

# The Effect of Trade Liberalization on CEO Compensation

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## **A Panel investigation of U.S. Manufacturing Companies**

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### Abstract

The research conducted in this paper tries to establish whether there is a link between trade liberalization and executive compensation. In light of recent criticism regarding free trade, it seems only adequate to take a closer look at the underlying mechanisms. Using a general equilibrium model, it is predicted that liberalization has two opposing effects on CEO compensation: A positive one caused by an increase in factor-market competition, and a negative impact caused by an increase in product-market competition. Making use of industry exports as a proxy for the former, and average industry tariffs as well as imports as proxies for the latter, I conduct an empirical analysis of the U.S. manufacturing sector that spans 25 years. The results indicate that while there appears to be a positive relationship between factor-market competition and total compensation, no such evidence is found when looking at the bonus component only. Additionally, there is also no conclusive evidence regarding the role of product-market competition for either total CEO compensation or the bonus.

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## 1. Introduction

Globalization. A phenomenon that has been praised as well as criticized throughout history. Today, what is mostly associated with this word is the extraordinary leap that was made in terms of international integration over the last two centuries. Yet, the roots of what we are witnessing right now go back a very long way: From the Chinese Empire, ancient Greece and the Romans, all the way to the British Empire and the age of colonization, many different periods and eras in history have contributed to the highly interdependent state that we find ourselves in at present (Hopkins, 2002). Arguably, globalization is one of the main reasons why developed countries enjoy a standard of living as we know it. The fact that ideas and information have spread at increasing rates resulted in tremendous advancements when it comes to transportation, infrastructure and technology (National Research Council, 1988)

Free trade is a more specific part of globalization that has evolved with it: While trade has always been essential in international relations, it is only in more recent times that trade barriers such as transport costs, tariffs, quotas and others have been reduced to a point where, in essence, any two countries in the world can trade with each other (Burk, 1993). But is trade liberalization a one-way street that improves the lives of everyone at no cost? The benefits resulting free trade are numerous indeed. Through rapid innovations and the establishment of organizations such as the WTO or the EEC, markets became more than just local, static points, now comprising entire continents. Increases in market size meant that firms could take full advantage of economies of scale, and paired with an increase in competition through integrated markets, this resulted in a drastic fall in prices for consumers (Kuepper, 2017). Furthermore, developing countries are now able to participate in international trade, meaning that they get to sell more of their products, thereby increasing income, while also getting access to resources that they do not produce or possess themselves (Mayer, 2001) The recent surges of China and India are the most impressive examples in a series of countries that have benefited greatly from improved access to foreign markets.

However, one has to wonder whether this view on free trade is not too simplistic. Recently, voices challenging trade liberalization and globalization as a whole have become louder, and the formation of populist movements criticizing the global economy is only the latest phenomenon in an alarming chain of events. The work of French economist Thomas Piketty (2013) has raised some questions about income inequality and

the role globalization may have played in its evolution, to say the least. Among other things, he showed that over the past decades, the average salary of a CEO increased disproportionately compared to that of an average worker, meaning that growing income inequality is a reality. Similar findings are reported by Kaplan (2012) and Mishel and Davis (2015). What is noteworthy is that while wages in most sectors showed moderate increases during booms and often fell during recessions, executive compensation shows a clear upward trend, increasing in good as well as bad times. Consequently, the public perception is that CEO's are vastly overpaid, and Globalization (and, as a result, free trade) has recently come under fire for allegedly being one of the main reasons for increasing inequality. As evidenced by the outcome of the 2016 election in the United States, the decision of the United Kingdom to leave the European Union, or the emergence of populist leaders in Eastern Europe, there appears to be a growing discontent with the status quo in the world.

Economic theory tells us that free trade is always beneficial for countries as a whole, because the parties that profit from it could more than compensate those that lose. But why does the level of executive pay in fact grow, and does trade liberalization as such contribute to ever increasing CEO salary? So far, the economic literature has tried to explain the level of CEO compensation by approaching it through optimal contracting theory or the managerial power hypothesis. According to contracting theory, executive compensation results from a so-called *War for talent*, where firms outbid each other by providing incentives for the most talented candidates. This in turn results in a competitive equilibrium, which sets the level of pay (Murphy 2012). On the other hand, the managerial power hypothesis states that because senior managers are often indispensable to the firm, they acquire a certain power that, to some extent, lets them set their own compensation. Needless to say, these theories do not fully explain the evolution of CEO compensation that we have seen in recent times, and it is clear that given the current public scrutiny, this is a topic where further explanations are needed. There is currently relatively little research on the relation between free trade and the salary of senior managers. Thus, what I want to address is the role trade liberalization plays in the composition of managerial compensation. To this end, I analyze its effects through the change in competition in the factor- and product-market that result from trade liberalization.

In what follows, I will first review the body of literature related to the study at hand. Following this, the third section presents the theoretical model, explaining how exactly

trade liberalization eventually affects compensation. It is used to make predictions for the empirical part, which are then formulated into hypotheses. The paper continues by presenting the various data sources and discussing the data sets used, after which the methodology utilized in the empirical part is explained. Finally, the results of the study are presented and discussed, and the paper concludes by highlighting the most important findings and making some final remarks on potential further research.

## **2. Review of existing literature**

In this section I will discuss the body of literature in the fields of trade liberalization and management compensation. While there is little to no research studying the connection between executive earnings and competition on factor and product markets resulting from trade liberalization, there are numerous studies and theories examining related areas. These include the effect of a higher degree of competition in general, resulting from sources other than trade liberalization, as well as studies on the evolution of executive compensation. I will start by giving an overview of the literature relating market competition to compensation, after which I will present the theories and empirics regarding the effects of trade liberalization on executive pay.

### **2.1. Market Competition and Executive Compensation**

The theories on the effect of product market competition on management compensation can essentially be divided into opposing views. The first one suggests that product-market competition acts as a substitute for incentive pay:

Hart (1983) proposes that fewer and weaker incentives are necessary to reach a high effort level on the manager's part when product-market competition is increasing. Hart's argument is that when the competition gets more intense, prices and profits tend to fall and there are fewer opportunities for managers to exhibit dysfunctional behavior. Also, since there are more market players in a more competitive industry, firms are able to obtain more accurate information about their managers and as a result are able to more easily identify and sanction those that show a poor performance. Thus, according to this view, the degree of competition will influence discipline, and by extension, managerial slack. This is supported by Schmidt (1997), who maintains the point of view that when product-market competition reaches a certain level, the probability of turnover increases

significantly. As a result, managers will exert a higher amount of effort because of the possibility of losing their job.

A different perspective is offered by Scharfstein (1988), who constructs a model that predicts the need for stronger incentives in the case of increasing product-market competition. He argues that this is the case because cost reduction initiatives are more attractive for the firm when competition increases, and the company wants to give the manager incentives to lower costs. The predictions made by Scharfstein differ from those previously mentioned because he assumes that the utility function of the agent or the manager increases linearly in income, meaning that their marginal utility is constant. Hart on the other hand takes a different approach in that he assumes marginal utility is decreasing, but not negative. This means that utility does not increase anymore after a certain threshold is reached. Scharfstein's work is supported by Raith (2003), who shows that organizations do in fact provide stronger incentives to managers when competition increases.

Another view on the effect of product-market competition is the one making use of agency theory, which argues that managers are extrinsically motivated to engage in activities that require effort. Exhibiting effort is thus a costly activity that reduces the manager's utility and he will only engage in the former if the cost-benefit analysis yields a positive result. The implication is that executives exert the minimum amount of effort when there are no incentives, as shown by Baiman (1990). Additionally, since agents are assumed to be risk averse, the principal is required to pay a premium when agents face a situation that is beneficial to the company, but exposes them to risk. For example, the risk of turnover is a widespread source of risk for managers. This relates to the work of DeFond and Park (1999), who show that executive turnover is more prevalent when product-market competition is intense. They conclude that relative performance evaluation is more adequate in a more competitive environment, as poor performance by the executive can be identified more easily when taking competitor performance as the benchmark. As the risk of dismissal grows, executive compensation increases as well, due to the difficulty for managers to find a suitable position after being let go: Core and Guay (2002) explain that economic shocks represent a challenge for executives. They struggle to adapt to changing circumstances and as a result, companies may hire new

management with a different skill set when the industry is facing turbulences (e.g. an increase in product-market competition).

Fee and Handlock (2004) find that compensation increases when the risk of turnover is particularly high, as it is in volatile industries, and that executives who have been replaced often struggle to find a position afterwards, meaning that turnover can also be related to signaling theory.

However, incentives set on the basis of common performance indicators can constitute another source of risk. Eisenhardt (1989) argues that because the nature of the principal-agent relationship makes it costly to measure the effort exerted by the agent, companies rely on performance measures that are not always accurately reflecting the agent's involvement. This is because measures such as sales or profits do not only depend on the effort level, but also on circumstances beyond the agent's control, such as economic shocks or a shift in consumer preferences, while the stock price of a company, which is arguably the most important indicator for investors, is influenced by market sentiment (Dechow, 2006).

Empirically speaking, there has been mixed evidence for an effect of product-market competition on executive compensation: Early work in this field conducted by Alexander & Zhou (1995) does not find a significant relationship. The Authors use a cross-sectional sample of 174 companies in 1987 and find no evidence for an effect of competition on total CEO compensation. However, the study is somewhat limited because of its cross-sectional nature and small sample size, and the current mechanisms may be very different than they were twenty years ago. Karuna (2007) conducted a study relating market competition to incentives provided to executives. His indicator for competition consists of product sustainability, market size, as well as entry costs. The evidence obtained suggests that product-market competition and competition are complements, as the compensation that executives obtained was (*ceteris paribus*) more important when the degree of competition increased in an industry. Taking a different approach, Cuñat & Guadelupe (2009) analyze the relationship between compensation and product-market competition by making use of a panel dataset from U.S. banks and financial service companies. Using two periods of heavy deregulation in the respective sectors, which they argue can be seen as quasi-natural experiments for an increase in competition, they find that a more competitive environment does not so much affect the level of compensation, but its composition: On average, the variable component of compensation was

significantly larger after deregulation. This is in line with the results of Sturkenboom (2015). Using an event study for large decreases of import tariffs in the U.S. as an exogenous measure for the degree of market competition, this author also finds that the level of compensation is not significantly affected by competition. Instead, he observes a change in the composition of executive salary three to four years after the initial decrease in tariffs.

Most recently, Rehder (2016) conducts a panel study covering 15 years and using 123 German manufacturing companies in order to link product and factor market competition to CEO compensation. The author finds no clear evidence for either product or factor market competition having a significant effect on compensation. Still, he retains that both elements of competition appear to have opposing effects when it comes to total compensation.

## **2.2. Trade liberalization and executive compensation**

The modern literature analyzing the effects of trade liberalization started with the *New trade theory* introduced by Krugman (1980), who constructed a model with homogenous firms and love-of-variety to explain why countries engage in intra-industry trade. This was extended to two sectors by Helpman & Krugman (1985). However, the seminal paper by Melitz (2003) took the analysis one step further by treating firms as heterogeneous and adding a fixed cost of exporting. Melitz comes to the conclusion that trade liberalization is the source of an increase in market competition, and results in the least productive firms having to exit the market. He argues that as new foreign firms enter the market, the profits of the entire industry become smaller and the firms who cannot produce efficiently enough to break even are forced out. This is confirmed in the empirical analysis of Bernard et al. (2007), who observe more intense competition from foreign firms in the U.S. as a result of trade liberalization. Additionally, the theoretical model developed by Amiti & Davis (2012) looks at the impact of trade liberalization on wages. They predict that wages are greatly affected by the manner and extend to which companies are involved in international trade. The argument is that the larger the firm, the more likely it is to be productive and engage in exporting and importing activities, resulting in overall higher wages. This result links directly to what Mayer & Ottaviano (2007) report about European exporters. Namely, exporters are fundamentally different



from non-exporters in that they are larger in size and are more productive. However, the authors cannot precisely determine if more productive firms become exporters, or if the exporting itself makes the firms more productive.

When it comes to the link between trade liberalization and executive pay, there have been a number of empirical studies examining the relationship. Sanders and Carpenter (1998) present evidence that CEO compensation is increasing in foreign sales, geographic dispersion and foreign production, which means that executive pay may be positively associated with trade liberalization. A similar result is obtained by Marin (2009), using Austrian and German firm survey data. Marin finds that globalization has a positive effect on a manager's compensation, and explains this by arguing that because of the tougher foreign competition, firms engage in a so called *war for talent*, where they try to attract the most talented executives by offering more attractive compensation packages. The result is in line with Guadalupe and Wulf (2010), who conduct a study on trade liberalization between the U.S. and Canada, reporting that the increased product-market competition resulting from trade liberalization drives up senior management compensation. Lastly, Egger and Kreckemeier (2012) construct a theoretical model that analyzes the effect of trade liberalization on income inequality. They look at the average effect for both managers and workers, and predict that the former gain disproportionately from liberalization, thus increasing inequality.

### **3. Theoretical framework**

This section presents the framework used to explain the mechanisms through which factor- and product-market competition affect the compensation on CEO's.

The basic train of thought is the following: As exports to foreign countries increase, the demand for domestic products increases consequently. Emami Namini et al. (2013) demonstrate that an increase in industry exports inevitably leads to a higher demand for the factor that exporting firms use most intensively. Because this factor is skilled labour and thus includes the executive level, compensation increases as a result of the higher demand for executives. As such, the amount of exports is a proxy for factor-market competition arising from trade liberalization.

On the other hand, trade liberalization leads to a larger number of imports, which translates into a larger number of firms active in the domestic market. This is because foreign firms now consider it more attractive to tap into the home market, as their trade

costs are lower. As a result, there is more goods market competition and lower profits, resulting in a decrease in compensation of executives. Consequently, a reduction in import tariffs and an increase in imports can be seen as a suitable proxy for measuring product market competition, with tariff reductions measuring the potential increase in competition, and imports measuring the effective one. An important assumption is the endogeneity of this measure: It is assumed that single companies, and thus CEO's, do not have the power to determine when changes in import tariffs take place. Since imports are to a large extent influenced by tariffs, as Bernard et al. (2007) show in their paper on firms in an international environment, the same rationale holds here as well.

The model used for this study is a simplified version of the one found in the working paper of Chisik and Emami Namini (2016). In their paper, they outline a general equilibrium model relating trade liberalization to the bonus component of manager compensation. The model is simplified in that it only includes the deduction of executive pay in a setting without discrimination.

### 3.1. Model

The model uses two countries with two sectors each: A numeraire sector and a monopolistically competitive sector. I will simplify the model by dropping the subscripts for the foreign country, because I assume identical countries.

The economic environment looks as follows: Goods produced in the numeraire sector are perfectly substitutable and use constant returns to scale technology. Additionally, labour is their only factor of production. Goods from the monopolistically competitive sector are differentiated, and their factors of production are labour and a manager.

Consumer preferences over the two different goods can be modelled using a Cobb-Douglas Utility function:

$$U(C_M, C_0) = C_M^\alpha C_0^{1-\alpha} \quad (1)$$

Where  $U$  is Utility,  $C_M$  is the aggregate manufacturing good, and  $C_0$  is the good from the numeraire sector.

Meanwhile, a constant elasticity of substitution sub-utility function depicts the preferences over goods in the monopolistically competitive sector

$$C_M = \left( \sum_{z=0}^{\infty} c_z \frac{\sigma-1}{\sigma} \right)^{\frac{\sigma}{\sigma-1}}$$

Where  $z$  represents varieties and  $\sigma$  refers to the elasticity of substitution between varieties, with  $\sigma > 1$ . This means that no variety is essential to consumption. Also, even though the horizon of varieties is potentially infinite, only a finite number of varieties will be available for consumption. Agents are skilled and unskilled in nature. Their income is either derived from working as labour, in the case of an unskilled agent, or from working as a manager, in the case of a skilled agent who finds a match.

Firms producing in the monopolistically competitive sector all make use of the same technology:

$$\ell_z = \begin{cases} q_z + f & \text{if } m_z = 0 \\ \xi & \text{if } m_z = 1 \end{cases}$$

Where  $\ell_z$  denotes the amount of labour used in the production of variety  $z$ ,  $q_z$  refers to the quantity produced of that variety,  $m_z$  is the manager of the firm producing variety  $z$ , and  $f$  is the fixed input requirement.  $\xi$  is an arbitrary large constant which means that the production of a variety is not feasible if the company fails to hire a manager (meaning  $m_z = 0$ ).

In the numeraire sector, the technology for producing the good is given by  $\ell_0 = q_0$ . The labour supply  $L$  is assumed to be sufficiently large in order to guarantee positive production of the numeraire good.

Since the analysis is centered around the relation between trade liberalization to firm performance and executive compensation, the model mainly looks at the monopolistically competitive sector. As such, the number of potentially active firms in the sector, denoted by  $N$ , is taken as exogenous, because the interest lies in the composition of firms and not their absolute number.

Firms in this sector are only able to produce a variety  $z$  if they are successful in hiring a manager. The firms who hired a manager and thus produce are denoted by  $M$ , but despite this, the economy is assumed to be large enough in order to guarantee a sufficient number of firms so that no single one can influence price and quantity of its competitors through its own output.

In case a company is successful in hiring a manager, the product market is described by monopolistic competition. Following Dixit and Stiglitz (1977), the set of purchased manufactured goods is considered as a composite good  $C_M$  with corresponding aggregate price

$$P_M = \left( \sum_{z \in M} p_z^{1-\sigma} \right)^{\frac{\sigma}{1-\sigma}}$$

Consumer maximization of the first stage utility function yields the following demand functions:

$$C_M = \frac{\alpha I}{P_M}, \quad C_0 = \frac{(1-\alpha)I}{P_0}$$

where  $I$  denotes aggregate income, which is derived at a later stage.

Consumer maximization of the sub-utility function then gives the demand for each variety:

$$c_z = C_M \left( \frac{p_z}{P_M} \right)^{-\sigma}$$

Each firm takes the output of competitors, the aggregate price index, as well as  $C_M$  as given and then chooses its own output to maximize profits, leading to the pricing rule  $p_z = \frac{\sigma}{\sigma-1}$ . This implies

$$c_z = \frac{\alpha I}{M p_z} = \frac{\alpha I}{M \frac{\sigma}{\sigma - 1}}$$

Then, gross profits of an operating firm are given by

$$\pi_z = r_z - l_z = p_z q_z - q_z - f = p_z q_z - q_z p_z \frac{\sigma - 1}{\sigma} - f = \frac{r_z}{\sigma} - f = \frac{\alpha I}{M \sigma} - f$$

where  $r_z$  denotes firm revenue

Agents in an economy are divided into two groups, skilled and unskilled. The unskilled agents either work as labourers in the numeraire sector or as labourers in the monopolistically competitive sector. Skilled agents can either work as managers, in case they are successful in finding a managerial position, or as unskilled labour if they are unsuccessful.

The number of skilled workers in a country is given by  $S$ , and by extension,  $L - S$  gives the number of unskilled workers in a country. As mentioned, only a fraction  $M$  of the skilled workers is going to find a position in management, with the remaining workers joining the labourers in either sector.

The timing and information structure of the model is the following: Each firm posts a bonus,  $b_z$ , for a manager. Following this, skilled workers can observe the vector of posted bonuses,  $\mathbf{b} = \{b_z\}$ , and decide where to apply, with skilled agents only being able to apply once and only to a single firm. Now, the action of a worker as seen by the firms is a collection of probabilities that they will apply to firm  $z$ , denoted as  $a_z(\mathbf{b})$ . The skilled worker's application strategy is restricted to those that assign equal probability to all firms offering the same bonus.

Finally, the  $M$  firms that successfully attracted an applicant will produce and sell their goods in the market, while firms failing to attract managers will not produce. Unmatched skilled workers and all other unskilled workers will be employed in the manufacturing sector or numeraire sector and earn a regular wage.

The strategy of each firm  $z$  consists of announcing a bonus and choosing output. The collection of all agents' strategies is a vector of application probabilities  $\mathbf{a}(\mathbf{b}) = \{a_z(\mathbf{b})\}$ . If all skilled workers use matching strategies, the expected number of workers of each label applying for a management position at firm  $z$  is given by  $\lambda_z = a_z(\mathbf{b})S$ .

The focus now lies on the limiting case where the number of potentially active firms,  $N$ , and the number of skilled workers in a country,  $S$ , become very large, and their ratio,  $\theta$ , is still finite. As mentioned, Firms can only produce if they hire a manager, implying that a firm needs to receive at least one application. The probability for at least one application is given by  $1 - (1 - a_z)^S$ , which converges to

$$1 - Pr(\lambda_z = 0) = 1 - (1 - a_z)^S \rightarrow 1 - e^{-a_z S} = 1 - e^{-\lambda_z}$$

when  $N$  and  $S$  are very large.

The firm's expected profits net of payment to managers is then:

$$E(\pi_z^{net}) = (1 - e^{-\lambda}) (\pi_z - b_z)$$

with  $b_z$  denoting the bonus paid to the manager. The equilibrium level of  $b_z$  that maximizes profits is given below.

From the perspective of an agent, the probability of being hired by firm  $z$  is given by the product of the probability of receiving at least one application and the probability that the applicant is chosen for the position. The probability that an agent is hired at firm  $z$  is thus:

$$Pr(hired) = h(\lambda_z) = \frac{1 - (1 - a_z)^S}{a_z S} \rightarrow \frac{1 - e^{-\lambda_z}}{\lambda_z}$$

By extension, the expected bonus of a skilled worker applying to firm  $z$  can be expressed as  $V_z = b_z h(\lambda_z)$ . It is assumed that, relative to the skilled labour supply, the total labour supply is large enough to guarantee an expected bonus that is higher than the wage, meaning that all skilled workers apply for a managerial position.

Looking at the equations connecting the bonus and the expected number of applications, one can now solve for the equilibrium of the wage-posting game by determining the profit maximizing bonus offered by firms. An extensive solution to the entire sub-game perfect monopolistic competitive equilibrium is presented in the paper of Chisik and Emami Namini (2016), using backwards induction. The SPMCE is set up such that firms' and workers' actions are best responses to the vectors of all firms' and workers' strategies, and each firm chooses an output that maximizes profits. Also, each agent chooses quantities consumed of the numeraire good and the different varieties  $c_z$  in a way that maximizes his utility, subject to the budget constraint. Finally, relative demand equals relative supply for the  $M$  manufactured goods as well as the numeraire, such that the labour market clears. I will continue by taking the solutions as given and discuss their implications for the relationship between trade liberalization and executive compensation.

The solutions to the SPMCE show that there is a unique symmetric equilibrium where all firms offer an identical bonus  $b_U = \frac{\pi_U \lambda_U}{e^{\lambda_U} - 1}$  and all skilled workers choose the same application strategy where they apply to each firm with the same probability. The expected bonus of a skilled worker is  $V_u = \pi_U e^{-\lambda_U}$ , whereas the profits of each firm are represented by  $\pi_U = \frac{1}{\sigma - \alpha} \left( \alpha \left[ \frac{L}{N(1 - e^{-\lambda_U})} - 1 \right] - \sigma f \right)$ . Expected profits of each firm net of bonus payments are given by  $E(\pi_U^{net}) = [1 - (1 + \lambda_U)e^{-\lambda_U}] \pi_U$ . Lastly, national income is  $I_U = \frac{\sigma}{\sigma - \alpha} [L - (1 + f)M_U]$ , and the number of operating firms is given by  $M_U = S \frac{1 - e^{-\lambda_U}}{\lambda_U} = N(1 - e^{-\lambda_U})$ .

For the study at hand, the bonus offered by firms particular interest. Because the bonus is increasing in a firm's profits, the effect of trade liberalization on the latter is also important.

Because the model assumes identical countries, the mechanism set forth by trade liberalization can be thought of as follows: As international trade increases, new profit opportunities arise for home exporters, who as a result sell more in foreign markets. This in turn means that additional income from abroad flows into the home country, while income from domestic households remains unchanged. As profits increase, so does the offered bonus and thus trade liberalization, through increased factor market competition, has a positive effect on the compensation of the manager.

On the other hand, the number of firms ( $N$ ) competing on the home market increases.

This is because, as a result of liberalization, foreign firms tap into the domestic market and start selling their products, thereby effectively increasing imports. As can be seen from the equation describing a firm's profits, an increase in  $N$  leads to a decrease in  $\pi_U$ , and consequently, to a lower bonus  $b_U$ . As such, trade liberalization has a second, negative effect on managerial compensation through an increase in product market competition. This effect can be split into potential as well as effective competition. Potential product market competition is measured by the average industry tariff, the argument being that as tariffs are reduced, firms in the industry will prepare for the imminent increase in firms and adjust managerial compensation accordingly. Effective competition on the other hand refers to the actual increase in firms and is measured by industry imports.

With two main forces that are expected to affect compensation in opposing directions, it is unclear which effect dominates, meaning the overall impact of trade liberalization on compensation is ambiguous. However, clear predictions can be made when it comes to the individual effects that are channeled through increased exports and imports.

### 3.2. Hypotheses

As a result of the theoretical model, three different hypotheses concerning the effect of competition resulting from trade liberalization on executive compensation can be made. These hypotheses concern the effect of factor market competition as well as product market competition.

**Hypothesis 1:** An increase in factor market competition, as measured by total industry exports, has a positive effect on total CEO compensation (bonus compensation).

**Hypothesis 2a:** An increase in potential product market competition, as measured by a reduction in industry tariffs, is associated with a lower level of total CEO compensation (bonus compensation).

**Hypothesis 2b:** An increase in effective product market competition, as measured by total industry imports, is associated with a lower level of total CEO compensation (bonus compensation).



## 4. Data

In what follows, I will discuss the data used in the analysis of the effects of trade liberalization on the compensation given out to CEO's of U.S. companies. I will start by describing the dependent variables concerning compensation measures, after which I will turn to the explanatory and control variables. The section is then concluded by the presentation of a number of summary statistics, as well as graphs depicting the evolution of exports, imports and total CEO compensation for the average firm.

The data used in this study was collected from four main sources. It is deemed reliable because all of these sources are widely used and cited, as well as being monitored by official institutions.

### 4.1. CEO Compensation and Characteristics

This data stems from the Compustat Executive Compensation database, specifically Annual compensation, accessed at Wharton Research Data Services<sup>1</sup>. Compustat is a database of immense size that covers various financial and market indicators, all of which are given in current prices. The data obtained covers the years 1992 through 2015, thus 24 years. A long time span was deliberately chosen in order to be able to determine that the effects are lasting.

The raw dataset obtained from the Compustat Executive database consists of manufacturing companies in the United States, grouped into industries according to the four-digit Standard Industry classification (SIC). There is a total of 3503 companies with 7150 different CEO's, giving a total of 40,697 company-year observations. These numbers are later reduced for the final set, when the data is cleaned and matched to other sets.

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<sup>1</sup> <https://wrds-web.wharton.upenn.edu/wrds/>

## **4.2. Industry-wide tariffs**

The source for information concerning the tariffs upheld by the United States with regard to imports is the World Integrated Trade Solution Database operated by the World Bank<sup>2</sup>. The database includes various trade measures including annual data on tariff rates. For the purpose of this study, I use the weighted average tariff rate per SIC code (as provided by WITS), meaning that the rate is constructed in such a way that products are weighed by their importance. The database is continuously updated and thus serves as a suitable base for analyses concerning the relationship of trade liberalization and executive compensation in recent years, one of the pressing questions when it comes to the discussion about globalization as such. It is considered reliable, as it is operated by the World Bank, and is thus subject to immense scrutiny.

## **4.3. Industry Exports as a measure of market competition**

Information on Industry Exports was obtained through the National Bureau of Economics Research (NBER) Website<sup>3</sup>. The data is based on the work of Schott (2010) and contains data covering consumption-, general-, and intermediate imports as well as industry exports, both in quantities and real values, which are available for the years 1989 to 2015. Being a federal agency, the NBER is a valuable and reliable source of data covering information on U.S. industries on an annual basis, meaning that the data is collected by experts who are specifically chosen to assemble this kind of data. The particular dataset composed by Schott has been used in numerous other papers as well.

## **4.4. Firm characteristics and financial information**

The company data originates from Compustat as well. In this case, the “North America” database was used, which covers hundreds of identification items, as well as information on income statement, cash flow and company portfolio, all of which are expressed in

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<sup>2</sup> Available at <http://wits.worldbank.org/>

<sup>3</sup> Available at <http://www.nber.org/nberces/>

current values too. Specifically, data on the control variables Earnings before Interest and Taxes (EBIT), the number of employees, total firm assets and firm Research & Development expenses was collected from this source.

As is the case with the others, the dataset that was chosen also covers the period 1992-2015, and includes 4,695 U.S. manufacturing companies, giving a total of 86,318 company-year observations.

The data from compustat is deemed to be highly appropriate for this research, as it is constantly updated, meaning that we do get detailed information about the structure and magnitude of executive compensation in even the most recent years. The pressing question of whether globalization actually increases compensation further can thus be addressed.

After cleaning the data from ambiguous observations, such as negative values for tenure and company assets, and combining the different datasets, the final data set for the analysis on factor market competition includes 1017 companies with 114 different SIC codes, giving a total of 11689 company-year observations.

#### 4.5. Data Summary

Table 1 gives an overview of firm characteristics in the sample used.

This includes the earnings, total assets, number of employees, R&D expenditures, as well as industry exports.

**Table 1**

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Observations</b>
EBIT (\$ mil.)	668	2,725	-25,913	71230	11671
Total Assets (\$ mil.)	6,765	23,498	0.088	479921	11689
Employees (thsd.)	13.98	33.2	0.02	745	11622
R&D Expenditure (\$mil.)	289.8	911.66	0	12183	9151
Industry Exports (\$ mil.)	10909	13875.74	0.258	77235	11671

The table shows that there is great variation when it comes to company specific characteristics and performance: While the smallest firm in the sample only possesses \$88,000 in assets, the largest one surpasses six billion by far. Companies in the upper

range are located mostly in the Steel Industry, as well as other heavy-metal related sectors. The EBIT is negative for some firms in some years, with most negative observations found in the years following the financial crisis.

Table 2 presents statistics on CEO characteristics and compensation. One can observe that tenure is relatively concentrated. The average is close to seven years, with a skewed distribution, meaning that few executives have a long tenure. The remainder of the table indicates that there is great variation when it comes to CEO compensation: The highest total earnings of an executive amount to almost five million, while the lowest value is only a little more than 3000, indicating that the compensation variables are not normally distributed.

5433 observations have value of zero for the bonus, meaning that the company either didn't use a bonus system or it was not reported for that year. The bonus itself is the most volatile of all the compensation measures, reflecting its flexible nature from year to year.

**Table 2**

<b>Variable</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Observations</b>
Tenure (years)	7.186	7.28	0	61	11671
Total Compensation (\$)	4832.144	8627.703	3.486	600347.4	11671
Salary (\$)	680.745	352.977	0	4000	11671
Bonus (\$)	412.98	1266.101	0	76951	11671
All other Compensation (\$)	219.959	1347.116	-590.609	96422.87	11671

(All variables in 1000's, except for Tenure)

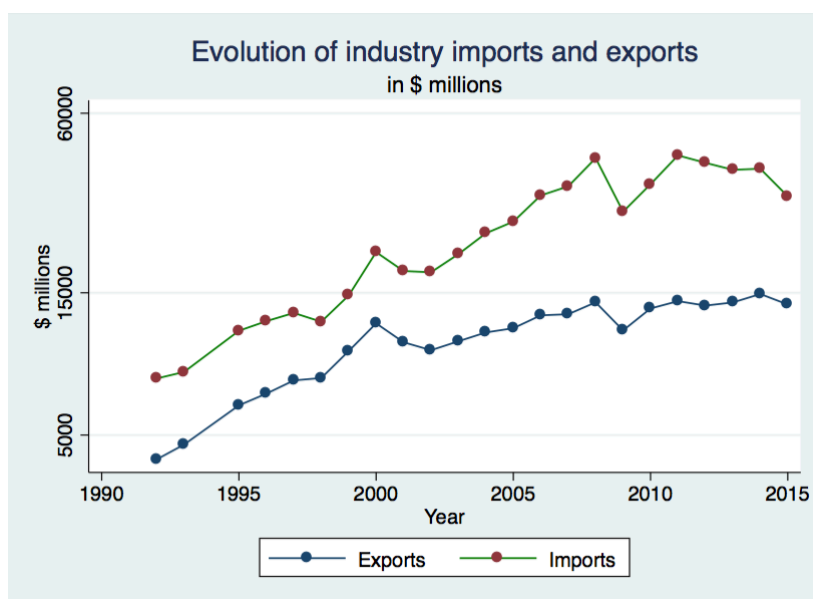
To conclude the section, figures 1 and 2 display the evolution in the sample of the average imports and exports per industry, and the average total compensation of a CEO over the years, respectively.

Figure 1 makes clear that international trade has increased significantly throughout the past two decades. Apart from the two crises, we see a steady increase in both industry imports and exports, and it can be argued that trade liberalization has been an important determinant of this evolution.

Figure 2 makes it clear that executive compensation has been on the rise as well. With few fluctuations, average total compensation has more than tripled in 20 years for the sample that is used in this study. This is remarkable and once again highlights the need to address this evolution when looking at inequality and the widening of the income gap.

Figure 1 : Average Industry imports and exports

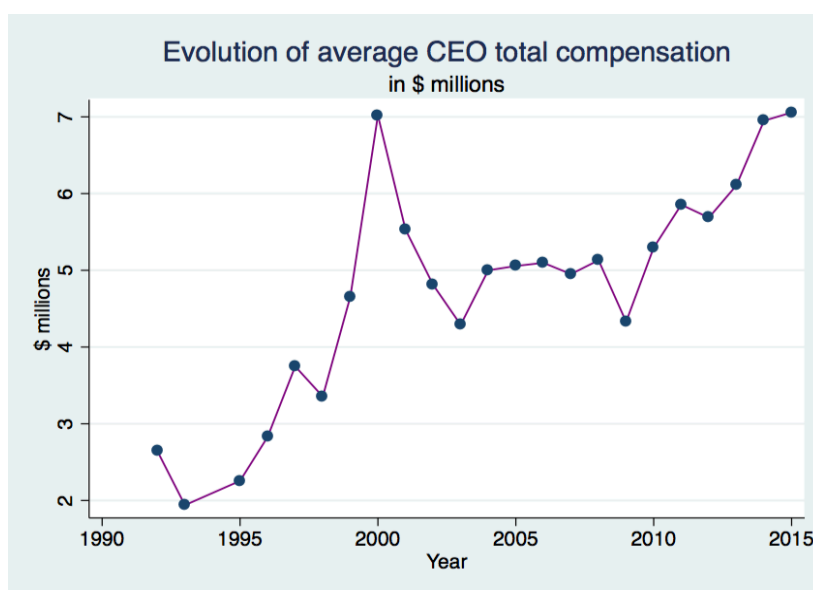
Figure created from the sample used in the empirical analysis



*A steady rise: Imports and exports have been steadily increasing overall, showing a trend towards more free trade. Recently however, there has been a slight decline, suggesting that the golden age of globalization may be coming to an end as the world climate moves in a more isolationist direction.*

Figure 2 : Average CEO compensation over the last decades

Figure created from the sample used in the empirical analysis



*A hectic rise: Average CEO compensation has more than tripled in the last 20 years, reaching a pinnacle in 2000, before stagnating for a number of years and finally dipping during the outbreak of the great recession. Post-crisis years saw a return to the remarkable increases from the late 1990's, indicating that even during the aftermath of the recession, executive compensation still increased.*

## 5. Methodology

I attempt to estimate a model that relates CEO compensation to trade liberalization as well as market competition. I do this by running regressions on a set of panel data.

### 5.1. Models

#### *1. Factor market competition*

In the second model, the effect of factor market competition on CEO compensation is analysed by regressing industry exports and various control variables on the natural logarithm of average CEO compensation

$$\ln CEO Compensation = \beta_0 + \beta_1 Exports + \gamma_t + \delta_i + \mathbb{X}_{it} \Gamma + \varepsilon_{it}$$

Where  $\gamma_t$  and  $\delta_i$  are year and industry fixed effects, respectively, and  $\mathbb{X}_{it}$  controls for factors such as CEO tenure, a company's earnings before interest and taxes, the number of employees, and the total value of assets.

#### *2. Product market competition*

In the first model, the effect of product market competition on CEO compensation is analysed by regressing tariff reductions and various control variables on the natural logarithm of average CEO tariff reductions.

$$\ln CEO Compensation = \beta_0 + \beta_1 X + \gamma_t + \delta_i + \mathbb{X}_{it} \Gamma + \varepsilon_{it}$$

Where  $X$  denotes either potential product market competition, measured by the tariff rate, or effective product market competition, measured by industry imports.

$\gamma_t$  and  $\delta_i$  are year and industry fixed effects, respectively, and  $\mathbb{X}_{it}$  controls for factors such as CEO tenure, standardized R&D expenses, standardized intermediate imports, a firm's earnings before interest and taxes, the number of employees, and the total value of assets.

Fixed effects: Time and industry fixed effects are included to control for industry specific factors or certain events such as the financial crisis that arguably have a strong impact on Compensation. As can be seen in table 2, most variables drop significantly for the average firm around 2007 as a result of the crisis.

## 5.2. Variables

*CEO tenure:* The amount of years an executive has been exercising the position. This represents differences in human capital and is included because one can argue that the longer a CEO is with the company, the more he will earn. In this respect, the position does not differ from any other job, as it is common for employees with more tenure to be paid a more important salary. However, some argue that the effect of tenure is more ambiguous: Alexander & Zhou (1995) think that while it is true that executives gain more knowledge that is specific to a firm, as well as grow more experienced and productive as they spend more time with a single company (which increases compensation as a result), it has also been found that switching to a different firm proves harder because of the same firm specific knowledge. This in turn undermines the leverage executives may have when it comes to negotiating their compensation. The consensus in the literature seems to be that tenure increases earnings of the executive, notably in the work of Dechow and Sloan (1991), as well as in Gibbons and Murphy (1992), where it is shown that Compensation increases in Tenure, all else equal, although the effect appears to be greater for executives past the age of 50. I thus expect CEO tenure to have a positive impact on Compensation.

*Standardized Research & Development expenditures:* The amount of money a company puts into innovation and new solutions every year. This is included because it may lessen the effect that import tariffs have: Decreases in import tariffs can lead to an increase in R&D expenditures in order to maintain a competitive advantage as Karuna (2007) finds. A negative sign is expected.

*Intermediate Imports:* The amount of imports in an industry that firms use in order to produce their products. This variable is included in the first regression as cuts of tariffs on final products resulting from trade liberalization often come with decreases in tariffs on intermediate products, as Amiti & Konings (2007) show. Cheaper intermediate products

result in a stronger competitive position and thus may have a negative effect on CEO compensation. The expected sign is thus negative.

*Earnings before Interest and taxes (EBIT):* This variable controls for firm performance is included because it can be argued that it is one of the main determinants of compensation. Especially the bonus is most often linked to a firm's sales or profits: If a company has important earnings, the amount the CEO will receive is somewhat correlated, as is demonstrated in Jensen & Murphy (1990). Accordingly, it is expected that EBIT has a positive effect.

*Number of employees and Total Assets:* These two variables control for the size of a company in an industry. Companies that have a higher number of employees and a greater value of total can on average be assumed to pay out larger compensation packages, as their larger size means they have more financial means available to do so. As Lee (2009) explains, firms that are larger in size are able to pay their executives a greater compensation. The sign is thus expected to be positive on both accounts.

CEO compensation measures, as well as all of the independent variables are transformed by taking their natural logarithm. While this measure enables for a more straightforward interpretation of the coefficients resulting from the regressions, I mainly chose to take this step in order to achieve a distribution that resembles the normal one, as some of the variables are heavy tailed.

Since CEO compensation can be assumed to react to changes in variables, both the industry exports and the tariff rates, as well as all firm characteristics are lagged for one year. This so called delay has been documented, and is especially reflected in the annual bonus payment, which is most often adjusted.



## 6. Results

The results of the study on factors affecting CEO compensation are presented in this next section. I will start by discussing the output of the two main regressions relating executive compensation to factor- and product market competition on the main dependent variable *CEO compensation*, and the implications for the respective hypotheses. This is followed by a discussion of alternative regressions using the bonus component of compensation as the dependent variable.

All regressions are performed using time- as well as firm fixed-effects.

### 6.1. Total compensation

Table 3 offers an overview of the results from the panel data regressions regarding the effect of Exports on total CEO compensation. I proceed such that the control variables are added one-by-one, resulting in five different specifications of the model. Starting with a simple regression on the variable of interest, each of the different controls is then incorporated.

The simple regression shows that there is a significant relationship between exports and the total compensation: On average, a one percent increase in industry exports leads to a 0.133 percent increase in compensation, lending support to the aforementioned hypothesis that an increase in factor market competition will lead to a higher level of pay. However, as the control variables are added, this effect becomes smaller in magnitude, as well as less significant: I end up with a 0.068 percent increase in compensation for every one percent increase in exports, significant at the ten percent level. This result confirms the findings of Sanders & Carpenter (1998), where compensation increases in foreign sales or exports. The same mechanism is presented in Emami Namini et al. (2013), where more industry exports lead to a higher level of compensation.

Table 3 - Factor market competition

Total compensation	CEO				
Exports <sup>1</sup>	0.133*** (0.015)	0.133*** (0.034)	0.083** (0.03)	0.069* (0.03)	0.068* (0.03)
Tenure <sup>1</sup>		0.006 (0.023)	0.0003 (0.023)	0.001 (0.23)	0.002 (0.023)
EBIT <sup>1</sup>			0.140*** (0.014)	0.091*** (0.014)	0.091*** (0.014)
TotalAssets <sup>1</sup>				0.159*** (0.031)	0.192*** (0.045)
Employees <sup>1</sup>					-0.042 (0.044)
R <sup>2</sup>	0.16	0.17	0.21	0.22	0.23
Observations	10536	10536	9010	9010	8958

<sup>1</sup> = Variable transformed to its natural logarithm

The control variables that stand out the most are earnings and total assets: Both have a strong positive effect on executive earnings that is significant at the one percent level throughout, with earnings adding 0.091 percent for every one percent increase, and total asset adding 0.192 percent in the final specification. This makes intuitive sense, since larger firms with more assets and earnings are arguably able to provide more attractive incentives, in part to be able to employ the most skilled executives, and is also in line with previous research such as Marin (2009) and Rehder (2016), where it is found that firm size is positively related to executive pay.

The tenure of an executive does not appear to have any significant effect on their compensation in this model. Since average tenure is only 7 years, it can be argued that this factor is far less important than performance-based indicators such as earnings. Furthermore, a variable capturing the executive's full experience, including time worked at other firms, could possibly prove more influential than the tenure with the current company. This is similar to what Alexander & Zhou (1995) and Rehder (2016) report.

The number of employees working at a firm is insignificant in all five specifications, meaning that while there does seem to be a link between compensation and firm size in terms of assets, the amount of staff employed is not relevant.

Turning to the effect of product market competition, table 4 describes the results obtained from seven different specifications of the model relating total compensation to industry tariffs. I follow the same procedure as before, by adding the variables one-by-one.

*Table 4 - potential product market competition*

Total compensation	CEO						
TariffRate <sup>1</sup>	-0.003 (0.018)	-0.004 (0.019)	-0.002 (0.022)	0.003 (0.025)	0.016 (0.027)	0.017 (0.027)	0.014 (0.026)
Tenure <sup>1</sup>		0.025 (0.026)	0.009 (0.032)	-0.026 (0.048)	-0.019 (0.046)	-0.018 (0.046)	-0.019 (0.046)
R&D Expenses <sup>1</sup>			0.193*** (0.036)	0.202*** (0.047)	0.096*** (0.059)	0.017 (0.061)	0.04 (0.075)
IntermImports <sup>1</sup>				0.022 (0.017)	0.014 (0.015)	0.014 (0.015)	0.015 (0.015)
EBIT <sup>1</sup>					0.14*** (0.021)	0.115*** (0.023)	0.115*** (0.023)
TotalAssets <sup>1</sup>						0.14** (0.049)	0.182** (0.065)
Employees <sup>1</sup>							-0.079 (0.081)
R squared	0.14	0.15	0.15	0.12	0.16	0.16	0.16
Observations	10087	9448	7361	4869	4197	4197	4178

<sup>1</sup> = Variable transformed to its natural logarithm

It is noteworthy that the coefficient for the tariff rate is insignificant for all specifications. This means that the measure for potential product market competition in the form of a change in tariffs does not affect total CEO compensation in this sample. The sign of the coefficient also changes throughout the specifications, and so there is no indication as to how tariffs may affect total compensation.

The control variables do not differ greatly from the factor market model: Earnings and total assets still exhibit a highly significant positive relationship with compensation, although the EBIT variable is slightly larger in magnitude, again confirming what is reported by previous studies.

Research and development expenses greatly influence compensation at first, but once one controls for assets, the coefficient becomes insignificant. This indicates that larger firms pay their executives more, and can afford to invest larger amounts into research.

The Regression relating compensation to actual product market competition gives similar insights: Table 5 presents the results obtained from regressing compensation on total industry imports. Intermediate imports were excluded from this specification because they exhibit a high correlation with industry imports. While imports do appear to have a

positive and significant effect on compensation in the first three specifications on average (close to 0.1 percent for every 1 percent increase in imports), this effect dissipates as soon as one controls for firm size and earnings. It can be concluded from this that industries facing a large amount of imports also host companies that are large in size and pay a significant compensation.

*Table 5 – Effective product market competition*

Total compensation	CEO					
Import Value <sup>1</sup>	0.113*** (0.03)	0.11*** (0.029)	0.098** (0.032)	0.047 (0.028)	0.044 (0.028)	0.042 (0.027)
Tenure <sup>1</sup>		0.024 (0.025)	0.007 (0.032)	0.014 (0.031)	0.013 (0.031)	0.013 (0.046)
R&D Expenses <sup>1</sup>			0.181*** (0.035)	0.094* (0.042)	0.023 (0.046)	0.041 (0.052)
EBIT <sup>1</sup>				0.124*** (0.017)	0.1*** (0.017)	0.102*** (0.017)
TotalAssets <sup>1</sup>					0.134** (0.046)	0.173** (0.058)
Employees <sup>1</sup>						-0.074 (0.061)
R squared	0.14	0.15	0.15	0.18	0.19	0.19
Observations	9448	9450	7361	4197	6256	6218

<sup>1</sup>= Variable transformed to its natural logarithm

The results from the product-market competition model indicate no clear evidence for a relationship between the former and total executive compensation, confirming the findings of Sturkenboom (2015) and Rehder (2016), who both report that an increase in product-market competition is not associated with any effect on compensation.

## 6.2. Bonus compensation

This section presents the results obtained from specifications including the same control variables as in the previous subsection, but now using the bonus component of compensation as the dependent variable. All regressions again use fixed effects as well as lag for most of the variables, and the results can be read in elasticity form, except for the tariff rate.

Table 6 summarizes the results from the factor market competition analysis, relating Industry exports to the yearly bonus paid out to CEO'S: As can be seen, the effects are different from the total compensation results. Most notably, while Industry exports do at

first have a similar positive effect on the compensation component, the impact becomes insignificant in the final specification, meaning that on average, bonus payments are largely unaffected by the exports in a given industry. This implies that this part of salary may react differently to increased competition than the total compensation. There is thus no support for the first hypothesis, which is in contrast to the results from the total compensation specification, as well as what is reported by Sanders & Carpenter (1998), but confirms the results of Sturkenboom (2015) and Rehder (2016).

*Table 6 - Factor market competition and the Bonus*

Bonus compensation					
Exports <sup>1</sup>	0.148*	0.143*	0.027	0.019	0.015
	(0.067)	(0.066)	(0.06)	(0.059)	(0.06)
Tenure <sup>1</sup>		0.064**	0.068*	0.068*	0.066*
		(0.026)	(0.027)	(0.027)	(0.027)
EBIT <sup>1</sup>			0.131**	0.092*	0.091*
			(0.04)	(0.038)	(0.038)
TotalAssets <sup>1</sup>				0.133*	0.22*
				(0.064)	(0.112)
Employees <sup>1</sup>					-0.127
					(0.106)
R <sup>2</sup>	0.1	0.1	0.14	0.14	0.14
Observations	5462	5462	4793	4793	4766

<sup>1</sup>= Variable transformed to its natural logarithm

In terms of the control variables, Tenure appears to have a significant effect on the bonus compensation, increasing it by 0.066% on average, for every 1% increase, implying that the time served as CEO matters considerably more when it comes to the bonus payment. This confirms the work of Dechow & Sloan (1991). The firm size variables earnings and total assets show effects similar to those obtained from the total compensation regression, but are less significant, while the number of employees does not have a significant result once again.

It has to be noted that the sample size is considerably smaller than in the total compensation analysis. This is due to the fact that only half of the firms in the dataset use a form of bonus compensation. However, the distribution of firm size and executive compensation does not differ significantly.

The Bonus regressions on product market competition are presented in tables 7 and 8. Table 7 once again shows the results from the regressions analyzing the effect of potential competition arising from trade liberalization. One can observe that there is no significant effect of the tariff rate in any of the specifications, meaning that the lowering of the rate does not appear to have a short-term effect on bonus compensation. Thus, there is no conclusive evidence to support the second hypothesis when it comes to the bonus component, once again confirming the results of Sturkenboom (2015) and Rehder (2016).

*Table 7 – Potential product-market competition and the Bonus*

Bonus compensation							
TariffRate <sup>1</sup>	0.012 (0.032)	0.009 (0.034)	0.016 (0.046)	0.025 (0.047)	0.018 (0.048)	0.016 (0.048)	0.016 (0.049)
Tenure <sup>1</sup>		0.109** (0.034)	0.089* (0.037)	0.046 (0.041)	0.007 (0.042)	0.007 (0.042)	0.0004 (0.042)
R&D Expenses <sup>1</sup>			0.146 (0.077)	0.086 (0.059)	0.047 (0.064)	-0.084 (0.071)	-0.077 (0.075)
IntermImports <sup>1</sup>				0.052* (0.025)	0.05 (0.029)	0.05 (0.029)	0.05 (0.030)
EBIT <sup>1</sup>					0.085 (0.052)	0.038 (0.054)	0.034 (0.055)
TotalAssets <sup>1</sup>						0.253* (0.104)	0.267 (0.140)
Employees <sup>1</sup>							-0.032 (0.156)
R squared	0.10	0.11	0.12	0.13	0.17	0.17	0.18
Observations	5088	4722	3538	2393	2126	2126	2116

<sup>1</sup> = Variable transformed to its natural logarithm

What is surprising is the fact that none of the control variables appear to have an impact either. Whereas earnings and total assets were important determinants of total compensation in the first models, they are now completely insignificant, once again suggesting that bonus payments are different in their very nature to other components of compensation.

Table 8 presents the results from the analysis on effective product market competition. Similar to potential competition, there is no clear evidence for a relationship with bonus payments: The coefficient for the lagged import value loses its significance as soon as tenure and firm size are accounted for, thus again finding no support for the second hypothesis.

Again, it is interesting to see that the control variables show no significant impact on the bonus. Especially firm size, measured by earnings and assets, would be expected to have a positive and significant impact on the variable in question, but they remain insignificant throughout all specifications.

*Table 8 – Effective product-market competition and the Bonus*

Bonus Compensation						
Import Value <sup>1 2</sup>	0.193*** (0.067)	0.202** (0.072)	0.215* (0.103)	0.074 (0.09)	0.077 (0.089)	0.076 (0.09)
Tenure <sup>2</sup>		0.107** (0.034)	0.084* (0.036)	0.054 (0.038)	0.051 (0.038)	0.048 (0.037)
R&D Expenses <sup>1 2</sup>			0.122 (0.074)	0.084 (0.063)	-0.014 (0.074)	-0.015 (0.076)
EBIT <sup>1 2</sup>				0.065 (0.048)	0.03 (0.046)	0.027 (0.047)
TotalAssets <sup>1 2</sup>					0.197 (0.105)	0.197 (0.145)
Employees <sup>1 2</sup>						-0.001 (0.136)
R squared	0.10	0.12	0.13	0.15	0.15	0.15
Observations	5089	4723	3538	3081	3081	3062

<sup>1</sup>= Variable transformed to its natural logarithm

Another result worth mentioning is that CEO tenure (to some extent) has an effect in all models regarding the bonus payment, meaning that it does appear to play a more important role in determining an executive's yearly bonus than it does in determining total compensation.

Summarizing, I find evidence to support the first hypothesis relating factor-market competition to total compensation: The export value, on average, has a positive effect on total CEO salary, albeit at a moderately significant level. There is no evidence for a similar impact of factor-market competition on bonus payments, highlighting their different nature. The effect of product-market competition remains unclear for both total as well as bonus salary. Because the amount of companies using yearly bonus payments is relatively low, the result should be interpreted with caution.

## 7. Discussion

This section provides a discussion of the implications and limitations arising from the study conducted herein. Setting this research apart from the body of literature is the use of potential, as well as effective product market competition, as well as the large time span, ranging over 24 years. The result is an analysis of CEO compensation that makes use of a sample of over ten thousand observations.

The first limitation that has to be addressed is measurement error regarding the use of exports and imports as measures for the degree of factor- and product-market competition, respectively. In order for the mechanics of the model to make sense, the model assumes that companies in an industry are small enough to not have a significant market share. This means that exports are not dependent on the level of output of any one firm. However, some industries in the sample only contain a handful of large firms, while others are dominated by one big player. It can thus be argued that some industries are highly dependent on only a few firms when it comes to exports. As a result, an increase in the latter might only reflect the higher level of a firm's production resulting from other factors than trade liberalization.

A second limitation is the fact that this study uses data from the last two decades. While this is appropriate for shedding light into the debate about the recent effects of globalization and trade agreements, it does not necessarily describe the mechanism for other periods of time. Of course, it can be argued that the equivalent of firm executives were always likely to benefit from more factor-market competition and potentially lose from increased product-market competition. Still, data from more distant time periods may paint a different picture than the one obtained from the results in the analysis at hand, and it will be interesting to see what the future holds.

Lastly, omitted variables may also be a source of bias, as some firm specific data was simply not available, due to confidentiality and security. Additionally, a fraction of the firms in the sample have missing values for some years, creating a slightly unbalanced panel. A number of observations in the sample did not contain information on certain variables, and the bonus compensation was only used by half of the companies that were analyzed.



## 8. Conclusion

The goal of this thesis was to analyze the impact that trade liberalization has on the compensation of CEO's, through changes in both product- and market-competition. In order to obtain an in-depth view of these mechanisms, I conducted a panel data study using a sample of 1017 companies over a time period of 25 years. The approach sheds new light into the recent debate about the benefits of free trade and globalization as a whole. While I distinguish between the effects of two different forms of competition, the analysis also brings new insight because it looks at the change in potential product-market competition, measured by the import tariff rate, as well as the effective product-market competition, which is measured by industry imports. In other words, there is a distinction between what companies expect to happen when trade is liberalized, and what actually takes place in terms of competition. The empirical analysis is preceded by a general equilibrium model, which predicts the impacts that different forms of competition have on a manager's compensation.

The results give mixed evidence when it comes to the relationship between trade liberalization, competition and executive compensation: I find that increased factor market competition has a positive effect on total compensation, meaning that more industry exports lead to a higher compensation. This confirms the predictions of the theoretical model, where an increase in exports meant additional revenue from abroad, eventually leading to a higher salary. However, there is no evidence for an impact of product-market competition, potential or effective. Consequently, it is not clear what increased foreign competition on the home market means for the salaries of executives. Following the model, one would expect them to decrease as a result of a larger number of firms and consequently lower profit opportunities in the industry, but on the other hand, one could also argue that compensation is likely to increase, at least at the senior level, in order to stimulate managers to act more responsibly in light of the increase in competition.

When it comes to the bonus component of compensation, neither product-market nor factor-market competition appear to have a significant effect. This is a noteworthy result, as one would expect that the bonus be most affected by changes in the competitive environment because of its flexible nature. Still, it may be that companies see increased

competition in the factor-market as a more permanent phenomenon, thereby more readily adapting the fixed components of compensation instead of the bonus.

In terms of previous research, this study confirms several established findings: Both earnings as well as total assets are associated with a higher level of compensation. CEO tenure only has a significant effect in one final specification, which is rather surprising. However, as the average tenure is only close to seven years, it can be argued that there are more important factors determining the compensation package. Another surprising result is that the number of employees is unrelated to CEO compensation in all specifications. This means that on average, holding other firm size indicators constant, an executive's compensation will not increase if he is overseeing a greater larger number of employees. This could be partially explained because of the high degree of digitalization in most sectors, leading to more emphasis on virtual assets and infrastructure than on employees.

The research contributes to the debate about growing inequality as a result of trade liberalization. The results indicate that free trade and globalization potentially increase inequality, as executive compensation becomes more important with exports. As such, trade agreements that lead to more exporting behavior may result in disproportionate gains for senior managers, and not to a balancing effect of factor- and product-market competition as is suggested by the theory. Of course, this result has to be interpreted with caution: There is room for bias, and the sample may not be representative of the mechanisms that operate on a global scale. Also, to get a clearer picture regarding inequality, one would have to take into account the effect of free trade on wages as a whole. As a result, the ongoing debate about the nature of trade agreements and globalization cannot be resolved. Of course, some might say that most of the actual trade barriers have already been removed by past agreements, and that today's trade deals are mostly designed to erode safety standards and make it easier for companies to sue governments, but that is an entirely different debate.

As mentioned, the role of trade liberalization in determining executive compensation is not entirely clear when considering the results of this study, with the product-market competition channel seemingly having no effect. This leaves ample opportunity for future research to expand on this topic. For example, further studies could look at the mechanisms that are at work in different parts of the world such as Europe, Asia, or

emerging economies, where the picture may be different from what was found here: Different cultures, as well as alternative compensation schemes could result in alternative ways of thinking about the issue. The type of industry studied can be a decisive factor as well. The present analysis only covers the manufacturing sector, which is arguably one of the most important industries to consider when it comes to trade as a whole. However, the share of services traded has grown significantly in recent times, and it would be interesting to study the impact of trade liberalization on companies and executives active in this sector. A cross-country panel study investigating new types of industries may be most appropriate.

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