Erasmus University Rotterdam
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Master Thesis International Economics

Governance or Pay to keep CEO shirking at bay?

In the context of globalization

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Pages: 31 excl. tables and references
Date: 20-08-2019

Abstract

This thesis investigates the effects of globalization on the agency problems between executive managers and stakeholders. It does so by applying a monopolistic competition model and altering it, such that it explores the substitution effect between corporate governance and executive pay as tools to minimize agency costs. The model is examined in the context of globalization, by incorporating multiple global factors and analyzing how the model responds. In the empirical analysis it finds good indications that trade liberalization has a negative effect on corporate governance and some indications that it has a positive effect on CEO pay. Indicators of international competition show mixed results. Decreasing national tariffs seem to have a negative effect on governance and a positive effect on pay. However, the results when having a comparative advantage as a country in a particular industry or as a company, being part of a highly dynamic industry with high rates of firm failure, mostly give ambiguous results. Somewhat outside of the initial model, indications have been found that an increase in the supply of managers has a deteriorating effect on corporate governance *and* pay.

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Introduction

There are many distinctive ways to manage a company and executive managers play a significant role in that. Depending on the regulatory structure of a company, managers can have a significant influence on how the company is governed, sometimes even against the will of the stakeholders. When the goals of the managers and stakeholders[1] are not aligned we are speaking of an agency problem (Jensen & Meckling, 1976). This misalignment can lead to inefficient decision-making in the eyes of the stakeholders and thereby to agency costs.

How is it possible to align the goals of executive managers with those of the stakeholders? Properly incentivizing the manager is important in a world where agency problems exist. Schymik (2018) focuses on and compares direct monitoring (corporate governance) versus monetary incentives such as salary. He does that by altering a monopolistic competition model originally designed by Melitz and Ottaviano (2008), such that a firm choice between these two factors emerges and analyzes it in the context of globalization and agency problems. The alterations have been inspired by the work of Acharya, Gabarro & Volpin (2015), who also explore the substitution effect between performance pay and governance in an agency context.

In this framework, especially with regard to monetary incentives, the amount and sensitivity towards these incentives is very much dependent on what other (international) companies have to offer (Cunat & Guadelupe, 2009). This leads to firm competition, which has a significant effect on the model presented. It shows the outside competition can drive up the salary of managers to such an extent, that it is not efficient/profitable anymore for the company to invest in corporate governance (Acharya & Volpin, 2010). Whereas at first sight this simply seems as a tradeoff for the company, it can potentially have a significant negative effect on the consumers and overall welfare in that particular market and the entire economy (Schymik, 2018).

When we enter the realm of globalization, it also becomes important to look at the comparative advantages between countries in certain industries and their effect on companies. A comparative advantage entails a certain country is more efficient in production and has lower opportunity costs regarding certain goods relatively to other countries, because of for instance more availability of market/industry specific skilled labor and capital to produce these goods (Golub & Hsieh, 2000). This abundance of factors increases the size of the market by attracting more companies. But, although the total cake is larger, more companies have to survive off of it. It thus also shows in which industries the companies have to battle the hardest in order to survive, which includes obtaining and having access to the best resources to ensure continued profits (Redding 1999; Siggel, 2006). The factor abundance also

[1] Stakeholder is a collective term for all parties involved with the daily exercise of business. In the current analysis the main focus lies on shareholders/owners of the company and when later in the text ‘welfare’ is

invokes a certain specialization in the advantaged industry in the relevant country, at the cost of other industries that do not have a comparative advantage. This thus focuses efforts on that industry, increases the size of the market and the competition within it (Costinot & Donaldson, 2012). This increased competition in turn can have an effect on how is dealt with agency problems within the individual firm.

Among the resources just discussed, one should also count human resources (skilled labor). In order to obtain and maintain a 'good' CEO, companies have to increase their income further and further to keep up with the competition in the labor market (Cheffins and Thomas, 2004; Siggel, 2006). However, in many cases this is worth the investment as the best executive managers can have a significant, positive effect on the continued profitability of a company, retrieving good projects and by maintaining good relations and policies for the long term (Kaplan, Klebanov & Sorensen, 2012). This increasing pay applies especially in a labor market where the supply of 'good' managers is scarce (Acharya, Gabarro & Volpin, 2015). Because there is this much competition profits are usually also lower, which makes it even harder for companies to come up with the highest salaries to lure in the best managers.

Instead of assuming the supply of managers is scarce, one can also examine what happens when it is made endogenous in the model. The monopolistic competition model in Schymik (2018) simply assumes the former, which means the companies have to bid up pay to obtain and keep a 'good' manager. Once this is made adjustable one can observe that in an industry in which the amount of managers increases, the tension on the competition between companies is relieved in the labor market. A higher supply (with constant company demand) usually implies a lower salary for the managers (Krugman, 2000). Krugman discusses this in the context of a student graduate model, in which more labor *demand* increases the amount of students, as the working conditions become more attractive in the form of higher pay. This thesis focuses on when the labor *supply* is higher than the mentioned demand, such that the opposite effect happens in the form of lower salaries because of the excess supply of future managers and it does not focus on student enrollment. The supply effect on salaries is also similar to the (opposite of the) ex-ante utility effect discussed in Acemoglu and Newman (2002). According to the model by Schymik (2018), this in turn seems to imply investing in corporate governance becomes important again. As managers might not be incentivized enough by the lower salary they receive to perform in the best interest of the stakeholders and obtain the most productive/profitable projects for the companies, corporate governance would again form an essential tool in aligning the goals of managers and of the stakeholders.

However, another possibility is that the increase in managerial supply diminishes the outside option for the managers in place to a large degree. This would imply managers are more easily replaced when they do not function properly and hence it becomes harder to find a new job. This is dubbed in

Acemoglu and Newman (2002) as the ex-post reservation utility effect.[2] This thereafter would likely entail that a manager even performs at his/her best when salary *and* corporate governance investments are lower, as the manager does not have any alternatives when he/she is eventually caught shirking and fired. Acemoglu and Newman (2002) show that this latter effect is dominated by the earlier mentioned ex-ante utility effect and the cost-of-monitoring effect (which does only apply very little in the current context through members of the supervisory board)[3], in an agency context where the manager is the monitoring agent. As in the current context the manager is actually the one being monitored, the ex-post reservation utility effect is still a plausible deciding factor and also the one expected to dominate in the current analysis.

These additional aspects to the international space make for an interesting analysis of the effects of the comparative advantage and manager supply on the agency model articulated in Schymik (2018). Thus, the research question that has been formulated for this thesis is:

What are the effects of globalization on the agency problems between executive managers and stakeholders?

This will be examined by replicating the research and model performed by Schymik (2018) and extending it by adding the comparative advantage and human resources (managers) supply to the original model and analyzing the effects of this in the empirical study.

The next section will show in more detail the theoretical agency model underlying the empirical analysis. Section 3 and 4 will focus on the data collection procedures and methodology with regard to how the analyses have been performed. Section 5 shows and interprets the results and section 6 formulates the discussion and conclusion.

[2] Again, this effect is stated in the opposite direction in their work.
[3] The cost-of-monitoring effect formulates the fact that monitoring itself becomes more expensive when salaries go up through increased labor demand (Acemoglu & Newman, 2002). Companies therefore want to apply less of it. This does not apply as much in the current context as the manager is the one being monitored, not the monitor.

2. Theoretical model

In this thesis an agency model is applied to seek what incentivizes an executive manager to execute the goals of the stakeholders as well as possible, under different circumstances. Additionally, it researches how the relevancy of these incentives can change when the circumstances are altered. The basic underlying idea here entails the choice of the company to keep the manager in line either by giving him/her a large paycheck or by applying corporate governance rules to monitor the performance of the manager. These mechanisms can also be applied together, but the model shows that at a certain threshold the income of the manager is high enough, such that the application of governance rules becomes redundant in order to incentivize the manager (Schymik, 2018). In other words, the income of the manager alone is enough to make him/her perform in the best interest of the stakeholders and thus supposedly cancelling out the agency problem.

Incentives are necessary to minimize agency costs according to the principal-agent model (Jensen & Meckling, 1976). The theory behind this model implies that an agent (manager/CEO) who owns less than a hundred percent stake in the company he/she is representing, has an incentive to shirk or follow their own goals as they do receive a hundred percent of the benefits when fulfilling their own goals/tasks. This misalignment of the goals between the agent and the principal (owners/stakeholders) creates the agency costs that occur because of this less efficient decision making (in the eyes of the stakeholders) (Ang, Cole & Lin, 2000).

As mentioned, the model applied in this thesis differentiates between incentivizing agents, and thus going against the agency costs, either through more pay incentives or by tightening corporate governance. The governance rules are better at observing the actual performance of the manager, which makes it easier for the supervisory board to decide whether the manager is actually bringing in and executing the best projects and whether he/she is in fact performing the best he/she can in general. Corporate governance takes on many forms, ranging from state legislation that companies have to comply to (e.g. green mail law), to management protectionism in the form of golden parachutes and other severance payments when the manager has to leave the company, to the direct monitoring of management by supervisory boards as mentioned above (Gompers et al, 2003). Considering the potential impact of these means, it should be taken into account what effect the choice between income and governance rules has on welfare in general. In principle the decision to incentivize the manager one way or the other is up to the company. If either *succeeds* in incentivizing the manager properly, this does not necessarily harm the company (other than when pay increases exponentially, see below). However, as mentioned above, a lack of supervision can alter the choice making of the manager in such a way that although it gives the highest of gains for the direct shareholders, it might not be best for welfare in general (Schymik, 2018).

The case where pay increases exponentially is when (international) competition between companies increases over who gets the best managers in a labor market where the managers are scarce (Marin & Verdier, 2003). In this situation the managers can demand higher and higher incomes, as companies are bidding up against each other to obtain and retain a 'good' manager (Acharya, Gabarro & Volpin, 2015; Edmans & Gabaix, 2009). Thus, the better the outside option for the manager, regardless of whether this is through domestic or international competition, the more the current company needs to offer to keep the manager in place (Acemoglu & Newman, 2002; Edmans & Gabaix, 2009). As discussed above, the salaries of managers can become high enough, such that it takes away the necessity of companies to invest in corporate governance rules entirely (Acharya & Volpin, 2010). A higher pay is associated with higher firm value, but this 'price' can at some point exceed the amount of funds the company would have to spend on incentivizing a manager properly in a less competitive market. This can go at the cost of not only corporate governance, but also other parts of the company that deserve investments (Acemoglu & Newman, 2002; Fong et al., 2015). These considerations lead to the following hypothesis:

(1) *In a more competitive market/industry, companies will invest more in pay (for performance) and less in corporate governance to incentivize their executive manager. The former works as a substitute for the latter.*

The international competition in multiple markets, among which the labor market for managers, constitutes one of the main international aspects in this research. It shows that changes such as trade liberalization, thereby increasing the potential for direct competition (in the product market), can have a large impact on the management of an individual company (Cunat & Guadelupe, 2009). According to the model it can affect the way companies deal with the agency problem to such an extent that the labor market for managers basically decides where the company is investing its funds regarding management and to some extent the companies' structure (Acharya & Volpin 2010; Acemoglu & Newman, 2002).

Whether a manager does the best he/she can in order to fulfill the goals of the stakeholders does not necessarily mean he/she will succeed. For example, a case which will also be examined in the current model is that in fast changing, highly competitive sectors with high exit rates it is hard to get good projects and thus for the company to stay afloat. Even with the best of intentions and a lot of effort the manager might fail in his quest of acquiring the best projects (Kaplan, Klebanov & Sorensen, 2012). These sectors are highly competitive, which according to the model will also entail (when this competition also translates into the specific labor market) that the managers have been obtained by offering them high salaries (Falato & Kadyrzhanova, 2008) and by cutting back on corporate governance investments. This consequently means that, without proper governance provisions in place, it will likely take too long for the monitoring agents of the company to find out if the manager is

failing and to find a new manager and a new, profitable project. In a highly competitive market, this could entail the entire company fails and goes bankrupt (Schymik, 2018). Thus, in this already cutthroat market with high exit rates because of the competition on the goods market, the lack of supervision as a consequence of the trade-off between monitoring and pay for performance in highly competitive labor markets, also increases the risk of failing as a company because of a failing CEO. These considerations imply that managers receive increased pay in a competitive market and that investments in corporate governance are lowered. This leads to the following hypothesis:

(2) *In a dynamic/highly competitive industry, characterized by high firm exits rates, firm investments are further focused towards pay for performance at the cost of corporate governance.*

The competition within industries is also affected by whether the company is active in a goods market with a comparative advantage. Therefore another aspect added to the model is whether the home industry is relatively efficient in production and has lower opportunity costs, compared to the same industry abroad (Golub & Hsieh, 2000). This efficiency can be based on multiple determinants (Siggel, 2006). According to the Ricardian model, this is caused by differences in technology (Davis, 1995). This implies technological advancements are the core reason these relative differences and selective advantages emerge between industries of different nations. The next efficient step is to specialize in these industries with relatively advanced technologies and to export the products to other countries.[4]

According to the Heckscher-Ohlin model the comparative advantage is caused by differences in relative factor endowments (Siggel, 2006). If the factors necessary for certain products are abundant and cheap comparatively, thus that it has higher factor endowments and these factors can be applied more intensively in production, the country has an incentive to specialize in producing these products and export them (Costinot & Donaldson, 2012; Davis, 1995). This specialization creates more competition in the home industry in both the Ricardian and Heckscher-Ohlin model (Redding, 1999). Especially industries such as the pharmaceutical and electronics industries (who are well represented in the empirical sample) require a lot of know-how and capital in order to produce them, let alone produce them efficiently and on a large scale (Redding, 1999).

This together is another factor, next to trade liberalization, which on the international plane influences competition between companies and thus, through the model, also the structure and management of the individual company (Schymik, 2018; Siggel, 2006). This leads to the following hypothesis:

[4] On the other end it should be noted that according to the comparative advantage theory, the country will import goods in the industries it has a comparative disadvantage. This together creates a situation which is beneficial to all countries involved, as they have the opportunity to focus on producing certain products and import the rest.

(3) Companies active in a comparatively advantaged, US industry experience more competition and thus invest more in pay for performance and less in corporate governance to incentivize their CEO's.

Another possible alteration of the model, is what happens when the labor market for managers is made endogenous and executive managers are no longer characterized as a scarce, exogenous resource. When there is an abundance of managers, simple demand and supply already predicts the salaries of the managers will be lower (Krugman, 2000)[5]. This is also a formulation of the ex-ante utility effect when the labor market becomes less tight, see Acemoglu & Newman (2002). Additionally, high competition between managers in the labor market increases the incentive for the manager to perform well, because it is easier for the company to replace him/her by another good manager (Cunat and Guadelupe, 2009). This together reinstates the choice of the company between salary and corporate governance as the means to incentivize the manager (Schymik, 2018). More funds should be left over to invest in monitoring the manager and this might also be necessary whereas the manager feels less motivated due to his/her lower salary. Alternatively, the outcome can actually show that the more easily replaced manager does not need to be monitored more in order to perform at his/her best, as he/she is well aware of the fact there is no good outside option. This is a formulation of (the opposite of) the ex-post reservation utility effect (Acemoglu & Newman, 2002; Shapiro & Stiglitz, 1984). In this latter case the substitution effect (Acharya & Volpin, 2010) between investing in pay for performance or corporate governance breaks down. Focusing on the latter effect, and somewhat going against the initial theoretical model, the accompanying hypothesis is as follows:

(4) Endogenizing managerial supply and making this resource less scarce, decreases both the necessity for companies to invest in pay for performance as well as corporate governance, to go against agency problems.

[5] Who discusses the opposite effect of increased demand for managers in a model with endogenized supply of college graduates.

3. Data

The sample in this thesis consists of S&P500 companies. Over the time period applied from 1990 till 2006 744 companies have been part of this index. This time period is used, as the data collection method of some of the databases (with an emphasis on the Institutional Shareholder Services Database (ISS) database[6] regarding governance indicators) have changed significantly after 2006. Also the economic crisis starting in 2008 would likely have a significant distortionary effect on the analysis.

The dependent variables (corporate governance indexes) decrease the amount of companies left in the sample quite substantially, whereas only 408 companies remain after incorporation. These companies consist of 113 distinguished industries. The industries are not represented equally in the sample, whereas industry 2834 and 1311 (the pharmaceutical and oil industry respectively) are represented disproportionally many times. Incorporating all variables meant only manufacturing companies would remain, as tariffs on goods are a crucial component of the analysis. This drops the sample down to 214 companies. Finally, a number of companies have been deleted because only one observation was available for the entire period of investigation. In the end 174 companies over 98 industries were left in the analysis. Companies that have missing data because they were formed during the examination period or went bankrupt during this period, were left in to prevent potential (survival) biases created by only including companies with complete data (Cader & Leatherman, 2011). This could bias the results upwards, because only the failing (often relatively smaller) companies are the ones that are excluded.

3.1. Variable descriptions

The variables included and their description consist of the following. Between brackets one can find respectively the relevant identification codes and data sources:

- Dependent variables/Governance indexes (Tickers/ISS):
    - Entrenchment index (inspired by Bebchuk et al., 2009): An index ranging from 0 to 6 that includes the following governance provisions: (1) limits to shareholder bylaw amendments, supermajority vote requirements for both (2) charter amendments and (3) mergers, (4) poison pills, (5) golden parachutes and (6) staggered boards. Ticker identification codes have been used to identify the S&P500 companies and subtract the relevant data from the Institutional Shareholder Services Database in Wharton Research Data Services.[7]
    - Protection index (inspired by Gompers et al., 2003): An index ranging from 0 to 6 that includes the following governance provisions specific for limiting managerial liability: (1) golden parachutes, (2) severance agreements, (3) manager indemnification included in the companies' charter or bylaws, (4) managerial liability limiting charter amendments, (5) contracts

[6] See https://wrds-web-wharton-upenn-edu.eur.idm.oclc.org/wrds/query_forms/navigation.cfm?navId=244.
[7] *Ibid.*

exempting managers from certain legal fees when law cases occur and (6) compensation plans for managers if they want to leave before a change of control occurs. Ticker identification codes have been used to identify the S&P500 companies and subtract the relevant data from the Institutional Shareholder Services Database in Wharton Research Data Services.[8]

- GIM index (inspired by Gompers et al., 2003): An index ranging from 0 to 23 that includes the following governance provisions: Options for delay for managers in the form of (1) blank checks, (2) classified board, (3) special meeting and (4) written consent. Protection in the form of (5) compensation plans, (6) contracts, (7) golden parachutes, (8) indemnification, (9) liability and (10) severance. Protectionist voting rules such as in (11) bylaws, (12) charter and with regard to (13) cumulative voting, (14) secret ballot, (15) supermajority and (16) unequal voting. Included state law categories are (17) business combination law, (18) cash-out law, (19) directors' duties law, (20) fair price law and (21) control share acquisition law. (22) Poison pills and (23) Silver parachutes are also included. Only anti-greenmail law could not be found for the current sample, while it was included in the GIM index of Gompers et al (2003). Ticker identification codes have been used to identify the S&P500 companies and subtract the relevant data from the Institutional Shareholder Services Database in Wharton Research Data Services.[9]
- O Index (inspired by Bebchuk et al., 2009): An index ranging from 0 to 17 that includes all the governance provisions of the GIM index, which are not part of the Entrenchment index. Ticker identification codes have been used to identify the S&P500 companies and subtract the relevant data from the Institutional Shareholder Services Database in Wharton Research Data Services.[10]

- Core independent variables original models:
  - WTO tariffs (HS codes/UN trains database[11]): The natural logarithm of the ad valorem tariff rate[12] (indicator 'B. weighted average in percentages' in the database) applied by the WTO countries on imports from the US per 4-digit SIC industry per year. The HS codes have been obtained by linking every 4-digit SIC industry with all the HS-6 product categories they trade internationally. The *weighted* average takes away some of the bias introduced by averaging the tariffs of all included WTO countries and averaging across all product groups relevant to the specific industry by weighing tariffs with the actual trade value per product group per country.

[8] *Ibid.*
[9] *Ibid*
[10] *Ibid.*
[11] See https://databank.worldbank.org/data/reports.aspx?source=UNCTAD-~-Trade-Analysis-Information-System-%28TRAINS%29.
[12] Indicator 'A. simple average in percentages' in the UN trains database, see *Ibid.* https://databank.worldbank.org/data/reports.aspx?source=UNCTAD-~-Trade-Analysis-Information-System-%28TRAINS%29.

- US tariffs (HS codes/UN Trains database[13]): The natural logarithm of the ad valorem tariff rate[14] applied by the US on imports of other countries of the WTO per 4-digit SIC industry per year. The HS codes have been obtained by linking every 4-digit SIC industry with the HS-6 product categories they trade internationally (see above at the description of $Tariffs_{WTO}$ for a more detailed explanation, as it has been retrieved in the same manner).
- Industry Exports (Peter Schott data[15] (SIC codes)): Natural logarithm of aggregated total exports of the US 4-digit SIC industry per year. The data has been retrieved from the Peter Schott trade data website.
- Firm level Exports (Ticker/Compustat[16]): Natural logarithm of total exports of the US per firm per year. Ticker identification codes have been used to identify the S&P500 companies and subtract the relevant data from the Historical Segments data in Compustat in the Wharton Research Data Services Database.
- Value Option grants (Tickers/Execucomp[17]): the natural logarithm of the cumulative value of granted manager stock options per firm per year acquired by using the S&P Black-Scholes methodology. Ticker identification codes have been used to identify the S&P500 companies and extract the data from Execucomp in the Wharton Research Data Services Database.
- Fixed salary (Tickers/Execucomp[18]): the natural logarithm of the base salary earned by managers per firm per year. Ticker identification codes have been used to identify the S&P500 companies and extract the data from Execucomp in the Wharton Research Data Services Database.
- Exit rates dummies (US Census Statistics of US Businesses[19]): average exit rates of firms per 3-digit SIC industry. Exit rates are the number of exits divided by total number of firms. To create three ranges of high/medium/low exit rates, the dataset has been divided into three equal groups. Three dummy variables have been created, each of which take on a value of 1 when either a high/medium/low exit rate applies for the relevant industry. The data has been retrieved from the U.S. Small Businesses Administration website.

- Own added variables:
  - Comparative Advantage variable (Peter Schott data[20] (SIC codes)): a log transformed variable that is positive when the US is a *net* exporter in that 4 digit SIC industry and negative when it

[13] See https://databank.worldbank.org/data/reports.aspx?source=UNCTAD-~-Trade-Analysis-Information-System-%28TRAINS%29.
[14] Also indicator 'B. weighted average in percentages' in the Un Trains database, see *ibid.*
[15] See http://faculty.som.yale.edu/peterschott/sub_international.htm.
[16] See https://wrds-web-wharton-upenn-edu.eur.idm.oclc.org/wrds/query_forms/navigation.cfm?navId=60 and then choose the historical segments database.
[17] See https://wrds-web-wharton-upenn-edu.eur.idm.oclc.org/wrds/query_forms/navigation.cfm?navId=72.
[18] *Ibid.*
[19] See https://www.sba.gov/advocacy/firm-size-data.
[20] See http://faculty.som.yale.edu/peterschott/sub_international.htm.

is a *net* importer. It is therefore a proxy for firm competition in the US home industry, whereas a comparative advantage (net exporter) implies more competition. The data has been obtained by subtracting the earlier mentioned US industry exports from the US industry imports from the same data source.[21] The log transformation is a necessity in this case to prevent outlier trade flows from dictating the analysis.

- Comparative advantage dummy (Peter Schott data[22] (SIC codes)): Dummy variable that takes on the value of 1 when the US is a net exporter in that 4 digit SIC industry. It basically constitutes a binary variant of the Comparative advantage variable addressed above.
- Student degrees in the field of management and business[23]: This variable counts the amount of student graduates per applicable state per year.[24] It is a proxy for the supply of managers in the model. The data concerns a survey per education institution regarding 'Completions' under 'Survey Data'. The dataset allows to differentiate between the level of diploma's, such as bachelor and master ('awlevel'). The universities are only mentioned by number and another file regarding 'institutional characteristics' is necessary to link the numbers to the actual universities and thus to observe in which state it is located. This variable is linked to the companies in the sample by linking the amount of graduates in a state to the state the company is positioned in.
- Student degrees in the field of management and business dummy[25]: This dummy takes on the value of one when the amount of graduates for that particular year, is above the average of all states represented in the sample. It is based on the same data as the student degrees variable above.

- Firm level control variables:[26]
  - Tobin's Q (Ticker/Compustat[27]): Natural logarithm of the market to book value per firm per year. Ticker identification codes have been used to identify the S&P500 companies and extract the data from Compustat in the Wharton Research Data Services Database.

[21] See http://faculty.som.yale.edu/peterschott/sub_international.htm.
[22] *Ibid.*
[23] See https://nces.ed.gov/ipeds/datacenter/DataFiles.aspx.
[24] Also an attempt has been made to do the same analyses, but with lagged student graduates terms by five years. This is done with the intuition in mind that after being graduated for five years, these students might have come further in their careers, therefore potentially forming a better proxy for managerial supply. However, the only significant results (at the 5%-level) were to be found for the management supply variable in the (generally underperforming) Protection model and the coefficient was inflated. Namely, every 1% increase in student graduates is supposed to increase the expected value of the index by 1.27. This while the scale only ranges from 0 to 6.
[25] See https://nces.ed.gov/ipeds/datacenter/DataFiles.aspx.
[26] Comparing to the work of Schymik (2018) one will notice he has a 'changed state' dummy, which takes on the value of one in a year where the company changes location. This dummy is not present in the current analysis, because none of the companies in the sample changed location.
[27] See https://wrds-web-wharton-upenn-edu.eur.idm.oclc.org/wrds/query_forms/navigation.cfm?navId=60.

- Leverage (Ticker/Compustat[28]): Debt divided by total assets per firm per year. Debt has been calculated by subtracting common equity from total assets.

- Industry level controls (SIC codes):
  - Skill intensity (NBER CES Manufacturing Database[29]): the proportion of non-production workers in total employment per 4-digit SIC industry per year. Total employment is measured in the form of the amount of workers per 1000.
  - Capital intensity (NBER CES Manufacturing Database[30]): the fraction of capital stock over total employment per 4-digit SIC industry per year. Total employment is measured in the form of the amount of workers per 1000.
  - Industry shipments (NBER CES Manufacturing Database[31]): the natural logarithm of the total value of shipments per 4-digit SIC industry per year.
  - Herfindahl (Ticker/Compustat[32]): Natural logarithm of the Herfindahl-Hirschman concentration index per 4-digit SIC industry per year based on company sales, limited to the group of firms included in the Compustat database. Ticker identification codes have been used to identify the S&P500 companies and extract the raw data from Compustat in the Wharton Research Data Services.
  - World Import demand (HS codes/UN Trains[33]): Total imports from and to the rest of the world[34] excluding the US per 4-digit SIC industry per year. The HS codes have been obtained by linking every with 4-digit SIC industry with the HS product categories they trade internationally.

[28] *Ibid.*
[29] See http://www.nber.org/nberces/.
[30] *Ibid.*
[31] *Ibid.*
[32] See https://wrds-web-wharton-upenn-edu.eur.idm.oclc.org/wrds/query_forms/navigation.cfm?navId=60.
[33] See https://databank.worldbank.org/data/reports.aspx?source=UNCTAD-~-Trade-Analysis-Information-System-%28TRAINS%29.
[34] Indicator 'E. Trade value' in the UN trains database, see *ibid.*

Table 1: descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Dependent variables					
Entrenchment index	1374	1.79	1.18	0	5
Protection index	1374	2.29	1.15	0	6
GIM index	1374	7.59	2.39	1	15
O index	1374	5.80	1.89	1	12
Value of option grants (in $)	2465	3041.1	13493	0[35]	600347
Fixed Salary (per 1000$)	2634	843.12	381.30	0[36]	4000
Independent variables original model					
WTO tariffs (in %)	2953	12.6	10.6	0.333	184.9[37]
US tariffs (in %)	2276	3.32	3.63	0.004	26,01
Industry exports (in $)	2945	1,3E+12	4,12E+12	384724	3,07E+13
Firm level exports (per 1 mill. $)	796	896.22	2069.7	0.122	26530
Added variables					
Comp. adv. Dummy	2959	0.325	0.468	0	1
Comp. adv. Variable (in $)	2959	-7.4E+12	2.66E+13	-2.3E+14	2.5E+13
Management degrees dummy	3196	0.607	0.488	0	1
Management degrees (# of degrees)	3196	15747	9777.1	707	41505
Exit rates	2669	0.363	0.481	0	1
Firm Controls					
Leverage	3269	0.580	0.214	0.0320	2.50
Tobin's Q	3269	2.18	1.60	0.510	39.8
Industry Controls					
Skill Intensity (in %)[38]	2798	0.365	0.151	0.0921	0.864
Capital Intensity[39]	2798	159.28	164.29	6.8282	1760.8
Industry shipments (per 1 mill. $)	2799	31157.7	44697.0	1	512142.7
Herfindahl	3382	0.253	0.195	0.0420	1

3.2. Descriptive statistics

Table 1 shows descriptive statistics of all included variables. The low amount of observations for the dependent variables immediately stand out. This is due to the ISS governance data being published every other year and for some periods even once every 3 years. The fact that the missing values are thus nonrandom because of the measurement procedure and the remaining data is still balanced, implies no corrections of the data are necessary. This should be compared to data missing at random or not at random because of a relationship with the present data and the adjustments necessary to deal with those cases (Rubin, 1976). The missing data implies the maximum amount of observations per

[35] This zero value will drop out once the variable is log transformed.
[36] Idem.
[37] This number represents a tariff of almost two times the price of the product, which seems unlikely in reality. However, it concerns SIC industry 2085, which trades in liquors. The nature of this product clarifies to some extent the height of the corresponding tariffs.
[38] Ratio of production workers per 1000 over total employment, as in the total amount of workers per 1000.
[39] Total, real capital stock per 1 million $ divided by the total employment.

group is 8 (out of the possible 17 years). Although the governance rules might not change significantly in one year, which might partly explain the gathering of the data every other year in the first place, it does have an effect on the other variables included in the analysis. Ideally information for every one of these years would be available, such that the observations of the explanatory variables would be included for these missing years as well, which could increase the precision and quality of the inferences made in the analyses. The reference paper has more observations in total. This is partially due to a larger amount of included companies, but when dividing the amount of observations by the amount of included companies in the analysis of the reference paper (Schymik, 2018), the amount of observations is consistently higher than 8 per group (although not much higher), while he upholds the same sample period. This might indicate that he had access to a somewhat more complete governance database.

Concerning firm level exports the data from Compustat is highly incomplete, with only 850 observations remaining after cleaning the data (for a total of 174*17=2958 potential observations). After including it in the model, only 300 observations remain, as the dependent variable is also incomplete. Attempts have been made to extract the data from other databases, but to no avail. Databases such as Orbis and ThomsonOne only go back to about ten years before 'the latest available year' as they are mainly focused on static data provision.[40] The Worldscope database in Datastream had the highest potential. To make sure to get as complete as possible data, three identifiers recognized in Datastream have been linked by hand to the company names via Datastream Navigator (SEDOL, ISIN and DS Mnemonic identifiers). The ISIN codes gave the most complete data and showed only 3 entry errors out of 214 companies as input (this was before exclusion of companies with only 1 observation, hence the larger input number). However, data on 114 companies were completely unavailable and for many more a part of the data was not available.[41] The most complete data retained 666 data points after cleaning, out of the earlier mentioned potential of 2958 data points and only 222 were in the regression because of the lack of data for the dependent variable. Therefore, an IV has been attempted with the Compustat data, but most inferences should be drawn from the more aggregated and more complete industry level exports data.

Ideally access to the US Census Bureau Exporter database, which is not open to the public, would have given better quality data. This database has annual data on key export statistics of all US exporting, manufacturing companies from 1996 onwards (US Census, 2019). Access to this database would therefore have made a serious contribution to the firm level exports variable in this research.

[40] With a sample that runs from 1990 till 2006, having 2009 as the earliest data available for companies that are still alive is not relevant for very obvious reasons.

[41] This was either because they did not export, but more likely this was due to no available data as it was often indicated with "NA", whereas some data points specifically mentioned a zero.

A concern revolving around the collection of variables and matching of companies between variables is that different identification coding systems are used and these systems do not always fully overlap. As mentioned in the list of variables above is that 4-digit SIC codes have been used to identify industries and according variables, Tickers to identify individual companies and according variables and HS-6 codes for international trade variables. For one, the SIC codes usually overlap with multiple HS-6 codes (sometimes to over a hundred HS-6 codes per SIC code), thereby making it difficult to match industries with their trade activities and thus diminishing the quality of some of the relevant trade variables (such as the tariff variables). This research has tried to match these as best as possible, but having some errors in data processing and in the overall distribution of the data, is imaginable here.

4. Methodology

The data has been organized as panel data. In this case the fixed effects estimator is the most common application, however the random effects estimator can also be applied when one is certain that the individual specific effects are not correlated with the independent variables. The Hausman test has been performed and the null hypothesis that these effects and the independent variables are uncorrelated, hence that the random effects estimator is consistent and can be applied, cannot be rejected for all models. However, considering the fixed effects estimator is only less efficient than the random effects estimator if no correlation can be found, whereas the random effects estimator is inconsistent when these correlations are present, makes the fixed effects estimator a much safer choice (Wooldridge, 2016). Therefore, the fixed effects estimator has still been applied. In this estimator firm and year fixed effects keep omitted factors constant, such that between variation is kept to zero for variables other than the ones incorporated in the model and thus to prevent bias potentially caused by these factors. Important to note therefore, is that when the R^2 is discussed further down the text, it is specifically about the *within* R^2.

Additionally, time dummies have been added in models in which aggregate, year effects seem to be present, which are not controlled for or captured in any other way in the model. In some models they were highly significant, whereas in other models they were not. To keep the interpretation of models, which are supposed to be comparable in terms of R^2 etcetera, as homogenous as possible, it has been attempted to compare the most similar results between these models. This entails it has been attempted to compare the models with or without time dummies with each other, not randomly. This is mentioned specifically, as indicators (such as the R^2) are obviously influenced by additional significant coefficients, but are also influenced by an increase in the amount of independent variables, regardless of whether they are significant or not (Wooldridge, 2016). Furthermore, to prevent autocorrelation and heteroskedasticity in the residuals, they are clustered by industry. This gives around 90 different clusters, hence 90 different industries are left in most of the analyses.

In order to evaluate potential cases of multicollinearity, a correlation matrix has been made and analyzed, see appendix 1. Higher correlations can be observed between governance indexes, for clear reasons. This does not cause any problems, because they will not be part of one and the same analysis. Other variables that show higher correlations are skill intensity and WTO tariffs, but it does not come close to the threshold after which multicollinearity should be assumed present.

Furthermore, it has been attempted to apply the variation inflation factor (VIF) on the estimates, to observe potential cases of multicollinearity. However, in panel data this approach does not seem to work properly, as the outcomes are inflated and the test does not take correlations between the dependent and independent variables into consideration (Stata, 2005). Indeed, the outcomes are

inflated to such an extent, that in general 7 out of 9 coefficients exceed the threshold and some even exceed it times 5. Therefore, the choice has been made to not apply this as a criterion.

4.1. Regression analyses

The analysis basically consists of 6 main regressions. First, the models focus on the governance indices. Here the main interaction examined is between the governance indices (Entrenchment, Protection, GIM and O-index) as dependent variables and a WTO tariffs variable as an indicator for trade liberalization. This is to empirically investigate *hypothesis 1,* regarding the expected negative effect trade liberalization can have on corporate governance. The regression looks as follows:

$$Gov_{fit} = \beta_0 + \beta_1 \ln(tariffs^{WTO})_{it} + \beta_2 \ln(tariffs^{US})_{it} + \gamma\Delta_{fit} + \varphi_f + \varphi_t + \varepsilon_{fit}$$

In this regression Gov_{fit} stands for the quality of corporate governance of a firm in a 4-digit SIC industry *i* in year *t*. A higher index actually entails weaker corporate governance, as it counts the amount of rules that work in favor of shirking. The tariff variables are the log transformed import weighted average tariffs applied by WTO countries on US HS-6 product groups and vice versa in industry *i* in year *t*. $\gamma\Delta_{fit}$ are the industry and firm level control variables, φ_f and φ_t are firm and year fixed effects and ε_{fit} is the error term. By analogy these terms are applied in the following formulas.

The second main regression is to make sure the effect observed in regression one is actually caused by a size increase of the relevant market/industry. Hence, the effect of the log transformed firm-level and industry-level exports in industry *i* in year *t* on corporate governance are researched by the following regression:

$$Gov_{fit} = \beta_0 + \beta_1 \ln(exports^{US})_{it} + \gamma\Delta_{fit} + \varphi_f + \varphi_t + \varepsilon_{fit}$$

Because of potential endogeneity problems between the exports variables and the governance indices, a panel data IV (more specifically the G2SLS random effects estimator) has been applied. In the first stage a proper instrument has to be found. As the tariff variables are not part of the initial analysis here and because they have an intuitive link with exports, they have good potential. Also world imports, a variable that captures all WTO country imports excluding traffic with the US, has been prepared for this analysis. As it turned out, the $tariffs_{US}$ variable was the instrument significant at the 1%-level in the first stage IV for all relevant regressions.[42] Intuitively the link with exports can be made where it is likely that US tariffs move together with WTO tariffs and that, just as the exports variable, it entails an indicator for increased competition. In that sense lower US tariffs and higher US exports both represent a more open economy (Schymik, 2018). The outcomes of the second stage analysis will be discussed in the results section.

[42] This is true for all industry exports analyses in all cases. For the firm level exports analyses this is true if the other control variables are not included in the first stage IV. Once included the statistical significance drops to the 10%-level in the Protection model and the 5%-level in the GIM and O index models.

Next, *Hypothesis 3* suggests that the lack of governance investments will be even more severe in dynamic industries with relatively high exit rates, because of their cutthroat competition. In these industries it becomes even more important that the best managers are brought in and that they perform at their best, because their failure to perform can have major consequences for the company they work for. This effect will be analyzed by adding an interaction term to both tariff variables in regression 1. The model will therefore look as follows:

$$Gov_{fit} = \beta_0 + \beta_1 \ln(tariffs^{WTO})_{it} \times exit_i + \beta_2 \ln(tariffs^{US})_{it} \times exit_i + \gamma \Delta_{fit} + \varphi_f + \varphi_t + \varepsilon_{fit}$$

Here $exit_i$ is a dummy variable taking on the value of 1 distinctly in low, medium and high exit rate industries. This term is multiplied by the tariff variables to form an interaction which analyses the effects of trade liberalization on governance rules in companies active in these distinct industries.

Then, to investigate the other part of *hypothesis 1*, that trade liberalization increases incentivizing managers by paying them higher salaries, is examined by analyzing the effect of trade liberalization on options granted and fixed salary of executive managers. The former being an example of pay for performance and the latter supposedly unrelated to firm performance. The regression in which the governance dependent variable from regression 1 has been replaced by managerial pay, looks as follows:

$$Pay_{fit} = \beta_0 + \beta_1 \ln(tariffs^{WTO})_{it} + \beta_2 \ln(tariffs^{US})_{it} + \gamma \Delta_{fit} + \varphi_f + \varphi_t + \varepsilon_{fit}$$

Furthermore, an addition to the model is looking whether the USA has a comparative advantage in the relevant industry, as formulated in *hypothesis 3*. A more comparatively advantaged industry implies more firm competition (such that the effect of trade liberalization is expected to be amplified), which according to the model implies a higher investment by companies in the managers' salaries and usually a cut in corporate governance. This will be done by interacting the tariff variables with a comparative advantage *dummy* and in another model applying a comparative advantage *variable*, to be able to look into its independent effect on governance measures and CEO pay. Therefore the regressions will be very similar to regression 1 and 4, supplemented by an interaction term and a separate variable respectively. The according regressions are as follows:

$$Gov_{fit}/Pay_{fit} = \beta_0 + \beta_1 \ln(tariffs^{WTO})_{it} \times ca_i + \beta_2 \ln(tariffs^{US})_{it} \times ca_i + \gamma \Delta_{fit} + \varphi_f + \varphi_t + \varepsilon_{fit}$$

And:

$$Gov_{fit}/Pay_{fit} = \beta_0 + \beta_1 \ln(tariffs^{WTO})_{it} + \beta_2 \ln(tariffs^{US})_{it} + \ln ca_{it} + \gamma \Delta_{fit} + \varphi_f + \varphi_t + \varepsilon_{fit}$$

In the former formula a comparative advantage (ca_i) dummy for industry *i* is interacted with the tariff variables and in the latter it is added as a separate log transformed variable which alters per industry *i* and year *t*.

Finally, the potential effect an increased supply of managers could have on the overall model is examined. The initial model assumes the amount of managers is exogenous and scarce in the model (Acharya, Gabarro & Volpin, 2015; Schymik, 2018). That is why increased firm competition is expected to increase payments to managers, to obtain the best one. The current analysis attempts to examine what happens when managers are not that scarce and there is less pressure on firms to pay the most to obtain a good performing executive manager. Additionally, an increased supply of potential managers might imply less governance is necessary to keep the manager at work incentivized. Because if he is caught slacking, he is more easily replaced as managers are not as scarce. In both cases the student bachelor and master degrees obtained in the field of Business/Management in the same state as where the relevant company is positioned will work as a proxy for management supply. These hypotheses lead to the following regression:

$$Gov_{fit}/Pay_{fit} = \beta_0 + \beta_1 \ln(tariffs^{WTO})_{it} \times ms_{st} + \beta_2 \ln(tariffs^{US})_{it} \times ms_{st} + \gamma\Delta_{fit} + \varphi_f + \varphi_t + \varepsilon_{fit}$$

And:

$$Gov_{fit}/Pay_{fit} = \beta_0 + \beta_1 \ln(tariffs^{WTO})_{it} + \beta_2 \ln(tariffs^{US})_{it} + \ln(ms)_{st} + \gamma\Delta_{fit} + \varphi_f + \varphi_t + \varepsilon_{fit}$$

The former investigates the effect increased human resources supply has on corporate governance and the latter on payments to management. They basically form a small alteration on models 1 and 4. Important to note here is that the managerial supply (ms_{st}) variable contrary to the other variables, varies by the state *s* the company is located in (in year *t*). Also important to note is that the ms_{st} term in the interaction term concerns a dummy variable, as opposed to the separate log transformed management supply variable. The former still has a subscript for time as the average amount of student graduates is allowed to fluctuate per year *t*.

5. Results

This section shows the results from the regression analyses inspired by the hypotheses formulated in the theoretical framework section.

5.1. Model 1: Trade liberalization and corporate governance

Table 3: model 1[43]

Dependent Variable	Entrenchment index			Protection index		
	(1)	(2)	(3)	(1)	(2)	(3)
WTO tariffs	-0.151*	-0.276***	-0.306***	-0.0740	-0.0359	-0.0688
	(0.0894)	(0.104)	(0.109)	(0.106)	(0.145)	(0.137)
US tariffs		0.0641*	0.0577		-0.0616	-0.0502
		(0.0374)	(0.0421)		(0.0512)	(0.0482)
Leverage	0.136	0.162	0.158	0.0732	0.236	0.222
	(0.182)	(0.208)	(0.208)	(0.255)	(0.283)	(0.296)
Tobin's Q	-0.0752	-0.0745	-0.0691	-0.0363	-0.0315	-0.0433
	(0.0463)	(0.0519)	(0.0502)	(0.0603)	(0.0695)	(0.0760)
Skill intensity			-0.0602			-2.53**
			(0.642)			(1.08)
Capital intensity			0.0000548			-0.000169
			(0.000281)			(0.000354)
Industry shipments			-0.116			-0.0142
			(0.0866)			(0.149)
Herfindahl			0.199*			0.0266
			(0.110)			(0.161)
Constant	2.74***	3.01***	4.50***	2.80***	2.71***	3.92**
	(0.283)	(0.377)	(1.12)	(0.332)	(0.425)	(1.66)
N. of obs.	1206	977	960	1206	977	960
N. of groups	174	153	150	174	153	150
N. of clusters	98	93	90	98	93	90
R^2	0.23	0.24	0.25	0.047	0.063	0.083
Time dummies?	Yes	Yes	Yes	Yes	Yes	Yes

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

5.1.1. Model 1: Entrenchment index

As the theoretical model predicts and similar to the analyses of Schymik (2018) concerning the Entrenchment index as the dependent variable, the WTO tariff variable has a negative sign in all specifications. Namely, trade liberalization is supposed to imply weaker corporate governance

[43] When comparing table 3 and 4 to the work of Schymik (2018), it stands out that his work includes an analysis including only exporters in the sample. In the current analysis there is purposely chosen not to include this, as the quality of the firm level export data is very low (see table 5 and the explanation in the data section), although the outcomes were mostly similar to specification 3 of every governance model.

according to the model formulated in the theoretical framework (also see Schymik (2018)) and in the model a higher index actually entails weaker governance standards.

Looking at specification 2 and 3, the economic significance of the WTO tariff variable in this analysis is over 0.1 higher than in the same analyses in Schymik (2018).[44] Also comparing between specifications in this thesis, the two sub-models discussed have about double the size of that in specification 1. Thus, the coefficient is increasing in absolute size as more controls are added to the model. The economic significance implies, whereas the independent variables are log transformed, that a decrease of 10% in WTO tariffs implies an increase in the expected value of the index by about 3.06. This is rather large as on one hand a 10% decrease in tariffs is large, but not unheard of, and at the other end a change of 3.06 is about half of the entire scale.

Remaining focused on specification 2 and 3, the WTO tariff variable is statistically significant at the 1%-level in both specifications, whereas this variable in specification 2 of the same analysis in Schymik is only significant at the 5%-level. Just as in Schymik, this variable is significant at the 10%-level in specification 1. The negative sign and statistical significance do confirm the hypothesis thus far that trade liberalization has a negative effect on governance.

The US tariff variable is only significant at the 10%-level in model 1.2. Lower US tariffs implies more room for competition in the relevant industry, thereby according to the model, making it more reasonable for companies to invest in pay for performance over corporate governance. Therefore, a negative sign is expected. However, looking at the sign one can observe that it is actually the only governance model that shows a *positive* sign for this variable. Comparing to Schymik (2018), the variable has a positive sign in most of his governance models. But then again, this variable is only significant at the 10%-level in his Protection model, where the US tariff variable has a negative sign.[45]

The firm level controls are all not statistically significant and with regard to the industry level variables only the Herfindahl-Hirschman Index is significant at the 10%-level, indicating that a higher concentration of firms in an industry and thereby (among other effects) the intensity of competition, does potentially have a negative effect on entrenchment. A within R^2 between 0.22 and 0.25 for these models indicates the independent variables do a very decent job at explaining the variance in the dependent variable.

[44] Table 2, specifications 2 and 3.
[45] Table 2, specification 7.

5.1.2. Model 1: Protection index

The WTO tariff variable shows no significant results in the Protection model (table 3). Also, in Schymik the Protection model has the lowest statistical significance for this variable of all governance models in the most complete specification (see specification 7, table 2; Schymik, 2018). However, in his analysis it is still significant at the 10%-level.

Additionally, the economic significance of the tariff variables is lower than in the other models, but this is likely caused by the fact the coefficients are not statistically significant in the first place. Comparing with Schymik, his most complete specification shows the lowest coefficient for the $tariff_{WTO}$ variable and this at the same time is the only coefficient that regarding size comes close to those in the current analyses. A decrease of 10% in WTO tariffs implies an increase in the expected value of the Protection index by about 0.069 (compared to 0.094 in Schymik).

Overall the model still has a higher R^2 than the GIM model of 0.083, as we will see next. However, this is due to the time dummies, as specification 3 without time dummies only has an R^2 of 0.030 and an F-statistic of 2.19. This is the highest F-statistic of all specifications and is statistically significant at the 5%-level. However, this outcome is likely solely explained by the fact that the skill intensity variable is significant at the 5%-level. Other than that it is very likely the overall model lacks explanatory power. However, even though the WTO tariff variable is not statistically significant, has a small coefficient and the overall model likely lacks explanatory power, the variable still has the expected negative sign. Only in that sense the model performs according to the predictions, as far as inferences can be drawn from statistically insignificant results.

Table 4: model 1

Dependent Variable	GIM index (1)	(2)	(3)	O index (1)	(2)	(3)
WTO tariffs	-0.330***	-0.170	-0.235*	-0.0500	0.134	-0.0120
	(0.0988)	(0.127)	(0.126)	(0.169)	(0.198)	(0.146)
US tariffs		-0.143***	-0.137**		-0.184***	
		(0.0448)	(0.0531)		(0.0561)	
Leverage	0.160	0.360	0.315	-0.0257	0.228	-0.0228
	(0.362)	(0.415)	(0.432)	(0.325)	(0.346)	(0.358)
Tobin's Q	-0.185	-0.188	-0.210	-0.0877	-0.0322	-0.113
	(0.131)	(0.155)	(0.165)	(0.108)	(0.129)	(0.127)
Skill intensity			-2.25			-2.26
			(1.96)			(1.74)
Capital intensity			-0.0000667			0.000782
			(0.000548)			(0.000882)
Industry shipments			-0.114			0.132
			(0.216)			(0.180)
Herfindahl			0.108			-0.201
			(0.237)			(0.225)
Constant	8.43***	8.02***	10.3***	5.41***	4.95***	4.59**
	(0.366)	(0.803)	(2.29)	(0.507)	(0.645)	(1.97)
N. of obs.	1206	977	960	1206	977	1106
N. of groups	174	153	150	174	153	160
N. of clusters	98	93	90	98	93	94
R^2	0.028	0.040	0.048	0.15	0.16	0.17
Time dummies?	No	No	No	Yes	Yes	Yes

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

5.1.3. Model 1: GIM index[46]

The GIM model consists of 23 indicators, as opposed to 24 in Schymik. Other than that the analyses are similar (not taking sample differences into account). In specification 1 the statistical and economic significance are very similar to that in Schymik (table 3, specification 1). The $tariff_{WTO}$ variable is significant at the 1%-level and the coefficient implies a decrease of 10% in WTO tariffs increases the expected value of the GIM index by 3.3 (versus 3.4 in Schymik). However, the difference is that the regression in Schymik concerns the most complete specification, similar to sub-model 3 in table 4 above. Comparing these two models, the statistical significance in the sub-model of this thesis has dropped to the 10%-level and the coefficient has gone down to an effect of 2.3 per 10% decrease in WTO tariffs. The most likely factor causing this is the added US tariff variable. Specification 2 shows

[46] Important to point out, is that the time dummies are not statistically significant in the GIM model, therefore they have been excluded. Together with the fact that this index ranges from 0 to 23, as opposed to 0 to 6, one should be cautious with trying to compare the governance index models with each other.

that by including this variable the WTO tariffs variable loses all statistical significance and as mentioned, regains it only partially in the last specification. Excluding this variable indeed shows that the WTO tariffs variable is significant at the 5%-level in specification 3 once again (not shown). The US tariff variable itself is significant at the 1%-level in specification 2 and almost reaches the same level of significance in the last sub-model. What stands out is that this variable is not statistically significant in Schymik and has a small positive coefficient.

As implied by the explanation about the coefficient, the WTO tariffs variable has the (expected) negative sign in all specifications. This, together with statistical significance in most models confirms the notion in hypothesis 1, that trade liberalization has a negative effect on corporate governance.

None of the controls show statistical significance. Although lower than in the other models (besides the protection model), the F-statistic is still significant at the 1%-level in specification 3, with a value of 3.9. The R^2 is also lower with a value of only 0.048. Interesting to note here is that the R^2 increases in size as more controls are added, whereas the F-statistic is actually largest in specification 2. This can likely be explained by the fact that the R^2 has the tendency to increase with an increase in independent variables, regardless of whether they together are better at explaining the variation in the dependent variable (Wooldridge, 2016).

5.1.4. Model 1: O index

The O index is comprised of the residual indicators of the GIM index minus the Entrenchment index. Interesting to see in this model is that when time dummies are not included, $tariff_{WTO}$ is statistically significant at the 5%-level or better, has the expected negative sign and has a decent sized coefficient in all sub-models (added in appendix 2 for reference). In specification 3, the WTO tariff variable has the same statistical significance (at the 5%-level) as presented in Schymik (table 3, specification 3).

However, when time dummies are introduced none of the statistical significance is left (table 4). Additionally, when the $tariff_{US}$ variable is added the WTO tariffs variable even swaps sign and becomes positive. Therefore the decision has been made to exclude the US tariff variable for specification 3 shown in table 4 above. Looking at the impact of the time dummies, it seems the $tariff_{WTO}$ variable is picking up on yearly aggregate effects that should not necessarily be contributed to these tariffs (Wooldridge, 2016). In the current analysis this could be explained by considering the fact tariffs function on an international scale with many global factors affecting it. Additionally, the variable attempts to aggregate the tariffs for all members of the WTO and for all HS-6 product types that are traded in the relevant industries. This could potentially introduce 'noise' into the estimation concerning time specific events, which the year dummies control for.

Next, looking at the effect the $tariff_{US}$ variable has, this can probably be contributed in part by the correlation between the tariff variables and the lower amount of observations in the model with US tariffs included. However, remarkable is that the sign of the $tariff_{WTO}$ variable shifts to positive only when the time dummies are also included. Additionally, the statistical significance does not change much when the US tariffs variable is introduced in the model without time dummies.

Comparing these estimates with the work from Schymik, has little added value. As mentioned, none of the statistical significance regarding the WTO tariff variable remains in the complete specification. Additionally, the coefficient is very small (-0.012) with less than 10% the size of the same coefficient in Schymik (-0.17). Overall, one can state that after including time dummies, the model in this thesis is not able to confirm hypothesis 1. The only interesting note is that contrary to the model in Schymik, the US tariff variable is significant at the 1%-level in the current analysis and has the expected, negative sign. The coefficient is also quite sizeable, with a increase in the O index of about 0.18 for every 1% decrease in US tariffs. This coefficient is much larger than in Schymik and in his analysis it is does not have the right sign, nor is it statistically significant.

Compared to the GIM and Protection model the explanatory power of this model is rather high, reaching 0.14 in the model without time dummies (see appendix 2). The F-statistic is also highly significant with a value of 11.6, showing the overall model has explanatory power. However, the model is not as strong as the Entrenchment model.

5.1.5. Model 1: Governance models overall

In general, one can say with almost certainty that trade liberalization has a negative effect on corporate governance when looking solely at the sign of the WTO tariff variable across all governance models. This estimate is however not statistically significant in all regressions, but the Entrenchment and GIM model show promising results. Concerning the other two models, Schymik has the same issue with the most complete specification of the Protection model and also shows a lack of statistical significance in his analysis of the O index focusing on exporter companies only. Therefore the outcomes in this thesis could be stated as a weak confirmation of hypothesis 1 concerning governance: trade liberalization has a negative effect on corporate governance.

5.2. Model 2: Exports and corporate governance

Table 5: model 2

Dependent Variable	Entrenchment index (1)	Protection index (2)	GIM index (3)	O index (4)
Firm level Exports	-0.0881	0.261	0.269	0.454
	(0.187)	(0.325)	(0.407)	(0.474)
Leverage	0.529	1.09**	2.03**	1.45*
	(0.469)	(0.491)	(0.902)	(0.811)
Tobin's Q	0.0562	0.00228	-0.0835	-0.114
	(0.153)	(0.201)	(0.310)	(0.313)
Constant	3.00***	-0.0528	6.58***	3.38
	(1.10)	(1.36)	(2.12)	(2.09)
N. of obs.	247	247	247	247
N. of groups	84	84	84	84
R^2	0.30	0.11	0.057	0.045
Industry controls?	Yes	Yes	Yes	Yes
Time dummies?	Yes	Yes	Yes	Yes
Dependent Variable	Entrenchment index (1)	Protection index (2)	GIM index (3)	O index (4)
Industry Exports	-0.0867	0.142*	0.271**	0.360***
	(0.0643)	(0.0773)	(0.126)	(0.130)
Leverage	0.100	0.268	0.546*	0.504*
	(0.143)	(0.171)	(0.282)	(0.286)
Tobin's Q	-0.0655	-0.0849	-0.233*	-0.154
	(0.0634)	(0.0750)	(0.127)	(0.125)
Constant	4.06***	1.57*	5.07***	1.31
	(0.820)	(0.929)	(1.71)	(1.54)
N. of obs.	952	952	952	952
N. of groups	150	150	150	150
R^2	0.15	0.033	0.023	0.051
Industry controls?	Yes	Yes	Yes	Yes
Time dummies?	Yes	Yes	Yes	Yes

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

None of the firm level export variables are statistically significant.[47] These findings do raise some concerns with regard to the initial idea that lower tariffs influence corporate governance through an

[47] Important to note with these results is also that, although the US tariffs variable is by far the best instrument available in the current analysis, it is only significant at the 5%-level for the O index and the GIM model (p-value = 0.016 for the latter) and only at the 10%-level for the Protection model, when all other (control) variables are included in the first stage IV. At the same time all US tariff coefficients are negative, as expected. Also, all the Wald-Chi statistics are significant at the 1%-level.

increase in the size of the markets. However below, when examining the same results for industry level exports, it will be shown that these concerns are most likely unfounded. The reason for the insignificant results in this case are more than likely the consequence of the low amount of observations left in the analysis after incorporating firm level exports. This makes it harder to draw inferences as if it concerns a representative group for the complete sample, let alone to draw inferences about the entire population.

The export variables do have the expected, positive sign, except for the Entrenchment model. As an *increase* in exports in an industry represents the increased size of the relevant market and thereby competition, according to the theoretical model, one expects weaker corporate governance and therefore an *increase* in the governance indices.

Considering the industry exports model, the US tariffs variable is by far the best instrument available, as it is significant at the 1%-level for all models. The second stage is shown in table 5. There one can see that in all regressions the industry exports variable is statistically significant, except for the Entrenchment model. These variables have a higher statistical significance than in Schymik (table 4, specifications 4 to 6). The industry exports variable in his analyses are all significant at the 10%-level.

All models with statistically significant results have the expected, positive coefficient. The economic significance is however not very consistent between these governance models. An increase of 1% in industry exports increases the expected value of the Protection index by 0.14, the GIM index by 0.27 and the O index by 0.36.[48] These coefficients are quite a bit smaller than comparable research of Schymik, at less than a quarter of the size (table 4, specifications 5 and 6).

In general, the significant outcomes above might have to be considered with a critical eye, as the explanatory power in the form of the R^2, works almost in the opposite direction of the statistically significant outcomes of the WTO tariff variables. Especially considering the Entrenchment model also performed well in model 1, it stands out that it is the only model not showing the predicted results.

Overall, the outcomes of the regressions including the industry level exports variable seem much more promising, than those including the firm level exports. In most of those specifications the main variable ($tariffs_{WTO}$) has the expected positive sign and is statistically significant. An increase in exports in an industry thus indeed seems to represents the increased size of the relevant market and thereby competition. The only side note is thus that the normally well-performing Entrenchment model does not predict well in this case. Thus, one can conclude that the relationship between governance and tariffs is indeed caused by an increase in the size of the market.

[48] Here one should still keep in mind the indices have a different scale. These are respectively 0-6, 0-23 and 0-17.

5.3. Model 3: Industry exit effects and governance

Table 6: model 3

Dependent Variable	Entrenchment index (1)	Protection index (2)	GIM index (3)
WTO tariffs*exit low	-0.393***	-0.216	-0.512***
	(0.142)	(0.191)	(0.154)
WTO tariffs*exit mid	-0.306**	-0.291*	-0.405
	(0.127)	(0.156)	(0.260)
WTO tariffs*exit high	-0.111	0.120	-0.0491
	(0.169)	(0.220)	(0.355)
US tariffs*exit rate low	0.0208	-0.129**	-0.144**
	(0.0388)	(0.0563)	(0.0679)
US tariffs*exit rate mid	0.0732	0.0248	-0.0191
	(0.102)	(0.102)	(0.139)
US tariffs*exit rate high	0.0106	-0.0692	-0.237**
	(0.0524)	(0.0676)	(0.108)
Leverage	0.0738	0.321	0.584
	(0.102)	(0.306)	(0.458)
Tobin's Q	-0.0910*	-0.0302	-0.108
	(0.0513)	(0.0721)	(0.149)
Constant	4.91***	4.71***	11.6***
	(1.02)	(1.48)	(2.26)
N. of obs.	860	860	860
N. of groups	135	135	135
N. of clusters	79	79	79
R^2	0.30	0.11	0.067
Industry controls?	Yes	Yes	Yes
Time dummies?	Yes	Yes	Yes

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

These models focus specifically on the additional effect high firm exit rates in an industry have on corporate governance. The methodology applied (see Data and Methodology section), creates the ability to differentiate between tariff changes in low, medium and high firm exit industries. The expected outcome is to see a negative sign and significant result for the high firm exit interaction terms. These exits can be linked to relatively strong competition compared to the low and medium exit rate industries, and are thus supposed to have an amplifying effect of trade liberalization on corporate governance in these industries (Schymik, 2018). All significant interactions have this negative sign, however they do not show up where they are expected. Only the low and medium exit rate WTO tariff interactions show statistically significant results. The outcome that comes somewhat closest to the expected effect is the US tariff interaction in the GIM model, as it is significant and negative for the high exit rate interaction term. However, this is not the most important variable of the analysis. These

outcomes are not at all what is expected according to the model and therefore this model is the least similar to the work of Schymik (table 5). In his analyses it is the high exit rate interaction that is significant at the 5%-level or better, in all of his governance models.

In the Entrenchment and GIM model in this thesis, the two models that have performed relatively well thus far, show the opposite effect in terms of economic significance and (as discussed) statistical significance than what is expected and what Schymik's results show. In both models the coefficients of the WTO interaction terms decrease when moving from low to high exit rates, instead of the other way around. Schymik's work shows the largest coefficients in the WTO high exit rate interactions for all of his models. As far as inferences can be drawn when statistical significance is absent, the Entrenchment model shows the largest coefficient for the WTO high exit rate interaction (with the expected, negative sign) and it is still less than half the size of the same coefficient in Schymik (table 5, specification 1).

When focusing on the $tariff_{US}$ interaction it is the high firm exit interaction that has almost double the size in coefficient compared to the low firm exit interaction. The coefficients can be interpreted as, that a reduction of 10% in US tariffs increases the expected value of the GIM index by 'only' 1.4 in low firm exit industries and by 2.4 in high firm exit industries. This latter result is what was expected for the WTO interactions and for all regression models in this subsection.

Everything taken together, the outcomes do not confirm the part of hypothesis 2, which states that companies that are active in relatively competitive, dynamic industries with high firm exit rates, have a stronger negative reaction to trade liberalization and cause weaker corporate governance. The outcomes are not consistent between models. Furthermore, as the outcomes already do not show any statistically significant effects in high firm failure rate industries, it is impossible to consider whether the effects on governance of trade liberalization are amplified in these industries. The outcome that could be considered the most consistent and obvious would be that industries characterized by low exit rates invest significantly less in corporate governance once trade liberalization occurs. A potential explanation for this outcome is that in the current sample the companies that constitute the industries with low exit rates have managers that perform well by finding good projects. Schymik (2018) states that an outcome in one of his earlier alterations of his work was that "governance deteriorates more in industries where managers contribute a lot to firm profit" (p. 54).

5.4. Model 4: CEO pay

Table 7: model 4

Dependent Variable	Options granted			Fixed salary	
	(1)	(2)	(3)	(4)	(5)
WTO tariffs	-0.832***	-0.0897		-0.156	
	(0.126)	(0.121)		(0.102)	
US tariffs	-0.394***	-0.0438		-0.0617	
	(0.0814)	(0.0471)		(0.0397)	
WTO tariffs*exit low			0.147		-0.109
			(0.157)		(0.172)
WTO tariffs*exit mid			-0.260		-0.510**
			(0.206)		(0.241)
WTO tariffs*exit high			-0.663*		0.185
			(0.343)		(0.543)
US tariffs*exit low			-0.0986**		-0.145***
			(0.0399)		(0.0529)
US tariffs*exit mid			0.0920		-0.203**
			(0.110)		(0.0987)
US tariffs*exit high			0.0555		0.0955
			(0.0813)		(0.161)
Leverage	0.296	-0.794***	-0.801**	0.696	0.763
	(0.351)	(0.300)	(0.324)	(0.605)	(0.615)
Tobin's Q	0.547***	0.609***	0.550***	-0.272	-0.295
	(0.162)	(0.109)	(0.117)	(0.205)	(0.242)
Constant	3.96	6.24***	6.49***	9.08***	10.2***
	(2.42)	(1.97)	(2.03)	(2.38)	(3.16)
N. of obs.	1283	1283	1146	1667	1475
N. of groups	144	144	129	148	133
N. of clusters	87	87	76	88	77
R^2	0.30	0.46	0.47	0.016	0.036
Industry controls?	Yes	Yes	Yes	Yes	Yes
Time dummies?	No	Yes	Yes	No	No

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

These models focus on financial incentives as the dependent variable. According to the model trade liberalization increases the incentive structure of CEO's towards pay, at the cost of corporate governance (see chapter 2 and Schymik, 2018). Therefore, a negative sign is expected for the tariff variables. The model also implies that a reward such as options, which are linked to the performance of the company, is expected to show a larger effect than the fixed salary CEO's receive. Indeed, if one compares both first specifications, the fixed salaries model does not show any significant results for the tariff variables, whereas the same variables in the options granted model are both significant at the

1%-level (specification 1 and 4 above). The statistical significance in the latter model is larger than in Schymik. In specification 1 of table 6 he shows that the WTO tariff variable is only significant at the 10%-level and the US tariff variable is not statistically significant at all.

However, when time dummies are introduced (specification 2 only, as they were insignificant in the fixed salary model), the tariff variables lose all statistical significance in the options granted model. It is therefore questionable whether the effects contributed to the tariffs, as proxies for trade liberalization, in specification 1, are in fact responsible for this. Or that it is actually part of certain, aggregate effects, specific to a year in the research period (Wooldridge, 2016). In this sense the outcomes show similar results to the O index model 1 (see table 4), in the sense that the time dummies take away all statistical significance from the core independent variables in the analysis. Once these are included, the coefficient of the WTO tariff variable is less than half the size of the same regression coefficient in Schymik (table 6, specification 1) and almost a tenth of the size of the same variable in the specification excluding time dummies (specification 1, table 7 above). As both the dependent and independent variables have undergone a log transformation, the interpretation of the variables is in elasticities. In this thesis a 10% reduction in WTO tariffs now only implies a 0.90% increase in CEO options granted and the same reduction in US tariffs to an increase of 0.44% (specification 2 above). However, as statistical significance is absent the only outcome that remains and that can be stated with rather certainty, is that the tariff variables still have the expected negative sign.

In the fixed salary model none of the control variables are significant. In the options granted model however, quite a lot of them are significant. This might also explain that even when the tariff variables are not significant anymore, the options granted model still explains far more of the variation in the dependent variable than the fixed salary model. Namely, the former has an R^2 of 0.30 (which increases even further when the time dummies are introduced) versus 0.016 respectively. Also the F-statistic is much higher at 3.60 for the fixed salary model and 52.29 for the options granted model.

Next, comparing specification 3 and 5, the firm exit dummies are researched once again, but now in the context of CEO pay. Similar to model 3, all the statistically significant interactions have the expected, negative sign. Also similar to model 3, the fixed salary model shows significant results in places where it is not expected according to the theoretical model. The model predicts this effect only for the tariff variables interacted with the high firm exits dummy, which are not significant at all in specification 5. After all these rather unexpected outcomes regarding the firm exit interaction models so far, specification 3 is actually a pleasant surprise. The main effect of interest of the WTO tariff interactions are indeed what the theoretical model predicts. Only the trade liberalization through WTO tariffs in high exit rate industries is significant at the 10%-level. The coefficient implies that a decrease of 10% of WTO tariffs in the relevant industries, have a +6.6% effect on the value of options granted

of CEO's of companies active in these high exit rate industries. The size of the coefficient is also comparable to the size of the same coefficient in Schymik (2018).[49]

Comparing the fixed salary model with the same regression analysis in Schymik, the main conclusion is that both models are similar in that they do not perform well. In Schymik the WTO tariff interaction term for high exit industries does not even have the expected sign. Seeing the same result in the current analysis does seem to confirm that pay for performance indicators (options granted in this case) can be better explained in this model than simple CEO pay indicators. Focusing on the options granted model, the outcomes seem to confirm to some extent the parts of hypothesis 1 and 2 that focus on CEO pay. The initial model in specification 1 strongly supports the statement that trade liberalization refocuses the effort against the agency problem towards pay for performance tools. However, this outcome should be considered with caution, as this effect becomes nearly obsolete and insignificant when time dummies are added. Therefore hypothesis 1 cannot be strictly confirmed. Hypothesis 2 is confirmed in as far as that in a more competitive industry, characterized by a higher rate of firm failure, trade liberalization has a stronger positive effect on pay for performance of CEO's, compared to trade liberalization in industries with lower exit rates and thus less competition.

[49] Table 6, specification 2.

5.5. Comparative advantage and managerial supply in governance models

In the coming models the supply of managers and whether the US has a comparative advantage in a certain industry are the two factors that are examined in this subsection.

5.5.1. Model 5: comparative advantage

Table 8: model 5

Dependent Variable	Entrenchment index (1)	Protection index (2)	GIM index (3)	Entrenchment index (4)	Protection index (5)	GIM index (6)
WTO tariffs	-0.317***	-0.0705	-0.275**	-0.295***	-0.0542	-0.238*
	(0.114)	(0.141)	(0.126)	(0.110)	(0.139)	(0.126)
US tariffs	0.0617	-0.0601	-0.133**	0.0623	-0.0523	-0.136**
	(0.0495)	(0.0494)	(0.0590)	(0.0431)	(0.0488)	(0.0533)
WTO tariffs*Comp. Adv. Dum.	0.0335	0.0224	0.0529			
	(0.0295)	(0.0338)	(0.0342)			
US tariffs*Comp. Adv. Dum.	-0.0109	0.0201	-0.0129			
	(0.0242)	(0.0241)	(0.0391)			
Comp. Adv. Variable				-0.00148	0.0102	0.00190
				(0.00912)	(0.0100)	(0.0185)
Leverage	0.163	0.197	0.309	0.165	0.192	0.314
	(0.208)	(0.290)	(0.433)	(0.209)	(0.294)	(0.435)
Tobin's Q	-0.0617	-0.0537	-0.202	-0.0603	-0.0606	-0.204
	(0.0501)	(0.0757)	(0.164)	(0.0502)	(0.0743)	(0.156)
Skill intensity	-0.0282	-2.45**	-2.14	-0.00169	-2.45**	-2.13
	(0.630)	(1.07)	(1.96)	(0.640)	(1.08)	(1.98)
Capital intensity	-0.00000909	-0.000250	-0.0000596	0.0000139	-0.000205	-0.0000537
	(0.000258)	(0.000312)	(0.000551)	(0.000261)	(0.000321)	(0.00053)
Industry shipments	-0.108	-0.0531	-0.102	-0.108	-0.0509	-0.116
	(0.0831)	(0.145)	(0.213)	(0.0840)	(0.138)	(0.202)
Herfindahl	0.197*	-0.0169	0.104	0.182	-0.0297	0.0793
	(0.114)	(0.147)	(0.232)	(0.110)	(0.149)	(0.239)
Constant	4.39***	4.17**	10.2***	4.33***	4.12***	10.3***
	(1.08)	(1.61)	(2.29)	(1.11)	(1.55)	(2.23)
N. of obs.	954	954	954	952	952	952
N. of groups	150	150	150	150	150	150
N. of clusters	90	90	90	90	90	90
R^2	0.25	0.078	0.049	0.24	0.078	0.047
Time dummies?	Yes	Yes	No	Yes	Yes	No

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

Table 8 focuses on the effects of an industry with a comparative advantage on corporate governance. The outcome of the WTO interaction term is counterintuitive (specification 1 to 3 above), whereas trade liberalization (through lower tariffs) and more competition in the domestic US market (by having a comparative advantage), are both expected to decrease the quality of corporate governance. The comparative advantage is expected to amplify the effect of trade liberalization. However, these regression results show an increase in corporate governance quality when it concerns a comparatively advantaged industry.

Just as expected the tariff variables have a negative sign (which applies to all specifications regarding the $tariff_{WTO}$ variable), something that has already been observed back in model 1. However, in the current case the WTO tariff variable itself represents the comparatively disadvantaged industries[50] that import goods from a country that does have an advantage in that industry. If anything this term is thus expected to have a smaller effect than in model 1 (table 3 and 4). However, comparing these models with regard to the Entrenchment and GIM model it shows this is not the case. For instance the coefficient of the WTO tariff variable in the Entrenchment model shows a 10% decrease in WTO tariffs increases the expected value of the index by 3.17. In model 1 (see table 3) this value is only 3.06 and it is almost 0.15 larger in size than what is observed in Schymik (table 2, specification 3). This has likely to do with the interaction term having the wrong sign, such that the WTO tariff variable has to increase in size to compensate for this. The (insignificant) coefficient of the interaction term however is small, as the same decrease in WTO tariffs only mitigates the effect of the WTO tariff variable by 0.34.

In all specifications (4 to 6) with the comparative advantage variable included, the comparative advantage variable has the (expected) positive sign, except for the Entrenchment model. This should raise concerns as it is this model that has performed pretty well thus far and has the highest explanatory power of all models. However, this does not matter much as further inferences cannot be drawn from statistically insignificant results with a small economic significance in the first place (as discussed above).

Considering none of the comparative advantage terms, regardless of being in the form of a dummy or a variable, is statistically significant, makes it difficult to draw any final inferences with regard to hypothesis 3.[51] As discussed, also the economic significance of all the comparative advantage terms are small and most even show the wrong sign. With better results potentially a conclusive answer to hypothesis 3 could have been established and it might have been interesting to compare these outcomes with the competition indicators (in the form of trade liberalization through lower US tariffs

[50] As in this case the dummy variable takes on a value of 0 and the interaction term drops out of the equation.
[51] Even when taking out the capital and skill intensity controls, which might interfere with the comparative advantage terms, as they are intuitively related (however not at all when looking at the correlations between these variables, see appendix 1), none of the outcomes change.

or being part of an industry with high rates of firm failure) discussed in the earlier models in this thesis and in the work of Schymik.

5.5.2. Model 5: Managerial supply

Table 9: model 5

Dependent Variable	Entrenchment index (1)	Protection index (2)	GIM index (3)	Entrenchment index (4)	Protection index (5)	GIM index (6)
WTO tariffs	-0.251**	-0.211	-0.375**	-0.315***	-0.113	-0.223*
	(0.107)	(0.128)	(0.151)	(0.112)	(0.131)	(0.126)
US tariffs	0.0357	0.0352	-0.0653	0.0524	-0.0681	-0.150***
	(0.0497)	(0.0758)	(0.0761)	(0.0416)	(0.0551)	(0.0534)
Manager supply variable				0.118	0.782	0.356
				(0.319)	(0.473)	(0.367)
WTO tariffs*man. supply	-0.105*	0.184	0.168			
	(0.0566)	(0.119)	(0.183)			
US tariffs*man. supply	0.0375	-0.146*	-0.137			
	(0.0351)	(0.0762)	(0.101)			
Leverage	0.144	0.251	0.356	0.161	0.260	0.339
	(0.208)	(0.295)	(0.434)	(0.211)	(0.293)	(0.429)
Tobin's Q	-0.0719	-0.0290	-0.184	-0.0635	-0.0208	-0.169
	(0.0506)	(0.0751)	(0.158)	(0.0510)	(0.0728)	(0.165)
Skill intensity	-0.0476	-2.27**	-1.33	0.0165	-2.20**	-1.58
	(0.659)	(0.939)	(1.49)	(0.644)	(0.977)	(1.56)
Capital intensity	0.000136	-0.000359	-0.000344	-0.000031	-0.000586	-0.000629
	(0.000288)	(0.000407)	(0.000496)	(0.000358)	(0.000434)	(0.000566)
Industry shipments	-0.116	-0.0335	-0.178	-0.122	-0.0395	-0.191
	(0.0873)	(0.145)	(0.197)	(0.0863)	(0.155)	(0.216)
Herfindahl	0.232*	0.0889	0.291	0.235*	0.0953	0.251
	(0.120)	(0.147)	(0.184)	(0.119)	(0.149)	(0.197)
Constant	4.53***	4.21***	11.0***	3.49	-2.92	7.71**
	(1.12)	(1.53)	(2.14)	(3.45)	(3.86)	(3.54)
N. of obs.	933	933	933	933	933	933
N. of groups	145	145	145	145	145	145
N. of clusters	88	88	88	88	88	88
R^2	0.25	0.091	0.058	0.25	0.093	0.057
Time dummies?	Yes	Yes	No	Yes	Yes	No

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

In the models with the interaction terms included (specifications 1 to 3), a management supply dummy has been used for the analyses. This dummy takes on a value of one when the amount of graduates is above the average of all states combined, for that particular year. The interaction term seems promising, as the Entrenchment model (the model with the highest explanatory power in the current

and earlier analyses) shows significant results. The WTO tariff variable is significant at the 5%-level and the WTO tariff interaction term is significant at the 10%-level. The WTO coefficients together imply (as both have been log transformed) that for every 1% decrease in WTO tariffs, the expected value of the Entrenchment index increases by 0.25, raised by another 0.10 if the company is located in a state with an above average amount of graduates in the field of Business and Management. Interesting to note is that in the Entrenchment model the $tariff_{WTO}$ variable coefficient is a bit smaller here than in model 1 (specification 3, table 3), but combined with the interaction term actually a bit larger. This is what you expect to see as the WTO tariff variable on its own is representing the companies that are located in states with below average amounts of student graduates, hence lower managerial supply.[52] Thus, everything considered so far is according to the maintained theory. The other two governance models do not seem to perform as well. The WTO tariff variable remains significant at the 5%-level in the GIM model, but in both models the interaction term with this variable is not statistically significant and has a (wrong) positive sign.

All models examining the management degrees variable separately, show the expected positive sign and have quite sizeable coefficients, but it is not statistically significant.[53] Especially the Protection model has a (too) large coefficient, considering this index only ranges from 0 to 6. The size is more than double that of the GIM index, while that index ranges between 0 and 23. Another concern with regard to the Protection model (that is likely related to the large coefficient for management supply) is that the coefficient of the constant is negative, while the dependent variable does not go below zero. Although the other independent variables are unlikely to all become equal to zero and although the constant is not statistically significant, it is a strange baseline for the current regression. It is also the only constant in this entire research that has turned out negative.[54]

The hypothesis in the theoretical framework suggests an increase of graduates increases the pool of potential managers and thereby increases competition between managers in the labor market (Acemoglu & Newman, 2002; Krugman, 2000). Salaries will go down as a consequence of this (ex-ante utility effect) and the outside option of managers will therefore become worse (ex-post reservation utility effect). The former implies increased corporate governance according to the theoretical model and the latter less.[55] Hypothesis 4 implicitly states that the ex-post reservation utility effect will dominate the ex-ante utility effect (Acemoglu & Newman, 2002). When solely focusing on the Entrenchment models, there are some good indications that this applies. Another argument in favor is that the Entrenchment model has had the highest explanatory power of all regressions so far. The

[52] And including the interaction term represents states with above average supply of managers, as implied by the explanation of coefficient sizes.
[53] Further inferences should therefore be drawn with caution concerning this term.
[54] Except for table 5, the Protection model with firm level exports. However, as discussed there, that analysis suffers from poor quality data.
[55] See theoretical framework (chapter 2) for more detail.

only counterargument is that the management supply variable in the Entrenchment model is statistically insignificant (specification 4). The other models perform a lot worse however and the WTO interaction term even has the wrong sign in the Protection and GIM models. Taken everything together therefore, indications have been found that the part of hypothesis 4 which states that less governance investments take place when management supply increases, can be confirmed. This can however not be confirmed strictly, and the counterarguments should be kept in mind.

5.6. Model 6: comparative advantage and managerial supply in CEO pay models

5.6.1. Model 6: comparative advantage

Table 10: model 6

Dependent Variable	Options granted		Fixed salary	
	(1)	(2)	(3)	(4)
WTO tariffs	-0.0748	-0.0872	-0.132	-0.112
	(0.119)	(0.121)	(0.111)	(0.110)
US tariffs	-0.0490	-0.0480	-0.0555	-0.0686
	(0.0488)	(0.0479)	(0.0481)	(0.0455)
WTO tariffs*Comp. Adv. Dum.	-0.0678*		-0.0217	
	(0.0398)		(0.0309)	
US tariffs*Comp. Adv. Dum.	-0.0118		-0.0265	
	(0.0638)		(0.0337)	
Comp. Adv. Variable		-0.0163		-0.0216
		(0.0157)		(0.0131)
Leverage	-0.770**	-0.786***	0.704	0.726
	(0.296)	(0.299)	(0.609)	(0.608)
Tobin's Q	0.609***	0.619***	-0.270	-0.250
	(0.107)	(0.111)	(0.205)	(0.209)
Skill intensity	-0.786	-0.724	-2.61	-2.83
	(0.999)	(0.981)	(2.35)	(2.30)
Capital intensity	-0.00101***	-0.00113***	0.000036	-0.000133
	(0.000306)	(0.000288)	(0.000728)	(0.000703)
Industry shipments	0.155	0.155	-0.120	-0.150
	(0.166)	(0.173)	(0.163)	(0.161)
Herfindahl	0.329**	0.341**	0.165	0.140
	(0.151)	(0.156)	(0.146)	(0.161)
Constant	6.19***	6.13***	9.04***	9.27***
	(1.92)	(1.99)	(2.37)	(2.39)
N. of obs.	1281	1279	1663	1660
N. of groups	144	144	148	148
N. of clusters	87	87	88	88
R^2	0.47	0.47	0.016	0.018
Time dummies?	Yes	Yes	No	No

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

In this subsection it is expected to see a positive impact of a comparative advantage on CEO pay. As stated in hypothesis (1 and) 3, trade liberalization is expected to weaken corporate governance and refocus investments towards pay for performance and a comparative advantage (for the US in the current sample) is expected to amplify this effect. Therefore a negative sign is expected for the interaction terms. Indeed, in both the fixed salary and options granted models (specification 1 and 3) the interaction terms show this negative sign and in the options granted model the WTO tariff interaction is significant at the 10%-level. Also, in both specifications the tariff variables have the expected, negative sign, but they have lost statistical significance and their coefficients have become small compared to earlier models. The interpretation of the combined effect on options granted of the WTO tariff variable and the interaction term, implies that a decrease of 10% in WTO tariffs increases options granted to CEO's by 0.75% and this effect is increased by another 0.68% for industries in which the US has a comparative advantage. Interesting to note is that when one compares this outcome with that of specification 2, table 7, the effect of trade liberalization through lower WTO tariffs on options granted is smaller in comparatively disadvantaged industries[56] and larger in advantaged industries, than for all industries together.[57] This is according to expectations and something that unfortunately could not be observed in model 5.1 (table 8).

When looking at the comparative advantage variable in these CEO pay models (specification 2 and 4), the outcomes are much more inconsistent. The sign of the coefficient is negative, whereas a positive association with financial incentives is expected, as discussed above. The tariff variables still have their expected negative sign, but have lost statistical significance in both models.

Hence, when purely focusing on the specifications including the comparative advantage dummies, good indications can be found that trade liberalization in industries characterized by a comparative advantage, does focus the involved companies' managerial incentive systems towards pay (for performance). When involving the comparative advantage variable into 'the equation' the outcomes become more clouded. Combining this outcome with the outcomes of model 5.1 (table 8), shows there is only partly a confirmation for hypothesis 3. This is only regarding the effects on pay and to the extent discussed above. Overall, looking at model 5.1 and this model, there might be a truth in the idea that a 'pure' application of the comparative advantage in international trade does not hold up. Krugman (1983) emphasizes this is especially the case for manufacturing companies, which comprise the entire sample of this research.

[56] Observed through the WTO tariff variable by itself, as discussed for model 5.1.
[57] Again, do keep in mind however that in both models the WTO tariff variable is not statistically significant. Thus, these outcomes are exactly according to predictions, if *all* terms were statistically significant

5.6.2. Model 6: managerial supply

Table 11: model 6

Dependent Variable	Options granted		Fixed salary	
	(1)	(2)	(3)	(4)
WTO tariffs	0.00807	-0.107	-0.103	-0.0905
	(0.127)	(0.120)	(0.113)	(0.114)
US tariffs	-0.0645	-0.0421	-0.0944***	-0.0537
	(0.0964)	(0.0472)	(0.0275)	(0.0425)
Management supply variable		-0.133		0.467
		(0.515)		(0.366)
WTO tariffs*man. supply	-0.170**		-0.0705*	
	(0.0799)		(0.0365)	
US tariffs*man. supply	0.0346		0.0624	
	(0.122)		(0.832)	
Leverage	-0.854***	-0.832***	0.711	0.692
	(0.292)	(0.297)	(0.608)	(0.620)
Tobin's Q	0.552***	0.561***	-0.277	-0.233
	(0.107)	(0.106)	(0.209)	(0.209)
Skill intensity	-0.633	-0.654	-2.60	-2.92
	(0.989)	(1.00)	(2.30)	(2.32)
Capital intensity	-0.000968***	-0.00105***	0.0000989	-0.000448
	(0.000279)	(0.000378)	(0.000737)	(0.000674)
Industry shipments	0.124	0.135	-0.120	-0.166
	(0.174)	(0.177)	(0.158)	(0.153)
Herfindahl	0.384**	0.395***	0.157	0.122
	(0.147)	(0.149)	(0.150)	(0.170)
Constant	6.55***	7.75	9.01***	5.08
	(1.99)	(5.00)	(2.33)	(4.46)
N. of obs.	1248	1248	1627	1627
N. of groups	140	140	144	144
N. of clusters	85	85	86	86
R^2	0.46	0.46	0.016	0.018
Time dummies?	Yes	Yes	No	No

***, **, * : Statistically significant at the 1%-level, 5%-level and 10%-level respectively. All analyses concern a fixed effects analysis with firm and year FE.

In these specifications the same expected effect applies to management pay as to governance (see model 4.1). The managers have less outside options in terms of moving to another company with equal or more pay and the companies themselves are now the ones with more outside options regarding replacing unproductive managers (Acemoglu and Newman's ex-post reservation utility effect, 2002). This implies a downward pressure on salaries and thus a negative sign for the management supply variable is expected and the opposite for the interaction term (Krugman, 2000). In both models the WTO interaction term is significant, at the 10%-level in the fixed salary model and at the 5%-level for

the options granted model. The negative sign of this term can be interpreted as that trade liberalization (negative change in WTO tariffs) has a positive effect on pay (for performance) and that increased managerial supply has a negative effect on pay. The former already followed from model 4 (table 7) and the latter is indeed what is expected in the current analysis.

The economic significance is larger in the options granted model, whereas an increase of 1% in supply decreases options granted by 0.17% and fixed salaries only by 0.071% (keeping tariffs constant). However, when comparing these coefficients one should take into account that the WTO tariff variable is negative and quite sizeable in the fixed salary model and positive and small in the options granted model. But then again, the variable is statistically insignificant in both models. Also, comparing the explanatory power of the two models, the options granted model performs better with an R^2 of almost 0.47 for this model, compared to not even 0.02 for both fixed salary models.

Considering specification 2 and 4, the management supply variable only has the expected sign in the options granted model, but is statistically insignificant. Overall, it is again the interaction terms that seem to give the desired outcomes. Combining these outcomes with the outcomes of model 5.2, it shows that there are some indications that increased management supply has a negative effect on a firm's corporate governance and quite strong indications that it has a negative effect on CEO pay. Focusing on the economic significance, this latter effect seems to be larger for pay for performance measures than for fixed pay measures. Thus, for the most part hypothesis 4 can be confirmed.

6. Discussion

Multiple limitations and ideas for future research can be formulated based on the current research. One such limitation is that the trade data it only looks into the main industry per company, while some companies trade in multiple industries (Keller & Yeaple, 2009). Thus although the data per industry has been linked to every HS6-product code that was related to that industry, it could still lead to company activities not fully being represented in the data.

Another limitation is related to the data on management supply, focused on the amount of graduates per state in the field of management and business. This concerns survey data, which implies not all US universities are represented and some states might be very much underrepresented compared to their true contribution to the amount of student degrees, thus potentially creating a selection bias in the data. This bias might be further exacerbated by the fact the survey is focused on individual universities on all levels from community college to universities and seemingly not focused on their distribution across states. Ideal would have been to have this data from the Digest of Education Statistics (Digest, 2017). This source aggregates all data regarding rewarded bachelor and master degrees per state for *all* universities. Therefore, the data does not have the problems related to survey data. This data is available per field of study, however the data publication only started in the year 2000. Considering the sample period is 1990 till 2006, it has been decided not to use this data, as it covers too little of the sample period.

Additionally, concerning limitations in the data, data on corporate governance structures is relatively scarce. This is especially detrimental in the current analysis, considering it is related to the dependent variable. With the current size of the sample, fortunately inferences could still be drawn. However, in the case of model 2, where the highly incomplete firm level exports was one of the independent variables, proper analysis became practically impossible. These two variables together depleted the sample available for examination to less than a tenth of its original size. Access to a more complete dataset on corporate governance rules and a complete dataset on firm level exports, would have made a large contribution to the analyses in this thesis. The latter could likely have been solved with access to the US Census Exporter Database (US Census, 2019).

Limitations in the model are that it does not (fully) seem to incorporate the potential effects of characteristics of individual CEO's on agency costs (Yim, 2013). Now it applies the most straightforward form of the agency problem, and it does not include other theories such as the stewardship theory (Clarke, 2004). It might be interesting to see what effects globalization has on these other theories in the same context as this research.

Another note on the model is that it assumes there is some substitution effect between pay and governance in order to incentivize CEO's (Schymik, 2018; Acharya & Volpin, 2010). However,

Hermalin (2005) argues increased corporate governance forces the manager to put in more effort and it makes his/her chances of being fired higher. It is then actually somewhat logical for them to demand a higher salary, something which does not fit in the current model.

Interesting with regard to the comparative advantage model might be to incorporate the theory of intra industry trade. According to Krugman (1983) this should resolve some of the drawbacks, that arise specifically in manufacturing industries. Namely, it explains the fact that in reality countries with similar factor endowments in certain industries, still trade a lot with each other. And, it explains why the exchanges between specific countries concern such similar products. The currently applied comparative advantage theory does not account for this (Costinot & Donaldson, 2012).

Another interesting topic for further research might be to explore the same ideas in for instance (mainland) Europe, as it is likely that a different corporate structure and different approaches to management and corporate governance, can have a significant effect on how is dealt with globalization and its challenges (Schymik, 2018). This does however require better quality data than is available at present. Especially considering the fact the governance data is already pretty scarce in the current research, while it concerns a sample of the largest manufacturing companies of the United States: generally a group which has relatively very complete data. The current sample has been chosen for exactly this reason of having as complete data as possible.

As a final remark, it is however important to realize that this sample makes it rather difficult to generalize the results to other areas of the world, to non-manufacturing industries or to smaller companies. One illustration of this is the comparison to mainland Europe, discussed above. As another example, Dicks (2012) confirms that the Sarbanes-Oxley Act, a regulation that put a lower bound on the governance rules and standards in companies, has a positive effect on the value of large firms, but a negative effect on small firms. According to his work small companies also focus more on pay for performance than governance, than bigger companies. Outcomes like these show generalizing remarks with regard to the results in this thesis should be made with caution.

7. Conclusion

As the theoretical model predicts, trade liberalization does seem to have a negative effect on corporate governance structures. At the same time some indications have been found that trade liberalization increases CEO pay for performance measures. Whereas this link was missing for the CEO's fixed salary, it did show to some extent when the focus shifted towards pay for performance. At least at the industry level it can be confirmed that these effects are due to the increase in market size and competition, as a consequence of trade liberalization. Other indicators of competition, in the form of lower US tariffs and the comparative advantage have been researched. The former shows rather strong indications that increased competition has a negative effect on corporate governance and to some extent a positive effect on managerial pay. Inferences with regard to the latter remain more or less ambiguous. Whether these competition effects are further amplified in fast changing, high exit industries, remains mostly ambiguous in the current research. This is especially the case when focusing on its effect on corporate governance. Only when the analysis is aimed towards pay for performance, high exit rate industries do seem to have a positive effect on it, when trade liberalization occurs. Finally, indications have been found that an increase in the supply of managers has a deteriorating effect on corporate governance, but taking all models into account it becomes hard to strictly confirm this outcome. Its impact on CEO pay also shows indications of a deteriorating effect.

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Appendix

Appendix 1: Correlation matrix

	Entrench-ment	Protection	Oindex	GIMindex	US tariffs	WTO tariffs	Industry exports	Firm exports
Entrenchment	1							
Protection	0.0175	1						
Oindex	0.0816	0.6454	1					
GIMindex	0.6305	0.5125	0.8250	1				
US tariffs	0.0401	-0.2658	-0.163	-0.1044	1			
WTO tariffs	-0.0622	-0.0161	0.1873	0.1106	0.327	1		
Industry exports	-0.2729	0.1139	0.0775	-0.0944	-0.141	-0.1331	1	
Firm exports	-0.1799	0.0707	0.0628	-0.0531	0.0113	0.0541	0.2402	1
Options granted	-0.1637	0.2815	0.0549	-0.0500	-0.100	-0.1244	-0.0580	0.1682
Fixed salary	-0.1806	-0.0063	0.0091	-0.0953	0.0201	0.0085	0.0906	0.1536
Comp. Advantage	-0.2305	0.1093	0.1250	-0.0333	0.1885	0.1937	0.3888	0.3390
Management supply	0.0218	-0.2499	-0.145	-0.1004	-0.070	-0.1909	-0.0326	0.0441
Leverage	-0.0235	0.0848	0.1670	0.1167	0.2053	0.1845	-0.1171	0.3019
Tobin's Q	-0.3648	0.0157	0.0074	-0.2011	-0.252	0.0145	0.3176	-0.021
Skill intensity	-0.2003	0.0555	-0.148	-0.2290	-0.009	-0.5791	0.0675	0.0637
Capital intensity	-0.1493	-0.0560	-0.188	-0.2310	-0.069	0.1581	-0.1654	0.2115
Industry shipments	-0.1649	0.0377	-0.045	-0.1285	-0.125	0.0063	0.5638	0.2433
Herfindahl	-0.0015	-0.1604	0.0102	0.0071	0.1048	0.1106	0.0369	0.1939

	Options granted	Fixed salary	Comp. Advantage	Management supply	Leverage	Tobin's Q
Options granted	1					
Fixed salary	0.1386	1				
Comp. Advantage	-0.0140	0.0463	1			
Management supply	-0.0006	-0.0574	-0.0436	1		
Leverage	0.1487	0.1945	0.2140	-0.1310	1	
Tobin's Q	0.0790	-0.1359	0.1194	0.0107	-0.4528	1
Skill intensity	0.2063	0.0447	0.0162	0.0369	-0.1451	0.1110
Capital intensity	0.1489	0.1377	0.0622	-0.0245	0.1545	-0.0312
Industry shipments	0.0296	0.1605	0.0701	-0.0718	-0.0196	0.0989
Herfindahl	0.0513	-0.1107	-0.1223	0.0561	0.1087	-0.0085

	Skill intensity	Capital intensity	Industry shipments	Herfindahl
Skill intensity	1			
Capital intensity	-0.0635	1		
Industry shipments	0.0231	0.1412	1	
Herfindahl	-0.1274	-0.0573	-0.2044	1

Appendix 2: O index model without (significant) time dummies

Dependent Variable	O index (1)	(2)	(3)
WTO tariffs	-0.587***	-0.340***	-0.299**
	(0.0960)	(0.106)	(0.118)
US tariffs		-0.222***	-0.180***
		(0.0479)	(0.0574)
Leverage	0.239	0.382	0.352
	(0.308)	(0.336)	(0.356)
Tobin's Q	0.0343	0.0458	-0.0168
	(0.109)	(0.121)	(0.142)
Skill intensity			-2.44
			(1.94)
Capital intensity			0.000310
			(0.000676)
Industry shipments			0.210
			(0.196)
Herfindahl			-0.172
			(0.232)
Constant	7.04***	6.56***	5.07**
	(0.769)	(0.373)	(2.09)
N. of obs.	1206	977	960
N. of groups	174	153	150
N. of clusters	98	93	90
R^2	0.094	0.12	0.14
Time dummies?	No	No	No