Force or Stimulate: A Comparison Between The Effect of Binding and Non-Binding Gender Quotas on Firm Value and Performance

Case Study of France & the Netherlands

Abstract

In this paper I investigate the effect of corporate gender quotas on firm value and performance. The objective of this paper is to compare the binding quota approach (with sanctions) to the non-binding quota approach (without sanctions). The cases of France (binding) and the Netherlands (non-binding) are compared to Sweden where no actions in terms of quotas are undertaken. The data is structed as panel, thereby a natural experiment is constructed and the Differences in Differences model is used to estimate the coefficients. From the results, there is evidence that the installation of a binding quota affects firm value negatively and the non-binding quota has no significant effect on firm value. Regarding firm performance, both the binding and non-binding quotas have insignificant effects. This paper provides evidence for a trade-off between social benefits and negative effects on firm value when implementing either of the quotas. The binding quota shows higher social benefits however there is a negative effect on firm value. The non-binding quota has no negative effect on firm value, but the social benefits are limited.

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1. Introduction

For over 40 years equality in business between men and women has had priority on the political agenda. In this four decades many improvements have been made, although women continue to be massively underrepresented in high-status jobs (European Commission, 2019). In 2017, women perform only 19.9% of corporate board occupations of the fortune 500 companies in the U.S. and compromised just over 5% of the Chief Executive Officer positions in those companies. The situation in Europe is somewhat better, although the conditions are still lacking. The labor force consists of 45% women, whereas only 5.1% of the CEO's are women, and just over 20% of the board of the publicly listed companies is comprised of female executives (EU Labor Report, 2019). For other continents, the number of women on corporate boards and in other leadership positions fall even further behind (Pande and Ford, 2011).

multinational organisations and national governments took measures to increase the representation of women in top-level occupations. They took the possibility of legislative action in consideration to increase gender-balance on boards of large corporations. The first country initiate movement towards such legislation was Norway. In the beginning of 2000, only 5% of members of the board in companies on Norway's stock exchange were female. Thereby, female executives made 30% less compared to their male counterparts on the same boards. In December 2003, Norway introduced legislative action that installed a quota with requirements of 40% representation of both male and female on the board of publicly listed corporations (Ahern & Dittmar, 2012). The quota was of non-binding nature, since there were no sanctions for companies that did not comply. As most firms did not comply with the non-binding quota, the increase the presentation of women on corporate boards was small. Therefore, at the start of 2006, the quota became binding, and non-compliance of firms from January 2008 onwards resulted in sanctions, such as delisting of the company. And the quota worked. The representation of women on the board of companies on Norway's stock exchange had risen to 40% in 2008, where the average percentage in 2003 was 0%.

Within other EU countries, gender imbalance on boards of corporations became a top priority significantly later in time, since 2010. In 2010 the European Commission installed the *Strategy for equality between women and men 2010-2015.*[1] The primary actions of this strategy was gender-balance in decision-making by 'monitoring the progress towards the goal of 40 percent

[1] *Strategy for equality between women and men 2010-2015 (European Commission, 2010),* is a book published by the European Commission in 2010, for more information see: https://op.europa.eu/en/publication-detail/-/publication/c58de824-e42a-48ce-8d36-a16f30ef701b/language-en

representation of both sexes in all companies (European Commission, 2011) [2]. Following these actions, a debate across Europe arose on the effectiveness of legislative action to ensure more representation of females in the high-earning high-power job positions within corporations. A clear answer to whether such legislative actions could have potential benefits is lacking (Smith, 2014). The ones in favour of such binding gender quotas (with sanctions) believe that they help crack the glass-ceiling and diminish the gender difference in earnings. Breaking the glass-ceiling enables women with high skills, to reach high-status occupations, with positive economic effect on firm value and performance where they enter (European Commission, 2014). Contrarily, the opponents of the gender quota claim that installation of a quota is too forceful. If boards are in place to maximize firm value, the introducing a binding quota for women on boards should lead to disruption and non-optimal output (Demsetz and Lehn, 1985). Furthermore, if discrimination in business is the aspect that primarily causes the disparity between the representation of men and women in business, a binding quota could help conquer the unfair bias towards men. It could thereby help to enhance efficiency because of the opportunity that is presented for highly skilled and competent female candidates (Beamen et al., 2009). Although, when women with these skills are not widely available, the quotas may results in reinforcing negative stereotypes, which leads to women devoting less of their time in their careers as they do not have to invest as much as their male counterparts to get to the same level job (Coate and Loury, 1993).

Despite the uncertainty regarding its effect on organizational outcomes, a binding gender quota is without doubt the most adequate instrument for creating an increase of women on corporate boards (Walby, 2013). The binding gender quota in Norway confirms this statement. The primary aim of the legislative actions was to foster the representation of women in high-skill and high-power occupations in corporations and diminish the gap in earnings between men and women in these corporate firms. Besides more women in top positions, the quota cutbacks the gender gap and the female board members are at this point more qualified than their predecessors (Bertrand et al., 2019).

Although, from a social standpoint the quota is fully justified, the initial findings on firm value and performance of the affected firms are less positive. Ahern & Dittmar (2012) investigated the effect of the quota in Norway on company value and performance. In their paper, there is evidence that the stock price drops significantly at the announcement of the law and a decrease

[2] In November 2012, decisive action was taken by the Commission. It imposed a quota with the aim of equalizing the amount of each sex on board. The target was 40% of each sex on each board.

in firm value over the following years was caused by the constraint that the quota imposed. Other effects of the quota were less experienced and younger boards, increases in competitive edge and amount of acquisition activity, and decrease in firm performance. Ahern & Dittmar (2012) find that, due to implementation of the quota, the firms' size increase, they acquire more, enhance their competitive edge, and decrease the amount of liquid funds. This happens for the reason that the board of directors are involved in decisions regarding acquiring other companies, has the ability to alter the financial strategy and boards became younger and less experienced.

Even with these negative findings, binding gender quotas with the aim of increasing the number of women on boards has found more and more traction across Europe. Following Norway's lead, Austria (introduced in 2011), Belgium (2011), Denmark (2000), Finland (2004), France (2011), Ireland (2004), Italy (2011), Spain (2007), Norway (2005) Iceland (2010) Germany (2015) and more (Paoloni & Lombardi, 2019). In most cases, the quota applies to public or state-participated countries and, in some cases, listed companies or large companies (in number of employees or assets) as well.

The legislations among these countries have different forms. The primary differences in the legislations are the sanctions for non-compliance. Some country imposes laws that do not have any punishment for non-compliance (Austria, Netherlands, Spain), the so-call non-binding quotas. Others have fines (Belgium, Italy) or annulment of the board (France, Italy) (Burrow et al., 2018), the binding quotas. There are multiple papers that investigate binding gender quota and their effect on firm performance (Nygaard, 2011; Ahern & Dittmar 2012; Burrow et al., 2018), however, none of these papers have investigated the effect of the quota without sanctions (non-binding quota). In 2010, the Dutch government imposed a non-binding law, that stated that 40% of board member should be women, without imposing any consequences if companies do not comply. Even without sanctioning non-compliance, this quota has fostered women on boards. In the Netherlands, the number of women in boards has risen, and the gender gap has diminished due to the non-compulsory law (Bertrand, 2018), although little is known about the effect on firm value and performance. This paper aims to uncover the effect of a non-binding quota on firm value and performance, and establishes a comparison with a more commonly researched binding-quota. The main question this paper aims to answer is: *What is the difference in economic effect of binding and non-binding gender quotas on firm performance?*

In this paper, I use two separate sets of regressions, one for each type of quota. The dataset is structured as a panel-data with observations of multiple companies over the period 2010-2019. I use a Differences in Differences model, with fixed effects, to estimate the coefficients [3]. The period before the quota is compared with the period after the quota. The first set of regressions compares firm performance in country with a binding quota, France, with firm performance in a country without any quota in place, Sweden. In the second set of regression I investigate the effect of the non-binding quota on firm performance. A comparison between the Netherlands (non-binding quota) and Sweden (no quota) is made. As dependent variables I use *Firm Value* and *EBITDA* (Earnings Before Interest, Taxes, Depreciation and Amortization). As firm valuation both captures firm performance and market expectation, and EBITDA isolates the effect of the quota on firm performance.

As for the analysis of this paper, I expect the binding quota's negative effect found in the earlier literature (Ahern & Dittmar, 2012; Matsa & Miller, 2013) to be partly caused by the point in time in which it was imposed. In over ten years, the environment for women in business has significantly changed. Thereby the pool of woman for executive board positions has grown substantially within the last years (Seierstad et al., 2017). The company should be able to stabilize and the added diversity in board composition could increase company performance (Bhagat & Black, 1999). Moreover, with the financial crisis in full display, many companies were on the verge of bankruptcy, and especially large banks and investors were hit. Although, the effect might be smaller in comparison with the findings of Ahern & Dittmar (2012), I still hypothesize the binding quota to have significant and negative effects on firm valuation due to the disruption it causes on the board by firing a competent member of the board and installing one with (on average) less experience. Furthermore, Ahern & Dittmar (2012) argue that although the financial crisis is controlled for, its effects might still be present in the results. The patterns of an initial slowdown in performance are also expected to be present in countries that have imposed similar quotas recently. For the non-binding gender quota, I expect the results to be positive, relative to the binding gender quota. A more gradual change in board composition does not initiate as great of a shock, and the economic performance of firms remains relatively stable. When comparing the binding, with the non-binding gender quota, I expect the non-binding quota to have a less negative economic effect, because it stimulates woman on boards, however the installation of women on boards happens more naturally, more gradually and in a less forced manner. From these expectations, three

[3] An elaborate explanation of the model used is found in section 3

hypotheses are formulated:

Hypothesis 1: the negative effect of a binding gender quota on firm value and performance is smaller than seen in Ahern & Dittmar (2012).

Hypothesis 2: Both the binding and non-binding gender quota have negative effects on firm value and performance relative to the 'do nothing' approach

Hypothesis 3: The non-binding quota has a less negative effects on firm value and performance compared relative to the binding quota.

In this paper, I contribute to research in the field of corporate governance and economic policy. The primary contribution is to present evidence for the effects on firm value and performance of a binding gender quota relative to a non-binding gender quota. Ahern & Dittmar (2012) is used as a benchmark paper, in terms of variables and model used, and extends their findings. First, I extend their findings for the binding quota with a different country, France. Thereby, I not only focus at the binding quota, but compare it to a non-binding quota. I also add to the existing literature by investigating more recently implemented quotas. The relevance of this paper is to find if there is an existing trade-off between a larger and faster increase in women on boards by means of a binding quota and negative economic effect for companies in countries where a binding quota is in place, compared to countries where a non-binding (or no) quota is in place. Both the effect of the non-binding quota and the binding quota are compared, which leads to a policy recommendation about the enforcement of such quotas. In this paper I find that the binding gender quota does have a significant negative effect on firm value. There is no evidence for an effect of the binding gender quota on firm performance. For the non-binding gender quota, I find no conclusive evidence for either a positive or negative effect on both firm valuation and firm performance.

2. Theoretical Background

In this paper I examine the effect of imposing a gender quota, binding and non-binding, on firm performance. In this section the theory on the topic is reviewed. There are multiple channels through which the two variables potentially relate. Most of them are dependent on the motivation behind the appointment of directors (maximizing of firm performance or the maximizing own private assets of managers) and how well-informed the appointers (shareholders and managers) are about potential director's characteristics.

2.1 Gender quotas and firm performance

The first approach that clarifies a gender quota's effect on firm value and performance assumes that the board of directors are appointed to maximize firm value. It assumes that both shareholders, top level management and executives are informed ideally about possible new director's and will choose the most competent and skilful in order to keep maximizing firm value (Hermalin & Weisbach, 2005). If this proposition is true, than any disruption to this process will constraint the value maximizing principle. It in turn leads to the appointment of female candidates that might be lesser qualified and skilful compared to the male candidates (Demsetz & Lehn, 1985). Therefore, some firms try to avoid complying with the quota. Examples are changing their legal status so that the law does not apply to them (change from a publicly listed to private company), decreasing the number of people on the board, or appointing female candidates for high-status occupations but not for actual board positions (Ahern & Dittmar, 2012).

The theory mentioned above builds on the belief that the board of directors' aim is to enlarge the value of the firm. However, another theory that relates gender quotas and their effect on firm performance is the agency theory. When a board of directors that is already in place appoint other directors, these other directors try to increase their own assets, not maximizing the value of the firm. In this view, imposing a gender quota creates external discipline on the board of directors, through monitoring (or sanctions) because of the quota. When new female board executives are appointed, the firm value could increase. This because the quota restricts the sitting board to maximize their own private benefits, and it stops them from using firm resources for their own good. In this case, gender quotas help increase monitoring of the board and diminishes the agency problems between the shareholders and top-level executives. These problems are influenced through independence. independency is much more common as a professional trait for women in executive positions, as compared to men. (Adams and Ferreira, 2009; Bianco et al., 2015). When a board member is independent, they are more effective, in comparison with dependent directors, in terms of monitoring and reducing manager's discretion. So, the intensity of board monitoring is positively influenced through an increase in gender diversity. This is highly common among firms where owners have a dominant role (Bianco et al., 2015).

Furthermore, gender quotas have an effect on firm value and performance in the light of information complications associated with determining competences and skill-level (Eisenhardt, 1989). In this case, managers and shareholders appoint directors. They aim at

maximizing profits, however do not see the true level of productivity and skill of female contestants. They are inclined to see women as having less talent or less competence based on statistics or (their own) taste-based discrimination (Balakrishnan & Koza, 1993). These pessimistic clichés and credence could bias the approach to female candidates' ability to lead the firm efficiently. In turn this negatively influences the appointment decision, even if the female candidates have equal qualifications as compared to their male counterpart (or the female candidates are even over-qualified). This in turn results in female underrepresentation in executive positions, despite equal (or superior) ability. Additionally, females have other talents and qualities, which could also be underutilized (European Commission, 2015). Gender quotas could help overcome the underutilization of women in business, by means of forcing competent (or even over-competent) women to replace less competent male board members.

Generally, the installation of board quotas lead a firm to forcefully adjust their governance structure to be able to comply with the imposed law. Appointment of women as members of the board could bring changes to average characteristics present in the board members already in place. For instance, age differences, experience differences, network differences, more or less independence or education. Ultimately, the impact of these change in characteristics on firm performance depends on the pool of women that are candidates for these board functions (Hillman et al., 2007). In this context, it is observed that the effect on firm performance does not arise from the appointment of a female candidate (or other male for that matter), but from the difference in characteristic of the board caused by the reconstruction of the board (the appointment of a less competent/more competent manager as its predecessor), due to complying to the quota.

Finally, another channel that could influence the relationship between gender quotas and firm value and performance is diversity of the board. A board serves as an apparatus that provides expert advice, monitoring and connectedness from different perspectives. The board primarily functions as a unit for control and advise within the company. It plays a vital role as to address stakeholder interests, it should implement the firm's strategy, and it increases the productivity of the firm as a whole (Finkelstein, Hambrick & Cannella, 2009). In the last years there has been in increase in the number of papers researching the effect that diversity of the board has on firm value and performance. In particular the diversity in terms of gender on boards of corporations (Hillman, 2015; Comi et al., 2015). The literature provides three main conclusions. The first is the massive underrepresentation of women on corporate boards compared to the presence in the population. It thereby concludes that the increase of diversity

through more women on these boards could lead to benefits in terms of productivity. This because an increase in diversity leads to an increase in unique characteristics in a boards, which could enhance performance. (Burgess & Thaenou, 2002; Simpson et al, 2010).

Thereby, research indicates that there are possible operational and strategical benefits when there is more diversity in within the board. Miliken & Martins (1996), predict that an increase in diversity of gender in the boardroom increases decision-making abilities and quality. Adams and Ferreira (2009) conclude that with more women on the board, the control and monitoring capacity of the board increases significantly and Terjesen, Sealy & Singh (2009) suggest that an increase in women on boards leads to increase in revenue and overall financial-performance. Although these papers have drawn these positive conclusions, they are mostly based on theoretical research or anecdotal evidence. The empirical evidence to support these findings is mixed and sometimes insignificant. Regarding impact of gender diversity on boards on firm performance, most papers find mixed evidence (Larcker & Yayan, 2011;Ferreira, 2015). However, there are some researches that have been able to find evidence for a positive effect of an increase in gender diversity on board on the market performance and accounting. (Campbell & Minguez-Vera, 2008;Carter, Simkins & Simpson, 2003). On the other hand, there are papers that have indicated negative effects that the proportion of women on boards has on firm performance (Ahern & Dittmar, 2012; Matsa & Miller, 2013). And then there are the papers that have not been able to establish significant evidence for an effect of women on boards on firm value or performance (Adams et al., 2015; Ferreira, 2015).

The results on the effect of imposing binding gender quotas on firm performance are thus diverse. One of the first and most prominent papers that examines the effect of imposing a gender quota law on the impact of women in board positions is Ahern & Dittmar (2012). Their paper finds that imposing a gender quota law, with far-stretching consequences for non-compliance, leads to significant negative effect on economic performance of the firms (firm performance measured as Tobin's Q). These findings have been confirmed for other countries, Belgium & Italy (Comi et al., 2017), Germany (Ciavarella, 2017). However, there are also studies that have not been able to establish evidence for the negative effect of imposing a binding-quota on firm performance (Yang et al., 2019) or even papers that argue that imposing such a quota does have positive economic effects in terms of accumulating capital within companies (Dale-Olsen., 2013). An overview of the institutional setting of gender quotas in place throughout Europe (France, The Netherlands and Sweden in particular) is found in the section below.

2.2 Gender Quota's in Europe

Since the legislation of the gender quota law in Norway, many countries throughout Europe followed. Although, many different approaches have been taken. For example, since 2010, Spain has imposed a non-binding quota law, that is not only focussed on supervisory boards, but also focuses on women in managerial position. Germany has posed a binding gender quota law that is targeted at the 1100 largest companies in the country. However, it only focussed on the supervisory boards, not the management boards. Then there are the countries that have not imposed a gender quota, binding or non-binding, the so-called 'do nothing' approach. Examples of such countries are Austria and Sweden. The gender quota laws in place in Europe are found in table 1.

Table 1. Overview of Gender Quota's in Europe.

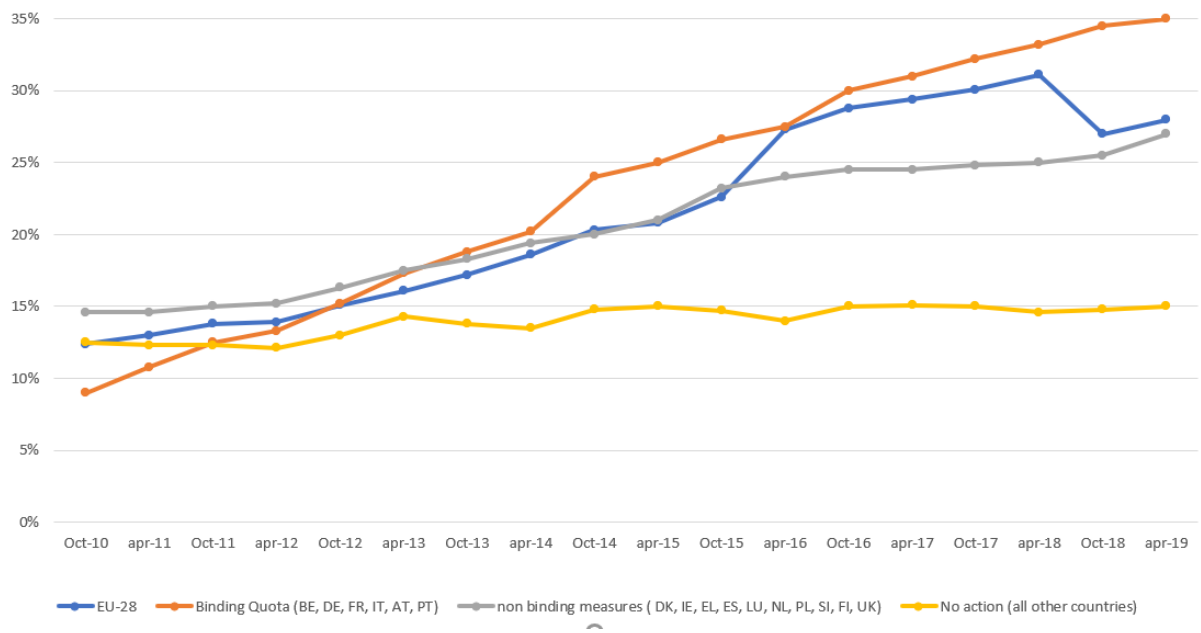
Country	Compliance year	Quota	Binding	Guideline or other regulation
Norway	2008	40%	Yes	GCG 2009
Iceland	2013	40%	Yes	GCG 2010
Spain	2015	40%	No	GCG 2006
France	2017	40%	Yes	GCG 2010
Belgium		33%	Yes	GCG 2009
The Netherlands	2015	30%	No	GCG 2010
Italy	2015	30%	Yes	
Finland	2010	1 woman	Yes	GCG 2010
Denmark				GCG 2008
Austria, Sweden, Czech Republic, Poland				No action; GCG 2008; GCG 2010
Luxembourg				Non-binding legislation focused on fostering gender equality for appointing new board members
Germany	2014	40%	Partly	GCG 2009, DAX 30 companies announced voluntary female quota. Binding quota since 2017, only targeted towards supervisory boards, not management boards.
UK	2015	25%	No	GCG 2010

Source: Smith (2014) : Gender quotas on boards of directors, IZA World of Labor, ISSN 2054-9571, Institute for the Study of Labor (IZA).

Despites their differences, all the legislation can be generalised into three groups: the binding quota, where a law is in place and non-compliance with that law leads to sanctions. The non-binding quota, where there is a law in place, but it is merely a stimulating measure. Non-compliance does not lead to sanctions. And the 'no action', where no law is in place, nor are

there any sanctions. Among the binding quotas are the countries Belgium, Germany, France and Italy. The non-binding quota includes countries such as Denmark, the Netherlands and the United Kingdom. At last there is the group of countries that are in the EU-28, but do not have any legislation in place to either force or stimulate gender equality. The progression of the percentage of women on boards due to the gender quota approaches from October 2010 until April 2019 is shown in figure 1.

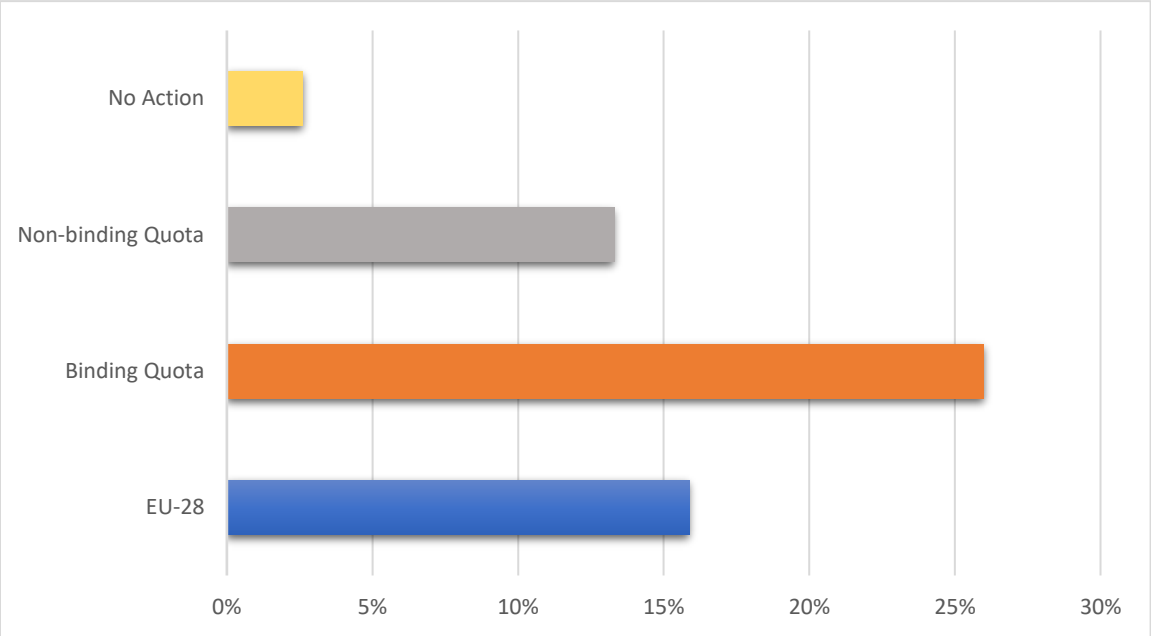
Figure 1. The Progression of Percentage Women on Boards from 2010-2019.



Source: European Commission (2018). Women in Economic Decision-Making in the EU: Progress Report

The aggregated increase in percentage points of women on boards in found in figure 2. Here we observe an expected result. Over the last ten year, in the countries that have imposed a binding quota the percentage of women on boards has risen by 26%. In the countries that have imposed a non-binding quota, the percentage of women has risen by 13.3%. And the countries that have no quota in place have an average increase of 2.6%. This figure makes clear that imposing a binding quota works, as expected. It also clearly indicates that a non-binding quota has results that are far superior to having no quota in place. One would thus expect to see the countries with the most stringent laws (binding quotas) to have the most women in boards.

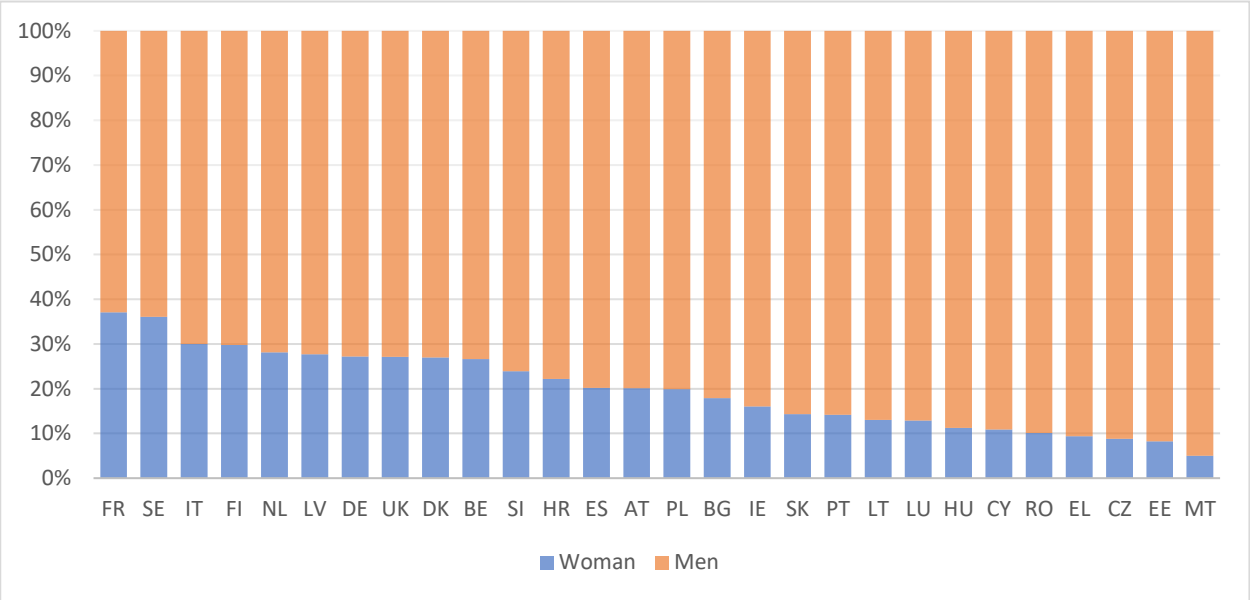
Figure 2. The Aggregated Increase (in percentage points) of Women on Boards per Quota Category.



Source: European Commission (2019). Women in Economic Decision-Making in the EU: Progress Report.

In figure 3 the percentages of men and women on boards in December 2018 is shown. One can observe that countries that have binding quotas in place are prominent among the top ten countries with the most female board members. For example France, Italy and Finland. An unexpected observation is that in the top five, there are also two countries that adhere to different legislation. The Netherlands, which has a non-binding quota and Sweden which does not have a quota at all. They are similar in terms of women on boards; however, they have different approaches to stimulating women in board position. Therefore, the analysis of this paper revolves around these three countries Additionally, they are similar in terms of social-economic development. Further elaboration about the social-economic development of these three countries can be found in section 4. In the next sub-sections, the gender quotas of the three countries are explained.

Figure 3. The Distribution of Men and Women on Boards.



Source: European Commission (2019). Women in Economic Decision-Making in the EU: Progress Report.

2.2.1 The binding quota in France

The first action towards an equal division of men and women in business was in 2006. In that year France installed a law that focussed on even remuneration for women and men. Later, in 2011, France introduced a gender quota on board-level executives. This was the 'Act of the 27th of January 2011'. It was imposed to balance the amount of men and women in both the governing and supervisory boards. It also aimed at diminishing the overall gap of men and women in business. The formal requirements were 20% of each gender on the board by the end of 2011. Moreover, this act states that all forms of corporate boards of companies should "seek balance in the percentage of women and men within organizations". This was an intermediate step in the legislative action. The final law was constructed as a binding quota, that required 40% of members of both men and women within the boards of companies, before the end of 2016 (Prat et al., 2016). This law covers private sector companies that had their shares listed the publicly, or have, during three years have over 500 full time employees and have a net revenue of over 50 million euros (or over 50 million is assets).

Two different sanctions apply for companies that are unable to follow the rules of the quota. First, appointed members of the board that do not comply with the guidelines of the gender quotas are to be let go and their contracts are considered to be null and void. If the board composition is not in line with the binding gender quota the board has to resort to temporal

appointments, within six months from the point in time when the seat on the board became vacant. Such appointments are to be nullified in the upcoming shareholder meeting. Any stakeholder that is interested can sue to company to court to assign authorisation for an agent to assemble such a meeting where a new board member could be elected. Another sanction that is imposed when the company board is not gathered complying with the law, is the suspending of payment of the entire board. The board members resume to receive payment after the board follows the requirements (Prat et al., 2016).

A problem that arises when a gender quota is imposed is the managing and monitoring of the quota in place. This to rightfully sanction non-compliant companies. In the first years of the quota, the monitoring proved difficult. Therefore, the French authorities together with the European Commission created an institution that is responsible for ensuring that the binding quota is implemented and the sanctions are handed out (Zenou et al., 2017).

2.2.2 The non-binding quota in the Netherlands

Since the early 1990's, gender equality is high on the list of the Dutch political agenda. The Dutch government has laid the responsibility of equality for men and women in business (and corporate boards) first and foremost by the corporations itself. The legislative power has done nothing besides promoting equality in business for a long time. That changed at the start of 2013, when the national government announced a quota for 30% equality of gender on corporate boards. However, this law was of a non-binding nature, and it's objective was to stimulate the installation of women on boards, but not to be too forceful (Kruisinga & Senden, 2017). The law was intended to be of temporary nature and it expired automatically on the January 1st 2016. It was the legislator's expectation that at that point companies would have (partly) complied with the quota and the law would no longer be necessary. When it was clear that a large majority of companies did not even come close to meeting the non-binding quota, a proposal was submitted to prolong the law with an additional 4 years. During these four years, speculation about a binding quota started, because still the improvements of women in business has not had the expected effect. However, this met much resistance and the proposals for a binding quota therefore never became concrete.

In December 2019, a body of government advisors published a report that recommends the Dutch government to implement a binding gender quota, since most companies do not adhere to the non-binding quota or even come close. Therefore, the social equalization of women in

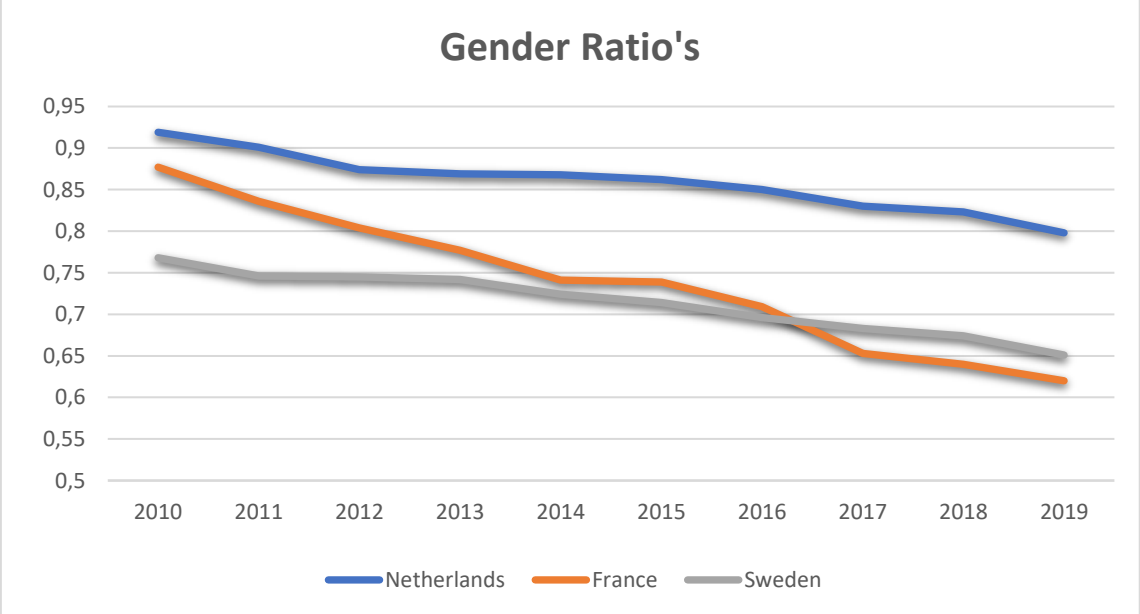
business is not progressing as some other European countries that have a binding quota in place (Sociaal-Economische Raad (SER), 2019).

2.2.3 The 'do nothing' approach in Sweden

Since the early 1980's business equality in terms of gender has been one of the primary aims of Swedish politics (Carrasco et al., 2015). Since the 1990's, this has led to a steady increase in women in board position. The transition started much earlier compared to both the Netherlands and France and has a much smoother, flatter curve. Sweden has, from an early stage recommended companies to include woman in business. Besides, Swedish culture has been developed in terms of social acceptance of woman in business from an early stage (Heidenreich, 2012).

In figure 4, I show a comparison between the progression in terms of gender quota in France, the Netherlands and Sweden. It is clearly observed that France has had the biggest downfall in terms of gender quota, followed by the Netherlands and Sweden with the least deviation in terms of gender ratio. In the next section the data used for the analysis is explained.

Figure 4. The Progression of Gender Ratio's in Sweden, the Netherlands & France. Where 1.0 means 100% men on boards.



Source: author's calculation.

3. Data

For the gathering of data, this paper uses two sources, the Bureau van Dijk[4] and the BoardEx[5] datasets, both accessed via Wharton Research Data Service. The Bureau van Dijk dataset consist of information on more than 375 million companies in all countries worldwide is one of the top resources for private company data. The BoardEx dataset provides data on board composition of over 20 million companies worldwide. This paper takes the period 2010-2019, because of the availability of data on board composition in this period. Data on board composition is not present in high enough amount in the data before 2010. Thereby, in this period, the legislations in both the Netherlands and France are passed.

For both France and the Netherlands, this paper distinguishes between 3 periods, the period before the imposition of the law, the period when the law was announced but not yet in (full) display (the Transition period) and the period after the imposition of the law (the Post Period). For France, the first period is before 2012, the second period is 2012 to 2016, and the third period is after 2017. For the Netherlands, the first period is before 2012, the second period is for 2012 to 2015 and the third period is after 2010. An overview of the different period used is found in table 2.

As mentioned in section 2, the countries are compared to a country that has similar economic characteristics, but do not have a gender quota in place, following Ahern & Dittmar (2012), in this case Sweden. The final dataset of this paper consists of 623 companies and 3184 observations.

Table 2. Defined periods for the Netherlands and France

	Pre Period	Transition Period	Post Period
France	2010-2014	2014-2016	2017-2020
The Netherlands	2010-2012	2012-2013	2014-2020

[4] For more information about the Bureau van Dijk dataset, see: https://www.bvdinfo.com/en-gb/
[5] For more information about the BoardEx dataset, see: https://corp.boardex.com/

3.1 Variables

For both analyses, the dependent variable, is firm performance and market expectations. Ahern & Dittmar (2012) use Tobin's Q, which could not be calculated with this dataset[6]. This paper sticks with the reasoning of Ahern & Dittmar (2012) but proxies firm performance and market expectations by *Firm Value.* The firm value captures firm performance because it is partly based upon the expectation from the market of a firm's performance.

To distinguish between the effect on performance and the market outlook, I also include a regression with *EBITDA.* Furthermore, the main independent variable of interest are the period dummies. Dummies are constructed for the period before the installation of the quota, for the transitioning period of the quota and the period after the installation of the quota. To distinguish between the different countries, a dummy for each country is created.

To isolate the effect of the quota and ensure that there is no omitted variable bias, I impose multiple control variables. First, to control for the effect that the gender ratio of a board has on firm performance, independent of the periods, the gender ratio per board is included. Furthermore, several board indicators are used to control for the other effects of board composition. These variables are the *number of directors* in the board, *standard deviation of age*, *nationality mix*, *network size* and *average number of qualifications* per board member. Thereby, I control for firm-specific financial factors that influences firm performance. These factors are the *number of employees*, *total amount of assets*, the *return on assets* and the *solvency ratio*[7]. Furthermore, I also include dummy variables of each year, and I cluster the variation per company. The board characteristics are *number of directors, standard deviation of age*, *nationality mix*, *network size* and *average number of qualifications* are given per board member. I first calculate the averages per year in the dataset and then collapse the dataset such that there is one observation per year with all the average board indicators. Because of large numbers and non-normal distribution, I transform several variables into their logarithmic scale. These variables are the *Firm Value, EBITDA and Assets*. All the variables and their descriptions are in table 3

[6] Tobin's Q is calculated with market value and book value of assets. These datasets do not differentiate between market value of assets and book value of assets.
[7] The solvency ratio is calculated by dividing a company's after-tax net operating income by its total debt obligations. For more information, see: https://www.investopedia.com/terms/s/solvencyratio.asp

Table 3. Variables included in the regression and their descriptions.

Name	Description	Dataset
Firm Value	Value of a firm, calculated by stocks outstanding and stock price, adjusted to expectations of performance	Bureau van Dijk
Assets	Total assets within a company, tangible and intangible	Bureau van Dijk
Employees	Total number of employees within one company	Bureau van Dijk
Return on Assets	Total company revenue (before takes) divided by the total assets of that company (%)	Bureau van Dijk
Solvency Ratio	This ratio is calculated as dividing a company's after-tax net operating income by its total debt obligations	Bureau van Dijk
Gender Ratio	Ratio of gender within a board (between 0 and 1), where 1 means 100% men	BoardEx
No. Directors	The number of directors within a company board	BoardEx
Standard Deviation Age	The average of standard deviations of each individual board member as compared to the average of the board for a specific year.	BoardEx
Nationality Mix	Amount of Directors from different countries in a certain year, where 1.0 means that all board members originate from the same country.	BoardEx
Network Size	Average Network size of selected Board (number of overlaps through employment, other activities, and education).	BoardEx
No. Qualifications	The average number of qualifications at undergraduate level and above for all the Directors at the Annual Report Date selected.	BoardEx
Succession Ratio	Measurement of the Clustering of Directors around retirement age at the Annual Report Date selected	BoardEx
Time on Board	Average time on board for the individuals on a board	BoardEx
Year Fixed Effects	Year fixed effects (more simply known as “year dummies” or “dummies for each of the years in your dataset”) capture the influence of aggregate (time-series) trends	BoardEx
Netherlands	Dummy (1 = the Netherlands 0= Other)	Constructed
France	Dummy (1 = France 0 = Other)	Constructed
Sweden	Dummy (1 = Sweden 0 = Other)	Constructed

Source: Bureau van Dijk & BoardEx databases, via Wharton Research & Data Service (WRDS).

The summary statistics of the three countries are found in tables 4, 5 and 6. These are the summary statistics for France, the Netherlands and Sweden respectively. The most striking difference, as mentioned before, is the difference in gender ratio. Where the gender ratio of Sweden remains relatively stable, the gender ratio within the Netherlands changes a little more, and the biggest change is seen in France. The change is France is 25.2 percentage points, the change in the Netherlands is 12.2 percentage points and the change is Sweden is 7.2 percentage points. In the next section the methodology and models used are introduced and explained.

Table 4. Summary Statistics France

	Gender Ratio	Enterprise Value (in log)	Assets	employees	Return on assets	Solvency Ratio	Number Directors	Standard deviation age	Nationality	Network Size	Number of Quals.	Succession rate	Time on board
2010	.877	9.86	5.84e+09	922.287	3.829	55.971	10.757	9.143	.214	537.249	1.462	.444	7.467
2011	.836	9.86	5.32e+09	3417.108	3.358	55.894	10.137	9.15	.209	514.189	1.42	.454	7.436
2012	.804	9.85	5.23e+09	2337.734	1.643	54.567	9.988	9.235	.22	535.824	1.465	.45	7.577
2013	.777	9.89	4.84e+09	3200.944	1.041	56.428	9.776	9.062	.214	526.695	1.496	.448	7.521
2014	.741	9.88	4.68e+09	2091.992	1.599	56.369	9.725	8.992	.22	525.398	1.495	.444	7.429
2015	.739	9.88	3.67e+09	2552.547	-1.807	55.66	8.742	9.02	.194	462.408	1.458	.465	6.819
2016	.709	9.87	3.71e+09	2329.564	-1.761	53.657	8.654	9.071	.207	479.093	1.441	.469	7.006
2017	.653	9.88	3.53e+09	2057.679	-1.892	54.372	8.686	8.902	.208	471.86	1.466	.48	6.731
2018	.64	9.80	4.54e+09	6251.212	-2.653	49.635	8.72	8.846	.209	469.106	1.453	.467	6.847
2019	.62	9.66	1.40e+10	25511.03	.132	40.933	10.299	9.007	.254	575.072	1.506	.457	7.293

Table 5. Summary Statistics the Netherlands

	Gender Ratio	Enterprise Value (in log)	Assets	Employees	Return on Assets	Solvency Ratio	Number Directors	Std. dev. age	Nationality mix	Network Size	Average number Quals.	Succession rate	Time on Board
2010	.919	9.86	7.54e+09	13278.92	7.397	43.969	8.469	7.014	.387	788.368	1.708	.312	5.627
2011	.901	9.88	7.84e+09	14981.32	3.696	42.833	8.625	6.883	.389	835.511	1.769	.304	5.419
2012	.874	9.96	1.40e+10	14078.86	5.169	42.337	8.265	6.812	.381	842.02	1.759	.305	5.695
2013	.869	9.97	1.39e+10	15377.08	3.716	43.678	8.373	6.943	.404	889.193	1.882	.298	5.567
2014	.868	9.91	1.27e+10	11818.73	4.95	41.947	7.933	7.42	.376	876.092	1.922	.337	5.275
2015	.862	9.92	1.30e+10	11329.01	3.169	47.943	7.829	7.427	.4	880.404	1.858	.346	4.763
2016	.85	9.91	9.52e+09	8356.682	1.521	46.272	7.934	7.186	.392	927.34	1.831	.33	4.747
2017	.83	9.92	1.35e+10	8580.516	.126	45.133	8.147	7.153	.388	907.423	1.808	.327	4.991
2018	.823	9.92	1.50e+10	9100.803	2.458	45.257	8.096	7.311	.389	860.958	1.808	.333	4.933
2019	.798	9.95	1.34e+09	246.5	-2.132	60.042	8.5	7.6	.375	903.996	1.714	.45	3.809

Table 6. Summary Statistics Sweden

	Gender Ratio	Enterprise value (in log)	Assets	Employees	Return on Assets	Solvency Ratio	Number directors	Std. Dev. age	Nationality Mix	Network Size	Number of Quals.	Succession rate	Time on Board
2010	.748	10.46	2.09e+10	529.14	4.811	62.534	8.356	8.199	.196	599.4	1.824	.494	6.049
2011	.746	10.47	1.97e+10	559.734	4.098	60.029	8.26	7.875	.193	621.921	1.814	.463	6.312
2012	.745	10.49	2.06e+10	816.269	5.537	59.752	8.204	7.692	.205	638.292	1.794	.443	6.528
2013	.742	10.51	2.20e+10	2028.074	2.232	59.677	8.232	7.654	.205	635.868	1.831	.419	6.634
2014	.724	10.49	2.49e+10	2231	2.255	57.976	8.222	7.472	.218	611.682	1.819	.407	6.489
2015	.714	10.53	2.08e+10	2016.432	5.807	58.163	8.077	7.677	.216	603.544	1.809	.422	6.45
2016	.696	10.57	2.10e+10	2487.11	4.292	57.135	7.891	7.569	.213	598.351	1.787	.42	5.845
2017	.683	10.60	1.53e+10	2707.829	3.449	62.357	7.5	7.828	.184	517.004	1.754	.447	4.965
2018	.674	10.61	1.42e+10	2747.953	2.478	60	7.367	7.678	.176	504.035	1.7	.434	4.899
2019	.671	10.64	2.98e+10	3188.824	.452	50.82	7.158	7.984	.147	527.935	1.668	.505	4.464

4. Methodology

The dataset for this paper consists of multiple companies, with observation in multiple years. The dataset is thus structured as a panel and is treated this way in the model. Furthermore, I investigate an event that could be specified as a natural experiment, the passing of a law. For this reason, I use a Difference in Difference (DiD) model. The reasoning for the use of both models is explained in section 4.1 and 4.2 respectively.

4.1 Panel data

Panel data is used when a dataset has variables that have multiple observations in multiple years. Structuring your data as a panel has the advantage of being able to deal with issues of unobserved heterogeneity that might be present for firms in your sample. This heterogeneity becomes an issue when there are variables that are not included in the regression, but they are correlated with the dependent variable. This means that there are variables in the error term that should be included in the regression analysis. If these variables are not included, this could lead to coefficients that are biased. For panel data, the most used model are the fixed effect and random effects model. For determination of which model to use, I construct a Hausmann test. If the Hausman test rejects the null-hypothesis of both models providing equal coefficients, the random effects model is used. If the Hausman test rejects the null-hypothesis, then the coefficients produced in both models are significantly different from one another and the fixed effects measure is used (Campbell & Minguez-Vera, 2008). In appendix B the results of the Hausman test[8] are shown. The coefficient is statistically significant and therefore I use fixed effects.

When constructing an empirical analysis, one major problem that arises and is cause for concern is endogeneity. Especially when working with a panel dataset, endogeneity often is an issue. Endogeneity occurs when explanatory variables and the error term are correlated (Roberts & Whited, 2013). To deal with the issue of endogeneity, one has to know the assumption and conditions that need to hold in an analysis, so that endogeneity can be avoided. There are several assumption that need to hold for evidence of a causal effect to be present. The first assumption

[8] The Hausman test compares the coefficients of a regression with random effects model with the coefficients of a fixed effects model, for more information see: https://www.stata.com/manuals13/rhausman.pdf

is that the sample needs to be random and there should be no self-selection or other biases in the sample (Roberts & Whited, 2013). The second assumption is that the error term should have a mean of zero. This means that the error term is not skewed in a positive or negative direction, so that it cannot have significant influence on the results. The third assumption is the assumption that there should be no perfect collinearity present within the explanatory variables. The correlation between the explanatory variables should not be too high. If so, the variables could explain one another and this would bias the coefficients. The fourth and last assumption causes the most concern. The fourth assumption is the 'zero conditional mean' assumption. This means that there should be an error term that has a mean of zero, conditional on the independent variables.

Most of the endogeneity that is found in empirical analysis comes forth out of the 'zero conditional mean' assumption that is not satisfied. Multiple channels are reason for this assumption not to hold. These channels are omitted variable bias, measurement error and reverse causality. The omitted variable bias occurs when a variable that should be included in the analysis is not. For this to be reason for concern, the omitted variables should be correlated with both the independent and dependent variables of the regression. This in turn causes the variables that are included not to have their true coefficient value, and therefore the results are biased. Measurement errors occur when the data that is used has mistakes or errors. One of the issues is that there could be significant differences between what a variables wants to describe and what it is proxied by. Variables that are difficult to measure can have proxies that do not provide coefficients that are true to the actual value of that variable. In both the dependent and independent variables, measurement errors can be found. Reverse causality appears when one cannot be sure in which way the causality runs. Variable x could explain y, but variable y could also explain x.

To check for possible multicollinearity a correlation matrix between the variables of interest has been made for both the countries France and the Netherlands. The correlation matrices are found in appendix A of this paper. The correlation matrices do not show high correlation that are a cause for concern, so the variable can be expected not to be multicollinear and used in the regression without the probability for multicollinearity being too high.

4.2 Differences in Differences model

There is one model that addresses these issues of endogeneity and is simultaneously suited for analysing a natural experiment, the difference in difference (DiD) model. When using this model, one tries to evaluate the impact of a program or treatment on a specific group. In the case of this paper, I analyse the effect of the installation of a gender quota (the 'treatment') on the firms in the country (the 'treatment group') where this gender quota is passed. Then these results are compared to another group, that did not receive the treatment, the 'control group'. The second difference this model looks at is the difference between the period where this treatment was not in display (the 'pre-treatment' period) and the period in which this treatment was in display (the 'post treatment' period). When combining these two differences, one is able to estimate a causal effect of a treatment on a treatment group. The reason for the DiD models appeal lies in its simplicity and its ability to deal with problem of endogeneity. As mentioned above, these commonly appear is statistical analysis of panel data, the comparison of individuals that are of heterogenous nature (Meyer, 1995).

The first regression of this paper looks at the binding gender quota law. In this case the country France is the treatment group and Sweden functions as the control group. For the analysis, the dummy for the country, the period dummies and gender ratio are included. A stylized model for the first regression looks like:

$$\begin{aligned} Firm\,Value = {} & \beta 1\, France_{it} + \beta 2\, Transition_{it} + \beta 3\, Post_{it} + \beta 4\, Gender\ Ratio_{it} \\ & + \beta 5\, France_{it} * Transition_{it} + \beta 6\, France_{i} * Post_{it} + Board\ Controls_{it} \\ & + Company\ Controls_{it} + Year\ Fixed\ Effects_{it} + U_{it} \end{aligned}$$

.

The second regression of this paper investigates the effects of a non-binding gender quota law on *Firm Value*. In this case the Netherlands is the treatment group, which is compared to the control group, Sweden. A stylized model for the second regression looks like:

$$\begin{aligned} Firm\,Value = {} & \beta 1\, Netherlands_{it} + \beta 2\, Transition_{it} + \beta 3\, Post_{it} + \beta 4\, Gender\ Ratio_{it} \\ & + \beta 5\, Netherlands_{it} * Transition_{it} + \beta 6\, Netherlands_{it} * Post_{it} \\ & + Board\ Controls_{it} + Company\ Controls_{it} + Year\ Fixed\ Effects_{it} + U_{it} \end{aligned}$$

where β1 is a coefficient for the dummy variable that indicates the treatment group, in this case the countries France and the Netherlands. The β2 is the transitioning period. For France this

means that there is already a law in place, but not yet in its final form. For the Netherlands, this is when there were already stimulating measures in place, but not the formal law. The β3 is the post period. The β4 is the treatment variable times the transition period. Which measures whether in the treatment group (France or the Netherlands) being in the transition period, has a significant effect on firm value. The β5 provides coefficient estimates for the treatment group when in the post period (the period where the law is in full extent). It measures whether the effect of being in the treatment group in the post period is significant. Furthermore, I include Board Controls and Company Controls[9]. Standard errors used to form confidence interval for β are OLS standard errors, in this case corrected for the company fixed effects (Bertrand et al., 2004).

As mentioned, to differentiate between firm Value and actual firm performance, I also include similar regression as above, with the difference that the dependent variable is *EBITDA*. A stylized model looks like:

$$EBITDA = \beta 1\, France_{it} + \beta 2\, Transition_{it} + \beta 3\, Post_{it} + \beta 4\, Gender\ Ratio_{it} + \beta 5\, France_{it} * Transition_{it} + \beta 6\, France_{it} * Post_{it} + Board\ Controls_{it} + Company\ Controls_{it} + Year\ Fixed\ Effects_{it} + U_{it}$$

$$EBITDA = \beta 1\, Netherlands_{it} + \beta 2\, Transition_{it} + \beta 3\, Post_{it} + \beta 4\, Gender\ Ratio_{it} + \beta 5\, Netherlands_{it} * Transition_{it} + \beta 6\, Netherlands_{it} * Post_{it} + Board\ Controls_{it} + Company\ Controls_{it} + Year\ Fixed\ Effects_{it} + U_{it}$$

There are three main assumptions that need to hold for the DiD model to provide accurate estimations (Betrand et al., 2004). First, the time period must be sufficiently long. Bertrand et al., (2004) advise a time period that is at least 16 periods. The dataset used in this paper however is only 10 periods, 10 years (2010-2019).

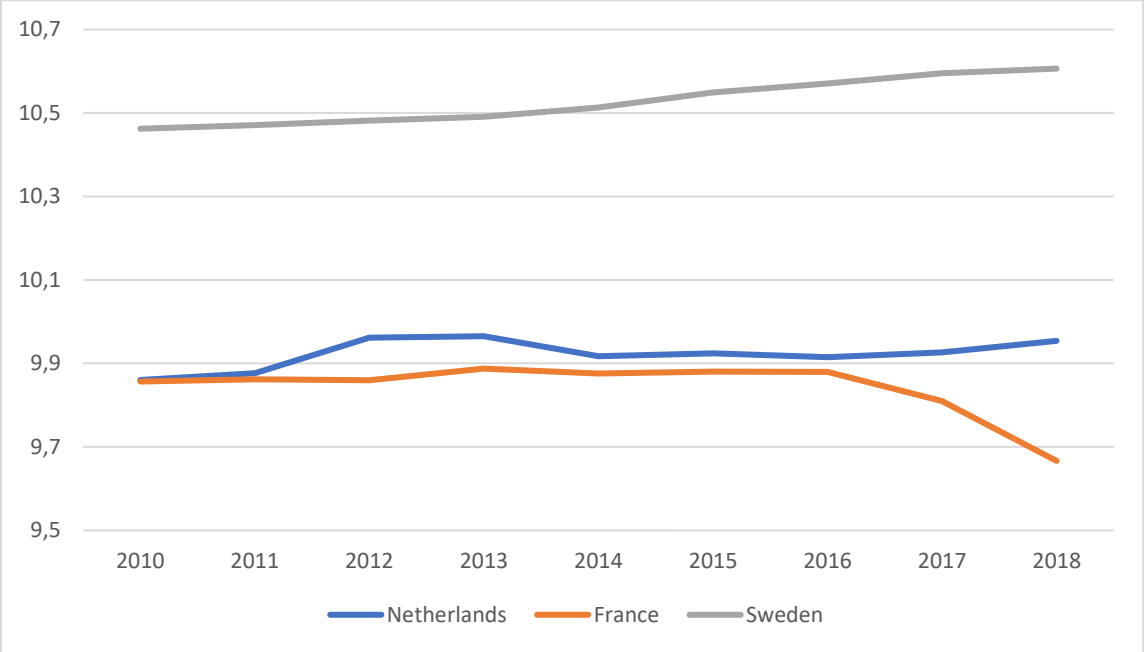
To address this issue, the data is divided into two periods. These are the pre-treatment and post-treatment periods. In this case the pre- and post-law periods, which is done in this paper. Secondly, a problem that arises is that the dependent variables that are most used in DiD

[9] For all the variables included see section 3, table 3

estimation show high serial correlation. When one allows the covariance structure to be unrestricted over time, this issue can be addressed. One has to create dummies for the different countries and structure the data as panel, so that the countries and companies are used separate. Another issue that could arise is when the treatment variable, changes insignificantly, over the time periods, within a country. The issues mentioned have an enlarging effect on one and other. When this issue is overlooked, it could be that the coefficients depicted in the regression downplay the standard deviation of these coefficients. As shown in section 2.1, there is variation of the gender ratios on the boards within a certain country. This inherently means that there also are changes within the companies within that country. Which means that the treatment variable does change.

Another problem that could arise from using the DiD model is that there is uncertainty about whether the trend observed in the dependent variable of interest would not have been the same within one country without the imposition of the law. In section 2.1 There is a comparison between countries with a binding quota, non-binding quota and countries without any quota in place. From the figures in section 2.1 it is shown that the three options yield substantially different outcomes. Figure 1 provides trendlines for the different countries and shows the trendline in the dependent variable of interest, *Firm Value*. Figure 5 shows the logarithmic scale of the firm value per year per country.

Figure 5. Logarithmic Scale of Firm Value



In figure 5, it is observed that the trendline for the control group, Sweden, is similar across time. It gradually goes up, without much change. It is shown that after 2012, the gradient is slightly more positive. This could be explained by the effects of the financial crisis diminishing. For France, the cut off point for the *transition* period is 2013 and for the *post* period 2017. Between 2016 and 2017 we see the trend line of France shift, and after 2017 the gradient of the trendline becomes more negative. Showing that during that time there are different trendlines between the treatment group (France) and the control group (Sweden). For the Netherlands, the cut off point for the transition period is 2011, and for the post period it is 2013. It is observed that the dependent variable does not follow the same trend within the different countries, and therefore this assumption for the DiD model is satisfied.

This paper follows the stylized model depicted above. I create two models, where, respectively, France and the Netherlands functions as the treatment group. The control group in this case should be similar in terms of social-economic development. The assignment of the treatment group should make sure that the trends of the dependent variable in the period before the imposition of the gender quota law are similar (Bertrand et al., 2004). In this case, this country is Sweden. Sweden is similar to the Netherlands and France in terms of social economic

development, as seen in the Human Development Index[10] (United Nations Development Program, 2019). There are over 200 countries included. France is situated in place 16, with a score of 0.914, The Netherlands is in place 10 with a score of 0.933 and Sweden is in place 8 with a score of 0.937.

5. Results

In this segment I describe the results of both the DiD regressions. First the regression regarding the binding quota of France is discussed. Secondly the results on the non-binding quota of the Netherlands defined.

5.1 First regression – France

For the regression, the data is considered a panel dataset and fixed effects are used. The time-period is 2010-2019. Table 7 shows the first regression, a comparison between the countries France and Sweden. There are 570 companies included in the dataset for this regression, from which 442 are French and 138 are Swedish, with a total of 2920 observations. In the first column, the *firm Value* is the dependent variable and in the second column the *EBITDA* is the dependent variable.

The most striking result is the negative and significant (at the 5% level) coefficient of the interaction term between *France* and *Post Period*. This coefficient provides evidence that in France, in the post period, the firm value was significantly lower compared to the reference group, which is the pre law period. It simultaneously provides evidence that this effect was not present in the control group, which was Sweden. So, we expect that changing the period dummy from 0 to 1, conditional on the post period and the country France, decreases the firm value of companies in France in that period by approximately 100 * β[11], which would be a decrease of 11.3 percentage points for the post period, as compared to the control group Sweden, ceteris paribus. This provides evidence that the imposition of the gender quota law has had a significant and negative effect on the valuation of a company. A result that is in line with papers in the literature (Ahern & Dittmar (2012); Adams & Funk (2012); Fedorets & Gilbert (2019)).

[10] The Human Development Index uses three measures for social-economic development: a long and healthy life, Knowledge and a decent standard of living. For more information see: www.hdr.undp.org

[11] The regression in is log-level structure (the dependent variable is in logarithmic terms and the independent variables are in normal absolute values), this means that its effect is calculated by 100 * β, for more information see: https://www.stata.com/stata-news/news34-2/spotlight/

Furthermore, we see that the interaction term for *Transition Period* and *France* has an insignificant effect on firm value. This means that in the transitioning period (when the quota was gradually set to 20%), the trend of *Firm Value* does not significantly differ from the reference period, period 1. Thereby, we see that the *gender ratio* does not have a statistically significant effect on the firm value, when it is not conditional on country or period.

For the performance measure as dependent variable, *EBITDA*, the results change. We see similar results in terms of control variables, however the interaction between *France* and *Post Period* has changed to being insignificant. Which means that there is no evidence that the imposition of the gender quota law in France had a negative effect on firm performance, measured as the EBITDA.

5.2 Second regression – the Netherlands

The second regression table of this paper the Netherlands, the results are shown in table 8. There are 228 companies in the regression, of which 90 are Dutch and 138 are Swedish, with a total of 885 observations. The regression with *Firm Value* as dependent variable is shown in column 1. The regression with firm performance, measured as *EBITDA*.

When looking at the Netherlands, the coefficients of the interaction terms for the *Transition Period* and the *Post Period*, they are both insignificant. Which means that for the Netherlands, there is no evidence that suggests that the *Firm Value* shows a significant change in periods of transitioning and imposition of the gender quota law, compared to the period before the gender quota law. Furthermore, we observe that the same control variables as in the first regression are significant.

When the dependent variable is *EBITDA*, the results remain the same. The coefficients for the interaction terms remain statistically insignificant. There is no evidence that the imposition of the gender quota law has had any statistically significant effect.

Table 7. Regression results for France

VARIABLES	Firm Value	EBITDA
Gender Ratio	-0.124	0.490*
	(0.107)	(0.269)
France	-0.671***	-1.030***
	(0.084)	(0.164)
Transition Period	0.139**	-0.042
	(0.062)	(0.172)
France * Transition Period	-0.039	-0.005
	(0.061)	(0.172)
Post Period	0.162**	-0.124
	(0.067)	(0.183)
France * Post Period	-0.113**	0.226
	(0.047)	(0.147)
Constant	4.411***	1.983***
	(0.340)	(0.735)
Board Controls	YES	YES
Company Controls	YES	YES
Year Fixed Effect	YES	YES
Observations	2,920	1,608
Number of Companies	570	409

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Regression Results for the Netherlands

VARIABLES	Firm Value	EBITDA
Gender Ratio	-0.030	0.217
	(0.222)	(0.488)
Netherlands	-0.584***	-0.265
	(0.164)	(0.284)
Transition Period	-0.237***	-0.298
	(0.078)	(0.221)
Netherlands * Transition Period	0.099	0.485
	(0.123)	(0.377)
Post Period	0.406**	-0.421
	(0.193)	(0.495)
Netherlands * Post Period	-0.074	0.037
	(0.099)	(0.243)
Constant	6.556***	-0.681
	(0.651)	(1.073)
Board Controls	YES	YES
Company Controls	YES	YES
Year Fixed Effect	YES	YES
Observations	885	412
Number of Companies	228	142

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

6. Discussion & Limitations

The theoretical evidence reviewed in section 2 suggests two main channels through which firm value and performance could be influenced by means of a gender quota. These channels are the maximization of private profits and the information the appointers (managers and shareholders) have about the potential director's characteristics. In general, the introduction of gender quotas causes a firm to adjust its governance structure to be compliant with the policy. Appointing women as members of the board could bring characteristic changes to those of board members already in place. For instance, age differences, experience differences, network differences, more or less independence or education. Ultimately, the impact of these change in characteristics on firm performance depends on the pool of women that are candidates for these board functions.

The evidence provided through the analysis of the natural experiment, estimated by a DiD model in section 5 provides evidence for negative effects on firm valuation by passing a binding gender quota law (with sanctions for non-compliance). Since the diversity within the company, most likely, increases, the effect of the quota is supposedly caused by restructuring of the company's boards to be compliant with the policy. The passing of the law forces companies to hire new board members, even if the current board members are qualified for the job and work efficient. This partly supports the second hypothesis of this paper. The binding quota does have a negative effect on firm value. Thereby the decrease is also greater compared to Ahern & Dittmar (2012), which means that my first hypothesis is refuted.

The summary statistics in table 3 show that since the passing of the law, the *average time on the board* of a company dropped, as well as the *number of qualification* and the *succession ratio* increases. These are all signs of the appointment of new board directors. Thereby, figure 4 shows that the gender ratio in France significantly dropped since the passing of the first law in 2014, which means that, supposedly, many of these newer, less experienced board members are women.

From the literature it is clear that the passing of a binding gender quota law increases the number of women in business. It thereby diminishes the gender gap and helps crack the glass ceiling. As stated in several papers, if the initial aim of the passing of the law is the social benefits it brings, the quota seems fully justified. However, this paper provides evidence for the negative effect of such a quota on firm value. This means that introducing a binding quota, creates a clear trade-off between social benefits and economic losses. In contrast, the evidence for the

non-binding quota suggests no effect on *firm Value*. In section 2, I show that there is statistical evidence for the that the non-binding quota does in fact decrease the gender ratio, and thereby increases the women on boards. However, the increase of women on boards through the imposition of a non-binding quota is substantially less compared to the binding quota.

The absence of evidence for a negative effect of the non-binding quota on firm performance suggests that there is no trade-off between the installation of a non-binding quota and economic effect. This confirms the hypothesis, that the non-binding quota, has a less negative effect compared to the binding quota. However, the hypothesis that the non-binding quota, by stimulating women on boards, does have a negative effect is not proven. This partly refutes my second hypothesis, since the non-binding quota does not have an effect on firm value. It does support the third hypothesis, the non-binding quota does have less negative effects on firm value compared to the binding quota.

The installation of gender quotas has been on the radar of policy maker throughout Europe. This paper shows the trade-off between the social advantages and economic disadvantages that come with installation of such a quota. If the policymakers in a country have the social advantages in mind, more women in top positions of large companies, than the installation of a binding quota could be a good measure to accomplish this goal. If a policymaker y values the social goals, but simultaneously wants to prioritize the economic effect for companies in consideration, a non-binding quota could be the compromise.

The conclusion that can be drawn from this paper are subject to some limitations of the research. The first limitation of this paper lies in the model used. The DiD estimation is the right model to use, when the treatments (and the countries or firms that receive the treatment) are random. The treatment is not random if, for example there is an economic threshold that a country must have to be able to install a quota (and this is unaccounted for). The treated country is then, wrongfully, compared to a country that does not meet this threshold, and it therefore not similar. In the case of this paper, it might be that the countries that implement these laws, have common characteristics. Only countries that have high enough level of social-economic development are eligible to impose such a quota (self-selection). Future research should look at countries outside the more developed countries and see if results hold up. Otherwise, the results are biased and conditional on social economic development

Another limitation is the fact that countries that do not impose a quota might have a higher social awareness among its society. It might be that without the installation of a gender quota

law, there could still be an equal amount of changes in the boardroom. This means that the country with the quota and the country without the quota would have similar changes in terms of women in the boardroom. Which could invalidate the reference category. Future research could incorporate a measure for changing social acceptance that differs among countries.

The last (main) limitation of this paper is that it only investigates the imposition of a gender quota on board positions of companies and its economic effect. As shown in the theoretical background section, diversity within a company could increase productivity and effectiveness. In this case, we find that the increase of diversity does not offset the negative effects on firm valuation a company experiences when women are forced on the board. It could be that throughout the company women do increase diversity, and the increased female leadership attracts more talented women within all layers of the company. The company would then show an increase in women within its business overall, and in the long run, the increased diversity within the company could increase valuation and performance. Future research could look into the phenomenon of the long run effects of gender quotas, its effect on the number of women throughout the company (not only board positions) and the economics effects of this possible phenomenon.

This paper distinguishes between firm value and the EBITDA of a company, to distinguish between market expectations of firm performance and the actual performance of the firm. The reason of different results between these two have not been uncovered in this paper and are a possible avenue for future research.

The first hypothesis of this paper is rejected, because of the larger effect found in this paper, compared to the effect found in Ahern & Dittmar (2012). However, the measure used to proxy firm value is similar, but slightly different for both papers. Therefore, the dependent variable is not fully comparable. If a true comparison of the effect is to be made, future research should use the same proxy.

7. Conclusion

This paper builds on the existing literature on gender quotas (Ahern & Dittmar, 2012; Matsa & Miller 2015, etc.) and extends the existing literature by comparing the economic effect of a non-binding gender quota with a binding gender quota, using firm value and EBITDA as dependent variables. I use an experimental setup, with a pre, transitional and post treatment period, where the treatment is the passing of the gender quota law. This paper uses the countries France (binding quota), the Netherlands (non-binding quota) and Sweden (control

group). In section 2, I show that the different gender quotas have different effect on the number of women on boards. In section 5 I provide evidence for the negative effect of the binding quota on firm value, and I do not find evidence for an effect of a non-binding quota on firm value. Moreover, I find no evidence for an effect of the binding or non-binding gender quota on firm performance.

All in all, this paper shows that a binding quota is an effective instrument to increase the number of women in business. The binding quota does achieve its social goals, however the disruption it causes within a company board and the restructuring necessary to comply with the law has negative effects on firm value. On the other hand, the non-binding quota does have a positive effect on women on boards, but substantially less compared to the binding quota. However, there is no evidence for an effect of the non-binding quota on firm value or firm performance. Therefore, this paper provides evidence for a trade-off between social benefits and negative effects on firm value when implementing a gender quota for corporate boards. The binding quota shows higher social benefits however there is a negative effect on firm value. The non-binding quota has no negative effect on firm value, but the social benefits are limited.

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Appendix A

Matrix of correlations for country France

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) France	1.000													
(2) Transition Period	0.035	1.000												
(3) Post Period	-0.035	-0.272	1.000											
(4) Assets	-0.387	-0.061	-0.041	1.000										
(5) Employees	0.086	-0.022	0.090	0.240	1.000									
(6) Return on Assets	-0.092	-0.013	-0.055	0.301	0.040	1.000								
(7) Solvency Ratio	-0.121	-0.012	-0.045	-0.161	-0.167	0.041	1.000							
(8) No. Directors	0.251	-0.026	-0.076	0.516	0.232	0.142	-0.150	1.000						
(9) Std. Age	0.221	0.001	-0.016	-0.111	-0.018	0.048	-0.017	0.158	1.000					
(10) Nationality Mix	0.023	0.008	-0.000	0.245	0.072	-0.054	0.037	0.247	-0.077	1.000				
(11) Network Size	-0.050	0.001	-0.023	0.456	0.142	-0.008	-0.055	0.323	-0.150	0.487	1.000			
(12) Qualifications	-0.194	-0.013	0.011	0.315	0.078	-0.148	0.081	0.129	-0.230	0.338	0.549	1.000		
(13) Succession Ratio	0.067	-0.003	0.025	-0.108	-0.045	0.028	-0.006	0.012	0.610	-0.097	-0.108	-0.157	1.000	
(14) Time on Board	0.155	-0.005	-0.080	-0.035	-0.011	0.216	-0.058	-0.014	0.159	-0.168	-0.207	-0.297	-0.147	1.000

Matrix of correlations for country the Netherlands

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Netherlands	1.000													
(2) Transition Period	0.006	1.000												
(3) Post Period	-0.013	-0.523	1.000											
(4) Assets	-0.249	0.046	-0.067	1.000										
(5) Employees	0.347	0.022	-0.031	0.252	1.000									
(6) Return on Assets	-0.005	0.038	-0.046	0.221	0.051	1.000								
(7) Solvency Ratio	-0.285	-0.001	-0.001	-0.268	-0.282	-0.025	1.000							
(8) No. Directors	0.033	0.033	-0.088	0.600	0.249	0.117	-0.205	1.000						
(9) Std. Age	-0.102	-0.022	-0.005	-0.009	-0.009	-0.034	0.071	0.035	1.000					
(10) Nationality Mix	0.310	0.006	0.000	0.167	0.272	-0.052	-0.060	0.343	-0.119	1.000				
(11) Network Size	0.232	0.028	-0.021	0.361	0.290	0.033	-0.119	0.395	-0.102	0.512	1.000			
(12) Qualifications	0.020	-0.001	0.001	0.129	0.107	-0.077	0.092	0.071	-0.046	0.245	0.380	1.000		
(13) Succession Ratio	-0.314	-0.009	-0.043	-0.044	-0.135	-0.052	0.138	-0.031	0.674	-0.187	-0.136	-0.083	1.000	
(14) Time on Board	-0.093	0.072	-0.099	0.169	0.044	0.177	-0.042	0.055	0.131	-0.094	-0.087	-0.094	-0.108	1.000

Appendix B:

table 1. Hausman Test

```
Test:  Ho:  difference in coefficients not systematic

             chi2(23) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =       73.03
            Prob>chi2 =      0.0000
            (V_b-V_B is not positive definite)
```