Influence of corporate income tax on the competitiveness of nations

Comparison between developed and emerging economies

Laurens Vleugels

R0576203

Master's thesis submitted to obtain the degree of

MASTER IN BUSINESS ADMINISTRATION

Promoter: Prof. dr. Ernst Verwaal

Academic Year 2018-2019.

Contents

Abstract

The purpose of this research is to examine the influence of corporate income taxes on the competitiveness of nations. Ample research on the competitiveness of nations exists, but the impact of corporate income taxes has never been investigated. A global trend of corporate income tax reform to ameliorate the competitiveness of nations arises at the moment, but it remained unclear and debated whether this motive could be justified or should be marked as vacuous. A quantitative dynamic panel data approach is employed in this research to test the hypothesis and a comparison is made between developed and emerging economies. The results indicate that corporate income taxation can form a motive to increase competitiveness for developed economies, but the influence remains insignificant for emerging economies.

Acknowledgements

1   Introduction

A global trend of corporate income tax reform arises at the moment and many arguments are being used by nations to justify these reforms. Some nations pursue corporate income tax changes as a reaction to lowered taxation of big international players, like the United States. Other nations lower the corporate income taxes because they think it will result in a competitive edge compared to other nations in the world. On the contrary, Latvia and Greece for example do not seem to believe in the relationship between corporate income taxes and competitiveness, since these countries increase their corporate income taxes. Whether this lowering of corporate income tax really results in an increased competitiveness is subject to intensive debate. Eurodad (2017) addresses this phenomenon as a race to the bottom, while the OECD (2018) speaks of a race to the average. A lot of research has been conducted about the impact of corporate income taxation on foreign direct investment (FDI), trade, and so on, but research about the impact on competitiveness seems to be non-existent. Therefore, this research will be relevant to see whether the argument of lowered corporate income tax used for enhanced competitiveness by politicians is well-founded.

Previous research tried to capture the complexity of competitiveness in a single definition. The multiplicity of definitions existing at the moment potentially explains why most countries seem to interpret competitiveness differently, hence many countries pursue different actions according to their own image of how to ameliorate competitiveness. This master dissertation uses the Global Competitiveness Index, established by the World Economic Forum, as the measurement of competitiveness. The index uses 114 indicators, congregated into twelve pillars and divided into three subindices, to define and measure competitiveness (Sala-i-Martin, 2005). The various aspects of economies are captured in this index. The goal of this dissertation is to determine the influence of corporate income taxes on the competitiveness score of nations. This research analyses the existing literature in detail, followed by an empirical analysis to test the hypothesis.

The difficulty to form a clear expectation about the impact of corporate income taxes on competitiveness lies in the fact that corporate income taxation is expected to influence the various aspects of a nation differently. Meaning that the effect of increased corporate income taxes can be positive or negative, depending on the specific aspect of the economy emphasised on. To give some examples, a positive influence on the economy when increasing corporate income taxes is expected for institutions or infrastructure. When the government's tax revenue increases, Institutions will have more income to impose a decent regulatory framework. Furthermore, there will be more liquidities to improve the existing infrastructure or to introduce new infrastructure. On the contrary, a negative impact is expected on technology for example. According to (Arbatli, 2011; Bloningen, 2005; Cassou, 1997; Krifa-Schneider & Matei, 2010; Mudenda 2015), increased taxes result in less FDI inflow, which means less technology coming into the country. This lower competition, due to reduced FDI, also results in less innovation (Aghion et al., 2014). The various aspects of the economy, which are captured in the global competitiveness index, are dealt with in detail in the literature review.

The research will be conducted using a quantitative panel data approach for 55 countries. These 55 countries will be divided into 28 developed economies and 27 emerging economies, which are chosen based on data availability. This division allows to see whether differences between these two categories exist. Previous literature points towards a fixed effects model, which is tested and confirmed in this dissertation. Since the past value of the dependent variable (Global Competitiveness Index) influences its own future value, a dynamic panel data approach is employed to test the hypothesis. The Arellano-Bond dynamic panel data estimation is used to investigate the influence of corporate income tax on the competitiveness of a nation.

2 Literature review

Relevant literature relating to the research subject has been compiled in this section in order to give a detailed overview of existing research on the subject. In this way, a framework is created to situate what is known and what will be investigated in this thesis. The first section covers the current situation regarding corporate income taxes followed by the public debate concerning this topic. The second section deals with competitiveness of nations and its measurement by the Global Competitiveness Index. Existing literature stresses the complexity of the term "competitiveness", therefore the first part of the second section explains what is meant by competitiveness for the purpose of this research, followed by expectations of the effects of corporate tax reduction on competitiveness in the third section.

2.1 Corporate income taxation

Taxation remains an invaluable asset for a government since it concerns the most important source of revenue enabling a nation to fund its goals. Nowadays, a trend of corporate income tax reduction seems to manifest itself, resulting in controversy among the public. Whether this lowering of corporate income tax really leads to an increased competitiveness, as many countries profess, is being researched in this master dissertation. According to Eurodad (2017), this trend of lowered corporate income taxation can lead to political momentum in other countries, resulting in a global race to the bottom. The OECD (2018) tackles this assertion and considers this phenomenon as a race to the average, since the necessity of corporate tax reform could not be ignored in some countries with high tax rates.

Table 1 on page 3 illustrates the recent and upcoming reforms in corporate taxation for OECD countries. For more information on this table please consult Table B. 1, which can be found in appendix 1. Prominent in this table is the reform pursued by Chile, Greece, Latvia, Slovenia, The Republic of Korea and Turkey. These countries do not seem to believe in the relationship between corporate income tax reduction and competitiveness. If the relationship exists, the probability of facing competitiveness problems for these countries will most likely increase since their actions do not follow the mainstream approach. However, not every country has the possibility of lowering taxes, like Greece for example which is struggling with an enormous debt. Politicians seem to cut taxes as a reaction to measures implemented by big players like the US. Mintz's (2018) investigated the tax cuts implemented by the US and highlighted several positive outcomes for the US. Furthermore, he also found a number of benefits for foreign nations, like a higher demand in the US for foreign products due to the increased wages. Mintz's (2018) research was conducted irrespective of other countries' tax reforms. An individual corporate tax reduction can foster the economy, but the effect becomes negligible when other countries impose similar measures (Eurodad, 2017). The choice whether to impose countermeasures is subject to intensive debate. King (2017) (quoted by Irvine, 2018) highlighted that countries should not enter the global tax race and should not engage in beggar thy neighbour measures. In his opinion, countries should try to persuade the international stage to avoid this race to the bottom from happening. All these questions lead to the main hypothesis of this dissertation:

Hypothesis: Corporate income tax reduction positively impacts the competitiveness of a nation.

Table 1 Recent and upcoming changes in corporate income tax rates in OECD countries, covering the years from 2015 to 2022

	Summary of changes	2015	2016	2017	2018	2019	2020	2021	2022
Hungary	52.63% reduction from 2016 to 2018	19%	19%	9%	9%				
United States	40% reduction from 2017 to 2018	35%	35%	35%	21%				
Belgium	24.24% reduction from 2017 tot 2020	33%	33%	33%	29%	29%	25%		
France	24.24% reduction from 2018 tot 2022	33%	33%	33%	33%	31%	28%	26.50%	25%
United Kingdom	15% reduction from 2016 to 2020	20%	20%	19%	19%	19%	17%		
Norway	14.81% reduction from 2015 to 2018	27%	25%	24%	23%				
Luxembourg	14.29% reduction from 2016 to 2018	21% (29%)	21% (29%)	19% (27%)	18% (26%)				
Italy	12.73% reduction from 2016 to 2018	27.50%	27.50%	24%	24%				
Australia	12.28% reduction from 2015 to 2022	28.50% (2)	27.50% (10)	27.50% (25)	27.50% (50)	27.50% (50)	26% (50)	25% (50)	25% (50)
The Netherlands	11% reduction from 2018 to 2021	25%	25%	25%	25%	24.30%	23.90%	22.25%	
Spain	10.71% reduction from 2015 to 2018	28%	25%	25%	25%				
Japan	9.57% reduction from 2015 to 2019	33.86%	30.86%	30.86%	30.86%	30.62%			
Israel	8% reduction from 2016 to 2018	25%	25%	24%	23%				
Denmark	6.38% reduction from 2015 to 2018	23.50%	22%	22%	22%				
Sweden	6.36% reduction from 2018 to 2021	22%	22%	22%	22%	21.40%	21.40%	20.60%	
Slovak Republic	4.55% reduction from 2016 to 2018	22%	22%	21%	21%				
Switzeland	1,01% reduction from 2015 to 2018	17.89%	17.80%	17.74%	17.71%				
Chile	4.17%/ 12.5% increase from 2016 to 2018	24%	24%	25.5%	25% 27%				
Republic of Korea	4.17% increase from 2016 to 2018	24%	24%	22%	25%				
Turkey	10% increase from 2017 to 2020	20%	20%	20%	22%	22%	22%		
Greece	11.54% increase from 2015 to 2018	26%	29%	29%	29%				
Slovenia	11.77% increase from 2016 to 2018	17%	17%	19%	19%				
Latvia	33.33% increase from 2017 to 2018	15%	15%	15%	20% 0%				

Source: Based on Eurodad (2017), extended with own calculations. Consult Appendix 1 for more information.

2.2 Competitiveness

Many researchers have investigated the phenomenon of national competitiveness and have tried to capture its complexity in a single definition, resulting in a multiplicity of different interpretations. This profusion of definitions is the result of the complexity of the term and its composite character. Some researchers stress the importance and economical value of the term, while others argue that competitiveness has no economical or scientific meaning at all.

2.2.1 Defining competitiveness

According to Wysokińska (2012), national competitiveness can be defined as the capability of a nation to adjust its export structure to the trends of global trade through shifts towards specialisation based on innovation and knowledge. Research of Ganna and Vertelieva (2013) also mentioned the importance for a nation to become a prominent player in terms of competitiveness at the world economic market in order to avoid being subject to the risks caused by globalization. According to them, the assessment of competitiveness and competitiveness-enhancing policies are incredibly relevant for the future development of any nation. Ganna & Vertelieva (2013) noted how this ability to adapt to the trends of globalization depends on factors such as innovation ability, investment volume, and others. Furthermore, they also accentuate the fact that these economic factors must be viewed in combination with political and social factors.

Not all researchers focussed on globalization and the need for adjustment while defining competitiveness. Many researchers tried to define competitiveness and all of them emphasised different aspects. Table 2, which can be found on page 5, gives an overview of the most commonly used and cited definitions currently available. Competitiveness is not a term only applicable to a nation, it also has a substantial value for enterprises. In order to distinguish these two implications, both aspects of competitiveness are defined in Table 2. The oldest definition mentioned dates back to 1985 and the most recent one was published in 2017, which emphasises the complexity and dynamic character of the subject.

Krugman (1994) criticised former US president Clinton's idea on competitiveness. Clinton once stated a nation's competitiveness can be compared to a big corporation, both competing in the global marketplace. According to Krugman's research, defining competitiveness for a nation is much more ambiguous compared to defining competitiveness for a corporation. A corporation is considered uncompetitive when its market position is unsustainable. Unless a corporation improves its performance, it will cease to exist. The complication in defining competitiveness for a nation lies in the fact that a nation does not go out of business, there is no defined bottom line. Krugman (1994) also highlighted that an increased competitiveness of one economy will not always be at another economy's expense. Countries are interlinked through imports and exports, which means an increase in import for one country results in an increased demand for another country. Politicians seem to blame the international competition for problems instead of facing the fact that the problem can be domestic. Blaming the international competition paradoxically makes problems seem easier to deal with. Competitiveness seems like a plausible-sounding explanation to a wide array of problems, which is frequently used by politicians to avoid dealing with the real issues (Krugman 1994).

If defining the concept of competitiveness is this complex, one can only imagine the intricacy of finding a way to measure this concept across countries. Multiple institutions have developed national indices to compare the relative measure of competitiveness between countries. Even though the two most famous indices, the World Economic Forum's Global Competitiveness Index and the International Institute for Management and Development's World Competitiveness Rankings, tend to incorporate indicators mainly relevant for businesses, these are the most reliable options available today (Im & Choi 2016). Not only indicators relevant for businesses are incorporated, but these indices lean towards defining

competitiveness from a business perspective. The Global Competitiveness Index will be used for the research in this thesis, which will subject the conclusions of the research to the limitations and emphases of this index.

**Table 2 Definitions of competitiveness according to various authors**

Author (year)	Definition
Altomonte et al. (2012, p.1)	External or international competitiveness is defined as the ability to exchange the goods (and services) in which a country is abundant for the goods and services that in the same country are scarce.
Buckley et al. (1988, p.176)	A firm's competitiveness means its ability to produce and sell products and services of superior quality and lower costs than its domestic and international competitors. Competitiveness is a firm's long-run profit performance and its ability to compensate its employees and provide superior returns to its owners.
Chao-Hung, Li-Chang (2010, p.235)	A firm's competitiveness is its economic strength against its rivals in the global marketplace where products, services, people and innovations move freely despite the geographical boundaries.
European Commission (2000, p.2-2)	An economy is competitive if its population can enjoy high and raising standards of living and high rates of employment on a sustainable basis.
Krugman (1994, p.32)	For an economy with very little international trade, "competitiveness" would turn out to be a funny way of saying "productivity" and would have nothing to do with international competition.
Porter et al. (2008, p.2)	The most intuitive definition of competitiveness is a country's share of world markets for its products. This makes competitiveness a zero-sum game, because one country's gain comes at the expense of others.
Scott, Lodge (1985, p.3)	National competitiveness is a country's ability to create, produce, distribute, and/or service products in international trade while earning rising returns on its resources.
Schwab, Sala-i-Martin (2017, p.11)	Competitiveness is the set of institutions, policies, and factors that determine the level of productivity of a country.

2.2.2 Global Competitiveness Index

The Global Competitiveness Index will be used in this thesis because it is said to be the most comprehensive according to Balzaravičienė and Pilinkienė (2012). Even though it can be seen as a shortcoming, the Global Competitiveness Index mainly incorporates indicators relevant for businesses. This focus does not form a limitation since the effect of corporate income tax is being investigated in this dissertation, henceforth the relevance for businesses. Specific shortcomings noted by Choi and Im (2016) are: stated but not justified definition; theoretical framework biased towards neoliberalism; causality not under consideration; and past-oriented. 137 Economies are covered in the latest composition of the index. The calculations are based on primary and secondary data and the combined output of the economies accounts for 98 percent of world GDP (Schwab et al., 2017). This research will be restricted to 55 countries due to data unavailability. The framework of the index is illustrated in Figure 1 and can be found on page 6. Sala-i-Martin (2005) developed the conceptual framework of the Global Competitiveness Index and incorporated 114 indicators that capture concepts that thrive long-term prosperity and productivity. These indicators are congregated into 12 pillars, as can be seen in Figure 1

on p 6. The subindices are visualised on the right hand side of the conceptual framework. Im and Choi (2016) acknowledged the Global Competitiveness Index's representativeness and exalted the index because of the inclusion of stages of development into the calculations. These stages of development translate into different weights given to the subindices according to the level of development of a country. By doing this, countries can be compared irrespective of different development levels.

Figure 1 Framework Global Competitiveness Index
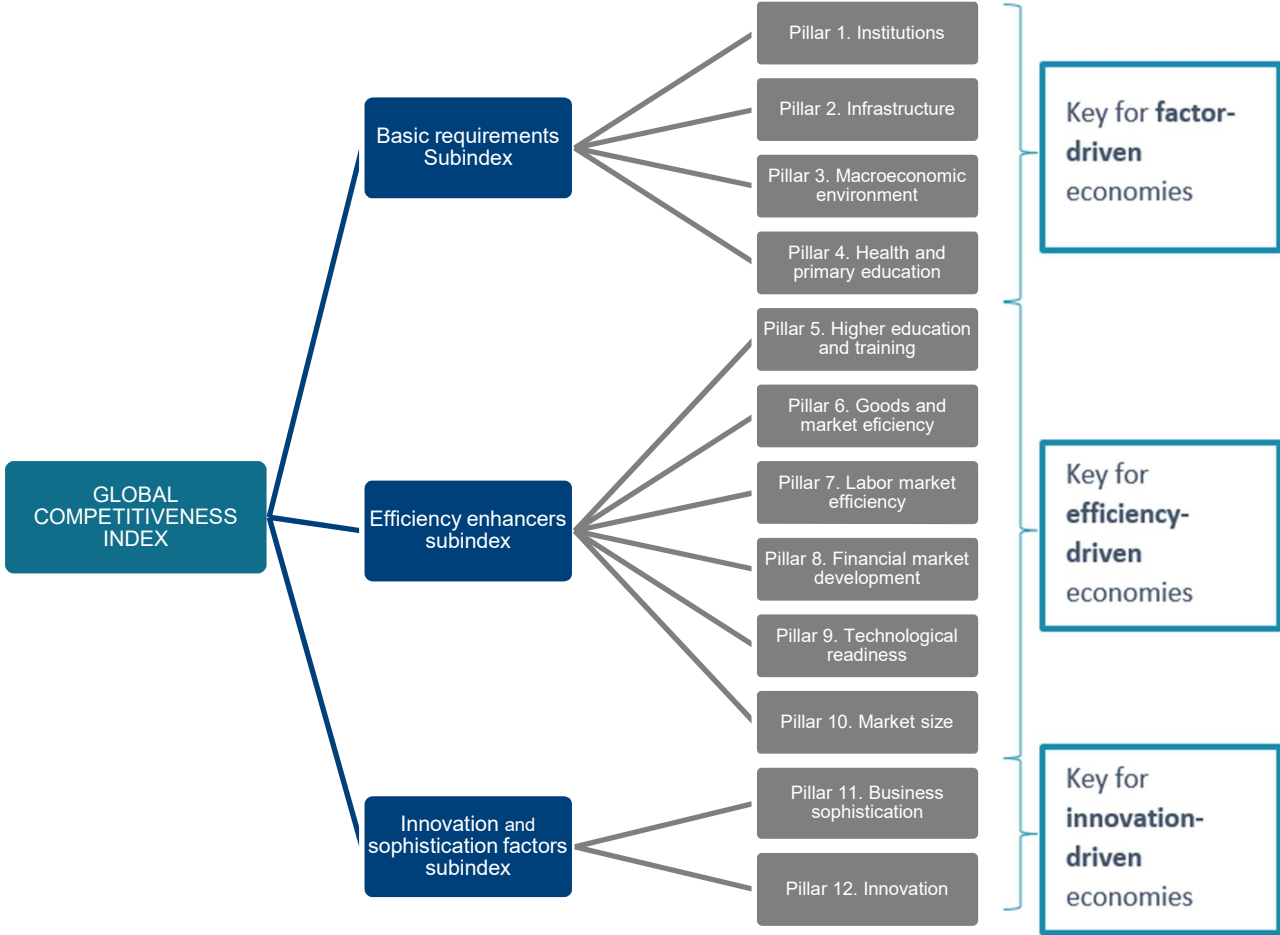
Source: Based on The Global Competitiveness Report 2017-2018: p12.

2.3   Twelve pillars of competitiveness & expectations

As already mentioned, the expected influence of corporate income tax reduction differs depending on which aspect of the economy is being emphasised on. This section will discuss the expected impact of corporate income tax reduction on the various aspects of the economy in detail. The various aspects of the economy dealt with correspond to the division into pillars proposed by the Global Competitiveness Index. Even though a distinction is made between the different aspects of the economy, this research will test the impact of corporate income tax reduction on the overall competitiveness of countries.

The first pillar encompasses the institutional environment of a country. This institutional pillar takes the efficiency and behaviour of private and public stakeholders into account. The quality of the public institutions is shaped by the legal and administrative framework within which firms, individuals and

governments intercommunicate. Formal and legal constraints are set by institutions together with enforcement mechanisms. Also informal constraints are included, such as conventions, business ethics and corporate governance. The institutional environment can be considered as the backbone of the society since this shapes the way in which individuals organize themselves and their economic transactions. Worldwide inequality in technology and in physical and human capital can partially be explained by the differences among institutions across countries (Schwab et al., 2015, 2017). The importance of institutions was first put forward by Adam Smith (1827, p387) *"Commerce and manufactures can seldom flourish long in any state which does not enjoy a regular administration of justice, in which the people do not feel themselves secure in the possession of their property, in which the faith of contracts is not supported by law, and in which the authority of the state is not supposed to be regularly employed in enforcing the payment of debts from all those who are able to pay. Commerce and manufactures, in short, can seldom flourish in any state in which there is not a certain degree of confidence in the justice of government".*

Research of Loayza et al. (2005) concludes that the higher the regulatory burden, the lower the growth and the higher the induction of informality by private institutions. However, this pillar mainly focusses on public institutions. Corporate income tax reduction will most likely affect public institutions differently since this reduction also means a decrease in income. If this income decline results in too little governmental income to enable a decent regulatory framework, the competitiveness will most likely decrease. This pillar is constructed by aggregating 21 different aspects, most of them dealing with the efficiency of public institutions. Since these public institutions require income in order to fulfil their duties, a corporate income tax reduction is expected to influence the competitiveness of institutions negatively.

Expectation 1: A reduction in corporate income tax lowers the competitiveness of institutions.

The second pillar, infrastructure, can be linked to connectivity since this pillar assesses the quality of the transport infrastructure. Not only the quality of the domestic infrastructure but also international transport networks are being incorporated in the composition of this pillar. Infrastructure is considered an important asset affecting productivity directly by reducing distance and time, reducing transaction costs, simplifying the information flow, and assisting the integration of markets into global value chains (Schwab et al., 2015). Calderón and Servén (2014) noted that productivity is being influenced by infrastructure since it enables and improves the access to basic services which leads to a healthier and more skilled workforce. The hypothesis that infrastructure improves productivity is also confirmed by Straub (2008). According to Manski (2012) taxation mechanisms are the main source of infrastructure financing. That being the case, a corporate tax reduction could result in a contraction of infrastructure spending, thus leading to a decrease of competitiveness.

This lower competitiveness can be the result, unless the reduced corporate income tax would make privatisation of infrastructure works possible. Private companies could for example engage in the construction of roads in exchange for tolls paid by the user. If this toll is substantially lower because of the lowered corporate income taxation, and the benefits of the improved infrastructure weighs out the disadvantage of payment, lowering corporate tax income might be beneficial for the infrastructure.

Expectation 2: A reduction in corporate income tax lowers the competitiveness of infrastructure.

The third pillar encompasses the macroeconomic environment. According to Schwab et al. (2015), the macroeconomic environment cannot be seen as a driver of economic growth, but it can be considered as a crucial condition to stimulate productivity. Fischer (1993) defines a steady macroeconomic environment as low and predictable inflation together with sustainable fiscal policy. According to his research, both factors will increase capital accumulation and productivity growth. Firstly, lowering the corporate income tax might result in an increase in the spending power of companies. This increased spending can lead to higher economic growth which generally results in inflation. Whether inflation is

caused by a corporate income tax cut depends on the state of the economy and on how the tax cut is financed (Friedman, 1975). Secondly, a sustainable fiscal policy is necessary for potential investors since uncertainty may cause them to hold back from committing resources to new projects (Pindyck and Solimano, 1993). Debt is also incorporated in this pillar since the government will not be able to provide services efficiently and guarantee a sustainable fiscal policy if it is obliged to make high-interest payments on its debts. Fiscal deficits limit the future strength of a government to react to business cycles (Schwab et al., 2017). Lowering corporate income tax can lead to problematic outcomes when a government is already struggling with the fiscal deficits. The effect of corporate tax reduction on the macroeconomic environment will most likely depend on the situation of a country's economy. Overall, corporate income tax reduction can potentially cause inflation and result in unsustainable fiscal policy due to the loss of income.

> Expectation 3: A reduction in corporate income tax lowers the competitiveness of the macroeconomic environment.

The final pillar of the basic requirements subindex consists of health and primary education. According to Schwab et al. (2017), a healthy workforce is indispensable to a nation's productivity and competitiveness. It is generally known that higher income customarily leads to better health since it enables a nation to have access to better nutrition, healthcare and hygiene. Previous research also points to reverse causality, meaning that better health generally leads to higher income by improving productivity (Bloom and Canning, 2000, 2008; Cole and Neumayer, 2006; Tompa, 2002). Productivity can be affected in two ways according Bloom and Canning (2008). First, healthy workers will perform better and function to their full potential since they have better physical and mental energy. Second, healthy workers are less likely to take time off work because of an illness. Thus, investment in the provision of health services is vital for economic and moral considerations.

The quantity and quality of primary education received by the population is also taken into account in the constitution of this pillar. Access to basic education generally increases the efficiency of the workforce (Schwab et al., 2017). Primary education is interlinked with health, since healthy children tend to have a lower absenteeism rate, resulting in higher cognitive ability. This will lead to an advancement of the general level of education of the future workforce (Schwab et al., 2015). With life expectancies getting longer, healthier individuals are likely to invest more in building their human capital through education because the expected return on their investment will be higher. Healthier individuals tend to spend less on medical expenses, which results in increased savings (Schwab et al., 2015). In the simplest extent, corporate income tax reduction will probably lead to fewer government spending due to the loss of income. It all depends on the source of healthcare and education spending. If another source of income can be guaranteed, the government would not have to cut spending on these vital elements of the society. Hence, lower investments will most likely result in a decline in competitiveness.

> Expectation 4: A reduction in corporate income tax lowers the competitiveness of health and primary education.

The efficiency enhancers subindex constitutes of six pillars, commencing with higher education and training. Empirical research confirmed the positive impact of education on productivity growth (Barro, 2001). Schultz (1961) described human capital growth as being the most distinctive feature of our economic system. According to this research, it is safe to conclude that higher education and training contributes to the economic wellbeing of a country. Hanushek and Kimko (2000) stated that it is not merely the years, also defined as the quantity of schooling, but the quality of schooling that has a substantial impact on the economic growth.

A misconception exists among the public that increasing government spending on higher education will simply result in an improvement of educational performance. Lips and Watkins (2008) investigated this

phenomenon for the American educational system and concluded that the continuous increase in educational spending has not corresponded with an equal advancement in American educational performance. The scarce relationship between education spending and performance suggests that simply raising spending will not improve the educational performance. When these conclusions are linked to this thesis research, corporate tax reduction is expected not to influence the competitiveness of higher education significantly. Even if this corporate tax reduction would result in an actual cut in educational spending, performance is not expected to contract, thus not affecting competitiveness. Lips and Watkins (2008) also highlighted the fact that an actual reform of the educational system would be more likely to lead to the desired results as compared to a change in spending.

On the other hand, the impact of corporate tax reduction on staff training is difficult to estimate. If these reduced corporate taxes translate in more liquidities available in companies for training, competitiveness might even increase. Training is often subsidised by the government. A corporate tax reduction reduces government income and might reduce subsidies which might thus lead to a competitiveness decrease.

Expectation 5: A reduction in corporate income tax lowers the competitiveness of higher education and training.

The second pillar of the efficiency enhancers subindex encompasses goods and market efficiency. Fama (1969, p.383) defines an efficient market as *"a market in which prices always "fully reflect" available information".* According to his research, the most desired goods and services will be sold at the lowest possible price when markets function efficiently. Distortionary regulations and fiscal policies hinder the market efficiency by reducing competition (Schwab et al., 2015). Hence, it can be concluded increased competition results in beneficial outcomes for consumers since increased competition leads to more efficient markets, therefore leading to lower prices. According to Blundell et al. (1999), more intense competition results in more innovation which emerges from a higher level of productivity.

The best firms will be selected by the market when government institutions pursue competition-enhancing policies since weaker firms will be forced out of the market (Aghion & Schankerman, 2004). Many governments consider corporate tax reduction a competition-enhancing policy. This thought is confirmed by (Arbatli, 2011; Bloningen, 2005; Cassou, 1997; Krifa-Schneider & Matei, 2010; Mudenda 2015) who found a significant negative impact on inward foreign direct investment (FDI) when increasing the corporate tax rate and vice versa. The lowering of the corporate income tax might thus lead to a creative destruction of less-productive firms resulting in an increased market efficiency. A significant impact is expected on the competitiveness of goods and market efficiency, especially because corporate income tax, together with labor tax and other taxes, is considered part of this specific aspect of the economy.

Expectation 6: A reduction in corporate income tax increases the efficiency of goods and markets, thus resulting in an increased competitiveness.

Subsequently, the third pillar of the efficiency enhancers subindex consists of labor market efficiency. As claimed by Schwab et al. (2015), efficient labor markets are characterized by the fact that employees are matched with the most suitable job based on their skillset. In addition, employees and employers are incentivized by efficient labor markets to act in ways that advances the productivity of human capital. Strict regulations, such as firing costs and rules, will limit the employment, consumption and productivity (Hopenhayn & Rogerson, 1993).

Three perspectives can be taken in the debate on the impact of corporate income tax reduction on labor market efficiency. To begin with, a corporate income tax reduction leads to increased profits that can outweigh the disadvantages of inefficient labor markets. By way of example, high firing costs can be compensated by increased profits, hence resulting in a lower relative importance of these costs. This lowered relative importance of these regulations and costs might thus lead to an increase in labor market efficiency. Secondly, it is generally accepted and confirmed by many researchers that decreased

corporate income tax results in an increase in inward FDI (Arbatli, 2011; Bloningen, 2005; Cassou, 1997; Krifa-Schneider & Matei, 2010; Mudenda 2015). This increased FDI can lead to the accumulation of economic welfare and human capital in certain areas (Frunza, Pascariu & Moga, 2013). This brain drain towards these countries might lead to an advancement in labor market efficiency since this accumulation of human capital can result in better matches between employees and the most suitable jobs. These two perspectives are based on my own interpretations and expectancies, however, the third perspective builds upon the research of Barro (2018). Barro (2018) highlights the fact that corporate tax reduction will lead to higher wages, resulting in an increased private consumption. Mintz (2018) confirmed this when investigating the US corporate income tax reform. According to Barro (2018), this increased private consumption would mean a downturn in work hours, hence resulting in a reduction of efficient labor. As stated by Schwab et al. (2017), an increased labor market efficiency results in an increased competitiveness and vice versa. Two out of three perspectives expect labor markets to become more efficient, while the third perspective considers a reduction in labor market efficiency.

Expectation 7: A reduction in corporate income tax increases the competitiveness of labor market efficiency.

The eighth pillar encompasses the financial market efficiency. Similar to the meaning of goods and market efficiency, an efficient financial market is identified by the fact that all public information is reflected in the prices (Tobin, 1984). Financial markets have to be developed and stable in order to achieve efficiency according to King and Levine (1993). Schwab et al. (2015) stressed the importance of financial development since it contributes to productivity.

According to Carlson (2018), who wrote about the tax cuts in the US, inequality will worsen due to these tax cuts since these cuts will potentially boost the returns on stock and the wealthy are the largest owners of equities. Levine (1991) also investigated the impact of changing corporate tax policy on the financial market. He concluded that changing corporate tax policy influenced growth of the financial markets directly since investment incentives were altered. Levine (1991) also found significant evidence that the functioning of the financial market is affected indirectly because of these altered investment incentives. The reduction of the corporate income tax will hence encourage investment, impacting the stock market positively. Even though financial markets might be influenced positively, this does not in essence implicate a higher efficiency. Since a reduced corporate income tax has no direct known impact on the efficiency of financial markets, forming a clear expectation about the effect on the competitiveness is not possible.

Expectation 8: A reduction in corporate income tax lowers the competitiveness of financial market efficiency.

The fifth pillar of the efficiency enhancers subindex constitutes of the technological readiness. An unequivocal link exists between technological readiness and competitiveness according to Schwab et al. (2015). This pillar highlights the readiness of an economy to adopt existing technology, leading to innovation and increased productivity, hence resulting in an increased competitiveness (Schwab et al., 2017). Technology should be seen broadly since it not only constitutes of products, but also encompasses organizational methods and processes. Available literature highlights the fact that effective adaptation of technology strongly depends on the conditions of the local economy (Alfaro et al. 2004; Borensztein et al., 1998, Durham, 2004; Xu, 2000).

As mentioned previously, a reduction in corporate income tax generally results in an increase of inward FDI (Arbatli, 2011; Bloningen, 2005; Cassou, 1997; Krifa-Schneider & Matei, 2010; Mudenda 2015). Concerning FDI, previous research suggests technology spillovers on growth in the host country in multiple ways. Koizumi and Kopecky (1977) noted imitation and contagion spillovers as a result of FDI. Imitation exists when a domestic firm copies the foreign production and contagion is a result of personal

contacts between the foreign and the domestic firm. Besides this, Glass and Saggi (2002) discovered technology spillovers from FDI as a result of the movement of labor. To this extent, know-how is transferred through training of these workers by the foreign firms. All these spillovers contribute to the technology in the recipient country of the FDI. Hence, the technological climate will benefit from the corporate income tax reduction via the increased FDI. The cut in corporate income tax also gives the local firms in the home country the possibility to increase investments in technology due to the increased profits. Either way, the competitiveness of the technological climate is expected to benefit from the reduction in corporate income tax.

Expectation 9: A reduction in corporate income tax increases the competitiveness of technological readiness.

The final pillar of the efficiency enhancers subindex encompasses the market size. Schwab et al. (2015) define the market size in this globalized world as the country size in combination with its foreign markets. According to him, productivity can be affected by market size via economies of scale and incentives for innovation. The bigger the market size, the more economies of scale can be achieved leading to an increased competitiveness. A larger market also incentivizes the generation of new ideas since more resources will be available and a single idea can be more lucrative (Romer, 1996, quoted by Schwab et al., 2015).

Since the reduction of corporate income tax increases inward FDI (Arbatli, 2011; Bloningen, 2005; Cassou, 1997; Krifa-Schneider & Matei, 2010; Mudenda 2015), the market size of foreign countries will basically be enlarged. Hence, it can be concluded that foreign countries will generally notice an increase in outward FDI to countries that pursue a corporate income tax reduction. This situation would mean an advancement in competitiveness for foreign countries, since their market share enlarges. Besides the benefits of attracting FDI, which are not dealt with in this pillar, the host country will not necessarily benefit since its market size will not be enlarged. Even though host country companies will experience increased profits due to the corporate income tax reduction, this generally does not form a motive for market extension.

Expectation 10: A reduction in corporate income tax lowers the competitiveness of the market size.

The last two pillars are part of the innovation and sophistication subindex. Business sophistication is considered the eleventh pillar of the global competitiveness index. Schwab et al. (2017, p.319) define business sophistication as *"the quality of a country's overall business networks and the quality of individual firms' operations and strategies"*. These networks are especially important since the clustering of companies heightens the efficiency, leading to greater opportunities for innovation (Roig-Tierno, Ribeiro-Soriano, & Mas-Verdú, 2017). Government institutions also play a central role in the development of clusters. According to this previous research, in 32% of cluster initiatives the government is responsible. Generally, businesses themselves do not engage directly in building clusters, the government and the industry mainly are responsible for this phenomenon (Ketels, Lindqvist, & Sölvell, 2003).

The effect of a reduced corporate income tax on business sophistication is expected to be negligible since businesses are not expected to change their operations and strategies or to suddenly engage in clustering. Research concerning the effect of corporate income tax reduction on business sophistication is non-existent, therefore forming expectations is a shot in the dark. Still, a hypothesis is formed in order to reject or confirm the negative impact of corporate income tax reduction on the competitiveness of business sophistication.

Expectation 11: A reduction in corporate income tax lowers the competitiveness of business sophistication

---

To conclude, the twelfth and final pillar encompasses innovation. Gradually, economies tend to approach the frontiers of knowledge. Especially in these economies, firms must engage in innovation in order to stay competitive (Schwab et al., 2017). Not only new products or services are considered innovation, also non-R&D forms of innovation are taken into account in this pillar. By non-R&D forms of innovation, innovations in organization techniques, personnel, finance,.. are implied.

There are multiple ways considered in which a corporate tax reduction can influence innovation. Cai, Chen, & Wang (2018) investigated the impact of corporate taxes on firm innovation for China and found some positive results. According to their research, a decrease in corporate tax rate increases the number of patent applications substantially. The lowering of the corporate income tax rate alleviates financial hindrances, making companies reallocate resources from tax evasion activities. Their research noted that this leads to an improvement of R&D expenditures. Following this research, an increase in innovation competitiveness can be expected when lowering the corporate income tax rate. As stated multiple times in previous sections, lowering corporate taxes will also lead to an increase in inward FDI (Arbatli, 2011; Bloningen, 2005; Cassou, 1997; Krifa-Schneider & Matei, 2010; Mudenda 2015), hence intensifying competition. Whether this increased competition leads to innovation is subject to intense debate. Aghion, Bechtold, Cassar, & Herz (2014) noted that intensified competition significantly increases R&D investment for neck and neck firms, but decreases R&D investments for firms lagging behind. Tang (2006) also found evidence suggesting that the arrival of competing products increases R&D and product innovation but quick obsolescence of products negatively affects acquiring technology or process innovation. In general, the competitiveness of innovation is expected to benefit from lowering the corporate income taxes.

Expectation 12: A reduction in corporate income tax will increase the competitiveness of innovation.

3 Methodology

The impact of corporate income tax reform on various variables, like FDI for example, has been tested in previous research. No available research investigated the impact of this reform on the competitiveness of nations. Since no research is available on this topic, econometric methods will be used to test whether the expectations of this dissertation match reality. This section will give an overview about the procedure of how this topic will be researched. The used methods and data will be expounded and this framework will be used as a guideline for the actual research.

3.1 Data

To test the hypotheses, quantitative methods based on secondary data will be applied in this dissertation. All the information necessary for this research is quantifiable and widely available for a select number of countries. Not all countries have detailed and up-to-date databases, hence the research will be restricted to 55 countries, divided into developed and emerging economies. The categorization of countries is based on the Inclusive Development Index 2018. The developed countries used in this dissertation are: Australia (21); Austria (18); Belgium (20); Canada (14); Czech Republic (31); Denmark (12); Estonia (29); Finland (10); France (22); Germany (5); Greece (87); Ireland (24); Israel (16); Italy (43); Japan (9); Republic of Korea (26); Luxembourg (19); Netherlands (4); New Zealand (13); Norway (11); Portugal (42); Slovak Republic (59); Slovenia (48); Spain (34); Sweden (7); Switzerland (1); United Kingdom (8) & United States (2) (Schwab, 2017; WEF, 2018). The emerging economies used are: Albania (75); Azerbaijan (35); Bangladesh (99); Brazil (80); Bulgaria (49); Chile (33); China (27); Colombia (66); Costa Rica (47); Croatia (74); Dominican Republic (104); Hungary (64); Indonesia (36); Kazakhstan (57); Latvia (54); Lithuania (41); Malaysia (23); Mexico (51); Nicaragua (93); Paraguay (112); Peru (72); Poland (39); Romania (68); Russian Federation (38); Thailand (32); Turkey (53) & Uruguay (76); (Schwab, 2017; WEF, 2018).The numbers in brackets indicate the global competitiveness ranking of 2017-2018. The variables used for these countries will be explained in the next section.

As already mentioned, the Global Competitiveness Index will be used. The last edition of the index dealt with 137 countries, all ranked based on 12 pillars containing multiple indicators. Each country is given a value for each pillar based on their performance. The higher the value, the better the country performed for this specific pillar and vice versa. These 12 pillars are then aggregated into a total competitiveness score, which will be used to test the hypothesis of this research. Only the values corresponding to the listed countries are used to investigate this topic. The lack of available data constraints the possibility to expand the research to all 137 countries used in the index. The Global Competitiveness Index has first been composed in 2007, resulting in a time frame of 11 years available for research. This 11 year time frame in combination with 55 countries results in 605 observations available for use, being sufficient for the methods used in this dissertation. A panel data technique will be used to test the hypotheses.

3.2 Variables & Model

According to previous research, an increase in inward FDI leads to an amelioration of competitiveness of nations and vice versa (Auge, Eslner, Frey, Kastrissianakis & Sanz, 2016; Clipa, 2002; UNCTAD, 2002). This particular relationship forms the basis for the establishment of the econometric model used in this dissertation. Economou, Hassapis, Philippas and Tsionas (2017) conducted research about the main determinants of inward FDI in OECD countries, which leads to competitiveness. The determinants

they found for inward FDI can and will be used in the econometric model in this dissertation to investigate the impact of corporate income tax reduction on the competitiveness, since inward FDI is linked to competitiveness. In the next paragraph the multiple variables used will be explained, as will be the sources of the data.

Economou et al. (2017) divide the used determinants into standard and institutional variables. The standard variables are: market size (proxied by GDP per capita); trade openness (import plus export as a percentage of GDP); human capital (proxied by school enrolment on secondary education); unit labor cost; market instability (proxied by inflation); corporate income tax rate; net FDI inflow; and gross capital formation as a percentage of GDP. Since labor cost is not available for most economies, gross national income per capita will be used as a proxy. Moreover, the first four standard variables are confirmed in other research to impact competitiveness (Agiomirgianakis et al.; 2004, Nourzad et al., 2014; Sekkat & Veganzones-Varoudakis, 2007). Furthermore, net FDI inflow, trade openness and GDPpc are also confirmed as determinants of competitiveness by Kharlamova (2013). Secondly, an institutional variable is proposed by Economou et al. (2017), namely the aggregation of the Worldwide Governance Indicators. This variable is calculated as the sum of voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption. The importance of these institutional factors is confirmed in other research (Arbatli, 2011; Bénassy-Quéré et al., 2007; Bloningen, 2005; Sekkat and Veganzones-Varoudakis, 2007, quoted by Economou et al., 2017). Finally, the total tax revenue as a percentage of the GDP is also included to avoid omitted variable bias.

The data for net FDI inflow, GDP per capita, labor cost and inflation were derived from the Organisation for Economic Co-operation and Development's (OECD) and The World Bank's database. Data for corporate income tax rate was derived from the OECD's database combined with data from KPMG (2018). Data for trade openness, school enrolment, and gross capital formation and total tax revenue were derived solely from the World Bank's database. Finally, the institutional variables were obtained from the World Bank's Worldwide Governance Indicators. To estimate the impact of corporate income tax reform on the total competitiveness score, one panel data regression model has to be computed. This means that the overall competitiveness score of nations, which is calculated based upon the twelve distinct pillars, will be used to test the hypothesis. Economou et al. (2017) suggest using a fixed effects model, but this assumption will be tested in the elaboration of the model. The fixed panel data regression model equation is structured as follows:

$$GCI_{it} = ß_{0i} + ß_1 FDI_{it-1} + ß_2 MS_{it} + ß_3 TO_{it} + ß_4 LC_{it} + ß_5 HC_{it} + ß_6 MI_{it} + ß_7 CIT_{it-1} + ß_8 GCF_{it} + ß_9 INST_{it} + ß_{10} TaxRev_{it} + (ß_{11} GCI_{it-1}) + u_{it}$$
$$i = 1, 2, ..., 55, t = 1, 2, ..., 11$$

GCI_{it} stands for the overall score of the global competitiveness index. FDI_{it-1} stands for the lagged FDI inward flows, MS_{it} for market size, TO_{it} for trade openness, LC_{it} for labor cost, HC_{it} for human capital, MI_{it} for market instability, CIT_{it-1} for corporate tax rate, GCF_{it} for gross capital formation as a percentage of GDP, $INST_{it}$ for the sum of voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law and control of corruption and TaxRev for the total of tax revenues. No taxes other than corporate income tax are included in the equation but the overall tax revenue divided by the GDP of each country for each year is incorporated to account for possible replacement of governmental income. Moreover, the inclusion of other taxes, such as value added tax, would be irrelevant to a nation's competitiveness according to Feldstein & Krugman (1990). To cope with reverse causality, the corporate income tax rate will be lagged. By doing this, the competitiveness of a nation can impossibly cause the corporate income tax rate of the previous year. The analysis will be divided between developed and emerging economies to investigate if a difference exists between these two categories.

As can be seen in the equation, the lagged dependent variable is put between brackets. A possibility exists that the past value will influence the value next year. If the dependent variable is affected by this lagged variable, a dynamic panel approach has to be employed. Relevant literature points towards Arellano-Bond (AB) dynamic panel model, which accounts for endogeneity and serial correlation. If reverse causality is present in the model, the AB model will tackle this problem as well (Leszczensky & Wolbring, 2018). The AB dynamic panel model was designed for datasets with a short time dimension (T=11) and a larger country dimension (N=55) (Mileva, 2007). Since the Global Competitiveness Index is only available for 11 years, using lagged variables of the dependent variable will reduce the number of years by one year, meaning that only 10 years can be used if the AB dynamic panel model with one lag has to be used. Of course this influence has to be researched first before concluding whether to use dynamic or static panel data models. If the Arellano-Bond dynamic panel model has to be employed, there will be no need to lag FDI and Corporate income tax since this method automatically corrects for reverse causality.

4   Empirical model

In this section, the empirical analysis is performed. Before the hypotheses are tested, the data is analysed thoroughly in order to make a correct estimation. The first section will investigate which approach has to be employed (static or dynamic panel data). Afterwards, the correct model will be used and the model will be estimated.

4.1   Static or dynamic panel data?

The first thing to consider is whether to use a fixed or random effects panel data model. Even though previous literature points towards a fixed effects model, the Mundlak test will be used in order to test this proposition. The Mundlak test compares -2 log likelihoods of two models in order to investigate whether a fixed or random model should be employed. The two models to be compared for the Mundlak test are a random effects model and a random effects model appended with the mean of the time variant independent variables. The difference between the two -2 log likelihoods is chi²-distributed with the degrees of freedom equal to the number of added means of the time variant independent variables. The results look as follows:

$$-826.472 - (-854.825) = 28.353 > 18.307 \; \chi^{2*} \; {}_{(df = 10) \; 0.005}$$

Since the difference between the two -2 log likelihoods is significantly higher than the critical Chi-squared value, we reject the null hypothesis. As a result, a fixed effects approach should be used. The output of the fixed effects model also indicates, by the means of a F-test, that the intercept significantly differs between the various countries, meaning that a pooled OLS approach cannot be deployed.

As mentioned before, it might be possible that the past value of the dependent variable influences the future value of the dependent variable. If this is the case, the literature points toward the Arellano-Bond linear dynamic panel data estimation. This model requires that there is no autocorrelation in the idiosyncratic errors, which will be investigated as well. From a theoretical point of view, it is very likely that the past value will influence the future value. The competitiveness of a country will most likely be influenced by the past value, pointing towards the need for a dynamic panel data model. No specific test exist in order to investigate whether static or dynamic panel data models should be used, but the lagged dependent variable shows a highly significant value when using the Arellano-Bond estimation, pointing towards a dynamic relationship.

Furthermore, according to Roodman (2009, p.1), the AB-estimation is designed for situations with: " *(1) small T, large N" panels, meaning few time periods and many individuals; (2) one left-hand-side variable that is dynamic, depending on its own past realizations; (3) independent variables that are not strictly exogenous, meaning they are correlated with past and possibly current realizations of the error; (4) fixed individual effects; (5) and heteroscedasticity and autocorrelation within individuals but not across them".* De Vita (2016) suggests that the first condition is satisfied when N>30 and 10<T< 25. Since 55 countries are used with observations for eleven years, it is safe to say that we are dealing with a "small T, large N" panel dataset. As already discussed above, the competitiveness of a nation depends on its past realizations, making the second condition satisfied as well. Intuitively, it can be assumed that the third condition is met as well. Strictly exogenous would mean that the independent variable would be completely unaffected by the dependent variable. To give an example, there are reasons to believe that the corporate income tax would not only affect the competitiveness, but the competitiveness might also

influence the levied corporate income tax rate in a specific country. The fourth condition has already been tested above as well. Since the null hypothesis of the Mundlak test has been rejected and the F-test showed that the intercept significantly differs between the various countries, it is safe to conclude that fixed individual effects are present in the dataset. In the case of heteroscedasticity or autocorrelation, the Arellano-Bond estimation has an option to deliver consistent standard errors. Since all conditions are satisfied, a dynamic panel data model approach has to be employed to test the hypothesis. Using a fixed effects model for dynamic panel data would result in inconsistent estimates, also known as the Nickell Bias (Nickel, 1981).

The table listed below gives an overview of the used variables. As can be seen in the table, a dummy variable is used to make a distinction between developed and developing countries. The dummy variable is zero for developed economies and one for emerging economies.

Table 3 Descriptive statistics

-> DumCountry = 0

Variable	Obs	Mean	Std. Dev.	Min	Max
TOTALGCI	308	5.044939	.451954	3.859568	5.857734
FDI	308	4.34e+10	8.71e+10	-3.95e+10	7.34e+11
GDPpc	308	44467.12	21406.53	14638.6	119225.4
Inflation	308	1.617067	1.541604	-4.478103	10.36236
TradeOpen	308	101.3979	66.53302	24.4909	423.9863
ULC	308	40224.64	11287.06	19870	72880
CIT	308	24.29468	6.414931	8.5	44.42889
SecSchoolE~l	308	111.8088	17.76391	90.66246	163.9305
ShareGCF	308	22.43711	4.210469	9.818878	39.29221
SUMinst	308	7.727447	2.582702	.9374811	11.33428
TotalTaxRe~P	308	20.18339	6.217493	7.929418	36.50029

-> DumCountry = 1

Variable	Obs	Mean	Std. Dev.	Min	Max
TOTALGCI	297	4.249689	.3592269	3.295129	5.225252
FDI	297	1.93e+10	4.37e+10	-2.09e+10	2.91e+11
GDPpc	297	8651.384	4207.969	541.0651	16881.21
Inflation	297	4.741352	3.627396	-1.544797	20.83729
TradeOpen	297	79.00606	37.2716	22.10598	192.4661
ULC	297	15712.39	6231.476	2150	31910
CIT	297	22.44276	6.656897	9	34
SecSchoolE~l	297	92.18821	13.6658	44.79849	126.054
ShareGCF	297	25.06757	5.995863	12.37117	47.68587
SUMinst	297	.0459244	3.397541	-5.646608	7.319057
TotalTaxRe~P	297	15.31285	3.830127	6.917263	23.88407

Source: own calculations with Stata.

4.2   Optimization of the model

The previous section explained why a dynamic panel model approach will be used to research the relationship between the competitiveness and the corporate income taxes. In order to generate a correct estimation, all parameters have to be analysed thoroughly. This section will deal with specification outliers, leverage points and so forth.

4.2.1   Outliers and Leverage points

Literature stresses the importance of keeping all observations when dealing with economic data. According to Rousseeuw & Hubert (2011), extreme values should only be corrected if it can be proven that these values are in fact erroneous. The data used for this research is retrieved from trustworthy sources and will therefore not be corrected for extreme observations. Deviating observations may in fact contain interesting information and correcting them may lead to a manipulation of the estimation. This approach of not correcting for outliers since it would manipulate reality is also confirmed by Prof. dr. Verwaal, the promotor of this dissertation.

4.2.2   Linear relationship

The Arellano-Bond estimator is considered to estimate a linear functional relationship. Logarithms could be used to linearize the relationship between the dependent and the independent variables. Some research suggests always to use logarithms since this will also reduce the influence of extreme observations. If previous literature is considered concerning the variables used in this research, a strong indication exists that the natural logarithm should be taken from GDP per capita since this variable shows exponential growth (Anderson & Slade, 2001; Benoit, 2011). If the relationship between GDP per capita with the total competitiveness is plotted, as can be seen in Figure 2, the same conclusions can be drawn. The left-hand side of the figure indicates the relationship between the competitiveness and GDP per capita, while the right-hand side shows the relationship between the two if the natural logarithm of GDP per capita is taken. These graphs clearly indicate that the relationship between the two is being linearized when taking the natural logarithm of GDP per capita. Furthermore, when Ln(GDPpc) is used instead of GDPpc, the model also improves and the significance of the variable increases.

Figure 2 Relationship between GDPpc and Competitiveness versus Ln(GDPpc) and Competitiveness
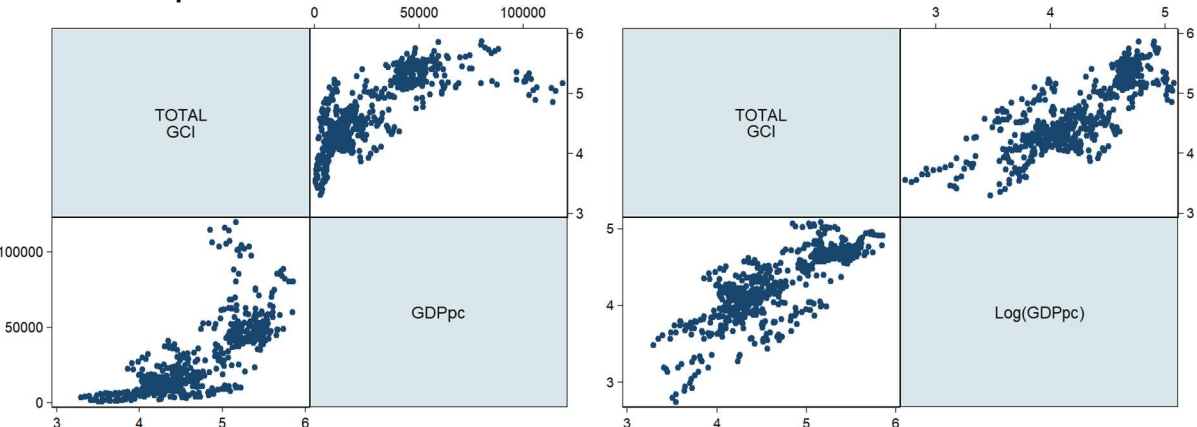
Source: own computation with Stata.

The same procedure is used for unit labor cost, as can be seen in Figure 3. Figure 3 clearly indicates that the relationship of Unit labor cost is being linearized by taking the natural logarithm. Furthermore, by doing this the model also improves and the significance of the variable increases. The need to take the natural logarithm from ULC is also confirmed by Murdock (2016) and Smith & Taylor (2016).

Figure 3 Relationship between ULC and Competitiveness versus Ln(ULC) and Competitiveness
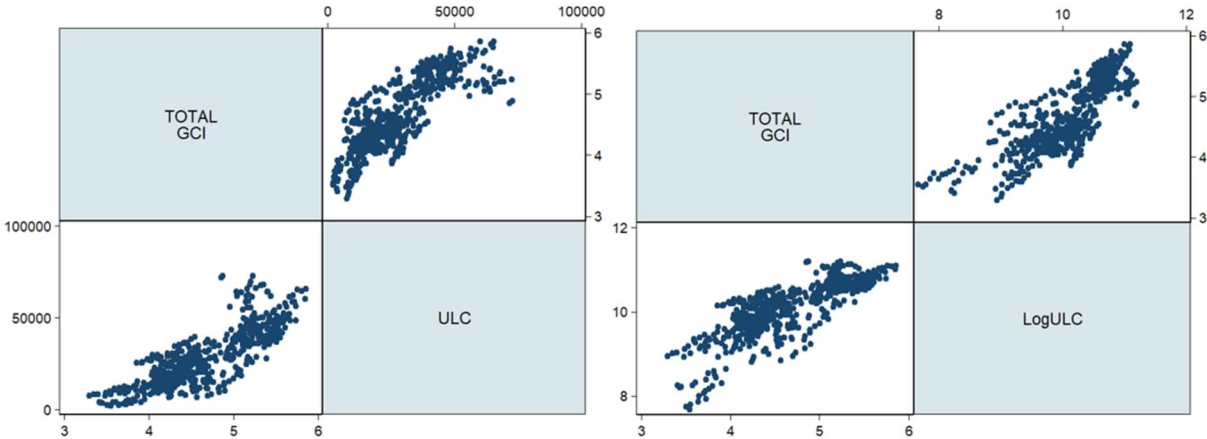
Source: own computation with Stata.

The other variables used in the estimation already show a linear relationship. Even if a natural logarithm is taken of these other variables, the model does not significantly improve. Also the dependent variable does not seem to grow exponentially, which makes a double log model unnecessary.

4.2.3   Multicollinearity

Intuitively, before running a multicollinearity test, multicollinearity is expected between the GDP per capita and the unit labor cost. Since data on unit labor cost is not widely available, gross national income per capita was taken as a proxy. The only difference between the two variables is that gross national income also takes the net receipts of primary income from abroad into account, the gross domestic product per capita does not. If a strong linear dependence exists between both variables, one of the two will have to be omitted. In order to see whether the expectation matches reality, the variance inflation factors are calculated and shown in Table 4. To give a complete image, Table 5 on page 20 shows the Pearson correlation matrix.

Table 4 Variance inflation factors

Variable	VIF	1/VIF
ULC	12.10	0.082656
GDPpc	10.77	0.092856
SUMinst	3.49	0.286765
SecSchoolE~l	1.97	0.508378
TotalTaxRe~P	1.78	0.561063
Inflation	1.43	0.700326
TradeOpen	1.42	0.702031
CIT	1.28	0.780620
FDI	1.28	0.783767
ShareGCF	1.21	0.824276
Mean VIF	3.67	

Source: own computation with Stata.

The variance inflation factors clearly show drastic multicollinearity, and confirm the expected correlation between GDP per capita and unit labor cost. Table 5 shows a Pearson correlation of 94.22% between the two variables, which is problematic.

Table 5 Pearson correlation matrix

	FDI	GDPpc	Inflat~n	TradeO~n	ULC	CIT	SecSch~l	ShareGCF	SUMinst	TotalT~P
FDI	1.0000									
GDPpc	0.2139	1.0000								
Inflation	-0.0856	-0.3996	1.0000							
TradeOpen	-0.0782	0.3629	-0.1946	1.0000						
ULC	0.2545	0.9422	-0.4747	0.3444	1.0000					
CIT	0.2117	0.0393	0.0638	-0.3241	0.0068	1.0000				
SecSchoolE~l	0.1198	0.4944	-0.3540	0.1278	0.5631	0.1272	1.0000			
ShareGCF	0.0853	-0.2262	0.2843	-0.1183	-0.2817	-0.0514	-0.2235	1.0000		
SUMinst	0.1490	0.7899	-0.4681	0.2432	0.8002	0.0660	0.5998	-0.2932	1.0000	
TotalTaxRe~P	-0.1275	0.4499	-0.2336	0.3007	0.4342	0.0862	0.5285	-0.2716	0.5028	1.0000

Source: own computations with Stata.

Besides the correlation between ULC and GDPpc, both variables seem to be moderately correlated with other variables as well. The correlation of ULC with other variables is higher compared to the correlation of GDPpc with other variables. Since ULC is proxied by gross national income per capita, which is the gross domestic income per capita including the net receipts of primary income from abroad, both variables measure the same thing and one variable can be dropped. Unit Labor Cost will be dropped since this variable shows the highest collinearity. Furthermore, GDPpc is confirmed in more literature to be relevant for this research compared to unit labor cost. When unit labor cost is being excluded from the model, the variance inflation factors are much more satisfying, as can be seen in Table 6.

Table 6 Variance inflation factors, ULC excluded

Variable	VIF	1/VIF
SUMinst	3.43	0.291178
GDPpc	3.06	0.327312
SecSchoolE~l	1.82	0.548034
TotalTaxRe~P	1.77	0.565803
TradeOpen	1.42	0.702123
Inflation	1.37	0.729898
CIT	1.25	0.800242
FDI	1.22	0.817800
ShareGCF	1.18	0.850042
Mean VIF	1.84	

Source: own computations with Stata.

4.2.4 Heteroscedasticity

Figure B. 1, which can be found in appendix 2, illustrates the partial regression plots. These partial plots clearly indicate that the variance of the total competitiveness increases or decreases as the exogenous variables increase, hence heteroscedasticity is present. Of course outliers can cause heteroscedasticity, but the graphs soundly illustrate that even if outliers were dealt with, heteroscedasticity would still be present.

Arellano & Bond (1991) mention the requirement for an adjusted estimation when heteroscedasticity is suspected. Since heteroscedasticity is suspected in this research, a robust approach of the Arellano-Bond estimator will be used. When the robust approach is employed, the standard errors of the estimation will be consistent with panel-specific autocorrelation and heteroscedasticity (Mileva, 2007). The use of the robust version of the Arellano-Bond estimator has consequences for other tests. When the robust version is used, the Sargan test for overidentifying conditions cannot be computed. The

Sargan test requires an asymptotic chi-squared distribution, wherefore a homoscedastic error term is needed (Arellano & Bond, 1991).

4.2.5   Serial correlation

Serial correlation would be present if the differenced unobserved time-invariant component would be related to the second lag of the endogenous variable (Pinzon, 2015). In case of serial correlation, endogeneity would bias the research. Table 7 indicates that the hypothesis of zero autocorrelation of order 1 can be rejected and the hypothesis of zero autocorrelation of order 2 cannot be rejected. This table shows evidence that the Arellano-Bond assumptions are satisfied and that no different instruments should be used for this research.

Table 7 Test for serial correlation

Order	z	Prob > z
1	-2.5049	0.0122
2	-.9527	0.3407

H0: no autocorrelation

Source: own computations with Stata.

4.3   Empirical results

The empirical results of the research are split up in two parts. The first part shows the Arellano-Bond estimation, which is followed by a discussion of each variable. A distinction is made between the empirical results of the developed economies and the emerging economies. Table 8 illustrates the Arellano-Bond estimation for the developed economies, while Table 9 illustrates the Arellano-Bond estimation for the emerging economies.

4.3.1   Arellano-Bond Estimation

Table 8 and Table 9 illustrate the Arellano-Bond estimation for the two distinct categories of countries. The Arellano-Bond estimation automatically generates the Wald model test. The results soundly indicate that the null hypothesis of all coefficients except for the constant equal to zero can be rejected.

Table 8 Arellano-Bond Estimation Developed Economies

```
-> DumCountry = 0


Arellano-Bond dynamic panel-data estimation   Number of obs       =       252
Group variable: CountryNR                     Number of groups    =        28
Time variable: Year
                                              Obs per group:  min =         9
                                                              avg =         9
                                                              max =         9

Number of instruments =      55              Wald chi2(9)         =    174.99
                                             Prob > chi2          =    0.0000
One-step results
                              (Std. Err. adjusted for clustering on CountryNR)
```

TOTALGCI	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
TOTALGCI						
L1.	.7004256	.0948024	7.39	0.000	.5146163	.8862348
CIT	-.0102427	.0056381	-1.82	0.069	-.0212932	.0008078
FDI	2.68e-13	1.05e-13	2.56	0.010	6.28e-14	4.73e-13
LogGDPpc	.0294935	.0620264	0.48	0.634	-.0920761	.1510631
Inflation	-.0025219	.0033821	-0.75	0.456	-.0091507	.0041069
TradeOpen	.0013893	.0008016	1.73	0.083	-.0001819	.0029605
SecSchoolEnrol	.0010866	.0017212	0.63	0.528	-.0022869	.00446
ShareGCF	.0067948	.0032679	2.08	0.038	.0003898	.0131997
SUMinst	.0153173	.0219012	0.70	0.484	-.0276083	.0582429
TotalTaxRevofGDP	.0221581	.0049126	4.51	0.000	.0125297	.0317866
_cons	.4663312	.8033123	0.58	0.562	-1.108132	2.040794

Source: own computations with Stata

Table 9 Arellano-Bond Estimation Emerging Economies

```
-> DumCountry = 1


Arellano-Bond dynamic panel-data estimation   Number of obs      =        243
Group variable: CountryNR                      Number of groups   =         27
Time variable: Year
                                               Obs per group:  min =          9
                                                               avg =          9
                                                               max =          9

Number of instruments =       55              Wald chi2(9)        =     285.07
                                              Prob > chi2         =     0.0000
One-step results
                              (Std. Err. adjusted for clustering on CountryNR)
```

| | | Robust | | | | |
TOTALGCI	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
TOTALGCI						
L1.	.6077165	.1130823	5.37	0.000	.3860794	.8293537
CIT	-.0016387	.0033533	-0.49	0.625	-.008211	.0049335
FDI	-5.33e-13	4.81e-13	-1.11	0.267	-1.48e-12	4.09e-13
LogGDPpc	.1045513	.0522161	2.00	0.045	.0022096	.2068931
Inflation	-.0041536	.001806	-2.30	0.021	-.0076932	-.000614
TradeOpen	.0031398	.0006282	5.00	0.000	.0019086	.004371
SecSchoolEnrol	.0021905	.0015192	1.44	0.149	-.0007871	.0051681
ShareGCF	-.0016223	.0026991	-0.60	0.548	-.0069124	.0036678
SUMinst	.0256282	.01557	1.65	0.100	-.0048884	.0561448
TotalTaxRevofGDP	.0006857	.0057565	0.12	0.905	-.0105968	.0119681
_cons	.3991294	.4525667	0.88	0.378	-.487885	1.286144

Source: own computations with Stata

4.3.2   Empirical findings and discussion

This section discusses the empirical results of the Arellano-Bond estimation and seeks for explanations about the sign of each variable, the significance and the difference between the two distinct categories of countries. Each variable is discussed separately, with the main emphasis on corporate income taxation. Both tables confirm the dynamic nature of the total competitiveness since a statistically significant and positive relationship exists between the total competitiveness and the one-lagged total competitiveness.

4.3.2.1   Corporate Income Taxation (CIT)

The effect of corporate income taxation on the competitiveness of countries seems to differ substantially between developed and emerging economies. Whether corporate income taxation of developed economies can be seen as significant, depends on how stringent the p-values are viewed. If a significance level of 10% is used, the effect of corporate income taxation on the competitiveness of developed economies could be seen as significant. On the contrary, the effect of corporate income taxation on the competitiveness of emerging economies shows no significant results.

Tanzi & Zee (2000) give multiple explanations why taxes have a different impact in developed and emerging economies. First of all, a lot of emerging economies lack a decent economic structure, resulting in difficulties when imposing and collecting taxes. Secondly, in most cases the tax administration of emerging economies has a limited capacity. The third reason Tanzi & Zee give is insufficient data. Finally, the political set up in developed economies is more oriented towards rational tax policy compared to emerging economies. To summarize, the tax administration in many emerging economies tries to impose a decent tax policy but lacks the ingredients to actually establish and collect these taxes. Tanzi & Lee (2000, p.300) also describe this phenomenon as *"tax policy in emerging economies is often the art of the possible rather than the pursuit of the optimal"*. On the other hand, Delavallade (2006) blames corruption in emerging economies for the minor impact of changing tax policy.

As can be seen in Table 8 and Table 9, the coefficient for both distinct clusters of countries has a negative sign. Meaning that an increase in corporate income taxation negatively affects the total competitiveness of nations. This negative impact of corporate income taxation on the total competitiveness of nations is not surprising since a negative impact was expected for eight out of the twelve pillars, as illustrated in the literature review. Even though this negative impact might not be surprising based on the literature review used for this research, it might be surprising for a lot of policy makers and can have severe implications. To give an example, the debated corporate income tax overhaul implemented by the Donald Trump, current president of the United States, to increase the competitiveness might not as vacuous as some people profess. Donald Trump lowered the corporate income taxes in the United States from 35% to 21%. According to the empirical results of the Arellano-Bond estimation, a decrease of 14% in corporate income taxation would result in an increase of the total competitiveness score of .1434 (The ß of CIT equals -.0102427 for developed economies, hence a reduction of 14% would result in an increase of -14*-.0102427 = .1434). On the other hand, emerging countries should not lower their corporate income taxes to increase competitiveness because the impact of corporate income tax reduction is insignificant. To give an example, Mihály Varga, the Hungarian minister of finance, lowered the corporate income taxes from 19% to 9% in order to increase the competitiveness (Varga, 2016). The evidence of the Arellano-Bond estimation clearly shows that increasing competitiveness cannot form a motive for lowering corporate income taxes in emerging economies due to the insignificant outcomes, thus this policy should be revised.

4.3.2.2 Foreign Direct Investment (FDI)

The effect of foreign direct investment on the competitiveness of countries seems to differ substantially between developed and emerging countries. Table 8 soundly illustrates that foreign direct investment positively impacts the competitiveness of developed economies since the coefficient for developed economies is highly significant at a level of 1%. On the contrary, foreign direct investment has no effect on the competitiveness of emerging economies since the coefficient is insignificant, which can be seen in Table 9.

The literature review briefly discussed the effect of foreign direct investment on the competitiveness of nations. The literature review indicates that increased foreign direct investment has a positive impact on the competitiveness. To give some examples, increased foreign direct investment inflow is expected to make markets more efficient, to increase R&D expenditures or to result in technology spillovers, thus increasing the competitiveness. This expectation also corresponds with the sign of the coefficient estimated by the Arellano-Bond estimation for the developed economies. The estimation soundly proves that foreign direct investment positively influences the competitiveness of developed economies. Foreign direct investment has a negative coefficient for emerging economies, yet this coefficient is insignificant. A possible explanation for this negative sign is given by Chaudhuri & Mukhopadhyay (2014). They mention the fact that foreign direct investment inflow might deteriorate the welfare when

tariff protection is present. These tariffs still prevail in emerging economies (UNCTAD, 2018), which can be one of the explanations for the negative sign of the coefficient for emerging economies.

Chaudhuri & Mukhopadhyay (2014) also give a possible explanation why foreign direct investment has no significant effect on the competitiveness of emerging economies. According to them, the beneficial effects of foreign direct investment can rarely be guaranteed in emerging economies since these economies are characterized by dualism and imperfect markets. Whether foreign direct investment has a positive effect depends according to them on the sharpness and efficacy of the government, which can explain the different impact in both categories of countries. Furthermore, as already mentioned in the literature review, foreign direct investment results in more efficient markets because of increased competition (Blundell et al., 1999; Schwab et al., 2015). This of course implicates that competition has to be present for markets to become more efficient, which might not be the case in emerging economies. When no competition is present in emerging economies, markets cannot become more efficient due to foreign direct investment, resulting in no effect on the competitiveness for emerging economies. Developed economies on the other hand have more chances of having competition, resulting in increased competitiveness when foreign direct investment is increased. A similar way of thinking applies to R&D. According to Aghion, Bechtold, Cassar, & Herz (2014) and Tang (2006), foreign direct investment results in increased R&D expenditures. Of course there is a substantial difference between the stage of development of R&D in both categories of countries. Developed economies tend to have more means for R&D compared to emerging economies (with China as an exception) (UNESCO, 2018), which also explains why foreign direct investment only shows significant results for developed economies.

4.3.2.3 *Market Size (proxied by gross domestic product per capita (GDPpc))*

Gross domestic product per capita is used as a proxy for the market size of a country. This variable does not seem to have the same impact on the competitiveness of developed and emerging economies. Table 8 and Table 9 clearly illustrate that gross domestic product impacts both clusters of countries positively, even though the coefficient is insignificant for developed economies. For the emerging economies, the coefficient is significant at a level of 5%.

Schwab (2017) already indicated that an increased market size improves the competitiveness of a nation. According to him, an increased market size leads to possible economies of scale in production and gives incentives for innovation, which explains the positive sign of the coefficient. Economies of scale are achieved since a bigger market translates into an increased production. Incentives for innovation are created since an increase in market size translates into more potential customers, hence more potential profit.

Market size is defined as the domestic market in combination with foreign markets. The Arellano-Bond estimation clearly shows that market size has a significant impact on competitiveness for emerging countries, but not for developed countries. A possible explanation is that emerging economies are growing at an accelerated pace compared to developed economies. When only considering the countries and time frame used in this research, the developed economies have known a growth on average in market size of 3.23%, while the emerging economies have known a growth on average in market size of 35.56% (Schwab, 2017). The emerging economies have increased their market size tremendously, enabling them to achieve the economies of scale and innovations which the developed economies have achieved many years ago, positively influencing the competitiveness. Developed economies might possibly have reached the upper limit, meaning that market size cannot be enlarged infinitely. Since developed economies might have reached the maximum level of economies of scale, an increase in market size does not necessarily benefit the competitiveness of a country.

4.3.2.4 Market Instability (proxied by inflation)

The effect of market instability on the competitiveness of countries seems to differ considerably between developed and emerging countries. Table 8 and Table 9 clearly illustrate that market instability negatively impacts the competitiveness of both categories of countries, since the coefficients both have a negative sign. Even though both coefficients have a negative sign, market instability insignificantly influences the competitiveness of developed economies. On the contrary, market instability influences the emerging economies significantly at a level of 5%.

On average throughout the 11 years used for this research, the developed economies have known an inflation of 1.62%, while the emerging economies have known an inflation of 4.74%. Of course the higher level of inflation in emerging economies can be dedicated to the rapid growth rate of these countries. Since high inflation leads to a depreciation of the currency, which translates into more expensive products and reduced export, the impact of inflation on the competitiveness of a country is negative.

According to Chevapatrakul & Paez-Farrell (2018), developed economies generally have a more stable institutional climate and a stronger credibility, which ensures that inflation does not cause major economic instability. On the contrary, emerging economies are facing a weaker institutional climate which translates into a greater exposure to international shocks. This difference explains why inflation has a negative significant effect for emerging economies but not for developed economies. Furthermore, emerging economies face a greater risk of policy errors since these countries often do not evaluate the inflation pass-through rate accurately, which causes inflation to have stronger effects on the competitiveness in these countries (Calvo and Reinhart 2002; Ball and Reyes 2008).

4.3.2.5 Trade Openness

The effect of trade openness on the competitiveness of countries does not seem to differ substantially between developed and emerging countries. Whether the coefficient of trade openness for developed economies can be seen as significant, depends on how stringent the p-values are viewed. If a significance level of 10% is used, the effect of trade openness on the competitiveness of developed economies could be seen as significant. On the contrary, the effect of trade openness on the competitiveness of emerging economies is significant at a level of 1%.

The coefficient of trade openness is positive, meaning that a higher trade openness results in a higher competitiveness. This has also been confirmed by the World Economic Forum (2018), who found that the more an economy participates in the global economy, the more competitive the economy will be. The World Economic Forum (2017) finds that greater trade openness results in greater productivity and encouraged innovation, which benefits the competitiveness of nations. The fact that trade liberalization results in productivity growth an innovation has also been confirmed by Coelli, Moxnes, Ulltveit-Moe (2016) & Licandro (2010). Also the IMF (2001) emphasised the fact that trade openness is required to increase living standards substantially, also benefiting the competitiveness of nations.

Previous literature agrees upon the fact that trade openness is beneficial for the competitiveness of nations, but a difference in significance still exists between developed and emerging economies. The results from the Arellano-Bond estimation show that the effect of trade openness on the competitiveness of emerging economies is more significant compared to developed economies. The IMF (2001) mentions that trade openness mostly benefits the poor, which are predominantly found in emerging economies. Trade openness results in job creation for unskilled workers, lifting them into the middle class. The IMF (2001) emphasises the fact that trade liberalization leads to more rapid growth in emerging economies compared to developed economies. The IMF (2001) also mentions that trade liberalization would be more beneficial for emerging economies since these countries are know more protectionism than developed countries and these countries are facing higher barriers. Furthermore, Dogan, Osakwe & Santos-Paulino (2018) also mention that trade liberalization is more important for

emerging economies since it enables them to diversify their export structure, reducing the dependence on a single commodity. The evidence that trade openness positively influences the competitiveness of nations also has important implications for current policy makers. The current trend towards protectionism would thus reduce the competitiveness of nations. As already mentioned before, current United States president Donald Trump's argument of reducing corporate income taxes to increase competitiveness might be right, but according to this evidence his policy of protectionism should be revised.

4.3.2.6   Human capital (proxied by secondary school enrolment)

As can be seen in Table 8 and Table 9, the coefficients of secondary school enrolment are insignificant. This insignificance means that human capital does not influence the competitiveness of nations. An explanation for this insignificance could be that human capital is not solely measured by secondary school enrolment, even though secondary school enrolment has been seen as an appropriate proxy for human capital in previous literature (Agiomirgianakis et al.; 2004, Nourzad et al., 2014; Sekkat & Veganzones-Varoudakis, 2007). For this variable to be complete, on-the-job training, brain drain, migration and other demographic factors should be accounted for as well (Aykac et al., 2005). Due to data unavailability, these other factors could not be included for the used countries, which can be seen as a limitation of this research.

4.3.2.7   Share of gross capital formation as a percentage of GDP (ShareGCF)

The effect of gross capital formation on the competitiveness of countries seems to differ substantially between developed and emerging countries. Table 8 soundly illustrates that gross capital formation positively impacts the competitiveness of developed economies since the coefficient for developed economies is significant at a level of 5%. On the contrary, gross capital formation has no effect on the competitiveness of emerging economies since the coefficient is insignificant, which can be seen in Table 9.

The share of gross capital formation as a percentage of GDP indicates how much money is being spent on additions to fixed assets of a country. Fixed assets include construction of roads, railways, land improvements, industrial buildings and so forth. Table 8 clearly illustrates that gross capital formation as a percentage of GDP positively impacts the competitiveness of nations, since the coefficient has a positive sign. On the contrary, the coefficient for emerging economies has a negative sign but is insignificant. A positive impact was expected for this variable, since the quality and quantity of infrastructure is incorporated in the calculation of the total competitiveness score of a country. Spending more on fixed assets and improving infrastructure would hence result in increased competitiveness.

Intuitively, increased gross capital formation is expected to improve the competitiveness of emerging economies as well. The insignificance can probably be dedicated to the accounting system used in emerging economies. The World Bank, from where the data on gross capital formation is retrieved, mentioned that the quality of data on government fixed capital formation is highly dependent on the quality of the government accounting system, which tends to be low in emerging economies. Noteworthy as well is the fact that the share of gross capital formation as a percentage of GDP is higher on average in emerging countries compared to developed countries, which can be seen in Table 3. Emerging economies tend to face higher corruption and be less efficient in public spending, which can also explain why more money is being spent on additions to fixed assets in these countries, but no increase in competitiveness can be guaranteed (D'agostino et al., 2016).

4.3.2.8   Sum Institutional variables (SUMinst)

The effect of the institutional variables on the competitiveness of countries differs between developed and emerging countries. Table 8 and Table 9 soundly illustrate that the institutional variables positively

impacts the competitiveness of both clusters of countries, since the coefficients both have a positive sign. Even though both coefficients have a positive sign, the institutional variables insignificantly influences the competitiveness of developed economies. Whether the coefficient of the institutional variables for emerging economies can be seen as significant, depends on how stringent the p-values are viewed. If a significance level of 10% is used, the effect of the institutional variables on the competitiveness of emerging economies could be seen as significant.

Since the coefficients of institutional variables are positive, an amelioration of the institutional variables hence results in an increased competitiveness. Ample research exists regarding the influence of institutions on a country, which is why a positive significant impact was expected for both categories of countries. It has been proven that institutions play a fundamental role in the productivity of nations (Hall & Jones, 1999). Furthermore, institutions are also responsible for guaranteeing the absence of violence, which is proven to have a positive impact on the private investments and economic transactions of a country (Detotto & Otranto, 2010; Detotto & Pulina, 2013). Even though previous research pointed towards a positive effect on the competitiveness of nations, developed economies show insignificant results and emerging economies show little significant results.

The difference in significance indicates that for developed economies, the institutional variables do not contribute to the competitiveness of the nation. For emerging economies on the other hand, institutional variables contribute little to the competitiveness of nations. A possible explanation could be that from a certain level of development of institutions, other sources of competitiveness amelioration should be sought. Meaning that countries should develop a certain level of institutional development to facilitate the foundation for economic activity, but after a certain level of development, institutions cannot foster competitiveness any further. Emerging economies are typically characterized by less developed institutions compared to developed economies, which can be the reason why an amelioration of their institutional climate can still significantly influence the competitiveness up until a certain level.

4.3.2.9 *Total tax revenue as a percentage of GDP (TotalTaxRevofGDP)*

The influence of the total tax revenue on the competitiveness of countries differs substantially between developed and emerging countries. Table 8 soundly illustrates that the total tax revenue positively impacts the competitiveness of developed economies since the coefficient for developed economies is significant at a level of 1%. On the contrary, the total tax revenue has no effect on the competitiveness of emerging economies since the coefficient is insignificant, which can be seen in Table 9.

The coefficient for both categories of countries has a positive sign, meaning that an increase in tax revenue results in an increased competitiveness. Even though the coefficient is positive, the effect of total tax revenue on the competitiveness of emerging economies is insignificant. As mentioned in detail in the literature review, taxes were expected to impact the distinct pillars of competitiveness differently. Meaning that the effect of increased taxes can be positive or negative, depending on the specific pillar. To give some examples, a positive influence on the economy when increasing taxes is expected for institutions or infrastructure. When the tax revenue increases, Institutions will have more income to impose a decent regulatory framework. Furthermore, there will be more liquidities to improve the existing infrastructure or to introduce new infrastructure. On the contrary, a negative impact is expected for technology for example. According to (Arbatli, 2011; Bloningen, 2005; Cassou, 1997; Krifa-Schneider & Matei, 2010; Mudenda 2015), increased taxes results in less FDI inflow, which means less technology coming into the country. This lower competition, due to reduced FDI, also results in less innovation (Aghion et al., 2014). Even though the impact of increased taxes was expected to influence different aspects of competitiveness differently, the overall impact is still positive. Thus, more tax income increases the competitiveness of nations.

An obvious explanation for the insignificant impact for emerging economies is corruption. Corruption in these economies tends to be higher, which can explain why more tax revenue does not automatically

results in increased competitiveness. As already mentioned before, this thought is also confirmed by Delavallade (2006), who blames corruption in emerging economies for the minor impact of changing tax policy. Furthermore, a lot of arguments already discussed in the section about corporate income tax also can be applied right here. Tanzi & Zee (2000) give multiple explanations why taxes have a different impact in developed and emerging economies. The lack of decent economic structure results in various complications when imposing and collecting taxes. Their research also points towards the limited capacity of the tax administration in emerging economies. To conclude, emerging economies are not as oriented towards rational tax policy as developed economies are. All these reasons indicate why the impact of tax revenue is insignificant for emerging economies.

Noteworthy is the different impact of corporate income tax and total tax revenue on the competitiveness of nations. As discussed previously, corporate income tax negatively influences the competitiveness, while increased tax revenue positively influences the competitiveness of nations. Besides the difference in sign for both variables, both variables are only significant for developed economies. From this empirical evidence, the conclusion can be drawn that only developed economies can increase their competitiveness by increasing taxes, but these countries should look at taxes other than corporate income tax. Developed economies should hence lower their corporate income taxes, but should look for other sources of tax revenue as well to increase their competitiveness.

5   Conclusion & implications

The objective of this dissertation is to investigate the influence corporate income taxes have on the competitiveness of nations. This conclusion will summarise the findings of this dissertation, which will complement prior research about competitiveness of nations. This section will also deal with the implications these results have for policy makers around the world.

5.1   General conclusion

The literature review soundly illustrates that corporate income taxes are expected to influence the various aspects of an economy differently. The Global Competitiveness Index, constructed by the World Economic Forum, is used to quantify and measure the competitiveness of nations and deals with these various segments of a nation's economy. By using the Global Competitiveness Index, the effect of corporate income taxation on the competitiveness of nations could be examined.

Even though corporate income taxes are expected to have a different impact on the distinct aspects of a nation's economy, the negative coefficients of the Arellano-Bond estimation indicate that competitiveness will be harmed when increasing corporate income taxes. This conclusion can only be drawn for developed economies, since the impact of corporate income taxation on competitiveness for developed economies remains insignificant. The rudimentary tax collection and economic infrastructure, complemented with corruption and irrational tax policy, potentially explains why corporate income taxation does not influence the competitiveness of emerging economies. Developed economies are characterised by more rational tax policy, decent economic infrastructure and a lack of corruption. These characteristics provide developed economies with the right ingredients to ameliorate competitiveness when altering corporate income taxes.

Besides corporate income taxation, this dissertation also investigates how other variables influence the competitiveness of nations. The empirical results indicate that foreign direct investment inflow positively impacts the competitiveness of developed economies. These highly significant results for developed economies are contrasted with an insignificant impact of foreign direct investment inflow on the competitiveness of emerging economies. Prior research indicates that increased foreign direct investment inflow makes markets more efficient, increases R&D expenditures and results in technology spillovers. This expectation also corresponds with the positive sign of the coefficient estimated by the Arellano-Bond estimation for the developed economies in this dissertation. The negative results for emerging economies can be explained by deteriorating welfare effects through tariffs protection. The insignificance on the other hand can be dedicated to dualism and imperfect markets, mostly prevailing in emerging economies (Chaudhuri & Mukhopadhyay, 2014). The lack of competition and means for research and development in emerging economies also forms a potential explanation of the difference between developed and emerging economies (Aghion, Bechtold, Cassar, & Herz, 2014; Tang, 2006; & UNESCO, 2018).

Furthermore, the results indicate that market size only significantly impacts emerging economies. The positive effect of increased market size on the competitiveness of nations can be dedicated to potential economies of scale in production and increased incentives for innovation. The accelerated growth occurring in emerging economies enables these countries to achieve the economies of scales the developed economies have reached years ago, which can explain the difference in significance. An upper limit to economies of scale might exist for developed economies, which can explain why increasing market size does not necessarily leads to increased competitiveness.

Market instability negatively impacts the competitiveness of both categories of countries, but the impacts is only significant for emerging economies. The rapid growth of the emerging economies used in this sample also translates in a substantially higher level of inflation. The negative sign of the Arellano-bond estimation matches expectations. Since high inflation leads to a depreciation of the currency, which translates into more expensive products and reduced export, competitiveness is impacted negatively. The stable institutional climate and stronger credibility of developed economy mitigates the impact of inflation and prevents major economic instability, which explains the insignificant impact (Chevapatrakul & Paez-Farrell, 2018). On the other hand, emerging economies have a greater exposure to international shocks and face a greater risk of policy errors, which causes inflation to have stronger effects on the competitiveness of these countries (Calvo and Reinhart 2002; Ball and Reyes 2008).

Depending on the stringency used when evaluating the results, the impact of trade openness on the competitiveness of developed economies can be seen as significant. On the other hand, the impact on the competitiveness of emerging economies is highly significant. A positive impact is found, which means that a greater openness of the economy ameliorates the competitiveness of countries. This ameliorated competitiveness can be explained by greater productivity, encouraged innovation and increased living standards as a results of a greater openness (IMF, 2001; & The World Economic Forum, 2017). The higher significance found for emerging economies can be explained by the fact trade openness mostly benefits the poor, which are predominantly found in emerging economies. The IMF (2001) also noted that trade liberalization leads to more rapid growth in emerging economies compared to developed economies. Another explanation of the higher significance is that trade openness enables emerging economies to diversify their export structure, reducing the dependency on a single commodity.

The results clearly indicate that human capital does not significantly influence the competitiveness of nations. An explanation for this insignificance could be that human capital is not solely measured by secondary school enrolment, even though secondary school enrolment has been seen as an appropriate proxy for human capital in previous literature (Agiomirgianakis et al.; 2004, Nourzad et al., 2014; Sekkat & Veganzones-Varoudakis, 2007). Due to data availability, this variable could not be extended in order to include all potentially important factors.

The share of gross capital formation, indicating how much money is being spent on additions to fixed assets of a country, only significantly impacts the competitiveness of developed economies. The effect is positive, meaning that spending more on fixed assets and improving infrastructure positively impacts the competitiveness of a country, which corresponds to the expectations. The rudimentary accounting system used in emerging economies results in a lower quality of data and can potentially explain why the results are insignificant for these countries (The World Bank, 2017). Furthermore, less efficient public spending and corruption can also explain why more money is being spent on fixed assets in emerging economies compared to developed economies (D'agostino et al., 2016), but no equal effect can be found on the competitiveness.

The institutional variables used in this research positively influence the competitiveness of nations. An improvement of institutions thus ameliorates the competitiveness of nations. Even though both categories of countries show a positive sign, only the influence on emerging economies can be seen as significant if the p-values are viewed not too stringent. Institutions play a fundamental role in the productivity of nations (Hall & Jones, 1999) and institutions are also responsible for guaranteeing the absence of violence. This absence of violence is proven to have a positive impact on the private investments and economic transactions of a country (Detotto & Otranto, 2010; Detotto & Pulina, 2013), which explains the positive effect on the competitiveness of nations. A possible explanation for the insignificant influence for developed economies could be that from a certain level of development of institutions, other sources of competitiveness amelioration should be sought. Meaning that countries should develop a certain level of institutional development to facilitate the foundation for economic activity, but after a certain level of development, institutions cannot foster competitiveness any further.

Finally, the results indicate that that the total tax revenue positively impacts the competitiveness of developed economies, but no effect is found for emerging economies. The positive sign indicates that increased tax revenues, which give the government more means, improve the competitiveness for developed economies. The literature review discussed the expectations of increased taxes on the various aspects of the economy in detail. Even though the impact of increased taxes was expected to influence different aspects of competitiveness differently, the overall impact is still positive. Also for this variable, corruption can be blamed for the insignificant impact for emerging economies (Delavallade, 2006). Besides corruption the same arguments discussed in the section about corporate income tax can be applied right here as well.

5.2   Implications for policy makers

This section discusses the implications of this research for policy makers around the world. The emphasis lies on corporate income taxes, being the main research goal of this dissertation. The results are complemented with the current trends of corporate income tax reduction and protectionism which are taking place around the world.

The results of this research indicate that the motive of corporate income tax reduction to increase the competitiveness of nations might not as vacuous as some people profess. However, this motive only applies for developed economies. The debated action of lowering the corporate income taxes to improve the competitiveness taken by Donald Trump, current president of the United States, are hereby proven effective. According to the empirical results in this dissertation, Donald Trump's reduction of corporate income taxes from 35% to 21% would result in an increase of the total competitiveness score of .1434, as measured by the Global Competitiveness Index. On the other hand, similar actions taken by emerging economies are proven to have an insignificant effect. To give an example, the corporate income tax reduction to improve the competitiveness implemented by Hungary should be reconsidered.

Remarkable is the different impact of corporate income tax and total tax revenue on the competitiveness of nations. The empirical results indicate that corporate income taxation has a negative impact, while total tax revenue positively influences the competitiveness of nations. These contradictory results indicate that nations can increase their competitiveness by increasing tax revenue, but these countries should look at taxes other than corporate income tax. This conclusion can only be drawn for developed economies, since both corporate income tax and total tax revenue is insignificant for emerging economies.

Currently a trend of protectionism is raising around the world. Countries, like the United States for example, are reducing their trade openness. The empirical results of this research soundly illustrate that the closing of trade deteriorates the competitiveness of nations. Even though the results for developed economies are only significant at a level of 10% for developed economies, the results are highly significant at a level of 1% for emerging economies. However Donald Trump can be right about lowering the corporate income taxes, his policy about trade openness is expected to lower the competitiveness of the United States. This conclusion can be drawn for both categories of countries.

6 Bibliography

Aghion, P., & Schankerman, M. 2004. On the Welfare Effects and Political Economy of Competition-Enhancing Policies. *Economic Journal*, 120(542): 800-824.

Aghion, P., Bechtold, S., Cassar, L., & Herz, H. 2014. The Causal Effects of Competition on Innovation: Experimental Evidence. *Working paper*: Harvard University.

Agiomirgianakis, G., Asteriou, D., Papathoma K. 2003. The determinants of foreign direct investment: a panal data study for the OECD countries. *Discussion Paper Series*: 03/06: Department of Economics.

Ajitabh, A. & Momaya, K. 2004. Competitiveness of Firms: Review Theory, Frameworks and Models. *Singapore Management Review*, 26(1): 45-61.

Alfaro, L., Areendam, C., Sebnem, K., & Selin, S. 2004. FDI and economic growth: the role of local financial markets. *Journal of International Economics*, 64(1): 89-112.

Almonte, C., Aquilante, T., & Ottaviano, G. 2012. The triggers of competitiveness: The EFIGE cross-country report. http://bruegel.org/wp-content/uploads/imported/publications/Blueprint_XVII_web.pdf (04/11/2018).

Anderson, G., Slade, E. 2001. The relationship between per capita income and diffusion of medical technologies. *Health policy*, 58(1): 1-14.

André, C., & Hwang, H. 2018. Tax Reform to Support Growth and Employment in Finland. *Economics Department Working Papers series*: 1468: OECD.

Arbatli, E. 2011. Economic Policies and FDI Inflows to Emerging Market Economies. *IMF Working Paper*: WP/11/192: International Monetary Fund.

Arellano, M., & Bond, S. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application To Employment Equations. *The Review of Economic studies*, 58(2): 277-297.

Assemblée Nationale. 2017. Projet de loi de programmation des finances publiques pour les années 2018 à 2022. http://www.assemblee-nationale.fr/15/ta/ta0028.asp (22/11/2018).

Auge, I., Elsner, T., Frey, T., Kastrissianakis, S., & Sanz, F. 2016. Single market integration and competitiveness report. https://ec.europa.eu/docsroom/documents/20210/attachments/2/translations/en/renditions/native, p5-39, (06/12/2018).

Australian Taxation Office. 2018. Reducing the corporate tax rate. https://www.ato.gov.au/General/New-legislation/In-detail/Direct-taxes/Income-tax-for-businesses/Reducing-the-corporate-tax-rate/ (19/11/2018).

Aykac,E., Bildirici, M., Orcan, M., & Sunal, S. Determinants of human capital theory, growth and brain drain; an econometric analysis for 77 countries. *Applied Econometrics and International Development*, 5(2): 109-140.

Ball, C., & Reyes, J. 2008. Inflation targeting or fear of floating in disguise? A broader perspective. *Journal of Macroeconomics*, 30(1): 308-326.

Balzaravičienė, S., & Pilinkienė, V. 2012. Comparison and Review of Competitiveness Indexes: Towards the EU Policy. *Economics and Management*, 17(1): 103-109.

Barro, R. 2001. Human Capital and Growth. *The American Economic Review*, 91(2): 12-17.

Bénassy-Quéré, A., Coupet, M., & Mayer, T. 2007. Institutional Determinants of Foreign Direct Investment. *World Economy*, 30(5): 764-782.

Benoit, K. 2011. Linear regression models with logarithmic transformations. https://pdfs.semanticscholar.org/169c/c9bbbd77cb7cec23481f6ecb2ce071e4e94e.pdf (03/04/2019).

Bevers J., Halprin, P., Reinoud, H., & Veldhuijzen, M. 2018. Netherlands: Tax Plan 2019. http://www.mondaq.com/x/738510/withholding+tax/The+Netherlands+Tax+Plan+2019 (06/12/2018).

Blonigen, B. 2005. A review of the Empirical Literature on FDI Determinants. *NBER Working paper series*: 11299: National Bureau of Economic Research.

Bloom, D., & Canning, D. 2000. The Health and Wealth of Nations. *Science*, 287(5456): 1207 - 1208.

Bloom, D., & Canning, D. 2008. Population Health and Economic Growth. *Growth Commission Working Paper*: 24: Commission on Growth and Development.

Blundell, R., Dearden, L., Meghir, C., & Sianesi, B. 1999. Human Capital Investment: The Returns from Education and Training to the Individual, the Firm and the Economy. *Financial Studies*, 20(1): 1-23.

Borensztein, E., De Gregorio, J., & Lee, J. 1988. How does foreign direct investment affect economic growth? *Journal of International Economics*, 45(1): 115-135.

Bräuninger, D. 2018. German corporate taxes, Growing need for action. https://www.dbresearch.com/PROD/RPS_EN-PROD/PROD0000000000476988/German_corporate_taxes%3A_Growing_need_for_action.pdf (22/11/2018).

Breicis Tax Solutions. 2018. New Corporate income tax in Latvia: How to benefit? http://breicis.com/en/new-corporate-income-tax-latvia/ (22/11/2018).

Buckley, P., Pass, C., & Prescott, K. 1988. Measures of International Competitiveness: A Critical Survey. *Journal of Marketing Management*, 4(2): 175-200

Cai, J., Chen, Y., & Wang, X. 2018. The Impact of Coporate Taxes on Firm Innovation: Evidence From the Corporate Tax Collection Reform in China. *NBER Working Paper series*: 25146: National Bureau of Economic Research.

Calderón, C., & Servén, L. 2014. Infrastructure, Growth and Inequality. *Policy Research paper*: 7034: World Bank Group.

Calvo, G., & Reinhart, C. 2002. Fear of floating. *Quarterly Journal of Economics*, 117(2): 379-408.

Carlson, B. 2018. Stock Investors Will Benefit Most From Corporate Tax Overhaul. https://www.bloomberg.com/opinion/articles/2018-01-05/stock-investors-will-benefit-most-from-corporate-tax-overhaul

Cassou, S. 1997. The link between tax rates and foreign direct investment. *Applied Economics*, 29(10): 1295-1301.

Chao-Hung, W., & Li-Chang, H. 2017. A Proposed Model of Competitiveness For Financial Leasing Companies, A study in Small and medium Sized Enterprises (SMEs) of Vietnam. *Imperial Journal of Interdisciplinary Research*, 3(8): 234-247.

Chaudhuri, S., & Mukhopadhyay, U. 2014. Foreing Direct Investment in Developing Countries: A theoretical Evaluation. New Delhi: Imprint Springer.

Chevapatrakul, T., & Paez-Farrell, J. 2018. How effective is inflation targeting in emerging market economies? *IDEAS working paper series from RePEc*: University of Sheffield.

Choi, H. 2016. Labor Market Flexibility and FDI: Evidence from OECD Countries. *Working Paper 16-06*: Korea Institute for International Economic Policy.

Choi, Y & Im, T. 2016. Rethinking National Competitiveness: A critical Assessment of Governmental Capacity Measures. *Social Indicators Research*, 135(2): 515-532.

Clipa, P. 2011. Competitiveness Through Foreign Direct Investment. https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID1861947_code1425535.pdf?abstractid=1861947&mirid=1 (06/12/2018).

Coelli, F., Moxnes, A., & Ulltveit-Moe, K. 2016. Better, Faster, Stronger: Global Innovation and Trade Liberalization. *IDEAS working paper series from RePEc*: St. Louis.

Cole, M., & Neumayer, E. 2007. The Impact of Poor Health on Total Factor Productivity. *Journal of Development studies*, 42(6): 918-938.

Courand, J. 2018. International Tax, Chile Highlights. https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-chilehighlights-2018.pdf (19/11/2018)

D'agostino, G., Dunne, J. P., & Pieroni, L. 2016. Government Spending, Corruption and Economic Growth. *World Development*, 84: 190-205.0

De Vita, G. 2016. Brief explenation of Arellano-Bond GMM. https://www.researchgate.net/post/Brief_explanation_of_Arellano-Bond_GMM (01/04/2019).

Delavallade, C. 2006. Corruption and distribution of public spending in developing countries. *Journal of Economics and Finance*, 30(2): 222-239.

Detotto, C., & Otranto, E. 2010. Does crime affect economic growth? *IDEAS working paper series from RePEc*: St. Louis.

Detotto, C., & Pulina, M. 2013. Does more crime mean fewer jobs and less economic growth? *European Journal of Law and Economics*, 36(1): 183-207.

Dogan, B., Osakwe, P., & Santos-Paulino, A. 2018. Trade dependence, liberalization and exports diversification in developing countries. *UNCTAD Research Paper No. 2*: UNCTAD.

Durham, J. 2004. Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth. *European Economic Review*, 48(2): 285-306.

Economou, F., Hassapis, C., Philippas, N., & Tsionas, M. 2017. Foreign Direct Investment Determinants in OECD and Developing Countries. *Review of Development Economics*, 21(3): 527-542.

Eurodad. 2017. Tax Games: the Race to the Bottom. https://eurodad.org/files/pdf/1546849-tax-games-the-race-to-the-bottom-1512547011.pdf (22/11/2018).

European Commission, 2000. European Competitiveness Report 2000, **Commission Staff Working Paper**.

European Commission, 2001. European Competitiveness Report 2001, **Commission Staff Working Paper**.

EY. 2018. Luxembourg's Parliament adopts Law on Tax reform 2017. https://www.ey.com/Publication/vwLUAssets/Luxembourgs_Parliament_adopts_Law_on_tax_reform_2017/$FILE/2016G_04432-161Gbl_LU%20Parliament%20adopts%20Law%20on%20tax%20reform%202017%20-%20Review%20of%20corporate%20tax%20measures.pdf (22/11/2018).

EY. 2018. New Swedish corporate income tax rules immediately affect income tax provisions. https://www.ey.com/Publication/vwLUAssets/New_Swedish_corporate_income_tax_rules_immediately_affect_income_tax_provisions/$FILE/2018G_03206-181Gbl_New%20Swedish%20CIT%20rules%20affect%20income%20tax%20provisions.pdf (22/11/2018)

Fama, E. 1969. Efficient Capital Markets: A Review of Theory and Empirical Work. **The Journal of Finance**, 25(2): 383-417.

Feldstein, M., & Krugman, P. 1990. International Trade Effects of Value-Added Taxation. **NBER working paper series**: 3161: National Bureau of Economic Research.

Friedman, M. 1975. **Unemployment versus inflation? An evaluation on the Philips curve**. London institute of Economic Affairs, 1975.

Frunza, R., Pascariu, G., & Moga, T. 2013. **The EU as a Model of Soft Power in the Eastern Neighbourhood**. Editura Universitatii, Alexandru Ioan Cuza.

Glass, A., & Saggi, K. 2002. Multinational Firms and Technology Transfer. **The Scandinavian Journal of Economics**, 104(4): 495-513.

Gov.uk. 2018. Rates and allowances: Corporation Tax. https://www.gov.uk/government/publications/rates-and-allowances-corporation-tax/rates-and-allowances-corporation-tax (22/11/2018).

Hall, R., & Jones, C. 1999. Why do some countries produce so much more output per worker than others? **The Quarterly Journal of Economics**, 114(1): 83-116)

Hanushek, E., & Kimko, D. 2000. Schooling, Labor-Force Quality, and the Growth of Nations. **The American Economic Review**, 90(5): 1184-1208.

Heinemann, F., & Spengel, C. 2018. Analysis of US Corporate Tax Reform Proposals and their Effects for Europe and Germany. http://ftp.zew.de/pub/zew-docs/gutachten/US_Tax_Reform_2018.pdf (22/11/2018)

Hopenhayn, H., & Rogerson, R. 1993. Job Turnover and Policy Evaluation: A General Equilibrium Analysis. **Journal of Political Economy**, 101(5): 915-938.

IMF. 2001. Global Trade Liberalization and the Developing Countries. https://www.imf.org/external/np/exr/ib/2001/110801.htm (13/04/2019).

Irvine, J. 2018. What economists really think about cutting corporate tax. *The Sydney Morning Herald*.

Ketels, C., Lindqvist, G., & Sölvell, O. 2003. *The Cluster Initiative Greenbook*. Stockholm: Bromma tryck AB.

Kharlamova, G., & Vertelieva, O. 2013. The International Competitiveness of Countries: Economic-Mathematical Approach. *Economics & Sociology*, 6(2): 39-52.

King, R., & Levine, R. 1993. Finance and Growth, Schumpeter Might Be Right. *The Quarterly Journal of Economics*, 108(3): 717-737.

Koizumi, T., & Kopecky, K. 1977. Economic growth, capital movements and the international transfer of technical knowledge. *Journal of International Economics*, 7(1): 45-64.

KPMG. 2018. Corporate tax rates table. https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html (22/11/2018)

Krifa-Schneider, H., & Matei, L. 2010. Business climate, political risk and FDI in developing countries: evidence from panel data. *International Journal of Economics and Finance*, 2(5): 54-65.

Krugman, P. 1990. *The Age of Diminished Expectations*. Cambridge: The MIT Press.

Krugman, P. 1994. Competitiveness: A Dangerous Obsession. *Foreign Affairs*, 73(2): 28-44.

Le Gouvernement Du Grand-Duché De Luxembourg. 2017. Personnes Morales. https://reforme-fiscale.public.lu/fr/personnes-morales.html# (22/11/2018).

Leszczensky, L., Wolbring, T. 2018. How to Deal With Reverse Causality Using Panel Data? Recommendations for Researchers Based on a Simulation Study. https://osf.io/preprints/socarxiv/8xb4z/download (30/12/2018).

Levine, R. 1991. Stock Markets, Growth, and Tax Policy. *The Journal of Finance*, 45(4): 1445-1465.

Licandro, O. 2010. Trade Liberalization, Competition and Growth. *IDEAS working paper series from RePEc*: St. Louis.

Lips, D., & Watkins, S. 2008. Does Spending More on Education Improve Academic Achievement? https://www.heritage.org/education/report/does-spending-more-education-improve-academic-achievement (16/11/2018).

Loayza, N., & Ranciere, R. 2005. Financial Development, Financial Fragility, and growth. *Working Paper*: 05/170: International Monetary Fund.

Manski, F. 2012. Choosing size of government under ambiguity: infrastructure spending and income taxation. *Working Paper*: 18204: National Bureau of Economic Research Cambridge.

Mileva, E. 2007. *Using Arellano-Bond Dynamic Panel GMM Estimators in Stata*. Fordham University.

Mintz, J. 2018. Global Implications of U.S. Tax Reform. *Ifo Schnelldienst*, 71(7): 22-35.

Mudenda, L. 2015. *Corporate Income Tax Rate and Foreign Direct Investment*. UMEA Universitet.

Murdock, J. 2016. Logarithms in Regression Analysis with Asiaphoria. http://individual.utoronto.ca/zammit/teaching/eco220/logarithms_in_regression_analysis_with_Asiaphoria.pdf (03/04/2019).

Nickell, S. 1981. Biases in Dynamix Models with Fixed Effects. *Econometrica*, 49(6): 1417-1426.

Norton Rose Fulbright. 2018. The Netherlands: 2019 Tax Plan and impact for international business. http://www.nortonrosefulbright.com/knowledge/publications/170399/the-netherlands-2019-tax-plan-and-impact-for-international-businesses (22/11/2018).

Nourzad, F., Greenwold, D., & Yang, R. 2014. The Interaction Between FDI and Infrastructure Capital in The Develoment Process. *International Advances in Economic Research*, 20(2): 203-212.

OECD. 2016. Population data. https://stats.oecd.org/Index.aspx?DataSetCode=EDU_DEM# (28/11/2018).

OECD. 2016. Tax Policy Reforms in the OECD 2016. https://read.oecd-ilibrary.org/taxation/tax-policy-reform-in-the-oecd-2016_9789264260399-en#page1 (22/11/2018).

OECD. 2017a. Consumer Price Indices - Complete Database. https://stats.oecd.org/viewhtml.aspx?datasetcode=PRICES_CPI&lang=en# (06/12/2018).

OECD. 2017b. FDI Financial Flows. https://stats.oecd.org/viewhtml.aspx?datasetcode=FDI_FLOW_AGGR&lang=en# (10/11/2018).

OECD. 2017c. Gross domestic product. https://stats.oecd.org/index.aspx?queryid=60702 (10/11/2018).

OECD. 2017d. Level of GDP per capita and productivity. https://stats.oecd.org/index.aspx?DataSetCode=PDB_LV# (10/11/2018).

OECD. 2017e. Statutory corporate income tax rate. http://www.oecd.org/tax/tax-policy/tax-database.htm#C_CorporateCapital (10/11/2018).

OECD. 2017f. Strictness of employment protection. https://stats.oecd.org/viewhtml.aspx?datasetcode=EPL_R&lang=en (10/11/2018).

OECD. 2017g. Unit labour costs, Annual indicators. https://stats.oecd.org/Index.aspx?QueryName=426 (10/11/2018).

OECD. 2018a. FDI financial flows, main aggregates. https://stats.oecd.org/viewhtml.aspx?datasetcode=FDI_FLOW_AGGR&lang=en (01/12/2018).

OECD. 2018b. Table II.1. Statutory corporate income tax rate. http://stats.oecd.org/index.aspx?datasetcode=TABLE_II1 (22/11/2018)

OECD. 2018c. Tax reforms accelerating with push to lower corporate tax rates. http://www.oecd.org/tax/tax-reforms-accelerating-with-push-to-lower-corporate-tax-rates.htm (22/11/2018)

Pindyck, R., & Solimano, A. 1993. Economic instability and aggregate investment. *NBER working paper series*: 4380: National Bureau of Economic Research.

Pinzon, E. 2015. Xtabond Cheat Sheet. https://blog.stata.com/2015/11/12/xtabond-cheat-sheet/ (09/04/2019).

Porter, M. 1990. *The Competitive Advantage of Nations*. New York: The Free Press.

Porter, M., Ketels, C., & Delgado, M. 2008. The Microeconomic Foundations of Prosperity: Findings from the Business Competitiveness Index. https://www.hbs.edu/faculty/Publication%20Files/BCI_Chapter_adf284c6-3d8b-483e-9f29-a5242e9c5999.pdf (4/11/2018)

PWC. 2018. Japan Corporate - Taxes on corporate income. http://taxsummaries.pwc.com/ID/Japan-Corporate-Taxes-on-corporate-income (22/11/2018).

Roig-Tierno, N., Ribeiro-Soriano, D., & Mas-Verdú, F. 2017. Clustering and innovation: firm-level strategising and policy. *Entrepreneurship & Regional Development*, 29(7-8): 814-816.

Romer, P. 1996. Why, Indeed, In America? Theory, History, and the Origins of Modern Economic Growth. *The American Economic Review*, 86(2): 202-206.

Roodman, D. 2009. How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, 9(1): 86-136.

Rousseeuw, P., & Hubert, M. 2011. Robust statistics for outlier detection. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 1(1): 73-79.

Rutte, M., Van Haersma Buma, S., & Pechtold, A. 2017. Vertrouwen in de toekomst. https://www.kabinetsformatie2017.nl/binaries/kabinetsformatie/documenten/publicaties/2017/10/10/regeerakkoord-vertrouwen-in-de-toekomst/Regeerakkoord+2017-2021.pdf (22/11/2018).

Schultz, T. 1961. Investment in Human Capital. *The American Economic Review*, 51(1): 1-17.

Schwab, K. 2015. The Global Competitiveness Report 2015-2016. http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf (11/11/2018)

Schwab, K. 2017. The Global Competitiveness Report 2017-2018. http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf?fbclid=IwAR13SwvuoZtVh8Y-RFlddyPhNn-y4L32z6Bz4jwoMy6NWUL1ZNm3jmlpRZg (04/11/2018)

Scott, B., & Lodge, G. 1985. *US Competitiveness in the World Economy*. Boston: Harvard Business School Press.

Sekkat, K., Veganzones-Varoudakis, M. 2007. Openness, Investment Climate, and FDI in Developing Countries. *Review of Development Economics*, 11(4): 607-620.

Siudek, T., & Zawojska, A. 2014. Competitiveness in the Economic Concepts, Theories and Empirical Research. *Oeconomia*, 13(1): 91-108.

Smith, A. 1827. *Wealth of nations*. University press of Edinburgh.

Smith, A., & Taylor, J. E. 2016. *Essentials of Applied Econometrics*. University of California Press.

Solomon, S. 2018. Israel set to adjust tax policies to counter Trump reform, tax chief says. *The times of Israel.*

Straub, S. 2008. Infrastructure and Growth in Developing Countries: Recent Advances and Research challenges. *Discussion Paper Series number*: 179: Edinburgh School of Economics.

Tanzi, V., & Zee, H. 2000. Tax policy for emerging markets: developing countries. *National Tax Journal*, 53(2): 299-322.

The World Bank. 2017a. Cost of business start-up procedures (% of GNI per capita). https://data.worldbank.org/indicator/IC.REG.COST.PC.ZS (10/11/2018).

The World Bank. 2017b. Foreign Direct Investment, net inflows (BoP, current US$). http://api.worldbank.org/v2/en/indicator/BX.KLT.DINV.CD.WD?downloadformat=excel (19/02/2019).

The World Bank. 2017c. GDP per capita (current US$). http://api.worldbank.org/v2/en/indicator/NY.GDP.PCAP.CD?downloadformat=excel (19/02/2019).

The World Bank. 2017d. GNI Per Capita. http://api.worldbank.org/v2/en/indicator/NY.GNP.PCAP.CN?downloadformat=excel (04/03/2019).

The World Bank. 2017e. Gross Capital Formation (% of GDP). http://api.worldbank.org/v2/en/indicator/NE.GDI.TOTL.ZS?downloadformat=excel (06/12/2018).

The World Bank. 2017f. School Enrolment, Secondary (% Gross). http://api.worldbank.org/v2/en/indicator/SE.SEC.ENRR?downloadformat=excel (06/12/2018)

The World Bank. 2017g. Tax Revenue (% of GDP). http://api.worldbank.org/v2/en/indicator/GC.TAX.TOTL.GD.ZS?downloadformat=excel (20/02/2019).

The World Bank. 2017h. Trade (% of GDP). http://api.worldbank.org/v2/en/indicator/NE.TRD.GNFS.ZS?downloadformat=excel (06/12/2018).

Tobin, J. 1984. On the Efficiency of the Financial system. *Lloyds Bank Review*.

Tompa, E. 2002. The impact of Health on Productivity: Empirical Evidence and Policy Implications. *The review of economic performance and progress*: 181-202.

Trading Economics. 2018. Hungary Corporate Tax Rate. https://tradingeconomics.com/hungary/corporate-tax-rate (22/11/2018).

Tyson D'Andrea, L. 1992. *Who's Bashing Whom: Trade Conflict in High Technology Industries*. Washington DC: Institute for International Economics.

Uebelhart, P. 2018. Clarity on Swiss Taxes. https://assets.kpmg.com/content/dam/kpmg/ch/pdf/clarity-on-swiss-taxes-2018-en.pdf (22/11/2018).

UNCTAD, 2002. Competitiveness, Restructuring and FDI: An Analytical Framework. https://vi.unctad.org/resources-mainmenu-64/digital-library?task=dl_doc&doc_name=comprestfdi (06/12/2018).

UNCTAD, 2018. Key statistics and trends in trade policy. https://unctad.org/en/PublicationsLibrary/ditctab2019d1_en.pdf (10/04/2019).

UNESCO. 2018. How much does your country invest in R&D? http://data.uis.unesco.org/Index.aspx?DataSetCode=SCN_DS&lang=en (10/04/2019).

United Nations. 2017. World Population Prospects 2017. https://population.un.org/wpp/DVD/Files/1_Indicators%20(Standard)/EXCEL_FILES/1_Population/WPP2017_POP_F01_1_TOTAL_POPULATION_BOTH_SEXES.xlsx (28/11/2018).

Varga, M. 2016. New tax package to improve economic competitiveness. http://www.kormany.hu/en/ministry-for-national-economy/news/new-tax-package-to-improve-economic-competitiveness (10/04/2019).

World Economic Forum. 1996. *The Global Competitiveness Report*. Geneva: WEF.

World Economic Forum. 2018. In Depth: Should countries pursue openness? http://reports.weforum.org/global-competitiveness-report-2018/in-depth-should-countries-pursue-openness/ (14/04/2019).

World Economic Forum. 2018. The Inclusive Development Index 2018. http://www3.weforum.org/docs/WEF_Forum_IncGrwth_2018.pdf (20/02/2019).

Xu, z. 2000. Financial development, investment, and economic growth. *Economic inquiry*, 38(2): 331-344.

Zmuda, M. 2017. Towards a Taxonomy of International Competitiveness. *Journal of Management and Business Administration*, Central Europe, 25(3): 97-116.

Appendix 1

**Table B. 1 Explanatory information concerning Table 1**

Australia	This reduction is only effective for small enterprises. The number in brackets indicate the aggregated turnover threshold in Australian Dollars to benefit from the reduced rate. All other companies pay 30%.
Chile	In 2018 two tax rates are applicable. If the business fall under the fully integrated system it is 25%, otherwise it is 27%.
Estonia	Not in table: they reduced corporate income tax from 20% to 14%, but only for regular profit distributions to legal persons.
Germany	Not in table: tiny changes in total corporate tax rate but caused by changes in local trade tax. Corporate tax + local trade tax + solidarity surcharge = total tax. The base corporate tax stays at 15%
Japan	The table shows the effective tax rate for large companies operating in Tokyo. Additional value-based tax or capital-based tax are not taken into account. The tax rate for 2019 is applicable for companies with tax year starting on or after 1 April 2018.
Latvia	The corporate tax rate was increased to 20 per cent, but simultaneously introduced a 0 per cent corporate tax rate for retained and reinvested earnings.
Luxembourg	The percentages in brackets illustrate the combined corporate income tax rate. The rate is for profits exceeding € 25 000.
Republic of Korea	Corporations with an income above KRW 300 billion are subject to this corporate income tax rate.
Switzerland	The maximum effective corporate tax rate on pre-tax profits varies between 11.54% and 24.41% (KPMG, 2018). The effective rate depends on the canton. Switzerland also plans to undergo corporate tax reform but no final decision is reached today (31/12/2018).
The Netherlands	The percentages are for profits exceeding € 200 000

Appendix 2

Figure B. 1 Partial Regression Plots
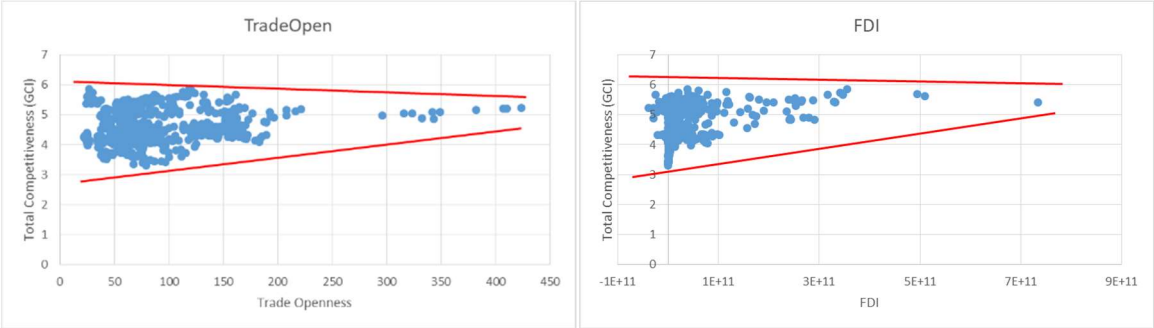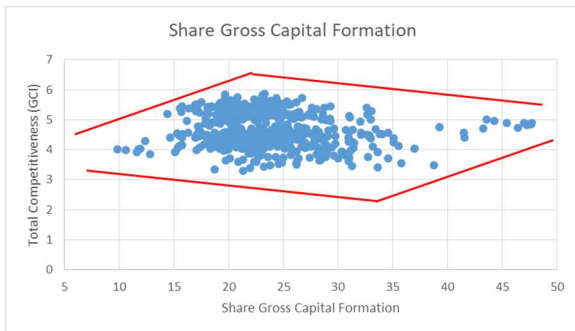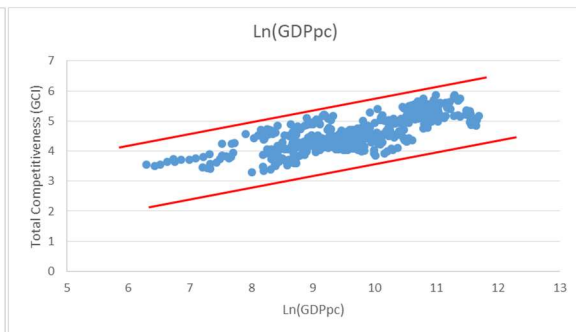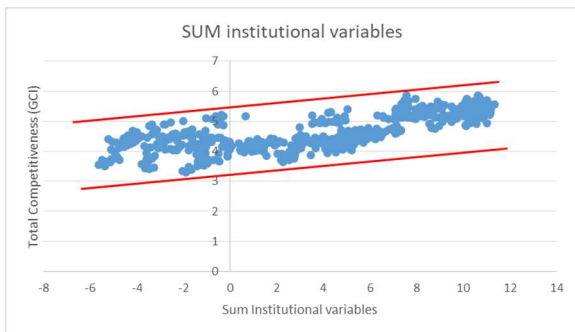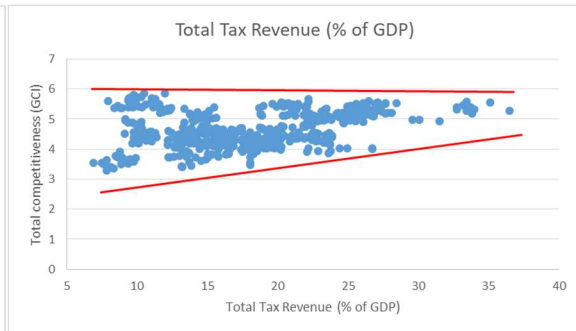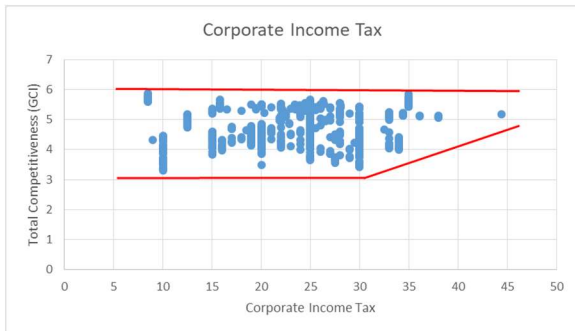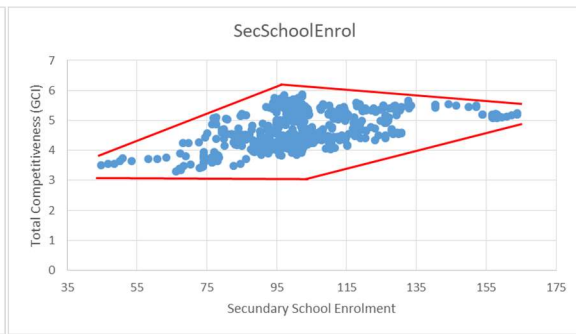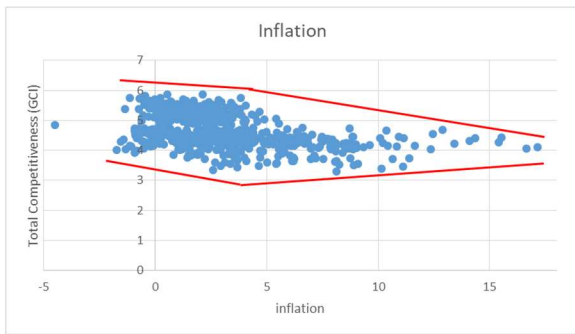
Source: own computations with Excel.

Press release

KU Leuven Campus Carolus
Korte Nieuwstraat 33, 2000
Antwerpen
+ 32 3 201 18 40
feb.antwerpen@kuleuven.be

15/05/2019 (1pm)

For immediate release

CORPORATE INCOME TAX REDUCTION IMPROVES COMPETITIVENESS OF DEVELOPED ECONOMIES: US AND EUROPEAN TAX REFORM JUSTIFIED

A global trend of corporate income tax reform arises at the moment and many arguments are being used by nations to justify these reforms. Various countries use corporate income tax reduction as a motive for increasing competitiveness. Even though these tax reforms are often marked as vacuous, policy makers in developed economies are right about the effect of these reforms on the competitiveness. Emerging economies on the other hand should revise their tax reform policy, since corporate income tax reduction will not lead to the targeted outcome.

Corporate income tax influences the competitiveness of nations

Policy makers around the world are constantly trying to increase their country's national competitive position. Up until today, no empirical evidence existed about whether corporate income tax reduction could be a mean for increasing national competitiveness. Research at the Catholic University of Leuven finds that lowering the corporate income taxes might not be as vacuous as many profess. Empirical evidence indicates that developed economies will experience an increased competitiveness when lowering their corporate income taxes. Due to rudimentary tax collection and economic infrastructure, complemented with corruption and irrational tax policy, emerging economies will not experience the same impact on their national competitiveness as developed economies when lowering corporate income taxes. These emerging economies lack the proper ingredients to ameliorate competitiveness when altering corporate income taxes.

Other factors influencing the competitiveness of nations

The research also finds that other factors influence the competitive position of developed economies. Foreign direct investment inflow, the trade openness of an economy, the investments made to fixed asset in the economy and the total tax revenue also have a positive impact on the competitiveness of developed economies. Emerging economies on the other hand seem to benefit mostly from opening trade as well, but experience negative effects when facing inflation. Inflation is proven not to influence the competitiveness of developed economies, since these countries are characterized by a more stable institutional climate and have a stronger credibility, which mitigates the impact of economic instability.

Implications for policy makers

The current corporate income tax reform happening in many developed European countries and in the United States is not as ignorant as many people believe. On the contrary, emerging economies need to reconsider their tax reform policy if increased competitiveness is used as a motive to justify these reforms. Even though a corporate income tax increase negatively influences the competitiveness of developed economies, more tax revenue for the government results in increased competitiveness for developed economies. These countries should thus look at taxes other than corporate income tax to improve their competitive position. Furthermore, the current trend of closing trade, protectionism and unilateral actions is proven to be negative for the competitive position of countries. These actions should be revised if policy makers want to improve the nation's competitiveness.

--END OF PRESS RELEASE---

KU Leuven is dedicated to education and research in nearly all fields. Its fifteen faculties offer education, while research activities are organized by the departments and research groups. These faculties and departments, in turn, are clustered into three groups: Humanities and Social Sciences, Science, Engineering and Technology (SET), and Biomedical Sciences. Each of these groups has a doctoral school for its doctoral training programmes. KU Leuven boasts fourteen campuses, spread across 10 cities in Flanders.

NOTE TO THE EDITOR(S)

Contact person: Laurens Vleugels, laurens.vleugels@student.kuleuven.be

FACULTY OF ECONOMICS AND BUSINESS
CAMPUS CAROLUS ANTWERP
KORTE NIEUWSTRAAT 33
2000 ANTWERP
PHONE. + 32 3 201 18 40
FEB.ANTWERPEN@KULEUVEN.BE