolation, due to unshared private information and common-knowledge effects.

In what follows we will skip over the analysis of what kind of coordination mechanism could be more effective in nudging

[4] A large literature in behavioral and experimental economics has persuasively pointed out that several cognitive biases and heuristics in processing information - like the anchoring and the representativeness heuristics, framing and overconfindence - can generate systematic judgment errors.

foundations to collaborate on large scale programs,[5] and we will simply assume that an agreement on how much to contribute has been somehow reached. Moving from this premise, we shall argue that a possible solution to the problems affecting philanthropic grantmaking – uncertainty on new ideas' potential on the one hand, and deliberative failures on the other one – consists in exploiting the ability of competitive prices to gather and aggregate imperfect and asymmetric pieces of information. The underlying intuition is to recognize that the knowledge on how pressing social needs could be solved by means of innovative ideas, or how nonprofit organizations asking for a grant work, or finally how effective their projects could be – far from being concentrated in the information sets and beliefs of the foundations' board members and expert consultants – remains widely dispersed among a multitude of people, whether they act as charity donors, beneficiaries, employees of social enterprises, volunteers, public employees or informed citizens. If it were possible to develop a mechanism to provide people with the right incentives to disclose the information they hold and convey it upon suitable aggregation, the task of those in charge of deciding how funds should be allocated would be far easier.

[5] One could think at a set of institutional designs ranging from compulsory schemes on pre-defined programs (like the automatic provisions banking foundations are forced to make to fund the Fondazione Con il Sud and the Centers of Service for Volunteering) to bilateral barganing mechanisms.

In the next Section we will argue in favor of the use of information markets. In particular, we will show that among the several mechanisms actually available[6] for eliciting dispersed information, such a design possesses several useful theoretical properties, its working is quite familiar and well-rooted in the daily experience of ordinary people as it takes the form of a market, and it has been already used with success in several fields other than philanthropy.

## 3. *Information markets*

An information market is an electronic marketplace which offers contracts whose payoffs are tied to pieces of information – rather than physical assets or commodities – like the outcome of a future event, so that contract prices can be interpreted as market-aggregated forecasts or beliefs about such an outcome. While the most popular example is the market for predicting the result of US Presidential elections developed at the University of Iowa in 1988,[7] in the last two decades information markets have been extensively used for predicting events ranging from decisions about interest rates by central banks to the likelihood scientists will solve unresolved scientific questions by a given target date (Pennock *et al*., 2001).

[6] Like, for example, opinion polls, expert panels or Delphi methods.

[7] A fascinating account of the forecasting capabilities of political betting markets in the late 1880s and early 1990s is provided by Rhode and Strumpf (2004).

The synthetic securities exchanged in a typical information market belong to one of three basic types, or combinations thereof.

1. *Winner-take-all contracts*. A contract which is traded at a price $p$ pays 1 (or 100) at the settlement date if an event occurs at a given future date, and does not pay anything otherwise. Under the assumption that traders are risk-averse (Wolfers and Zitzewitz, 2006), the market price $p$ represents the market's expectation of the probability the event will occur. To exemplify, the so-called *Saddam Security* traded on the web-based platform Tradesport.com – which paid $100 if Saddam Hussein ousted from power by June 2013 and 0 otherwise – was exchanged at $55 on January $1^{st}$ 2003 and $70 on March $1^{st}$ 2003 respectively, indicating that the traders' aggregated expectation of the probability the event would occur[8] raised from 55% to 70% as the II Iraq war unfolded (Wolfers and Zitzewitz, 2009).

2. *Index contracts*. In an index contract, the amount the security pays at the settlement date varies continuously with a number linked to the outcome of an underlying event, like the percentage of votes received by a candidate to a political election. The market price of an index contract measures the mean value that the market assigns to the outcome itself. So, traders participating to the *2012 US*

[8] The war commenced on March $19^{th}$ 2003, while Saddam Hussein was deposed on April $9^{th}$ 2003.

*Presidential Vote Share* market run by the Iowa Electronic Market on October 20$^{th}$ 2012 signalled they expected on average that the Republican candidate would have received 47.5% of the popular vote at the upcoming elections, given that the price of the UREP12_VS security paying \$0.01 for every percentage point gained by the Republican candidate registered that day was \$0.475.

3. *Spread contracts*. These contracts - also known as *sides contracts* in sport betting - are such that the initial cost of the security is fixed and the pre-determined payoff is paid if and only if an indicator is above a spread value $y$. Typical examples are contracts which pays if the point differential between two sport teams is at least equal to $y$, or contracts paying out if the a candidate wins more than $y$% of the popular vote in a political election. However, the size of the spread varies as contracts are sold and bought in the market. If contracts are designed in such a way that winners double their money while losers do not receive anything, the final value of the spread $y^*$ reveals the market's expectation of the median outcome, given that this represents a fair bet if and only if the payoff is as likely to occur as not.

To understand what it means for a market mechanism to be able to pool dispersed information and transmit it through prices, let us assume that in a winner-take-all market three securities were designed such that the first one pays 1 if an event $A$ occurs and 0 otherwise, the second one pays 1 if an event $B$ occurs and 0

otherwise, and the third security has a similar payoff structure linked to an event *C*. The three events (*A*, *B*, *C*) are mutually incompatible, while the true state of nature (that is, which event will actually occur) will be revealed at a predetermined future date. Suppose now that some traders know for sure that the event *A* will not occur, while a second group of traders know for sure that the event *B* will not occur. If the two groups were able to share the pieces of private information they hold, they would know with certainty that the event that will occur is *C*, so that the security associated to the latter should be worth 1, while the prices of the other two securities should go to 0. The key point is thus to check whether in a market in which these securities are exchanged, the price vector tends to the configuration (0, 0, 1) if the true state of nature is *C*. If this is the case, the market has done its job in correctly aggregating the dispersed information, while the entity running the market has at its disposal a powerful tool to correctly forecast the future.

Information markets have been shown to offer predictions that are in many cases more accurate than those of other forecasting techniques – like polls, expert focus groups and statistical models – in several different domains, such as presidential elections (Berg *et al*., 2008), sport events (Spann and Skiera, 2009), movie box-office sales (Spann and Skyera, 2003), infectious disease activity (Polgreen *et al*., 2007) and many others. In particular, the accuracy of market prices to forecast future events – typically measured in terms of the

average absolute percentage error – turns out to be on average higher in absolute terms (i.e., relative to what actually happens), while in advance of the settlement date prices are more stable and respond less to transient events reported by the media.

In addition, starting from the late 1990s several companies have successfully began to use information markets to improve their ability to forecast relevant variables like future demand for new products or the likely date of completion of innovative projects, by asking their employees to trade suitably designed artificial securities in internal market platforms. Early experiments conducted at Hewlett-Packard, for instance, have shown that sales forecasts obtained by means of prices on a set of Arrow-Debreu securities were more accurate and more stable than official company predictions in a vast majority of cases (Chen and Plott, 2002). Also Intel has tested markets for predicting product demand, and similarly found them to be at least as accurate – and sometimes significantly better – than official forecasts (Hopman, 2007). The most comprehensive experimentation with corporate prediction markets has been performed by Google, who has been running prediction markets since 2005. In the first three years from the launch of the initiative, Google ran about 275 markets for making predictions about demand, performance, industry news, and other subjects. Cowgill *et al*. (2009) show that overall market prices closely approximated actual event probabilities, and discuss how market

outcomes have been actively used by the company in exploring the cognitive biases affecting decisionmakers employed in different departments, as well as the way information moves inside them through different types of networks.

While the most immediate explanation for why information markets do better than other information aggregation mechanisms is that markets incentivize people to put their money where their mouth is, from a theoretical perspective their predictive power can be explained by recurring to the idea – dating back at least to Hayek (1945) – that in a competitive market the equilibrium price vector should have the capacity to collect, aggregate and disseminate all the private information distributed across a system of dispersed individuals. Grossman (1976) was the first to formally show that in a continuous double auction (CDA) market where many traders with risk-averse utility functions receive independent signals from a normal common distribution about the true value of an asset, the equilibrium price fully aggregates their dispersed information, a result extended by Radner (1979) to encompass the notion of fully revealing rational expectation equilibrium.

However, the information aggregation results offered in these papers rely on the assumption that traders are small with respect to the market, so that they ignore the effects of their behavior on the evolution of the trading process. In fact, the introduction of strategic considerations in markets with symmetric but differently informed

agents generates a *no-trade* paradox (Milgrom and Stokey, 1982), according to which rational risk-averse traders will never trade at an equilibrium with commonly known prices, each reasoning that any willing trading partner must know something that she does not know. Notice that the no-trade results represents an extreme instance – triggered by the common prior assumption – of the more general issue that a CDA market process is not in general dominant-strategy incentive compatible, defined as the property according to which agents have incentives to truthfully reveal their beliefs whatever the others will do.[9]

A possible solution to escape the no-trade paradox consists in admitting the presence of a small subset of uninformed (*noise*) traders, whose existence suffices to break the *common knowledge of rationality* presumption and allow for trade to resume even among the non-noise traders. In the case of information markets, this assumption could be easily justified by recognizing that some traders may be driven to the marketplace not because of their perceived superior information, but because of recreational motives, a reason for action well-known to exists in the contiguous field of gambling. The introduction of noise traders does not assure that the lack of incentive compatibility and the consequent possibility of market manipulation could be completely overcome, however. In a classic paper, Kyle (1985) offers a dynamic model with three types of

[9] Clearly, in no-trade case the incentive of agents is that of retaining their pieces of information to the extent that they do not trade at all.

agents: a large informed trader (insider), a noise trader and a market maker (like a security dealer). He shows that the insider, by taking into account the nonnegligible impact of her trading timing on prices, has the incentive to trade slowly and maintain an informational advantage over the rest of the market, provided that this allows her to gain a greater profit. Information is thus released gradually and incorporated into the market price at a constant rate as the number of discrete trading rounds increases, while the convergence in finite time of the price to its expected value conditional on the traders' pooled information is just approximate.[10]

These difficulties have prompted researchers to investigate whether recurring to the weaker notion of Bayesian incentive compatibility – i.e., it is best for each trader to truthfully reveal her beliefs, provided that all the others are doing so – could ensure that full information aggregation obtains. In particular, Ostrovsky (2012) analyzes a

[10] To grasp the intuition at the roots of the argument, consider the following example. In a market for a security paying 1 if at the settlement date an event occurs and 0 otherwise, three agents receive a private signal which can be *h* (high probability of occurence) or *l* (low probability). One of the three agent is an information monopolist, however, and she knows for certainty that the event will occur (her signal is *c*). If the monopolist bids truthfully, the equilibrium price of the security *p* jumps immediately to 1 (i.e., the information is fully revealed, since the other two agents would infer that the right signal is *c*), and she makes no profits. But if the holder of *c* misrepresents his information and pretends to be a type *h* instead, she is able to buy the security at a price reflecting the difference between $p(2l, 1h)$ and $p(1l, 2h)$ – lower than 1 – and gain higher profits as the market closes. But this implies that the equilibrium price does not reflect the full-information posterior, for which $p = 1$.

dynamic market environment in which a finite number of risk-neutral players receive a piece of private information, to show that if the security is *separable* – meaning that, for every nondegenerate prior belief about the states of the world, there exists at least a trader who receives an informative signal – information gets aggregated in the limit at any Perfect Bayesian equilibrium of the game. Given that the class of separable contracts contains, among the other, the winner-take-all Arrow-Debreu securities typically employed in information markets, this result is particularly important for our purposes. Furthermore, the theoretical proof that full information aggregation is attainable under mild conditions provides an explanation for the large body of evidence[11] showing that information aggregation do occur in experimental asset markets under different designs.

What is necessary to keep in mind, however, is that the main goal of an information market is that of acquiring and aggregating information which could be usefully employed to take decisions. This means that in an information market trade is always a means, not an end in itself. It also implies that issues related to the cost-effectiveness of the artificial stock exchange may not be a concern: an information market may operate at a loss, given that it is perfectly rational for an operator interested in acquiring information to pay for it.

[11] See Plott (2000) for a survey.

## *4. An innovative approach to grantmaking*

As argued for the first time by Goldberg (2009), well-designed information markets capable to aggregate the knowledge and beliefs of donors, volunteers and informed citizens could be effectively employed to forecast the relative success of charities and social entrepreneurs competing for donations. This information could help philanthropic institutions to allocate their grants to nonprofits so that the likelihood of making an impact is maximized.

This section is devoted to elaborate on this intuition, by illustrating a possible application of information markets to the elicitation and selection of projects aimed at producing transformative social impacts at a national scale. The goal of creation and dissemination of knowledge at the base of the strategic approach to philanthropy is pursued through a sharing procedure, that takes nonprofit organizations center stage by encouraging them to identify and communicate innovative solutions, and exploiting their experience and knowledge to inform grantmaking decisions.

The whole procedure can be divided into three steps: 1) a call for proposals on defined broad areas; 2) a set of *idea* markets for eliciting and evaluating new projects related to each area; 3) a set of *decision* markets for supporting grantmaking deliberation, in which contingent securities linked to the most promising projects are traded. Let us see them in turn.

### 4.1 Areas for proposals

The first step consists in selecting a given number of key areas of social change, where the solution of acute problems can exert a large impact both on individual lives and the society at large, and to issue a call for proposals for new project ideas characterized by substantial significance and potential for transformational progress. The identification of these areas – to be defined in very broad terms, and on which the scientific community and the public debate ought to have achieved a uniform vision regarding the need and urgency of action – has the task of steering the process of proposal, in order to provide guidance to nonprofit organizations and social entrepreneurs in the submission of operational projects anchored to well-defined themes. At the same time, in describing the call's contents it should be brought to evidence that treating the root causes of complex socio-economic problems require multifaceted solutions, so that the creativity of prospective grantees could be emphasized.

As a matter of example, the call for proposals could be focused on the following three programs.

1. A large amount of cross-country econometric evidence has highlighted that educational achievement, measured by harmonized international assessments of cognitive skills like the OECD Programme for International Student Assessment (PISA), is positively related to economic well-being and growth. Hanushek and Woessmann (2011) suggest that if the Italian educational system

were able to foster – over the next twenty years – the average performance of students in math and science scores so that the share of pupils below a minimum threshold of 400 points goes to zero (starting from the current proportion which is around 20%), the long-run GDP growth rate would be 1.04% higher than today, while the comparable figure if Italian students were able to reach the same level of performance attained on average by their Finnish colleagues (which lead the ranking) would be 1.41%. As far as the determinants of students' achievements are concerned, the major factors affecting Italian students performance are the socio-economic status of their families, the macro area of the country in which they live (with Northern Italy schools performing better than their Center, South and Isles counterparts), and the type of school they attend (with *Liceo* schools outperforming technical and vocational schools) (Bratti *et al*., 2007; Longobardi *et al*., 2009). It is clear that any large-scale project designed to tackle the problem requires an integrated approach embracing the socio-economic context in which a child lives and a careful examination of the learning processes and objectives consistent with the required educational achievements.

2. Many official reports have shown that over the last two decades the childhood (relative) poverty rate in Italy has remained stubbornly high at around 25% (OECD, 2007; European Commission, 2008). This figure turns out to be higher than among the population as a whole (20%), and sensibly higher than the proportion of children at

risk of poverty registered on average in the EU-25 (19%). Furthermore, the gap between the risk of poverty for children and for the overall population is wider in Italy than in the EU as a whole. Other things being equal, the risk of poverty of a child increases if her parents have a low level of education, and if she belongs to a lone parent family (especially if the breadwinner is the mother), a jobless household or a large family with three or more children (Del Boca and Mancini, 2013). It is also well known that children who spend a significant part of their childhood in persistently poor or dysfunctional households are far more likely to endure poverty as adults, given that they have a higher probability to enter their 20s without secondary education due to school drop-outs, to become under-age workers employed in low skill jobs, and to have a teen premarital birth. As a result, the cycle of poverty tends to persist across generations, and effective solutions must support quality education for young children and equitable opportunity for parents.

3. As reported by the World Health Organization, eight risk factors (alcohol use, tobacco use, high blood pressure, high body mass index, high cholesterol, high blood glucose, low fruit and vegetable intake, and physical inactivity) associated to bad behavioral and nutritional habits account for 61% of cardiovascular deaths, 71% of cancer and 75% of ischemic heart disease affecting the population of high-income countries. Estimates suggest that reducing the exposure to these risk factors would increase global life expectancy by almost

5 years (WHO, 2009). Analogously, childhood obesity and alcohol and drug abuse among teenagers represent serious health concerns in almost all industrialized countries, including Italy (Beccaria and Prina, 2010). Of course, private nonprofit subjects cannot recur to legislation to impose healthier behaviors. However, several examples have been documented of successful projects aimed at framing choices in order to nudge people to adopt a behavior that improve health outcomes, without forbidding any options or significantly altering their economic incentives (Thaler and Sustein, 2008). For instance, by simply rearranging the lunch line of several schools of the New York area so that the salad bar becomes more visible and approachable while in queue, the amount of fruit and vegetables bought by school children at lunchtime increased by more than 20% (Just and Wansink, 2009); while the systematic provision of information through the web on the healthy behavior of others (*social norm feedback*) resulted in a significant reduction of alcohol misuse among teenagers in 27 studies conducted in the UK (Moreira *et al*., 2009).

The proposals collected through the call must define the expected results in quantitative terms (for example, by estimating the number of subjects the policy can reach), and the projects must be easily scalable. The results from this first step make up the input to the second and third phases of the procedure.

## 4.2 Markets for new ideas

As emphasized above, making transformational changes to society requires an innovative approach to philanthropy, focused on creative thinking and methods to meet existing needs, or in the execution of existing programs in new ways. From this point of view the challenges faced by high-impact foundations is similar to that of business companies, whose survival depends on their ability to introduce product or process innovations.

According to the literature on innovation management, the process of taking a new idea – that is, an initially untested conception for a new product, service or process – to the marketplace involves four stages: 1) concept generation; 2) screening; 3) feasibility testing; 4) implementation (Cooper, 1992; McAdam and McClelland, 2002). The front-end represented by the first two stages is usually defined as *idea management*. Organizations have traditionally employed a variety of methods and tools to generate and evaluate ideas, ranging from expert groups to brainstorming sessions. In the last few years, several companies have started to use information markets in creating and evaluating innovative design concepts (Spears *et al*., 2007; Dahan *et al*., 2011; Soukhoroukova *et al*., 2012). Contrary to traditional information markets used to make predictions – in which shares' payoff values relate to events that occur immediately after the market close – in so-called *idea* markets the outcome cannot be validated with certainty, either because the latter can be known only

at a point very distant in the future, or because some of the outcomes may never be known (think, for instance, to an idea that is admitted to evaluation but that will never be implemented). Hence, in idea markets payoff values are determined according to the valuation participants attribute to stocks through their trading activity. As traders are allowed to exchange securities referring to different ideas according to their beliefs on which one is more likely to deliver the best result if implemented, market prices reflect the rank order attributed to their potential for success by participants.

While the accuracy of these tools[12] in corporate applications has been estimated to be lower if compared to that of prediction markets (Kamp and Koen, 2009), additional experimental research – in which a comparison under controlled conditions between the two designs can be done – suggests that their performance is in fact comparable (Slamka *et al*., 2012). Furthermore, the number and the quality of ideas generated through markets tend to be higher than those obtained using traditional methods, while the possibility to freely interact in a market allows to exploit the creativity and competencies of people not normally involved in idea management processes.

A solution to the problem of generating and evaluating new ideas in philanthropy inspired to such an approach could be devised according to the following lines. For each of the broad areas of social

[12] In early studies, accuracy has been measured in terms of the correlation between the share prices of ideas in the market and the ranking of those same ideas by groups of experts or managers.

change identified during the previous step, an idea market is set up in which traders buy and sell virtual stocks, each one representing an innovative approach to attack a social problem. In a market aimed at facilitating ideas' contribution and ranking on the issue of confronting childhood obesity, for example, a virtual stock called *Energy Balancing* would represent a project to re-design school environments so that children burn as many calories as they consume by increasing opportunities for physical exercise, while the virtual stock *Kiss'em, instead* would represent a program to educate parents not to use food full of sugar and fat as a reward for their children. Traders are incentivized to buy and hold the ideas which according to them have the highest potential, so that the market mechanism ensure that the ideas that are regarded as the most valuable receive the highest share price. Participants are rewarded with a cash dividend proportional to the final net asset value (NAV) of their portfolio, like in a trading competition, and it is common knowledge that the ideas which have the highest last fixed price – or alternatively a volume-based weighted average price over $n$ days prior to market close – when the market closes have the highest probability to be chosen for implementation.

In order to ensure that exchanges can take place from the start, the market is seeded with a small number of stocks chosen by the managing entity. As the market evolves, however, new stocks (i.e., ideas) can be offered to the market by interested individuals or

groups through an initial public offering (IPO) mechanism. Once admitted to the listing by an eligibility committee which formally verifies the pertinence and novelty of the proposal, the new stock undergoes a phase during which traders can express their interest by submitting buy offers (*flotation period*). Only if by the end of the flotation period the stock reaches a demand threshold with respect to the value and number of buy offers the security is admitted to trade, otherwise it is withdrawn. This allows to facilitate the emergence of brand new ideas on the one hand, and to provide an incentive to participants to quickly recognize idea stock candidates on the other one.

### 4.3 Contingent prediction markets

The third step of the procedure involves the use of *conditional* information markets as a decision support system (Hanson, 1999; Berg and Rietz, 2003). The key idea consists in building a set of securities which are based on combinations of events, so that each contract pays a final positive payoff if and only if a certain event $W$ will occur, provided that a second event $Z$ has already happened. There are at least two alternative designs concerning conditional contracts which can be usefully employed to inform a grantmaking process, given that they allow to estimate the possible consequences of funding decisions.

The first mechanism is particularly suited to extract comparative

information on the effectiveness of alternative projects. To fix ideas, let us suppose that a consortium of foundations is interested in funding a project aimed at reducing the fraction of students below the 400 threshold in the next round of PISA-OECD tests. Several charities have advanced proposals inspired to alternative approaches to reach the goal, but the consortium lacks immediate knowledge on which one promises to be the most effective. Furthermore, it must be considered that a variation (possibly, an improvement) of the target could be expected even if none project is implemented. In order to elicit information on the topic, one could extract the information contained in the market prices obtained by trading on couples of securities according to the following scheme.

Let *S* be a particular project under scrutiny, $x_T$ the average score in 2015 of the sub-sample of pupils which scored below the threshold in 2009, and $L_T = \min\left\{\frac{x_T}{400}, 1\right\}$. A first pair of winner-take-all securities are then offered such that:

*a*) The contract WTA_SY pays 1 *if* *S* is chosen, and 0 otherwise. The market price of this security is $p_S$.

*b*) The contract WTA_SN pays 1 *if S* is not chosen, and 0 otherwise. The market price of this security is $p_{notS}$.

In addition to that, a second pair of index securities are designed such that:

*c*) The contract I_SY pays $L_T$ *and* $S$ is chosen, and 0 otherwise. The price of this security is $q_S$.

*d*) The contract I_SN pays $L_T$ *and* $S$ is not chosen, and 0 otherwise. The price of this security is $q_{notS}$.

By construction, the two index securities pay a maximum amount (1) if the goal set by the foundation – in this case, to cancel out the fraction of students below 400 points – is achieved.

The contracts *a*) and *b*) are such that the actual prices reflect the market expectation that $S$ occurs or not, respectively, that is $p_S = E(S)$ and $p_{notS} = E(notS)$. By the same token, the prices related to the contracts *c*) and *d*) reflect joint expected values, i.e. $q_S = E(L_T, S)$ and $q_{notS} = E(L_T, notS)$. An interesting question is that of asking what achievement the virtual market expects *conditional* on the project being adopted, $E(L_T \mid S)$. By the rule of conditional probability, it is immediate to note that the answer can be obtained by solving the equation $q_S = p_S E(L_T \mid S)$.

One can then setup two markets in which traders can exchange

contracts. In a market $\alpha$, shares of WTA_SY can be exchanged against shares of I_SY, while in a market $\beta$ shares of WTA_SN can be exchanged against shares of I_SN. It turns out that in equilibrium the price ratio $\lambda_S = \frac{q_S}{p_S}$ represents the market's expected achievement conditional on the project being funded $E(L_T \mid S)$, while the correspondent price ratio $\lambda_{notS} = \frac{q_{notS}}{p_{notS}}$ is the market estimate of the expected achievement if the project is not implemented $E(L_T \mid notS)$. If $\lambda_S > \lambda_{notS}$, the market is signalling that it expects the fraction of low-scoring students to be lower if the project *S* is approved than if not.

The mechanism can be easily extended to allow a comparative analysis. Let $\{\lambda_S^1, ..., \lambda_S^n\}$ the equilibrium price ratios for *n* competitive projects, under the assumption that for each one of them the condition $\lambda_S > \lambda_{notS}$ holds. One can thus immediately rank the projects according to their expected effectiveness by ranking their prices in descending order.

The second mechanism combines the use of conditional information markets with a reverse auction to obtain information on the likely benefits and costs of a social program (Hahn and Tetlock, 2006). As recalled above, according to official statistics the number of children in absolute poverty in Italy has reached the impressive number of

723,000 units in 2012. Let us suppose that the consortium has already collected the candidacy of a number of charities ready to attack the problem by implementing plans based on similar operational guidelines. The donor has the problem of evaluating which charity deserves money the most based on the prospective cost-effectiveness of the program it is going to deploy on the one hand, and to provide the right incentive to its grantee to maximize efforts on the other one. Let us further assume that the consensus on the average cost for helping a child to escape poverty is 500.

A first issue is that of eliciting information useful to decide on the total budget the consortium has to set for the project. To accomplish this task, the consortium can set up a conditional information market in which two index securities are traded. The first contract will pay 0.01 for every 500 children who succeed in coming out of poverty at a given date, if and only if a project to attack the problem is funded. The second security has a similar payoff structure, but final payments are conditional on the project not being implemented. If, for example, the price of the first security is $p = 1.12$ and the price of the second one is $p = 0.18$, the market is expecting that 56,000 children will be helped to escape poverty if a suitable program is developed, but also that 9,000 children are expected to be out of poverty at a given date regardless of it. Hence, the expected social value added of funding a project is to help 47,000 children, which amounts to a budget of 23.5 million euros.

In order to allocate the budget efficiently, the consortium can conduct a reverse auction in which, starting from a reserve price of 500 per unitary outcome achieved, prospective grantees can bid the price down according their internally estimated costs per child.[13] Bids are then ranked from the lowest to the highest, allowing the auctioneer to determine which charity is the most competitive. Let us suppose that the bid of the winner is 460. Hence, the consortium can devise a contract with the grantee stating that the target of 47,000 children must be reached at a given date, and to do it the grantee receives payments amounting to a total 21.62 million euros (47,000 x 460). In order to protect the grantee against the risk that unpredictable adverse contingencies could affect its performance beyond its actual commitment to deliver, one can establish a margin below the target (say, minus 15%) which, if not achieved, will cause the unitary payment to be nonetheless disbursed. If the final achievement is below the threshold (in this case, less than 40,000 children successfully reached by the program), the grantee incurs in penalties.

It is interesting to note that if the established goal is achieved the consortium saves 1.38 million euros from its initial budget, a buffer that can be used to provide additional incentives to the grantee according to a pay-for-performance scheme (Birdsall and Savedoff,

[13] See Greenhalgh *et al*. (2007) for a discussion on how reverse auctions have been applied to allocate funds for environmental protection in the USA.

2010). This would occur if the contract states that for any additional child snatched away from poverty over the 47,000 ones originally targeted, the consortium will pay 500 until exhaustion of the buffer. The charity can thus get 40 of extra funding[14] for each child lifted out of poverty in addition to the contractual target, while the donor succeeds in reaching a possible maximum of 2760 more children without increasing the original budget.

## *5. Issues in market design*

In order to ensure that the knowledge and beliefs of traders could be aggregated properly, information markets have to be designed and implemented very carefully. The key design elements that deserve attention comprise the trading mechanism to be employed, the incentives to be provided to participants to attract them to the marketplace and press them to reveal what they know, and the details regarding how to initialize the market and its duration.

### 5.1 Market microstructure

The most essential aspect regarding the microstructure of a virtual stock exchange is how buyers and sellers are matched. In a continuous double auction (CDA) traders submit buy and sell orders, which are executed immediately if they are matched by orders of

[14] Possibly with the requirement that this extra money is used in other social projects fielded by the nonprofit.

equal amount and reversed sign. If this is not the case, orders are queued in an order book and remain there until they are matched by a counteroffer, or until they expire. In many cases, orders are executed according to price/time priority (*limit order*). Simply stated, the procedure requires that the buy orders with a higher limit and the sell orders with a lower limit take priority in the execution line. If several orders are placed with an identical limit, a *first-in first-out* execution rule applies. Since it only pairs willing traders, a CDA market represents a zero-sum game and poses no financial risk for the entity operating the stock exchange. Moreover, the CDA allows for continuous information incorporation into prices, given that traders are capable of quickly reacting to events if the market is liquid enough.

If the number of traders is small, however, a CDA market design may suffer from illiquidity. In this case, buy and sell order can not be matched immediately, the bid-ask spread can be large, or the order queues can remain empty for a long time. Since most information markets have fewer participants than traditional financial markets, this limitation is particularly relevant for them. In addition to that, as explained in Section 3 a CDA market is not in general incentive-compatible, in that monopolist information holders have an incentive not to fully reveal their information immediately, and can instead manipulate the market by releasing it gradually over time to gain higher profits.

In order to overcome these problems, Hanson (2003; 2007) has proposed the use of a sequential scoring rule mechanism, in which an automatic market maker maintains a probability distribution over all events and provides infinite liquidity to the market by operating as a dealer. A scoring rule is a method to elicit probability beliefs by paying individuals to communicate their information, in a way that motivates them to be honest. Formally, let *v* represent a discrete random variable with *m* mutually exclusive and exhaustive outcomes, and suppose an individual is asked to report a probability estimate *r* for the event. A scoring rule $S = \{s_1(r), s_2(r), ..., s_m(r)\}$ is an incentive-compatible payment structure that assigns a reward (*score*) of $s_i(r)$ if the actual outcome is *i*. The scoring rule is defined as *regular* if it implies that $s_i(r)$ is finite for every *r*, and *proper* if the expected reward of a risk-neutral agent is maximized if she reports truthfully.

To see how a scoring rule works, let us consider the widely employed case of a logarithmic rule in the simplest case in which *m* = 2. An agent is rewarded with $\ln\left(\frac{r_1}{0.5}\right)$ if outcome 1 occurs, and $\ln\left(\frac{1-r_1}{0.5}\right)$ if outcome 2 occurs. If the agent is risk-neutral and she believes that the true probability of occurrence of state 1 is *q*, she maximizes her expected reward by reporting an estimate *r* such that

the function $q\left[\ln\left(\frac{r_1}{0.5}\right)\right]+(1-q)\left[\ln\left(\frac{1-r_1}{0.5}\right)\right]$ reaches its maximum. It is immediate to see that the unique solution to this problem is to report $r = q$. Thus, it is possible to device an incentive-compatible rule such that an information monopolist can be motivated to tell the truth, by paying her accordingly.

To obtain multiple predictions, one could recur to a shared scoring rule that rewards each participant according to the difference between her reported estimate and the average of the others. A mechanism that allows to implement a share scoring rule sequentially is called a *market scoring rule* (MSR). As shown by Chen and Vaughan (2010), a MSR with strictly proper scoring rules operates exactly like a a convex cost-function-based market maker. To see how it works, consider a winner-take-all market for a future event in which the security *A* pays 1 if the event occurs and 0 otherwise, while the security *B* pays 1 is the event does not occur, and 0 otherwise. At any point of time, a market maker keeps track of how many shares of each security - $q_a$ and $q_b$ - have been purchased thus far by the traders, and maintains a cost function $C(q_A, q_B)$ which records how much money traders have collectively spent in the market. For example, for a logarithmic MRS the cost function is $C = (b \ln e^{\frac{q_A}{b}} + e^{\frac{q^B}{b}})$, where $b$ is a parameter that controls the liquidity of the market, given that a higher *b* means that traders can

buy more shares at or near the current price without causing massive price swings.

Traders arrive one at a time, and report to the market maker how many shares they want to buy or sell of each security. If the trader *j* communicates she is willing *x* shares of security *A*, the amount she has to pay to the market maker is $C(q_A + x, q_B) - C(q_A, q_B)$. If, on the contrary, she reports that she is willing to sell *y* shares of security *B*, the market maker pays her the sum $C(q_A, q_B - y) - C(q_A, q_B)$. In general, if a trader wants to buy or sell shares of either or both outcomes so as to change the number of shares outstanding from $(q_A, q_B)$ to $(q_A', q_B')$, then she must pay $C(q_A', q_B') - C(q_A, q_B)$. If this amount is negative, it means the trader receives money instead of paying money. Notice that as the market closes the market maker can incur in a variable loss, but it can be shown that such a loss is bounded (in a 2-security winner-take-all market, the maximum loss is $b \ln 2$), and one can immediately interpret it as a the cost the market maker is willing to pay to acquire the information dispersed in the market. Any trader who believes the probabilities implicit in the current price vector are wrong can change them by placing a new order. Traders can expect a positive payoff if they succeed in moving the prices towards their fundamental value, otherwise they will lose money. New information is hence revealed immediately to the market.

An additional important issue in market microstructure regards the fact that an idea market – as the one discussed in sub-section 4.2 – is a beauty-contest game, given that the final payoff is linked to the ability a trader has in forecasting the choices of other market participants (Marinovic *et al*., 2011). It is well known that in a such an environment the price can bubble away from its fundamental value, so that the market can be affected by a significant mispricing. A possible solution is that of admitting short-selling, in order to allow traders who believe the market valuation of an idea security is too high to drive the price down even if they do not own shares of that idea, and to expect profits from that (Scherbina, 2008).

## 5.2 Accessibility and comprehensibility

Information markets work best in thick situations, that is when they are able to attract a sufficiently large number of participants generating high volumes of trades. This implies that the success of an information market depends on details regarding the design of at least three aspects: *a*) which motivation drives participants to enter the market, and what sense they attach to their actions; *b*) which degree of comprehension traders have of the market outcomes they observe; *c*) the easiness of access and the amount of operating costs participants must bear in using the market.

As regards the first point, the approach traditionally followed in attracting and motivating traders has been that of allowing them to

risk and to be paid in real money, according to the view that the incentive to reveal private information is the highest when participants are asked to put their money where their mouth is. While recognizing the importance of having a real personal stake in the game, several studies have shown that markets making use of play-money tend to be as accurate as real-money ones (Servan-Schreiber *et al*., 2004; Luckner and Weinhardt, 2007). The key reasons emerging from self-reported accounts of what motivates participants to trade in play-money markets comprise the sense of belonging to a community of people sharing interests in a given matter, the strong belief of having first-hand knowledge on the likelihood of future events, a competitive spirit and desire to get involved, and the entertainment associated to gaming (Christiansen, 2007).

A design aimed at reinforcing these attitudes consists in providing a competitive setting aimed at promoting seriousness and intensity in market participants, for instance through the provision of an online discussion forum where participants can share their opinions about securities, the listing of the top performers – including their ranks and sign-on IDs – in a leaderboard web page, and by sending periodic e-mails to participants updating them on the market activity.

Regardless of the intrinsic motives driving players to participate, in play-money markets it is common to provide an incentive to the truthful communication of personal knowledge through the provision of monetary prizes to the best performing players. In the case of

information markets designed to support the decision process of grantmaking foundations, the determination of the total amount of money available for final rewards should be done by comparing it with the cost that is normally incurred to extract useful information using alternative methodologies. Private estimates suggest that for sufficiently large projects, the costs for the remuneration and reimbursement of expenses assigned by Italian foundations to the external members of expert groups employed in evaluation activities is about 2% of the grant. For a nation-wide project mobilizing resources in the order of 20 million euros, therefore, the pool of monetary prizes could be around 400,000. Rewards should be disbursed under the agreement that recipients will donate their prizes to a preferred nonprofit, so that the regulatory requirement obliging foundations to use their donations for social purposes is respected.

For information markets to work properly, it is also important that participants understand how the mechanism function well enough to be able to make informed decisions on whether to buy, sell or hold a security. Prospective traders must therefore be supplied with detailed instructions on the main objectives of the information aggregation mechanism, in particular on the fact that the market is a means to help grantmakers to take better decisions. The explanations must be clear and simple, the structure of the securities determined without ambiguities, and the final payoff defined accurately. A training period must be provided before the market starts, aimed at improving

the understanding of three key abilities required for effective participation: *a*) how to access and leave the market; *b*) how to buy and sell securities; *c*) how to implement trading strategies and manage a portfolio.

As a last point, both the development and the participation to the market must be easy, while exchange activities should be carried out at a tiny if not null cost. From this point of view, several software and web-based platforms are currently available on a ready-to-use base, whose architecture is flexible enough to be easily adapted to different needs. A non exhaustive list of commercial suppliers of information market solutions includes Flex-E-Markets, Huunu and Inkling, while several other toolkits like Zocalo and Serotonin are distributed under an open source licence. Once a platform has been chosen, it would be very easy to develop an application for portable devices like tablets or smartphones that allows an immediate use of the market.

### 5.3 Initialization and duration

We argue that for reasons of convenience and ethical attitudes of prospective participants, an information market used as part of a philanthropic grantmaking process has a higher probability to be successful if it is run with play-money. This has the advantage of allowing the entity governing the market to initialize it by providing each trader with an endowment that can consist of virtual money

and/or shares of virtual stocks. This part of the design is in fact crucial, as it is important to avoid that too much market liquidity in relation to the number of securities might encourage excessive speculative trading behavior. According to Dahan *et al*. (2010), an effective solution to this problem consists in setting the initial virtual cash endowment of each trader to 25% of the overall value of her starting portfolio. If the market admits the possibility of listing new securities through IPOs, traders should receive a given number of new shares and an additional amount of virtual money accordingly.

Finally, with reference to the duration of the market the relevant issue concerns the need to keep alive the traders' attention. The standard length of an information market is thus defined in terms of days or weeks. In order to prevent tournament-like effects and speculative behavior in correspondence of the end date of the market, the actual closing should be determined randomly.

## *6. Conclusions*

In recent years, a consensus has emerged on the fact that innovation is key for the success of philanthropic initiatives offering solutions to the most challenging social problems. The process of creation and evaluation of innovative projects requires an enormous amount of knowledge, however, which is largely dispersed among the people involved in the voluntary sector and in the area of social commitment at large. Being able to collect and aggregate this information in order

to use it within the granting process of endowed foundations is a challenge that requires innovative thinking in itself.

In this paper, we have discussed the design of a mechanism aimed at revealing, transmitting, collecting and gathering information through virtual markets in which participants trade concept securities. The underlying idea is that each agent makes predictions that contain bits of truth mixed with various misconceptions. If in a population of individuals the bits of truth are correlated with each other (common prior) so that they can be added up to a larger truth, whereas biases are not (independent errors) and cancel each other out, a mechanism that provides incentives to individuals to communicate the pieces of information they hold generates collective knowledge. Accordingly, several possible applications of information markets have been offered, designed as parts of a comprehensive procedure to inform grantmaking decisions regarding large scale projects.

Obviously, the approach we argue for is just one among the many possible methods that can be used to increase the effectiveness of the decision-making process of an high-impact philanthropic foundation, and the results one obtains by employing virtual trading platforms cannot be applied acritically and automatically. In fact, the judgement ability of experienced philanthropists is an element of which one can not do without. Nevertheless, supplementing their skills with properly designed information market may be significantly helpful.

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