ESCAPING THE TAXMAN

MARKET EFFECTS OF A GLOBAL CORPORATE MINIMUM TAX FRAMEWORK ON MULTINATIONAL ENTERPRISES

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Abstract:

This thesis studies market effects during time periods when certain information was released concerning the Pillar two model - a law proposal by the OECD intended to combat global tax evasion and raise global corporate tax rates. Several Difference in differences regressions are performed looking both at the market as a whole, as well as an intellectual property intensive subpart of the market. We conclude that the market in general did not correctly price such new information and that corporate valuations have not been adjusted accordingly. This provides a challenge to the common assumption within economics that markets are characterised by perfect information. These results can also be interpreted as an indication that the market does not believe effective tax rates will increase substantially, which is a negative assessment of the proposed policy.

Keywords:

Corporate taxes, Pillar two model, tax haven, Base erosion and profit shifting

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1. Introduction

1.1 Taxes as a research subject

In this paper we will examine market effects at the time when important information was released regarding the Pillar two model, a new global regulatory framework set forth by the Organisation for economic co-operation and development (OECD). We will thereby test the level of efficiency for the market to price new information by comparing a group of companies affected by the Pillar two model and a group not affected. The paper will concern specific dates for when new information was revealed — information that is estimated to have had material impact on market valuations. Additionally, the paper will contain information about current and previous attempts to limit global tax evasion as well as a discussion on what might occur in the future in this area.

Taxes are the main revenue source of governments to be able to carry out the necessary spending needed to maintain a well-functioning state. It is also known that corporate taxes tend to be amongst the most important revenue sources contributing with a large share of the revenue in developed economies. The world is currently progressing through a challenging period of becoming climate neutral to combat the threat of climate change. Therefore, we expect states around the globe to be in need of making large investments in the future. Investing into green energy sources and the infrastructure to support this as well as research and development to be able to carry out the transition are only a few examples. We estimate that a current focus area is, and will be going forward, to be able to collect the tax revenue needed to finance such investments. Additional tax revenue is also expected to be a major key in efforts to reduce current and future budget deficits. Deficits increased during the last financial crisis (Johannesen and Zucman, 2014), and likely did so again during the COVID-19 pandemic.

Cash flow analysis is a main area of focus within finance, and investors look at projected cash flow as one of the main methods of valuing a corporation. When a corporation pays taxes, this lowers the amount of cash available for investors. Thus, the corporate tax rate level is interesting for companies as well as their investors and is something which should be studied in the field of finance. Reducing the effective tax rate through tax planning can therefore improve cash flows available to investors. This should provide an incentive for investors to look for such opportunities. Simultaneously, global tax evasion strips states of their expected tax revenue and reduce their capabilities to carry out crucial investments or upholding the function of the state to the same level. Due to this we have seen the willingness to limit such tax planning opportunities by policy makers during the last couple of years. To be able to follow through with measures against global tax evasion we need an understanding of how big of a problem this currently is. This involves tax evasion by both individuals, financial institutions, and corporations. This paper will mostly focus on this through a corporation's perspective.

Zucman (2013) found that around 8% of the global financial wealth of households were held in tax havens, where 75% of that figure, 6% of the global financial wealth, went unrecorded. It was also found that 40% of the world’s foreign direct investments were routed through tax havens, using IMFs definition of tax havens (Zucman, 2013). Additionally, it was estimated that the eurozone which is a net debtor would turn into a net creditor given certain assumptions of how global financial wealth stemming from the

eurozone were held in tax havens (Zucman, 2013). These figures display substantial losses in tax revenue. However, this regarded private wealth for private individuals hiding their fortunes offshore, this article did not concern corporations.

Countries vary significantly in their level of corporate taxation. Having a low corporate tax level can be a strategy employed by countries to attract capital as a measure of benefitting from that inflow of capital and increasing the standard of living. This was e.g. studied by Klein and Ventura (2021) who found that the reduction of business tax "played a significant, but secondary role in the Irish miracle". The Irish miracle is the term used to describe how Ireland went from one of the poorest countries in the developed world to one of the richest countries in the world between 1980–2005. During this period Ireland implemented, amongst others, drastic changes in their level of corporate taxes to a level of 12.5% which is amongst the lowest in the OECD (Klein and Ventura, 2021). The reduction of corporate taxes contributed to 23% of the positive effect on output per adult, slightly more than a fifth of the full effect, observed in 2005 (Klein and Ventura, 2021).

There are many definitions regarding what countries are tax havens and there are several lists available aimed at specifying this group of countries (Bennedsen and Zeume, 2018). One way of defining tax havens is "countries and territories that offer low tax rates and favourable regulatory policies to foreign investors" (Hines Jr., 2010). Consequently, all countries providing financial incentives to relocate assets can be considered tax havens. Examples of jurisdictions often considered tax havens are Aruba, Cayman Islands, Gibraltar, Liberia, and Singapore, although there are more examples (Bennedsen and Zeume, 2018). Tax havens thus exist all over the globe and in most continents. Tax havens are often, but not exclusively, smaller countries which do not have plenty of other ways for building wealth. Contrary to what might be public opinion, it was found that tax havens generally have high-quality governance and government institutions (Dharmapala and Hines Jr., 2009). The absence of functioning governmental organisations makes it difficult to be a tax haven. As there are potential financial benefits of being a tax haven, realising such benefits would not be possible without good governance. Tax havens are commonly not dictatorships that support organised crime on a government-level, still there are concerns that bank secrecy provides opportunities for organised crime (Hines Jr., 2010).

Tax havens are not exclusively small island countries abroad but can also be a domestic phenomenon within non-tax haven countries. The state of Delaware in the United States (U.S.) is an example of this which provides financial benefits to firms who incorporate there due to low relative tax rates. As a result, a majority of publicly traded companies in the U.S. has parent firms located in Delaware (Dyreng, Lindsey, Thornock, 2013).

Hanlon, Maydew and Thornock (2015) studied tax evasion from the perspective of foreign portfolio investment (FPI), employing a method referred to as round-tripping which is a method when domestic investors place their capital abroad and then invest it in the domestic market of the investor, but from abroad. It was found that increases in ordinary and capital gains taxes in the U.S. were related to higher levels of FPI (Hanlon et al., 2015). Additionally, it was found that the use of Tax information exchange agreements (TIEA) between pairs of countries whereby one was considered a tax haven led to a decrease of FPI (Hanlon et al., 2015). Thus, the authors advised policymakers to increase the information exchange as a measure in improving the tax compliance. However, it is also the case that companies engage in haven hopping, a process of moving

subsidiaries between tax havens to escape TIEAs thus making it difficult to estimate a precise effect from the implementation of TIEAs (Bennedsen and Zeume, 2018).

One might wonder how come corporation are willing to go through the process of relocating to a tax haven, which likely includes additional costs. Mackie-Mason (1990) found evidence in an article from more than three decades ago that effects on marginal tax impacted firms financing decisions on whether they would finance through debt or equity. Similarly, by relocating to tax havens a corporation might be able to lower their marginal tax rate which gives a rational incentive to do so if it could long-term make the firm more profitable (Mackie-Mason, 1990). While the financial benefit of relocating is present, realising such benefits are not as easy since there are costs associated with doing so (Gumpert, Hines Jr., Schnitzer, 2016). Gumpert et al. found that roughly one fifth of German multinational firms had tax haven subsidiaries, although some of these companies were estimated to have it due to operational reasons instead of financial reasons. Furthermore, it was estimated by the authors that since a relatively high degree of firms in Germany work with manufacturing then that could potentially lead to a lower share of firms having subsidiaries in tax havens. In contrast to Germany, a country whereby a higher degree of firms work with research and development, or intellectual property could potentially see a higher share of firms with tax haven subsidiaries.

In conclusion, this introduction establishes that tax evasion and base erosion is common, and this is a problem since it strips countries of tax revenue they would otherwise receive. See for instance Zucman (2013), Hanlon et al. (2015) and Gumpert et al. (2016) who discuss this matter in their respective articles. However, most previous research has been from the perspective of capital investments or shielding private wealth. A minority of the research focuses on corporations and their tax revenue generation as an effect of their income and operations.

A solution to the problem of global tax evasion is something that has been frequently discussed in recent years, by large organisations as well as world leaders and is something that would have substantial impact on the world of finance. Consequently, we find in our preliminary research that further studies focusing on corporations with regards to current initiatives to combat tax evasion could bring value to the academic literature. We intend to study market effects due to new information being released. Thereby we are also testing if and how quickly the market has responded to information that should change the overall valuation for the affected securities. This results in the formulation of the following research question:

Research question: Did new market information regarding the Pillar two model *on average* lead to abnormal negative returns for the group of companies affected by the law proposal compared to a group of companies not affected?

As a consequence of the research question, we have formulated the following two hypothesises:

H_0 = The new market information regarding the Pillar Two model *did not* lead to *on average* abnormal negative returns for the group of companies affected by the law proposal compared to a group of companies not affected.

H_1 = The new market information regarding the Pillar Two model *did* lead to *on average* abnormal negative returns for the group of companies affected by the law proposal compared to a group of companies not affected.

We aim to study the current major proposal intended to combat global tax evasion. We believe that the world of business and finance needs to be aware of the issue as well as be prepared for new prerequisites in the future if the current proposals would turn into law. In our thesis we will study the market effects of the Pillar two model which is a law proposal primarily put forth by the Organisation for economic co-operation and development (OECD) intended to combat global tax evasion. This study intends to research whether there have been substantial implications in market valuations due to this law proposal. Market valuation was chosen as it is a proxy for the whole economy. The market has a function of representing the value of assets, this function allows us to draw conclusions about the future by measuring the reactions by the market today.

1.2 Literature review

The Pillar two model is a new proposal, see Section 2 for more specific information on the subject, which partly explains the low number of studies done on this specific area. Instead, there are similar studies done on other types of law implementations. Additionally, as the Pillar two model is expected to come into effect as of the year 2022, see Section 2.3, there has not been sufficient time to study the effect the global agreement will have on tax revenues globally. Such research would be of high interest, to measure the success of the Pillar two model but that would require more time to pass.

Joshi (2020) studied the effect Country-by-country reporting (CbCr) had on tax revenue and, amongst other things, found that effective tax rates had increased. Additionally, a limited effect on income shifting due to tax-motivations was found. A similar study was done by Joshi, Outslay, and Persson (2020) who concluded limited effects on income shifting while no evidence on effective tax rates, in this case on European banks. Both mentioned articles also provided value to policy makers in addition to the academic literature. Our study draws inspiration from Joshi (2020) and Joshi et al. (2020) in the regard that we also study a particular law implementation intended to influence global tax evasion. Similar to both mentioned articles we also use the Difference in differences method to evaluate our area of study. However, we differ as we do not measure the effect through a societal perspective, i.e. collected tax revenue or effective tax rate etc., but through a financial and markets perspective as we study the market effect of released information. Consequently, we study exact dates for when important information became available and should influence the market. Although not a research questions we thereby also test the common efficient market assumption that markets have perfect information as we determine how well the market in this case priced new information.

Despite not finding an exact similar study to the one we are conducting, i.e., measure market effects from political proposals, and comparing different groups of companies according to their size of revenue. We believe this study will contribute to the academic literature by evaluating the market effect from the new information released regarding the law proposal in question. This will give results to how effective the market has been in including new information and pricing securities according to new prerequisites. The study will also provide information to policy makers on whether the market believes the

Pillar two model will have an effect like the one intended. If there have been no changes in valuation for the group of companies affected by the law proposal, this could imply that the market does not believe that effective tax rates will increase due to this.

2. Background

2.1 Previous efforts to limiting global base erosion and profit shifting

There have previously been numerous initiatives to combat tax planning and base erosion, i.e. when corporations take measures intended to exploit differences in tax laws to lower their tax burden. Initiators of these have included the Organisation for economic co-operation and development (OECD), the G20 nations, the European union (EU), the Financial accounting standards board (FASB), and the United nations (UN) (Joshi, 2020).

According to Hanlon et al. (2015) the OECD has historically been a major initiator for anti-tax havens efforts. During the year 2000 the OECD launched their list of uncooperative tax havens, today commonly referred to as the OECD Gray list. The first version of the list contained 35 jurisdictions and defined them as tax havens. This put pressure on these countries to be more cooperative and transparent. This also led to more Tax information exchange agreements (TIEA) being signed which led to sharing of tax information that assisted the tax enforcement. Still these agreements are not perfect but have a couple of drawbacks. Namely that exchange of information takes place upon request of information, which is not necessarily available to begin with, that information agreements do not affect bank secrecy laws, and that the tax haven country might not have substantial information to give away (Hanlon et al., 2015). Such agreements as TIEAs have no direct effect on corporate taxes, instead it has been found that the risk of more transparent information has led to reassessments of base erosion strategies used by companies (Bennedsen and Zeume, 2018). By 2009 the OECD had removed all original jurisdictions labelled as tax havens in 2000, and instead only had four non-European countries on their Grey list i.e. Costa Rica, Malaysia, the Philippines, and Uruguay (Hanlon et al., 2015 and OECD, undated 2).

Bennedsen and Zeume (2018) also showed that implementations of TIEAs which led to more transparency through better sharing of information also led to an increase in market value of 2.5%. This regarded firm value and not better profitability or operational efficiency, which should lead to better incentives to remain transparent as a measure of increasing market valuation. It was also shown that firms who responded to TIEAs by haven hoping did not experience an increase in firm value (Bennedsen and Zeume, 2018).

Another effort in reducing the lack of information that historically has enabled tax evasions was initiated by the G20 after the financial crisis of 2008–2009. Johannesen and Zucman (2014) found that as the G20 compelled tax havens to provide more information under the threat of sanctions, it instead led to capital and assets being moved between tax havens rather than to the home country. This showcase a weakness in previous policy in the fight against tax evasion, that deposits are shifted between tax havens rather than being repatriated (Johannesen and Zucman, 2014, and Bennedsen and Zeume, 2018). Global agreements might therefore have the benefit of not providing an incentive to haven hop to avoid bilateral agreements.

Since 2013 the OECD together with the G20 adopted a 15-point action plan that would address the problem of base erosion and profit shifting (BEPS), namely when countries exploit differences in tax laws to lower their tax burden (OECD, undated 3). One of these action points, namely number 13, regarded instituting requirements on information sharing between multinational enterprises (MNEs), governments and their tax administrations (OECD, 2015, and Joshi, 2020). Such information requirements included operational information provided to tax administrations on a global scale, transaction data and transfer pricing information to each country present in, and a report filed annually with operational information on a per tax jurisdiction-basis which is referred to as the Country-by-country report (OECD, 2015). Joshi (2020) studied the implementation of these country-by-country reports (CbCr) and to the extent that they led to less tax avoidance and profit shifting. It was found that CbCr did contribute to the amount of information available to tax authorities. Additionally, an increase in effective tax rates measured at GAAP-rules (Generally accepted accounting principles) at 1–2% was found because of less tax avoidance. An effect on income shifting due to tax reasons steaming from CbCr was deemed limited. The results suggested that on a firm-level the amount of tax avoidance decreased, however on a jurisdiction-level the amount of avoidance did not decrease substantially (Joshi, 2020). Similarly, Joshi, Outslay and Persson (2020) studied the similar effect from CbCr but from the perspective of reports published publicly by European banks to increase transparency in their field. No effect was found on the effective tax rate level by European banks but some influence on the amount of income shifting.

Past attempts at deterring base erosion and profit shifting measures by MNEs can be seen as ambitious attempts that did not fully reach their goals. Johannesen and Zucman (2014) concluded that previous attempts have led to an increase in funds directed to the least compliant countries while the most compliant countries have lost funds. This thereby implies that the least compliant countries have gained from previous policy and given them an incentive to maintain their strategy. Consequently, previous attempts have led to the OECD launching the Pillar two model which is the most ambitious attempt thus far and will look at instituting a global corporate minimum tax – which will be studied further in this paper and is explained in Section 2.2 below.

2.2 The Pillar two model – tax challenges from the digital economy

On 20 December 2021, the Organisation for economic co-operation and development (OECD), released a statement regarding new reforms to the international tax system referred to as the Pillar two model. Sometimes also referred to as the Global anti-base erosion proposal (GloBE). This will take aim at countering global problems of tax avoidance by multinational enterprises (MNEs) which has especially occurred as digitalisation has prolonged. When multinational enterprises use tax planning strategies to take advantage of gaps in the tax laws in order to avoid paying corporate taxes this is referred to as Base erosion and profit shifting (BEPS). Which is something that the Pillar two model will aim at preventing. This proposal will create a global minimum corporate tax at a rate of 15% and will be applied to multinational enterprises with revenues above EUR 750 m (OECD, 1 July 2021). This is estimated to generate between USD 125–150 bn in additional tax revenue on a global scale and will regard more than 90% of the global

GDP through the wide rate of acceptance around the globe (OECD, 8 October 2021 (1), and OECD, 20 December 2021).

The background behind this proposal is the arising challenges countries have seen in realising corporate income taxes from especially the digital economy. While this has been considered an important challenge before it has become more and more relevant as digitalisation has become a bigger part of the economy. With digital business models comes a challenge for countries to prove that economic profits occur in their jurisdiction. For long several European countries have been looking for ways to impose corporate taxes on American tech companies (Christie, IMF website, spring 2021).

Once the Pillar two model is implemented it is indented to function through a top-up design where a company will pay the difference between its effective tax rate and the 15% tax rate agreed through the Pillar two model (OECD, undated 1). The part of the tax that came through the top-up rules will be payable to the country where the headquarter is located. Since this is the country that lost out on tax revenue due to relocation to a jurisdiction with a lower tax rate. However, in practice the calculation of the top-up tax will be slightly more complicated. For each company in each jurisdiction, it will be based on the effective tax rate which is affected by business choices made by the company. The top-up tax rate is applied to the income generated in that specific jurisdiction, after deductions for substance-based income exclusion which will reduce the effect of the minimum tax since it will allow for a decrease in recorded revenue based on a percentage of tangible assets and payroll costs (OECD, undated 1).

The establishment of the Pillar two proposal has progressed over time. The most important dates for this have been gathered which are estimated to have influenced the market valuations of the companies hit by the law proposal. These dates are 1 July 2021 which was when 130 countries agreed on a joint statement regarding creating a new international tax reform (OECD, 1 July 2021). 8 October 2021 which was when the OECD communicated the ambition of this new framework and the broad agreement amongst the worlds' countries (OECD, 8 October 2021). 20 December 2021 when detailed information was released on the suggested framework on international tax reform (OECD, 20 December 2021). See Table 2.1 in the appendix for a condensed list of these event dates.

2.3 The current state of the Pillar two model

As of November 2021, a total of 141 member jurisdictions had agreed to the framework (OECD, undated 4). This includes 26 out of 27 countries in the European Union as of March 2022. These EU members include Austria, Belgium, Bulgaria, Croatia, Czechia (Czech Republic), Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden. The only exception of the EU members is Cyprus. When looking at Europe as a whole, additional countries who have agreed to the framework are Albania, Andorra, Belarus, Bosnia and Herzegovina, Iceland, Liechtenstein, Montenegro, Russia, San Marino, Serbia, Switzerland, Ukraine, and the United Kingdom. European non-EU member countries which have not agreed to the proposal are the Holy See, Kosovo, and Moldova. This is relevant as we will look at

European countries in our study. It can this be concluded that on the European continent the law proposal has been widely accepted.

The proposal is expected to be passed into law during the year 2022 and then come into effect and generate tax-revenue as of 2023. During 2024, additional laws will come into effect. The Pillar two model rules are designed to act as a model for which the individual jurisdictions can implement into their own domestic laws. The though behind the model is to be a template from which the countries can draw inspiration from (OECD, 8 October 2021 (2)).

3. Data

3.1 Gathering European listed companies and stock performance data

The data was gathered from FactSet which is a database supplied through Wharton research data services (WRDS). This gave us access to look at all the listed European companies with their headquarter in a European country. To be able to determine what companies would be affected by the law proposal, access to public accounting figures was needed which are available for publicly traded corporations. Although the Pillar two model will affect both publicly traded and non-publicly traded firms, such figures were only available for the publicly traded firms in Europe. See Table 3.1 in the appendix for the exact list of countries included. The initial data gathered contained such things as country of headquarter location, stock exchange information, as well as industry and sector classification etc. for all these European companies. The initial list consisted of 7,844 companies. Total revenue in EUR m for the last reported annual year was the basis for determining which group the companies would belong to.

The list of companies was gathered during Tuesday, 11 February 2022 and was at that time a complete list of each publicly traded company with a headquarter in a European country. Since then, there might have been changes to this list, for example with initial public offerings, acquisitions or delisting due to insolvency. We deem the probability of additions to this list due to initial public offerings as low since the market has been bearish, a negative trend, during the beginning of 2022. The probability of deductions from this list we consider somewhat higher but still low as this is not something that often occurs, especially not on the largest publicly traded companies which is what this study focuses on. Therefore, the list of companies from 11 February 2022 is deemed as still highly accurate and relevant as of May 2022.

The proposal for a global corporate minimum tax is intended to target large multinational enterprises and the limit for the law proposal has been set at total revenue above EUR 750 m. The initial list of 7,844 companies was split into the HIGH-group of companies with a total revenue above EUR 750 m and a LOW-group with a total revenue below this limit. This resulted in 1,381 companies in the HIGH-group and 6,463 companies in the LOW-group. Since the study concerned market valuations, the daily share price data had to be extracted and needed to be available for each company and to a sufficient level. We gathered pricing data since the beginning of the year 2020 to have sufficient comparable data. This was based on the fact that the most important dates when news came out about this law proposal was during the latter part of 2021, which are referred to as the event dates. Thus, each company which did not have available share prices at the beginning of

January 2020 and at the beginning of March 2022 was excluded from the list of companies. That means that the included companies had to be publicly listed during the whole period.

With the initial 1,381 companies in the HIGH-group i.e. those companies which did have a total revenue of above EUR 750 m during its last reported fiscal year, 74 companies were removed due to insufficient data and thus 1,307 companies remained which was used in the study. This group is also referred to as the treatment group. Out of the 6,463 companies in the LOW-group i.e. the companies which did not have a total revenue above EUR 750 m in the latest reported fiscal year, a total of 932 companies were removed due to insufficient data, and thus 5,531 companies remained. See Table 3.2 in the appendix for a summary of the number of companies.

To make the LOW-group somewhat smaller and thereby easier to treat it was decided to reduce the LOW-group into a selection of its largest companies. A smaller group would be easier to work with and this new selection of the LOW-group would also be better in comparison to the HIGH-group since both groups would feature large multinational enterprises with different size, and th study would thereby get rid of the small and risky companies that have a very low total revenue and naturally makes up a large portion of the initial 5,531 companies in the LOW-group. It was decided to try to make a selection that would somewhat match the size of the total HIGH-group i.e. the 1,309 companies in our treatment group. To do this, the mean, the median and the population standard deviation for the entire LOW-group was calculated. Population standard deviation was used since the study did look at the full population of publicly traded companies headquartered in Europe with a total revenue below EUR 750 m, and that did have sufficient data available. With this data, a portion of the distribution of the LOW-group was selected which would be included in the study. It was decided to select 0.5 standard deviations above the mean in the population as this would generate a selected group of 1,062 companies in the final LOW-group in comparison to the already 1,307 companies in the final HIGH-group. The total revenue boundary to be included was thereby EUR 189.9 m of which 1,062 companies were above. These 1,062 companies selected represents the biggest companies in terms of total revenue from the initial LOW-group. This meant that a certain standard of the companies that would be part of the LOW-group could be maintained, they would still be large corporations while not being included in the HIGH-group. See Table 3.3 in the appendix for figures regarding this calculation.

The initial list of companies which featured 7,844 companies represented firms from 42 different jurisdictions. See Table 3.1 for this data. After the treatment and control group was established the distribution of countries represented was still very wide. None of the groups had substantial dependency on any country. See Table 3.4 in the appendix for this breakdown.

The determining factor for group formation was total revenue during the last reported fiscal year. Out of the 1,307 companies in the HIGH-group 58% reported their figures during the calendar year 2022 and would thus be considered as highly up to date while it can then be assumed that 42% reported during 2021 and is thus still very up to date. Out of the 1,062 companies in the LOW-group 80% reported their figures during the calendar year 2022 and would thus be considered as highly up to date while 20% were assumed to be reported during 2021 and is thus still very up to date.

For all the companies included in our study the next step was to gather stock price data on a per day basis. This led to research of the important dates where information about the global corporate minimum tax proposal was published, and which could have had material impact on the stock price of the companies affected. It was determined that several of these event dates occurred during 2021. The last step was to gather closing stock price data per day for each company between 1 January 2020 – 4 March 2022 to be able to compare trading development to its history. This stock price data was gathered in EUR currency, to have a common currency that would simplify comparisons between countries. EUR was selected due to the fact that that the highest number of countries in Europe use EUR as their currency compared to any other currency. The stock price data was gathered with the help of FactSet which was able to extract daily share price and use the exchange rate on each specific date in its conversion into EUR.

3.2 Filtering data for further analysis

The first analysis will concern the full population of European publicly traded firms with total revenues above EUR 750 m in their last reported financial year, as well as a selected sample of additional companies below the EUR 750 m threshold. These two groups became the treatment group and the control group. This analysis is found in the Section 5.1.

To extend the analysis, the same test as in the first analysis was performed only this time with the most liquid firms from the two initial groups. Since the test revolves around finding abnormal negative returns, a prerequisite for any type of return is to have liquid firms. Such firms experience both highs and lows in the share price since the level of trading is higher compared to firms with low liquidity in their trading. Consequently, it was decided to remove the 10% least liquid firms from both the initial treatment and control group. Liquidity was measured in total market valuation in EUR m at the time of 4 March 2022 which was the last trading day at which the share price for each firm included was recorded. Thus, 90% of the firms with the highest market capitalisations were kept for this second analysis.

For the Liquid_HIGH-group, the treatment group which initially had 1,307 companies included, had 7 companies removed for insufficient data and 130 companies removed due to illiquidity. For the Liquid_LOW-group, the control group, the initial size of the group was 1,062 companies and became 949 companies after removal. This included 8 companies removed due to insufficient data and 105 companies removed due to illiquidity. The analysis for only the most liquid companies is found in Section 5.2.

The second step in extending the analysis concerned limiting the scope of the analysis to specifically look at the industries which was estimated to be the most affected by the Pillar two model. Two types of companies were estimated to potentially see larger abnormal negative returns compared to the full population of companies in the first analysis. The first type would be tech-companies which rely on an internet-based business model that in practice allows the firm to claim that their income is generated in any jurisdiction of their choice. As mentioned in Section 2, a motivation behind the Pillar two model was to be better able to tax these firms which do not pay corporate taxes in several of the jurisdictions where their users and customers are located.

The second type of company to look further into are companies engaged in industries which are intellectual property intensive. These industries were selected because intellectual property provides international corporations with a way to artificially create expenses in one jurisdiction, and revenues in another jurisdiction. This is done through for example rent costs associated with the right to use an intellectual property. By having one subsidiary located in a tax haven owning all the intellectual property rights, this subsidiary can earn fees from other subsidiaries within the group, and potential profits are shifted abroad. Firms that are intensive in their intellectual property rights are defined as those having intellectual property rights per employee above average (European union intellectual property office, 2019). Almost every company has some kind of intellectual property, such as a trademark protected corporate logo or name. However, firms engaged in producing products or engaged in manufacturing often have more intellectual property compared to firms engaged in providing consumers services. According to the European union intellectual property office (2019) these industries are primarily found in the manufacturing, technology, and business services sectors. This is because the firms which sell products also have the ability to protect the design of their products or have a patent protecting the innovation behind that product. The study of intellectual property intensive industries will focus on industries where the intellectual property is a core asset and/or concerns a major part of the total amount of assets. Consequently, certain manufacturing industries where firms tend to possess intellectual property but where the intellectual property is estimated to only be a minor asset compared to total assets are not included in the selection of the intellectual property intensive industries. On the opposite, industries engaged in biotechnological research and development for example tend to have their intellectual property as a core asset and in terms of value these assets make up a major part of their total assets. These types of industries are included because their operations tend to be highly affected by intellectual property matters. While selecting the industries included in the analysis we wanted to include as many as possible to capture the intellectual property intensive industries. While at same time not including too many as this would then to a higher degree reflect the whole market. See Table 3.5 in the appendix for a summary of the selected industries.

When the initial data was downloaded it included a standardized industry classification and explanation of that industry for each of the 7,844 companies. This classification was the base for determining which industries to include when specifically looking at intellectual property intensive industries. The final selection of industries included was made on a subjective basis however as informed as possible to assess which industries generally tend to include companies where intellectual property matters are highly important. Of the initial 128 different industries, 23 industries were determined to be intellectual property intensive.

Once a selection of relevant industries had been completed, the initial data was filtered to only include intellectual property intensive industries. With this came a new set of data comprising of 2,271 companies. Similar to the first analysis the natural threshold for the treatment group and control group was the EUR 750 m limit put forth in the Pillar two model. This meant that 227 companies remained in our IP_HIGH-group after 12 companies were removed due to insufficient data. For the IP_LOW-group, a similar approach was taken as in the first analysis when gathering the control group. From the intellectual property intensive industries, there were 2,032 companies below the limit of EUR 750 m. Out of this we looked at the statistics of this group and selected a limit based

on the average total revenue and the population standard deviation to set a revenue limit which would make the IP_LOW-group approximately correspond to the size of the IP_HIGH-group. The average plus one standard deviation was selected which set the limit at EUR 205.8 m in total revenue. After removing 24 companies due to insufficient data. the final set of the IP_LOW-group consisting of 198 companies was reached. These 198 companies represented the largest intellectual property intensive companies that were below the EUR 750 m limit set forth in the Pillar two model. Using the same share price development data that was gathered for the first analysis, this could be filtered to fit with the intellectual property intensive companies. This analysis is found in Section 5.3.

Similar to when the illiquid companies were removed from the first version of the HIGH-group and LOW-group we narrowed down the IP_HIGH-group and the IP_LOW-group to only include the most liquid companies. The 10% least liquid companies, measured by their market capitalisation by 4 March 2022 were removed and the 90% highest valued companies were kept. This in order to focus on companies which are more frequently traded, and which could potentially see more volatility in the market following the release of information. Out of the 227 in the previous IP_HIGH-group, 22 companies were removed from the group and thus 205 companies were left in the Liquid_IP_HIGH-group. Out of the 198 companies which were part of the previous IP_LOW-group a total of 19 companies were removed, and thus 179 companies where part of the final Liquid_IP_LOW-group. This analysis is found in Section 5.4.

This concludes the process of finding as well as filtering the initial data to reach four different pairs of treatment- and control groups. The first analysis and set of data represents the original data and covers all kinds of industries and the companies with the largest total sales where full data was available. The second analysis in a narrow down of this into the 90% most liquid companies measured by their market capitalisation. The third analysis focuses on the intellectual property intensive industries and includes companies which are operating in industries deemed as intellectual property intensive. The fourth and final analysis continues on the companies operating in intellectual property intensive industries and filters these to only include the 90% most liquid companies measured by the highest market capitalisation.

4. Empirical method

4.1 Statistical model: Difference in differences

To examine the effect of the new global corporate tax proposal, an extended version of the statistical method *Difference in differences* ("DiD") is employed. The DiD method is a suitable fit as we are examining the effect of a policy change using panel data. The policy change only targets a subgroup of the population; the multinational enterprises earning more than EUR 750 m in annual revenue. Time variant effects are controlled for at the group level. In order to control for time-invariant unobserved heterogeneity, a fixed effects dummy variable is added, which consequentially controls for all that is time-invariant for each individual stock.

Equation 1: *Difference in differences with an added fixed effects dummy variable*

$$y = \beta_i + \beta_2 \times d_{high.earning} + \beta_3 \times d_{event} \times d_{high.earning} + u$$

y = the estimated percentual average return of the group

β_i = the average y for each individual stock

β_2 = the estimated difference in average returns between the control group and the treatment group

β_3 = the difference in differences-estimator

d_{event} = the dummy variable for the event dates, at which information has been released. This variable will represent the current date we are testing, as we test one event at a time under Section 5 below.

$d_{high.earning}$ = the dummy variable for members of the treatment group

u = the error term

The betas will on average be giving the right treatment effect, meaning that the difference in differences-estimator will be the average treatment effect that we get. With the help of the method above, the expected results are abnormal negative returns for the treatment group but not the control group, after the specified event dates have occurred.

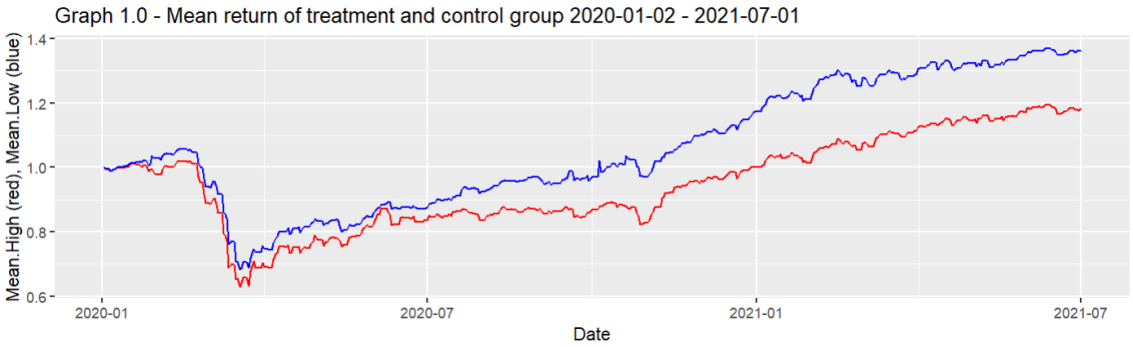
4.2 Key assumptions

To infer a causal effect by this policy, it is necessary to assume that the two groups would have had an otherwise parallel development, meaning that in the absence of treatment the treatment group and the control group would have evolved in a similar way. This is a reasonable assumption due to the nature of the data, where both groups are relatively large. The two sets of initial stock data consisted of 1,309 corporations in the treatment group and 1,063 corporations in the control group. Both contain large multinational enterprises, with more than half of the total amount seeing a yearly consolidated revenue above EUR 750 m. This implies that over time, the companies as a group should follow a development which approximately corresponds to the market index. As the groups contain a diverse set of companies from a wide range of industries, it is assumed that any idiosyncratic risk is neutralized and that any systematic risk should affect both groups similarly. This assumption consequently includes the COVID-19 pandemic, which was highly topical during the entirety of the time period the data covers; 1 January 2020 – 4 March 2022.

The assumption above is examined by checking for common trends, as illustrated in Graph 1.0. The two lines represent the indexed daily average return for each group, and

are following each other closely, thereby showing a high correlation as they both correspond to the volatility one would expect from the market as a whole. The LOW-group in blue shows a stronger return since the beginning of 2020 which we would expect from a group containing relatively smaller companies which carry more risk and therefore investors expect higher returns. The HIGH-group in red shows a lower indexed return since the beginning of 2020, however the correlation between the groups is high when looking at the short-term ups and down in the market. The somewhat varying distance between the red and blue lines, which increases along the x-axis, can be interpreted as the effect of compound interest.

Graph 1.0 – Mean return of treatment and control group up until July 2021



The graph displays the indexed average return development for each of the two groups included in our study between 2 January 2020 – 1 July 2021. It contains data from the two initial groups which represented the market as a whole and which is analysed in Section 5.1. The graph displays a high level of correlation between the two groups, thereby confirming the common trends assumption.

Group members are treated as randomly chosen. While the data covers a large share of the European publicly traded companies, the population of companies affected by this law is global, as well as regards non-publicly traded companies. Even more companies would pertain to the control group which is below the law proposal threshold of EUR 750 m in total sales. Consequently, we regard our data as representative of the population and treat them as randomly chosen, which is an important assumption for identification**.**

The identification assumption states that the policy change is exogenous and therefore does not depend on group characteristics. Ultimately, that is a question of whether the chosen group is a suitable control group. There may be differences which indicate that they are not completely comparable, as the treatment group has a higher incentive to avoid taxes in the first place due to their size and thereby potential upsides in absolute figures. However, the treatment group also has a lower incentive to engage in tax avoidance as a consequence of their required transparency from being publicly traded. The selected control group is the best control group available in this case, as both groups are stemming from similar geographic areas, affected by similar regulations, and exposed to similar systematic risks. Additionally, exogeneity is assumed of the independent variables of the model.

4.3 Model considerations and inherent risks

The dates below represent the crucial dates for information release with regards to when the market can be expected to react. These are the event dates which will be tested in the four different analyses:

1 July 2021: 130 jurisdictions join the international tax reform. This was the first time the global scale of the agreement was presented, and that it would represent a majority of the world's GDP.

8 October 2021: The international community strikes a ground-breaking tax deal. The OECD informed about the ambition of the framework and the scale at which the global community agreed.

20 December 2021: The OECD officially releases the Pillar two-model. This was the first time they officially released detailed information about the design of the Pillar two model.

There is an inherent risk with the data when only public companies are considered. As the Pillar two model is affecting private companies as well, it can be argued that public companies are scrutinized to a higher degree than their private counterparts and will consequently have lower incentives to engage in base erosion and profit shifting (BEPS) activities. Simultaneously, larger corporations would have a higher incentive to avoid taxes due to the potential upside in absolute figures. Hence, the dataset is not entirely representative of the population. The motivations for this are described more extensively under Section 3.1 above, where it is explained how the different treatment and control groups were selected.

Furthermore, the total dataset is converted to a single currency, the Euro, and the return is calculated over different time horizons depending on the specific event date in each analysis. As described in Section 3, the daily exchange rate for each trading day is used to convert the dataset. This is in order to control for the daily fluctuation in the different currency values and avoiding skewing effects with one currency increasing in value compared to another.

As the data covers a relatively large number of companies, and the regressions are made on a ±20 days interval surrounding each event, the regressions fulfil an important precondition for deriving asymptotic distributions. The smaller companies making up the control group are likely exposed to a higher risk overall. Their variance will likely be higher and their data more spread out. In an attempt to account for this effect, the clustered standard error is used, where clusters are based on membership to the treatment or control group. Bearing this in mind, each regression has two versions, the first being an ordinary least squares regression with a fixed effects dummy variable included, and the second one being the same however also including the clustering of standard errors, turning it into a weighted least squares regression. In the tables in Section 5, these are indicated with "FED" which are ordinary least squares regressions with a fixed effects dummy variable, and respectively with "WLS" which are the weighted least squares regressions.

Considering that the dataset represents the whole population to a high extent, i.e. the full population of European publicly traded companies, we estimate that the standard error will not be a major factor in our analysis. Since the initial dataset collected was the full population of publicly traded companies with a headquarter in Europe and the filtering of

data has been to extract a sample from the full population instead of gathering a sample from the beginning the standard error should not be a large concern.

Lastly, the validity of this natural experiment is strengthened by the clearly defined treatment affecting only the treatment group. This defined treatment came from the design of the Pillar two model. This provides a clear separation between the groups, leaving the companies either affected or not affected. Certainly, the companies included are on either side of the EUR 750 m threshold.

4.4 Empirical layout

The empirical method consists of linear regressions made on four main sets of data. These main sets are each divided into three subsections, where the data is tested on each of the event dates in turn. The first event date on 1 July 2021 is referred to as JOIN130. The second event date on 8 October 2021 is referred to as INTDEAL. Lastly, the third event date on 20 December 2021 is referred to as RELEASEDATE.

The regressions are done on a ±20 days interval-basis around each event date, and this was determined as one could reasonably expect most of the large market effect from the release of information to happen within that interval. It is also reasonable to assume that such an effect could be seen across a longer time frame due to its material nature of changing the conditions for operating large multinational enterprises by fundamentally changing how global corporate taxes are designed. One might expect the market effect to be the strongest during the nearest days following the release of the information. This is especially true for the first event date, where the least amount of information existed prior to that day. Additionally, the event dates are all during the latter part of 2021 which was a period containing a high amount of volatility as well as concerns about the development of the market. This was a period where the COVID-19 pandemic took place, where the vaccines where being distributed to the populations across the globe and where the market feared future inflation and subsequently rising interest rates. In short, the market was busy during this period. Consequently, we selected ±20 days intervals for our analyses to fully capture the difference in return between our two group despite the conventional method to test for ±3–5 days intervals. However, we believe the effect we test will have substantially larger implications compared to smaller difference in differences-analyses. We also wanted to make sure we would capture potential effects by extending the tested interval.

While the regression formula is the same for all regressions below, see Equation 1, the dataset is successively narrowed down. The results in the initial regression prompted the analysis of more specific data used in the second, third and fourth regression. Each subsection contains explanations as to what data is used in each respective regression.

The first regression revolves around the market as a whole and gathering as many publicly traded companies as possible given that they have European headquarters and are of a certain size in terms of total revenues. The first set of regressions, in Section 5.1, can thus be considered a general and all-encompassing model in this particular case. Each following section being increasingly more specific in the data examined. The second regression concerns limiting the dataset to the most liquid companies in order to measure an effect among corporations which tend to be more actively traded on the stock market.

The third regression concerns corporations active in industries considered as intellectual property intensive. These industries have higher abilities and therefore stronger incentives to avoid taxes. Further explanations of this is found in Section 3.2. Lastly, the fourth regression is a mix between the second and third regression as the fourth regression will look at the most liquid companies within intellectual property intensive industries.

All separate analyses shed light on different aspects of the hypothesis and the data. Consequently, each of these are included in this study and have separate subsections within Section 5 below. They are divided into four main sections according to the four different datasets created. Each with three separate regressions made based on the three different event dates studied. Each event dates then includes two regressions, one linear regression including a fixed effects variable, and one regression adjusting for clustered standard errors.

5. Empirical results

5.1 First regression – Full European data

In the first set of regressions, the full dataset is examined through a difference in differences model, as shown in Equation 1 in Section 4.1. The data for the regressions below differs as all data up until the event is considered "before" and all data from the event and onwards is considered "after". As is given below, this cut-off point in the data differs between the three regressions depending on the different event dates.

The main motivation for the first regression is to study the effect on the market as a whole through a proxy of what would represent the full market. This is therefore done on companies in all types of industries and from several European countries. These initial regressions aim to give a general perspective of how the data fits the model, with the data covering the 1 January 2020 until the 4 March 2022, and with all companies included, as described in Section 3.1.

The adjusted r^2 is very low across all regressions, which would indicate a low level of fit of the model to the data, thus decreasing its' predictive abilities.

The results for the regressions 5.1.1 indicated significant results for the high-earning-variable but not for the event variable JOIN130, and the combinations of the variables only fell under the 10% significance threshold.

Regressions 5.1.2 show significant p-values for the INTDEAL-variable which would indicate a change in valuation between the two groups. Despite this, the adjusted r^2 is very low in relation to this, indicating a very low correlation.

Significant effects were found for the RELEASEDATE-variable in regressions 5.1.3, possibly indicating a change in valuation for the treatment group. The p-value for the entire regression is significant as well. The adjusted r^2 is very low indicating a very low correlation.

Table 5.1 – Regression results for the full European dataset

5.1 - All results

	avg.growth.rate					
	5.1.1 FED	5.1.1 WLS	5.1.2 FED	5.1.2 WLS	5.1.3 FED	5.1.3 WLS
High Earning	-0.0005**	-0.0005**	-0.0001	-0.0001	0.001	0.001
	(0.0002)	(0.0002)	(0.001)	(0.001)	(0.001)	(0.001)
Join130	0.0002	0.0002				
	(0.0002)	(0.0002)				
High Earning:Join130	0.001*	0.001*				
	(0.0003)	(0.0003)				
Intdeal			0.002***	0.002***		
			(0.001)	(0.001)		
High Earning:Intdeal			-0.001	-0.001		
			(0.001)	(0.001)		
Releasedate					0.002**	0.002**
					(0.001)	(0.001)
High Earning: Releasedate					-0.001	-0.001
					(0.001)	(0.001)
N	4,663	4,663	4,667	4,667	4,666	4,666
R^2	0.003	0.003	0.003	0.003	0.002	0.002
Adjusted R^2	0.002	0.002	0.002	0.002	0.001	0.001
Residual Std. Error	0.005 (df = 4659)	2.143 (df = 4659)	0.016 (df = 4663)	4.861 (df = 4663)	0.021 (df = 4662)	6.256 (df = 4662)
F Statistic	4.129*** (df = 3; 4659)	4.459*** (df = 3; 4659)	4.216*** (df = 3; 4663)	4.216*** (df = 3; 4663)	2.893** (df = 3; 4662)	3.059** (df = 3; 4662)

Notes:

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

The table shows a summary of the regression results 5.1.1 – 5.1.3, with the full European dataset. The two columns named 5.1.1 represent the first event date 1 July 2021. The two columns in the middle named 5.1.2 represent the second event date 8 October 2021. The two last columns named 5.1.3 represent the third event date 20 December 2021. FED are the ordinary least squares regressions with a fixed effects dummy variable, and WLS are the weighted least squares regressions. This table shows significant results for the combination variables under the 10% significance threshold for the first event date. Additional significant results are found the single variables on both the second and third event dates. In combination this would indicate some change in valuation. The adjusted r^2 is very low throughout indicating a very low correlation.

5.2 Second regression – Only liquid companies

The second regression concerns the most liquid companies. It is identical to the first regression in Section 5.1, with the addition of altering the data to only include the corporations with the highest market capitalisation in both the treatment and control group. The 10% least liquid companies where removed. The motivation for which is provided in Section 3.2 above.

The motivation behind this analysis is the estimation that the effect of abnormal negative returns for the treatment group but not the control would be stronger amongst companies that are more liquid. This concerns companies which are more frequently traded over the stock markets. As these companies on average are liquid to a higher extent compared the groups in the first regression, we would expect these groups to both experience stronger rise and downfall in prices.

In this section we found significance for the 1 July 2021 event date in two variables. Significant was also found on the 8 October 2021 event date. This would give some

indication that valuations did change for one group but not the other. The model used did not fit the data very well as shown through adjusted r^2 scores.

Regressions 5.2.1 provide significant results for both the high.earning-variable and the JOIN130-varible, indicating significant changes in valuation. The adjusted r^2 are low but higher than the corresponding regressions in 5.1.1.

The only significant p-values in 5.2.2 were found in the Intdeal-variable, showing high significance. Despite this, there is a low usefulness of model indicated by r^2 score.

In regression 5.2.3, significant effects were found in all variables, with both the High-earning and the event date-variable falling below the 1% significance level.

Table 5.2 – Regression results for only liquid companies

5.2 - All results

	avg.growth.rate					
	5.2.1 FED	5.2.1 WLS	5.2.2 FED	5.2.2 WLS	5.2.3 FED	5.2.3 WLS
High Earning	-0.001***	-0.001***	0.000	0.000	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Join130	0.000**	0.000**				
	(0.000)	(0.000)				
High Earning:Join130	0.000	0.000				
	(0.000)	(0.000)				
Intdeal			0.002***	0.002***		
			(0.000)	(0.000)		
High Earning:Intdeal			-0.000	-0.000		
			(0.000)	(0.000)		
Releasedate					0.002***	0.002***
					(0.000)	(0.000)
High Earning: Releasedate					-0.001**	-0.001**
					(0.000)	(0.000)
Observations	4,208	4,208	4,208	4,208	4,208	4,208
R^2	0.008	0.008	0.045	0.046	0.045	0.046
Adjusted R^2	0.007	0.008	0.044	0.045	0.044	0.045
Residual Std. Error (df = 4204)	0.004	1.615	0.004	1.526	0.004	1.715
F Statistic (df = 3; 4204)	11.259***	11.720***	66.279***	67.065***	65.701***	67.167***

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

The table shows a summary of the regression results 5.2.1 – 5.2.3, with the dataset containing only liquid companies. The two columns named 5.2.1 represent the first event date 1 July 2021. The two columns in the middle named 5.2.2 represent the second event date 8 October 2021. The two last columns named 5.2.3 represent the third event date 20

December 2021. FED are the ordinary least squares regressions with a fixed effects dummy variable, and WLS are the weighted least squares regressions. This table shows significant results from two variable on the first events dates. Additionally, it shows some significant results on the other event dates. Adjusted r^2 is very low throughout indicating a very low correlation.

5.3 Third regression – Companies in IP-heavy industries

In the third regression, the full dataset has been filtered to only include companies active in intellectual property intensive industries. A reason for this is found in Section 3.2, and a table containing the industries considered as intellectual property intensive is found in Table 3.5 in the appendix.

This third regression is aimed at studying specifically how intellectual property intensive industries would react on average to released information regarding the Pillar two model. This will provide an interesting comparison to the previous two regressions, which represented the general market, to see whether the effect was potentially stronger for the intellectual property intensive industries.

In this analysis, few significant effects were found, as shown below. This would indicate that for the subsection of the market concerning intellectual property intensive industries, valuations did not change and so the market did not change its price of these assets. As showcased through the r^2 amongst other the model did neither yield a good fit for this data.

No significant results found for regression 5.3.1. This would indicate that for this subsection of the market the valuations did not change substantially for the treatment group compared to the control group.

Regression 5.3.2 only show significance at the event-date variable Intdeal, but a highly significant effect found for the Releasedate-variable for regression 5.3.3, which would indicate that valuations for the treatment group did change following the release of information.

Table 5.3 – Regression results for companies in IP-heavy industries

5.3 - All results

	avg.growth.rate					
	5.3.1 FED	5.3.1 WLS	5.3.2 FED	5.3.2 WLS	5.3.3 FED	5.3.3 WLS
High Earning	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
Join130	0.000	0.000				
	(0.000)	(0.000)				
High Earning:Join130	0.000	0.000				
	(0.001)	(0.001)				
Intdeal			0.003***	0.003***		
			(0.001)	(0.001)		
High Earning:Intdeal			0.001	0.001		
			(0.001)	(0.001)		
Releasedate					0.001***	0.001***
					(0.000)	(0.000)
High Earning: Releasedate					-0.000	-0.000
					(0.001)	(0.001)
Observations	850	850	850	850	850	850
R^2	0.010	0.010	0.052	0.055	0.016	0.016
Adjusted R^2	0.006	0.007	0.048	0.051	0.012	0.012
Residual Std. Error (df = 846)	0.004	1.556	0.006	1.860	0.005	1.645
F Statistic (df = 3; 846)	2.786**	2.856**	15.376***	16.284***	4.501***	4.485***

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

The table shows a summary of the regression results 5.3.1 – 5.3.3, with the dataset containing companies in IP-heavy industries. The two columns named 5.3.1 represent the first event date 1 July 2021. The two columns in the middle named 5.3.2 represent the second event date 8 October 2021. The two last columns named 5.3.3 represent the third event date 20 December 2021. FED are the ordinary least squares regressions with a fixed effects dummy variable, and WLS are the weighted least squares regressions. This table shows an absence of significant results for the first event date. It shows significant results for the second and third event date which would indicate some changes in valuation. Adjusted r^2 is very low throughout indicating a very low correlation.

5.4 Fourth regression – Liquid companies in IP-heavy industries

The fourth set of regressions are extensions of the third, by combining the second and third sets of regressions. In this analysis we use the data from the third regression containing the industries considered to be intellectual property intensive. This data has also been filtered to only include the most liquid companies, the companies with the highest market capitalisation that are the most liquid in their trading, in similarity with

the second regression in Section 5.2. A reasoning behind this analysis is found in Section 3.2.

The motivation behind this analysis is to test the level at which results could be discovered by combining several interactions. In this case both the liquidity effect as well as the intellectual property-effect. The standalone effects of these two can be found in the two previous regressions in Section 5.2 and Section 5.3.

Similar to Section 5.3 this analysis resulted in a few significant results, slightly more compared to Section 5.3. While we can draw the conclusion that the model did not fit the data very well and thus the valuation of the treatment group as a whole did not change substantially. However, the regressions in Section 5.4 where comparatively more significant compared to Section 5.3 which would indicate that the relative effect was stronger for the group containing more liquid companies.

No significant results found in regression 5.4.1 regression, indicating that market valuations did not change significantly for the treatment group following the release of information.

Regression 5.4.2 show significance both in the high-earning variable, as well as the event-date variable, showing that valuations did change to some extent following the release of information. The adjusted r^2 value is the highest one across all regressions of all datasets.

One significant result found for the RELEASEDATE-variable in regression 5.4.3, which would indicate that valuations did change to some extent for the treatment group. It is outweighed by a very low adjusted r^2 score, implying a low usefulness of the model.

Table 5.4 – Regression results for liquid companies in IP-heavy industries

5.4 - All results

	avg.growth.rate					
	5.4.1 FED	5.4.1 WLS	5.4.2 FED	5.4.2 WLS	5.4.3 FED	5.4.3 WLS
High Earning	0.000	0.000	0.001**	0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Join130	0.000	0.000				
	(0.000)	(0.000)				
High Earning:Join130	0.001	0.001				
	(0.000)	(0.000)				
Intdeal			0.003***	0.003***		
			(0.000)	(0.000)		
High Earning:Intdeal			-0.000	-0.000		
			(0.001)	(0.001)		
Releasedate					0.001***	0.001***
					(0.000)	(0.000)
High Earning: Releasedate					-0.001	-0.001
					(0.001)	(0.001)
Observations	768	768	768	768	768	768
R^2	0.010	0.013	0.123	0.122	0.012	0.012
Adjusted R^2	0.007	0.009	0.119	0.118	0.008	0.008
Residual Std. Error (df = 764)	0.003	1.389	0.004	1.440	0.004	1.615
F Statistic (df = 3; 764)	2.696**	3.324**	35.588***	35.281***	3.044**	3.091**

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

The table shows a summary of the regression results 5.4.1 – 5.4.3, with the dataset containing liquid companies in IP-heavy industries. The two columns named 5.4.1 represent the first event date 1 July 2021. The two columns in the middle named 5.4.2 represent the second event date 8 October 2021. The two last columns named 5.4.3 represent the third event date 20 December 2021. FED are the ordinary least squares regressions with a fixed effects dummy variable, and WLS are the weighted least squares regressions. This table shows an absence of significant results on the first event date. It shows some significant results for the second and third event date. Adjusted r^2 is very low throughout indicating a very low correlation.

5.5 Summary of empirical results

The results we have presented cover several different perspectives on the analysis of market effects due to information released concerning the Pillar two model. Different datasets and regressions have been used to further isolate effects, to examine whether there would be stronger effects on certain subsections of the market. For example, for more liquid companies, and then for companies which are operating in intellectual property intensive industries.

All the presented regression models 5.1.1–5.4.3 show significance at the 5%-level, with most regressions falling below a 2.8% threshold, and with most regressions including at least one significant variable. As a group, the regressions 5.2.1–5.2.3 have the lowest p-values, with the fifth lowest, the very lowest, and the second lowest p-value respectively.

As the model is including a fixed effects dummy variable, the adjusted r^2 becomes the relevant metric of evaluation, as to abstract for the explanatory power of the dummy variables. All adjusted r^2 values can be considered to be very low at close to zero correlation. The exception is regression 5.4.2, with an adjusted r^2 value of 0.119. This is significantly higher than almost all other regressions but is still considered relatively low.

In summation, section 5.1. showed some significant results for all three event dates. Section 5.2 found significance for event dates 1 July and 20 December 2021. Section 5.3 only found significance for the 20 December 2021. Lastly, 5.4 presented some significant effects for the 8 October and 20 December 2021.

To conclude, the indications of the high number of positive p-values, both in the regressions and their individual variables, are counteracted by the low outcome of the adjusted r^2. Keeping this in mind, we cannot be fully confident that the statistical model applied will correctly evaluate the data and thus cannot confidently reject H_0, meaning that we cannot say that the new market information regarding the Pillar two model *did* lead to *on average* abnormal negative returns for the group of companies affected by the law proposal as compared to a group of companies not affected.

Instead, the data point towards confirming H_0 given the context of the significant results as well as the lack of good statistical evaluation which would provide a lack of confidence in confirming H_1. Thus, we conclude that the new market information regarding the Pillar Two model *did not* lead to *on average* abnormal negative returns for the group of companies affected by the law proposal compared to a group of companies not affected.

6. Discussion

The adjusted r^2 is consistently close to 0, showing that a very low percentage of the variance of the dependent variable is explained by the independent variable. This is likely due to the fact that the model is very simple and unspecific. The results presented in Section 5 clearly show that an extension of the research would entail adding more independent variables and increasing the complexity of the model to better reflect the complex reality of the stock market behaviour.

In the Literature review we presented two articles which we used as inspiration. These were Joshi (2020) as well as Joshi, Outslay, and Persson (2020). In short these provided some evidence on how corporations shift their operations because of new prerequisites from political implementations. As mentioned, these studied what we would refer to as societal effects such as effective tax rates for example. While we have conducted our analysis around market and financial effects by looking at market valuations. The results we obtained can therefore not be exactly compared to these two mentioned articles. However, as stated we could not find any articles which had the particular combination of statistical methods and data, and we will therefore compare our results to these two articles to the best way possible.

The results we obtained were in majority non-significant as concluded in Section 5.5. Meaning that there was not abnormal negative return for the treatment group following the release of information. In some cases we found significant results which we interpret as either showcasing small changes in valuation or resulting from a lack of a well-fitting statistical model. Instead the results point towards low or absence of changes in valuation for the treatment group following the release of information. However, the presence of non-significant results and absence of abnormal negative returns could potentially be because the market has not fully priced the new information, or the market does not believe the Pillar two model will have a substantial effect on effective tax rates and thus cash flow. The first potential reason, a lack of correct pricing, could be due to the information being released during times where there were plenty of other concerns for the market and in which new information had to be priced correctly. During the second half of 2021 the market was amongst others characterised by fear of new mutations in the COVID-19 virus, fear of inflation as an effect of excessive government spending during the pandemic and thereby fear of future interest rate spikes. During this period, it is not entirely impossible that the pricing mechanism in the market did not adapt to all kinds of new information. A second potential interpretation of the results are that the market does not believe the Pillar two model will have actual substantial effects on the corporate taxes paid by multinational enterprises and thereby not affecting their future cash flow to any significant level.

Relating our results back to Joshi (2020) and Joshi, Outslay, and Persson (2020), if the lack of results are because of the market does not believe the Pillar two model will have substantial effects on effective tax rates then this provides an evaluation of policy similar to Joshi (2020) and Joshi, Outslay, and Persson (2020). This thus extends applicable ways of evaluating political proposals by both looking at the changes following the proposals as well as the market reaction towards the proposals.

As mentioned, our results can be interpreted as the market has not correctly priced new information which could have tangible effects on future cash flows and thereby according to financial theory should have an effect on corporate valuations. This would then challenge the common assumption that markets are characterised by perfect information which would lead to perfect pricing in all instances. Such an assumption appear as a bit too far stretched when the market makes valuation mistakes and does not price new information correctly.

As we did generally not find significant results, we also could not prove a less significant information effect. That would have been when only the first event contributed with crucial information and the following events did not contribute to the same extent as the first because some information was already published and the following events where not as surprising. If for example the effect would have been larger on the first event date compared to the other two events across the board. However, this is now something that we can dismiss and conclude that the effect was not materially stronger for any event date compared to the other. We must also acknowledge the risk of the selected event dates not being the ones causing particular returns in any direction. The three selected event dates where selected following research of the release of information and estimated to be the events where crucial information was released. However, the risk remains that other event dates, possibly prior to the ones studied had larger effects on market valuations despite containing less significant information.

Conducting a study even more similar to the one conducted by Joshi (2020) would have been interesting as this could have evaluated societal effects from different political proposals. However, this would have required more time to allow for the Pillar two model to take effect and have adaptation time before being able to measure matters such as effective tax rate or tax revenue. As noted by Joshi (2020) who found that it took firms up to two years to become used to new regulation and for that regulation to have an effect. Concerning the Pillar two model which is expected to be implemented during the year 2022, that time has not passed yet where societal effects can be measured. Such research can hopefully be conducted in the future.

A potential issue for future studies on the Pillar two model is the issue of transparent financials. Consequently, this thesis only look at publicly traded companies since these companies have transparent financials. This was crucial as it allowed us to determine which companies would be affected by the law proposal due to having a total revenue above the limit set furth in the Pillar two model. In Sweden, and Scandinavia in general, it is relatively easy to find financial data on private companies as well. However, this is not the case in all European countries. Consequently, we believe future studies on matters such as effective tax rates and tax revenue with regards to the Pillar two model could be done in Sweden for both private and public companies. But this would not be as easy to do one a European scale. Therefore, public companies will likely be studied more often which will not necessarily represent the full population of operating companies in the economy. Private companies are affected by the law proposal as well, but we cannot determine how their financials and effective tax rates etc. are affected by the Pillar two model due to a lack of transparency.

Concerning the design of the Pillar two model we do have some thoughts regarding why it might not have substantial positive effects on society stemming from corporations paying more in absolute taxes. Although the Pillar two model has the strength of being a global agreement which might be able to deter firms from engaging in haven hoping. The Pillar two model included a limit of total revenue above EUR 750 m to be affected by the proposal. This limit is relatively high. For example, out of the 7,844 total number of publicly traded companies with European headquarters, a total of 1,381 companies were above that limit. 1,381 companies are a lot in absolute terms. However, in relative terms only approximately 18% of the full population were above the threshold for the Pillar two model. We would consider this figure as relatively low, and we therefore deem that there will be many companies considered as large multinational enterprises that will not be affected because of the limit at EUR 750 m in total revenues. The potential implications from this could be that an anticipated increase in tax revenue will turn out to be lower than expected.

A historical and contemporary motive for European countries is the ability to tax American tech companies. However, the Pillar two model does not appear to have been designed according to fulfil this purpose. The consequence of the new agreement might be that the United States (U.S.) can easier tax their own tech companies since these have their headquarters in the U.S. and that is where they are ultimately incorporated. That begs the question how a framework such as the Pillar two model might evolve going forward. We estimate that there will be future proposals which put emphasis on digital business models and provide a way to tax the revenue created in each market, even for tech companies where it is difficult to prove where the service is being created.

Additionally, the Pillar two model concerns corporate income, not corporations holding assets. While the shielding of income in tax havens implies a current and future loss of tax revenue, it does not affect historical income held today as assets. Companies that are only holding assets such as cash in tax haven subsidiaries will not be affected by the Pillar two model. Efforts have been made to encourage repatriation of foreign held fund. The U.S. has for example tried this by instituting tax deductions for repatriated funds so that corporations would bring back cash into the U.S. (Fritz Foley, Hartzell, Titman and Twite, 2007). A future law proposal might concern these assets specifically and target the shielding of cash in tax havens instead of income generated there as with the Pillar two model. Fritz Foley et al (2007) found evidence that taxes have a high impact on the amount of cash held by firms from the U.S. Additionally, they found a relationship between higher taxes when repatriating funds and the amount of cash held in foreign jurisdictions. We might therefore see further proposals like the Pillar two model regarding other types of economic activity in the future.

One might reason why the Pillar two model was designed that way it was. We certainly don't know the ultimate reason behind each part of its design. We believe the Pillar two model was an initial effort to combat tax evasion from the perspective of where profits are recorded globally. Due to some of the shortages of the Pillar two model we expect future law proposals to concern tech companies and the problem of deciding where revenue is collected when offering digital business models as well as the holding of assets in tax havens for example. We expected that this will prompt additional academic research in the future.

Some of the research we would like to see in the future are as mentioned research that would study the effects of the Pillar two model on for example effective tax rates and tax revenue. This would evaluate the effects of the law proposal and determine if it was successful or not in implementing a new global corporate tax system as well as raise tax revenue for countries around the globe. Further research we would like to see is similar studies on market reactions but with shorter time spans. Instead of ±20 days we would like to see such studies on ±3 days and ±5 for example as we believe this would provide additional interesting results.

In the future we expect to see more studies done on this subject, as a measure of critically evaluating the response by the business and finance community to law implementations from global organisations and their members. Such research can provide good evidence for either the success or failure of attempts to combat base erosion and profit shifting. Additionally, we have seen haven hoping as the response to some earlier efforts to reduce the level of tax evasion globally. Which provided an argument to why global agreements must be implemented, in opposition to bilateral agreement between countries. With the learning of haven hoping because of previous efforts we believe this will lead global organisations to continue working on global agreements. Creating incentives for corporations to engage in haven hoping benefits the least compliant tax havens and provides incentives for tax havens to not be compliant. We recommend avoiding providing such incentives going forward, and highly stress the importance of global agreements.

We believe a potential long-term effect from the Pillar two model will be that the jurisdictions normally considered as tax havens increase their own corporate tax rates. This will go against their strategy of attracting corporations to locate there to build

national wealth. Although long-term in a couple of years and going forward we might see a global tax system where it is very rare to pay below 15% in corporate taxes. At this point the tax havens jurisdictions might realise that they could benefit from raising their own corporate tax rates to 15%. Since this is the rate that corporations will have to pay regardless of the rate in the tax haven. Increasing the rate to 15% will benefit the tax havens jurisdictions further by increasing their tax revenue while not having substantial effects on the individual corporations which would have been taxed at the 15% rate no matter what the rate in the tax haven was. At this point the cost-benefit analysis by corporations to decide to relocate we estimate will shift from the effective tax rate to matters of transparency or regulations. Corporations will most likely still relocate to tax havens jurisdictions but for other reasons than to pay lower effective tax rates. One such reason could be the secrecy provided by tax havens.

7. Conclusion

Through several difference in differences regressions this study has evaluated the release of information of several different event dates as well as on several different datasets. The initial question was whether or not new market information regarding the Pillar two model on average lead to abnormal negative returns for the group of companies affected by the law proposal compared to a group of companies not affected. This study can conclude that this was not the case and that such abnormal negative returns could not be proven.

This indicates that the market has not fully reacted and priced accordingly after such new information was released which would change the conditions for corporate taxation globally. Either the market was dull in adoption to this, or the market did not believe that the new law proposal would have any real effect on effective tax rates and that this would not affect their cash flow rates going forward. If the case is such that the market failed to appropriately price new information then this would be a criticism of the common assumption within economics that market are effective and that there is perfect information, which could be of value to future research.

Potential shortcomings of the study are the statistical model applied, which with more experience, could have been more thorough in order to account for the complex data set. Another potential shortcoming is that the study specifically focuses on publicly traded companies while the law proposal regards private companies as well. Looking at exclusively publicly traded companies became a practical compromise following the need for public and transparent financials for each firm. With additional resources at hand, this study could be replicated and edited to fit the data better, as well as to evaluate different types of political proposals and potentially also all types of companies. We look forward to taking part of future research building upon this study as well as policy evaluations of the Pillar two model through the lens of effective tax rates and tax revenue in order to determine the effect generated by the law proposal.

Although not being able to state that abnormal negative returns did occur for the treatment group but not for the control group we hope this study will provide some value in raising interesting research questions within the field of studying the effects of political proposals and corporate taxes. As well as thoroughly gathering much of the previous research conducted on this area and performing a study of our own we hope this can be of benefit when evaluating political proposals intended to combat global tax evasion.

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9. Appendix

9.1 Additional tables

Table 2.1 – Summary of the event dates

Table 2.1 - Event dates

ī..Date	Event	Comment
1 01/07/2021	130 jurisdictions join international tax reform	The first time the global scale of agreement was presented and that it would represent a majority of the world's GDP
2 08/10/2021	International community strikes ground-breaking tax deal	When the OECD informed about the ambition of the framework and the scale at which the global community agreed
3 20/12/2021	OECD released the Pillar two model	The date at which the OECD released detailed information regarding the desgin of the Pillar two model. Adding details to previous information about the scale of and ambitions with the framework.

This table provides a summary of the event dates that we used in our study. These represent the dates at which important information was released which could have had an impact on the market valuations.

Table 3.1 – Countries included in the initial data collection

Table 3.1 - Countries	
	Country
1	Aland Islands
2	Austria
3	Belgium
4	Bosnia And Herzegovina
5	Bulgaria
6	Croatia
7	Cyprus
8	Czech Republic
9	Denmark
10	Estonia
11	Faroe Islands
12	Finland
13	France
14	Germany
15	Gibraltar
16	Greece
17	Hungary
18	Iceland
19	Ireland
20	Italy
21	Latvia
22	Liechtenstein
23	Lithuania
24	Luxembourg
25	Macedonia
26	Malta
27	Monaco
28	Netherlands
29	Norway
30	Poland
31	Portugal
32	Romania
33	Russian Federation
34	Serbia
35	Slovakia
36	Slovenia
37	Spain
38	Sweden
39	Switzerland
40	Turkey
41	Ukraine
42	United Kingdom

This table shows the geographic catchment area of our analysis which shows that the group of companies included represents a wider definition of continental Europe.

Table 3.2 – The number of companies in each group after the initial removal

Table 3.2 - Amount per group

	ī..Group	Initial.amount	Removed	Final.amount
1	HIGH-group	1,381	74	1,307
2	LOW-goup	6,463	932	5,531
3	Total	7,844	1,006	6,838

This table presents the number of companies in each group as well as the total number of companies included in the first analysis on the full European data. We excluded companies which did not have sufficient trading history throughout the full period between January 2020 and March 2022. The table displays how the size of our two groups changed during this process. This dataset represented the full market and then the following groups were filtered from this original data set.

Table 3.3 – LOW-group population statistics

Table 3.3 - Population statistics LOW

	LOW.group.population.revenue.statistics	X	X.1	X.2
1	n	Mean	Median	St. dev (pop)
2	5531	107	28.2	165.7

In order to decrease the size of the LOW-group to a size which corresponded to the size of the HIGH-group we decided to only include a portion of the distribution in the group. This table displays the population statistics for the LOW-group upon which we based our inclusion criteria. This was done for the first analysis when studying the full European data.

Table 3.4 – Countries represented in our final two groups

Table 3.4 - All Countries

	ï..High.Group	Amount	Low.Group	Amount.1
1	Austria	29	Austria	16
2	Belgium	35	Belgium	25
3	Croatia	2	Bosnia and Herzegovina	1
4	Cyprus	10	Bulgaria	7
5	Czech Republic	3	Croatia	9
6	Denmark	33	Cyprus	7
7	Estonia	1	Czech Republic	3
8	Finland	36	Denmark	21
9	France	146	Estonia	3
10	Germany	148	Faroe Islands	1
11	Gibraltar	1	Finland	27
12	Greece	15	France	104
13	Hungary	4	Germany	109
14	Iceland	2	Greece	29
15	Ireland	36	Hungary	4
16	Italy	73	Iceland	9
17	Lithuania	1	Ireland	9
18	Luxembourg	21	Italy	55
19	Malta	1	Latvia	1
20	Monaco	2	Liechtenstein	2
21	Netherlands	51	Lithuania	3
22	Norway	30	Luxembourg	15
23	Poland	36	Macedonia	1
24	Portugal	11	Malta	3
25	Romania	6	Monaco	3
26	Russian Federation	69	Netherlands	18
27	Serbia	1	Norway	52
28	Slovenia	4	Poland	55
29	Spain	53	Portugal	8
30	Sweden	88	Romania	7
31	Switzerland	89	Russian Federation	52
32	Turkey	45	Serbia	2
33	Ukraine	1	Slovakia	1
34	United Kingdom	224	Slovenia	6
35			Spain	28
36			Sweden	74
37			Switzerland	67
38			Turkey	52
39			Ukraine	2
40			United Kingdom	171

This table displays the number of companies and their geographical distribution for our final version of the two groups used in the first analysis. The table shows that the spread of countries is wide and neither group is dependent on a few single countries to a high extent. As all other datasets came from this original the dependence on any country within any analysis was deemed to be low.

Table 3.5 – Industries selected as intellectual property intensive

Table 3.5 - Industries selected as intellectual property intensive

	Sector	Industry.code	Industry.name
1	Durables	1,340	Computer Processing Hardware
2	Durables	1,345	Computer Peripherals
3	Durables	1,425	Electronics/Appliances
4	Durables	1,435	Recreational Products
5	Non-durables	2,205	Chemicals: Major Diversified
6	Non-durables	2,210	Chemicals: Specialty
7	Non-durables	2,215	Chemicals: Agricultural
8	Non-durables	2,305	Pharmaceuticals: Major
9	Non-durables	2,310	Pharmaceuticals: Other
10	Non-durables	2,315	Pharmaceuticals: Generic
11	Non-durables	2,320	Biotechnology
12	Non-durables	2,325	Medical Specialties
13	Services	3,308	Information Technology Services
14	Services	3,310	Packaged Software
15	Services	3,320	Internet Software/Services
16	Services	3,430	Movies/Entertainment
17	Services	3,530	Home Improvement Chains
18	Infrastructure	4,830	Finance/Rental/Leasing
19	Infrastructure	4,840	Investment Banks/Brokers
20	Infrastructure	4,845	Investment Managers
21	Infrastructure	4,860	Multi-Line Insurance
22	Infrastructure	4,890	Real Estate Investment Trusts
23	Miscellaneous	6,010	Investment Trusts/Mutual Funds

This table displays the industries that were selected to be included in the third analysis regarding intellectual property intensive industries. Out of 128 initial categories of industries these 23 industries were selected to represent firm where intellectual property matters could have substantial impact on their operations and where a high share the total assets are made up of intellectual property.