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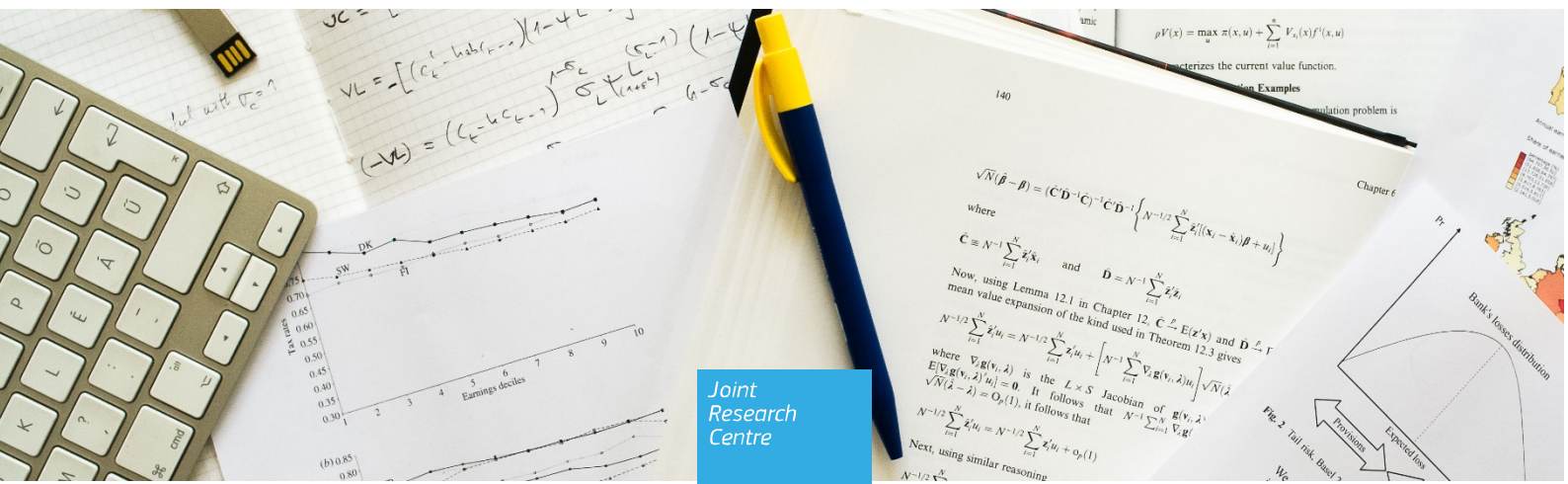

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Venture Capital Financing and Green Patenting*

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Abstract

This paper explores the role of green innovation in attracting venture capital (VC) financing. We use a unique dataset that matches information on VC transactions, companies' balance sheet variables and data on patented innovation at the firm level over the period 2008-2017. Taking advance of a novel granular definition of green innovative activities that tracks patents at the firm level, we show that green innovators are more likely to receive VC funding than firms without green patents. Likewise, a larger share of green vs. non-green patents in a firm's portfolio increases the probability of receiving VC finance. Robustness checks and extensions tackling several dimensions of heterogeneity corroborate the view that green patenting is an important driver of VC funding.

JEL classification: G24, M13, M21, O35, Q55

Keywords: Venture capital, Green ventures, Patents, Green technology

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1 Introduction

The commitment to climate neutrality by 2050 and to the other ambitious environmental goals set out in the European Green Deal involve structural economic changes and significant technological innovation, which implies both the creation of new products and processes and their diffusion and application. The International Energy Agency (IEA, 2021) projects that, in 2050, almost 50% of CO2 emissions reductions in the net-zero scenario come from technologies currently at demonstration or prototype stage. The need to accelerate the development of new technologies, which are of critical importance to achieve decarbonization, is not limited to the domain of clean energy production, but spans virtually all sectors of the economy. The financial effort required to move towards less environment- and resource-intensive economies and societies is equally unprecedented. Already in 2016, the World Bank's International Finance Corporation estimated investment opportunities from the green transition worth about USD 23 trillion until 2030 (International Finance Corporation, 2016). As part of this, the IEA documents that the investment in energy systems, particularly in renewables, has risen to USD 820 billion in 2021. Alignment with the target of net-zero emissions by 2050 still requires tripling this figure by 2030. At the European level, the 2050 net-zero target calls for an increase in energy-related investments in the period 2021-2030 worth € 350 billion annually more than during the period 2011-2020. This figure represents an increase of around € 90 billion per annum compared to the investments needed to achieve the 2030 climate and energy targets.

The sheer magnitude of the financial resources that are needed calls for mobilizing private capital, in addition to public sources of finance, on a massive scale. In this context, Venture Capital (VC) financing can play an important role, primarily because of venture capitalists' natural propensity to fund firms with high potential but risky growth trajectories and returns. Moreover, their ability to rapidly shift investments and fund new ventures in response to market prospects and signals (Bellucci et al., 2020) makes them a potential source of finance even in the short term.

In this paper, we explore the nexus between venture capital financing and firms' green innovation. In particular, we investigate whether firms that have obtained green patents are more likely to attract VC financing than firms without a patented record of green innovation. In doing so, we shed light on the potential of green innovation to be considered as an opportunity for venture capitalists, which has important policy implications at a juncture where ambitious climate and environmental goals are set at the EU and global levels.

The fact the VC has a strong link with innovation is already well documented in the literature (e.g. Florida and Kenney, 1988; Kortum and Lerner, 2001; Lerner, 2002; Da Rin and Penas, 2007; Arvanitis and Stucki, 2014; Hirukawa and Ueda, 2011; Faria and Barbosa, 2014; Bernstein et al., 2016, among others). It is widely held that, while imperfections in capital markets discourage investments in research and development, given the important asymmetric information inherent in these activities, their high risk-return profile is typically very attractive to VC finance. In this context, patents can mitigate financing constraints by acting as a signaling device to investors, notably venture capitalists, particularly in the case of start-up firms (Conti et al., 2013). In turn, the ability of VC funds to enable innovation, and, thereby, to contribute positively to aggregate growth, is increasingly apparent (Akcigit et al. 2019, Bernstein et al. 2016, Kortum and Lerner, 2000).

Against this background, the specific role of green innovative ventures and its relationship with VC finance has not been explored extensively. The relatively high capital intensity of green ventures and the fact that green deals take longer to reach the maturity phase pose challenges to the traditional VC business model (see e.g., Criscuolo and Menon, 2015). Moreover, green innovators are involved in more complex patenting activities from a technological standpoint, as documented by the fact that green patents have more general applications (Amore and Bennedsen, 2016) and receive citations from a wider array of technological classes (Popp and Newell, 2012) than other types of patents. These distinctive features of green patents have important implications for other areas of firm organization, such as corporate governance, in that worse governed firms generate fewer green patents relative to all their innovations (Amore and Bennedsen, 2016). Indeed, green ventures entail both technical and managerial complexity, because of the nature of the environmental technologies and the infant stage of the sector in terms of commercialization and market acceptance, and, thus, may be exposed to higher risk of market exit. These features may reduce their attractiveness for VC finance compared to other high-tech ventures (Ghosh and Nanda, 2015). At the same time, however, a favorable policy stance towards environmental issues may significantly reduce the uncertainty and risk associated to investment in green ventures. Criscuolo and Menon (2015) find that, in contrast to short-term fiscal policies, national policies with a long-term perspective that are aimed at creating a market for environmental technologies are a significant determinant of the amount of equity finance invested in green ventures. Hence, policy stability, predictability and credibility seem to be of paramount importance to favor financing and patenting applications of environmental technologies (Johnstone et al., 2010). This suggests that the global policy efforts towards net zero emissions and the environmental initiatives pioneered in the European Green Deal might indeed create favorable conditions to equity investment in green ventures.

Against this background, the nature of relationship between green innovation and VC finance – notably whether green innovation is attractive to venture capitalists – remains an empirical open question. We tackle it using a unique dataset that matches information on VC deals with company level data over the period 2008-2017. Specifically, we retrieve information on the equity transaction (e.g. date, round) from VentureSource. Relevant financial variables from companies' balance sheets are drawn from the Orbis database. Finally, Patstat is our source of information on innovation activities and patents held by firms. The classification between green and non-green patents is based on the methodology developed by the European Commission's Joint Research Centre (JRC) to derive indicators of global innovative activity in clean energy technologies (Fiorini et al., 2017; Pasimeni et al., 2019; Pasimeni et al., 2021). All patent documents relevant to a distinct invention (e.g. patent applications to multiple authorities) are grouped under the same family, as a reliable proxy of one invention. Patents in green technologies are detected via the Y02 and Y04 schemes of the Cooperative Patent Classification (CPC) that specifically tag patents related to climate change mitigation technologies. Therefore, the technology tags assigned to patent applications allow us to pin down the firms' inventive activity in the green technology area. In other words, this approach ascertains that firms are active in developing green technologies based on a precise empirical evaluation of their patent portfolio. Importantly, our methodology improves on alternative approaches in the literature that classify firms' activities as green exclusively on the basis of the description of their business operations (Mrkajic et al., 2019).

In our sample, approximately 17% of firms have received at least one patent. Non-green patents are more frequent than green patents, which in fact represent approximately 18% of total patents. Using a probabilistic regression model, we explore whether green patenting increases the likelihood that a firm receives VC funding. We find that having a green patent is associated with up to approximately 20% higher probability of raising equity finance, all other things - including the concurrent presence of non-green patents - being equal. Likewise, a larger share of green vs. non-green patents in a firm's portfolio increases the probability of receiving VC finance. Our baseline results are robust to the use of a matched sample of firms to address endogeneity concerns. Further, we uncover some heterogeneity in the impacts in terms of type of VC investor, such as Corporate Venture Capital (CVC), Business Angel (BA) or Institutional Venture Capital (IVC), and financing stage, i.e. early or later. Overall, our findings corroborate the view that green patenting, in addition to broader innovation activities, is a distinctive important driver of VC funding.

Our work relates to the literature that explores the innovation-financing nexus. Patents in particular, by creating property rights to the underlying knowledge assets, may exert positive effects

on the patenting firm's financial conditions (Hall, 2019). One of the most important channels through which this takes place has to do with the external signal that granted patents provide about the quality of the inventions (Hottenrott et al., 2017; Hoenig and Henkel, 2015). We contribute to this strand of the literature by singling out the specific role of green patents in the context of general patenting activities. The distinctive features of green patenting discussed above make the topic worth exploring and our analysis particularly relevant, as they may potentially invalidate the results obtained in the literature on the general population of patents. Moreover, our use of a granular definition of green innovative activities that tracks patents at the firm level improves on the extant literature that employs aggregate data on green sectors (Criscuolo and Menon, 2015; Mrkajic et al., 2019). In fact, when we check our results against a different definition of green ventures, based on an aggregate NACE2 sectoral classification, we do not find a significant link between VC and green activities, in line with Mrkajic et al. (2019). This suggests that the relevant green characteristics of firms are patent-specific and not sector-specific.

Overall, documenting the attractiveness of green patenting for VC investment, our findings suggest that this type of private equity finance can play an important role in fostering green innovation. This, in turn, can generate positive externalities in the form of knowledge spillovers and thus facilitate the adoption and diffusion of environmental technologies, and, ultimately, bolster green growth. Given the complexity of green innovations, to fully characterize the role of VC finance in enabling and scaling the solutions needed for the low-carbon transition under the Green Deal calls for further analysis. In this respect, particularly relevant appears the investigation of the interplay between public support measures and private finance. We leave this and the related issues for further research.

The remainder of the paper is structured as follows. Section 2 presents the data and the description of variables, including the definition of green technologies and the methodology used to classify patents. Section 3 describes the empirical strategy, while Section 4 illustrates the results. Section 5 and 6 report a battery of robustness tests and extensions tackling several dimensions of heterogeneity, respectively. Lastly, Section 7 concludes.

2 Data and variables

2.1 Data sources

The empirical analysis builds on a database (hereafter, the *matched DB*) obtained by matching data from three different sources. First, we draw detailed information at the level of individual VC deals from Dow Jones VentureSource, a commercial database that provides a information on VC-

backed companies, Venture Capital investors and Venture Capital investment transactions, at global level, with breakdown by industry, sector and stage of development.[1] Details on the VC-backed companies include name, addresses, geographical location, website, sector of activity and some financial variables, such as employees, total assets, turnover and total liabilities, at the date of the transaction. Similar data are provided on the investing entities – including the type (e.g. Corporate VC vs Independent VC) – and all the co-investors, if any. Lastly, VentureSource includes information on the Venture Capital deal itself, such as the invested amount, the deal date, the type of investment, notably the round, and the currency of the transaction.[2] For the purpose of this study, we exploit the VentureSource database considering venture-backed companies as the primary target of analysis. Interestingly, VentureSource also includes data for several other forms of equity investments (and related equity-backed companies) such as Angel investments, Private Equity, and Mezzanine. These can be used as potential candidates for the control group with respect to which VC-backed firms are compared. The geographical coverage of the current analysis focuses on venture-backed companies located in EU-27 and in the United Kingdom.

To overcome some limitations of VentureSource[3], we match the venture-backed companies with financial information retrieved from the Orbis database, provided by Moody's Bureau Van Dijk. Orbis contains data financial data from firms' profit and loss accounts and balance sheets gathered from business registers, credit bureaus, statistical offices, and company annual reports for each accounting year. The raw information is harmonized to enable meaningful cross-country comparison.[4] Finally, we obatin bibliographical and legal event patent data from Patstat. Patstat is the patent statistical database created and maintained by the European Patent Office (EPO), and collects patent data directly from the EPO itself and from other sources, such as national and supranational patent authorities, across leading industrialised and developing countries. Despite its global coverage, the incomplete provision of data generates lack of accuracy and completeness,

[1] Previous studies already provided a detailed overview of VentureSource (Kaplan et al., 2002; Nepelski et al., 2016) and a comparison with other commercial databases (e.g. Thomson Venture Economics and Crunchbase) for a purpose similar to that of the current investigation. In particular, they found that VentureSource is a more comprehensive data source offering longitudinal and standardised information on VC deals, with more detailed information on financed and financing entities. Along these lines, Kuckertz et al. (2019) state that VentureSource is a comprehensive data source, particularly when looking at VC deals completed in the United States and Europe.

[2] In the text, we refer to the number of deals (and related amounts) including both disclosed and undisclosed transactions. We alternatively refer to VC deals as VC transactions.

[3] VentureSource does not provide, for instance, the historical series of financial information of VC-backed firms for the years before and after the VC transaction and a standard classification of the VC-backed firms' industry.

[4] Evidence of the advantage in using Orbis over similar commercial databases is already described in Kalemli-Ozcan et al. (2015). In particular, the authors state that Orbis provides harmonized balance sheets and profit and loss data with a significant coverage of private companies, together with a more detailed industry classification (NACE 4-digit codes).

which requiring a preliminary cleaning procedure before processing the data in order to avoid elaboration of misleading information (Pasimeni, 2019).

2.2 The matched database

The process for the creation of the *matched DB* has been performed in two steps. First, we matched data from VentureSource and Orbis. In the absence of a common unique identifier, entities in the two databases have been matched using univocal variables available in both databases, such as the company name, the web and e-mail addresses, and the telephone and fax numbers. The matching between VentureSource and Orbis associates for each company the contract terms of the deal, i.e. the amount, the deal date, the type of investment or the funding round, the currency and the name and geographical location of the investor(s), with the financial information of the target company – notably total assets, total debt, turnover, number of employees, industry – available from Orbis.[5] The dataset resulting from the matching between VentureSource and Orbis includes 11,546 observations.

Next, we need to pin down which firms from the VentureSource-Orbis merged dataset have an inventive activity, and, if so, whether or not that extends also to green technologies. To this purpose, in the second step, the data is further matched with the information on patents. A major obstacle in the use of patent data is the disambiguation of individuals and institutions (Morrisonet al., 2017). This is because patent documents do not contain firm identification codes. Likewise, patent databases may include multiple entries and identifiers for the same firm as an applicant. When matching with firm level data, typical problems arise from variations in the spelling of a person's or institution's name (including typos and misspellings), from variations in the way names appear in two or several datasets (in many cases caused by different naming conventions) or from the problem of consolidating firm subsidiaries in groups. The goal of disambiguation is to link and consolidate all of these alternate spellings of institutional or individual names without incorrectly including similar names referring to different entities. To this end, we apply a simple approach that matches companies from the VentureSource-Orbis dataset, with companies as defined by the cleaning and grouping in the JRC patent dataset (Pasimeni and Fiorini 2017). The latter uses data from the OECD HAN (Harmonised patents Applicant's Names) database[6] as an input to the patent-based methodology proposed in Pasimeni et al. (2021). The name and country of location

[5] We should acknowledge that Orbis does not exactly cover the same firms included in VentureSource, and vice versa. In addition, despite its large coverage, Orbis does not provide financial statements for some young and SMEs provided by VentureSource. Indeed, many SMEs do not disclose a financial report of their business on first stages of activity, and some of them may end their business after having received early stages financing. Hence, the *matched DB* includes a subset of the information available in VentureSource.

[6] https://www.oecd.org/sti/inno/intellectual-property-statistics-and-analysis.htm

of the company are the only attributes common in the two datasets. Therefore, our procedure (i) standardizes the company names in both datasets and (ii) for each company name in the VentureSource-Orbis dataset identifies and validates a unique match in the JRC patent dataset. The standardization of company names uses a dictionary-based approach, consisting of several steps derived from Thoma et al., (2010) to facilitate the matching and its validation. A fuzzy matching algorithm[7] is then used to establish the similarity ratio between the standardized company names from both datasets and to identify for each company from VentureSource-Orbis the best potential match in the JRC patent dataset. The best potential match is the one with the highest similarity ratio, for which the country names are also similar in both datasets.

Out of the 11,546 companies included in the VentureSource-Orbis merged dataset, potential matches are grouped in three categories. Companies in Category 1 (2,089) are matched with a similarity ratio higher than 95 %. These are companies that are matched with the highest confidence and therefore have a patenting activity over the considered period. Companies in Category 2 (8,163) are not matched, that is the fuzzy matching does not return a potential match from the JRC patent dataset in the given country, hence they most likely do not have a patenting activity over the considered period. Lastly, companies in Category 3 (1,294) are matched but with a similarity ratio lower than 95 %. Given that these companies are matched with a lower level of confidence, we cannot have a conclusive answer on whether they had or not a patenting activity over the considered period. In order to ensure representativeness of the final dataset, we only include Category 1 and 2 companies (i.e. 10,252 companies) and choose to exclude companies in Category 3. For each company having completed any equity transaction in the period 2008-2017 taken from VentureSource-Orbis that is matched with a company from JRC patent dataset, a time series (2000 to 2017[8]) with the following information is available: (i) the identifiers of the patent families the company has contributed to, allocated to the year of the first patent filling of the family; (ii) for each patent family, dummy variables indicating if the patent family is related to green technologies or non-green technologies (by definition all other technology areas).

Overall, the *matched DB* between VentureSource, Orbis and Patstat contains 11,748 observations - with the identifier being the single VC / other equity transaction completed over the period 2008-

[7] https://github.com/seatgeek/fuzzywuzzy

[8] Patent applications are published between 18 and 30 months after they are actually filed. Patent data statistics provided by the autumn version of Patstat 2019 are therefore not complete for the year 2017 (Pasimeni & Georgakaki 2020). This implies that some Category 2 companies may have contributed to a new patent family later in 2017 and be confirmed as Category 1 companies in future Patstat vintages.

2017 – of which 2,240 are related to firms holding patents (Category 1) and 9,508 to firms without any patent (Category 2).

2.3 Dependent and control variables

Our aim is to analyze whether firms that have been investing in green innovation and have registered a green patent have a higher probability of raising Venture Capital finance than firms which either hold non-green patents only or do not hold any patents. To test whether firms with green patents have higher probability of raising VC investments, we construct our dependent variable as a dummy indicator, *VC*, that is equal to one if firms received a VC investment and zero otherwise over the period 2008-2017. The definition of VC and the classification of VC investment types is the one provided by VentureSource. Throughout this work, we adopt a *stringent* definition of Venture Capital and our variable, *VC*, includes firms only raising the following funding types: Seed, all VC funding rounds (from 1st to 9th) and VC later rounds. In some other specifications, we adopt a broader definition of VC investments, *VC broad*, which includes, in addition to all the stringent funding types, also the following other type of equity finance: Accelerator, Business Angel investments, Venture Recapitalization, Venture Leasing, and Corporate Venture Capital (CVC).

To explore the nexus between venture capital financing and firms' green patenting activities, we first classify firms based on the presence of green patents in their portfolio. The distinction between green and non-green patents is based on the methodology developed by the European Commission JRC (Pasimeni and Fiorini 2017) to derive indicators of global innovative activity in clean energy technologies. Operationally, we define an indicator variable (*GreenPat*) that takes the value of one if the firm holds at least one green patent according to our classification at the year of VC (or other equity) funding, and zero if the firm does not have any green patents. In a similar vein, we build another indicator variable (*OtherPat*) that takes the value of one if the firm's patents portfolio contains non-green patents only at the year of the funding, and zero otherwise.

Several firm characteristics could be related to both the likelihood of receiving VC funding and the likelihood of being a (green) innovator. To ensure the estimated effects of the firms' patenting activities are not driven by such confounding factors, we construct several control variables to be included in our econometric analysis. First of all, we consider firm size, proxied using firm's total assets (*Assets*), available from the balance sheets (Orbis). Then, we include the age of the firm at the time of the VC investment (*Age*), generated as the difference between the funding year and the date of incorporation. Next, to account for the firm capital structure, we focus on a measure of indebtedness (*Leverage*), defined as the ratio between long term debt plus loans over total assets.

We also consider the research and development activities carried out by the firms (*R&D*). Specifically, we build an indicator that takes the value of one if the firm develops any research and development activity as reported in its balance sheet, and zero otherwise. To minimize potential endogeneity concerns, the control variables *Total Assets, Age, Leverage*, and *R&D* are included with a one-year lag in all our model specifications.

Table 1 report the descriptive statistics of all the listed variables included in the dataset.[9] As is apparent, firms with green patenting activities, on average, tend to be larger (in terms of assets), older, more indebted and with higher propensity to invest in R&D activities than firms engaging in non-green patented innovation or without any patenting activities at all.

Our *matched DB* also include information on the industrial sectors of activity of the firms based on the NACE2 classification, both broad and at 4-digit level, as well as on the country of origin of the firms. We exploit this information to control for sectoral and geographical differences in the econometric analysis.

[INSERT TABLE 1 HERE]

3 Empirical strategy

Our objective is to estimate whether and to what extent the probability of raising a venture capital investment changes for firms that have been investing in green innovation and have registered a green patent, compared to firms holding non-green patents only or no patents at all. In other words, in line with the literature that considers patenting as a signalling device to mitigate asymmetric information and financial constraints, we test whether green innovation represents a way for firms to provide a distinctive signal to the VC market and, ultimately, facilitate their access to VC funding. Specifically, we estimate several specifications of the following Probit model:

$$Pr(VC)_{i,t} = \alpha + \beta GreenPat_{i,t} + \gamma OtherPat_{i,t} + \delta Controls_{i,t-1} + \varphi_t + \varphi_c + \varphi_s + \varphi_{(c,s)} + \epsilon_{i,t} \quad (1)$$

In equation (1), *Pr (VC)* is an indicator variable that is equal to one if firm *i* raises VC finance at time *t*, and zero otherwise[10]. *GreenPat* is a dummy variable that equals one if the firm holds at least

[9] Further description of all the variables included in the *matched DB* is included in Table A1 while their correlation matrix is presented in Table A2 of the Appendix.

[10] The indicator is zero if the firms raises another equity-based financing at year *t*.

one green patent according to our classification already at the year of VC (or other equity) funding, and zero otherwise. Similarly, *OtherPat* is equal to one if the firm's patents portfolio contains non-green patents only at the year of the funding. To account for any possible unobserved heterogeneity across firms, we include a set of control variables that could have an impact on both the firm probability to raise a VC investment and the likelihood for it to be a green innovator. In particular, the vector *Controls* includes four indicators related to the size (*Assets*), maturity (*Age*), its capital structure (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms. To control for potential shocks occurring in different periods and common to all firms of the sample we add year fixed effects, φ_t. Moreover, to account for cross-sectional heterogeneity across VC markets, we also include a set of country, φ_c, and sector, φ_s, fixed effects. In a tighter specification, we also introduce them interacted, $\varphi_{(c,s)}$, to control for specific characteristics of sectors across countries. Lastly, ε_{it} is the error term.

In Equation (1), the coefficient β, alongside its associated marginal effect, is the focus of our interest. It represents our estimate of the effect of green innovation on the probability of raising a VC investment. Similarly, the coefficient γ provides information on the effect of non-green innovation on the probability of raising a VC investment. As such, it is also meaningful to compare them to gauge the relative importance of green vs. non-green patenting as signals for VC investors.

While the introduction of control variables and fixed effects should mitigate concerns on the specification of the model, an additional potential source of bias for our estimates may arise from systematic heterogeneity across firms. Otherwise said, VC-backed firms might be systematically different from other equity-backed firms according to some unobserved characteristics. If this is the case, then our econometric estimates would be affected by these confounding factors, thus hampering a clean identification of the effect of green patenting. To eliminate this potential source of bias, we adopt a matching approach. Our goal is to identify a pool of other equity-backed firms that are similar to VC-backed firms along a relevant set of observable characteristics so that the residual difference across these groups is limited to the fact that one group of firms raises a VC, while the other does not. In particular, we implement a propensity score matching (PSM) procedure to build statistically comparable groups of VC-backed and other equity-backed firms. Specifically, we model the probability of a firm receiving VC using the firm country and sector, as well as predetermined financial characteristics, such as assets, age, leverage ratio, investments in R&D, considered at the year before the investment. The matching between firms is based on the

Nearest-Neighbor (NN) algorithm.[11] Then, we impose the common support option, that requires that VC-backed firms have comparable other equity-backed firms with similar propensity scores. Starting from 11,748 observations, 6,410 are dropped because of outside support, with the final number of observations in the support being equal to 4,735. Table 2 which displays the t-tests for equality of means in the matched sample for the continuous variables included in the PSM logit regression. The t-tests are statistically insignificant, thus suggesting that the matching was successful in that the matched sample is balanced. Therefore, in what follows, we present the baseline results of estimating Equation (1) on both the full and matched samples, while we focus on the matched sample only for the further robustness analyses and extensions.[12]

[INSERT TABLE 2 HERE]

4 Results

4.1 Baseline results on the full sample

This section presents the baseline results from regression model (1). We first run the model on the full sample of firms. Table 3 reports the coefficient estimates (Panel A) and the associated marginal effects (Panel B). Column (1) reports the benchmark specification that includes only the patent indicator variables, while in the specifications in columns (2)-(5) different sets of fixed effects are added. In particular, year fixed effects control for common time-varying shocks that might affect the probability of raising venture capital financing. Country and sector fixed effects allow us to take into account time-invariant unobservable correlated with financing that are specific to the country and to the sector where the firms operate, respectively. Lastly, in the most extensive specification, we include interacted country- and sector-specific fixed effects.

We find that the coefficient for the *GreenPat* indicator is positive and highly statistically significant throughout the specifications of the model. The magnitude of the associated marginal effects is fairly stable across all specifications without controls, with the coefficients ranging between 6 and 9%. Holding a green patent increases the probability that a firm raises VC financing by around 9% when we control for the full set of fixed effects (column (5)). Importantly, this effect is identified separately from the impact of non-green patents. The coefficient on the *OtherPat* is also positive and highly statistically significant. The associated marginal effects point to an increase in the

[11] We adopt the nearest-neighbours matching algorithm through the Stata command *psmatch2* developed by Leuven and Sianesi (2003).

[12] For the sake of robustness, we also replicate all the estimations presented across the paper on the full sample. Reassuringly, the results – reported in Tables A3 to A6 of the Appendix – are consistent with those presented for the matched sample.

probability of raising VC finance by 12% for firms that have already engaged in patenting activities in areas other than green technologies.

In columns (6) and (7) we add controls at the company level, with one-year lag to avoid simultaneity. Specifically, we include the log of total assets to control for size, firm age, leverage and an indicator for R&D investments. The sample size roughly halves, as these variables are not available for all firms. Turning to the indicator variables of interest, the marginal effects are still positive and highly statistically significant, irrespective of the inclusion of the full set of fixed effects in the regressions. Specifically, having a green patent is found to increase the probability of raising VC finance by around 18%. This is twice as large as the impact estimated in the specifications without firm-level controls. By contrast, with a marginal effect around 14%, the impact of non-green patenting activity is in line with the findings from the models in columns (1)-(5). Overall, these results corroborate the view that patents act as positive signal towards VC. Moreover, importantly, we uncover also a strong effect for patents associated to green technologies. Hence, green innovation seems to provide an additional signal to VC investors compared to alternative types of corporate innovation activities.

[INSERT TABLE 3 HERE]

4.2 Baseline results on the matched sample

As next step, we run the Probit model that links VC financing to patents on the matched sample of similar firms. Compared to the full sample with up to 11,748 observations, as discussed above, performing the matching significantly reduces the sample size to 4,735. First, we consider the baseline specification with the two indicators that measure whether the firm already holds at least a green or a non-green patent at the time when VC funds are received. The results are reported in Table 4. Reassuringly, the coefficient estimates (Panel A) and associated marginal effects (Panel B) are positive and highly statistically significant, qualitatively confirming the results obtained on the full sample. The size of the marginal effects indicates that the presence of green patenting increases the probability of receiving VC finance by up to 20%, as obtained in the full specification (column (7)). For non-green patents, the estimated impact is up to 14%.

[INSERT TABLE 4 HERE]

5 Robustness tests

In this section, we verify the robustness of our baseline findings by conducting several additional tests based on different measures of green patenting activities and alternative definitions of the dependent variable.

5.1 Patent portfolio composition

To gauge the additional effect of green innovation with respect to other types of innovation activities we run an alternative specification of model (1). In particular, we replace the two indicator variables for green and non-green innovators with a single variable, the (lagged) ratio between the number of green patents over the total number of patents that the company holds (*GreenPatRatio*). In this way, by focusing on their relative importance in a company patent portfolio, we capture the contribution of the extensive margin of green (and non-green) innovation activities. Besides providing a measure of the intensity of green innovation, the use of this alternative variable rules out that the effect in the baseline model is driven by the correlation between the two patent indicators. Table 5 reports the results. The coefficient of interest is positive and significant at the highest levels throughout (Panel A). The associated marginal effects in Panel B are also fairly stable across the different specifications. The magnitude of the effect is substantial, since the probability of receiving VC funds increases by between 24 and 29 % when green patents are more represented in firms' patent portfolio. Overall, in line with the results for the baseline specification, we find that firms engaging in green innovation are more likely to attract VC investments.

[INSERT TABLE 5 HERE]

5.2 Alternative VC definition (VC broad)

We now analyze whether the impact of green patenting on the firm's likelihood of receiving VC funding is driven by our definition of VC financing. Specifically, instead of using the dependent variable *VC*, we adopt a broader definition of VC investment (*VC broad*) that includes Accelerator, Business Angels, Venture Recapitalization, Venture leasing and Corporate Venture Capital in addition to the funding rounds of the variable *VC*. Then, we estimate equation (1) with *VC broad* as a dependent variable. The results of this analysis are reported in columns (1) of Table 6. The coefficients of *OtherPat* and *GreenPat* are both positive and statistically significant. Looking at the magnitude of coefficients, the table shows that both are in line with those shown for our stricter indicator *VC*. We conclude that the adoption of a stricter definition of VC does not overrate the probability of investing in green technologies.

[INSERT TABLE 6 HERE]

5.3 Alternative measures of green innovation

In our baseline model, we have classified firms into three mutually exclusive categories: i) firms without any patents, ii) firms with at least one green patent, and iii) firms with at least one non-green patent and no green patents. One might argue that this classification does not perfectly identify green innovators and cannot precisely discriminate them from non-green innovators given

that, in principle, the same firm might hold both green and non-green patents. This could induce potential measurement error hampering the empirical identification of the effect of green innovation. To address this concern, we run our baseline model on two restricted sub-samples of firms. In the first exercise, we exclude from the sample those firms having both types of patents with green ones being less than 50% of the total. In other words, we consider as 'green innovators' only those firms whose patent portfolio is mostly composed by green innovations (*Mostly green patents*). In the second exercise, we exclude from the sample firms having a 'mixed' patent portfolio, that is all those companies holding both green and non-green patents at the time of the financing, and we compare firms holding non-green patents only (*Fully other patents*) and green patents only (*Fully green patents*).

The results of these analyses are presented in Table 7 columns (1) and (2), respectively. All the estimated coefficients are positive and statistically significant. The marginal effect of *Fully green patents* is lower in magnitude (0.112) with respect to the one calculated for the *Mostly green patents* coefficient (0.197), which is fully aligned with that of our baseline model. All in all, these findings confirm the robustness of our identification strategy.

Another potential issue arises with respect to the measurement of green innovation. Specifically, we classify green innovators only on the basis of the analysis of firms' patent portfolios. Hence, in our approach, we discard firms operating in innovative green sectors that, however, have not registered any green patents. While this implies that we might indeed be identifying a lower bound in the effect of green innovation on the probability of obtaining VC funding, it is nonetheless relevant to assess our results against a broader definition of green innovation. Thus, following Mrkajic et al. (2019), we adopt an industry-based definition of green innovative firms. Specifically, we first define as 'green macro-sectors' and 'green micro-sectors' those broad and 4-digit NACE2 sectors, respectively, with at least one firm holding a green patent. Then, we tag as green all other firms in these sectors, even if they do not hold a green patent. This approach allows us to reduce the likelihood of 'false negatives' in our setting.[13]

The results of this robustness analysis are presented in Table 7, columns (3) and (4). Column (3) shows that the probability of raising a VC is not higher for firms belonging to green macro-sectors than non-green macro-sectors, thus suggesting that the 'born-to-be-green' characteristics of firms are patent-specific and not sector-specific. However, while the magnitude of the coefficient is more than halved, the analysis at the micro-sector (4-digit) level qualitatively confirms the results

[13] A similar methodology is adopted by Bellucci et al. (2020) to test the robustness of the results of a model in which the identification strategy was based on a deal-level analysis rather than an industry-level analysis.

obtained in our baseline estimation. This suggests that a higher granularity in the identification of green innovations helps in the specification of the model, and, more importantly, in drawing the correct inference about its relevance for attracting VC investments.

Overall, these results confirm the main messages from our baseline findings, that is, that green patenting is an important driver of VC funding. Moreover, the merits of granular data at the firm level on innovation activities are apparent in the fact that, when using macro indicators at the sector level, one would erroneously conclude that there is no association between green innovation and VC finance. This indeed suggests that VC finance can play an important role in fostering green innovation.

[INSERT TABLE 7 HERE]

6 Heterogeneous effects

To investigate whether there is evidence of heterogeneous effects, we analyze how the probability of VC funding is driven by the investment stage of financing or by some investor characteristics.

6.1 Investment stage

While patenting can be thought as a relevant signal for VC investors to reduce information asymmetries in the first stages of investments, this aspect should be less relevant when the relationship between investor and VC-backed firm is more consolidated, that is for the later rounds of investments (Hoenen et al., 2014; Zhou et al., 2015). However, this hypothesis could be (at least partially) offset in the case of green patents due to the to the longer average time needed to develop patentable green technologies (Mrkajic et al., 2019). Hence, we further investigate possible heterogeneous effects related to the stage of financing by distinguishing between early and late investment rounds. In particular, we compare the probability of raising a Later- vs Early-stage VC in the presence of (green) patents.

To analyze the possible differential effect for early and late investments, we construct a dummy variable, *Later Stage*, which takes the value of 1 for later-stage deals, and 0 for early-stage ones. We consider seed stage, as well as the 1st and 2nd investment rounds as early-stage. By contrast, we categorize as later stage all stages from the 3rd to 9th rounds and VC later. We then estimate equation (1) with the variable *Later Stage* as a dependent variable. Were the estimated coefficient significantly negative, we could conclude that later-stage VC investments are less influenced by the presence of (green) patenting than early-stage ones.

The results of the estimation are shown in columns (2) of Table 8. The coefficients of the variable *GreenPat* and *OtherPat* are both negative (as expected) but not statistically significant, which means that we do not find any significant differences across VC investment rounds. This result seems to suggest that the presence of (green) patents is equally important for receiving both stages of VC financing.

6.2 Type of investor

We also analyze possible heterogeneous effects created by different types of investors. Specifically, we distinguish between Institutional Venture Capital investors (IVC) and Venture Capital investments made by Corporations (CVC). The differences between IVCs and CVCs in their organization, incentives, objectives and mode of operation may induce different responses by these types of investors to green innovation, and different propensity to invest therein. On one hand, IVCs aim at increasing the value of portfolio companies prior to exit (Gompers and Lerner, 2001). The VC funding or the acquisition of equity stakes of firms with green innovation activities and patents may increase the performance and consequently the value of these companies before exit strategy. Hence, IVCs might have the incentive to invest heavily with respect to other types of investors. On the other hand, CVCs are more likely to finance companies that develop technologies complementary to those of the parent (Dushnitsky and Lenox 2006; Da Rin et al. 2013; Maula et al. 2013). In such a case, CVCs may postpone their investments waiting for more emerging and disruptive technologies. To examine the different behaviors between IVCs and CVCs towards the VC financing of green patented innovation, we create a dummy variable, *CVC*, that takes the value of 1 for deals involving a corporate VC, and 0 for independent VC. We then estimate equation (1) with CVC as a dependent variable.

The estimation results are in columns (3) of Table 8. The analysis suggests that CVCs do not respond in a systematically different manner respect to IVCs, as indicated by the insignificant estimates of coefficients for green and non-green patents. According with the survey evidence reported by Gompers et al. (2020), we conclude that while relevant, the investor type is not a primary determinant for investing in green technologies in the VC market.

In a further exercise, we explore the possible heterogeneous effects by distinguishing between investments made by Business Angels (BAs) and IVCs when investing in the presence of (green) patents. BAs are considered 'informal' venture capital investors (Haines et al., 2003) that are more interested to personal signals related to the company founders or management such as their commitment, trust and enthusiasm, while IVCs mostly base their investments on more structured and objective evaluation processes (Van Osnabrugge and Robinson, 2000; DeGennaro, 2010). Along

this line, the fact that the company is a patent holder should attract more interest from the IVCs than from the BAs. If this is empirically validated, we also want to verify whether this different approach applies both to green and to all the other patents. Indeed, a recent survey by EIF shows that although both IVCs and BAs tend to be interested in ESG investments, Angel investors are more attentive to ethical issues and impact financing (Botsari and Lang, 2020). We then analyze whether the presence of (green) patents could be more likely associated to VC rather than to Angel investment. To do so, we limit our sample to firms that raised VC (identified by our dependent variable as $VC = 1$) and to those that received BA ($VC = 0$).

The results of this analysis are reported in column (4) of Table 8. We find that the probability of investing in firms with green patents is lower for BAs respect to IVCs. The lower probability of BAs emerges also when they invest in firms with other non-green patents. Our results are consistent with those of Conti et al. (2013) who find that patenting is a more effective signal for IVCs than for BAs. At the same time, the presence of green patents does not seem to be a sufficiently strong signal for BAs to place themselves as recognized operators in the impact financing arena.

[INSERT TABLE 8 HERE]

7 Conclusions

In this paper we investigate whether firms that have obtained green patents are more likely to attract VC financing than firms without a patented record of green innovation. We use a unique matched sample of equity-backed companies, equity transactions and information on innovation activities and patents in clean energy technologies associated to VC-backed firms over the period 2008-2017. We find that engaging in green patenting activities increases the likelihood that a firm receives VC funding. The same results hold when we consider the share of green over total patents instead of an indicator that captures the status as patented green innovator. Robustness and heterogeneous analyses corroborate the view that, in addition to general innovation activities, green patenting in particular is an important driver of VC funding.

Overall, our findings point to green innovation as an investment opportunity for venture capitalists. This has important implications at a juncture where substantial technological innovation is crucial to meet the ambitious climate and environmental goals set at the EU and global levels, and the required financial effort is equally unprecedented. In this respect, it is widely recognized that public sources of finance are largely insufficient to fund the massive amount of investment needed to move towards less environment- and resource-intensive economies and societies. In addition to public support, the initiatives pioneered by the European Commission in the area of

sustainable finance indeed aim at providing a guide to private investments towards green recovery. By documenting the attractiveness of green patenting for VC investment, our findings suggest that this type of private equity finance can play an important role in fostering green innovation. This, in turn, can generate positive externalities in the form of knowledge spillovers, and thus facilitate the adoption and diffusion of environmental technologies, and, ultimately, bolster green growth.

Given also the peculiarities of green innovation, confirming the pivotal role of VC finance in enabling and scaling the solutions needed for the low-carbon transition calls for further analysis, to disentangle the complexity of venture funding of green technologies. Many of those solutions indeed require high level of investments over a long period and have shown to be a poor fit for the business model of traditional European VC funds (World Economic Forum, 2020). A paradigmatic example are deep-tech start-ups, which build on scientific knowledge and are characterized by long R&D cycles and untested business models. They typically rely on large capex investments in pilot plants for new technologies to be able to scale their revenues.

In this context, particularly relevant appears also the investigation of the interplay between public support measures and private finance. Many countries are developing support measure to incentivize and de-risk investment in green technologies, including for instance tax credits, funds and grants, as well as equity and debt co-investment. We leave this and related issues for further research.

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Tables

Table 1 - Summary Statistics

Variables	Total			Green Patents			Non-green Patents			No Patents		
	Obs.	*Avg*	*SD*	*Obs.*	*Avg*	*SD*	*Obs.*	*Avg*	*SD*	*Obs.*	*Avg*	*SD*
VC	11,748	0.37	0.48	415	0.43	0.50	1,825	0.49	0.50	9,508	0.35	0.48
VC broad	11,748	0.45	0.50	415	0.48	0.50	1,825	0.53	0.50	9,508	0.43	0.50
Patents	11,748	0.23	0.50	415	2.00	0.00	1,825	1.00	0.00	9,508	0.00	0.00
Assets	6,344	7.92	2.22	274	8.44	2.13	1,092	7.87	2.00	4,978	7.90	2.27
Age	6,981	1.83	0.90	289	1.92	0.80	1,148	1.87	0.83	5,544	1.82	0.92
Leverage	6,083	0.22	0.34	267	0.25	0.36	1,044	0.26	0.37	4,772	0.21	0.33
R&D	7,374	0.02	0.13	318	0.06	0.24	1,236	0.04	0.20	5,820	0.01	0.10

Notes: The table provides descriptive statistics for the variables used in the analysis for all transactions and for the groups of transactions with firms with green patents, for firms without non-green patents and for firms without any patent. *VC* is an indicator variable that takes the value of 1 if the firm receives Venture Capital funding and 0 otherwise (i.e. receive other equity financing). *VC broad* is an indicator variable that takes the value of 1 if the firm receives Venture Capital funding according to our broader definition that also include Business Angel, CVC, Venture Leasing, Venture Recapitalization) and 0 otherwise (i.e. receive other equity financing). *Patents* is an indicator variable that takes the value of 1 if the firm holds at least one green patent according to our classification at the year of VC (or other equity) funding, and 0 otherwise. *Assets* is the natural logarithm of the total assets of the firm at time t-1. *Age* is the natural logarithm of a continuous variable that measures the years since its establishment at time t-1. It is expressed in natural logarithm. *Leverage* is the natural logarithm of a continuous variable that measures the firm's financial indebtedness, constructed as the ratio between the firm's Long-term Debt plus Loans scaled by Total Assets at time t-1. *R&D* is an indicator variable that takes the value of 1 if the firm develops activities of research and development, and 0 otherwise. The descriptive statistics of the variable *Assets*, *Age*, *Leverage* and *R&D* are reported one year before the financing. The table reports mean and standard deviation of each variable for each group of firms.

Table 2 - Balancing test for the matching – Results with NN matching (support 3)

Dep. Variable	VC-backed firms	Other equity-backed	% reduct bias	Difference from other equity-backed firms
Assets	23,387	24,565	90.6	1,178
Age	9.149	8.948	-10.7	-0.201
Leverage	0.440	0.346	31.3	-0.094
R&D	0.039	0.039	100.0	0.000

Notes: *** p < 0.01; ** p < 0.05; * p < 0.10. The table shows the mean values in the year before the financing. *Assets* are reported in Millions of euros. The estimation includes the whole set of Fixed Effects. The test is run without replacement and with three nearest neighbors for each treated unit.

Table 3 - Baseline model on full sample

Panel A - Probit Estimation							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
OtherPat	0.347***	0.350***	0.374***	0.310***	0.333***	0.443***	0.482***
	(0.032)	(0.032)	(0.040)	(0.042)	(0.043)	(0.049)	(0.056)
GreenPat	0.203***	0.206***	0.276***	0.166**	0.253***	0.570***	0.639***
	(0.063)	(0.064)	(0.075)	(0.076)	(0.079)	(0.092)	(0.102)
Observations	11,748	11,748	11,748	11,748	11,748	5,775	5,775
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Panel B - Marginal Effects							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
OtherPat	0.135***	0.136***	0.138***	0.111***	0.117***	0.139***	0.142***
	(0.013)	(0.013)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)
GreenPat	0.078***	0.079***	0.101***	0.058**	0.088***	0.179***	0.189***
	(0.025)	(0.025)	(0.028)	(0.027)	(0.028)	(0.029)	(0.030)
Observations	11,748	11,748	11,748	11,748	11,748	5,775	5,775
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Notes: The table reports regression results, on the full sample, of the Probit estimation of equation (1) in Panel A and associated marginal effects in Panel B. The dependent variable is *VC*, an indicator variable that takes the value of 1 if the firm receives Venture Capital funding and 0 otherwise (i.e. receive other equity financing). *OtherPat* is an indicator variable that takes the value of 1 if the firm's patents portfolio contains non-green patents only at the year of the VC funding and 0 otherwise. *GreenPat* is an indicator variable that takes the value of 1 if the firm holds at least one green patent according to our classification at the year of VC (or other equity) funding, and 0 otherwise. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 4 - Baseline model on matched sample

Panel A - Probit Estimation							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
OtherPat	0.309***	0.303***	0.333***	0.258***	0.317***	0.440***	0.475***
	(0.049)	(0.049)	(0.053)	(0.055)	(0.057)	(0.054)	(0.062)
GreenPat	0.366***	0.361***	0.417***	0.280***	0.396***	0.602***	0.684***
	(0.091)	(0.091)	(0.098)	(0.100)	(0.104)	(0.099)	(0.112)
Observations	4,735	4,735	4,735	4,735	4,735	4,708	4,708
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Panel B - Marginal Effects							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
OtherPat	0.119***	0.116***	0.122***	0.092***	0.111***	0.135***	0.138***
	(0.019)	(0.019)	(0.020)	(0.020)	(0.020)	(0.017)	(0.018)
GreenPat	0.142***	0.139***	0.154***	0.100***	0.139***	0.186***	0.199***
	(0.036)	(0.036)	(0.037)	(0.036)	(0.037)	(0.031)	(0.032)
Observations	4,735	4,735	4,735	4,735	4,735	4,708	4,708
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Notes: The table reports regression results, on the matched sample, of the Probit estimation of equation (1) in Panel A and associated marginal effects in Panel B. The dependent variable is *VC*, an indicator variable that takes the value of 1 if the firm receives Venture Capital funding and 0 otherwise (i.e. receive other equity financing). *OtherPat* is an indicator variable that takes the value of 1 if the firm's patents portfolio contains non-green patents only at the year of the VC funding and 0 otherwise. *GreenPat* is an indicator variable that takes the value of 1 if the firm holds at least one green patent according to our classification at the year of VC (or other equity) funding, and 0 otherwise. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 5 – Patent portfolio composition

Panel A - Probit Estimation							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
GreenPatRatio	0.773***	0.760***	0.800***	0.706***	0.781***	0.905***	0.828***
	(0.208)	(0.210)	(0.220)	(0.221)	(0.223)	(0.206)	(0.212)
Observations	4,735	4,735	4,735	4,735	4,735	4,708	4,708
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Panel B - Marginal Effects							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
GreenPatRatio	0.292***	0.284***	0.289***	0.248***	0.270***	0.274***	0.242***
	(0.078)	(0.078)	(0.079)	(0.077)	(0.077)	(0.062)	(0.062)
Observations	4,735	4,735	4,735	4,735	4,735	4,708	4,708
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Notes: The table reports regression results, on the matched sample, of the Probit estimation of equation (1) in Panel A and associated marginal effects in Panel B. The dependent variable is *VC*, an indicator variable that takes the value of 1 if the firm receives Venture Capital funding and 0 otherwise (i.e. receive other equity financing). *GreenPatRatio,* is continuous variable that measures the ratio between the number of green over the total patents that a company holds the year before obtaining VC financing. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 6 - Alternative VC definition (VC broad)

Panel A - Probit Estimation							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
OtherPat	0.233***	0.232***	0.262***	0.175***	0.237***	0.358***	0.398***
	(0.048)	(0.049)	(0.053)	(0.056)	(0.058)	(0.057)	(0.064)
GreenPat	0.290***	0.300***	0.373***	0.232**	0.323***	0.567***	0.655***
	(0.09)	(0.091)	(0.099)	(0.102)	(0.104)	(0.105)	(0.117)
Observations	4,735	4,735	4,735	4,735	4,735	4,708	4,708
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Panel B - Marginal Effects							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
OtherPat	0.092***	0.091***	0.097***	0.063***	0.082***	0.105***	0.109***
	(0.019)	(0.019)	(0.02)	(0.02)	(0.02)	(0.016)	(0.017)
GreenPat	0.115***	0.118***	0.137***	0.083**	0.112***	0.166***	0.178***
	(0.036)	(0.036)	(0.036)	(0.037)	(0.036)	(0.03)	(0.03)
Observations	4,735	4,735	4,735	4,735	4,735	4,708	4,708
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Notes: The table reports regression results of the Probit estimation of equation (1) on the matched sample (Panel A) and its marginal effects (Panel B). The dependent variable is *VC broad*, an indicator variable that takes the value of 1 if the firm receives Venture Capital funding according to our broader definition (i.e. also including Business Angel, CVC, Venture Leasing, Venture Recapitalization) and 0 otherwise (i.e. receive other equity financing). *OtherPat* is an indicator variable that takes the value of 1 if the firm's patents portfolio contains non-green patents only at the year of the VC funding and 0 otherwise. *GreenPat* is an indicator variable that takes the value of 1 if the firm holds at least one green patent according to our classification at the year of VC (or other equity) funding, and 0 otherwise. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 7 - Robustness: mostly green, only green patents and sectoral analyses

Panel A - Probit Estimation				
Dep. Variable	(1)	(2)	(3)	(4)
	VC = 1	VC = 1	VC = 1	VC = 1
Fully other patents	0.490***	0.492***		
	(0.063)	(0.063)		
Mostly green patents	0.681***			
	(0.171)			
Fully green patents		0.388*		
		(0.231)		
Green Macro Sectors			0.404	
			(1.113)	
Green Micro Sectors				0.195***
				(0.051)
Observations	4,113	4,081	4,241	4,241
Year	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Sector x Country	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Panel B - Marginal Effects				
Dep. Variable	(1)	(2)	(3)	(4)
	VC = 1	VC = 1	VC = 1	VC = 1
Fully other patents	0.142***	0.142***		
	(0.018)	(0.018)		
Mostly green patents	0.197***			
	(0.049)			
Fully green patents		0.112*		
		(0.067)		
Green Macro Sectors			0.118	
			(0.326)	
Green Micro Sectors				0.057***
				(0.015)
Observations	4,113	4,081	4,241	4,241
Year	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Sector x Country	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Notes: The table reports regression results, on the matched sample, of the Probit estimation of equation (1) in Panel A and associated marginal effects in Panel B. The dependent variable is *VC*, an indicator variable that takes the value of 1 if the firm receives Venture Capital funding and 0 otherwise (i.e. receive other equity financing). In column (1) we exclude from the sample firms having a 'mixed' patent portfolio, that is all those companies holding both green and non-green patents at the time of the financing, and we compare firms holding non-green patents only (*Fully other patents*) and green patents only (*Fully green patents*). *Fully other patents* is an indicator variable that takes the value of 1 if the firm holds at least one patent at the year of VC (or other equity) funding, and 0 otherwise. In column (2) we exclude from the sample firms having less than 50% of green patents in their patent portfolio. *Mostly green patents* is an indicator variable that takes the value of 1 if the firm's patent portfolio is composed by more than 50 % of green patents. In column (3), the variable *Green Macro Sectors* is an indicator variable that takes the values of 1 if a firm operates in a 'green macro-sectors', represented by those NACE2 'broad 'sectors

with at least one firm holding any green patent. In column (4), *Green Micro Sectors* is an indicator variable that take the values of 1 if a firm operates in a 'green micro-sectors', represented by those 4-digit sectors with at least one firm holding any green patent. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table 8 - Heterogeneous effects on green patenting

Panel A – Probit Estimation			
Dep. Variable	(1)	(2)	(3)
	VC Later = 1	CVC = 1	BA = 1
	VC Early = 0	VC = 0	VC = 0
OtherPat	-0.076	-0.198	-0.559***
	(0.113)	(0.164)	(0.187)
GreenPat	-0.073	-0.151	-1.128**
	(0.198)	(0.319)	(0.477)
Observations	1,549	1,387	1,513
Year	Yes	Yes	Yes
Sector	Yes	Yes	Yes
Country	Yes	Yes	Yes
Sector x Country	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Panel B - Marginal Effects			
Dep. Variable	(1)	(2)	(3)
	VC Later = 1	CVC = 1	BA = 1
	VC Early = 0	VC = 0	VC = 0
OtherPat	-0.017	-0.015	-0.052***
	(0.025)	(0.012)	(0.013)
GreenPat	-0.016	-0.012	-0.075***
	(0.043)	(0.023)	(0.012)
Observations	1,549	1,387	1,513
Year	Yes	Yes	Yes
Sector	Yes	Yes	Yes
Country	Yes	Yes	Yes
Sector x Country	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: The table reports regression results, on the matched sample, of the Probit estimation of equation (1) in Panel A and associated marginal effects in Panel B. In column (1), we analyze the possible differential effect for early and late VC investments, we construct a dummy variable, *Later Stage*, which takes the value of 1 for later-stage deals (all stages from the 3rd to 9th rounds and VC later), and 0 for early-stage ones. In column (2), we analyze possible heterogeneous effects created by different types of investors. Specifically, we distinguish between Institutional Venture Capital investors (IVC) and Venture Capital investments made by Corporations (CVC). The dependent variable, *CVC*, is an indicator that takes the value of 1 for deals involving a corporate VC, and 0 for independent VC. In column (3), we distinguish between investments made by Business Angels (BAs) and IVCs when investing in the presence of (green) patents. In this exercise, we limit our sample to firms that raised BA and IVC investments. The dependent variable, *BA*, is an indicator that takes the value of 1 for deals involving a Business Angels (BAs), and 0 for IVC. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Appendix

Table A1 - Definition of variables

Variable	Definition
VC	An indicator variable that takes the value of 1 if the firm receives Venture Capital funding and 0 otherwise (i.e. receive other equity financing)
VC broad	An indicator variable that takes the value of 1 if the firm receives Venture Capital funding according to our broader definition (i.e. also including Business Angel, CVC, Venture Leasing, Venture Recapitalization) and 0 otherwise (i.e. receive other equity financing)
GreenPat	An indicator variable that takes the value of 1 if the firm holds at least one green patent according to our classification at the year of VC (or other equity) funding, and 0 otherwise
OtherPat	An indicator variable that takes the value of 1 if the firm's patents portfolio contains non-green patents only at the year of the VC funding and 0 otherwise
GreenPatRatio	A continuous variable that measures the ratio between the number of green and non-green patents that a company holds the year before obtaining VC financing
Assets	Natural logarithm of the total assets of the firm
Age	A continuous variable that measures the years since its establishment. It is expressed in natural logarithm
Leverage	A continuous variable that measures the firm's financial indebtedness, constructed as the ratio between the firm's Long-term Debt plus Loans scaled by Total Assets
R&D	An indicator variable that takes the value of 1 if the firm develops activities of research and development, and 0 otherwise
Sector	Industrial sectors of activity of the firms based on NACE 2-digit sector classification
Country	Country of origin of the firm
Green Macro Sectors	An indicator variable that takes the values of 1 if a firm operates in a 'green macro-sectors', represented by those NACE2 broad sectors with at least one firm holding any green patent.
Green Micro Sectors	An indicator variable that takes the values of 1 if a firm operates in a 'green micro-sectors', represented by those 4-digit sectors with at least one firm holding any green patent.

Table A2 - Correlation Matrix

	VC	*Total Assets*	*Age*	*Leverage*	*R&D*	*Patents*
VC	1.0000					
Total Assets	-0.2985	1.0000				
Age	-0.4003	0.5486	1.0000			
Leverage	0.0129	-0.1262	-0.0595	1.0000		
R&D	0.0064	0.0922	0.0561	0.0198	1.0000	
Patents	0.0880	0.0313	0.0303	0.0559	0.1138	1.0000

Table A3 – Patent portfolio composition on the full sample

Panel A - Probit Estimation							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
GreenPatRatio	0.353**	0.345**	0.339**	0.255*	0.336**	0.784***	0.717***
	(0.145)	(0.145)	(0.155)	(0.154)	(0.159)	(0.200)	(0.201)
Observations	11,145	11,145	11,145	11,145	11,145	5,775	5,775
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Panel B - Marginal Effects							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
GreenPatRatio	0.134**	0.131**	0.123**	0.090*	0.116**	0.243***	0.212***
	(0.055)	(0.055)	(0.056)	(0.054)	(0.055)	(0.062)	(0.059)
Observations	11,145	11,145	11,145	11,145	11,145	5,775	5,775
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Notes: The table reports regression results, on the full sample, of the Probit estimation of equation (1) in Panel A and associated marginal effects in Panel B. The dependent variable is *VC*, an indicator variable that takes the value of 1 if the firm receives Venture Capital funding and 0 otherwise (i.e. receive other equity financing). *GreenPatRatio,* is continuous variable that measures the ratio between the number of green and non-green patents that a company holds the year before obtaining VC financing. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table A4 – Alternative VC definition (VC broad) on the full sample

Panel A - Probit Estimation							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
OtherPat	0.253***	0.265***	0.300***	0.224***	0.250***	0.360***	0.402***
	(0.032)	(0.032)	(0.041)	(0.042)	(0.043)	(0.051)	(0.058)
GreenPat	0.116*	0.140**	0.232***	0.115	0.192**	0.536***	0.606***
	(0.063)	(0.064)	(0.075)	(0.077)	(0.079)	(0.099)	(0.108)
Observations	11,748	11,748	11,748	11,748	11,748	5,775	5,775
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Panel B - Marginal Effects							
Dep. Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1	VC = 1
OtherPat	0.101***	0.105***	0.112***	0.081***	0.089***	0.107***	0.112***
	(0.013)	(0.013)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)
GreenPat	0.046*	0.055**	0.086***	0.042	0.068**	0.159***	0.167***
	(0.025)	(0.025)	(0.028)	(0.028)	(0.028)	(0.029)	(0.029)
Observations	11,748	11,748	11,748	11,748	11,748	5,775	5,775
Year	No	Yes	Yes	Yes	Yes	No	Yes
Sector	No	No	Yes	Yes	Yes	No	Yes
Country	No	No	No	Yes	Yes	No	Yes
Sector x Country	No	No	No	No	Yes	No	Yes
Controls	No	No	No	No	No	Yes	Yes

Notes: The table reports regression results of the Probit estimation of equation (1) on the full sample (Panel A) and its marginal effects (Panel B). The dependent variable is *VC broad*, an indicator variable that takes the value of 1 if the firm receives Venture Capital funding according to our broader definition (i.e. also including Business Angel, CVC, Venture Leasing, Venture Recapitalization) and 0 otherwise (i.e. receive other equity financing). *OtherPat* is an indicator variable that takes the value of 1 if the firm's patents portfolio contains non-green patents only at the year of the VC funding and 0 otherwise. *GreenPat* is an indicator variable that takes the value of 1 if the firm holds at least one green patent according to our classification at the year of VC (or other equity) funding, and 0 otherwise. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table A5 - Robustness: mostly green, only green patents and sectoral analyses on the full sample

Panel A - Probit Estimation				
Dep. Variable	(1)	(2)	(3)	(4)
	VC = 1	VC = 1	VC = 1	VC = 1
Fully other patents	0.494***	0.498***		
	(0.057)	(0.057)		
Mostly green patents	0.600***			
	(0.153)			
Fully green patents		0.334*		
		(0.200)		
Green Macro Sectors			0.133	
			(0.704)	
Green Micro Sectors				0.192***
				(0.045)
Observations	5,629	5,629	5,775	5,775
Year	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Sector x Country	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Panel B - Marginal Effects				
Dep. Variable	(1)	(2)	(3)	(4)
	VC = 1	VC = 1	VC = 1	VC = 1
Fully other patents	0.145***	0.146***		
	(0.016)	(0.016)		
Mostly green patents	0.176***			
	(0.045)			
Fully green patents		0.097*		
		(0.059)		
Green Macro Sectors			0.039	
			(0208)	
Green Micro Sectors				0.057***
				(0.013)
Observations	5,629	5,629	5,240	5,240
Year	Yes	Yes	Yes	Yes
Sector	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Sector x Country	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Notes: The table reports regression results, on the matched sample, of the Probit estimation of equation (1) in Panel A and associated marginal effects in Panel B. The dependent variable is *VC*, an indicator variable that takes the value of 1 if the firm receives Venture Capital funding and 0 otherwise (i.e. receive other equity financing). In column (1) we exclude from the sample firms having a 'mixed' patent portfolio, that is all those companies holding both green and non-green patents at the time of the financing, and we compare firms holding non-green patents only (*Fully other patents*) and green patents only (*Fully green patents*). *Fully other patents* is an indicator variable that takes the value of 1 if the firm holds at least one patent at the year of VC (or other equity) funding, and 0 otherwise. In column (2) we exclude from the sample firms having less than 50% of green patents in their patent portfolio. *Mostly green patents* is an indicator variable that takes the value of 1 if the firm's patent portfolio is composed by more than 50 % of green

patents. In column (3), the variable *Green Macro Sectors* is an indicator variable that takes the values of 1 if a firm operates in a 'green macro-sectors', represented by those NACE2 'broad 'sectors with at least one firm holding any green patent. In column (4), *Green Micro Sectors* is an indicator variable that take the values of 1 if a firm operates in a 'green micro-sectors', represented by those 4-digit sectors with at least one firm holding any green patent. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table A6 - Heterogeneous effects on green patenting on the full sample

Panel A – Probit Estimation			
Dep. Variable	(1)	(2)	(3)
	VC Later = 1	CVC = 1	BA = 1
	VC Early = 0	VC = 0	VC = 0
OtherPat	-0.044	-0.191	-0.478***
	(0.107)	(0.155)	(0.145)
GreenPat	-0.068	-0.071	-0.491*
	(0.188)	(0.308)	(0.289)
Observations	2,185	2,519	2,482
Year	Yes	Yes	Yes
Sector	Yes	Yes	Yes
Country	Yes	Yes	Yes
Sector x Country	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Panel B - Marginal Effects			
Dep. Variable	(1)	(2)	(3)
	VC Later = 1	CVC = 1	BA = 1
	VC Early = 0	VC = 0	VC = 0
OtherPat	-0.008	-0.013	-0.052***
	(0.021)	(0.01)	(0.011)
GreenPat	-0.013	-0.005	-0.053**
	(0.036)	(0.023)	(0.022)
Observations	2,185	2,519	2,482
Year	Yes	Yes	Yes
Sector	Yes	Yes	Yes
Country	Yes	Yes	Yes
Sector x Country	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: The table reports regression results, on the matched sample, of the Probit estimation of equation (1) in Panel A and associated marginal effects in Panel B. In column (1), we analyze the possible differential effect for early and late VC investments, we construct a dummy variable, *Later Stage*, which takes the value of 1 for later-stage deals (all stages from the 3rd to 9th rounds and VC later), and 0 for early-stage ones. In column (2), we analyze possible heterogeneous effects created by different types of investors. Specifically, we distinguish between Institutional Venture Capital investors (IVC) and Venture Capital investments made by Corporations (CVC). The dependent variable, *CVC*, is an indicator that takes the value of 1 for deals involving a corporate VC, and 0 for independent VC. In column (3), we distinguish between investments made by Business Angels (BAs) and IVCs when investing in the presence of (green) patents. In this exercise, we limit our sample to firms that raised BA and IVC investments. The dependent variable, *BA*, is an indicator that takes the value of 1 for deals involving a Business Angels (BAs), and 0 for IVC. The vector *Controls* includes four indicators related to the size (*Assets*), the experience (*Age*), the level of debt (*Leverage*), and

the attitude towards innovation (*R&D*) of the observed firms (all these indicators included are taken at the year before the funding to avoid simultaneity). To control for shocks common to all firms in different periods of the sample we add year fixed effects. To take account of differences in the VC markets, we also include a set of country and sector fixed effects, while we also introduce their product to control for specific characteristics of sectors across countries. All variables are defined in the text and the Appendix. The table reports coefficient estimates (resp. marginal effects) followed by robust standard errors, clustered at the deal level, in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

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