ERASMUS UNIVERSITEIT ROTTERDAM

INNOVATIVE ENTREPRENEURSHIP

AN EMPIRICAL ANALYSIS ON THE EFFECT OF TAX POLICY ON PROCESS INNOVATION AMONG ENTREPRENEURS

Bachelor Thesis – International Bachelor Economics and Business Economics

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ERASMUS SCHOOL OF **ECONOMICS**

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ABSTRACT

The purpose of this empirical study is to shed light on the relationship between tax policy and innovative entrepreneurship. This study contributes to the growing discussion on how tax policy in the form of corporate and consumption tax rates affects the willingness of entrepreneurs to engage in process innovation. Logistic regression analysis will be applied to data that has been gathered from the Global Entrepreneurship Monitor 2011 and World Competitiveness Yearbook, which consists of 132,130 individuals from 60 countries, of which 13,355 are entrepreneurs and of which 4,709 are innovative entrepreneurs that engaged in process innovation. Prior research suggests that the entrepreneurial propensity to innovate is negatively influenced by government regulations, which subsequently impact technological conditions that are crucial for economic growth and social welfare. Contradicting the expectations of this study, the results show that there is no clear evidence of a relationship between corporate tax rates and process innovation. Similarly, the results also displayed that no significant relationship can be found between consumption tax rates and process innovation among entrepreneurs.

Keywords: innovative entrepreneurship, process innovation**,** tax policy, corporate tax rates, consumption tax rates

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1. INTRODUCTION

Over the last decade, the pace of innovation has been growing rapidly (Horn, 2005). Innovation has been and currently is the primary driver for nations to achieve economic growth, for academics to translate research knowledge into high-quality goods and services and for enterprises to achieve long-term growth and survival (Hasan & Tucci, 2010; Segerstrom, 1991; Cefis & Marsili, 2006). Additionally, innovation brought about by individuals and firms has been crucial for growth at the micro-level, but also enhances wealth in terms of economic progress and job creation at the macro-level (Ahlstrom, 2010; Greenan & Guellec, 2000). At the macro-level, economic development and job creation are achieved due to the creation of new industries caused by revolutionary changes within existing industries as a result of innovative behavior (Burns & Stalker, 1994). Also, as a result of spillover effects of innovation, knowledge that is shared may encourage innovative behavior and thereby reinforce innovation (Jaffe, 1986; Ornaghi, 2006). Similarly, economic growth is reinforced through productivity growth, which is positively linked with innovation (Nadiri, 1993; Hall, Lotti, & Mairesse, 2009). All in all, technological progress is crucial to achieve economic growth and therefore innovation is an important factor to enhance social welfare (Solow, 1957; Grossman & Helpman, 1994).

Firms engage in innovation to influence organizational outcomes, structures and operations with the aim to stabilize or improve the level of performance or efficiency (Damanpour & Gopalakrishnan, 1999). Moreover, firms focus on innovation as a means of strategy to be able to respond to changing external conditions such as global competition and dynamics (Evan & Damanpour, 1984). However, two kinds of innovation come to light, namely product innovation and process innovation. Product innovation involves introducing new commodities or new types of existing commodities (Schumpeter, 1934). Firms use product innovation to strategically respond to competitive forces and customer demands by providing unique products and services (Porter, 1979). It enhances social well-being, since new and higher quality products may expand product choices and increase standards of living (Trajtenberg, 1989). The other type of innovation, namely process innovation, involves implementing revolutionary changes in how work is done with the objective of improving existing business processes within an organization (Popadiuka & Choo, 2006). Entrepreneurs must consider process innovation as essential means to improve their financial performance. From a strategic point of view, entrepreneurs should not solely depend on product innovation, but should use process innovation to keep up with competition. Another strategic motivation to engage in process innovation is because it leads to increased efficiency of business operations in terms of lower costs and time (Davenport, 2013). Therefore, process innovation boosts productivity, not just at one point in time, but it boosts productivity in the long-run as a result of accumulating experience in how

to improve business operations over time (Huergo & Jaumandreu, 2004). Additionally, if entrepreneurs wish to satisfy increasing demands of their customers in terms of speed of delivery and high quality products, entrepreneurs will need to improve their businesses processes in order to maintain a long-term relationship with their customers (Lundvall, 2009). On the whole, innovative entrepreneurs are perceived as influential market players in terms of providing competitive pressure, since they challenge established firms by making existing technology, services and products obsolete (Carree, van Stel, Thurik, & Wennekers, 2002). Therefore, the best way for entrepreneurs to engage in such innovative and dynamic industries is by correspondingly providing novel products and improving business processes, which result in higher growth, higher survival rates and greater productivity gains (Audretsch, 1995; Hall, Lotti, & Mairesse, 2009).

Baumol (1990) argued that entrepreneurial decision-making such as the willingness to innovate is influenced by 'rules of the game'. These 'rules of the game' refer to government regulations that include the design of tax systems, which subsequently influence technological and economic conditions (Acs & Audretsch, 1988). Therefore, specifically looking at tax regulations and its influence on entrepreneurial decision-making, the choice to become an entrepreneur is negatively influenced by corporate income taxation, whereas a high level of wage taxes makes it attractive for wage-workers to leave the labor market and become self-employed. Also, income taxation that is progressive in nature may discourage potential entrepreneurs to pursue innovative business ideas and therefore also limits the expansion of such innovative industries (Nielsen & Keuschnigg, 2003). Therefore, tax policies that are less progressive stimulate entrepreneurial entry (Gentry & Hubbard, 2000). Furthermore, a negative relationship between corporate tax rates and investment can be found and it is also argued that corporate tax rates are negatively related with firm growth (Djankov, Ganser, McLiesh, Ramalho, & Shleifer, 2010). Regarding individual taxes, it is observed that personal income taxes also negatively influence investment decisions of entrepreneurs (Carroll, Holtz-Eakin, Rider, & Rosen, 1999). Thus, the above mentioned 'rules of the game' impose costs on entrepreneurs, which subsequently lead to more expensive business entry. As a result, the establishment of new firms is hampered and entrepreneurs are discouraged to pursue innovative business ideas (Djankov, La Porta, Lopez-de-Silanes, & Shleifer, 2002). For that reason, it is essential to examine how regulations influence entrepreneurial decision-making and more specifically the willingness of entrepreneurs to invest in innovation.

In spite of advantages of process innovation at both the micro and macro-level, the willingness of entrepreneurs to engage in process innovation is affected by various factors, of which this research will particularly focus on tax policy. On the whole, governments have tried to redesign tax systems in order to

encourage innovation, but the quantitative impact of such changes have rarely been assessed (Mansfield, 1982). While governments wish to support entrepreneurship due to their contribution to economic progress, it is observed that government regulations in terms of tax policies may either encourage or discourage entrepreneurship (Chen, Lee, & Mintz, 2002).

Specifically looking at innovative entrepreneurship, prior research suggests that taxes have a profound negative effect on the willingness of an entrepreneur to engage in product innovation, since taxes may diminish the rewards of product innovation (Darnihamedani, Block, Hessels, & Simonyan, 2015). However, little is known about how tax policy is related to process innovation among entrepreneurs. Tax policies matter in providing incentives to invest in process innovation, because various taxes may affect how many resources are allocated towards risky projects that are aimed at radically improving business processes. This is in accordance with prior research stating that tax policy has a significant influence on entrepreneurial risk taking (Da Rin, Di Giacomo, & Sembenelli, 2011; Cullen & Gordon, 2007). Thus, tax policy affects the willingness to innovate, and more specifically innovative entrepreneurship, while the entrepreneur is regarded as a source of innovation and driver of economic growth (Schumpeter, 1934). Therefore, this paper contributes to the growing discussion on the link between tax policy and innovative entrepreneurship, and more specifically on process innovation among entrepreneurs. Hence, the research question is the following:

How does tax policy influence process innovation among entrepreneurs?

Regarding tax policy, this paper draws particular attention to corporate tax rates and consumption tax rates. It is important to focus on corporate tax rates, since corporate tax rates are directly imposed on firm profits. Assuming that firms are profit-maximizing, the level of corporate tax rates directly affects financial performance. Therefore, it influences managerial decisions on how to allocate resources among various company objectives, which includes resource allocations towards innovation. Additionally, it is necessary to focus on consumption tax rates, because it influences both the purchasing decision of the firm and their customers. If process innovation requires buying capital stock, the level of consumption tax rates may affect whether a firm will or will not invest in certain equipment that is needed to improve current business processes. Moreover, consumption tax rates are relevant to focus on, because the level of consumption tax rates influences the level of sales, which may subsequently influence how many resources firms re-allocate towards innovation. Other types of taxes do not directly affect profits and do not have a double-sided effect on the decision to re-allocate resources towards innovation. Hence, this paper will primarily focus on corporate and consumption tax rates as specific forms of tax policy.

To examine the relationship between taxes and process innovation, a logistic regression model will be built. A logistic regression model is needed due to the binary characteristic of the proxy for process innovation and will be applied to a range of individuals and countries that participated in the Global Entrepreneurship Monitor (GEM) and World Competitiveness Yearbook (WCY) in 2011. Hence, a cross-sectional analysis will be performed. Data on the dependent variable 'process innovation' will be acquired from the GEM in which individuals are asked whether the used technologies or procedures were available more than a year ago. Moreover, to control for factors influencing process innovation and taxation at the individual level, data will be gathered from the GEM. Additionally, the WCY will be used to collect data on the main independent variables which are corporate tax rates and consumption tax rates, but also to gather data for factors that influence process innovation and tax policy on the national level such as GDP per capita and growth.

In continuation of this introduction, a literature review follows which discusses the current state of knowledge within the field of process innovation and innovative entrepreneurship. Along these lines, hypotheses will be introduced to examine the relationship between different kinds of taxation and process innovation. Subsequently, in the data and methodology section, the use of the logistic regression model will be justified along with reasons for including various control variables. Afterwards, the results section will explain what is found in the logistic regression analysis and how these results relate to the hypotheses. Finally, the discussion will include a brief summary of the main findings on the relationship between process innovation and tax policy, whereas limitations and avenues for further research will be suggested.

2. LITERATURE REVIEW

2.1 IMPORTANCE OF TAX POLICY

Tax policy is a vital means for governments to carry out tasks that favor social well-being (Harberger, 1964). The importance of tax policy can be attributed to many reasons. The first justification for the use of tax policy by governments is to be able to fund public expenditures such as the provision of public goods e.g. education, infrastructure and health care (Alm, McClelland, & Schulze, 1992). Secondly, taxation can be used to redistribute income within the current generation, but also inter-generationally (Logue & Avraham, 2002). Taxation redistributes income within the current generation through redistributing wealth among the rich and poor individuals (and firms) by imposing higher taxes as income increases, and thereby reducing inequality among classes within society (Slemrod, 1994). However, taxes

also redistribute income from future generations to current generations or vice versa by adjusting the level of taxes accordingly and thereby reducing government debt over time (Gordon & Varian, 1988). Thirdly, tax policy has been regarded as an effective instrument to discourage behavior that creates negative externalities, such as higher health care costs due to smoking, in which excise taxes effectively counter such behavior (Sandmo, 1975). Nonetheless, the level of taxes can also be adjusted in such a way to promote behavior that generate positive externalities e.g. tax incentives that promote the generation of green energy (Cansino, Pablo-Romero, Roman, & Yniguez, 2010). Following the previous arguments, it can be concluded that use of tax policy is justified due to its contribution to economic progress and social welfare (Easterly & Rebelo, 1993).

2.2 TAX POLICY AND BUSINESS DECISIONS

Yet, tax policy has been regarded as a double-edged sword in the sense that it may discourage business activities, but can also favor business decisions regarding profit, investment and capital (Devereux & Maffini, 2006).

Regarding tax policy and its impact on profits from business activities and decisions, it is apparent that taxable income is lower in jurisdictions with high level of taxes (OECD, 1991). This in turn may affect further business decisions concerning the reallocation of resources after taxation towards business domains such as foreign direct investment and investment in property, plant and equipment (PPE), which will also be discussed below (Keuschnigg & Ribi, 2010). Examining the relationship between taxation and the level of investment in PPE, it is found that taxation has a large and significant negative effect on the level of capital stock of PPE (Hines & Rice, 1994). In other words, a reduction in tax rates induces firms to invest in PPE (Grubert & Mutti, 1991).

Concerning investment decisions about where to locate, it is observed that multinationals are more likely to export rather than to place production facilities in high-tax countries to minimize costs from taxation (Griffith & Devereux, 1998). Yet, if multinationals do decide to produce abroad, it has been found that the probability for firms to locate in a certain jurisdiction is negatively affected by their corresponding level of taxes and thereby taxes significantly impact location decisions of international firms (Kemsley, 1998). As a result, taxation also has a significant impact on foreign direct investment flows, because a high level of taxation in particular countries restricts international firm expansion (Bénassy-Quéré, Fontagné, & Lahrèche-Révil, 2005). In other words, investment decisions are sensitive to taxation (Hassett & Hubbard, 2002).

Nonetheless, tax policy does not merely impose costs on business activities and decisions; it also comes in the form of tax incentives (Morisset & Pirnia, 2000). Examples of tax incentives include, but are not limited to tax holidays (in which new firms are temporarily exempted from income taxation), investment allowances and tax credits (e.g. R&D tax credits which reduce the amount of taxes that should be paid based on the amount of expenditures in R&D) and timing differences (e.g. accelerated depreciation that may be subtracted from income before taxes) (Holland & Vann, 1998). The purpose of these tax incentives is to influence business activities and decision in such a way that regional growth, employment growth, export growth and innovation spillovers are encouraged (Holland & Vann, 1998; Czarnitzki, Hanel, & Rosa, 2011; Bloom, Griffith, & Reenen, 2002).

2.3 TAX POLICY AND SMALL BUSINESSES

After having elaborated on the effect of taxes on decisions of mostly large and international firms, it is essential to specifically examine the influence of tax policy on business activities and decisions of small and young firms.

On the whole, the same negative effects of taxation on investment, innovation and employment hold for small and young firms (Davis, Read, & Snook, 2009). Yet, decision-making between small and large firms may differ in terms of their motivation and aspirations (Busenitz & Barney, 1997). Regarding tax incentives, it is found that tax policy that is designed to reduce the tax burden for small business owners, leads to higher output of small firms (as a proxy for entrepreneurial effort). Therefore, lighter taxation induces more economic activity of entrepreneurs (Harju & Kosonen, 2012).

Concerning entrepreneurial investment decisions, it has been found that entrepreneurs are unaware of their own marginal tax rate, which means that entrepreneurs do not fully know how much tax is imposed on every additional unit that is invested. Moreover, it has been observed that entrepreneurs overweight tax rates, meaning that entrepreneurs overestimate their own tax rate when deciding to invest or not (Hundsdoerfer & Sichtmann, 2009). Scholars have regarded this as irrational behavior, while a possible explanation for overweighing tax aspects is that entrepreneurs minimize taxes rather than maximizing income after taxes, which leads to differences in business performance (Adam, 1998). Therefore, as argued previously, if entrepreneurs overweight tax considerations in investment decisions, it is relevant to examine how tax policy influences investment decisions regarding innovation. More specifically, this research will examine how tax policy impacts the entrepreneurial decision to invest in process innovation.

2.4 STRATEGIC IMPORTANCE OF PROCESS INNOVATION

Innovative entrepreneurs are regarded as important market players in terms of providing competitive pressure to large firms, since they challenge established firms by making existing technology, services and products obsolete (Carree, van Stel, Thurik, & Wennekers, 2002). Concerning business entry and survival, small and medium-sized enterprises are exposed to relatively higher risks of business failure than large firms (Geroski, 1995). Nonetheless, it has been shown that the use of innovation has a significant positive effect on the probability of firms to survive within an industry, especially on the probability of survival of new and small firms (Cefis & Marsili, 2006). Furthermore, it has been observed that entrepreneurs are more likely to fail if they enter innovative industries rather than industries where less innovation take place. It is relevant to note that such innovative environments are characterized by many small, but innovative firms (Geroski, 1995). Therefore, the best way for entrepreneurs to adapt to such innovative industries is by correspondingly providing novel products and improving business processes and thereby experience higher growth and higher survival rates (Audretsch, 1995).

Schumpeter (1934) classified various kinds of innovation, in which he distinguished between product and process innovation. Process innovation is defined as the "application of new methods of producing or distributing products". Its primary objective is to improve financial performance. Process innovation is mostly used for improving production processes in terms of reducing time and costs. Although process innovation improves performance, it is challenging to gain competitive advantage using process innovation, since new production technologies can easily be imitated (Ettlie & Reza, 1992). Moreover, process innovation is also considered as organizational innovation, which aims to set up new tasks and managerial methods into the workplace. Yet, process innovation without successful organizational integration remains an issue to many firms due to a lack of understanding and skills on how to manage changes in business processes (Zmud, 1984; Leiponen, 2005). Additionally, process innovation exhibits a positive effect on firms' productivity growth, which can be attributed to associated purchases of new machinery and equipment. In contrast to larger and older firms, small and medium-sized enterprises experience relatively greater productivity gains from process innovation (Hall, Lotti, & Mairesse, 2009). Nonetheless, the academic literature on process innovation focusing on the difference between small and large firms remains rather scarce. Neither do scholars focus on the importance of process innovation for entrepreneurs in particular, although process innovation functions as an evident way for small and young firms to improve performance and to keep up with competition.

2.5 TAX POLICY AND PROCESS INNOVATION

Knowing that the willingness to innovate is influenced by tax policy, which subsequently influence technological and economic conditions, it is important to look at how different tax policy regimes across countries are related to innovation, and more specifically process innovation among entrepreneurs (Acs & Audretsch, 1988; Baumol, 1990). Therefore, to examine the relationship between process innovation and tax policy, this research looks at two types of tax rates, namely corporate tax rates and consumption tax rates.

2.5.1 CORPORATE TAX RATES AND PROCESS INNOVATION

It is essential to focus on corporate tax rates, since corporate tax rates are directly imposed on firm profits and therefore directly affect the financial performance of entrepreneurs. Previous studies suggest that corporate tax rates exhibit a negative effect on entry rates and therefore an increase in corporate tax rates leads to fewer new firms (Da Rin, Di Giacomo, & Sembenelli, 2011). Therefore, lowering taxes on firm profits has commonly been proposed as a way to subsidize the rise of new and innovative firms (Nielsen & Keuschnigg, 2003). For new firms to engage in risky projects, prior studies have shown that they rely on debt financing, since equity financing does not always suffice due to credit constraints that new firms face. Therefore, lowering taxes on profits will lead to the availability of more internal financing and thus encourages the establishment of new and innovative firms (Poterba, 1989). However, other scholars suggest that a reduction in corporate tax rates does not lead to a change or merely leads to slight increase in entrepreneurial risk taking (Cullen & Gordon, 2007). Thus, those contradicting views suggest that corporate taxes are ineffective means to significantly alter entrepreneurial activity (Donald & Mohsin, 2006). After describing various views on the role of corporate taxes, it is relevant to specifically consider the following intuitions behind the relationship between corporate tax rates and process innovation.

Regarding innovative entrepreneurship, if the type of process innovation requires major investments in capital stock and if such are deductible from corporate taxes, the entrepreneur will be more inclined to commit to process innovation than if it were not deductible from taxes (Trezevant, 1994). This is due to the possibility to subtract capital stock purchases from taxable income, which will be regarded as an incentive by innovative entrepreneurs to improve and reorganize existing business operations (Eisner, 1973).

Additionally, it can be argued that a relatively low corporate tax rate leads to less incentive among entrepreneurs to invest in more cost-efficient business processes. Entrepreneurs may even increase investment expenditures, but in other areas than process innovation, because entrepreneurs may not feel the need to be more cost-efficient due to having relatively stable profits as a consequence of low corporate tax rates. In other words, if innovative entrepreneurs deal with relatively high taxes on their profits, they will be relatively more pressured to improve their financial performance through the use of process innovation than if they do not experience high corporate tax rates (Stiglitz, 1983).

Hence, the previous arguments propose a positive relationship between corporate tax rates and process innovation among entrepreneurs. Nonetheless, the following intuitions can be provided for an adverse association.

Innovative firms are more harmed by corporate taxes than standard firms, because taxes on profits lead to more credit constraints among innovative firms. Therefore, investments in capital stock to innovate business processes are discouraged, since corporate taxes restrict the reallocation of resources towards innovation. The reallocation of resources is restricted due to a reduction in free cash flow caused by corporate taxes (Keuschnigg & Ribi, 2010). First, since corporate taxes reduce internal cash flows, firms may be more likely to use debt financing as the level of corporate tax rate increases (Heider & Ljungqvist, 2015). However, debt financing is not regarded as the preferred form of innovation financing and as a consequence entrepreneurs will minimize risks by turning away from reorganizing existing business operations that improve efficiency (Mukherjee, Singh, & Zaldokas, 2015). Second, knowing that corporate tax rates restrict the reallocation of resources, the entrepreneur weighs the gains and benefits of investing in process innovation relative to different investment options such as product innovation. If the entrepreneur comes to the conclusion that greater benefits can be gained from product innovation than costs-savings from process innovation, it is apparent that a profit-maximizing individual will invest in product innovation (Callois, 2008). A combination of process and product innovation with slack investments in both choices may not always be considered as profit-maximizing strategy. Therefore, if entrepreneurs experience such a trade-off, corporate tax rates are negatively associated with process innovation, since entrepreneurs will fully commit to product innovation if they believe that it exceeds the gains of process innovation, in case of a high level of corporate tax rates.

Thus, these previous arguments suggest an adverse association. Hence, the first hypothesis is as follows:

H1: Corporate tax rates are negatively related to process innovation among entrepreneurs.

2.5.2 CONSUMPTION TAX RATES AND PROCESS INNOVATION

Corporate tax rates solely influence the entrepreneur, whereas the following type of tax policy, namely taxes imposed on the purchase of goods and services or also known as consumption tax rates, influence consumption behavior of both entrepreneurs and their customers. Now, it is also important to focus on how customers react to varying degrees of consumption taxes, because they predominantly impact revenue streams and thereby affect the financial performance of entrepreneurs (Pitts & Wittenbach, 1981). Previous studies suggest that changes in consumption tax rates have a significant impact on when and how much people consume i.e. intertemporal consumption (Abel & Blanchard, 1983). For example, a reduction in consumption tax rates gives people an incentive to purchase more if they are expecting consumption tax rate to rise in the future or vice versa (Barrell & Weale, 2009). Yet, the effect of consumption tax rates have rarely been linked to investment decisions regarding innovation (Auerbach, 2006). After describing views on general effects of consumption taxes, it is relevant to focus on the following intuitions behind the relationship between consumption tax rates and process innovation.

First, consumption tax rates negatively influence buying decisions of customers, since products become more expensive due to consumption tax rates (Keen, Smith, Baldwin, & Christiansen, 1996). Consequently, assuming that demand is elastic, the entrepreneur is pressured to engage in more cost-efficient business processes to be able to provide lower priced products and thereby retaining its sales and profits. Therefore, this pressure for the entrepreneur to retain its financial position and satisfy consumer demands is caused by effects of high consumption tax rates. Subsequently, the entrepreneur will try to stabilize its profits by producing products at relatively low costs, which is achieved through more cost-efficient business operations. Thus, this proposes a positive relationship between consumption tax rates and process innovation.

Although consumption tax rates on capital stock which will be used in process innovation may be high, entrepreneurs are able to levy such costs on their customers by increasing the price of their offered products or services (Crawford, Keen, & Smith, 2007). They may even increase prices in such a way that they do not pay any costs involved with an increase of consumption tax rates. Therefore, the level of consumption tax rates does not determine whether an entrepreneur will devote time and effort into process innovation, because entrepreneurs can simply impose higher costs of consumption taxes on their customers. This proposes that consumption tax rates do not affect the willingness to invest in more cost-efficient business operations. Hence, no relationship exists between consumption tax rates and process innovation among entrepreneurs.

Nonetheless, the following intuitions behind a negative relationship between consumption tax rates and process innovation can be provided. First, as a consequence of consumption tax rates, prices of goods and services rise, but this also implies that potential capital stock for introducing new and improved processes become more expensive (Hall R. E., 1996). Therefore, consumption tax rates negatively influence the consumption behavior of entrepreneurs, meaning that entrepreneurs will be discouraged to engage in process innovation due to expensive capital stock. Similarly, if consumption tax rates are low, entrepreneurs may be more inclined to purchase equipment that is required to increase efficiency of their current business operation and thereby improve their financial performance. Thus, this proposes a negative relationship between consumption tax rates and process innovation.

Another argument proposing a negative association between consumption tax rates and process innovation is a similar line of reasoning for consumption tax rates as compared to the argument for corporate tax rates regarding a restricted reallocation of resources. Now, also through the channel of sales, consumption tax rates reduce incoming cash flows. Put differently, not only do consumption taxes discourage capital stock purchases, they also discourage customer purchases of their offered products and services, which both lead to major reductions in cash flows. This is due to consumption taxes causing a rise in prices of capital stock investments. Subsequently, entrepreneurs will be less willing to enhance the efficiency of existing business operations. Therefore, entrepreneurs will not be able to provide lower priced products in response to high consumption taxes and will generate less incoming cash flows from sales. Knowing that entrepreneurs are less willing to attract financing from public debt markets, they will experience limited access to capital markets. Prior studies have shown that investment decisions such as the propensity to commit to process innovation, is highly sensitive to fluctuations in cash flows (Gilchrist & Himmelberg, 1995). Since consumption taxes negatively influence cash flows through the channel of sales and capital stock purchases, the amount of resources that is re-allocated towards process innovation is also influenced, which implies a negative relationship between consumption tax rates and process innovation.

Thus, these previous arguments suggest an adverse association. Hence, the second hypothesis is as follows:

H2: Consumption tax rates are negatively related to process innovation among entrepreneurs.

3. DATA

3.2 GLOBAL ENTREPRENEURSHIP MONITOR 2011 – ADULT POPULATION SURVEY

For information about process innovation and individual control variables, the Adult Population Survey (APS) of the Global Entrepreneurship Monitor 2011 (GEM) has been used a source of individual-level data. Since 1999, the GEM has been monitoring nation-wide differences in entrepreneurial activity, aspirations and individual behavior. In order to explore such nation-wide entrepreneurial differences, the GEM employs an extensive questionnaire, also known as the APS, which has annually been conducted to a vast number of individuals across GEM participating countries. The APS is more than just a questionnaire, since it collects exhaustive data on individual behavior in over 85 nations, which is valuable for empirical analysis and comparison. In terms of academic research, scholars have used the GEM to examine and explain differences in entrepreneurial aspirations and motivations across nations (Hessels, Gelderen, & Thurik, 2008; McMullen, Bagby, & Palich, 2008). In terms of policy implications, scholars have analyzed GEM data to suggest how public policy can be altered to support entrepreneurship as a channel to foster economic growth (Szerb & Acs, 2007). All in all, the GEM is particularly useful in understanding and assessing the role of entrepreneurship in national economic development (Reynolds, et al., 2005; Bosma, 2013; Sternberg & Wennekers, 2005).

3.2 WORLD COMPETITVENESS YEARBOOK

For information about corporate tax rates, consumption tax rates and macroeconomic control variables, the World Competitiveness Yearbook (WCY) has been used as source of country-level data. Since 1989, the WCY has covered statistical data of 61 countries, which compares aspects of national competitiveness such as economic performance, government efficiency, business efficiency and infrastructure. In terms of academic research, scholars have used the WCY to examine to what extent governments are obliged to facilitate the creation of wealth brought about by firms (Kaufmann, Kraay, & Mastruzzi, 2009; Ireland, Hitt, Camp, & Sexton, 2001). In terms of policy implications, scholars have analyzed WCY data to suggest how governments can adopt business friendly policies, since businesses are crucial for a country's competitiveness and wealth creation (Zahra, 1999). Therefore, the WCY is especially useful in acquiring insights on the relationship between national competitiveness and success of countries e.g. economic growth and prosperity (Ajitabh & Momaya, 2004; Kao, Wu, Hsieh, Wang, Lin, & Chen, 2008).

3.2 DEPENDENT VARIABLE - PROCESS INNOVATION

Data on the dependent variable 'process innovation' (dummy) has been gathered from the GEM in which individuals are asked if the used technologies or procedures have been available more than five years ago. For the logistic regression model, process innovation has been recoded as a dummy variable. It takes the value 1 if individuals used new technologies or procedures that have been newer than five years. However, if the used technologies or procedures are older than five years, process innovation takes the value 0. Table 1 shows that approximately 35% of all entrepreneurs engaged in process innovation. Nonetheless, the share of entrepreneurs that engaged in process innovation is only approximately 4% of the total number of individuals.

Table 1: List of countries and number of individuals and (innovative) entrepreneurs

Country	Total number of Individuals	Number of Entrepreneurs	Number of Entrepreneurs that engaged in Process Innovation	Entrepreneurs (% of total individuals)	Process Innovation (% of total individuals)	Process Innovation (% of entrepreneurs)
Argentina	2,000	365	125	18.25%	6.25%	34.25%
Australia	2,000	177	57	8.85%	2.85%	32.20%
Belgium	1,852	105	37	5.67%	2.00%	35.24%
Brazil	2,000	302	36	15.10%	1.80%	11.92%
Chile	7,195	1,600	727	22.24%	10.10%	45.44%
China	3,690	885	263	23.98%	7.13%	29.72%
Colombia	10,374	2,052	942	19.78%	9.08%	45.91%
Croatia	2,000	133	56	6.65%	2.80%	42.11%
Czech Republic	2,005	167	80	8.33%	3.99%	47.90%
Denmark	2,015	91	22	4.52%	1.09%	24.18%
Finland	2,011	123	37	6.12%	1.84%	30.08%
France	2,009	90	36	4.48%	1.79%	40.00%
Germany	4,260	274	51	6.43%	1.20%	18.61%
Greece	2,000	159	65	7.95%	3.25%	40.88%
Hungary	2,002	126	29	6.29%	1.45%	23.02%
Ireland	2,002	140	40	6.99%	2.00%	28.57%
Japan	2,004	109	31	5.44%	1.55%	28.44%
Latvia	2,000	237	65	11.85%	3.25%	27.43%
Lithuania	2,003	216	71	10.78%	3.54%	32.87%
Malaysia	2,053	103	43	5.02%	2.09%	41.75%
Mexico	2,511	241	31	9.60%	1.23%	12.86%
Netherlands	3,500	244	72	6.97%	2.06%	29.51%
Norway	2,001	139	36	6.95%	1.80%	25.90%
Peru	2,010	459	130	22.84%	6.47%	28.32%
Poland	2,000	208	53	10.40%	2.65%	25.48%
Portugal	2,011	153	53	7.61%	2.64%	34.64%
Romania	2,028	171	83	8.43%	4.09%	48.54%
Russia	7,500	331	50	4.41%	0.67%	15.11%
Singapore	2,000	130	60	6.50%	3.00%	46.15%
Slovakia	2,000	288	123	14.40%	6.15%	42.71%
Slovenia	2,009	68	18	3.38%	0.90%	26.47%
South Africa	3,178	262	123	8.24%	3.87%	46.95%
South Korea	2,001	155	31	7.75%	1.55%	20.00%
Spain	17,500	958	347	5.47%	1.98%	36.22%
Sweden	3,101	159	30	5.13%	0.97%	18.87%
Switzerland	2,000	116	22	5.80%	1.10%	18.97%
Taiwan	2,012	160	38	7.95%	1.89%	23.75%
Thailand	2,000	373	158	18.65%	7.90%	42.36%
Turkey	2,401	296	89	12.33%	3.71%	30.07%
United Arab Emirates	3,029	237	127	7.82%	4.19%	53.59%
United Kingdom	2,000	126	32	6.30%	1.60%	25.40%
United States	5,863	627	190	10.69%	3.24%	30.30%
Total	**132,130**	**13,355**	**4,709**	**10.11%**	**3.56%**	**35.26%**

3.2 INDEPENDENT VARIABLES – CORPORATE AND CONSUMPTION TAX RATE

Information about the independent variables 'corporate tax rate' (continuous) and 'consumption tax rate' (continuous) are gathered from the WCY database, which includes a list of tax rates for 60 countries. Corporate tax rate is defined as the maximum tax rate that is imposed on firms' profits. Additionally, consumption tax rate is defined as the standard rate of Value Added Tax (VAT) or Goods and Services Tax (GST), which is imposed on the purchase of commodities and services. For all the 60 countries included in the logistic regression model, the average corporate tax rate is approximately 25%, whereas the average consumption tax rate is approximately 17%. Table 2 provides an overview of various descriptive statistics for the dependent and the independent variables that are included in the logistic regression model.

3.3 INDIVIDUAL CONTROL VARIABLES

Regarding individual-level control variables, the logistic regression model includes entrepreneurial experience (dummy), skills (dummy), networks (dummy), education (dummy), male (dummy), industry type (categorical) and age (continuous). First, entrepreneurial experience takes the value 1 if individuals have, in the past 12 months, sold, shut down, discontinued or quit a business they owned and managed, or sold goods or services to anyone and otherwise takes the value 0. Secondly, entrepreneurial skills take the value 1 if individuals believe that they have the knowledge, skills and experience to start a new business and take the value 0 if they think otherwise. It is relevant to control for entrepreneurial experience and skills, since previous studies have shown that both variables affect the ability of an individual to spot and exploit opportunities aimed at improving financial performance (Rerup, 2005). Thirdly, entrepreneurial networks takes the value 1 if individuals know someone personally who started a business in the past two years and takes the value 0 if they do not know anybody. It has been included in the model, because the access to a social network of entrepreneurs influences the individual's plan to establish a business, since individuals are able to discuss aspects of planning within their social network (Greve & Salaff, 2003). Fourthly, education takes the value 1 if individuals have a university degree and otherwise takes the value 0. The model controls for education, because prior research has shown that human capital predicts whether an individual will pursue a business idea, which also includes whether individuals are willing to take the risk of setting up their own firm (Davidsson & Honig, 2003). Fifthly, gender takes the value 1 if the individual is male and takes the value 0 if female. Taking into account gender is relevant, because men and women show differences in risk-taking behavior, which may subsequently affect the willingness to engage in risky innovation projects (Byrnes, Miller, & Schafer, 1999). Sixthly, various industry types

have been included as categorical variable with the extractive industry as reference category. The other industry types consist of transforming firms, business services and consumer oriented firms. Examples of extractive firms include, but are not limited to firms that are active in agriculture and mining. Similarly, transforming firms include firms that are involved in manufacturing and electricity, gas and water. Likewise, examples of business services include those that provide financial services and real estate, whereas consumer oriented firms consist of retail, hotel and restaurants. The model controls for industry types, because differences in knowledge conditions and technology among industries may lead to different degrees of commitment to innovation among individual firms (Audretsch, 1995). Finally, the age of individuals has been included as a continuous control variable. It makes sense to include age in the model, because entrepreneurial motivations may change over the life course of an individual, while motivations are also related to the willingness to innovate and the financial performance of a firm (Jayawarna, Rouse, & Kitching, 2013).

3.3 COUNTRY-LEVEL CONTROL VARIABLES

Regarding country-level control variables, the regression model includes GDP per capita measured in US dollars (continuous) and GDP growth (continuous) which is measured as GDP annual growth in 2011 with reference to the GDP level in 2010. The model controls for economic differences among countries, because welfare differences may lead to different types of entrepreneurship such as innovative entrepreneurship, but also imitative entrepreneurship (Szirmai, Naudé, & Goedhuys, 2011). Table 2 shows descriptive statistics for all the control variables that are included in the logistic regression model.

Table 2: Descriptive Statistics

	Mean	Minimum	Maximum	Number of individuals	Number of firms
Dependent Variable					
Process innovation	0.353	0	1	4,709	
Independent Variables					
Corporate tax rate (in %)	0.254	0	0.421		
Consumption tax rate (in %)	0.168	0	0.250		
Individual-level Control Variables					
Entrepreneurial experience	0.035	0	1	4,650	
Entrepreneurial skills	0.461	0	1	59,058	
Entrepreneurial networks	0.325	0	1	42,487	
Education	0.440	0	1	57,547	
Male	0.491	0	1	64,821	
Age	42	16	99		
Extractive industry					549
Transforming industry					3,432
Business services industry					2,514
Consumer-oriented industry					6,417
Country-level Control Variables					
GDP per capita (in USD)	27,975	5,220	98,398		
GDP growth (in %)	0.030	-0.089	0.093		

3.4 CORRELATION MATRIX

To examine the strength of the relationship between variables, a correlation matrix has been provided in table 3 below. The correlation coefficients have been calculated for each observation which contains data for every variable that is included in the model (Moore, McCabe, Alwan, Craig, & Duckworth, 2011). A correlation coefficient of ±0.1 will be regarded as a small effect, above ±0.3 as a medium effect, and a correlation coefficient that is greater or equal to ±0.5 will be viewed as a large effect between variables (Field, 2009). Following these thresholds, the correlation coefficients will be analyzed. Regarding the dependent variable, it can be seen that process innovation has little or no correlation with other variables in the model i.e. a small, medium or large effect cannot be found between process innovation and another variable in the model. Moreover, for the independent variables, the correlation matrix shows a correlation coefficient of -0.187, which implies a small negative effect between corporate and consumption tax rates. Concerning the control variables at the individual level, a small positive effect of +0.115 between entrepreneurial networks and skills can be seen. Regarding the control variables at the country level, small positive effects can be found between GDP per capita (log) and education and GDP per capita (log) and age, +0.169 and +0.142 respectively. Yet, a small negative effect is found between GDP growth and education and a large negative effect between GDP growth and GDP per capita, -0.112 and -0.613 respectively.

Table 3: Correlation Matrix

	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.
a. Process innovation	1.000										
b. Corporate tax rate	-0.001	1.000									
c. Consumption tax rate	-0.021	-0.187	1.000								
d. Entrepreneurial experience	0.030	-0.029	-0.017	1.000							
e. Entrepreneurial skills	-0.001	0.011	0.035	0.051	1.000						
f. Entrepreneurial networks	0.003	-0.044	0.045	0.034	0.115	1.000					
g. Education	0.026	-0.001	-0.066	0.004	0.082	0.098	1.000				
h. Age	-0.069	0.041	-0.017	0.005	0.028	-0.071	0.017	1.000			
i. Industry	0.016	0.070	-0.034	0.006	0.008	0.002	-0.002	-0.063	1.000		
j. GDP per capita (log)	-0.064	-0.086	-0.045	-0.007	0.061	0.013	0.169	0.142	-0.051	1.000	
k. GDP growth	0.026	-0.047	0.035	0.019	-0.047	0.025	-0.112	-0.092	0.043	-0.613	1.000

4. METHODOLOGY

4.1 LOGISTIC REGRESSION MODEL – MARGINAL EFFECTS

To examine the relationship between tax policy and process innovation, a logistic regression model will be built. More specifically, a logistic regression model is required due to the binary outcome of the dependent variable 'process innovation'. Marginal effects will be used in order to intuitively interpret whether a positive or negative relationship exists between variables and to examine size effects of changes in independent and control variables. The marginal effects represent the change in the probability of an individual to engage in process innovation for each additional unit increase in independent and control variables. In other words, marginal effects will be used to examine how process innovation is influenced by one-unit changes in independent and control variables (Moore, McCabe, Alwan, Craig, & Duckworth, 2011). To determine whether marginal effects are significant, a 5% significance level will be applied.

Two models will be built to be able to answer both hypotheses. For the first hypothesis, the model includes corporate tax rate along with all individual and country-level control variables, whereas consumption tax rate is excluded. Similarly, for the second hypothesis, the model takes into account consumption tax rate together with all individual and country-level control variables, but does not include corporate tax rate. To ensure higher robustness of the model, the observations in the dataset are clustered by country, since observations may be correlated within countries, but observations may be independent between countries. Consequently, by clustering the data, the analysis results into higher standard errors than if it had not been clustered, because the number of countries is relatively low compared to the total number of observations (Field, 2009). A further remark about the dataset is that most variables range between 0 and 1, whereas the country-level variable 'GDP per capita' has a range anywhere between 5,000 and 100,000 US dollars. This causes the data to be skewed with a long tail to the right. To establish a more symmetric distribution and a better fit of the regression curve, it is essential to perform a logarithmic transformation on GDP per capita (Hill, Griffths, & Lim, 2012). Finally, after combining both the GEM and WCY dataset and after recoding different variables, the sample consists of a total number of 11,924 individuals from 39 countries, since the logistic regression analysis throws out individual observations that contain missing data.

5. RESULTS

5.1 CORPORATE TAX RATES AND PROCESS INNOVATION

After the logistic regression model has been built, the results of the first hypothesis can be found in table 4. With respect to the corporate tax rate model, it can be seen that a *negative* relationship exists between corporate tax rate and process innovation. In other words, a high level of corporate tax rate is negatively related to process innovation among entrepreneurs, or vice versa. Yet, the first hypothesis is *rejected* due to an insignificant relationship between corporate tax rates and process innovation.

5.2 CONSUMPTION TAX RATES AND PROCESS INNOVATION

The results of the second hypothesis can also be found in table 4. Regarding the consumption tax rate model, it can be seen that a *negative* relationship also exists between consumption tax rate and process innovation. In other words, a high level of consumption tax rate is negatively related to process innovation among entrepreneurs, or vice versa. Nonetheless, the second hypothesis is also *rejected* due to an insignificant relationship between consumption tax rates and process innovation.

Table 4: Logistic Regression Model - Tax Policy and Process Innovation

	Marginal Effect (dy/dx)	**T-statistic**	**Marginal Effect (dy/dx)**	**T-statistic**
Independent variable				
Corporate Tax Rate	-0.052	-0.18		
Consumption Tax Rate			-0.222	-0.98
Control variables				
GDP per capita (log)	-0.052***	-2.69	-0.052**	-2.42
GDP growth	-0.379	-0.85	-0.355	-0.74
Entrepreneurial experience	0.052***	3.38	0.052***	3.14
Entrepreneurial skills	-0.001	-0.05	0.000	0
Entrepreneurial networks	-0.008	-0.73	-0.007	-0.61
Education	0.030	1.57	0.028	1.52
Age	-0.007***	-3.5	-0.008***	-3.4
Age (squared)	0.000***	2.41	0.000**	2.35
Male	0.007	0.65	0.007	0.69
Industry[a]				
Transforming	0.064***	2.66	0.064***	2.61
Business services	0.126***	4.51	0.127***	4.45
Consumer oriented	0.066***	2.7	0.064***	2.61
Number of observations	11.924		11.924	

* p-value < 0.10 , ** p-value < 0.05 , *** p-value < 0.01

[a]Reference category: extractive industry

5.3 INDIVIDUAL AND COUNTRY-LEVEL CONTROL VARIABLES

Having a closer look at the control variables included in both models in table 4, it can be seen that GDP per capita (log), entrepreneurial experience, age, age (squared), transforming, business services and consumer oriented firms are significant in estimating process innovation.

Concerning control variables at the country-level, it is found that GDP per capita (log) has a significant *negative* relationship with process innovation. In other words, individuals who live in countries characterized by relatively high GDP per capita will be less likely to engage in process innovation, ceteris paribus. The marginal effect of GDP per capita (log) in both models shows that an individual is approximately 5.2% less likely to engage in process innovation for every percentage-point increase in GDP per capita (log), ceteris paribus.

Moreover, for control variables at the individual level, it is observed that entrepreneurial experience has a significant *positive* relationship with process innovation. Ceteris paribus, an individual with prior experience is more likely to devote time and effort in improving current business processes than individuals with no entrepreneurial experience. More specifically, the marginal effects in both models show that the probability to engage in process innovation increases by approximately 5.2% if an individual has entrepreneurial experience, given that all other variables are constant. Additionally, both age control variables are significantly associated with process innovation. It can be inferred that an individual is less likely to invest in process innovation, the higher the age of the individual, ceteris paribus. Yet, the marginal effect of age on process innovation is rather small or non-existent.

Finally, in terms of controlling for different types of firms, it can be seen that all three industries types with reference to the extractive industry show significant *positive* relationships with process innovation. For the marginal effects regarding the corporate tax rate model, transforming type of firms are found to have a higher probability of engaging in process innovation than extractive businesses by 6.4%, ceteris paribus. Similarly, business services are more likely to improve business processes than extractive firms by 12.6%, given that everything else stays constant. Also, ceteris paribus, consumer oriented firms have a higher probability of investing in process innovation than extractive business by 6.6%. For the consumption tax rate model, the marginal effects of the various firm types are rather similar, while the same significant *positive* relationships are found. Surprisingly, entrepreneurial skills, networks, education and gender appear to have insignificant associations with process innovation, whereas such control variables are expected to significantly influence risk-taking behavior, which includes investments in

process innovation (Rerup, 2005; Greve & Salaff, 2003; Davidsson & Honig, 2003; Byrnes, Miller, & Schafer, 1999).

6. DISCUSSION

Regarding a negative, but insignificant relationship between corporate tax rates and process innovation, the following possible explanations can be given. Innovative entrepreneurs are more harmed by corporate taxes than other kind of entrepreneurs, because taxes on profits lead to more credit constraints among innovative entrepreneurs. Therefore, investments in capital stock to innovate business processes are discouraged, since corporate taxes restrict the reallocation of resources towards process innovation due to reductions in free cash flows brought about by corporate taxes (Keuschnigg & Ribi, 2010). Yet, due to a lack of evidence on a negative relationship, it cannot be argued that corporate taxes severely restrict the reallocation of resources in such a way that entrepreneurs significantly turn away from reorganizing how work is done within their organization. Hence, neither can be argued for a higher likelihood of engaging in process innovation as a consequence of relatively low corporate taxes due to insignificant findings and thereby a lack of evidence. This is mainly in accordance with prior studies stating that a reduction in corporate tax rates does not lead to significant changes in entrepreneurial risk-taking (Cullen & Gordon, 2007). Additionally, in the case of a high level of corporate taxes, and if entrepreneurs believe that gains from product innovation outweigh cost-savings from process innovation, a profit-maximizing entrepreneur would choose to engage in product innovation (Callois, 2008). Therefore, the choice to engage in product innovation over process innovation in this scenario proposes a negative relationship between corporate taxes and process innovation. However, due to an insignificant relationship, it cannot be argued with full certainty that an entrepreneur would choose to engage in product innovation rather than process innovation in the case of relatively high corporate tax rates.

Nevertheless, contradicting views have been proposed in favor of a positive relationship between corporate tax rates and process innovation. First, assuming that purchases of capital stock to be used for process innovation are deductible from taxable income, it can be argued that entrepreneurs perceive this tax deductibility option as an incentive to purchase capital stock and thereby enhance the efficiency of existing business operations as corporate tax rates increase (Trezevant, 1994; Eisner, 1973). Moreover, entrepreneurs are more inclined to stabilize or improve their financial performance through process innovation if they experience high corporate tax rates than if they did not experience high corporate tax rates. Similarly, if entrepreneurs experience low corporate tax rates, they have less incentive to devote time and effort to cost-efficient operations and therefore are less likely to engage in process innovation

(Stiglitz, 1983). Yet, this study does not show any significant findings in favor of a positive relationship between corporate tax rates and process innovation.

However, taken all previously discussed arguments together, a possible explanation for an insignificant negative relationship between corporate tax rates and process innovation is that positive effects of corporate tax rates on process innovation neutralize negative effects.

Concerning a negative, yet insignificant relationship between consumption tax rates and process innovation, the following possible explanations can be provided. Due to consumption tax rates, goods and service become more expensive, however this also suggests that potential capital stock for introducing new and improved business operations become more costly (Hall R. E., 1996). Therefore, consumption tax rates negatively impact the consumption behavior of entrepreneurs, which implies that entrepreneurs are discouraged to improve their financial performance through engaging in process innovation due to expensive capital stock. Moreover, not only do consumption taxes discourage capital stock purchases, they also discourage customer purchases of their offered products and services, which both lead to reductions in cash flows. Cash flows are reduced through revenue streams, because consumption taxes increases the prices of products and services and therefore negatively influence customer purchases. Also, since capital stock purchases are discouraged, entrepreneurs will be less able to provide lower priced products in response to high consumption tax rates and therefore less commitment to process innovation also negatively influences incoming cash flows from sales. Previous studies have stated that investment decisions such as the propensity to commit to process innovation, is highly sensitive to fluctuations in cash flows (Gilchrist & Himmelberg, 1995). Since consumption taxes negatively impact cash flows through the channel of sales and capital stock purchases, the amount of resources that is re-allocated towards process innovation is also influenced, which implies a negative relationship between consumption tax rates and process innovation. Yet, the findings do not significantly show that entrepreneurs negatively weigh consumption tax rates in investment decisions regarding process innovation.

Contradicting the previously mentioned arguments, a statement regarding a positive relationship between consumption tax rates and process innovation has been suggested. Since products become more expensive due to consumption tax rates, entrepreneurs will be pressured to stabilize their revenue streams by providing lower priced products to their customers (Keen, Smith, Baldwin, & Christiansen, 1996). To be able to provide lower priced products and thereby satisfy customer demand, entrepreneurs will need to invest in cost-efficient business processes. Put differently, the entrepreneur will be more likely to engage

in proces innovation if pressured by relatively high consumption tax rates. Therefore, this proposes a positive association between consumption tax rates and process innovation. Yet, one can also argue that no relationship exist between consumption tax rates and process innovation. This is due to possibility for an entrepreneur to levy costs on their customers regarding capital stock purchases that have become more expensive due to consumption tax rates (Crawford, Keen, & Smith, 2007). In other words, consumption tax rates do not determine whether entrepreneurs will engage in process innovation, since they can impose higher costs of consumption taxes on their customers. This suggests that consumption taxes do not affect the willingness of entrepreneurs to invest in process inovation, implying no relationship between consumption tax rates and process innovation. Yet, this study does not show any significant findings claiming a positive or non-existent relationship between consumption tax rates and process innovation.

Nonetheless, taken all previously discussed arguments together, an insignificant negative relationship between consumption tax rates and process innovation can be explained due to positive effects that counterbalance negative effects of consumption tax rates on process innovation.

6.1 CONCLUSION

This study examined the link between tax policy and innovative entrepreneurship. In other words, this research contributes to the growing discussion on how tax policy affects the willingness to innovate, and more specifically the willingness of entrepreneurs to engage in process innovation. A logistic regression model had been built to investigate the relationship between corporate tax rates and process innovation on the hand and consumption tax rates and process innovation on the other hand, while taking into account individual and country-level control variables. After combining the Global Entrepreneurship Monitor 2011 and World Competitiveness Yearbook dataset, the data consisted of 132,130 individuals from 60 countries, of which 13,355 are entrepreneurs and of which 4,709 are innovative entrepreneurs that engaged in process innovation.

The results showed that there is no clear evidence of a relationship between corporate tax rates and process innovation. Therefore, the first hypothesis had been *rejected* based on an insignificant association between corporate tax rates and process innovation. Similarly, the results also displayed that no significant relationship can be found between consumption tax rates and process innovation. Thus, based on this insignificant association, the second hypothesis had also been *rejected*.

Surprisingly, when closely examining the control variables in the logistic regression analysis, it is remarkable that entrepreneurial skill, network, education and gender appear to have insignificant associations with process innovation, whereas those are expected to influence investment decisions in process innovation (Rerup, 2005; Greve & Salaff, 2003; Davidsson & Honig, 2003; Byrnes, Miller, & Schafer, 1999). Yet, the results do show that log GDP per capita, entrepreneurial experience, age, transforming, business services and consumer oriented firms are significant in estimating process innovation, which is in accordance with previous conducted studies (Szirmai, Naudé, & Goedhuys, 2011; Rerup, 2005; Jayawarna, Rouse, & Kitching, 2013; Audretsch, 1995). Thus, with respect to the research question on how tax policy influences process innovation among entrepreneurs, it can be concluded that there is no clear evidence for any relationship between tax policy in the form of corporate and consumption tax rates with process innovation among entrepreneurs.

6.2 IMPLICATIONS

When it comes to implications of this research, policy-makers should consider the following insights. Although this research found an insignificant negative relationship between tax policy (both corporate and consumption tax rates) on process innovation among entrepreneurs, that does not simply imply that governments are able to raise corporate and consumption tax rates without any consequences. A more severe tax system would discourage business entry, since taxes are found to have a negative impact on investment decisions in innovation, the expansion of a firm or innovative industries as a whole and thereby negatively influencing the aggregate economic performance (Carroll, Holtz-Eakin, Rider, & Rosen, 1999; Nielsen & Keuschnigg, 2003; Baumol, 1990). Therefore, policy-makers should design tax policy in such a way that innovative entrepreneurs are inclined to contribute to technological progress, since innovation is crucial for social welfare and economic growth (Solow, 1957; Grossman & Helpman, 1994).

Similarly, the results of this research also have implications for managerial decisions. Despite the fact that there is no clear evidence that corporate and consumption tax rates influence the entrepreneurial decision concerning process innovation, it does not mean that entrepreneurs should disregard effects of tax policy on decisions regarding innovation. This is due to taxes negatively influencing the propensity of individuals to commit to product innovation, whereas process innovation commonly remains of strategic importance to improve financial performance and keep up with competition regardless of tax policy effects (Darnihamedani, Block, Hessels, & Simonyan, 2015; Davenport, 2013).

6.3 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Nonetheless, it is important to note that this research has its limitations. First, this research only provided insights on association between variables in the logistic regression model. A suggestion for further research would be to establish a causal relationship, which would give a better insight on the one-way directional impact of tax policy on process innovation.

Second, regarding the degree of statistical analyses, this research applied straightforward logistic regression analysis, which was a rather simplistic approach to examine the relationship between tax policy and process innovation. Therefore, for future studies, building a probit model would give more insights on the predicted probabilities of investing in process innovation, while also performing more robustness checks of the model.

Third, this research solely focused on the decision of entrepreneurs to devote to process innovation versus not engaging in process innovation, which may suggest that an entrepreneur does not engage in innovation at all or engages in product innovation. Therefore, it may also be relevant to examine how the entrepreneurial choice between product innovation versus process innovation is affected by tax policy, to study whether this choice is perceived as a trade-off by entrepreneurs or whether process innovation is already incorporated into product innovation.

Finally, particular attention was drawn to corporate and consumption tax rates as specific form of tax policy. As a suggestion for further research, it may be relevant to focus on how process innovation among entrepreneurs is influenced by other types of tax policies such as property taxes and R&D tax incentives. Concerning the impact of property taxes, it is relevant to study whether a rise in property taxes would lead to a decrease in the purchase of capital assets, which would have been used for improving existing business processes (Yinger & Carroll, 1994). Regarding R&D tax incentives, it is found that R&D tax incentives lead to additional innovation output in large manufacturing firms, which includes improvements in business processes (Czarnitzki, Hanel, & Rosa, 2011). Therefore, for further studies, it may be interesting to look at how R&D tax incentives influence process innovation in small and young firms in particular.

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