Do National and Entrepreneurial Framework Conditions influence economic growth?

*Using path analysis (PA) on the example of Nordic countries between the years 2005-2014*

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Abstract

This paper investigates whether national and entrepreneurial framework conditions positively affect economic growth via its effects on entrepreneurial activity more significantly than via its effects on technological innovation intensity. The revised GEM conceptual model is tested for a sample of Nordic countries (Norway, Finland, Sweden, Denmark, Iceland), between the years 2005-2014, using path analysis. The variables representing national and entrepreneurial framework conditions, entrepreneurial activity, technological innovation intensity and economic growth are Global Competitiveness Index (which includes also number of procedures to start a business and number of days to start a business, venture capital availability etc.), self-employed workers (expressed as % of total employed), R&D expenditures (expressed as % of GDP) and GDP per capita. In each of the models, the author finds out a positive effect of national and entrepreneurial framework conditions. The hypotheses stating the positive indirect influence of national and entrepreneurial framework conditions on economic growth via entrepreneurial activity (H1) and the positive indirect influence of national and entrepreneurial framework conditions via technological innovation intensity (H2) have been accepted. The calculated total effect on economic growth indicates that the path via entrepreneurship (H1) is more significant (H3).

Keywords
Economic growth, National Framework Conditions, Entrepreneurial Framework Conditions, GCI, GEM, Path Analysis

JEL classification
M21, O11, O32, O34, O40

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1 Revised GEM Conceptual Model, 2015/2016
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1 Introduction

Since the world becomes more interconnected and disparities between the countries intensify, policy makers, business leaders, academics and other globally minded citizens, all of them, require a better understanding of the forces that contribute to economic growth.

One of the pivotal aim of policy makers is to generate economic growth and create employment. There are many economic and non-economic variables that influence economic growth (climate, schooling, rule of law index, inflation, ethnic diversity, saving propensity, political freedom, etc.) (Bleaney and Nishiyama, 2002; Sala-i-Martin, 1997). Unfortunately, entrepreneurship has failed to be included in this list of variables. One reason that entrepreneurship disappeared from economic theory is that it did not play any role in neoclassical growth models as in Solow growth model (Solow, 1970). This growth model assumes that technological improvement is exogenous and not dependent of economic incentives (Carree, Thurik 2002). Endogenous theory of economic growth (explicitly focused on the -human- capital formation and innovation) tries to fit entrepreneurship and innovation into growth models but entrepreneurship still remains mainly implicit. Moreover, this theory does not shed light on the conditions of the entrepreneurial activity necessary for the capital formation and innovation (Wennekers, Thurik, 1999).

The positive contribution of entrepreneurship on economic growth has been already proved by many scholars in entrepreneurial studies (Carree and Thurik, 2010; Van Praag and Versloot, 2007). Both, entrepreneurship and innovation are conceived to be the powerful drivers of economic growth and job creation (Europa, 2016).

Should Nordic economic policy makers be primarily focused on entrepreneurship ecosystem or on innovation-friendly environment? The main aim of this paper is to find out if national and entrepreneurial framework conditions positively affect economic growth via its effects on entrepreneurial activity more significantly than via its effects on technological innovation intensity. It is tested for a sample of Nordic countries (Norway, Finland, Sweden, Denmark, Iceland), between the years 2005–2014.

The author tests national and entrepreneurial framework conditions of the revised GEM model, because the GEM’s unique contribution is to describe, in detail, the conditions under which entrepreneurship and innovation can thrive.
In addition, the revised GEM model has not been tested before by using path analysis. Nordic countries have been chosen because firstly, this kind of study has not been done before for Nordic countries as well and secondly, Nordic countries have a higher GDP per capita than the EU, therefore, it seems reasonable to choose Nordic countries. In Norway, GDP per capita is double the size of the EU. Then, followed by Sweden, Iceland, Denmark and Finland with more or less the same figures (Norden, 2016)

Figure 1: Gross domestic product (GDP) per person in PPS (Purchasing Power Standards)

Source: Norden (2016)

The paper is divided into a theoretical and empirical part. First, the author is going to describe a pivotal role of national framework conditions and business environment in a process of economic growth according to the previous studies.

Second, the author is going to present the Global Entrepreneurship Monitor (GEM) and its revised conceptual model. The author chooses to test this model because it complements widely known global competitiveness model and explains the role of a range of national and entrepreneurial framework conditions in the process of economic growth in one framework.

At the beginning of the empirical part, the author is going to visualize two path diagrams and then, the author will estimate the path coefficients representing the relationship between national framework conditions, entrepreneurial framework conditions, entrepreneurial activity, technological innovation intensity and economic growth.
2 Theoretical Background

The theoretical background comprises two parts. Firstly, it presents introductory frameworks, how scholars describe the role of national framework conditions and business environment in the process of economic growth.

Secondly, the paper focuses on presentation of the revised GEM conceptual model because previous research did not undertake such detailed explanation what can be imagined under national framework conditions and business environment in the process of economic growth. Also, visual presentation of the revised GEM conceptual model is provided for better understanding of the model.

2.1 Role of National Framework Conditions and Business Environment in Process of Economic Growth: Introductory Frameworks

For understanding the role of national framework conditions and business environment in the process of economic growth, it requires introductory frameworks. These frameworks are adopted because there is usually no direct link between national framework conditions and business environment and economic growth. That is why it is needed to have different intermediate variables or linkages explaining how national framework conditions and business environment are linked to economic growth.

See Figure 2, Figure 3, Figure 4 and Figure 5 where existing empirical literature on the role of national framework conditions and business environment in the process of economic growth, is provided.

2.1.1 Linking entrepreneurship and economic growth

In discussing the first introductory framework, the author concentrates on entrepreneurship and economic growth and what factors link them together. Figure 2 illustrates a framework inspired by many insights in the literature.

It is also necessary to take into account wider ranging relationships. More concretely, linking entrepreneurship to economic growth means linking the individual level to the firm and the macro level.
The outcome of these dynamic processes is determined by a set of conditions. Given entrepreneurial endowments, environment, in which an entrepreneur carries out the entrepreneurial activity, represents these conditions. Firstly, this refers to national cultural environment (open-mindedness, acceptance of risk, etc.) and internal culture of corporations (business culture – open-mindedness, proactiveness, trust in employees, internal rules and procedures, incentives).

Secondly, institutional framework (property rights, incentives, competition rules, entry barriers) on the firm level and national level defines the incentives for individuals to turn ambitions into actions. Institutional framework also determines to which extent unnecessary barriers will hamper these individuals. Thurik and Wennekers (1999) highlight that the importance of institutions, for the development of entrepreneurship, is paramount and that it deserves further study.

On the firm level, entrepreneurial action needs a vehicle that transforms the person qualities into actions. Small firms where an entrepreneur has a controlling stake can be the vehicle. Larger firms mimic small firms by introducing corporate entrepreneurship. The outcome of entrepreneurial activities on the firm level is “newness” (newness through product, process and organizational innovation, entry into new markets, innovative business start-up).

At the aggregate level (industries, regions and national economies), many individual entrepreneurial actions are characterised by new experiments. The process of competition occurs continuously between the variety of new ideas and it leads to the selection of the most viable firms and industries. Then, variety, competition, selection...
and imitation expand and transform the productive potential of a regional or national economy (replacement or displacement of obsolete firms, higher productivity, expansion of new niches and industries). Moreover, it enhances international competitiveness and its market share (Carree and Thurik, 2002).

There are also important feedback mechanisms. Competition and selection, amidst variety, enable individuals and firms to learn from the own and other’s successes and failures. This learning process also increases the individuals’ skills and adapt their attitudes. (Thurik, Wennekers, 1999). Thurik and Wennekers (1999) assume that outcome of this chain of variables linking the individual level to the macro level is economic growth.

2.1.2 Framework of Entrepreneurship at the macro level

Figure 3 depicts the framework at the macro level. The first part of framework explains how various conditions as technological, economic, demographic, cultural and institutional exert the influence on nascent entrepreneurship (the attempt to establish a new company) by way of individual occupational choice.

In the second part of framework, Wennekers, Uhlaner and Thurik (2002) shed light on how nascent entrepreneurship influence the actual rate of business ownership.
The third part explains the linkages between nascent entrepreneurship, start-ups and business ownership and economic growth at the individual, firm and macro level.

Individuals choose between the wage-employment and business ownership by assessing potential financial and non-financial rewards and risks. The assessment of potential financial and non-financial rewards and risks are influenced by the perception of opportunities and personal capabilities and preferences. These occupational choices have the impact on nascent entrepreneurship. The framework also links technology, economic development, demography, institutions, and culture with the individual assessments through either demand-side (opportunities available for starting a business) of entrepreneurship or supply-side (pool of individuals with capabilities and preferences to start a business) (Thurik, Wennekers and Uhlaner, 2002). The nascent entrepreneurs are those who intent and/or intensively try to start a business. Thurik, Wennekers and Uhlaner (2002) highlight that only certain proportion of entrepreneurs succeed in setting up and running the business. They express this proportion, in their model, by the variable -start-ups- that represent the firms which are entering market (firm level variable). They also state that merely some proportion of new firms foster innovation (introducing new products, finding new ways of producing and/or delivering existing products and delivering goods).

Then, start-ups start restructuring an economy through adoptive reaction such as business exits, mergers, reengineering (diffusion) and new innovations by incumbents. Decisions that lead to these reactions are made on firm level but the accumulated effects also influence the aggregate level. The accumulated effect of these start-ups, change the structure of industry in the term of number of businesses (the rate of business ownership). This restructurization takes place at the aggregate level of sectors, regions and national economies. The new industry structure is crucial input for variety and competition at aggregate level. New industrial constellations lead to the new forms of static and dynamic competition, when new products and processes are manifested (innovation). This variety and competition has the impact on the process of restructuring through selection of the most viable firms and the best ideas.

2.1.3 Nordic Growth Entrepreneurship Review (NGER) Model

According to the Nordic Growth Entrepreneurship Review (NGER) model, the companies’ entrepreneurship performance is viewed as a driver of wealth creation. The
external factors that influence entrepreneurship performance can be enhanced by public policymaking. Governments can work strategically for strengthening entrepreneurship’s performance through framework conditions for entrepreneurship (The Nordic Growth Entrepreneurship Review, 2012):

- regulatory framework (administrative burdens, bankruptcy legislation, product and labour legislation, court and legal framework, competition legislation, income taxes, business and capital taxes and patent systems standards),
- market conditions (foreign markets, degree of public involvement, public procurement),
- access to finance (access to debt financing, access to venture capital, stock markets),
- the creation and diffusion of knowledge (R&D activity, transfer of non-commercial knowledge, technology availability and take-up),
- entrepreneurial capabilities (business and entrepreneurship education: skills, immigration),
- entrepreneurial culture (entrepreneurial attitude in society and entrepreneurial education: mindset).

Figure 4: Relations between framework conditions and entrepreneurship performance


2.1.4 Cultural Norms and Institutions

Cultural norms and institutions are often regarded to explain why certain countries grow rich and others poor. Is there any connection between economic development and economic liberties? According to Barro (1996), economic freedom, in the form of free markets and small governments, focuses on the maintenance of property rights and encourage economic growth. Friedman (1962) believes that political and economic freedom are mutually reinforcing. An expansion of political rights (more “democracy”), fosters economic rights and stimulates growth. Johnson and Lenartowicz (1999) state that economic freedom is the ability of a society to conduct businesses in unfettered manner without intrusion of government. According to them, economic freedom is a key determinant of economic success.
Figure 5: Culture, Freedom and Economic Growth

Given general definition, the next step is to decide, which elements should be in constructing the indicator. The well-known indicator used by many researchers is the indicator of Heritage Foundation (Johnson & Lenartowicz, 1999; McArthur and Sachs, 2002) Heritage Foundation (2016) measures economic freedom based on ten quantitative and qualitative factors. These factors are grouped into four broad categories: Rule of Law (Freedom from Corruption, Property Rights), Limited Government (Government Spending, Fiscal Freedom), Regulatory Efficiency (Business Freedom, Labour Freedom, Monetary Freedom) and Open Markets (Investment Freedom, Financial Freedom and Trade Freedom). Business freedom measures the efficiency of government regulation of businesses. The overall quantitative score is derived from many measurements of difficulty to start, operate and closing a business. The business freedom score is a number between 0-100, where 100 means the freest business environment. The overall derived score is based on 10 factors (Heritage Foundation, 2016):

- Starting a business (Number of Procedures),
- starting a business (Time – Days),
- starting a business (Cost - % of income per capita),
- starting a business (Minimum capital - % of income per capita),
- obtaining a license (Cost - % of income per capita),
- closing a business (Time – years),
- closing a business (Cost – % of estate) and
- closing a business (Closing a business – recovery rate: cents of dollars)
Where framework of linking entrepreneurship and economic growth, framework of entrepreneurship at the macro level, Nordic Growth Entrepreneurship Review Model and framework of culture, freedom and economic growth were focus in the previous sections, the paper will now focus upon the well-known Global Entrepreneurship Monitor (GEM) and its revised conceptual model.

2.2 Global Entrepreneurship Monitor (GEM)

The Global Entrepreneurship Monitor (GEM) was presented in September 1999 as a joint research initiative by Babson College and London Business School. The core aim was to bring together the best world’s scholars in entrepreneurship for studying comprehensive relationship between entrepreneurship and economic growth. The GEM research design includes data from national secondary sources, adult population surveys, in-depth interviews with the key informants in each participating country. For understanding the role of entrepreneurship in economic growth, the GEM defined entrepreneurship as: “…Any attempt at new business or new venture creation, such as self-employment, a new business organization, or the expansion of an existing business, by an individual, a team of individuals, or an established business…” (Reynolds et al., 1999, p. 3) For understanding its core aim, GEM developed a conceptual model (Reynolds et al, 1999).

2.2.1 The Revised GEM Conceptual Model

The GEM model was created by Paul Reynolds based on an idea by Michael Hay in 1997 for the World Enterprise Index that would become the equivalent for an entreprise and entrepreneurship of IMD’s World Competitiveness Yearbook and the World Economic Forum’s Global Competitiveness Index (Levie & Autio, 2008). Reynolds wished to provide the model that complements the Global Competitiveness Model. It was an alternative to thinking that only large established firms are significant. After ten years of collecting the empirical evidence, and continuous improvements in the measurement adopted, GEM researchers revised the GEM model for reflecting the comprehensiveness of the casual interdependence between entrepreneurship and economic development globally (Bosma et al., 2010).

The GEM conceptual model is based on the concept that the contribution of entrepreneurs to an economic growth varies according to the phase of economic development, which drives the institutional settings to certain extent.
The GEM distinguishes economies that participate in the study as factor-driven, efficiency-driven and innovation-driven. These categories are based on the World Economic Forum’s Global Competitiveness Report that recognizes three phases of economic development based on GDP per capita and the share of exports consisting of primary goods (Kelley et al., 2015/2016).

According to World Economic Forum (WEF) classification, in the first stage of development, the economy is factor-driven and countries compete based on their factor endowment. The factor endowment is represented mainly by unskilled labour and natural resources. For maintaining the competitiveness, it is necessary to focus on well-functioning private and public institutions, on well-developed infrastructure, a stable macroeconomic environment and healthy workforce that has at least basic education. As far as the economy becomes more competitive, productivity and subsequently wage will increase with advancing development. Afterwards, the countries will move into the efficiency-driven phase.

In the efficiency-driven phase, countries have to start with more efficient production processes and increase the quality of products because wages have risen and they cannot raise the prices of the products. In this stage, the increasing competitiveness is driven by higher education and training, efficient good markets, well-functioning labour markets, developed financial markets, the capability to harness the benefits of existing technologies and finally, a large domestic/foreign market.

According to the World Economic Forum’s Global Competitiveness Report, Nordic countries belong to the innovation-driven economies (Schwab et al., 2015/2016). In the innovation-driven phase, businesses are more knowledge-intensive and the service sector expands. The wages raise so much that to be able to sustain those wages and the associated standard of living is only possible if the businesses are able to compete through the most sophisticated production processes and to modern the old ones. (Schwab et al., 2015/2016).

According to Acs (Acs, 2006), entrepreneurial economies should strengthen technology transfer, make early-stage funding available and support entrepreneurial activity at the state, corporate and university level. Moreover, higher education system should play the important role in research and development and technology commercialization.
Table 1: National Framework Conditions

<table>
<thead>
<tr>
<th>Economic development phases</th>
<th>National Framework Conditions based on World Economic Forum pillars for profiling economic development phases</th>
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</table>
| Key to Innovation-driven economies | Two linked elements  
• Business sophistication  
  - The quality of country’s overall business networks (measured by the quality and quantity of local suppliers and the extent of their interaction)  
  - The quality of individual firms’ operations and strategies  
| Innovation |  
• Innovation  
  - Investment in research and development (R&D)  
  - The presence of high quality scientific research institutions  
  - Extensive collaboration in R&D between universities and industry  
  - Protection of intellectual property  

Source: Singer et al., 2014

2.2.2 Description of the Model

In the model, social, cultural, political and economic context is represented by national framework conditions and entrepreneurial framework conditions. The latter is conceived to influence the entrepreneurial activity more directly.

Social values about entrepreneurship cover how a society values entrepreneurship as a good career choice, whether entrepreneurs have a high social status and whether media attention to entrepreneurship is contributing to the development of a national entrepreneurship culture.

Individual attributes comprise demographic characteristics (age, gender, etc.) self-perception (how entrepreneurs perceive capabilities and opportunities, fear of failure and if the entrepreneur is opportunity/necessity driven for starting a new business.

Entrepreneurial activity encompasses multiple phases of the business process, potential impact and the kind of activity: TEA (Total Early-Stage Entrepreneurial Activity), SEA (Social Entrepreneurial Activity) and EEA (Employee Entrepreneurial Activity) (Kelley et al., 2015/2016).

Entrepreneurial output (job creation, internationalization, innovation) is characterized by potential impact of entrepreneurial activity.
In the following sections (2.2.2.1 and 2.2.2.2), national and entrepreneurial framework conditions of the revised GEM model are presented. National framework conditions are built upon the Global Competitiveness Index, therefore, first, Global Competitiveness Framework and its Global Competitiveness Index is presented, second, entrepreneurial framework conditions of the revised GEM model are described.

2.2.2.1 Structures, Institutions and Policies: National Conditions as the Starting Point

The Global Competitiveness Framework is used by World Economic Forum’s Global Competitiveness Report (GCR). Its core objective is to assess the capacity of national economies to achieve sustained economic growth. In GCR, it is carried out by analysing to which extent, the individual national economies have structures, institutions and policies for economic growth over the medium term. This capacity features are summarized in the GCI (Stel and Carree and Thurik, 2004). GCR identifies three inter-related mechanisms within economic growth. The first is efficient allocation of labour. Adam Smith has already identified this factor in 1776 and observed that international trade plays a pivotal role in achieving an efficient allocation of labour. The second mechanism is capital accumulation (including human capital) and the third
mechanism is technological advance. All three mechanisms are very important but technological advance is pivotal. Without technological advance, the benefits from the division of labour and higher rate of capital accumulation would led to higher standards of living, but not to higher economic growth.

Improvements in technology, both new goods and a better manner how to produce goods, can be accomplished by creating new technology or by adopting and adapting the technology from abroad. The first process is technological innovation and the second is technological diffusion. In this regard, the GCR distinguishes core economies (for example Nordic countries) and non-core economies (for example Czech Republic). It is stated that economic growth is achieved in different ways in core and non-core economies. In core economies, the growth is powered by the capacity to innovate and to win new global markets for the technologically advanced products. The main innovators, measured for instance by the rate at which they patent new products and processes, are few in amount (McArthur and Sachs, 2002). High growth rates in non-core economies are often achieved by rapidly absorbing the advanced technologies and capital of the core economies. (Stel and Carree and Thurik, 2004). But it is necessary to highlight that “catch-up” effect has its inherent limits. As a non-core economy narrows the income gap, its ability to narrow gap gets further to diminish. For being able to close the income gap fully, the non-core economy has to become technological innovator (McArthur and Sachs, 2002).

The Global Competitiveness Index (GCI) encompasses a range of explanatory variables for achieving sustained economic growth (Stel and Carree and Thurik, 2004). McArthur and Sachs (2002) tested 2001 GCI for a sample of 75 economies. They investigated the relationship between the GCI and economic growth, during the years 1992-2000, using the following equation: average annual change in GAP = β₀ + β₁ x GCI + β₂ x natural log (percentage GDP gap in 1992). McArthur and Sachs (2002) found out that the 2001 GCI had a significantly positive influence on economic growth over the period 1992-2000. A description of this index could be useful because the author will use this index in the regression analysis.

The Global Competitiveness Index comprises 114 indicators which captures concepts that matter for productivity. The indicators are grouped into 12 pillars: (1) institutions, (2) infrastructure, (3) macroeconomic environment, (4) health and primary education, (5) higher education and training, (6) goods market efficiency, (7) labour
market efficiency, (8) financial market development, (9) technological readiness, (10) market size, (11) business sophistication and (12) innovation. These indicators are divided into three sub-indexes: basic requirements, efficiency enhancers and innovation and sophistication factors. (Schwab et al., 2015/16).

Components of Global Competitiveness Index

1st pillar: Institutions

1.01 Property rights
1.02 Intellectual property protection
1.03 Diversion of public funds
1.04 Public trust in politicians’
1.05 Irregular payments and bribes
1.06 Judicial independence
1.07 Favoritism in decisions in government officials
1.08 Wastefulness of government spending
1.09 Burden of government regulation
1.10 Efficiency of legal framework in setting disputes
1.11 Efficiency of legal framework in challenging regs
1.12 Transparency of government policymaking
1.13 Business costs of terrorism
1.14 Business costs of crime and violence
1.15 Organized crime
1.16 Reliability of police services
1.17 Ethical behaviour of firms
1.18 Strength of auditing and reporting standards
1.19 Efficacy of corporate boards
1.20 Protection of minority shareholders’ interests
1.21 Strength of investor protection, 0-10 best

2nd pillar: Infrastructure

2.01 Quality of overall infrastructure
2.02 Quality of roads
2.03 Quality of railroads infrastructure
2.04 Quality of port infrastructure
2.05 Quality of air transport infrastructure
2.06 Available airline seat km/week, millions
2.07 Quality of electricity supply
2.08 Mobile telephone subscriptions/100 pop.
2.09 Fixed-telephone lines/100 pop.

3rd pillar: Macroeconomic environment

3.01 Government budget balance, % GDP
3.02 Gross national savings, % GDP
3.03 Inflation, annual % change
3.04 General government debt, % GDP
3.05 Country credit ranking, 0-100 (best)

4th pillar: Health and primary education

4.01 Malaria cases/100,000 pop.
4.02 Business impact of malaria
4.03 Tuberculosis cases/100,000 pop.
4.04 Business impact of tuberculosis
4.05 HIV prevalence, % adult pop.
4.06 Business impact of HIV/AIDS
4.07 Infant mortality, deaths/1,000 live births
4.08 Life expectancy, years
4.09 Quality of primary education
4.10 Primary education enrolment, net %

5th pillar: Higher education and training

5.01 Secondary education enrolment, gros %
5.02 Tertiary education enrolment, gros %
5.03 Quality of the education system
5.04 Quality of math and science education
5.05 Quality of management schools
5.06 Internet access in schools
5.07 Availability of specialized training services
5.08 Extent of staff training

6th pillar: Goods market efficiency

6.01 Intensity of local competition
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<td>10.01</td>
<td>Domestic market size index, 1-7 best</td>
</tr>
<tr>
<td>10.02</td>
<td>Foreign market size index, 1-7 best</td>
</tr>
<tr>
<td>10.03</td>
<td>GDP (PPP$ billions)</td>
</tr>
<tr>
<td>10.04</td>
<td>Exports as a percentage of GDP</td>
</tr>
<tr>
<td>11th pillar: Business sophistication</td>
<td></td>
</tr>
<tr>
<td>11.01</td>
<td>local supplier quantity</td>
</tr>
<tr>
<td>11.02</td>
<td>Local supplier quality</td>
</tr>
<tr>
<td>11.03</td>
<td>State of cluster development</td>
</tr>
<tr>
<td>11.04</td>
<td>Nature of competitive advantage</td>
</tr>
<tr>
<td>11.05</td>
<td>Value chain breath</td>
</tr>
<tr>
<td>11.06</td>
<td>Control of international distribution</td>
</tr>
<tr>
<td>11.07</td>
<td>Production Process sophistication</td>
</tr>
<tr>
<td>11.08</td>
<td>Extent of marketing</td>
</tr>
<tr>
<td>11.09</td>
<td>Willingness to delegate authority</td>
</tr>
<tr>
<td>12th pillar: Innovation</td>
<td></td>
</tr>
<tr>
<td>12.01</td>
<td>Capacity for innovation</td>
</tr>
<tr>
<td>12.02</td>
<td>Quality of scientific research institutions</td>
</tr>
<tr>
<td>12.03</td>
<td>Company spending on R&amp;D</td>
</tr>
<tr>
<td>12.04</td>
<td>University-industry collaboration in R&amp;D</td>
</tr>
<tr>
<td>12.05</td>
<td>Gov’t procurement of advanced tech products</td>
</tr>
<tr>
<td>12.06</td>
<td>Availability of scientists and engineers</td>
</tr>
<tr>
<td>12.07</td>
<td>PCT patents, applications/million pop.</td>
</tr>
</tbody>
</table>

### 2.2.2.2 Entrepreneurial Framework Conditions

For potential entrepreneurs, who decide about starting a new business, they are affected by the characteristics within existing business environment. These pillars are
called entrepreneurial framework conditions. The entrepreneurial framework conditions consist of:

1. **Entrepreneurial Finance** – It represents financial resources (equity, debts) for SMEs. It includes grants and subsidies as well.

2. **Government Policy** – The support of public policies towards entrepreneurship. This entrepreneurial framework condition has two components:
   
   2a. Entrepreneurship as a significant economic issue
   
   2b. Taxes and regulations are either size-neutral or encourage the new and SMEs

3. **Government Entrepreneurship Programs** – The presence and quality of programs assigned to SMEs at all levels of government (national, regional, municipal)

4. **Entrepreneurship Education** – It represents to which extent the training in setting up and managing SMEs is incorporated in the education and training at all levels.
   
   4a. Entrepreneurship Education at Basic Schools (primary, secondary schools)
   
   4b. Entrepreneurship Education at post-secondary levels (vocational, college, business schools)

5. **Research and Development Transfer (R&D)** – It represents to which extent national research and development lead to new commercial opportunities and if it is available for SMEs.

6. **Commercial and Legal Infrastructure** – The presence of property rights, commercial, accounting and other assessment services and institutions that tend to support SMEs.

7. **Entry Regulations** – The entry regulations comprise two components:
   
   7a. Market Dynamics: It describes the level of change from year to year
   
   7b. Market Openness: It describes to which extent new firms are free to enter new markets

8. **Physical Infrastructure** – It represents the ease of access to communication, transportation, utilities, and land of space

9. **Cultural and Social Norms** – It describes if cultural and social norms encourage actions leading to new business method and creation that can potentially increase the personal wealth and income (Singer et al., 2014).
For the purpose of comparison, the previous sections introduced the different frameworks on the role of national framework conditions and entrepreneurial framework conditions in the process of economic growth. The revised GEM conceptual model is chosen for testing through path analysis from all above models because the GEM’s unique contribution is to describe and measure, in detail, the conditions under which entrepreneurship and innovation can thrive. Therefore, for the aims of this paper, it seems reasonable to choose this conceptual model. Based on the theoretical background, the author forms these hypotheses:

H₁: National framework conditions and entrepreneurial framework conditions positively affect economic growth via its effects on entrepreneurial activity.

H₂: National framework conditions and entrepreneurial framework conditions positively affect economic growth via its effects on technological innovation intensity.

H₃: The positive influence of national framework conditions and entrepreneurial framework on economic growth via its effects on entrepreneurial activity is more significant.

According to Van Praag and Versloot (2005), productivity and growth are measured by (a firm’s or region’s) contribution to a country’s domestic product (GDP) or GDP growth. For instance, Van Stel, Carree, Thurik (2004) measure economic growth by GDP growth rates.

GEM’s national framework conditions are drawn upon Global Competitiveness Index and index has been already explained in section 2.2.

For helping to assess the state of entrepreneurial framework conditions, GEM designed and implemented a tool: the National Experts’ Survey (NES). The information provided in Doing Business Report covers some topics which are included in the GEM expert survey. For example – starting a business – is of important interest of GEM, as the experts provide subjective valuations on the perceived governmental support to entrepreneurs. In this paper, the author uses the Global Competitiveness Index because it also covers number of days to start a business and number of procedures to start a business, presence of property rights, ease of access to communication etc.² (Global Entrepreneurship Monitor, 2012).

Several ways how to measure entrepreneurial activity are known since Global Entrepreneurship Monitor (2016) does not embed all data necessary for

² See section 2.2 where the Global Competitiveness Index is explained
empirical research. One of the approaches is to use the effect of self-employment rate on economic growth figures (Blanchflower, 2000) and Carree et al. (2002). The first advantage is, that while it is not being a direct measure of entrepreneurial activity, it can be an useful proxy of entrepreneurial activity (Storey, 1991). Secondly, it is available and it is possible to compare across countries and over time.

Wong and Autio (2005) discuss which variable is convenient as the measurement of technology innovation intensity. They highlight the ratio of granted patents to GDP but unfortunately, data source for granted patents were not obtained (only applications) and hence, the author uses the second variable discussed in Wong’s and Autio’s paper and it is R&D expenditure to GDP. Van Praag and Versloot (2007) also discuss innovations as a broad concept to which a multitude of indicators is employed. Concerning a firm’s innovative output (the production of innovations), they highlight that both measures of its quantity and quality are used. For quantity, commonly research and development expenditures are used and he has the same opinion as Wong and Autio (2005) that it measures rather input than output (patents and the introduction of new products and technologies). The quality of these innovations is often indicated by patents citations and the importance of innovations. He also states that commercialization of innovations and also the adoption of innovations are used as measures of contributions to economic value through innovation.

3 Research Techniques and Methodology

In this paper, following research methods have been used: literature review and path analysis.

**Literature Review** – summarizes the current literature on the role of national framework conditions and business environment in the process of economic growth and describes, in detail, the Global Entrepreneurship Monitor and its revised conceptual model and its national framework conditions and entrepreneurial framework conditions.

**Path Analysis** – this quantitative research method is used to test the revised GEM conceptual model. Path analysis is a special case of structural equation models (SEM). SEM are used in a range field of sciences, such as psychology, mineralogy, palaeontology, chemistry, business administration and economics.

The path analysis begins by assuming a graphical representation (priory known) of the model through which dependent and independent variables are related. This
A graphical representation is called path diagram. A path diagram represents the pictorial representation of a system of simultaneous equations presenting the relationships assumed to be hold.

In path diagram, we distinguish between these variables:

i. Dependent variables.

ii. Independent variables.

iii. Residuals.

For researchers who are untrained in mathematics these pictures can show the relationships more obviously than the equations. Path analysis calculates the strength of the relationship using merely correlation or covariance matrix as input. It is matter of taste if merely correlation or covariance matrix is used. The relations in the diagram are the parameters of the equations to be estimated, called path coefficients. Ordinary Least Squares Method (OLS) is the method most frequently used for path coefficients estimation. In a path diagram, different symbols and arrows are used for different kind of variables. The basic notations are:

i. A box symbolizes an observable variable.

ii. An oval symbolizes latent variable.

iii. Residuals are symbolized by a lowercase Greek letter without an outside border.

iv. A straight arrow is also drawn to each dependent variable from the dependent variable’s residual.

v. A straight arrow is drawn for a one-directional relation to a dependent variable.

vi. A double headed arrow is drawn between pair of independent variables hence to have nonzero correlations.

Once the path diagram is obtained; the structure and the parameters of variables are written in a set of equations.

Finally, the important question here is: What can path analysis do? Within a given input path diagram, the path analysis can tell which are the more significant paths and this can have implications for the plausibility of pre-specified causal hypotheses (University of Exeter, 1997).
4 Path Analysis

The empirical part is divided into two parts. Firstly, the paper visualizes two input path diagrams, then, data source for estimating path coefficients are presented. Next, parameters of the equations are estimated and written into the output path diagrams. Finally, the total effect of one variable on another is calculated to find out the strength of the path and furthermore, the paper investigates which path within two outcome diagrams is more significant.

4.1 Path diagram

Path diagrams are based on the revised GEM model. The paper supposes that national framework conditions and entrepreneurial framework conditions affect economic growth indirectly. The path diagrams are depicted in Figure 7 and Figure 8. The path diagrams do not investigate latent variables as social values about entrepreneurship (how society values entrepreneurship as a good career choice, whether entrepreneurs have the high societal status, whether media positively represents entrepreneurship in economy), psychological attributes (perceived capabilities, perceived opportunities, fear of failure) and motivation (necessity driven entrepreneurs versus opportunity driven entrepreneurs) and demographic characteristics (gender, age and income of early-stage entrepreneurs) but observed variables.

Figure 7: Input path diagram I based on the GEM Revised Model
4.2 Data

In this section, the author discusses data and estimated models. The author makes use of Eurostat, World Bank Database and World Economic Forum Database. Data on four basic variables are used in the model: Global Competitiveness Index, self-employed workers (as % of total employed), R&D expenditures (% of GDP) and GDP per capita.

**GDP per capita, constant 2005US$**

GDP per capita represents gross domestic product divided by midyear population. GDP is characterised by the sum of gross value added by all residents producers in economy plus product taxes minus subsidies. It is calculated without any deduction of depreciation of fabricated assets and of depletion and degradation of natural resources. Data for GDP per capita were obtained from World Bank Database.
Figure 9: Mean GDP for the Nordic countries 2005-2014

Source: Gretl, own elaboration

GCI

The Global Competitiveness Index is described in section 3.1. Data source on the Global Competitiveness Index was obtained from the World Economic Forum dataset (2016).

Figure 10: Mean GCI for the Nordic countries 2005-2014

Source: Gretl, own elaboration

Self-employed (% of total employed)

Data source on self-employed workers was obtained from the World Bank. The self-employed workers are those who work on their own account, with one
or a few partners or in cooperative and they hold the type of jobs defined as “self-employment jobs” (World Bank, 2016).

Figure 11: Mean of self-employed in Nordic countries 2005-2014

Source: Gretl, own elaboration

Research and development expenditures (R&D)

Research and development expenditures expressed as % of GDP represent current and capital expenditures, public and private, on creative work for increasing knowledge, including knowledge of humanity, culture and society and use of knowledge for new applications. Research and development expenditures cover basic research, applied research and experimental development. The data source for this variable was obtained from dataset of World Bank (2016) and Eurostat (2016).

Figure 12: Mean of Research and development expenditures in Nordic countries 2005-2014

Source: Gretl, own elaboration
The model estimated is as follows:

(1) \(d\_d\_log\_Self\_Employed = b_0 + b_{11}d\_GCI + \varepsilon\)
\(d\_log\_R\&D\_Expenditures = b_0 + b_{21}d\_GCI + b_{22}d\_d\_log\_Self\_Employed + \varepsilon\)
\(d\_log\_GDP\_PER\_CAPITA = b_0 + b_{31}d\_GCI + b_{32}d\_d\_log\_Self\_Employed + b_{33}d\_log\_R\&D\_Expenditures + \varepsilon\)

(2) \(d\_log\_R\&D\_Expenditures = b_0 + b_{11}d\_GCI + b_{12}d\_d\_I\_self\_Employed + \varepsilon\)

4.3 Stationarity

All above presented variables are created into panel data (or longitudinal data) bringing together Nordic countries between the years 2005-2014. The panel data consists of a time series for each cross-sectional member in data set. For instance, it is possible to collect data for the same set of counties in the United States on immigration flows, tax rates, wage rates etc. for the several years (Wooldridge, 2002). Historically, stationary process plays a significant role in the analysis of time series. For testing stationarity, the author suggests the unit root test, specifically AugmentedDickey-Fuller test (ADF) with constant model:

\[(1-L)y = b_0 + (a-1)*y(-1) + \varepsilon\]

The author tests the null hypothesis on the chosen statistical level (5 %) of significance if the variable is non-stationary. If the null hypothesis is rejected \((a = 1)\), the alternative hypothesis that the variable is stationary can be accepted. When:

- \(Impesaran-Shin\ t-bar < \text{critical value} = \text{we can reject null hypothesis = stationarity}\)
- \(Impesaran-Shin\ t-bar > \text{critical value} = \text{the null hypothesis can not be rejected = non-stationarity.}\)

On the 5 % level of significance, the variables used for econometric models are corrected to be stationary and hence, the author adds first differences of selected variables to resolve the problem with non-stationarity. The results are depicted in the table below:
**4.4 Results**

Path coefficients are estimated in econometric software Gretl. Firstly, when estimating the regression model on panel data, it is necessary to choose between Pooled Ordinary Least Square Method (OLS), Fixed Effects Estimator or Random Effects Estimator. After estimation models by Pooled OLS Method, the author runs panel model diagnostics and tests with Fixed Effect Estimator the null hypothesis that pooled OLS model is adequate and an alternative hypothesis of fixed effects, then author also uses Breusch-Pagan test statistic to test the null hypothesis that the pooled OLS model is adequate and an alternative hypothesis of random effects. For all models, the null hypothesis that Pooled OLS Method is adequate is accepted:

- Model 1: $0.781823 > 0.05$
- Model 2: $0.987519 > 0.05$
- Model 3: $0.909326 > 0.05$
- Model 4: $0.743639 > 0.05$

All models are checked for heteroskedasticity by using White’s test and in all models, the author accepts null hypothesis that the models are healthy without heteroskedasticity presented. The author also tests if the models are clean to collinearity by checking Variance Inflation Factors (VIF) and all values are lower than ten and hence, every model is clean to multicollinearity. Finally, the author tests autocorrelation using Durbin-Watson and rho statistics and according to these tests, all models are clean to autocorrelation. The outcomes of the regression analysis and the estimation of the standardized path coefficients are presented in the following tables.

### Table: Stationarity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Im-Pesaran-Shin t-bar</th>
<th>Critical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>d__I_GDP_PER_CAPITA</td>
<td>-3.72576</td>
<td>-3.65</td>
</tr>
<tr>
<td>d_I_EXPENDITURES_RD</td>
<td>-4.07586</td>
<td>-3.65</td>
</tr>
<tr>
<td>d_d_I_SELF_EMPLOYED</td>
<td>-4.21144</td>
<td>-3.99</td>
</tr>
<tr>
<td>d_GCI</td>
<td>-5.10857</td>
<td>-3.65</td>
</tr>
</tbody>
</table>

Source: Gretl, own elaboration
Table 2: Model 1

Model 1: Pooled OLS, using 25 observations
Included 5 cross-sectional units
Time-series length = 5
Dependent variable: d_d_1_SELF_EMPLOYED

<table>
<thead>
<tr>
<th>coefficient</th>
<th>std. error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>-0.0197254</td>
<td>0.118692</td>
<td>-0.1662</td>
</tr>
<tr>
<td>d_GCI</td>
<td>-0.326022</td>
<td>0.357501</td>
<td>-0.9119</td>
</tr>
<tr>
<td>d_GCI_1</td>
<td>-0.208283</td>
<td>0.320689</td>
<td>-0.6495</td>
</tr>
<tr>
<td>d_GCI_2</td>
<td>1.89082</td>
<td>0.433030</td>
<td>4.367</td>
</tr>
<tr>
<td>d_GCI_3</td>
<td>1.43172</td>
<td>0.551837</td>
<td>2.596</td>
</tr>
<tr>
<td>d_GCI_4</td>
<td>0.0420473</td>
<td>0.419602</td>
<td>0.1002</td>
</tr>
</tbody>
</table>

Mean dependent var | 0.034690 | S.D. dependent var | 0.312825
Sum squared resid | 0.953588 | S.E. of regression | 0.224005
R-squared | 0.594067 | Adjusted R-squared | 0.487242
F(5, 19) | 5.61144 | P-value(F) | 0.002546
Log-likelihood | 5.351155 | Akaiake criterion | 1.281631
Schwarz criterion | 0.594946 | Hannan-Quinn | 3.310077
rho | -0.380664  | Durbin-Watson | 2.104824

Excluding the constant, p-value was highest for variable 39 (d_GCI_4)

Source: Gretl, own elaboration

Table 3: Model 2

Model 2: Pooled OLS, using 25 observations
Included 5 cross-sectional units
Time-series length = 5
Dependent variable: d_l_EXPENDITURES_RD

<table>
<thead>
<tr>
<th>coefficient</th>
<th>std. error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>0.0481741</td>
<td>0.0395645</td>
<td>0.8050</td>
</tr>
<tr>
<td>d_GCI</td>
<td>0.0771699</td>
<td>0.175011</td>
<td>0.4409</td>
</tr>
<tr>
<td>d_GCI_1</td>
<td>0.424206</td>
<td>0.246763</td>
<td>1.719</td>
</tr>
<tr>
<td>d_GCI_2</td>
<td>1.03178</td>
<td>0.287963</td>
<td>3.583</td>
</tr>
<tr>
<td>d_GCI_3</td>
<td>0.724561</td>
<td>0.215442</td>
<td>3.363</td>
</tr>
<tr>
<td>d_d_1_SELF_EMPLOY</td>
<td>-0.0898820</td>
<td>0.100523</td>
<td>-0.8913</td>
</tr>
<tr>
<td>d_d_1_SELF_EXP_1</td>
<td>0.0781303</td>
<td>0.225584</td>
<td>0.3463</td>
</tr>
<tr>
<td>d_d_1_SELF_EXP_2</td>
<td>0.621146</td>
<td>0.177999</td>
<td>3.491</td>
</tr>
<tr>
<td>d_d_1_SELF_EXP_3</td>
<td>0.163583</td>
<td>0.117137</td>
<td>1.396</td>
</tr>
</tbody>
</table>

Mean dependent var | -0.003087 | S.D. dependent var | 0.155818
Sum squared resid | 0.128265 | S.E. of regression | 0.226559
R-squared | 0.779078 | Adjusted R-squared | 0.669018
F(8, 16) | 7.085886 | P-value(F) | 0.000474
Log-likelihood | 30.43315 | Akaiake criterion | 42.86631
Schwarz criterion | -31.89642 | Hannan-Quinn | -39.82373
rhol | -0.008057 | Durbin-Watson | 1.579698

Excluding the constant, p-value was highest for variable 20 (d_d_1_SELF_EMPLOYED_1)

White's test for heteroskedasticity -
Null hypothesis: heteroskedasticity not present
Test statistic: LM = 16.847
with p-value = P(Chi-square(15) > 16.847) = 0.3938789

Source: Gretl, own elaboration
Table 4: Model 3

Model 3: Pooled OLS, using 30 observations
Included 5 cross-sectional units
Time-series length = 6
Dependent variable: d_l_GDP_PER_CAPITA

<table>
<thead>
<tr>
<th>coefficient</th>
<th>std. error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>0.0467926</td>
<td>0.0206784</td>
<td>2.263</td>
</tr>
<tr>
<td>d_GCI</td>
<td>0.00256305</td>
<td>0.0639596</td>
<td>0.04011</td>
</tr>
<tr>
<td>d_GCI_1</td>
<td>0.158875</td>
<td>0.0712093</td>
<td>2.245</td>
</tr>
<tr>
<td>d_GCI_2</td>
<td>0.107156</td>
<td>0.0683159</td>
<td>1.692</td>
</tr>
<tr>
<td>d_d_l_SELF_EMPLOYED_~1</td>
<td>0.403263</td>
<td>0.0901508</td>
<td>4.473</td>
</tr>
<tr>
<td>d_d_l_SELF_EMPLOYED_~2</td>
<td>0.278935</td>
<td>0.0872605</td>
<td>3.197</td>
</tr>
<tr>
<td>d_d_l_EXPENDITURES~1</td>
<td>0.0736440</td>
<td>0.0437128</td>
<td>1.685</td>
</tr>
<tr>
<td>d_d_l_EXPENDITURES~2</td>
<td>-0.501549</td>
<td>0.0982171</td>
<td>-3.070</td>
</tr>
<tr>
<td>d_d_l_EXPENDITURES~3</td>
<td>0.259704</td>
<td>0.0970262</td>
<td>2.677</td>
</tr>
<tr>
<td>d_d_l_EXPENDITURES~4</td>
<td>0.347184</td>
<td>0.112105</td>
<td>3.097</td>
</tr>
</tbody>
</table>

Mean dependent var 0.0629358 S.D. dependent var 0.091732
Sum squared resid 0.048129 S.E. of regression 0.049056
R-squared 0.902770 Adjusted R-squared 0.734016
F(8, 20) 9.044927 P-value(F) 0.000024
Log-likelihood -53.95779 Akaike criterion -79.91557
Schwarz criterion -73.90360 Hannan-Quinn -83.43502
rho -0.337804 Durbin-Watson 2.235600

Excluding the constant, p-value was highest for variable 9 (d_GCI)

Source: Gretl, own elaboration

Table 5: Model 4

Model 4: Pooled OLS, using 25 observations
Included 5 cross-sectional units
Time-series length = 5
Dependent variable: d_l_EXPENDITURES_RD

<table>
<thead>
<tr>
<th>coefficient</th>
<th>std. error</th>
<th>t-ratio</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>0.0481741</td>
<td>0.0586448</td>
<td>0.8050</td>
</tr>
<tr>
<td>d_GCI</td>
<td>0.0771639</td>
<td>0.175011</td>
<td>0.4409</td>
</tr>
<tr>
<td>d_GCI_1</td>
<td>0.424206</td>
<td>0.246763</td>
<td>1.719</td>
</tr>
<tr>
<td>d_GCI_2</td>
<td>0.03178</td>
<td>0.287963</td>
<td>3.583</td>
</tr>
<tr>
<td>d_GCI_3</td>
<td>0.014561</td>
<td>0.215442</td>
<td>3.363</td>
</tr>
<tr>
<td>d_d_l_SELF_EMPLOYED~1</td>
<td>-0.0898680</td>
<td>0.100823</td>
<td>-0.8913</td>
</tr>
<tr>
<td>d_d_l_SELF_EMPLOYED~2</td>
<td>0.0781308</td>
<td>0.225558</td>
<td>0.3463</td>
</tr>
<tr>
<td>d_d_l_SELF_EMPLOYED~3</td>
<td>0.621146</td>
<td>0.177949</td>
<td>3.491</td>
</tr>
<tr>
<td>d_d_l_SELF_EMPLOYED~4</td>
<td>0.163553</td>
<td>0.117137</td>
<td>1.396</td>
</tr>
</tbody>
</table>

Mean dependent var -0.083087 S.D. dependent var 0.155818
Sum squared resid 0.122265 S.E. of regression 0.059535
R-squared 0.779878 Adjusted R-squared 0.669810
F(8, 16) 7.085866 P-value(F) 0.000474
Log-likelihood 30.43315 Akaike criterion -42.86631
Schwarz criterion -31.08642 Hannan-Quinn -39.02373
rho -0.003087 Durbin-Watson 1.879698

Excluding the constant, p-value was highest for variable 16 (d_d_l_SELF_EMPLOYED_1)

Source: Gretl, own elaboration
4.5 Standardized beta coefficients

Estimated Model 1 investigates the relationship between national framework conditions, entrepreneurial framework conditions and entrepreneurial activity. In this model, explanatory variable representing national framework conditions and entrepreneurial framework conditions is GCI and dependant variable is represented by the self-employed expressed as % of total employed. For estimating standardized beta coefficient, GCI is lagged up to four years. Lagged by two years, the author is able to prove its statistical significance. On the 1 % level of significance, beta coefficient for the Global Competitiveness Index is statistically significant (0.0003 < 0.01). The coefficient is positive and it means that between the years 2005-2014, in Nordic countries, higher Global Competitiveness Index (in the form of better national framework conditions and entrepreneurial framework conditions) led to the higher entrepreneurial activity.

The estimated Model 2 investigates the relationship between the entrepreneurial activity next to the national framework conditions, entrepreneurial framework conditions and technological innovation intensity. In this model, explanatory variable representing entrepreneurial activity is self-employed expressed as % of total employed and national framework conditions and entrepreneurial activity are represented by the GCI and dependent variable is expenditures on R&D expressed as % of GDP. For quantifying beta coefficient, the explanatory variables are lagged up to three years. Lagged by two years, the author shows its statistical significance. On the 1 % level of significance, beta coefficient for the self-employed is statistically significant (0.0030 < 0.01). Moreover, beta coefficient is positive and it means, that between the years 2005-2014, in Nordic countries, higher entrepreneurial activity next to the national and entrepreneurial framework conditions led to the higher technological innovation intensity.

The estimated Model 3 investigates the relationship between technological innovation intensity next to the national framework conditions, entrepreneurial framework conditions and next to the entrepreneurial activity and GDP per capita. In this model, explanatory variables representing national framework conditions, entrepreneurial activity and entrepreneurial output are GCI, self-employed and expenditures on R&D and dependant variable is GDP per capita. For quantifying beta coefficient, the explanatory variables are lagged by two years to prove their statistical significance. On the 1 % level of significance, beta coefficient for the R&D
expenditures is statistically significant (0.0057 < 0.01). Moreover, beta coefficient for the R&D expenditures lagged by two years next to the constant self-employed and constant GCI is positive and it means, that between the years 2005-2014, in the Nordic countries, higher technological innovation intensity led to higher GDP per capita.

The estimated Model 4 investigates the relationship between national framework conditions, entrepreneurial framework conditions, entrepreneurial activity and technological innovation intensity. In the model, explanatory variable representing national framework conditions, entrepreneurial framework conditions is Global Competitiveness Index, entrepreneurial activity is represented by the self-employed and dependent variable representing technological innovation intensity is represented by R&D expenditures expressed as % of GDP. The Global Competitiveness Index and self-employed lagged by two years prove the statistical significance of these variables. The beta coefficients are significant on the 1% level of significance (0.0025 < 0.05; 0.0030 < 0.05). The relationship between the variables is positive and that means that between the years 2005-2014, in Nordic countries, higher Global Competitiveness Index (in the form of better national framework conditions and entrepreneurial framework conditions led to the higher technological innovation intensity) next to the constant self-employed led to the higher technological innovation intensity. Also, higher self-employed next to the constant Global Competitiveness Index led to the higher technological innovation intensity.

All econometric models are statistically significant (p-value (F) < 0.05). Moreover, model 1 explains 59.41% of dependant variable, model 2 explains 77.99% of dependant variable, model 3 explains 80.28% of dependant variable and model 4 explains 77.99% of dependant variable. In all of the models, the author finds out the positive effect of national framework conditions and entrepreneurial framework conditions by lagging the explanatory variables. Also, other key variables, in the regression analysis, are put into the regression models with lags to observe the long-term impact of the variables on economic growth. When author compares Model 1 to Model 2, Model 3 and Model 4, the author finds out that the addition of other explanatory variables to national framework conditions and entrepreneurial framework conditions increases $R^2$ considerably. Model 3 finds the long-term positive effect of national framework conditions and entrepreneurial framework conditions, entrepreneurial activity and technological innovation intensity on economic growth.
Figure 14: Output path diagram I based on the GEM Revised Model

Socio-Economic development

Entrepreneurial output (Technological Innovation Intensity)

Entrepreneurial activity (self-employed)

National and Entrepreneurial Framework Conditions

Resource: Own elaboration

Figure 15: Input path diagram II based on the GEM Revised Model

Socio-Economic development

Entrepreneurial output (Technological Innovation Intensity)

Entrepreneurial activity

National and Entrepreneurial Framework Conditions

Source: Own elaboration
As the next step, the author calculates residuals for endogenous variables (entrepreneurial activity, technological innovation intensity and socio-economic development) as 1-R².

Finally, the author also calculates overall indirect impact of one variable on another to be able to find out a more significant path towards economic growth within two output diagrams (Figure 14 and Figure 15):

1. National framework conditions and entrepreneurial framework conditions
   \[ \rightarrow \text{Entrepreneurial activity} \rightarrow \text{Entrepreneurial output} \rightarrow \text{Socio-economic development}: \ 1,89982 \times 0,621146 \times 0,347184 = 0,40969989 \]

2. National framework conditions and entrepreneurial framework conditions
   \[ \rightarrow \text{Technological innovation intensity (entrepreneurial activity)} \rightarrow \text{Socio-economic development}: \ 1,03178 \times 0,621146 \times 0,347184 = 0,22250537 \]

Based on the estimated models 1-4, the author accepts H₁ hypothesis that national and entrepreneurial framework conditions positively affect economic growth via its effects on entrepreneurial activity.

The author also confirms H₂ hypothesis that national and entrepreneurial framework conditions positively affect economic growth via its effects on technological innovation intensity.

Also, according to the calculated total indirect effect of one variable on another, the path included in H₂ hypothesis is more statistically significant \( (0,40969989 > 0,22250537) \) and therefore, the author accepts H₃ hypothesis as well.

**Conclusion**

The paper presented the previous empirical findings of researchers on the role of national and entrepreneurial framework conditions in the process of economic growth. The author chose to test the revised GEM model because it describes, in detail, the conditions under which entrepreneurship and innovation can thrive. National framework conditions and entrepreneurial framework conditions were quantified by the Global Competitiveness Index (GCI), entrepreneurial activity by self-employed workers (% of total employed), technological innovation intensity by R&D expenditures (% of GDP) and economic growth by GDP per capita. Data were obtained from the World Bank, World Economic Forum and Eurostat and were formed into panel dataset.
bringing together Nordic countries (Norway, Finland, Sweden, Denmark and Iceland) between the years 2005-2014, using Pooled Ordinary Least Square Method (OLS). Standardized path coefficients were estimated in software Gretl.

The author visualized two input path diagrams based on the revised GEM model. The first path diagram showed the indirect influence of national and entrepreneurial framework conditions on economic growth via its effects on entrepreneurial activity. The second path diagram depicted the indirect influence of national and entrepreneurial framework conditions on economic growth via its effects on technological innovation intensity (influenced by entrepreneurial activity).

Before interpreting results, there were some limitations within the paper. Firstly, the path analysis was used for the restricted period 2005-2014 because there were no more data available. Secondly, the path analysis tested merely observable variables from the revised GEM conceptual model and it did not test latent variables (social values about entrepreneurship, psychological attributes, motivation and demographic characteristics), because data source was not available for Nordic countries. It would be also convenient to use more entrepreneurial conditions than it is used in the Global Competitiveness Index by using Doing Business Database. Nevertheless, the extension of the Global Competitiveness Index by entrepreneurial variables was not the aim of this paper.

In all of the models, the author found out the positive effect of national and entrepreneurial framework conditions using lagged explanatory variables. The author also found the positive effect of entrepreneurial activity and technological innovation intensity on economic growth using lagged explanatory variables.

In addition, the result obtained showed that national and entrepreneurial framework conditions positively affect economic growth via its effects on entrepreneurial activity and also that national and entrepreneurial framework conditions positively affect economic growth via its effects on technological innovation intensity (influenced by entrepreneurial activity). Nevertheless, the calculated total effect showed that the path via entrepreneurial activity is more significant.

Therefore, the obtained results suggest that Nordic economic policy makers should primarily encourage entrepreneurial activity by putting effort to create friendly entrepreneurship ecosystem (make it easier for entrepreneurs to set up a business and also to grow entrepreneurs’ businesses) followed by encouraging technology innovation intensity-friendly environment (capacity for innovation, quality
of scientific research institutions, company spending on R&D, university-industry collaboration in R&D, government procurement of advanced tech products, availability of scientists and engineers, encouragement of patenting).

Regarding friendly entrepreneurship environment, the author follows the Nordic Growth Entrepreneurship Review (2012), which states, that throughout Nordic countries, the focus should be primarily taken towards the abilities and skills to accelerate economic growth in young firms. The lack of entrepreneurial capabilities which is related to the lack of experienced management teams, in young companies, seems to result in difficulties to attract later stage-venture capital.

Moreover, despite the fact, that framework conditions for entrepreneurship in Nordic countries are as strong as in the best-performing countries, according to the World Economic Forum (2016), there are still some challenges. The most problematic factors for doing business are restrictive labour regulations (Norway), tax rates (Finland, Sweden, Denmark) and foreign currency regulations and access to financing (Iceland).

Regarding innovation-friendly environment, the author is mainly in accordance with Norden (2012) which states, that the realization that innovation policy needs to open up for innovation in larger parts of society is now more apparent than ever. Professor Henry Chesbrough is godfather who coined the concept of open innovation. Busarovs (2013) concludes five Chesbrough’s elements of open innovation: (1) networking (the advantage of open innovation is that it allows commercialization of internal ideas and also it allows to use external ideas), (2) collaboration (collaboration includes partners, competitors, universities and users), (3) corporate entrepreneurship (highlights corporate venturing, start-ups and spin-off as the alternative ways of marketing ideas), (4) proactive intellectual property management (this idea is based on buying and selling intellectual property and through this mechanism it helps markets to develop and to embody ideas and make them marketable) and (5) R&D (it is a way how to obtain a competitive advantage in the marketplace and it also helps the company to develop an absorptive capacity -to assimilate new ideas-).
References


Online References


