The Environmental Regulation Paradox for Clean Tech Ventures

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The Environmental Regulation Paradox for Clean Tech Ventures

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Abstract:
Traditionally, regulations are seen as harmful for the starting and growing of firms. However, strict environmental regulation can also trigger the discovery and introduction of clean technologies, and this innovation might improve the competitiveness of the firm. In this paper we will test this environmental regulation paradox in the context of new venture growth. The key questions are: 1) to what extent do new ventures perceive environmental regulation to be a bottleneck; and 2) how does environmental regulation affect the growth of clean tech ventures? We analyse the characteristics of a panel of new ventures during their emergence, and trace the effect of environmental regulation on the subsequent growth of these new ventures. We also specify these analyses for a subsample of firms that is especially liable to environmental regulations, namely clean tech ventures. The empirical evidence shows the paradox of environmental regulation for clean tech ventures: they more often perceive this to be a bottleneck, but environmental regulation also seems to drive their growth.

Keywords: environmental regulation, institutions, clean tech, entrepreneurship, new ventures, new firm growth

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1. Introduction

Climate change and depletion of natural resources are major societal challenges for the coming decades. There are several ways to deal with these challenges, ranging from taxing the use of polluting energy resources, to forbidding the use of particular resources, to stimulating the development of new sources of (cleaner) energy. Developing new clean technologies is one of the ways to tackle public problems related to climate change and resource depletion. These new clean technologies are likely to be commercialized by new (clean tech) ventures (cf. Utterback, 1994). Clean tech ventures are said to face a number of sector specific challenges such as a need for large capital expenditure and often long lead times (Mott, 2008), signaling significant market failures for the development of clean technologies, and high regulatory hurdles and uncertainty with respect to the stability and interpretation of environmental regulation, which presents additional risk to both companies and investors (see for example Noailly, 2009; Kopetsky, 2008). However, environmental regulations might also trigger environmental innovations, and in the end stimulate economic performance. This is central in the so-called Porter hypothesis that states that properly designed environmental standards can trigger innovation that may partially or more than fully offset the costs of complying with them (Porter, 1991; Porter and Van der Linde, 1995; Lee et al., 2011). Clean tech ventures might also be seen as entrepreneurial acts that turn market failures into entrepreneurial opportunities (cf. Cohen and Winn, 2007; Dean and McMullen, 2007). They address emerging needs and ‘create’ their market by persuading customers to alter long established behaviour and business practices (Lai, 1993). Thus, environmental regulation might both enable and constrain the performance of clean tech ventures. In this paper we will test this environmental regulation paradox. The key questions are:
1) do new ventures perceive environmental regulation to be a bottleneck; and 2) does environmental regulation positively affect the growth of clean tech ventures?

This study contributes to the existing literature in three ways. First, it provides evidence on the differential perception of environmental regulation by new firms that sell products based on new environmental and energy technologies (clean tech) versus new firms whose products are not based on these technologies. Second, new firms are often not analyzed in the context of environmental regulation, due to lack of data on this group of firms. Especially this group of firms is likely to be susceptible to (environmental) regulation, and is likely to make a difference in the creation and diffusion of clean technologies. However, in order to make an impact these firms should grow to a substantial size. It is thus imperative to find out how these clean tech ventures grow, and in particular to uncover the role of environmental regulation in their growth. The third contribution of this study is a longitudinal analysis on the effect of perceived environmental regulation on the performance of new firms. Together we provide a micro and longitudinal analysis of the Porter hypothesis, and in a broader sense, of how institutions are perceived by and affect new firms.

This article proceeds as follows. We first discuss the literature on environmental regulation and firm performance. Then we present our data and research method. We subsequently analyze the characteristics of a panel of new ventures during their emergence, and trace the effect of environmental regulation on the subsequent growth of these new ventures, controlling for human capital, financial capital, organizational capital, and growth ambitions. We also specify these analyses for a subsample of clean tech ventures. We finish with conclusions.
2. Institutions, environmental regulation and firm performance

Institutions are the rules of the game in a society (North, 1990; Nooteboom, 2000), which implies some constraints on firm performance. However, constraint may also open up new possibilities: it may enable choices and actions that otherwise would not exist. Institutions may not always be the antithesis of freedom; they might also be its ally (Hodgson, 2006). Yet, regulation, as a formal institution, is often defined as a public action that aims to constrain private activity in order to promote public interests and socially desirable activities. These regulations may be harmful for individual private actors, but are seen to have net positive effects on the general public. A frequently used rationale for this public action is the correction of inefficient or inequitable market practices such as environmental externalities, monopolistic behaviour, information asymmetries, and inadequate provision of public goods. This market failure rationale has been important in introducing environmental regulation as a means to internalize the social costs of industrial production. In this way regulation improves static efficiency. More recently, environmental regulation has also been introduced as a means to stimulate dynamic efficiency, i.e. innovation (see Paraskevopoulou, 2012; Blind, 2012).

Traditionally, regulations are seen as a regulatory burden for the performance of firms. Complying with bureaucratic “red tape” regulations implies costs that constrain new ventures at start-up (Djankov et al., 2002; Stam et al., 2010) and during growth (Bosma et al., 2009; Dabla-Norris and Inchauste, 2007). Even though this constraining effect of regulation in general is confirmed in multiple studies, there is more debate about the constraining effects of more particular types of regulation, especially environmental regulation. In line with the argument against regulations in
general, environmental regulations have been found to negatively affect the performance of firms (Greenstone, 2002; Gray and Shadbegian, 1998). In contrast, Porter and Van der Linde (1995) argued that strict environmental regulation triggers the discovery and introduction of clean technologies and this innovation improves the competitiveness of firms. There are several reasons why environmental regulation may positively affect firm performance (Porter and Van der Linde, 1995; Ambec et al., 2010). First, it may create new markets and in that way stimulate the performance of firms serving these markets. Second, it might signal firms about likely resource inefficiencies and potential technological improvements. Third, this environmental regulation might focus firms on information gathering and raise their awareness for new opportunities. Fourth, regulation may reduce the uncertainty about the returns on (environmentally friendly) investments. Fifth, it might create pressures that motivate innovation. Therefore, do environmental regulations have a negative or a positive effect on the performance of new ventures?

Based on the existing literature one could pose two opposite hypotheses on the effect of environmental regulation on firm performance. On the one hand, in line with the traditional literature on the harmful effects of regulation on firm performance, one can hypothesize a negative effect. For example, Rassier and Earnhart (2009) found that a more stringent Clean Water Act regulation, measured by permitted wastewater discharge limits, undermines expected future financial performance of publicly owned firms in the chemical manufacturing industries. On the other hand, a contrasting effect is to be expected from the literature on the so-called Porter hypothesis (Porter, 1991; Porter and Van der Linde, 1995), namely that environmental regulation has a positive effect on the performance of firms. Jaffe and Palmer (1997) found a positive effect of environmental regulation on R&D expenditures, but not on inventive output (patents),
on the industry level. More conclusively, Lanoie et al. (2008) find that the direct (contemporaneous) impact of environmental regulation on the productivity of industries is negative, while the opposite is observed with lagged regulatory variables, which they regard as a confirmation of the Porter hypothesis, since it takes time to implement productivity enhancing innovations. Noailly (2009) found evidence that countries with more stringent regulatory standards achieve higher levels of patenting activities than countries with less stringent environmental regulations. In this paper we will test for the direct and indirect effects of environmental regulation on the growth of new ventures, which has until now been a neglected area in the literature on environmental regulation and firm performance (see Ambec et al., 2010). In particular, we distinguish between the effect of environmental regulations on the general population of new firms and the effect on clean tech ventures, which are likely to be very liable to these regulations.

3. Research design and method

3.1. Dataset

For this study we use a panel survey dataset on the first six years of the life course of firms in the Netherlands (see also Stam and Wennberg, 2009). We use this dataset for two reasons. First, this panel contains some of the most complete information gained on new firms in the Netherlands. The initial aim of the survey was to gain insights into characteristics, problems, and antecedents of the development of new Dutch ventures. The survey sample initially contained a group of 1938 new
ventures representative for the population of new ventures in the Netherlands. Subsequently, these firms were interviewed annually by mail and computer assisted telephone from during the first six years of their life course. During this period, 1,291 ventures exited the database due to bankruptcy, ceased economic activities, or having moved locations. After six years, 647 firms survived and continued to respond to the survey.

The second reason we select this dataset for this study is that it enables us to classify and separate a subsample of clean tech ventures. Typically, datasets are organized by industry, which excludes research into clean tech ventures that traverses many industries and not by technological applications as in the present dataset. This allows a unique opportunity to study clean tech ventures longitudinally over a six year period. Clean tech ventures are distinguished from other ventures based on the question “is your product based on environmental and/or energy technology”.

3.2. Variables

The dataset allows for two possible ways to measure venture growth: growth in terms of sales turnover and/or in the number of employees. In consideration of the ongoing debate about how to measure venture growth, we choose to use growth in number of employees for two reasons. First, employment growth indicates the need for additional numbers of individuals working for the venture due to a change in the organizational composition or strategy of the firm (Hanks et al., 1993). Changes often occur when the scope of firm expands and operations increase in business. This expansion means that additional human capital is added when employees are hired, which allows organizational objectives to be met. In addition to the internal change to
the venture, employment growth illustrates the contribution the venture is making to the community in which it operates (Kirchhoff and Phillips, 1988). Second, sales growth is dependent on the firm having a product or service available to sell. We expect the clean tech ventures to spend years developing their products for a nascent market, and thus, a more relevant indicator of growth performance for such ventures is growth in employment.

To establish how entrepreneurs of new ventures view environmental regulations, we explored questions about issues and problems ventures faced during start-up. We measured the perception of environmental regulations using a binary response (0 = none, 1 = partly or largely) on the question: “Could you indicate to what extent your venture has experienced the following issues / problems: environmental regulation”. Environmental regulation in the Netherlands includes, for example, pollution permits, energy performance standards, and maximum levels of noise and radiation that are also relevant for non-clean tech ventures (e.g. construction, chemical and medical industries).

The first control variable is growth intentions of the entrepreneur. It might be that especially growth ambitious ventures will suffer from regulations, as they are more pro-active and more expansive, which makes them more likely to perceive and realize the barriers created by these regulations. So controlling for growth ambitions is likely to wash out the negative effect of environmental regulation. Growth intentions have been found to be an important predictor in the growth of new ventures and small firms (Stam and Wennberg, 2009; Wiklund et al., 2009). Most entrepreneurs do not wish to grow their venture in the future, which has been found to reduce their observed growth in the future. We measure growth intentions by the question: “What personal or organizational objectives do you strive for in the medium term (2 – 3
years?)” with an option indicating, “adding additional employees”. Given the distinctiveness of new environmental technologies, we regard previous knowledge on how to develop and commercialize environmental technologies and how to manage and lead organizations as possible significant contributors to new venture growth. Thus, the previous management and entrepreneurial experience as well as leadership experience of the venture founder(s) may be particularly important for growth. We control for experience levels along three dimensions: leadership, industry, and prior business ownership. Entrepreneurs with previous leadership and industry experience have been found to more likely grow their ventures in the future (Bosma et al., 2004; Stam and Wennberg, 2009; Vivarelli and Audretsch, 1998). Colombo and Grilli, (2005; 2010) and Chrisman et al., (2005) have established that entrepreneurship experience is also statistically linked to growth of ventures. These experience variables are measured as dummy variables (0=no experience, 1=experience). We use additional control variables to capture demographic differences in age (Colombo and Grilli, 2005, 2010; Bonaccorsi and Giannangeli, 2010; Stam and Wennberg, 2009), gender (Bosma et al., 2004; Brüderl and Preisendörfer, 1998), and education (Colombo and Grilli, 2005) levels that have been found to increase probabilities of venture growth over time. Age is measured in three groups (1= younger than 35, 2=35-44, and 3=45 or older), gender is measured as a dummy variable (0=women, 1=man), and education level is also measured as a dummy variable (0=below university level, 1=university or higher). We also control for venture characteristics: start-up capital, number of founders, start-up size. Clean tech ventures are often high in start-up capital investments and high capital investments have been found to influence venture growth (Colombo and Grilli, 2005; Bonaccorsi and Giannangeli, 2010). Another control variable is used to control for the number of founders.
Schutjens and Wever (2000) and Colombo and Grilli (2005) find that entrepreneurial teams have a higher probability of venture growth. We control for this by including the amount of business partners at start-up. Not only may the size of the entrepreneurial team influence venture growth, but also the size of the initial workforce. Contrasting evidence has been found on the impact of the initial employment size on subsequent firm growth. Results from relevant industrial economic literature provide argumentation that young and small firms grow relatively fast because they need to achieve the minimum efficient size (MES) needed to survive in their industry (Mansfield, 1962; Audretsch et al., 2004). On the other hand, relatively large ventures have more resources at hand to realize growth and are more likely to attract financial capital and human resources, which enables them to grow more rapidly than small ventures (cf. Westhead and Cowling, 1995). Yet, initial size has been found to have a negative association with firm growth in other studies (Audretsch et al., 1999; Lotti et al., 2001). Thus, the initial size of the workforce may influence venture growth over time, as a larger ventures are more probable to add one more employee relative to smaller ventures. To capture the initial employment levels, we include the amount of employees in the first year. Lastly, a key factor leading to growth of new ventures is development of R&D (Stam and Wennberg, 2009). We measured R&D as a dummy variable (0: no involvement in R&D activities; 1: involved in R&D activities).

Table 1 summarizes the variables used for the regression analyses, and their correlations. This overview already shows that environmental regulation (perceived as a barrier during the start-up phase of the venture) is positively correlated to start-up capital, and subsequent firm growth and new product development.
4. Results

4.1. The nature of clean tech ventures

The samples of clean tech and non-clean tech ventures are significantly different from each other in several respects: entrepreneurs of clean tech ventures more often have growth ambitions and industry experience, green ventures are more often involved in R&D, and they have higher levels of start-up capital (see Table 2). So entrepreneurs involved in setting up clean tech ventures have higher ambitions with respect to the impact of their venture, they put more at stake, and invest more in knowledge creation. However, they do not differ with respect to several characteristics of the founder, like age, gender, educational level, entrepreneurial
experience, leadership experience. In line with the favourable initial conditions regarding growth ambitions, R&D activities and start-up capital, the clean tech ventures do perform better (with respect to employment growth) than their counterparts, during the first two post entry years, but not in the subsequent post entry years (2-6 years after start-up).

**Table 2**

Differences between clean tech and other new ventures

<table>
<thead>
<tr>
<th></th>
<th>Mean non-clean</th>
<th>Mean clean tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>age founder</td>
<td>1.79</td>
<td>1.86</td>
</tr>
<tr>
<td>gender founder</td>
<td>.71</td>
<td>.77</td>
</tr>
<tr>
<td>educational level</td>
<td>.28</td>
<td>.32</td>
</tr>
<tr>
<td>entrepreneurship experience</td>
<td>.07</td>
<td>.09</td>
</tr>
<tr>
<td>leadership experience</td>
<td>2.56</td>
<td>2.61</td>
</tr>
<tr>
<td>industry experience**</td>
<td>.59</td>
<td>.71</td>
</tr>
<tr>
<td>employment growth ambitions T0***</td>
<td>1.5320</td>
<td>1.7973</td>
</tr>
<tr>
<td>start-up capital***</td>
<td>2.44</td>
<td>3.05</td>
</tr>
<tr>
<td>size entrepreneurial team</td>
<td>.10</td>
<td>.12</td>
</tr>
<tr>
<td>number of employees at start</td>
<td>.535</td>
<td>.905</td>
</tr>
<tr>
<td>R&amp;D in start-up year***</td>
<td>.08</td>
<td>.19</td>
</tr>
<tr>
<td>Environmental regulation perceived as a barrier***</td>
<td>.069</td>
<td>.216</td>
</tr>
<tr>
<td>Growth rate T0-T2***</td>
<td>.2318</td>
<td>.6177</td>
</tr>
</tbody>
</table>

Growth / no-growth T0-T2*** .0817 .1486

Statistical significant difference at * 0.1; ** 0.05; *** 0.01 level

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1 We also analyzed the difference between clean tech ventures and other technology based ventures: this revealed that these two groups are very similar, but clean tech ventures are more likely to perform R&D, have founders with leadership experience, founders with industry experience, and multiple founders, and are more likely to grow, and as expected, more likely to perceive environmental regulation as a barrier, than other technology based ventures. This shows that the susceptibility to environmental regulation sets the clean tech ventures apart from all other ventures, also other technology based ventures.
Do clean tech ventures perceive particular bottlenecks more intensively than other ventures? Clean tech ventures have a particular relation with environmental regulations: these can be in favour of them, and be more of a constraint to other ventures (cf. Porter and Van der Linde 1995). On the other hand, clean tech ventures are also more dependent on and constrained by these environmental regulations when they are not clearly stated, sanctioned, or erratically changed. More than a fifth (21.6%) of the clean tech ventures perceives environmental regulations to be a bottleneck for their business activities, in contrast to only 6.9% of the other (non-clean tech) ventures. Clean tech ventures thus suffer more from environmental regulations than other ventures, so these do not seem to act as a consistent stimulus for the development of clean technologies.

4.2 Regression models on growth and innovation

In contrast to our expectations based on the nature of clean tech ventures and their specific negative perception of environmental regulation, environmental regulation turned out to be positively related to the early growth of all new ventures, and more strongly so for clean tech ventures. New ventures that perceive environmental regulations to be a bottleneck in the beginning are more likely to grow over the subsequent two years: this counts both for clean tech ventures as for non-

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2 A striking feature of environmental policy in the Netherlands is the large number of different policy programs implemented (and often terminated) successively for short periods of time (see Nosailly et al., 2009).
3 We also controlled whether clean tech ventures were more likely to suffer from regulations in general (planning regulations, labour regulations, municipal regulation, and other regulations): clean tech ventures did not turn out to suffer (statistically significantly) more from these kind of regulations than other ventures.
clean tech ventures (see table 3). One might expect that this is just a spurious correlation, driven by underlying entrepreneurial growth ambitions; i.e. ambitious entrepreneurs are more likely to face the constraints of regulation than self-sufficient self-employed (even though there is no such correlation, see table 1). However, even when growth intentions and other explanatory variables are controlled for, a strong positive effect of environmental regulation remains. Growth intentions turn out to be an important factor as well, in line with other studies on new firm (Stam and Wennberg, 2009) and small firm growth (Wiklund et al., 2009); together with R&D. Growth intentions do not seem to drive the perception of environmental regulations as a bottleneck.

One might also argue that environmental regulations are perceived to be a bottleneck for growing ventures, because these are more often confronted with regulation than firms that only produce on a small scale. We tested for this reverse causality by analyzing the correlations between environmental regulation perceived as a bottleneck at T0 and subsequent growth and also the correlation between growth in the period T0-T2 and environmental regulation perceived as a bottleneck at T2. The first correlation was positive and statistically significant, while the second correlation was not statistically significant.

Another, perhaps more direct test of the so-called Porter hypothesis would be provided by the analysis of the effect of environmental regulation on innovation. The regression model on new product development (model 6), reveals that here also, environmental regulation seems to have a positive effect (see also Horbach, 2008). However, for these new ventures developing new products does not increase the probability of growth, in contrast to what is assumed in the work (only on established firms and industries until now) on the Porter hypothesis (see Ambec et al., 2010).
Table 3
Regressions growth of new ventures, growth of clean tech ventures, innovation by clean tech ventures

<table>
<thead>
<tr>
<th>Model 1</th>
<th>All ventures</th>
<th>Model 2</th>
<th>Non CT Ventures</th>
<th>Model 3</th>
<th>CT ventures</th>
<th>Model 4</th>
<th>CT ventures</th>
<th>Model 5</th>
<th>CT ventures</th>
<th>Model 6</th>
<th>CTV NPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.541</td>
<td>.158</td>
<td>-2.577</td>
<td>.171</td>
<td>-2.361</td>
<td>.468</td>
<td>-5.551</td>
<td>1.668</td>
<td>-4.142</td>
<td>2.858</td>
<td>.010</td>
</tr>
<tr>
<td>Environmental regulation</td>
<td>1.488***</td>
<td>.339</td>
<td>1.373***</td>
<td>.417</td>
<td>1.850***</td>
<td>.697</td>
<td>2.174***</td>
<td>.801</td>
<td>2.690**</td>
<td>1.306</td>
<td>2.327***</td>
</tr>
<tr>
<td>Growth intentions</td>
<td>1.494**</td>
<td>.649</td>
<td>1.707*</td>
<td>.972</td>
<td>-.190</td>
<td>.463</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age founder</td>
<td>-1.462</td>
<td>.923</td>
<td>-.368</td>
<td>.579</td>
<td>.749</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender founder</td>
<td>-1.120</td>
<td>1.287</td>
<td>.579</td>
<td>.749</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational level</td>
<td>-.513</td>
<td>1.262</td>
<td>1.555**</td>
<td>.669</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entrepreneurial exp</td>
<td>-1.477</td>
<td>1.751</td>
<td>-1.669</td>
<td>1.073</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Leadership experience</td>
<td>.219</td>
<td>.655</td>
<td>.029</td>
<td>.340</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry experience</td>
<td>-.223</td>
<td>1.066</td>
<td>.263</td>
<td>.645</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start-up capital level</td>
<td>.034</td>
<td>.324</td>
<td>-.242</td>
<td>.209</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of founders</td>
<td>-3.458</td>
<td>2.499</td>
<td>.673</td>
<td>.796</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start-up size (empl.)</td>
<td>.122</td>
<td>.130</td>
<td>.023</td>
<td>.126</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D</td>
<td>3.478**</td>
<td>1.630</td>
<td>-.182</td>
<td>.846</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

R^2 0.055 0.037 0.158 0.299 0.507 0.356
N 647 563 74 74 72 72

Significance *p<0.1; **p<0.05; ***p<0.01

Model 1 environmental regulation – growth (T0-T2) all ventures
Model 2 environmental regulation – growth (T0-T2) non-clean tech ventures
Model 3 environmental regulation – growth (T0-T2) clean tech ventures
Model 4 environmental regulation – growth (T0-T2) clean tech ventures, including growth intentions
Model 5 environmental regulation – growth (T0-T2) clean tech ventures, including growth intentions + controls
Model 6 effect on new product development T0 (similar outcomes for T2)
5. Conclusions

In this paper we tested hypotheses on the role of environmental regulation for new ventures in general, and clean tech ventures in particular. The new venture context (and level of analysis) has until now largely been neglected in the literature on environmental regulation and firm performance (see Ambec et al., 2010), while high hopes are put on clean tech ventures and environmental regulation to trigger and develop environmental innovations, to mitigate climate change. We hypothesized that environmental regulations are a bottleneck for new (clean tech) ventures, and found this to be true much more often for clean tech ventures than for other ventures. Environmental regulation can also have a positive effect on the performance of firms, in line with the so-called Porter hypothesis. In this study we found a positive effect of environmental regulation for the growth of clean tech ventures as well as for other new ventures. In other words, we found environmental regulation to constrain and enable the performance of (clean tech) ventures.

How can we explain the seemingly paradoxical effect of environmental regulation on new ventures in general, and clean tech new ventures in particular? About one out of five clean tech ventures perceives environmental regulation to be a bottleneck, but this perceived bottleneck seems to be a stimulus to growth as well. This is not explained by an underlying growth ambition, as this has an independent effect on growth, next to the independent effect of environmental regulation. It also does not seem to run via a positive effect on innovation. Another explanation could be that the entrepreneurs that perceive environmental regulation to be a bottleneck, have entered a growing market that has been made possible by this regulation (like for example the recycling industry that has been growing tremendously in that period). However, the clean tech ventures that perceive environmental regulation as a bottleneck are
not situated in the recycling industry, but predominantly in the wholesale and manufacturing industries (no high-growth industries in the Netherlands).

Our interpretation of the environmental regulation paradox would be that it should be treated as a barrier to growth: entrepreneurs that aim to expand their business in markets that are sensitive to environmental regulation face these regulations as a bottleneck for their activities, but this necessary evil informs them how to successfully expand in these markets giving them a competitive edge over other less well informed firms. Without this hurdle they would probably not be sufficiently informed about the possibilities and impossibilities in these markets. This especially counts for clean tech ventures, but also for the group of non-clean tech ventures that is active on markets liable to environmental regulations. This interpretation does justice to the initial Porter hypothesis - environmental regulation can trigger innovation that may partially or more than fully offset the costs of complying with them – as environmental regulation is both perceived as a cost, but in the end seems to more than fully offset these costs indicated by the growth inducing effect of environmental regulation.

5.1. Future research

In this study we used a measure of perceived (constraining) environmental regulation. The advantages of this measure are that it comes close to the everyday reality of entrepreneurs, and that it is a rather specific measure of regulation. Some would argue that it is still a very broad measure, including heterogeneous environmental regulations ranging from pollution permits, energy performance standards, maximum levels of noise and radiation, pollution laws, to CO2 emission caps. In order to accommodate this heterogeneity, future research might specify the types of environmental regulation involved and also relate this to
the performance of particular kind of firms (e.g. energy intensive firms for CO2 emission caps, and building (materials) firms for energy saving building prescriptions).

From an institutional point of view, one might argue that our measure of regulation is too broad as it only indicates a ‘regulatory burden’, and not the quality of the regulation (e.g. including clarity, implementation, and volatility). Future research might disentangle these effects, which could reveal what the causes are of the perceived regulatory bottlenecks, e.g. too strict implementation, too high volatility, or too loose implementation. It might also be useful to execute a number of case studies on clean tech ventures, in order to better disentangle the causalities involved in the effect of environmental regulation on new venture growth. This might, for example uncover why these ventures so frequently state that environmental regulation is a bottleneck for their business, and how this affects the growth of their venture.

References


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4 E.g. Dabla-Norris and Inchauste (2007) found that firms reduce their formal operations with a higher tax and regulatory burden, but increase it with better enforcement quality.


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