



# **Master Thesis**

## **Institutions and Entrepreneurship**

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December 2011

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## Acknowledgement

The journey of this master thesis started more than a year ago during the course of Designing Innovation Research. At that time I was unfolding my plans for studying abroad in the US. After deciding to do my elective master courses at the University of Wisconsin, Madison in the spring 2011 semester; I needed to improvise with the planning of my thesis. By that time, Andrea Herrmann was granted a position as Marie Curie research fellow at the Center on Organizational Innovation at Columbia University for the next year. This collaboration together with Utrecht University allowed several Science and Innovation Management students to be part of this combined research project. Through this project I got to experience both a public (UW, Madison) and private (Columbia) Ivy League school in the US; two of the most prestigious universities in the world. I sincerely would like to thank Andrea for giving me the opportunity to be part of this ambitious group and the provision of related

(human) resources. This thesis could never have been realized without the help of her and the complete group. Our international group of coworkers led to interesting Skype sessions with multiple time zones.

Finally, I could not have done this study without the participation of all the entrepreneurs. Their stories are, besides the usefulness for my thesis, also a major inspiration. Ever since I was young, I am inspired by great industrialists such as Thomas Edison, Alexander Graham Bell and Gerard Philips. My academic interest for entrepreneurship and industrial policy was further encouraged by Erik Stam, my initial second reader. His bachelor course Analysis of Competitiveness and Innovation Policy encouraged me to explore this topic from an academic point of view. When it appeared that Andrea was planning to do related entrepreneurship research at Columbia University; I did not hesitate joining this group.

*“Be courageous. I have seen many depressions in business. Always America has emerged from these stronger and more prosperous. Be brave as your fathers before you. Have faith! Go forward!”*

*-Thomas Alva Edison (1847 – 1931)-*

## Abstract

The stimulation of entrepreneurship is one of the spearheads of contemporary industrial policy in developed economies, in particular start-ups in the renewable energy sector. Entrepreneurs are the engines of innovation and play a major role in the transition towards a more sustainable energy supply. These policies are so far not efficient in the stimulation of entrepreneurship and major differences occur in the level of self-employment between developed countries. The goal of this study is to have a better understanding of the venture foundation process in the renewable energy sector by applying an institutional economic approach. It is widely accepted that comparative advantages shape corporate strategies of established firms; however the influence on starting ventures is hardly explored. Therefore this study compares the two ideal types of capitalistic economic systems; Germany and the Netherlands as archetypical coordinated market economies and the United States as liberal market economy. It is hypothesized that the rigid labor market, presence of venture capital and an active industry association caused by national institutions are major determinants in the foundation process of entrepreneurs. A combined quantitative and qualitative analysis is applied based on the interviews with 19 entrepreneurs in the solar energy sector in both types of market economies. The results confirmed the role of labor

market institutions and industry associations in the venture foundation process. The rigid labor market creates hesitance among entrepreneurs in the Netherlands and Germany to hire employees and entrepreneurs are more often motivated out of necessity, because they have more firm specific skills. It is also more common for entrepreneurs in these countries to join an industry association, but the supportive role of this association is however marginal according to the qualitative insights. Only one of all the interviewed ventures actually did receive an external investment so it cannot be said what the role of financial market institutions is, but entrepreneurs did indicate a lack of venture capital and in particular seed capital in the Netherlands and Germany. Another remarkable finding in this study is the major bureaucracy experienced by entrepreneurs in the US, which is not in line with the comparative political economy literature. Therefore, governmental policies in the Netherlands and Germany trying to foster entrepreneurship the renewable energy sector should create more labor market flexibility and foster seed capital to stimulate the venture foundation process in the Netherlands and Germany. A more comprehensive study (which is now done by my supervisor) could lead to a more general comparative framework for entrepreneurship.

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# 1. Introduction

Over the last century extensive economic growth has led to the use of large amounts of fossil fuels. As energy use grew, so did our knowledge on the downsides of fossil energy usage. Climate change is partially the result of carbon emissions of fossil energy (IPPC, 2007). Fossil fuel dependency also forms a big threat to our economy. The rise of emerging economies like the BRIC countries will only further increase the worldwide demand for energy. The rising oil price leads to higher inflation and thus lower purchasing power for our economy. The Copenhagen Agreement of 2009 underlines the need to develop a sustainable energy supply and the Netherlands have the ambition to take the lead in this paradigm switch. Less than 5 percent of the Dutch primary energy usage is generated by sustainable energy sources, so there is still a long way to go (Euroobserver, 2009). However the current economic crisis makes it hard for them to act: the government has a major budget deficit and the economic recovery is fragile. So programs in order to stimulate this paradigm switch needs to be efficient and creative.

Innovation is the key driver of economic growth and essential in dealing with this complex problem. Innovation leads to more efficient economic processes and higher productivity rates and thus economic prosperity (Freeman, 1982; Dosi, 1984). Without innovation companies and countries as a whole cannot compete in the globalizing world (Schumpeter, 1934; Porter 1990). New technological opportunities can result in solutions which are not only environmentally, but also economically sustainable.

The market has to exploit and commercialize these new innovations in real practice. Large firms were thought to be the

key drivers of innovation in the post-war era due to their financial power and economies of scale, but the role of entrepreneurship in modern economic systems is undoubted by policy-makers and business scholars alike: *High-innovative* entrepreneurs are perceived as key drivers of technological innovation and therefore enhance economic growth. When our traditional manufacturing economy shifted to a more knowledge based economy; the role of entrepreneurship increased by a reduction in the extent of economies of scale and communication costs. (Schumpeter, 1934; European Commission, 1999, 2003; Wennekers and Thurik, 1999; Audretsch and Thurik, 2001). Often large firms fail in the development of 'dynamic capabilities' in order to exploit innovations outside its current business model (Teece et al., 1997). "*The role of the entrepreneur is to turn the potential of new knowledge, networks, and markets into concrete actions to generate—and take advantage of—new business opportunities*" (Hekkert et al., 2007 pp. 421). A wave of entrepreneurial activities in renewable energy technology can help to transform the incumbent fossil energy supply and will result in sustainable energy and economic growth in the future. In the United States, more than 10 % of the private sector jobs come from high-tech start-ups backed by venture capital (NVCA, 2011)

Innovative entrepreneurs are essential for the innovation process of an economy and they show significantly higher growth rates than their non-innovative counterparts. However the likelihood of survival of a new innovative business is lower than for a non-innovative and differs between different types of industries (Almus and Nerlinger, 2000; Audretsch and Thurik, 2001; Lotti, Santarelli and Vavarelli, 2003). One of the fundamental principles of exploiting innovation is that it is inherently uncertain. But even if an entrepreneur fails; their efforts can add to the innovation process when others adopt the knowledge and technology and apply it in a commercially

successful way (Davidsson, 2008). The social value for society of innovative entrepreneurs is as a result higher than the private reward for entrepreneurs. If new businesses survive the first few years the likelihood of survival and their added value to the innovation process increases (Stam and Wennberg, 2009). Support in the start-up process of new businesses is as a result key in promoting innovation.

For that reason comprehensive financial policies are applied by economic policy-makers on local, national and international level in order to stimulate and facilitate high-tech entrepreneurship (OECD 2002). These policies focus in particular on high-innovative renewable energy incentives (Eurostat, 2009). Despite these efforts, the entrepreneurial activity in the high-tech renewable energy technology industry in the North-Western European countries remains underdeveloped compared to the USA (Acs et al., 2005). An explorative research of the OECD even showed a negative relationship between entrepreneurship policies and new venture foundation. The shares of annual budget which the OECD countries spend on R&D programs are negatively correlated with the rate of company foundation (OECD, 2007). This is in particular present in economic backwards regions, which receive relatively the most subsidies from the European Union (European Commission, 2003). For example, financial subsidies in East-Germany did not significantly increase the rate of entrepreneurship (Koster, 2009). Also several Asian countries are catching up and have higher levels of entrepreneurial activity and high-tech clusters (European Commission, 2003). The rate of private business ownership (self-employment) in the Netherlands slightly rose, but this is mostly due to an increase in (low-tech) self-employment in the construction and engineering sector (Nootenboom and Stam, 2008). High educated People still prefer employment in existing corporations above self-employment and the list of unsuccessful

policy measures seems endless (EC, 2003; Negro et al. 2003). Yet, some types of high-innovative entrepreneurial clusters do manage to develop without governmental support. Emerging Italian biotech clusters in the Emilia Romagna region are a classic example of such a development (Herrmann 2008). This shows how unpredictable and intangible entrepreneurship can be. Every country hopes to have the next Silicon Valley alike entrepreneurial cluster in their borders.

It becomes clear that current entrepreneurship policies are not necessarily successful in fostering high-tech entrepreneurship. Entrepreneurs do not act in isolation, but interact with institutions, so despite a globalizing economy location still matters (Porter, 1990; Hall and Soskice, 2001). Varieties in institutional (economic) characteristics seem to affect the rate of entrepreneurial activity in countries. E.g. why would somebody give up their employment if that encounters several beneficiaries? These institutions are often the result of years of political and economic development. (one size fits all) policies of the European Union to stimulate entrepreneurship, create a level playing field for all member states, but do not take these national characteristics into account. Research on the foundation process of innovative entrepreneurs will lead to their specific triggers, motivation and requirements in different economic systems. These understandings could make it possible to 'customize' entrepreneurship policies and thus lead to more emerging and successful start-ups in renewable energy technologies. In doing so, the actual bottlenecks and motivation for venture foundation process of entrepreneurs can be better understood. The current economic crisis and budget deficits also forces governments to reform institutions such as the labor, capital and pension market. Insights in the interaction of these institutions with entrepreneurship could also provide useful implications for

the great challenges our governments face these days with the reforms. The main research question is addressed as follows:

*How do national institutions influence the order, timing and triggers of innovative venture foundation processes in the renewable energy sector?*

## **1.1 Outline**

The outline of this thesis is organized as follows: In the next section a state-of-the-art overview of the literature is provided upon which this study is build. Several hypotheses are presented based on this literature. In section three the methodology of the study is described and the concepts presented in the hypotheses are operationalized. The results are presented in section four. The last two sections contain the conclusion and discussion with implications for policy makers and further research.

## 2. Theory

The theory of this thesis builds upon two strands of literature. The first part focuses on the process oriented entrepreneurship literature. The second part focuses on the comparative political economies literature and in particular on the varieties of capitalism framework. Finally both sections will be combined to extend comparative political economics to entrepreneurship in order to create several hypotheses.

### 2.1 Foundation process oriented entrepreneurship

Theory about entrepreneurship and innovation dates back to the work of Joseph Alois Schumpeter in the beginning of the 20<sup>th</sup> century. Schumpeter was one of the first to overthrow the static neoclassical economic theories and foresaw creative destruction as the key driver of innovation and economic growth (Schumpeter, 1934). According to Schumpeter these entrepreneurs such as Alexander Graham Bell and Thomas Edison were visionaries with specific characteristics who could build new industries with Schumpeterian profits. Schumpeter however reconsidered the major role of entrepreneurs in later works. This resulted in the interesting discussion between Schumpeter as an advocate of big monopolies and Arrow as an advocate of perfect competition and thus more entrepreneurship as drivers of innovation. (Schumpeter, 1943; Arrow, 1962). As explicated in the introduction; the recognition of SME's and entrepreneurs as drivers of innovation and economic growth increased in the post war era.

These insights led to a large strand of literature to analyze entrepreneurship, all seeking for a 'silver bullet' to identify and stimulate entrepreneurs. Based on the early

theories of Schumpeter, scholars focused on the individual characteristics of these champions. According to these 'trait researchers' entrepreneurs are motivated out of opportunity related to their specific background: "*Trait researchers assume that entrepreneurs distinguish themselves most notably by their personal characteristics – such as their educational background, age or financial endowments*" (Herrmann, 2010 pp. 735).

These determinants are seen as the key to identify entrepreneurs, which are opportunity driven in their attempt to start-up a business. Studies which seek to understand different levels of entrepreneurial activity by individual ideal typical traits however fail to provide consistent accounts (Gartner (1988; Carter et al. 1996; Gartner and Carter, 2003). These trait studies also neglect the consideration that the motives and triggers of (potential) entrepreneurs could lay in the dissatisfaction of their current situation (Whittaker, 2009). Necessity motives such as unemployment and job dissatisfaction are not considered as reasonable motives to trigger entrepreneurship, while several studies show that these aspects can lead to more entrepreneurship (Hessels et al., 2008; Thurik et al., 2008).

These insights require a more comprehensive approach. Agreement is broad among scholars that entrepreneurs can be better understood from a more dynamic perspective which focuses on differences in the foundation processes instead of static background information of the entrepreneur (Herrmann, 2010). Another logical argument for this reasoning is the fact that entrepreneurs often operate in teams, i.e. with multiple founders, to set up a new venture. As a result it is futile to look at single characteristics and traits of an individual person. In this case not who, but how is the right question.

This conviction has led to several comprehensive attempts to map patterns in the process of starting up a business. The

Panel Study of Entrepreneurial Dynamic (PSED) collected longitudinal data on individuals in the process of founding a business. This has led to a broader understanding of the foundation process and its role in the success of entrepreneurship (Reynolds and Curtin, 2004). However again no 'silver bullet' is found in the sequence of events which entrepreneurs have taken to successfully found a business. It seems that new organizations are too heterogenous in order to compare them on a wide scale. (Gartner, 2004). These attempts so far however do not explain differences in entrepreneurial activity levels, because process research focused on the process per se and not on systematic institutional influences. Cross country comparisons are impossible whenever only prospective entrepreneurs in one country are interviewed.

Another gap in current literature is the unilateral focus on entrepreneurs who eventually succeeded in starting a business (Baker et al., 2005). As mentioned earlier, entrepreneurs who failed in their attempt to start a business also can 'drive the innovation process' and therefore have a positive societal-level outcome. These 'catalyst ventures' can have viable business ideas, but could have stopped by of reasons which lay beyond their own control (Davidsson, 2008 pp. 21). These entrepreneurs could even be more interesting for policy makers, who try to stimulate entrepreneurial activities. It is however harder to identify these 'failed' business attempts, because there is sometimes hardly any trace of their initial activities. The approach and method of this study differs from earlier works and will track down and include these 'failed' entrepreneurs.

## **2.2 Varieties of Capitalism**

It is widely accepted among scholars that national institutions strongly influence business interactions in order to explain differences between countries in economic characteristics (Streeck, 1992; Hall and Soskice, 2001). It remains however unclear how these institutions influence entrepreneurs in their foundation process and motivations, because current literature exclusively focused on established firms. Institutions have a broad meaning, but are defined here as *"a set of rules, formal or informal, that actors generally follow, whether normative, cognitive, or material reasons, and organizations as durable entities with formally recognized members whose rules also contribute to the institutions of the political economy"* (Hall and Soskice, 2001 pp. 9). Current research on the influence of these institutional characteristics on established firms showed that national institutions lead to comparative advantages and therefore trigger established firms to obtain a certain strategy which fits these comparative advantages. Relatively low minimum wages are for example in favor of companies who focus on traditional manufacturing (Casper, 2000). Firms are in this conception not autonomous in their acts.

The varieties of capitalism (VoC) theory of Hall and Soskice (2001) and further developed by Hancke et al. (2007) provides *'new tools for analyzing and comparing national political economies'* (Hancke et al., 2007 pp. 8) to understand varieties in institutions across nations. Firms are the center of analysis in this framework and are embedded in their institutional environment. In the VoC framework, this environment is based on five *spheres*, which must be coordinated by firms. *"Its success depends substantially on its ability to coordinate effectively with a wide range of actors"* (Hall and Soskice, 2001 pp. 6). These spheres interact and reinforce each other when present in the right form and are the following (based on Hall and Soskice, 2001):

1. *Industrial relations*: The problem of firms how to coordinate bargaining with their workforce. The bargaining depends on the presence of powerful labor unions, minimum wages, productivity levels, unemployment rates and inflation.

2. *Vocational training and education*: The problem securing a suitable workforce by firms and the problem of employees on how to fill in their (educational) skills. This eventually determines the skill levels and competitiveness of the economy as a whole.

3. *Corporate governance*: The coordination between the availability of financial (venture) capital for firms and to what extent investors seek assurance on their investment. The fulfillment of the pension system, one of the biggest assets available in developed economies, is very important for the match between investor and firm.

4. *Inter-firm relations*: This sphere contains the problem of coordinating the cooperation and interaction with partners, both vertically (suppliers and customers) as horizontally in the market (competitors). This interaction determines the development of standards, technology transfer and collaborative research and development.

5. *Employees*: This is the problem of coordination firms have regarding employees internally. Employees have tacit knowledge and have to cooperate with other employees and share this information. Problems such as moral hazard and adverse selection do arise here (Milgrom and Roberts, 1992). The way how firms deal with this problem does not only determine their own competencies, but also the entire economy's production regime (Soskice, 1999).

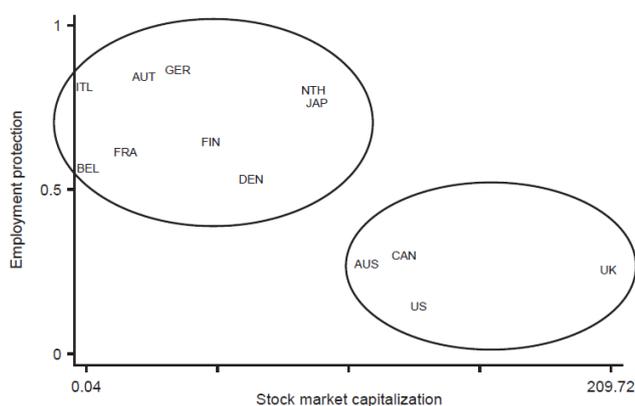
National institutions define how firms coordinate the above mentioned spheres. Hall and Soskice (2001) define two types of market (capitalistic) economies which “constitute ideal types at the poles of a spectrum along which many nations can be arrayed” (pp. 8): liberal market economies (LME) and coordinated market economies (CME). As

mentioned before, both types of economies create comparative advantages and certain scholars focus on ‘best practices’, but it is more realistic to speak in terms of ‘distillation’ (Halls and Soskice, 2001). The success of Japan, in particular in car manufacturing and electronics in the 60’s and 70’s was a case for the CME type economies, but eventually history did not provide a significant difference in nationwide performances between the two types of economies in the post war era (Tidd et al. 2001). Both types of archetypical capitalistic economies have strengths and weaknesses regarding innovation and economic growth as a result of different institutions.

## 2.2.1 Liberal Market Economies

In a LME, which is also known as the Anglo-Saxon model because of the presence in these countries (USA, Australia, UK and Canada), coordination of firms is primarily done via competitive market arrangements; the invisible hand of the free markets regulates the spheres. A LME is characterized as more dynamic and short term focused. Institutions, both formal as informal are based on neoclassical and individualistic values. Banking, management, employees and the government are all embedded in this free market paradigm. The (private) labor market is not determined by a minimum wage, collective labor agreements and labor unions but demand and supply (although unions still have a major influence on public jobs). This makes it relatively easy and inexpensive for firms to hire and dismiss employees. As a result the market is fluid and employers and employees invest in more general rather than firm specific skills. Figure 1 presents a clear distinction in employment protection between both types of economies. The competitive market and collusion is protected by rigorous antitrust regulation. Inter-firm relationships are based on enforceable formal contracts and

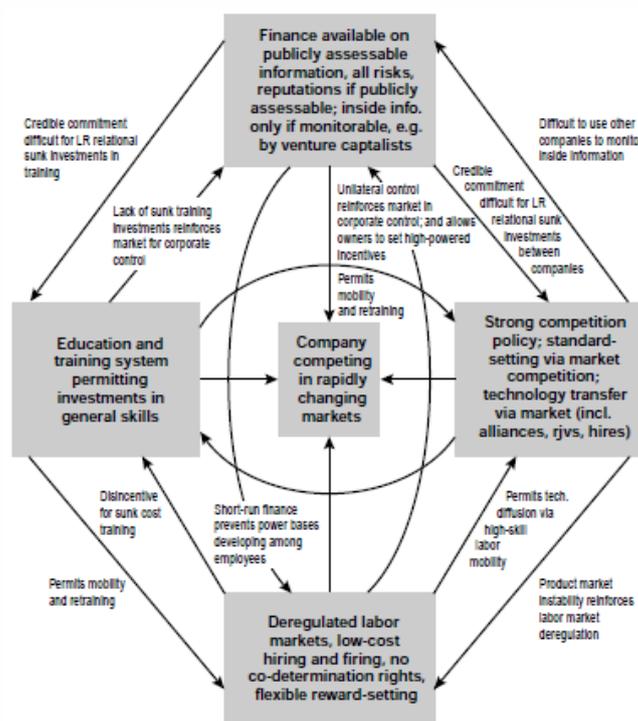
standard market relationships (Hall and Soskice, 2001). This restrains firms from horizontal collaboration in industry associations and research and development. Therefore technology transfer between firms occurs through movement of employees; the result of the fluid labor market. The lack of industry associations and collaborations also creates market races for standardization based on licenses instead of industry wide agreements (Tate, 2001). Firms therefore tend to focus more on industries which rely on effective patenting instead of more learning by doing innovation industries. The dominance of the US in the software industry and the presence of ‘patent trolls’ in the US market perfectly reflect this. The lack of standard setting and thus an uncertain market race also partially explain the presence of venture capital in LME economies. Investors bet on multiple ventures of which one wins this lucrative race to standard setting (Borras and Zysman, 1997). Finally, the corporate governance system focuses more on formal and absolute indicators. As can be seen in figure 1, the stock market as a publicly tradable market is therefore relatively more dominant as a method of finance.



**Figure 1. Employment protection and stock market capitalization as a percentage of GDP (Hall and Soskice, 2001)**

This publicly based system enables investors to more efficiently use capital in search for high returns on capital (Tidd et al., 2001).

This is another explanation for the excessive presence of venture capital which involves high returns rates (and high risk) (NVCA, 2001). This paradigm results in a dynamic response on radical innovation and failure, but an impatient response on incremental innovation and long term opportunities such as research and development expenditures. In order to stay innovative, large corporations buy up emerging technological start-ups, instead of investing in large research centers. Figure 2 shows a complete overview of the complementarities in the American liberal market economy as presented by Hall and Soskice (2001).



**Figure 2. Complementarities across subsystems in the American Liberal Market Economy (Hall and Soskice, 2011)**

## 2.2.2 Coordinated Market Economies

In a CME, also known as the Rhineland model (present in continental Europe and Japan), the coordination problem is solved by governmental regulation and non-market relationships. Firms and the free market still have a role in this economy, but

coordination by the government is based on more collectivistic values and cooperative arrangements. The labor market is based on collective labor agreements, a high minimum wage and firm-level employment protection. This makes it complex and expensive to hire and dismiss employees. Employers are however also protected against the movement of employees to competitors. This ensures both employers and employees invest in long term firm specific relationships. Horizontal collaborations are allowed in order to prevent firms from fierce market races and thus major layoffs. The private market often works together with public institutions to set broad supported standards. As a result firms in the same industry tend to focus on product differentiation instead of direct competition so they can all have their share of the pie. This efficient standard setting however makes it harder for start-ups to compete with incumbent companies. This lock in is not in favor of venture capital investments in start-ups. Finally, institutional banks and pension funds are the most dominant supplier of capital. These investors have a low risk profile, focus on the long term and are often involved in corporate control. In practice, a supervisory board which represents all corporate stakeholders can only be found in CME type economies. A CME can therefore be characterized as static and long term focused, caused by a low and safe interest rate. This results in an opposite response on innovation; the economy acts static on radical innovation and failure, but has the patience to overcome initial failure and for long term incremental innovation (Hall and Soskice, 2001; Hancke et al.,2007).

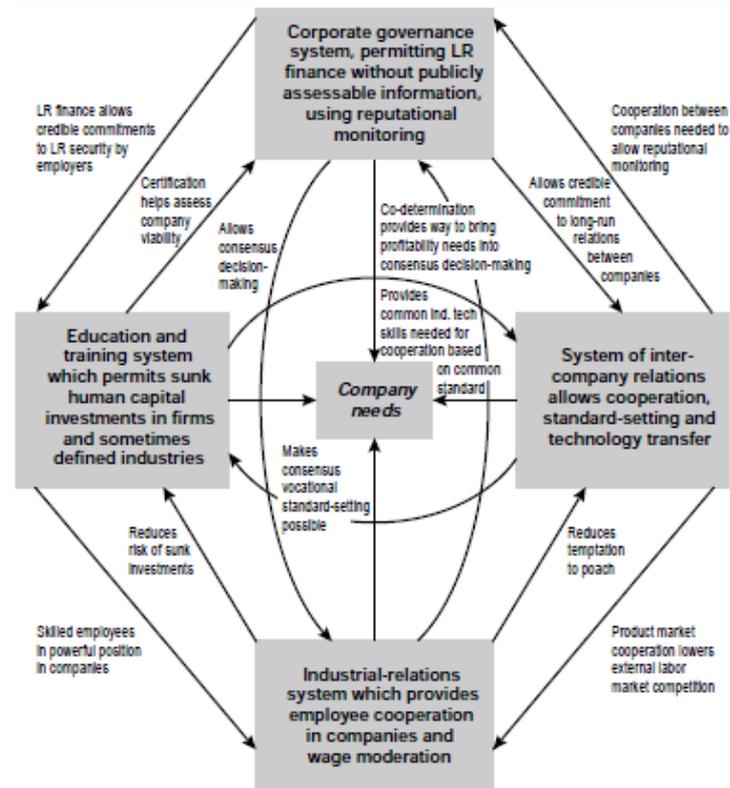


Figure 3 show a complete overview of the complementarities in the American liberal market economy as presented by Hall and Soskice (2001).

### 2.2.3 VoC and entrepreneurship

Comparative advantages based on national institutional differences proved to favor certain corporate strategies of existing firms (Casper, 2001). The influence on starting entrepreneurs is however still a black box. Entrepreneurs operate in the same institutional environment, but have other input factors and bottlenecks than existing firms. We cannot assess all the complementarities which are related to a certain type of economy and some of them are irrelevant for starting entrepreneurs. The acquisition of finance, hiring of employees, antitrust legislation and the presence of active industry associations are assumed to be the most relevant aspects of institutional differences. This will also form the foundation of the hypotheses of this thesis. The varieties of capitalism theory will be combined with the foundation process

approach. In short, these are the main differences between CME and LME type economies: First, CME type economies lack the presence of high risk venture capital. Second, they have a rigid labor market which makes it relatively complex and expensive to hire and dismiss employees. Finally, active business associations are more present in CME type economies.

## 2.3 Hypotheses

As mentioned above, the VoC literature is combined with the foundation process approach to formulate the hypotheses. It is studied how these comparative advantages lead to differences in the venture foundation process. Therefore the following three main hypotheses will be explored in this study:

1. *The order and length in acquiring employees, finance and R&D partners is different in a CME and LME.*
  - 1.1 *In a CME, prospective entrepreneurs will hire employees later due to rigid labor market institutions.*
  - 1.2 *In a CME, prospective entrepreneurs will receive their first external investment (capital for shares) later, the request takes more time, and the likelihood of an external investment is decreased due to limitations in venture capital caused by financial market institutions.*
  - 1.3 *In a CME, the total length of venture foundation process is longer than in a LME.*

It is hypothesized that the rigid labor market and lack of venture capital is a major obstacle for starting entrepreneurs in CME type economies. To circumvent the high costs of employees, I expect entrepreneurs to look for other collaborators and wait with the hiring of employees. The limitations in venture capital will lead to later and a decreased chance of an external investment at all. It is therefore expected that it will take

entrepreneurs more time to start-up their venture in CME type economies. The actual need for finance and employees are control variables. Financial institutions do not play a role if the entrepreneur is wealthy enough or the venture not capital intensive. The same applies to employees, if the venture initially does not require the hiring of employees.

2. *The type and order of collaboration with related established companies is different in a CME and LME.*

*2.1 In a LME, the likelihood is increased that a prospective entrepreneurs collaborates with related established firms as R&D business partner.*

*2.2 In a CME the likelihood is increased that a prospective entrepreneurs joins an industry association due to presence of active industry associations.*

Start-ups in CME type economies can more rely on public (e.g. universities) R&D institutions and industry associations. These partnerships allow them to have access to new technologies and apply these in the market. LME type economies have more fierce market competition; as a result start-ups are forced to collaborate with related established firms as a R&D business partner to win this market race.

3. *The motivation for prospective entrepreneurs to start a new venture differs between CME and LME type economies.*

*3.1 In a CME, prospective entrepreneurs are more often necessity driven in their motivation to start a venture.*

The rigid labor market in a CME allows employees and employers to both invest in long term and firm specific skills. These firm specific skills together with competition legislation make it harder for employees to move to another firm. Self employment becomes an alternative if employees are not satisfied or become unemployed. This creates new ventures out of necessity, so

entrepreneurs are pushed instead of pulled by the Schumpeterian traits.

## **2.4 Operationalization**

This section contains the operationalization of the concepts and stated in the hypotheses.

The length of the venture foundation process and the timing of activities in this process play a role in most of the hypotheses stated above. There is broad discussion between entrepreneurship how to define the start and end of the venture foundation process. At the moment of registration a venture becomes officially a legal entity and business on paper. However multiple activities such as product development, the search for capital and business partners can already be done beforehand. These are all important activities which in this thesis are assumed to be influenced by the institutional environment. Therefore this study states the moment the idea of the venture is first discussed as the start of venture foundation. The end of venture foundation is also arbitrary. First of all, entrepreneurs and venture capitalists apply different exit strategies (NVCA, 2011) or the entrepreneur just wants to continue with their venture as an independent entity. The moment a company is economically sustainable is therefore the end of the foundation process. This can either be an IPO, merger or acquisition by another firm or three consecutive month of a positive operational income. Although the PSED has some methodological shortcomings according to me, this is however in line with their research. Eventually this leads to a certain time span the entrepreneurs took to complete the venture foundation process. In case of business cessation or a pending venture foundation process, the venture is not included in this analysis. Ventures on hold would create outliers in the results. The reason for cessation or delay is off course

interesting, but this is will be part of the qualitative analysis.

The timing for the hiring of employees is measured from the start of the venture foundation process. Thus how many months after the start did the entrepreneur hire an employee for the first time. It is obvious that this is after the legal registration of the company. I do not distinguish between the types of contract of employees. Atypical contracts, such as temporary working agencies are more common in Europe and could be a way to circumvent comparative disadvantages (Herrmann, 2010). Therefore all sort of employees are treated as the same.

Regarding the acquisition of external investments; I only consider investments where capital is traded for shares in the new venture. A regular loan with interest payments is therefore not considered as an external investment. The months between the first acquisition of capital and the start of the foundation process will be the measurement here. The length for requesting venture capital is the time between requesting and actually receiving the investment. The actual receiving is measured on a nominal scale. Entrepreneurs can also invest with money of their own or 'sweat equity'. This can be the result of not getting sufficient venture capital at all. Therefore it is asked whether any venture capital firms are requested at all (nominal scale) in these cases.

R&D collaborations with related established companies are measured nominally (whether or not present). The same applies for the membership of an industry association. A corporate consortium related to the industry is also included as an industry association.

Finally the motivation for starting a venture is operationalized. The necessity motive is measured by two steps. First, if one of the founders were unemployed before starting the venture and the unemployment was the

reason for starting the business. In case they had a job, it is asked if they were starting the venture because of dissatisfaction in their current job. In case one of the two indicators is answered with yes, the motivation for starting comes out of necessity, which is therefore measured on a nominal scale. One control question is asked regarding the motivation. If the entrepreneurs explains that the pull factor (e.g. the prospect of being able to live from the venture was very promising) was more important than the push factor (job dissatisfaction), than the venture foundation motive is not measured as a necessity motive.

### 3. Method

In order to test these hypotheses, entrepreneurs will be interviewed who attempted to start a business, whether successful or not, in the solar energy industry in the Netherlands, Germany and the US on the other hand. The quantitative comparisons are supported with in depth qualitative insights. The reason for this strategy is to prevent ambiguity in the possible relationships which are studied. Certain correlations could be the result of other underlying mechanisms. The eventual number of cases also forced to look more into qualitative data.

#### 3.1 case selection

The goal of this study is to contribute to entrepreneurship literature and in particular to gain more insights in the venture foundation process of entrepreneurs in the renewable energy sector. However, the characteristics of a certain technology have major influences on the innovativeness and competitiveness of a certain industry (Dosi, 1984). Wind, hydro, solar and biomass are all examples of renewable energy and thus all have a different playing field (industry association, competitiveness and technological complexity). In order to maintain a high internal homogeneity, this study solely focuses on the solar energy industry. Solar energy is in particular useful to analyze institutional circumstances on high-tech entrepreneurship in general. As an emerging industry it is capable of providing enough high-tech entrepreneurs and the characteristics of this industry -capital intensive, complex technology and high subsidy rates- emphasize comparative differences. The technology itself is very promising and will be competitive to incumbent (fossil) energy sources within the next ten to twenty years (REC group, 2011).

The selection of countries – the Netherlands and Germany on the one hand and the US on the other – is motivated by the following reasoning: Language-barriers make it easier for me to interview Dutch (and American) entrepreneurs. In order to have a sufficient sample German entrepreneur are also included.

The Netherlands and Germany both have an archetypical CME character: The labor market is strictly regulated in order to protect employees. Figure 1 shows that both countries have practically similar employment protection rights. Both countries also have limitations in venture capital due to financial institutions. The portfolio of pension funds and banks focuses more on low risk interest rates such as private and public bonds. The only possible difference is the activity and maturity of the industry association in both countries. The work of Negro et al. (2003) showed that the solar industry is more developed in Germany than in the Netherlands. Subsidies are applied in both countries, but this study will take into account any possible differences in both countries.

The USA on the other hand have an archetypical LME character: Employees have hardly any dismissal protection, public expenditures are relatively low and financial market institutions have resulted in sufficient venture capital for innovative start-ups. The VoC literature is based on the presence of regulatory regimes which are nation-based. Hall and Soskice (2001) however admit that regional differences do matter. The scope will therefore be narrowed down to the California, New York and Boston area. These are the typical areas with lots of venture capital firms and innovative start-ups. The institutional environment for the average town in Wisconsin can therefore be different,

because venture capital is often locally based (NVCA, 2011).

Despite these major institutional differences; both countries have homogeneity in external (economic) conditions which could affect entrepreneurial behavior as mentioned in the Global Entrepreneurship Monitor (Acs et al. 2005). The level of GDP per capita, internal market openness, the access to physical infrastructure and the commercial and legal infrastructure are comparable in both countries. These control variables are as a consequence excluded as an explanation for differences in entrepreneurial behavior in both countries.

The process of starting up a venture often takes several years. Therefore it can hard for entrepreneurs to remember the order and steps they have taken to set-up their new venture. Therefore I only interviewed entrepreneurs who registered their company after 2004 and before 2010. This ensures that the foundation process is recent enough to permit the collection of detailed data that requires a good memory of the venture foundation process.

### **3.2 Data selection**

The Orbis database forms the search engine to gather information of possible entrepreneurs. This database contains all registered start-ups of all the studied countries. These can either successful as unsuccessful attempts, which make it possible to avoid earlier biases in this research field. NACE industry codes were combined with keywords to find the entrepreneurs in the respective countries and sectors. This created an extensive list of all registered business attempts related to solar energy. After getting the right information through email and telephone traffic; the entrepreneurs were asked to fill in an online sample questionnaire (appendix 2). This basic information allowed me to schedule an

appointment with the entrepreneur or to filter out irrelevant ventures. The actual interviews were held through Skype together with recording software. A more comprehensive interview is applied for the final interview, because this thesis is part of a major research group (appendix 3). At every question I also asked to the underlying reason why the entrepreneur did a certain activity. It was not possible to determine the response rate in advance. Through our dataset I eventually got 19 cases of which 12 in the Netherlands, 2 in Germany and 5 in the US.

### **3.3 Data analysis**

The final number of interviews turned out to be much lower than hoped for. As a result, large N quantitative analyses are not suitable for this dataset. An one-way ANOVA is applied for cases where the differences are measured over a certain time span (e.g. length of the venture foundation process). Through this method significant quantitative differences can be observed between both institutional environments. The relationships which are measured on a nominal scale (e.g. received venture capital, yes/no), will be based on contingency tables. The statistical data derived from both methods can be unreliable due to the presence of possible outliers or ambiguous indicators. Therefore both methods will be supported with qualitative information derived from the interviews. This information is presented with relevant quotes and a narrative and either confirms or rejects the relationships found in the quantitative section. In order to draw any substantiated conclusion from the data, both the quantitative and qualitative part must confirm the hypothesis.

## 4. Results and analysis

The interviews with the entrepreneurs resulted in an extensive dataset. Their characteristics and results are presented in appendix 1. I will discuss the results and analysis per (sub) hypothesis. As described in the method section the Dutch and German ventures are combined. In this section, I will refer to these countries as CME.

*1.1 In a CME, prospective entrepreneurs will hire employees later due to rigid labor market institutions.*

'I hope you will get lots of personnel' is a famous saying among Dutch accountants. Employees are assumed to be a millstone around the neck of entrepreneurs. Our quantitative and qualitative analyses confirm this attitude towards the hiring of employees in CME type countries. Although the dataset only contains five American ventures, it can be noticed that CME entrepreneurs are more hesitant about hiring employees. The average time between venture foundation and the hiring of the first employee is 26,57 months for CME ventures and only 2,00 months for American ventures. The ANOVA analysis showed a significant difference between both institutional environments (table 1 & 2). The qualitative insights underline these results. Several CME entrepreneurs explained they often work with self-employed professionals (ZZP) instead of hiring or waited until they had the security to employ the employee for multiple years. Except for some installation ventures, they all admitted they could have realized more innovation and growth if hiring and dismissal of employees was more flexible. The level of innovativeness of the venture did not result in either quantitative or qualitative deviations. Atypical contracts were no really noticed as a way to circumvent these comparative disadvantages. American entrepreneurs clearly have a different mindset regarding the hiring of

employees. The following quote of an American entrepreneur represents this mindset:

*"After I decided to start this business I almost immediately hired two employees to start a team"*

The entrepreneurs searched for employees with certain skills, which were complementary to their own (e.g. engineers or sales). The American venture who did not hire any employees just did not need any employees for his venture to succeed.

First\_employee

Country	Mean	N	Std. Deviation
CME	26.57	7	19.321
LME	2.00	4	2.000
Total	16.33	12	19.109

**Table 1 Average time of hiring first employee after venture foundation (months)**

ANOVA					
First_employee					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1760.952	1	1760.952	7.807	.019
Within Groups	2255.714	10	225.571		
Total	4016.667	11			

**Table 2 Anova analysis of average time of hiring first employee after venture foundation**

*1.2 In a CME, prospective entrepreneurs will receive their first external investment (capital for shares) later, the request takes more time, and the likelihood of an external investment is decreased due to limitations in venture capital caused by financial market institutions.*

Only one (Dutch) of all the ventures had an actual venture capital investment. As a result

it is futile to apply any comparative quantitative analysis. The data however does show that out of five requests in CME type countries only one actually received an external investment. These include all the ventures which are involved with radical new innovation. They unanimous explained that venture capital was very limited and they would have realized more growth and innovation with external investments: *“the availability and knowledge in the field of investing in emerging ventures is very limited in the Netherlands. ... I might start such firm myself in the future to help prospective entrepreneurs. I have more experience with export finance than the average bank here”* said a Dutch entrepreneur. In their opinion, the few private equity and venture capital firms only focus on ventures which already established some operational revenues. Instead of venture capital, these ventures now used bank loans (four out of five) or capital of their own (three out of five). However banks were also not experienced with international financing of ventures operating in Europe. Besides not needing any external investments, several entrepreneurs were also not aware of the possibilities of external investments. The American entrepreneurs on the other hand did not make any requests for external investments. Either because they were wealthy enough themselves or the investment costs was fairly low. These ventures therefore do not provide any comparative insights in the process of venture capital in the US or differences between both institutional environments.

*1.3 In a CME, the total length of the venture foundation process is longer than in a LME.*

The quantitative analysis of the length of the venture foundation process does not show a significant difference between both institutional environments. The average length is almost identical for both environments; 26,2 months for CME type countries and 26,5 for the US (table 3 & 4). According to several CME entrepreneurs,

the VFP would be shorter with either external investments or more flexible labor regulation. The individual characteristics of the ventures are however more depended in this dataset than possible institutional influences. The internal deviation is very high for both institutional environments. A start-up which requires a large production plant will take much more time than a more service or sales related venture. The level of innovativeness could be related to the complexity of the start-up, but did not result in deviations. Another phenomenon which I noticed is the combination between jobs and starting a business. Five Dutch entrepreneurs combined the venture foundation process with their previous job to secure their financial position:

*“the reason for this combination was the absence of external investment and I did not want to take too much risk in the beginning years”*

This quote reflects the reason for all the entrepreneurs who did this. This combination enabled them to invest their income in the venture and the space to build up sweat equity, but delayed the venture foundation process.

Finally, it is expected that there is more bureaucracy governmental (market) interference in CME type countries. However, relatively more American entrepreneurs are the complexity of the tax system and regulatory requirements. Regulation is therefore not seen as an influence on the venture foundation length in our case.

Length\_venture\_foundation

Country	Mean	N	Std. Deviation
CME	26.20	10	17.956
LME	26.50	4	25.489
Total	26.29	14	19.317

**Table 3 Average length of venture foundation (months)**

**ANOVA**

Length\_venture\_foundation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.257	1	.257	.001	.980
Within Groups	4850.600	12	404.217		
Total	4850.857	13			

**Table 4 Anova analysis of average length of venture foundation**

*2.1 In a LME, the likelihood is increased that a prospective entrepreneurs collaborates with related established firms as R&D business partner.*

Again no significant difference can be observed between both institutional environments. Eight out of fourteen ventures in CME type countries collaborated with a private R&D business partner while three out of five American applied such collaborations (table 5 & 6). The underlying reasons for these collaborations are very diverse for all the entrepreneurs. Some were focused on the technology side; to have access to or develop a technology. While others focused on the business side; to have access to potential customers and suppliers and cross selling. I also did not notice any difference in the experience of market competition which should force American entrepreneurs to collaborate with established firms. Standardization or fierce market competition was never mentioned by any of the entrepreneurs in both environments. The R&D collaborations in both types of economies were more a supplement on top of their current business activities.

		RD_collaboration		
		no	yes	Total
Country	CME	6	8	14
	LME	2	3	5

		RD_collaboration		
		no	yes	Total
Country	CME	6	8	14
	LME	2	3	5
	Total	8	11	19

**Table 5 Presence of R&D collaborations**

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.025	.912
N of Valid Cases		19	

**Table 6 Comparison of presence of R&D collaborations**

*2.2 In a CME the likelihood is increased that a prospective entrepreneurs joins an industry association due to presence of active industry associations.*

The activity in industry associations does show a significant difference between both institutional environments. Ventures in CME type countries are more likely to join an industry association, while Americans did not really have an eye for them. Moreover, two of the four CME ventures who did not join an industry association did not reach the stage of development where they could join one. Table 6 & 8 show the difference in percentage and sampling errors. Even though the sample is relatively small sample; the means are significantly different. The reason for joining is mostly to show more credibility and to network with related parties in the industry. Technology access or standardization motives are so far not an issue among the entrepreneurs. The activity of the Dutch industry association, Holland Solar is however doubtful. One of the interviewed entrepreneurs is board member of Holland Solar. The industry association is

according to him: *“still in formation and not really mature at the moment. The usefulness and dues are relatively small compared to other industries. ... We need to further organize the association to increase the influence on for example the subsidy policy”*

The Dutch founder of a high-tech start-up which eventually was listed on the NASDAQ called the industry association *“a joke”*. He partially blamed the lack of collaboration in the industry association as one of the reasons for the failing subsidy policies in the Netherlands. These are, according to him, more in favor of large companies such as Nuon or Eneco who are not focused on the development of new innovative technologies, but just the sales of solar panels to customers.

		Member_Industry_Assoc		
		no	yes	Total
Country	CME	4	10	14
	LME	4	1	5
	Total	8	11	19

**Table 7 Membership of industry association / corporate consortium**

**Symmetric Measures**

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.417	.046
N of Valid Cases		19	

**Table 8 Comparison of membership of industry association / corporate consortium**

*3.1 In a CME, prospective entrepreneurs are more often necessity driven in their motivation to start a business.*

In the motivation for starting a venture there is no significant quantitative difference observed. There are major differences between both groups, but these did not turn

out to be significant. The necessity motive, job unemployment and dissatisfaction lowered the threshold to finally start a venture for more than half of the entrepreneurs in the CME type countries. However none of these entrepreneurs were involved with radical innovation. Unemployment and job dissatisfaction are clearly an important motive for starting a venture, but not in particular for starting a high tech venture. The only three Dutch ventures involved with radical innovation are not pushed by necessity motives. These radical innovative ventures seemed very promising for the entrepreneurs and they were already active in the solar energy business, either as a scientist or professional. When comparing the non radical innovative ventures, a significant result is observed. Only one of the American entrepreneurs noticed the necessity motive as the reason to start his venture. When looking at American entrepreneurs, they were more pulled by the advantages of starting a venture and being self-employed. They all were confident about the viability of the venture even the less innovative ventures. The only American entrepreneur who founded the venture after unemployment started the venture while working on other self-employed jobs to. He is also the only one whose venture foundation process is not successfully ended in the US.

		Necessity		
		no	yes	Total
Country	CME	7	7	14
	LME	4	1	5
	Total	11	8	19

**Table 9 Necessity motive for starting a venture**

**Symmetric Measures**

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.258	.243
N of Valid Cases		19	

**Table 10 Comparison of necessity motive for starting a venture**

**Symmetric Measures**

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.391	.049
N of Valid Cases		14	

**Table 11 Comparison of necessity motive for starting a non radical venture**

## 5. Conclusion

The goal of this study is to better understand the innovative venture foundation process in the renewable energy sector by applying an institutional economic approach. Research on established firms resulted in several comparative advantages which favor certain corporate strategies. Although assessing the institutional environment on entrepreneurship is very complex, it can be said that national institutions influence the innovative venture foundation process and the motivation for starting a venture in this sector in several ways. The most distinctive institutional differences in this thesis can be found in the labor market, industry associations and the motive for starting a new venture. I will first elaborate on these aspects and then conclude this section with several (policy) implications related to these findings.

The rigid labor market in the Netherlands and Germany creates a barrier for entrepreneurs to hire new employees and create more growth and innovation. Even firms backed by venture capital or long term bank loans are hesitant about hiring employees. Atypical contacts are specifically applied by entrepreneurs to circumvent these comparative disadvantages. They tend to focus more on other self-employed professionals do help with projects. Although no differences are observed in the length of venture creation; it is obvious that this does slow down the innovation and growth process of new ventures. The timing of innovations is essential in dynamic markets as the solar energy industry.

Industry associations are important institutions in CME type countries. Entrepreneurs in our study see it as a self-evident to join this association, but they do not yet have many benefits of the membership. The usefulness of these associations as institutions to stimulate

standard setting, collaboration and product differentiation as formulated in the VoC literature (Hall and Soskice, 2001; Hancke et al., 2007) is so far not observed. CME entrepreneurs only applied for the association to have access to networking events. Herein the influence of the institutional environment does differ between established and starting ventures in the renewable energy sector. This again could be the result of the immaturity of the industry.

Finally the Schumpeterian pull motive for starting a business are questioned in this study. It is observed that necessity, so job unemployment and dissatisfaction, are a relatively more important motivation for entrepreneurship in CME type countries. It can however not be said whether this is directly the result of firm specific skills or legislation preventing employees to work for related firms. Whether these motivations also lead to the foundation of radically innovative ventures, the initial subject of this thesis, can't be stated either. The ventures of necessity motivated entrepreneurs are relatively less complex and more involved with traditional reproduction instead of radical innovation.

Another interesting finding in the interviews was the export limitations of CME ventures. One of the goals of the European Union and European Monetary Union is to create one large home market for participating members. However the ventures that tend to operate on an international level experienced several bottlenecks. Most banks are not experienced in export finance for relatively small and starting ventures. Local regulation is often completely different even within the same country. Finally, local governments tend to favor local ventures, a form of protectionism.

In my opinion, the VoC literature sometimes has a too much generalist approach and overestimates the role of certain institutions

in economic systems and innovation. Antitrust regulation, market competition and governmental interference did not specifically differ between both institutional environments. Incumbent (fossil) energy sources are the main competitors of the renewable energy sector and it seems that both governments allow collaboration, consolidation and provide subsidies for these renewable alternatives (for example LA Times, 2011).

## **5.1 Policy implications**

The current economic crisis forces governments to trigger economic growth and reconsider several political institutions embedded in our economic system. Several policy initiatives are presented based on the comparative disadvantages in both institutional environments and point of view of the interviewed entrepreneurs. The actual effectiveness of these policy implications is not studied in this thesis and therefore useful for further research.

Innovative ventures are seen as engines of job creation in the American economy. The rigid labor market however creates hesitance among entrepreneur in Germany and the Netherlands to hire employees in line with the potential growth of the venture. There are several well founded reasons why employees have the protection in these economies, but these policies do hamper the job creation among starting entrepreneurs. My uncle, Hans van Bruggen, owner of eCDT Consultancy and Qdossier, two innovative start-ups in the drug regulation sector, called the business climate “*sick*” in the Netherlands. Both companies have relatively high employee costs due to the non-functioning of several employees. Reforming the labor market is a major item in the Netherlands and other CME type countries (Advisory Commission Labor Participation, 2008). I would suggest a more flexible labor market regulation which is more in favor of SME’s. This creates a

balance between flexibility and employment security. Another policy implication related to the labor market is the motive for starting a business. Job dissatisfaction and unemployment are in this study recognized as important push factor for prospective entrepreneurs. German and Dutch ventures together with employment institutions (e.g. UWV) have to come up with a social plan after major layoffs or bankruptcy. These employees will get a severance package depending on their age, working years and the alternative of a new job. Helping these employees to start their own venture would save on severance costs for both the governments and the respective firms.

Although institutional differences regarding venture capital could not be traced back based on this study, the lack of this type of capital does seem to hamper start-ups in CME type countries. In particular seed capital is not present in Germany and the Netherlands. Furthermore, several entrepreneurs, in need of external capital, were not aware of trading capital for shares. An awareness campaign at the chambers of commerce (KVK or Handelskammern) could take away this external capital ignorance. Entrepreneurs complaining about a lack of venture capital argued in line with the earlier work of Lerner (1999). The government and direct venture capital investments are not a fruitful combination. Tax initiatives which make it more attractive for individuals (business angels) and institutional investors to invest in starting ventures are seen as more effective. The following quote of the Dutch entrepreneur with his solar start-up listed at the NASDAQ illustrates this mindset:

*“Investors weigh several investments opportunities. Seed capital has more risk and costs more effort, but also has the highest returning rates. A tax initiative will lower the threshold for investors. ... Governmental involvement in the investment side will take too much time and will deter private investments on the long term”*

When looking at disadvantages for American entrepreneurs, the common denominator is the large bureaucracy, especially in California. Cities, counties and the state have separate regulatory requirements for entrepreneurs. The tax system is as a result also very complex. The accountancy of a small self employed professional simply cannot be done by someone who is not a legal professional. Collaboration between all governmental levels should create one tax authority in order to lower the administration costs of ventures.

## 6. Discussion

In this section the limitations of this study are discussed. Based on the limitations in the reliability and construct validity, I will come to some implications for further research.

The most considerable limitation of this study is the small dataset. Only five American entrepreneurs were interviewed. It is questionable how these entrepreneurs represent entrepreneurs in the entire renewable energy sector in the US. First of all, entrepreneurs of ventures with a more considerable organization (and thus growth rates) were harder to reach. I had this experience in both institutional environments. The effect of outliers could therefore be substantial in this study, the external validity. As a result some quantitative analyses were even futile, because aspects like institutional investors were not even present in the US. However, the combination of in-depth interviews and qualitative analysis resulted to a better understanding of the underlying mechanism found in the quantitative analysis. This helped to exclude micro level factors of individual ventures. The internal validity of this data is therefore more reliable. Regarding the reliability of the dataset; the data of this study is for a large part depended on the interpretation of the interviewed entrepreneur. The level of innovativeness, reason and timing of certain activities or rejections could lead to interpretative flexibility and socially desirable answers. Entrepreneurs would rather not blame their unsuccessfulness or capital request rejections on the viability of their business idea and more on external effects such as unwilling banks or the government. However most of these items cannot be measured in other ways, so different studies would have this bias to. Another methodological bias of earlier works was the

unilateral focus on successful entrepreneurs. I did manage to include some unsuccessful entrepreneurs, but these were harder to trace back. Their initial attempts often lack contact information.

This study only mapped certain aspects of the institutional environment. Extended research on other sectors, a larger sample and more applied variables could lead to a more general theory of the influence of the institutional environment on entrepreneurship and create a similar framework of complementarities related to starting innovative ventures. Starting ventures as an entity also interact with economic actors and therefore will also determine the institutional environment. Unfortunately, this study only looks one way to the institutional environment. It could however also turn out that technological conditions of an industry are more dominant determinants in the foundation process.

Due to limitations in the sampling strategy, it was not possible to out rule the effect of the recent economic and credit crisis in our study. These crises had a major effect on the credit provision, the (sustainable) energy market and unemployment rates, especially in the US. It is already known that unemployment has a general 'refuge' effect on entrepreneurship, but the recent crisis could bias the results for the US, because they had a recent surge of (youth) unemployment (Audretsch et al., 2001). Dropping energy prices also ceased the worldwide investment in energy alternatives and several entrepreneurs in both institutional environments indicated that the crisis slowed down their progress. In order to avoid the (temporarily) influence of the crises; I would therefore suggest to either choose a sample which started a substantial amount of years before the crisis or a sample with a longer time span.

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## 8. Appendix

### 8.1 appendix 1

Characteristics and results of interviewed entrepreneurs:

venture	industry	country	start of venture foundation process	end of venture foundation process	length of VCP	innovativeness
1	SOLAR	Netherlands	Feb-06	-	-	partly new
2	SOLAR	Netherlands	Oct-08	Jan-10	15	traditional reproduction
3	SOLAR	Netherlands	Oct-09	Sep-10	11	partly new
4	SOLAR	Netherlands	Jan-09	Aug-09	7	partly new
5	SOLAR	Netherlands	Mar-02	Jul-03	16	traditional reproduction
6	SOLAR	Netherlands	Dec-02	Jul-08	65	traditional reproduction
7	SOLAR	Netherlands	Feb-03	Dec-04	22	radical
8	SOLAR	Netherlands	Jul-08	Jul-10	24	partly new
9	SOLAR	Netherlands	Jul-09	-	-	radical
10	SOLAR	Netherlands	Feb-05	-	-	radical
11	SOLAR	Netherlands	Feb-07	Mar-11	49	traditional reproduction
12	SOLAR	Netherlands	Dec-08	-	-	partly new
13	SOLAR	Germany	Jan-08	Jul-10	30	partly new
14	SOLAR	Germany	Jan-02	Dec-03	23	partly new
15	SOLAR	United States of America	Feb-03	-	-	traditional reproduction
16	SOLAR	United States of America	Jul-04	Dec-05	17	partly new
17	SOLAR	United States of America	Jun-06	Jan-07	7	radical
18	SOLAR	United States of America	Mar-06	Jul-11	64	partly new
18	SOLAR	United States of America	Apr-08	Oct-09	18	radical

venture	job dissatisfaction/unemployment	at least one employee	date of first employer	time between start and first employee	approached institutional investor	received any investments
1	yes	no	-	-	yes	no
2	yes	no	-	-	no	no
3	no	no	-	-	no	no
4	yes	no	-	-	no	no
5	no	no	-	-	yes	no
6	yes	no	-	-	no	no
7	yes	yes	Mar-04	13	yes	no
8	yes	yes	Jan-10	17	no	no
9	no	no	-	-	yes	no

10	no	yes	Jul-10	65	yes	yes
11	no	yes	Jan-10	35	no	no
12	yes	yes	Feb-09	13	no	no
13	no	yes	Jul-10	31	no	no
14	no	yes	Jan-03	12	no	no
15	yes	no		-	no	no
16	no	no	Aug-04	1	no	no
17	no	yes	Sep-06	3	no	no
18	no	yes	Mar-06	0	no	no
18	no	yes	Sep-08	5	no	no

venture	VC request	VC received	time VC request	industry association	R&D collaboration
1	-	-	-	yes	yes
2	-	-	-	yes	no
3	-	-	-	no	yes
4	-	-	-	yes	no
5	-	-	-	no	no
6	-	-	-	no	yes
7	-	-	-	yes	yes
8	-	-	-	yes	no
9	-	-	-	yes	yes
10	Jan-08	may 2008	5	yes	yes
11	-	-	-	yes	no
12	-	-	-	yes	yes
13	-	-	-	no	yes
14	-	-	-	yes	no
15	-	-	-	no	no
16	-	-	-	no	yes
17	-	-	-	yes	no
18	-	-	-	no	yes
18	-	-	-	no	yes