Globalization and Executive Compensation*

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Abstract

This paper identifies globalization as a factor behind the rapid increase in executive compensation and inequality over the last few decades. Employing comprehensive data on top executives at major U.S. companies, we show that compensation is higher at more global firms. We find that pay responds not only to firm size and technology but also to exports conditional on other firm characteristics. Unpredictable export shocks that are not related to the executive's talent and actions also increase executive compensation, indicating that globalization is influencing compensation through pay-for-non-performance. Furthermore, this effect is asymmetric, with executive compensation increasing with positive export shocks but not decreasing with negative shocks. Finally, export shocks primarily affect discretionary forms of compensation of more powerful executives at firms with poor corporate governance, as one would expect if globalization has enhanced rent-capture opportunities. Overall, these results indicate that globalization has played a more central role in the rapid growth of executive compensation and U.S. inequality than previously thought, and that both higher returns to top talent and rent-capture are important parts of this story.

Keywords: Inequality, Executive Compensation, Globalization, Exports

JEL Codes: F16, F14, F66, M12, J31

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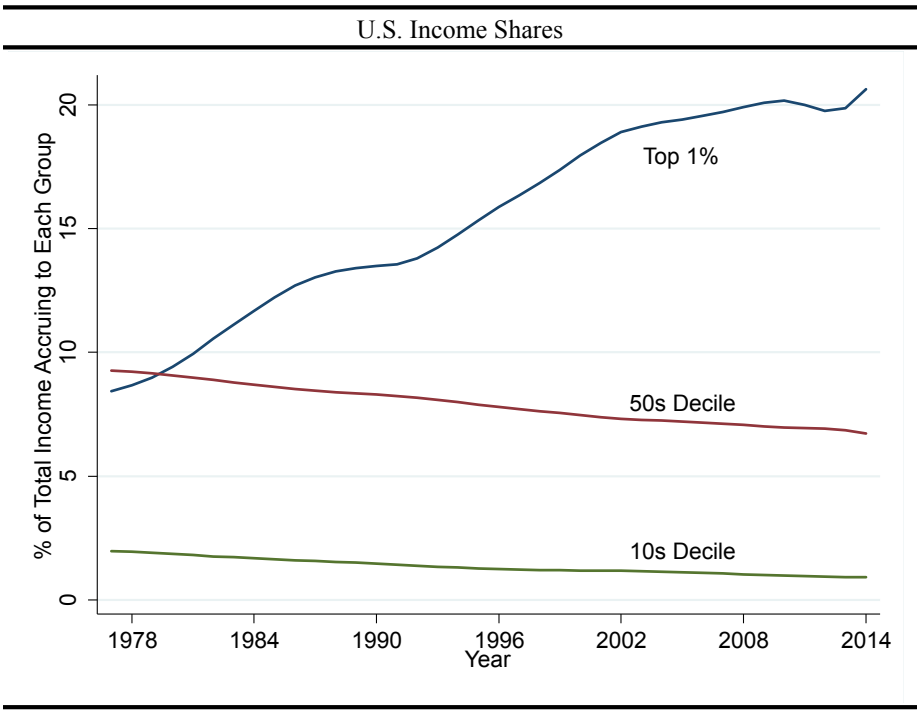
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1 Introduction

"American policy has allowed the winners to keep most of the spoils of trade and has given the losers crumbs. This has exacerbated income inequality by raising the profits of big corporations and the salaries of executives and other white collar professionals while leaving blue-collar and lower-skilled workers poorer"
New York Times Editorial April 2, 2016

Globalization and income inequality are currently two of the most important economic issues, with dissatisfaction about both shaping elections throughout the developed world. While there is a common perception that these issues are related (as illustrated by the quote above), research has tended to focus on the impact of globalization on the low-end of the income distribution. However, it is high incomes, especially the top 1%, that drive U.S. inequality:

FIGURE 1



Notes: Kernel-weighted local polynomial smoothed data from World Wealth and Income Database (WID).

This paper examines the relationship between globalization and growing inequality by focusing on the incomes of top business executives. Managerial compensation has quadrupled between the years 1980 and 2000, as shown in Figure 2. By 2013, the typical top business executive of a Standard and Poor 500

Indexed firm earned more than $4 million a year, while Chief Executive Officers (CEOs) make upwards of $9 million a year, versus a top 1% threshold pre-tax income of below $1.3 million.[1] Moreover, CEO pay rose more than eight times as fast as average worker pay in these firms over the last three and half decades (Edmans, Gabaix, and Jenter 2017). While our analysis will focus on business executives, compensation in other fields, like finance, entertainment, and sports, may be even more susceptible to globalization.[2]

While the income trends of Figure 1 are well-documented and exist in most developed countries, the causes of this growth in inequality have remained controversial.[3] A variety of explanations have been proposed, but globalization has rarely been a focus (see the reviews of Edmans, Gabaix, and Jenter 2017 and Kaplan and Rauh 2013). Thus, our first goal is to examine whether globalization is playing a role in the rapid increase in top incomes. A preliminary check of the data offers some support for this hypothesis. Figure 2 shows that over the last seventy years there has been a rapid increase in both executive compensation and exports, our preferred proxy for globalization:[4]

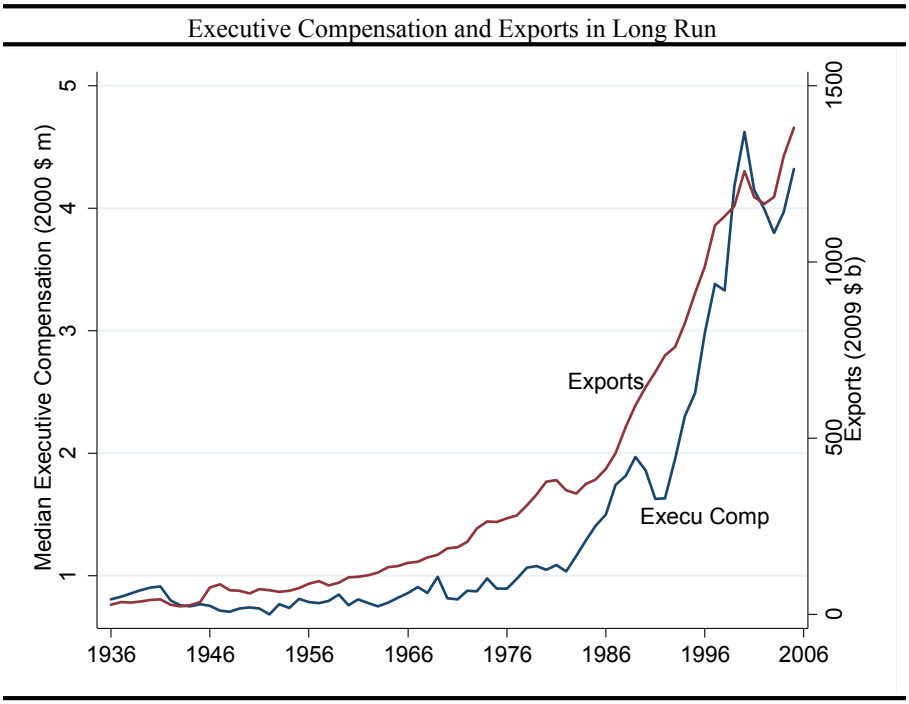
[1]Piketty, Saez, and Zucman (2017) note that $1.3 million is the *average* pre-tax income of the top 1% in 2014, with the cutoff lower than that. The threshold income depends to some extent on whether measures of total income (closer to data from the Internal Revenue Service) or labor income (closer to data from the Social Security Administration) are employed; Guvenen and Kaplan (2017) discuss a number of major issues. Guvenen, Kaplan, and Song (2014) note that the 1% wage and salary threshold in 2012 was $291,000 based on a 10% sample of Social Security Administration data, with wages and salaries accounting for about 60% of total income for the top 1% individuals.

[2]Kaplan and Rauh (2013) show that executives are both representative of and an important part of the top 1%.

[3]Appendix A.6 shows that these trends are not specific to the U.S., with top 1% shares increasing across most OECD countries.

[4]Export data is more available than other measures of globalization. At the same time, exports are likely correlated with other forms of globalization and thus serve as a useful proxy for globalization overall. We show below that similar results are obtained using information on sales of U.S. owned multinational affiliates abroad (section 6.2).

FIGURE 2



Notes: Data on the median compensation of the three highest paid executives at the 50 largest U.S. firms comes from Frydman and Saks (2010). Total compensation includes salary, bonuses, stocks, and options granted (valued using Black–Scholes). Real U.S. export data comes from FRED (St. Louis Fed)

To the extent that globalization matters for executive compensation, our second goal is to understand more fundamentally why exports increase executive pay. First, perhaps rising compensation reflects pay-for-performance, where talented executives successfully make strategic decisions that expand export markets. As a result, these high-ability executives are being rewarded for shrewd business decisions that promote sales abroad. Furthermore, globalization benefits large firms at the expense of small ones (Melitz 2003), which can increase the scope of the executive's job, and increase their compensation accordingly (Gabaix and Landier 2008, Tervio 2008). Globally engaged firms also need talented executives to navigate the logistics of selling to many markets, deal with the complexity of setting up production stages that span numerous countries, and overcome bargaining and contractual issues in foreign countries. In short, globalization may have changed the nature of the executive's job and increased the importance of top talent, with compensation rising accordingly (Rosen 1981).

Second, globalization may lead to pay-for-non-performance, where the executive is being rewarded for factors that are unrelated to the talent or actions of the executive. Perhaps the firm is expanding

abroad due to sheer luck (as in Bertrand and Mullainathan 2001). For example, the firm may be part of an industry that happens to be expanding globally for reasons outside of the control the executives, but they are nonetheless reaping the rewards of this fortunate turn of events.[5] Even more concerning, globalization may also increase the possibility for executives to capture rents (Bebchuk and Fried 2004, Bivens and Mishel 2013). The sheer size of global firms alone might enhance rent-capture opportunities, or international transactions might make it harder for shareholders, board members, as well as regulatory and tax authorities to monitor executive behavior. Thus, due to both luck and rent-capture behavior, particularly at firms with poor governance, globalization could increase executive compensation.

Distinguishing between the pay-for-performance and pay-for-non-performance explanations is crucial because it influences society's willingness to tolerate inequality. If executive pay simply reflects market forces that optimally reward the executive's talent and performance, inequality will be less objectionable. Instead, if pay increases result from sheer luck, or worse, from rent-capture then the recent rise in executive compensation is more troubling. In addition to the immediate distributional implications and the public outrage caused by such rent-capture, if executive compensation at even a subset of companies is not set efficiently this may generate negative externalities for the overall economy.[6]

The relationship between globalization and top incomes is studied by examining the impact of exports on the compensation of executives over the years 1993 to 2013. Our analysis focuses on top executives at publicly traded U.S. firms from *Compustat's* comprehensive and well-known *ExecuComp* data set. We examine whether globalization is influencing top incomes, and if so whether this relationship reflects returns to talent, luck, or rent-capture.

In line with anecdotal evidence and the simple correlation illustrated in Figure 2, our first finding is that exports have a significant positive impact on executive compensation, after accounting for firm fixed effects, year fixed effects, and a number of other firm and executive characteristics. Consistent with existing evidence, we also find that firm size (Gabaix and Landier 2008), technology investments (Garicano and Rossi-Hansberg 2006, Kaplan and Rauh 2013), and insider board relationships (Bertrand and Mullainathan 2001) lead to higher executive compensation.[7] The ability to simultaneously assess these explanations in a unified empirical framework represents an important contribution of our paper. While a portion of globalization's impact on executive compensation operates through firm size and

[5] Fabbri and Marin (2015) emphasize such industry effects.

[6] Contagion effects in assignment models are discussed in Gabaix and Landier (2008) and in the context of pay-for-non-performance contagion may lead to the shifting of social norms (Piketty and Saez 2003).

[7] Interestingly, we do not find strong evidence that top marginal tax rates are significantly affecting top incomes in our sample. However, we are exploiting variation in state-level tax rates, in contrast to Piketty, Saez, and Stantcheva (2014) who focus on federal rates.

technology, we find that exports influence pay even conditional on these firm characteristics. This indicates that globalization has been a more important force behind the increase in executive compensation than generally perceived.

Second, we examine the extent to which the impact of globalization reflects pay-for-non-performance. Our analysis offers a unique opportunity to separate returns to luck and rent-capture from returns to talent by employing an instrumental variable approach that focuses on exogenous shocks to exports. Our approach utilizes a Bartik (1991) style shift-share instrument that identifies shocks, which by construction are unrelated to the executive's ability and actions. Specifically, our instrument is constructed using presample industry-level bilateral export flows and exogenous industry-level export growth in other developed countries.[8] We find that executives are also rewarded for exogenous increases in exports.[9] Quantitatively, the results indicate that a 10% export shock leads to a 2% increase in the compensation of executives. Furthermore, there is evidence of asymmetry, where executive compensation increases with positive shocks but does not respond to negative shocks. Alternate instrumental variable approaches using exchange rate fluctuations and shocks in the foreign importing country generate similar results. This analysis demonstrates that globalization is increasing top incomes, and thus also inequality, through channels other than market returns to performance.

Third, our analysis sheds light on the importance of rent-capture in explaining the recent rise in executive compensation by separating it from other forms of non-performance pay. We exploit the fact that some forms of compensation are set in a more discretionary way than others, and thus are more susceptible to rent-capture. Our findings confirm that export shocks primarily increase bonus payments, with little impact on less-discretionary forms of compensation. Further, we exploit the fact that rent-capture is more likely at poorly governed firms. Our results confirm that the impact of exogenous export shocks is stronger at those firms with insider board relationships. Finally, we take into account the fact that some executives have more managerial power to influence pay decisions. In particular, we show that the effect of export shocks on bonuses is strongest for CEOs of poorly governed firms. Together these results indicate that rent-capture is playing an important role in pay for non-performance.

Extensions show that similar results are obtained using the executive-worker compensation ratio, as

[8] Examples of instrumental variables strategies based on other countries are Haskel, Pereira, and Slaughter (2007), Autor, Dorn, and Hanson (2013), and Blanchard and Olney (2017).

[9] Related is the concept of relative performance evaluation (RPE; Holmstrom 1979), which implies that optimal contracts should only reward executives for relative performance differences, and not, for example, for positive shocks affecting all firms in an industry. Under certain conditions, e.g. when there are constraints on the feasible set of contracts, the optimal contract however need not satisfy full RPE (see Edmans, Gabaix, and Jenter 2017). We examine whether factors that might make pay-for-non-performance optimal seem to be driving our results (see Appendix A.3).

well as a firm-level measure of globalization - the sales of foreign-owned subsidiaries of multinational firms. Furthermore, in the appendix we verify that the results are robust to a variety of additional extensions and sensitivity tests.[10] Overall, we show that globalization has contributed to the recent rise in top-incomes by increasing executive compensation, and rent-capture has played an important role in this relationship.

The paper makes a number of contributions. First, it speaks to a large literature assessing the impact of globalization on inequality. Early studies typically found that skill-biased technical change was more important than globalization in explaining growing inequality (Katz and Autor 1999; Feenstra and Hanson 1999). However, this literature tended to focus on the distinction between skilled and unskilled workers, which of course is not particularly well suited for studying the role of the top 1%. More recently there has been a growing consensus that trade, driven in part by the integration of China into the world economy (Krugman 2008), has affected income inequality in many high-income countries. Rising import competition has adversely affected the low-end of the skill distribution (Autor, Dorn, and Hanson 2013, Pierce and Schott 2016). Our analysis complements this work by shifting the focus to exports and the gains experienced by high-income earners.[11] This is important not least because high-income earners, especially the top 1%, are arguably the most important driver of income inequality (Piketty and Saez 2003 & 2006, Piketty, Saez, and Zucman 2017).

Second, globalization is a promising long-run explanation for the changing pattern of executive compensation over the last century. Specifically, any successful explanation needs to come to grips with why executive pay was relatively flat prior to 1980 and then has increased dramatically since (as seen in Figure 2). A rent-capture explanation has emerged (e.g., Yermack 1997, Bertrand and Mullainathan 2001, Bebchuk and Fried 2004 and Bivens and Mishel 2013), which views managerial entrenchment and complicit company boards as the key driver of executive compensation. However, it has been challenging to explain the dramatic *rise* in executive pay since 1980, because corporate governance has strengthened by most measures over the last two decades, which by itself should *lower* executive compensation.[12] [13] Growth in firm size is another prominent explanation for the recent increase in executive compensation (Gabaix

[10]This includes dealing with the endogeneity of poor governance, exploring alternate explanations for RPE failure, using a variety of different samples of firms and executives, including alternate measures of firm size and performance, identifying import shocks, and controlling for executive turnover.

[11]Hummels et al. (2014) study the impact of exports on wages, though these authors do not focus on top incomes.

[12]For example, due to possible conflicts of interest the Security and Exchange Commission (SEC) started requiring firms in 2006 to disclose the role and identity of all paid compensation consultants; in 2010 the Dodd-Frank Act strengthened this to stipulate that only independent consultants can be hired. Edmans, Gabaix, and Jenter (2017) give a broader discussion.

[13]A skeptic might argue that the increase in regulation is not evidence against a rise in rent-capture because it is merely the endogenous reaction to skimming by executives. Others might see higher executive pay as compensation for the hassle of increased regulatory requirements (Hermalin 2005). These factors may indeed have played a role; at a minimum we show that they are not necessary to explain the recent rise of executive compensation.

and Landier 2008). However, firm size also increased from the 1940s to the early 1970s when median CEO compensation was almost constant (Frydman and Saks 2010). In contrast, globalization provides a compelling explanation for the evolution of executive compensation in both the pre- and post-1980 periods, as illustrated in Figure 2.

Third, while anecdotal evidence indicates that globalization may be an important driver of executive compensation, it has received little attention from researchers studying executive compensation. One critique argues that globalization should be ubiquitous whereas the trends in top income shares across countries differ (Alvaredo et al. 2013, Piketty, Saez, and Stantcheva 2014).[14] Another argument contends that globalization should affect occupations differently whereas the trends in top incomes across occupations are the same (Kaplan and Rauh 2013). By moving past simple cross-country and cross-occupation comparisons, we present one of the first rigorous empirical studies of the impact of globalization on top incomes.

Fourth, we provide a unifying analysis of executive compensation that combines pay for performance and rent-capture, which are often treated as mutually exclusive explanations. Our findings show that executive compensation is increasing in firm size and technology, consistent with Gabaix and Landier (2008) and Garicano and Rossi-Hansberg (2006) respectively. We go beyond this argument by demonstrating that globalization affects executive pay even after holding size and technology constant.[15] We also show that not all compensation increases reflect market returns to performance. Our approach to non-performance pay is similar to Bertrand and Mullainathan (2001) who identify variation in firm performance that is outside the executive's control using an instrumental-variables approach.[16] We identify environments where rent-capture is more prevalent using information on types of compensation, the structure of the company's board of directors, and CEO entrenchment. In contrast to Bertrand and Mullainathan (2001) and others who employ the firm's market value, we focus on export shocks to identify how exogenous changes in firm performance influence executive compensation. This is advantageous to the extent that there are mechanical reasons that link executive pay to the firm's market value, such as that both are correlated with the firm's stock price (Himmelberg and Hubbard 2000, Frydman and Saks 2010).

The paper proceeds as follows. In the next section, we begin by discussing the data sources employed in this analysis, providing background information on executive compensation, and describing the main

[14] While there is certainly variation in top income growth rates across countries, Figure A6 presented in the Appendix A.6 shows a clear upward trend across a diverse set of OECD countries.

[15] In contrast, Ma (2015) finds no relationship between exports and executive pay once firm size is accounted for.

[16] Cunat and Guadalupe (2009) present evidence that import competition increases the sensitivity of executive pay to performance, with little room for luck or rent-capture effects. We also consider import competition, finding smaller or no effects on executive compensation compared to exports (see Appendix A.7).

relationship between executive pay and exports. Our regression analysis begins in Section 3 by examining whether globalization is influencing executive compensation. Confirming this to be the case, in Section 4 we focus on why exports increase top incomes and specifically whether pay-for-non-performance is important. Section 5 then uses a variety of approaches to show that rent-capture plays an important role in rising executive compensation. A number of extensions are pursued in both Section 6 and in the Appendix. Finally, section 7 provides some concluding thoughts.

2 Data

The empirical analysis utilizes executive compensation data, firm-level information, and detailed trade data from the following sources.

2.1 Executive Compensation

Compensation information of the top five executives within each Standard & Poor firm was obtained from the *Compustat ExecuComp* data set. To the best of our knowledge this is the most comprehensive data set on executive compensation, with information about each executive, including their name and identifier as well as their company's name and identifier. Importantly the data set has detailed administrative compensation information based on company filings with the Securities and Exchange Commission (SEC).

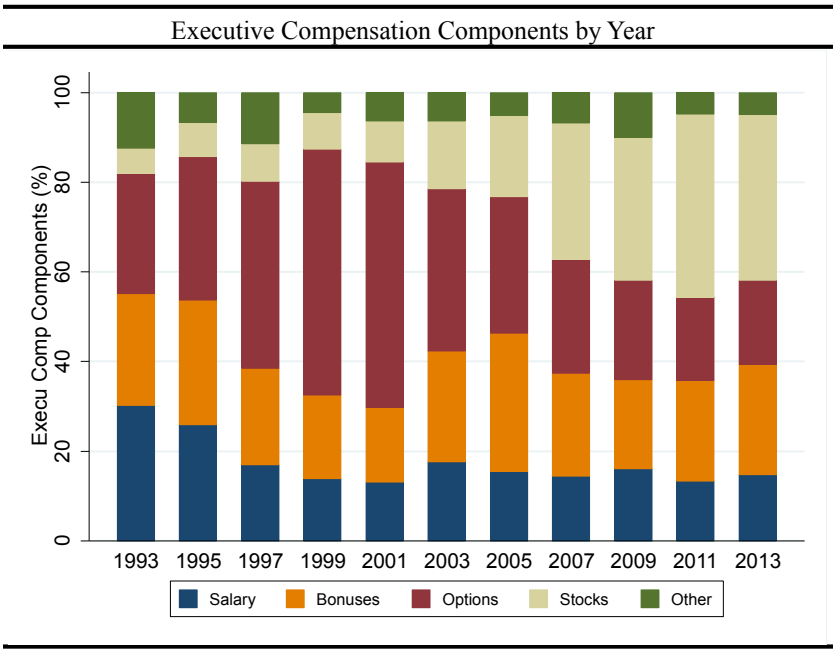
The most commonly used measure of total compensation, TDC2, captures compensation realized by an executive in the given year and is similar in spirit to adjusted gross income (Kaplan and Rauh 2010). We show that similar results are obtained using the ratio of executive compensation to average worker wages or an alternate measure of total compensation (TDC1), which includes compensation awarded but not necessarily realized in the given year (see section 6.1 and Appendix A.8 respectively).

An appealing feature of this executive compensation data is that it also provides detailed information on individual components of compensation, which allows us to examine how globalization differentially affects more and less discretionary types of pay. Following the existing literature (Edmans, Gabaix, and Jenter 2017 - henceforth EGJ 2017), we focus on the five most important components of executive pay, including salary, bonuses, stock options exercised, stock awards, and other compensation.[17] Note that all nominal compensation values are converted to real 2014 U.S. dollars using the Consumer Price Index

[17]Salary includes the executive's base salary, bonuses includes bonuses and long-term non-equity incentive plans, options are the value of stock options granted, stocks are the value of restricted stock granted, and other compensation includes things such as personal benefits, 401k plans, life insurance premiums, termination payments, and tax reimbursements.

(CPI) provided by the Bureau of Labor Statistics. Figure 3 reports these compensation components over time:

FIGURE 3



Notes: Salary includes the executive's base salary, Bonuses includes bonuses and long-term non-equity incentive plans, Options are the value of stock options granted, Stocks are the value of restricted stock granted, and Other is all other compensation received by the executive. Values are in millions of real 2014 dollars.

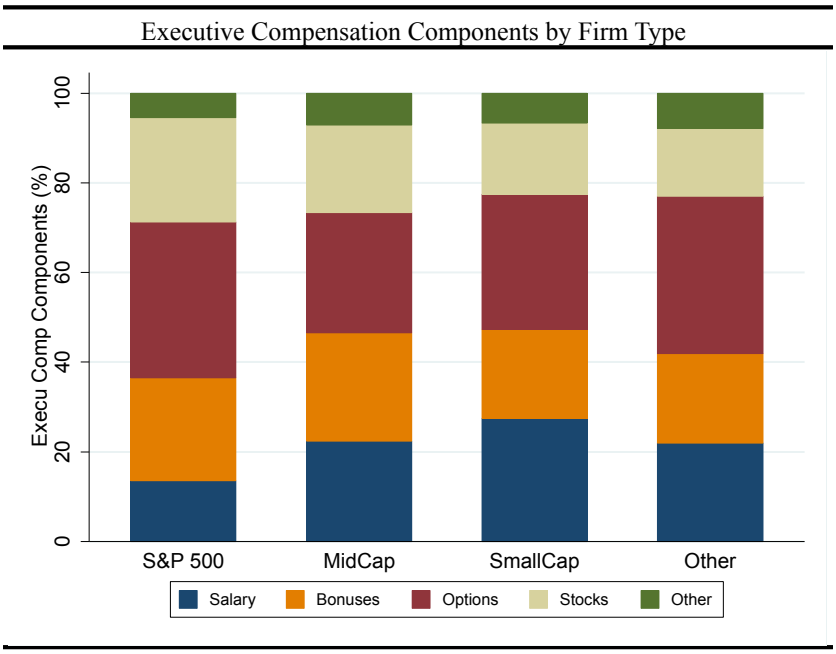
On average in 2013, a top five executive in our main sample earned $4.4 million which consisted of about $0.6m of salary, $1.1m of bonuses, $0.8m of options, $1.6m of stocks, and $0.2m of other compensation (using real 2014 dollars). By comparison, CEOs earn $9.1m overall which consists of $1.1m of salary, $2.3m of bonuses, $2.0m of options, $3.5m of stocks, and $0.3m of other compensation. Consistent with existing evidence, Figure 3 shows that options represented a larger share of compensation in the late 1990s, while stocks represent a larger share of pay more recently (see Frydman and Jenter 2010 and EGJ 2017 for more details on the evolution of pay over time).[18]

Figure 4 examines the composition of pay across different firm types. Following common distinctions in the literature, we focus on S&P 500 firms, S&P MidCap firms, S&P SmallCap firms, and Other firms not on a S&P index. We find that salary, for instance, represents a somewhat lower share of compensation

[18]Given that the SEC changed it's reporting rules in 2006, it is important to concord these components across this definitional change.

at S&P 500 firms (14%) and higher share at SmallCap firms (27%) on average in our sample. However, bonuses are fairly consistent across firm type at around 20% of total compensation. While there are some subtle differences, overall we find that the composition of compensation is similar across firm type, which is consistent with existing evidence (EGJ 2017).

FIGURE 4



Notes: Salary includes the executive's base salary, Bonuses includes bonuses and long-term non-equity incentive plans, Options are the value of stock options granted, Stocks are the value of restricted stock granted, and Other is all other compensation received by the executive. Values are in millions of real 2014 dollars.

2.2 Globalization

Our preferred measure of globalization is international trade, given its excellent coverage and the fact that it is often correlated with other forms of globalization. Detailed U.S. export and import data at the Harmonized System (HS) ten-digit product level for the years 1989-2012 come from the U.S. Census Bureau via Schott's International Economics Resource Page (Schott 2008). These nominal trade flows are converted to real 2014 U.S. dollars using the CPI. An appealing aspect of this data set is that the HS ten-digit trade flows are linked to the six-digit industry codes of the North American Industry Classification System (NAICS). This proves useful when merging this trade data with the *ExecuComp* data which

reports the six-digit NAICS industry of the executive's firm.[19]

Employing industry export data has a number of advantages. Most importantly, it avoids obvious endogeneity concerns given the correlation of firm-level exports, which are not actually available in *Compustat*, with other firm characteristics. Bertrand and Mullainathan (2001) use industry performance as an instrument for firm-level performance precisely for this reason. In contrast, our analysis starts with industry-level trade and then we go a step further by identifying exogenous variation in exports. Trade data at the detailed industry level are also available bilaterally (US flows to any particular foreign country), which proves useful in constructing our instrumental variable. At the same time, our analysis also employs measures of globalization at the firm-level, namely the sales of foreign affiliates of U.S. multinational firms, and finds similar results despite data limitations.

2.3 Firm & Executive Information

The *ExecuComp* data set is linked to the companion *Compustat* data set using a unique firm identifier which allows us to merge the executive compensation information with other firm-level measures in the larger *Compustat* data set. This allows us to measure a variety of factors that are often found to be important predictors of executive compensation.

Following the insights of Gabaix and Landier (2008), we include firm size as a key predictor of executive compensation. We measure size as the number of workers at the firm. We prefer to proxy for size using employment rather than market value because both market value and executive compensation are typically a function of stock price, and thus a positive correlation is not surprising. However, additional results illustrate that our findings are similar if we proxy for size using firm sales, assets, costs, stock price, or market value.

Technological change is also likely to be important for executive compensation (Kaplan and Rauh 2013). We follow the customary method of measuring technology investment using information on the capital expenditures of the firm (Feenstra and Hanson 1999).

By encouraging skimming or rent-capture, poor corporate governance may be an important driver of executive compensation (Bertrand and Mullainathan 2001). Building on existing approaches, we measure governance using information on the relationship between the executives and board of directors of the

[19]In the case of multi-industry firms, this measure reflects the primary industry of the firm. An alternate approach would be to use the weighted average of the firm's industries of production (Cunat and Guadalupe 2009). Relying on the firm's main industry of production may introduce classical measurement error, which would attenuate our findings (see Keller and Yeaple 2009 in a related context). Our industry measure (from *ExecuComp*) is time-invariant which ensures that industry switching does not lead to artificially large swings in export exposure. However, similar results are obtained in Appendix A.8 when the time-varying NAICS measure from *Compustat* is used instead.

company, whose tasks include making compensation decisions. Specifically, our *interlock* measure is defined as a binary variable indicating whether any executive at the firm (in a given year) serves on the firm's board committee making compensation decisions, or serves on another company's compensation board that has an executive serving on their board. The idea is that firms that have executives determining their own compensation will be more prone to rent-capture. Alternatively, we also utilize a different measure of *insider board* relationships, that is defined as a binary variable indicating whether three or more executives serve on the board of directors. This measure does not focus on the compensation committee per se, but rather captures the more general influence of executives on the board of directors. As shown in Appendix A.6, a final alternate measure of poor governance uses the co-movement of the firm's stock price and executive compensation, rather than the structure of the board of directors, and finds similar results.[20]

Recent work indicates that top marginal tax rates are an important driver of executive compensation (Piketty, Saez, and Stantcheva 2014). Using data from the Taxsim database we measure top marginal income tax rates in the state in which the firm is headquartered. While all the U.S. executives in our data set face the same marginal federal income tax rates, many also pay state income taxes which can vary significantly across states and over time. For instance, the top marginal income tax rate has increased in California from 9.3% in 1990 to 14.1% in 2014, has remained at 0% in Texas, and has decreased from 8.5% to 5.1% in New Mexico. We examine whether these changes in top marginal state tax rates can explain part of the growth in top incomes.

Finally, compensation is related to the individual characteristics of the executive. While the data availability of executive-level variables generally tends to be less comprehensive in the *ExecuComp* data, we focus on three measures that likely influence compensation and where the coverage is reasonably comprehensive. Specifically, we include measures for experience, education, and gender. Experience is defined as the number of years the individual has been a top five executive at any firm in the *ExecuComp* data set.[21] Education is defined as whether the executive has a doctorate degree. Finally, given the detailed nature of the data set, we can observe individuals entering and exiting the top echelon of the firm. Our results are robust to firm- or executive-level measures of turnover and mobility (Appendix A.2).

[20] We have also considered corporate governance indices, including the "Governance Index" constructed by Gompers et al. (2003) and the "Entrenchment Index" constructed by Bebchuk et al. (2008). However the coverage of both of these variables is limited. Data constraints are severe: they are only available every few years between 1990 and 2006. We lose three quarters of our sample when these governance proxies are included and thus strong inferences are not possible.

[21] The results are similar if experience is defined as the number of years that the executive has been at the firm or the number of years the executive has been the CEO of the firm (see section 6.3).

2.4 Descriptive Statistics

Combining these data sources, Table 1 reports summary statistics of our key variables. For obvious reasons our analysis is restricted to industries for which there is trade data.[22] Furthermore, the handful of firms that report compensation information for fewer than five executives are dropped in the main analysis. For firms that report compensation information for more than five executives, only the top five are included in the sample. This ensures that each firm in the main sample has compensation information for exactly their five highest paid executives.[23]

Columns 1 and 2 of Table 1 report summary statistics using the full sample. Columns 3 and 4 report summary statistics for the sample that has data on all variables.[24] Finally, columns 5 and 6 show summary statistics for a balanced sample of firms that span all the years. This conservative approach alleviates concerns that entry or exit into the sample could be influencing the results and thus will be the main sample in our subsequent analysis. Reassuringly, we see in Table 1 that our key compensation, trade, firm, and executive level variables are similar across these different samples. Firms in the balanced sample are on average slightly larger in terms of employment and capital expenditures, but similar in terms of trade, governance, and the top tax rate. The average level of total executive compensation varies modestly, while the executive characteristics are very similar across samples. The similarity of these summary statistics across different samples alleviates concerns about selection bias. Furthermore, results from Figures 3 and 4 indicate that the executive compensation components in our sample are similar in relative size to those found in the existing literature (Frydman and Jenter 2010; EGJ 2017).[25] Finally, Appendix A.4 shows that our results are remarkably robust to the use of a wide variety of alternate samples, including the full sample of firms as well as those that focus on longer tenured firms or executives.

Our main sample includes 19,788 observations and spans 3,821 executives, 191 firms, 93 six-digit NAICS industries, and 21 years (1993-2013). The mean natural log of executive compensation across all years is 7.6, which translates into pay of approximately $2.0m per year (in real 2014 dollars). For CEO's (unreported), executive compensation averages $4.2m across all years. Both findings are consistent with the 2013 compensation values discussed in the context of Figure 3. We also see that interlock relationships

[22] For instance, services industries are excluded. However, globalization may have an even stronger impact on service industries such as finance and entertainment, than on the mostly manufacturing industries that are included in our analysis.

[23] Results reported in section 5.3 examine whether globalization differentially effects executives within this group.

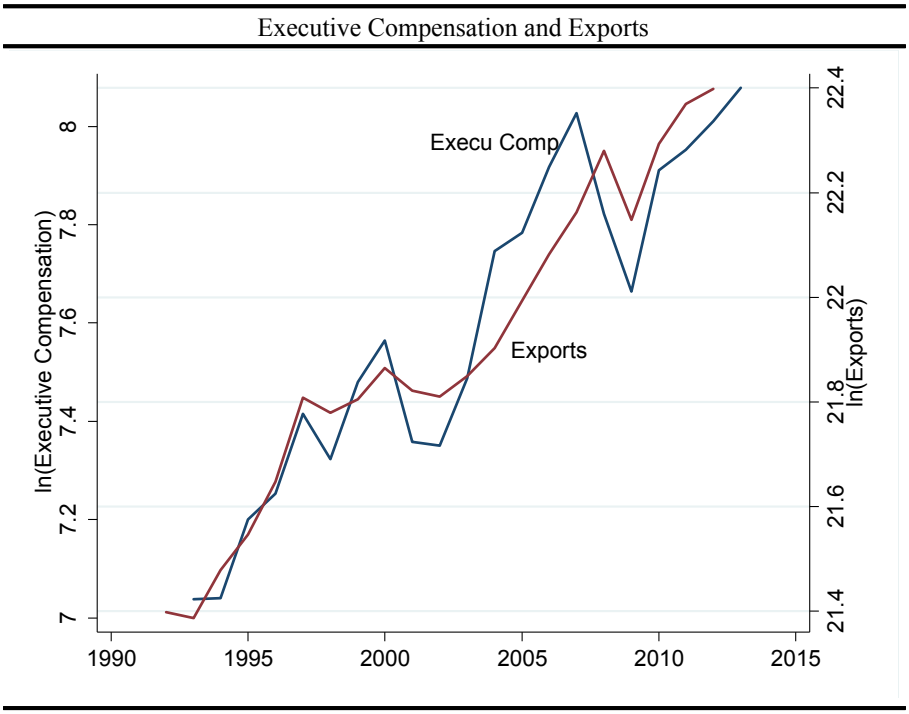
[24] The top tax rate variable is the main constraint since many firms do not report their headquarter state, which is necessarily to construct this measure.

[25] As an additional check on our data set, we replicated EGJ (2017) Table 1, which shows median CEO compensation over time for S&P 500, S&P MidCap 400, and S&P SmallCap 600 firms. The correlation coefficients between our values and theirs are 0.92, 0.92, and 0.87 respectively.

occur in 5% of firms, insider board relationships occur in 17% of firms, executives have on average five years of experience as a top five executive, the large majority of executives in our sample are male, and a small fraction have a doctoral degree.

Figure 5 examines a key relationship of interest between top incomes and globalization using our data set. Clearly, both executive compensation and exports have increased substantially over this twenty year period. Reassuringly, these results are very similar to the long-run trends in Figure 2, which provides additional external validity for our analysis.

FIGURE 5

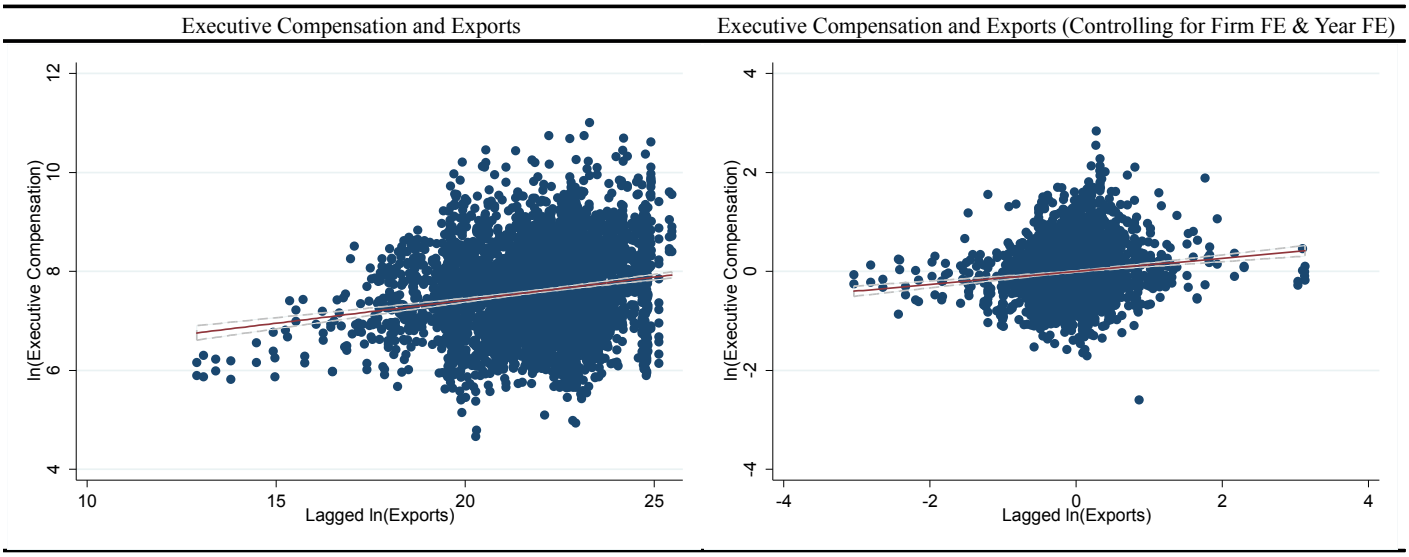


Notes: Average real executive compensation and average real exports over time. Compensation data for top 5 executives is obtained for firms that span all the years in the sample from the Compustat ExecuComp data set. U.S. industry-level export data for firms in the ExecuComp data set are obtained from the U.S. Census Bureau via Schott's International Economics Resource Page (Schott 2008).

To gain further insight into the data, the left panel of Figure 6 plots the average real executive compensation at the firm-level against lagged real exports. A significant positive relationship emerges (the dotted lines give the 95% confidence interval), which is consistent with the hypothesis that firms that are more integrated into global markets pay their executives more. However, this relationship could arise, for example, if both variables are simply increasing over time (as in Figure 5). To account for these and

other factors, the right panel controls for both firm and year fixed effects and plots the residuals. These within-firm changes over time are the variation we exploit in our subsequent analysis, and a significant positive relationship is evident.

FIGURE 6



Notes: Average real executive compensation versus lagged real exports on the left; analogous on the right after controlling for firm fixed effects and year fixed effects.

It is encouraging that this relationship emerges in such a raw cut of the data. The remainder of the paper examines this relationship in a more rigorous econometric analysis.

3 Impact of Globalization

This section tackles our first key question of whether globalization influences executive compensation.

3.1 Approach

We adopt a simple framework to examine the relationship between executive compensation and exports, given by the following equation:

$$(1)\quad \ln comp_{ifnt} = \beta_0 + \beta_1 \ln exp_{nt-1} + \beta_2 \ln size_{fnt-1} + \beta_3 \ln tech_{fnt-1} + \beta_4' X_{fnt-1} + \beta_5' E_{ifnt} + \gamma_f + \gamma_t + \varepsilon_{ifnt}.$$

The dependent variable is the total compensation of executive i, at firm f, in industry n, and in year

t. On the right side are exports (*exp*), firm size (*size*), and technology investments (*tech*). The vector X includes other firm-level characteristics that may influence executive compensation, including insider board relationships, top marginal state tax rates, and imports. The vector E includes our executive-level variables, including experience, education, and gender. We follow general practice in the literature and include firm and year fixed effects (γ_f and γ_t, respectively).[26] We report robust standard errors clustered at the industry level throughout and estimation is by least squares.

To the extent that exports increase executive compensation, then $\beta_1 > 0$. This could reflect pay-for-performance in the sense that the executive took specific actions to expand abroad and is thus reaping the rewards of this development. It could also reflect pay-for-non-performance in the sense that the executive is being rewarded for luck or rent-capture.

Growth in firm size may increase the scope of the executive's job and thus increase compensation accordingly. We will employ a number of commonly used measures of firm size.[27] Since export activity can increase firm size, as noted above, a portion of the export effect on executive compensation may operate through firm size. By including size explicitly in equation (1), we ask whether exporting affects compensation conditional on firm size. In other words, equation (1) examines whether exporting increases the complexity and difficulty of the executive's job and thus drives up compensation, conditional on size.

New technology, particularly in the form of advanced communication equipment, may enable executives to direct a larger workforce. This in turn increases the importance of executives and increases their compensation accordingly. The inclusion of both size and technology equation (1) captures the changing nature of the executives job and allows us to focus more carefully on the impact of globalization.

Rising imports have adversely affected the employment opportunities of low-skilled U.S. workers. While the implications for executives are less clear, we include imports in the analysis throughout in an analogous way to exports.[28] A large literature also shows executive compensation depends on firm governance, and in particular on the organizational structure of the board of directors and their relationship with executives. We include in equation (1) a measure of interlocked relationships between executives and the compensation committee, which may increase executive compensation. Executive pay may also depend on the tax environment. For example, a lower tax rate may provide incentives for the executive

[26] Industry fixed effects are unnecessary since they are subsumed by the firm fixed effects, because no firm switches industries according to the *ExecuComp* measure of NAICS. A robustness check using the *Compustat* time-varying measure of industry and both firm and industry fixed effects, yield similar results (see Appendix A.8).

[27] The role that average firm size in the economy has on executive compensation (Gabaix and Landier 2008) is captured by year fixed effects.

[28] We also examine the impact of exogenous import shocks, finding that they have no impact on executive compensation (Appendix A.7).

to bargain more aggressively over pay (Piketty, Saez, and Stantcheva 2014). Thus, we include the top marginal state tax rate faced by the executive as a regressor.

3.2 Findings

Table 2 reports the main results from estimating equation (1). We begin by examining whether factors commonly found to be drivers of executive compensation are important in our context. After controlling for firm fixed effects and year fixed effects, the results in column 1 indicate that the size of the firm has a positive and significant impact. This indicates that as executives oversee a larger firm, the scope of their job grows, the demand for talented executives increases, and compensation rises (Rosen 1981). These findings are not specific to measuring firm size using employment; similar results are obtained using sales, assets, costs, stock price, or market value (see Table 3 and Appendix A.5). In column 2, there is evidence that technology investments (*cap_exp*) raise executive compensation. This indicates that new technologies complement executives in the production process, increase their marginal product, and thus drive up their compensation.

The next specification pivots from explanations centered on the changing nature of the job to an explanation focused on corporate governance and potential rent-capture. In column 3, we see that insider relationships at the firm (i.e. an executive serves on the board's compensation committee), lead to significantly higher executive pay. In contrast, executive pay is not significantly related to tax rates in our sample (column 4), although the coefficient is negative which is consistent with existing evidence.[29]

After confirming existing findings in our sample, we now examine whether globalization affects executive compensation. Column 5 shows that exports have a significant positive impact on executive compensation, while imports have an insignificant effect. Holding fixed firm characteristics, including size and technology, we see in column 6 that exports still positively impact executive pay.[30] This is an important new result since it extends an existing finding that firm size can explain all of the growth in executive compensation (Gabaix and Landier 2008). While we confirm that firm size is important, our results show that globalization, as well as technology investments and corporate governance, also affects executive pay conditional on firm size.

Interestingly, the coefficient on exports drops by 35% from column 5 to 6, suggesting that a portion of the impact of exports on executive pay operates through other firm characteristics, such as size.

[29]This insignificant result may be due to our reliance on state tax variation given our focus on U.S. executives.

[30]The fact that the results are significant conditional on a variety of firm performance measures, indicates that the link between exports and executive compensation is not simply due to a mechanical relationship built into compensation contracts.

The coefficients on employment and capital expenditures also drop which provides further evidence that globalization may be a deep determinant of executive compensation. These findings are not surprising, given the abundance of evidence that shows trade liberalization increases firm size. However, unlike Ma (2015) we do not find that *all* of the impact of exports on executive compensation operates through firm size. Our findings show that conditional on firm size, exports still have a significant direct impact on executive compensation.

These results remain unchanged when we add executive-level variables, specifically experience, gender (*male*), and education (*Dr.*). All three have a positive impact on executive compensation, although only the former two are significant (column 7). Importantly, globalization, size, technology, and corporate governance continue to be significant predictors of executive compensation even after controlling for the experience, education, and gender of the executive. These various results are both plausible and consistent with existing research, which provides support for our empirical approach and makes our new export findings all the more interesting.

To more easily compare economic magnitudes, column 8 reports normalized (beta) coefficients for the column 7 specification. We see that the export beta coefficient is similar in magnitude to that of firm size and technology investments. The impact of globalization on executive compensation is smaller than that of executive experience, although it is larger than the influence of corporate governance, measured using interlocked board relationships. Overall, these results indicate that globalization is one of the most important explanations for the rapid increase in executive compensation.

Table 3 illustrates that our main findings are not specific to certain variable definitions or samples. In particular, column 2 uses our alternate compensation measures (TDC1), and still finds this responds positively to exports. Furthermore, the results are not sensitive to our firm size proxy. See column 3, where the inclusion of firm sales instead of employment does not alter our findings. Finally, column 4 utilizes the full sample which finds similar results and thus alleviates concerns about sample selection bias. If anything, our conservative reliance on a balanced sample attenuates the findings on the importance of exports (the export point estimate is 0.07 in column 1 but is 0.08 in column 4). All of these issues are pursued in greater detail in extensions found in the Appendix. [31]

[31] See Appendix A.4, A.5, and A.8.

4 Pay-for-Non-Performance

These results indicate that exports are an important driver of executive pay, but can we say more on *why* exports are increasing compensation? Perhaps talented managers make strategic decisions that lead to export growth, in which case export-led pay raises really reflect the skill and ability of the executive. Alternatively, maybe exports are increasing because of greater global demand for the firm's products, which in turn increases executive compensation. Thus, executives are being rewarded for a fortunate turn of events that is unrelated to their own talents and actions. In practice both channels are likely important. This section seeks to disentangle these explanations by determining to what extent executives are rewarded for non-performance. Specifically, the following instrumental variable approach identifies pay-for-non-performance using exogenous export shocks, which by definition are unrelated to executive talent and behavior.

4.1 Approach

Our strategy draws on the insights of the influential Bartik (1991) instrumental variable approach and applies it to our global trade setting. The original Bartik instrument takes presample industry employment within a city and assumes this grows at the same rate as industry employment at the national level. In line with this approach, we use presample U.S. export flows for each detailed industry and allow these trade flows to grow at an exogenous rate. Instead of using the aggregate U.S. growth rate, as suggested by Bartik's approach, we employ industry-level export growth in other developed countries. Specifically, we multiply presample 1991 bilateral export flows for each detailed industry by the growth in industry exports from eight other developed countries.[32] These predicted bilateral export flows are then summed across all foreign destination markets to obtain predicted U.S. exports abroad in a particular industry and year:

$$bartik_exp_iv_{nt} = \sum_{c}(exp_{nc1991} * (1 + g_{nt})), \tag{2}$$

where g is the growth rate of exports from other developed countries from 1991 to year t in industry n, and c represents one of the top 100 U.S. trading partner countries (identified using total export sales).[33]

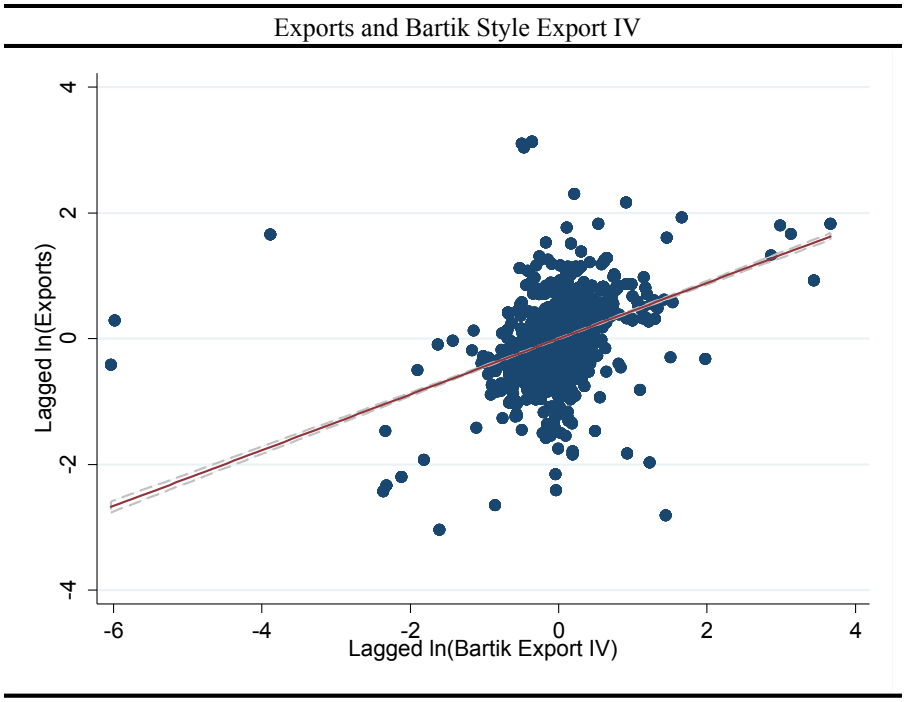
[32]The eight countries are Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland, as in Autor, Dorn, and Hanson (2013).

[33]One advantage of this instrument is that it can be constructed for years in which no bilateral export flows exist, since it only relies on presample bilateral exports and the industry level growth from other developed countries. Thus, the instrument is balanced and does not pick up extensive margin adjustments into or out of foreign destination markets which can occur

This approach identifies variation in U.S. exports stemming from common import demand shocks for a particular industry, as well as falling trade costs in this sector. For instance, the growth of China would typically lead to an increase in exports of a particular industry from both the U.S. and from other developed countries. In addition, improvements in transportation and communication would typically make it easier to export particular goods for both the U.S. and other developed countries.[34] Importantly, by relying on variation that is unrelated to executive or firm-level characteristics, this method eliminates fluctuations in exports that are due to executive talent. Thus, if executives are rewarded solely for their ability, then executive compensation will be unresponsive to exogenous export shocks and our export instrumental-variables (IV) coefficient will be zero. On the other hand, if the export IV coefficient is positive, it will indicate that the executive is being rewarded for something other than managerial talent (i.e. compensation reflects pay for non-performance).

Figure 7 illustrates a strong positive relationship between actual exports and this instrumental variable after accounting for firm and year fixed effects:

FIGURE 7



Notes: Lagged real exports are plotted against the lagged real Bartik export IV, controlling for firm and year fixed effects.

in the actual data set and could be endogenous.

[34]This approach is preferred to employing aggregate U.S. export growth because patterns of globalization are highly industry-specific.

One important threat to our identification strategy is that exports from the U.S. and other developed countries might be driven by common domestic export supply shocks rather than common import demand shocks. This would be problematic for our instrumental variable approach to the extent that these domestic supply shocks are correlated with executive compensation. We address this concern in three ways. First, the sample of other developed countries, used to construct the instrument, are selected in order to reduce this risk. For instance, Canada is not included in this comparison group, since the likelihood that it experiences similar export supply shocks as the U.S. is comparatively high. Second, we explicitly control for several of the most plausible domestic supply shocks, such as those related to scale and technological change. Third, we introduce two alternate instrumental variable strategies that address this and other threats to identification. The first approach constructs the instrumental variable using the percent change in the exchange rate between the U.S. and country c rather than industry-level export growth from other developed countries. The second approach employs a gravity equation method to identify variation in bilateral exports that is driven by changing economic conditions in the importing country. As shown in section 6.4, these alternative instrumental variable approaches based on quite different strategies generate similar results.

4.2 Findings

Turning to the results, Table 4 reports the first-stage results of the instrumental-variable estimation. Consistent with the scatter plot shown in Figure 7, we see that the instrumental variable is a strong predictor of actual export flows. The coefficient on the export instrument is positive and changes little with the inclusion of additional variables. Furthermore, the robust (Sanderson-Windmeijer, SW) F-statistic on the excluded instrument is well above 10 in all specifications, which indicates a relatively strong first stage.

Table 5 reports the corresponding second-stage instrumental-variable results. With only exports and imports included in column 1, the coefficient on the former is 0.3 while the coefficient on the latter is essentially zero. Adding firm and executive level variables reduces the export coefficient somewhat, but throughout we estimate a positive and significant impact of export shocks on executive compensation (see columns 2 and 3). Since by construction these fluctuations in exports are not driven by executive characteristics or decisions, this provides evidence that executives are rewarded with pay for non-performance. We have also explored an analogous instrumental-variable approach on the import side, but there is little evidence that import shocks significantly affect executive compensation (reported in Appendix A.7).

If executives were only rewarded for performance, then executive compensation would be unresponsive to exogenous export shocks. In contrast, the findings in Table 5 show that executives are rewarded for factors unrelated to their performance. This is consistent with existing evidence (Bertrand and Mullainathan 2001). Furthermore, we find a sizable effect: a 10% export shock leads to a 2% pay increase for executives (column 3). Our finding is at odds with the result that optimal contracts should typically reward executives only for relative performance differences (relative performance evaluation (RPE); Holmstrom 1979). Instead, we find that executives are rewarded for shocks, which are by construction *not* due to executive performance. To be sure, payment for non-performance, in principle, can be part of an optimal contractual compensation scheme, especially when there are limits on the set of feasible contracts or bounded rationality leads to the optimal adoption of rules-of-thumb.[35] However, it is worth keeping in mind that only about half of executives even have an explicit written employment contract detailing the extent of their compensation (Gillan, Hartzell, and Parrino 2009). While we take these results as evidence that luck and rent-capture are likely to play an important role in the link between globalization and executive compensation, alternative reasons for why RPE might fail, in particular firm-specific human capital and issues related to executive turnover, are discussed in section A.3 of the Appendix.

Notice that these instrumental variable point estimates are somewhat larger than the analogous OLS coefficients of Table 2, which show that a 10% increase in exports translates to about a 1% increase in executive compensation. It is tempting to make inferences about the relative importance of pay-for-performance and pay-for-non-performance by comparing the magnitudes of the OLS and IV estimates. However, the instrumental variable approach eliminates not only the endogenous returns to executive talent but also measurement error and omitted variable bias, which complicates attempts to interpret the difference between the OLS and IV results. Furthermore, the standard errors around these estimates make it challenging to conclude that they are statistically different.

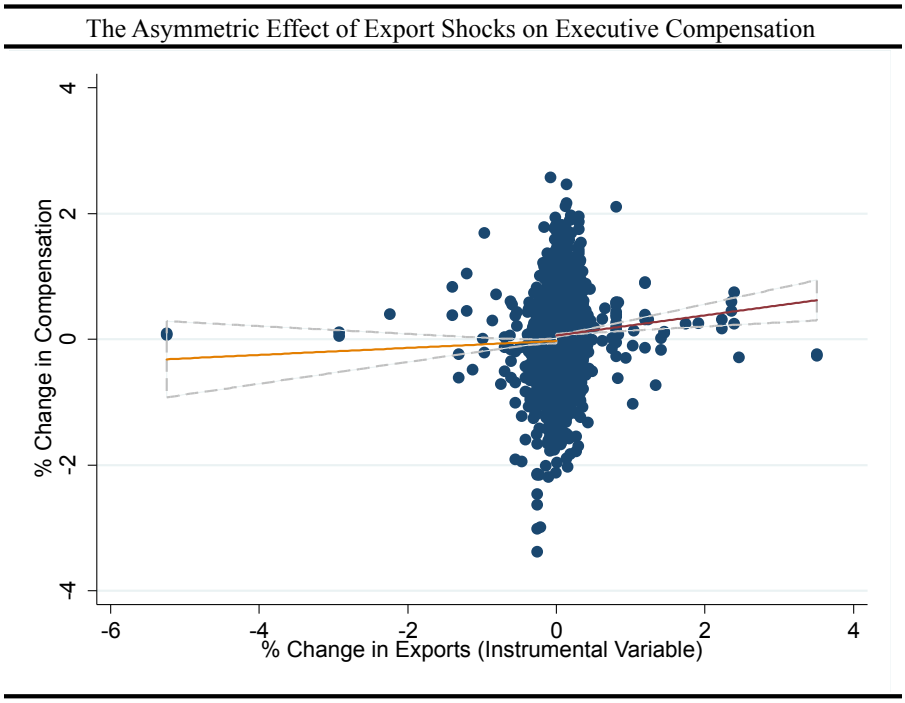
Table 5 indicates that executives are rewarded for external export shocks that are unrelated to their performance. However, if positive export shocks and negative export shocks were equally likely and their impact symmetric, then pay-for-non-performance alone could not explain the dramatic increase in executive compensation. To the contrary exports have increased dramatically over this period (see Figure 4), which indicates that positive shocks are relatively more common.[36] Furthermore, there is evidence that the response of compensation to positive and negative export shocks is not symmetric (see Figure

[35] See Edmans, Gabaix, and Jenter (2017) for more discussion.

[36] This is confirmed in Figure 8 below, where a disproportionate share of export shocks are positive (72.4%) compared to negative (27.6%).

8). The percent change in firm-level executive pay is plotted against the percent change in our export instrumental variable. Consistent with the results from Table 5, there is an overall positive relationship between export shocks and executive pay. However, this relationship differs depending on the nature of the shock. The kinked fitted line in Figure 8 illustrates that positive export shocks have a stronger impact on executive compensation than negative export shocks. In fact, there is no evidence that negative export shocks lower compensation (the relationship is not statistically different from zero). Positive shocks, however, do significantly raise executive compensation. Overall, the impact of export shocks on executive pay is asymmetric, and thus pay-for-non-performance can explain rising executive compensation. In the subsequent section, we explore whether this asymmetry is due in part to executive's capturing the rents associated with these positive export shocks.

FIGURE 8



Notes: Annual percent change in average firm-level total compensation plotted against the annual percent change in the export instrument. Fitted lines show how compensation responds to positive and negative export shocks.

5 Rent-Capture

Pay-for-non-performance plays an important role in the link between globalization and executive compensation. This section examines whether rent-capture contributes to these results. Distinguishing luck from rent-capture is important because it informs public attitudes about rising executive compensation. Returns to luck will tend to be less objectionable compared to executives actively trying to capture profits associated with shocks that are not of their own making. Furthermore, the policy responses to these alternate explanations differ.

We employ three approaches to shed light on rent-capture, which admittedly is challenging given that it is an inherently secretive affair. First, we examine whether exogenous export shocks disproportionately affect more discretionary types of compensation that are therefore more conducive to rent-capture. Second, we ask whether the impact of export shocks on executive pay is stronger at poor governance firms where rent-capture is more likely. Finally, we exploit the fact that some executives, in particular the CEO, likely have more managerial power to influence pay decisions.

5.1 Types of Compensation

We focus on the following compensation categories: salary, bonuses, options, stocks, and other forms of compensation (as seen in Figures 3 and 4). We hypothesize that relatively short-run and discretionary types of compensation, such as bonuses, might be more conducive to rent-capture and more responsive to exogenous export shocks. In contrast, it is difficult to influence more permanent sources of income, such as salary, which may be less responsive as a result. In sum, we expect that random export shocks will tilt compensation towards less-structured and more discretionary components of pay if rent capture is important.

Table 6 reports the IV results which identify the impact of exogenous export shocks on different components of executive pay. For ease of comparison, column 1 re-reports the earlier results which use total compensation as the dependent variable, while columns 2-6 decompose compensation into salary, bonuses, options, stocks, and other compensation. We see that exogenous export shocks have no impact on salary (column 2). Furthermore, options, stocks, and other types of compensation (columns 4-6) are also relatively unresponsive to random export shocks. However, in column 3 we find that exogenous export shocks have a strong, significant, and positive impact on bonuses. These results are consistent with the hypothesis that export shocks should have a stronger impact on short-run, flexible forms of compensation

that are more prone to rent-capture.[37]

Interestingly, we also see that the presence of executives on the compensation committee (i.e. *interlock*) significantly increase bonuses payments, with little impact on other forms of compensation. The fact that poor governance at the firm is associated with larger bonuses reinforces the idea that bonuses are more susceptible to rent-capture. It is possible that poor governance may be correlated with unobserved firm characteristics that could influence executive pay. However, the direction of this endogeneity bias should attenuate the positive effect of poor governance illustrated in Table 6.[38] Additional results presented in Appendix A1 further alleviate concerns about the endogeneity of poor governance. In contrast to poor governance which only affects bonuses, firm size increases all types of compensation.[39] Overall, these contrasting results indicate that various forces affect the compensation of executives through different but intuitive channels. The key result is that exogenous export shocks disproportionately affect bonuses, which is not surprising since they are more conducive to rent-capture. In the subsequent section, we extend this analysis of bonus payments.

5.2 Poor Governance

If rent-capture is important, the impact of export shocks on executive bonuses should be stronger at firms with poor corporate governance. This section examines this hypothesis as another means to assess whether pay-for-non-performance is driven in part by rent-capture.

To formally test this idea we interact exogenous export shocks with measures of poor corporate governance. Recall that our measures of poor governance indicate whether a firm has an executive that serves on the compensation committee (*interlock*)[40] or has at least three executives on the board of directors (*insider board*). The first of these measures more directly reflects the executive's control over the pay process itself, while the second reflects the general executive influence over the board.

Column 1 of Table 7 re-reports our earlier bonus result, while column 2 includes the interaction of exports with *interlock*. We instrument for both exports and the export interaction term, using the interaction of the export instrumental variable and *interlock*. The positive and significant interaction

[37] While bonus payments are often based on accounting performance measures, there is evidence that executives often find ways to influence the process, for instance by strategically selecting performance measures (Murphy 1999, EGJ 2017).

[38] Poor governance is likely correlated with poor firm performance which all else equal (i.e. in the absence of rent-capture) will lower executive compensation. Thus, to the extent that endogeneity is an issue, it will introduce a negative bias in our results and work against our findings.

[39] The negative capital expenditure coefficient in the bonus regression is in line with executives cutting R&D spending that increase future profitability in order to boost current accounting profitability and thereby bonus payments, as discussed by Murphy (1999).

[40] Or a reciprocal relationship with another firm.

coefficient indicates that export shocks disproportionately increase bonuses at firms with executives on the compensation committee. A 10% export shock raises bonuses by 4% in general, but at poor governance firms bonuses increase by almost 8%, or by about 100% more. In other words, the impact of export shocks on executive bonuses is much stronger at firms where rent-capture is likely.

Exogenous export shocks also disproportionately increase bonuses at firms where many executives are on the board of directors, as seen in column 3. Specifically, a 10% export shocks raises bonuses by 6% at these poor governance firms, compared to about 4% at other firms. Finally, column 4 shows that the two poor governance measures are largely orthogonal to each other because both are significant when included simultaneously, which further reinforces the importance of poor governance. Furthermore, the export interaction coefficient with *interlock* is larger in magnitude (0.327) than the analogous coefficient on the insider board interaction term (0.152). This indicates that export shocks have a larger effect on bonuses at firms with insider relationships on the compensation committee than at firms with insider relationships on the board more generally, which is plausible. Overall, these findings provide evidence that globalization's impact on executive compensation reflects in part rent-capture.

5.3 Managerial Power

Our final piece of evidence on the importance of rent-capture examines whether more powerful executives are the ones that disproportionately benefit from export shocks at poor governance firms. Relative to their less influential colleagues, powerful managers, such as CEOs, should be well placed to capture the rents from unexpected shocks.

The results from this analysis are presented in Table 8. In columns 1 and 2, we begin by splitting the sample into CEOs and non-CEOs and we find that the linear coefficient on exports is similar.[41] However, the coefficient on the *export*interlock* interaction term is 0.80 for CEOs, which is substantially larger than the 0.27 coefficient for non-CEOs (in column 2). In other words, a 10% export shock on average increases both CEO and non-CEO bonuses by 4%, but at poor governance firms this same shock increases CEO bonuses by over 12% while increasing non-CEO bonuses by only 7%. In columns 3 and 4, we split the sample according to compensation rank rather than job title. Specifically, we find that the top two highest paid executives at poor governance firms are the ones that disproportionately benefit from exogenous export shocks (i.e. the interaction coefficient in column 3 is 0.48 while in column 4 it is 0.30). This provides further evidence that it is powerful executives who benefit most from globalization,

[41] Note that non-CEOs are still among the top 5 highest paid executives at the firm.

due to their rent-capture opportunities.

We take an alternate approach in column 5 by measuring *interlock* at the executive-level rather than at the firm-level. This approach examines the impact of exports on the bonuses of the executive sitting on the compensation committee, rather than on all executives at the firm.[42] The results indicate that a 10% export shock increases the bonus of the executive on the compensation committee at a poor governance firm by 10%, compared to 8% when poor governance is measured at the firm level (column 2 of Table 7). Thus, the executive serving on the compensation committee tends to benefit somewhat more from exogenous export shocks than other executives at the same firm.

Finally, we compare these results to those employing our more general *insider board* measure in columns 6-9 of Table 8. We again see that more powerful executives (including CEOs and the two highest paid executives) are the ones that disproportionately benefit from exogenous export shocks at poor governance firms. Also, comparing the magnitude of the interaction effects in columns 1-4 and 6-9, indicates that having an executive on the compensation committee seems to be more conducive to capturing rents than simply having many executives on the board of directors.

In sum, our findings present compelling evidence that rent-capture is playing an important role in the link between globalization and executive compensation. First, we found in Table 6 that exogenous export shocks exclusively increase more discretionary forms of compensation (i.e. bonuses), which are more conducive to rent-capture. Second, we see in Table 7 that the impact on bonuses is strongest at poor governance firms where rent-capture is more likely. Finally, the results in Table 8 show that, at these poor governance firms, it is the executives with more managerial power that are the ones that disproportionately reap the rewards from exogenous export shocks.

6 Extensions

6.1 Executive - Worker Pay Gap

Our results indicate that exogenous export shocks increase executive compensation, but broader implications for inequality hinge on executives disproportionately benefiting from globalization. To the extent that exports increase the wages of other workers within the firm in the same way, then there would be no effect on within-firm inequality (see work by Song, Price, Guvenen, Bloom, and von Wachter 2015). Of

[42] The downside of the executive-level approach is that selection to the compensation committee may not be exogenous. The firm-level approach helps alleviate this concern. More generally, the endogeneity of poor governance is addressed in Appendix A1.

course not all firms are exposed to globalization, but those that are would experience little within-firm inequality growth. One way to address this issue is by studying whether exogenous export shocks increase the executive-to-worker pay ratio.

Since U.S. firms are not required to report non-executive compensation, *Compustat* does not include a direct measure of wages. We therefore define average wages within the firm as labor expenses per employee, as in Bertrand and Mullainathan (1999). Unfortunately, not all firms in the *Compustat* data set report labor expenses. In cases where this variable is missing, we use average labor expenses per employee at other similar firms within the same industry and year.[43] This approach takes advantage of the fact that firms in the same year and within an industry likely pay similar wages. While this is not a perfect method, it provides an opportunity to maintain a consistent sample of firms in light of data constraints.[44]

Table 9 reports our instrumental-variables specification using the executive to worker compensation ratio as the dependent variable. In the first specification, exports enters with a positive coefficient. As we see in the subsequent columns of Table 9, this finding is not sensitive to the inclusion of firm or executive level variables, often found to be important predictors of executive compensation. This result shows that executives disproportionately benefit from exogenous export shocks relative to the average worker. In other words, globalization is leading to within-firm inequality. Based on this finding, it is plausible that globalization is also increasing inequality between executives and the population at large.

Technology investment also has a strong positive impact on the executive-worker pay gap. This reinforces existing evidence that indicates skill-biased technical change and globalization are two of the most prominent explanations for rising inequality in the U.S. However, in contrast to many existing studies the results in Table 9 focus on top incomes earners (i.e. executives) who are driving inequality (Piketty and Saez 2003) through within-firm adjustments (Song et al. 2015). Imports reduce the executive-worker pay ratio, but this point estimate is smaller in absolute magnitude and weaker than the export finding (furthermore import shocks tend to have an insignificant effect as see in Appendix A.7). Interestingly, employment has a positive impact on executive compensation (Table 5) but little impact on the executive-worker pay gap (Table 9). One interpretation of these findings is that firm size increases not only executive compensation but also average worker compensation, so that the executive-worker pay gap does not

[43]Specifically, if firm-level average wage is missing then we use average wages at other firms within the same six-digit NAICS industry and year. If this industry-level wage is also missing, then we use average wage at the five-digit NAICS industry and so forth. Of the estimated average wage data, 22% use the six-digit NAICS average, 16% use the five-digit average, 7% use the four-digit average, 33% use the three-digit average, and 22% use the two-digit average.

[44]Note that the results could be attenuated because executive pay is also included in the average worker compensation in the denominator.

change. Thus, unlike globalization and technological change, firm size is leading to little within-firm inequality. Finally, we also see that increases in top marginal income tax rates tend to reduce the executive-worker pay gap. Overall, these results support our executive compensation findings above and provide addition direct evidence that exports have led to a significant increase in within-firm inequality.

6.2 Foreign Affiliate Sales

Given the availability of detailed trade data, we have thus far focused on exports and imports as our measures of globalization. Another component of globalization that could potentially influence executive compensation is foreign direct investment (FDI). Foreign affiliate sales provides an alternate way for multinational firms to sell to foreign markets. Unfortunately, relative to exports, data on foreign affiliate sales is limited in terms of years covered and in terms of the destination of these sales (which also makes it challenging to identify foreign affiliate sales shocks using an instrumental-variable approach). However, the *Compustat* data set has information on foreign affiliate sales at the firm-level for the years 2010-2013. Given the importance of multinational firms for globalization, we investigates the link between foreign affiliate sales and executive compensation using this data even though the sample period is relatively short.

Table 10 reports the relationship between foreign affiliates sales and executive compensation. The results in column 1 indicate that foreign affiliate sales have a positive and significant impact on executive compensation, after accounting for firm and year fixed effects. Adding firm size, technology investment, and top tax rate reduces the size of this coefficient somewhat, although it remains significant in column 2.[45] Column 3 shows that executive compensation is responsive to domestic sales too, although interestingly the point estimate is a bit smaller than that of foreign sales. This reinforces earlier findings that conditional on firm size, here measured using employment and domestic sales, globalization is an important driver of executive compensation. Finally, we see that the inclusion of executive-level variables (i.e. experience, gender, and education) does not change the finding that foreign affiliate sales raise executive compensation (column 4). Due to the limited data, these results should be interpreted with caution. However, they provide another piece of evidence that globalization, broadly defined, is indeed playing a role in the growth of executive compensation.

[45]The *interlock* variable is absorbed by the firm fixed effects due to a lack of variation over this limited time frame.

6.3 Globalization and Returns to Skill

We have seen that globalization increases executive compensation conditional on firm size, and that pay-for-non-performance is an important part of this finding. An alternate lingering explanation for some of our results is that globalization changes the nature of the executive's job, increases the demand for high-ability managers, and thus raises their compensation accordingly.[46] Our analysis so far has not fully investigated this potential explanation yet. Thus, this section complements our earlier analysis by examining whether globalization disproportionately increases compensation for more experienced and highly educated executives.

Table 11 reports results showing how exports affect compensation.[47] Column 1 re-reports the results from column 7 of Table 2 for comparison purposes. All specifications also include the full set of firm-level variables but given the focus of this analysis (and space constraints) we now only report the executive-level controls. Columns 2-4 then includes interaction terms between exports and various measures of experience. Specifically, column 2 uses the main experience variable that measures the number of years the executive has been a top five executive at any firm in the *ExecuComp* data set. Column 3 measures experience as the number of years the executive has worked at the firm, while column 4 measures it using the number of years the executive has been the CEO of the firm. Throughout, exports continue to have a positive and significant impact on executive compensation. Furthermore, in unreported results, each of these experience measures has a positive and significant impact on executive compensation when the interaction term is not included.[48] However, when the interaction terms are included, we see that exports do not disproportionately increase the compensation of more experienced executives. Column 5 finds that the interaction between exports and education (proxied using doctorate) is also insignificant. Finally, column 6 includes all of the experience and education variables together. None of the interaction terms are positive and significant.[49]

Overall, there appears to be little evidence that globalization affects compensation by increasing market returns to executive talent and ability, at least as measured by our variables. The insignificant interaction terms indicate that exports do not disproportionately increase the compensation of more

[46] To identify pay-for-non-performance, our instrumental variable approach purposely discards this type of variation.

[47] There is no need to analyze export shocks, because now we are focusing on pay-for-performance.

[48] This indicates that these experience measures, despite their data limitations, are important predictors of executive compensation. These findings also indicate that executive pay is more sensitive to general executive experience than to firm-level experience. Within the firm, experience as the CEO is more important for compensation than simply total experience at the firm.

[49] Some coefficients are marginally significant but they are actually negative (see column 2 and 6).

experienced and educated executives.[50] One reason for this might be that globalization rewards other executive characteristics, such as language ability or familiarity with other cultures, and not specifically experience and post-graduate education. Investigating the executive skills that are highly valued in an increasingly globalized world is a fruitful avenue of future research.

6.4 Alternate Instrumental Variable Approaches

This section examines the robustness of our results to two alternate methods of generating exogenous export variation. While these additional approaches are conceptually distinct from our earlier instrumental variable, all three strategies share the common goal of identifying exogenous variation in exports that is uncorrelated with executive or firm behavior.

6.4.1 Exchange Rate Instrument

Our first alternate instrumental-variable approach uses exchange rate variation to construct an export instrument along the lines of Bertrand and Mullainathan (2001) and Bertrand (2004). This method exploits two sources of variation. First, there are exchange rates fluctuations over time, defined as the number of units of the foreign importing country's currency per U.S. dollar.[51] Second, based on presample bilateral export flows, some industries will be more exposed to exchange rate fluctuations in a particular foreign country than other industries.

More specifically, the instrument is constructed in the following way:

$$ER_exp_iv_{nt} = \sum_{c}(exp_{nc1991} * (1 + g_{ct}^{ex})). \tag{3}$$

We use presample 1991 U.S. bilateral export flows in industry n and to foreign country c, as before.[52] The difference is that now we multiply presample export flows by the percent change in the exchange rate

[50] This does not mean that talent and ability are unimportant for executive compensation. To the contrary, experience (regardless of how it is defined) and education have a positive direct impact on executive compensation (Tables 2, 3, and 11), which indicates that it is not necessarily mismeasurement of the experience and education variables that is leading to insignificant interaction coefficients.

[51] Nominal exchange rate data is obtained from the World Bank (WB) for numerous countries spanning the years 1990-2015. Unfortunately, the World Bank does not report exchange rates for EU countries post 1999, so instead for these EU countries we use the OECD exchange rate data that spans the entire sample. For non-EU countries that are present in both the WB and the OECD data sets, the exchange rate data are identical. The results are similar if just the WB data is used instead.

[52] Similar to the Bartik IV, we focus on the top 100 U.S. trading partner countries and can construct the instrument for years in which there are no actual trade flows. Thus, this instrument is balanced and does not capture extensive margin adjustments into or out of foreign destination markets which could be endogenous.

in country c between 1991 and year t. Then we sum across trade partners to generate an industry-specific export instrument that relies on variation in exchange rates that affect some industries more than others based on presample export flows.

An advantage of this instrumental-variable approach is that exchange rate fluctuations may be harder for firms and executives to anticipate compared to foreign import demand shocks. However, a drawback is that exchange rates may be responsive to domestic U.S. conditions, which in turn could be correlated with executive compensation.

With these considerations in mind, column 1 of Table 12 re-reports our earlier instrumental variable analysis for comparison purposes and column 2 presents the instrumental variable results using this exchange rate export instrument. The first stage results, reported in the bottom panel, show that the coefficient on the exchange rate instrument is negative and significant. As expected, an increase in the exchange rate, reported as the foreign currency per U.S. dollar, makes U.S. goods more expensive abroad and thus reduces exports. The second stage results, reported in the upper panel, show that exogenous export shocks driven by exchange rate fluctuations have a significant positive impact on executive compensation. The magnitude of this effect is similar to our earlier results. Thus, our main findings are confirmed using an entirely different identification strategy that relies on exchange rate fluctuations.

6.4.2 Gravity Instrument

Our second alternate instrumental-variable approach uses bilateral export flows and insights from the gravity equation of trade to identify an exogenous source of variation in exports. Specifically, this method utilizes variation in bilateral exports driven by changing economic conditions in the foreign importing country and time-invariant geographic characteristics. Then the predicted bilateral export flows are summed across all of the U.S. trading partners within that industry. This generates an instrument for industry-specific exports that is by construction exogenous to domestic conditions in the U.S. (including executive compensation).

This approach builds on the insights of Frankel and Romer (1999) and applies these ideas to industry-level exports, as in Blanchard and Olney (2017). The ability to use the same foreign shock to separately identify industry fluctuations in exports implicitly takes advantage of two important sources of variation. First, the U.S. does not export all goods to all countries. Consequently, it is possible that a shock in a foreign country could affect exports in one industry but not another. Second, the impact of the shock could be very different across industries. For instance, economic growth in one foreign country may increase

U.S. exports of semiconductors more quickly than it would increase U.S. exports of asphalt shingles.

More specifically, U.S. exports for each six-digit NAICS industry are regressed on real GDP in the foreign country and on geographic characteristics as follows:

$$ln(x_{nct}) = \alpha_1 ln(rgdp_{ct}) + \alpha_2 ln(dist_c) + \alpha_3 contig_c + \varepsilon_{ct}, \tag{4}$$

where x_{nct} is the bilateral U.S. export flows in industry n to foreign country c in year t. The key independent variable is the real GDP ($rgdp$) in foreign country c in year t.[53] In addition, the specification includes the population-weighted distance ($dist$) between the U.S. and the foreign country and an indicator for whether they share a border ($contig$). These time-invariant factors will not affect changes in executive compensation over time and thus do not pose a problem for the exclusion restriction. Additional details about this approach and the results from these industry-specific regressions are reported in Appendix A.9.

The fitted values from each of these regressions are captured and used to construct the instrument. Note, by construction these fitted values are not a function of conditions in the U.S. Since the unit of observation in the main analysis (equation 1) is at the industry-year level, the final step is to sum these fitted values across all of the U.S.'s trading partner countries. The unlogged bilateral fitted values are summed to construct an instrument that varies by industry and year:

$$Gravity_exp_iv_{nt} = \sum_c e^{\widehat{\alpha_1} ln(rgdp_{ct}) + \widehat{\alpha_2} ln(dist_{ct}) + \widehat{\alpha_3} contig_c} \tag{5}$$

Like the Bartik instrumental-variable strategy, the goal of this approach is to construct an instrument that identifies an exogenous source of variation in exports. However, unlike the Bartik instrument, this method does not rely on exports from other developed countries to identify import demand shocks and changes in sector-level trade costs. Instead this approach specifically identifies the shock in the foreign country, using variation in foreign GDP, that is driving the change in demand for U.S. exports.

The instrumental-variable results using the gravity approach are reported in column 3 of Table 12. The first stage results reported in the bottom panel show that the gravity instrument is a significant predictor of actual export flows and the first stage (Sanderson-Windmeijer) F-statistic is around 10. The second stage results indicate that these exogenous export shocks have a positive and significant impact on executive compensation. This export point estimate (in column 3) is similar to those obtained using

[53] GDP data comes from the World Bank.

the Bartik instrument and the exchange rate instrument (reported in columns 1 and 2 respectively). Specifically, the estimated impact of exogenous export shocks on executive compensation using our three approaches fall within the relatively narrow and precisely estimated range of (0.21 to 0.27). Overall, the results in Table 12 are reassuring since they indicate that our findings hold using a variety of different methods of identifying exogenous export shocks.

6.5 Additional Results

Our online appendix reports a number of additional results of interest, which due to space constraints are not reported here. Specifically, we address concerns about the endogeneity of corporate governance by showing in section A.1 that the results are similar using long-run averages of our poor governance measures. Executive turnover is shown to be an important predictor of executive pay in A.2, but it does not alter our globalization results of interest. Section A.3 investigates other explanations for the absence of Relative Performance Evaluation and finds little evidence that frictions such as firm-specific human capital or turnover costs are driving our results. We then return to concerns about sample selection bias and the measurement of firm size by showing that the results are robust to other samples and specifications in sections A.4 and A.5. Section A.6 shows that the increase in the top 1% observed in the U.S. is also qualitatively occurring in other developed countries. Finally, import shocks, an alternate compensation variable, a time-varying industry definition, an alternate rent-capture measure, and gravity instrumental variable results are reported in sections A.7-A.9 respectively.

7 Conclusion

We construct a panel data set spanning thousands of executives working at hundreds of major U.S. firms over the last twenty years to examine the influence of globalization on the rising compensation of business executives. Our analysis generates a number of key new findings. First, through the growth in top incomes, globalization is playing a more important role in inequality than previously thought. We show that rising exports, along with firm size, technology investments, and insider boards, has a positive impact on executive compensation. Conditional on other firm characteristics, we find that exports not only remain an important predictor of executive pay but is comparable in importance to firm size and technical change. While past studies have focused on imports or dismissed globalization's impact on top incomes based on simple cross-country or cross-occupation comparisons, we show using a comprehensive

data set and a rigorous empirical analysis that globalization is actually an important driver of the recent growth of executive compensation.

Second, this finding is not simply due to talented executives successfully expanding abroad and thus being more highly compensated. Our instrumental-variable results demonstrate that compensation increases with export shocks that are by construction unrelated to the talent and actions of the executive. We show that a 10% exogenous export shock leads to a 2% increase in compensation for these executives. Thus, the link between globalization and executive compensation reflects in part pay-for-non-performance.

Third, we find that rent-capture plays a prominent role in this relationship. Exogenous export shocks primarily affect discretionary, less-structured forms of compensation (i.e. bonuses), which are more conducive to rent-capture. In addition, exogenous export shocks have a much larger effect on executive bonuses at poor governance firms where rent-capture is prevalent. Finally, at these poor governance firms, it is the executives with more managerial power, in particular CEOs, that disproportionately benefit from exogenous export shocks.

Our finding that recent globalization trends have increased U.S. inequality by disproportionately raising top incomes represents an important step forward. At the same time, our results might help to explain the gap between the public perception of globalization and economic research. In recent elections throughout the developed world, anger about globalization has led to a populist resurgence. To the extent that top income earners disproportionately benefit from globalization through the exploitation of poor governance settings, these attitudes are understandable. However, these findings should not be interpreted as a rationale for protectionist policies, since globalization has generated large increases in the overall standard of living. The key question for policy makers is to devise ways to address the distributional implications of globalization, such as those identified in this paper, without compromising aggregate welfare gains.

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TABLE 1

Summary Statistics

	Full Sample (without Tax Rate)			Full Sample			Balanced Sample		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Compensation Variables:									
ln (Executive Compensation)	63,669	7.23	1.11	39,497	7.41	1.12	19,788	7.60	1.10
ln (Salary)	63,669	6.06	0.61	39,497	6.11	0.62	19,788	6.26	0.59
ln (Bonus)	63,669	4.97	2.23	39,497	5.28	2.14	19,788	5.68	2.02
ln (Options)	63,669	4.63	2.93	39,497	4.69	2.97	19,788	5.01	2.92
ln (Stocks)	63,669	2.84	3.03	39,497	3.37	3.15	19,788	3.45	3.21
ln (Other Compensation)	63,669	3.48	1.68	39,497	3.65	1.64	19,788	4.01	1.55
Independent Variables:									
ln (Exports)$_{t-1}$	63,669	21.91	1.78	39,497	21.98	1.72	19,788	21.90	1.76
ln (Imports)$_{t-1}$	63,669	22.03	2.27	39,497	22.11	2.23	19,788	22.14	2.14
ln (Employment)$_{t-1}$	63,669	8.18	1.66	39,497	8.45	1.67	19,788	9.11	1.54
ln (Capital Expenditure)$_{t-1}$	63,669	17.94	1.89	39,497	18.21	1.89	19,788	18.93	1.74
Interlock	63,669	0.05	0.21	39,497	0.04	0.19	19,788	0.05	0.21
ln (Top Tax Rate)$_{t-1}$	39,497	1.24	1.55	39,497	1.24	1.55	19,788	1.26	1.48
Insider Board	63,669	0.13	0.34	39,497	0.13	0.34	19,788	0.17	0.37
Experience	63,669	4.58	3.60	39,497	5.04	3.91	19,788	5.35	4.11
Male	63,669	0.96	0.20	39,497	0.96	0.20	19,788	0.97	0.18
Dr.	63,669	0.03	0.18	39,497	0.04	0.20	19,788	0.03	0.17

Notes: Total Executive Compensation (TDC2) includes Salary, Bonus + LTIP, Options, Stocks, and Other types of compensation. Exports and Imports are measured at the 6-digit NAICS level. Employment, Capital Expenditure, Interlock, and Insider Boards are measured at the firm level. Experience, Male, and Dr. are measured at the executive level. The top marginal tax rate in the state in which the firm is headquartered is obtained from Taxsim. The Full Sample includes firms entering and exiting the sample, while the balanced sample only includes firms present in all years.

TABLE 2
The Impact of Exports on Executive Compensation

	Executive Compensation							Beta Coeff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exports-1					0.118**	0.077**	0.071**	0.113**
					[0.048]	[0.034]	[0.033]	[0.053]
Imports-1					0.052	0.036	0.044	0.084
					[0.043]	[0.037]	[0.039]	[0.076]
Employment-1	0.218***					0.106***	0.073*	0.101*
	[0.032]					[0.040]	[0.039]	[0.054]
Capital Expenditure-1		0.175***				0.107***	0.092***	0.145***
		[0.030]				[0.032]	[0.028]	[0.044]
Interlock			0.215**			0.185**	0.177**	0.034**
			[0.088]			[0.078]	[0.073]	[0.014]
Top Tax Rate-1				-0.189		-0.117	-0.135	-0.182
				[0.168]		[0.156]	[0.156]	[0.210]
Experience							0.089***	0.330***
							[0.003]	[0.013]
Male							0.152***	0.025***
							[0.043]	[0.007]
Dr.							0.094	0.014
							[0.058]	[0.009]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,993	19,843	20,053	20,053	20,053	19,788	19,788	19,788
R-squared	0.484	0.488	0.478	0.477	0.481	0.491	0.581	0.581

Notes: The dependent variable is the log of total compensation (TDC2) of the executive. Estimation by OLS. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Column 8 reports the Beta Coefficients after standardizing all variables to have a mean of 0 and a standard deviation of 1. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 3
The Impact of Exports on Executive Compensation - Extensions

	Baseline	Alt. Comp.	Sales	Sample
	(1)	(2)	(3)	(4)
Exports-1	0.071**	0.046*	0.069**	0.081***
	[0.033]	[0.026]	[0.034]	[0.022]
Imports-1	0.044	0.024	0.043	0.026
	[0.039]	[0.022]	[0.038]	[0.020]
Employment-1	0.073*	0.124***		0.081***
	[0.039]	[0.029]		[0.028]
Sales-1			0.088*	
			[0.050]	
Capital Expenditure-1	0.092***	0.104***	0.080*	0.065***
	[0.028]	[0.020]	[0.040]	[0.019]
Interlock	0.177**	0.103**	0.163**	0.104**
	[0.073]	[0.050]	[0.073]	[0.044]
Top Tax Rate-1	-0.135	-0.283**	-0.124	
	[0.156]	[0.128]	[0.154]	
Experience	0.089***	0.068***	0.089***	0.092***
	[0.003]	[0.003]	[0.003]	[0.002]
Male	0.152***	0.135***	0.149***	0.158***
	[0.043]	[0.042]	[0.044]	[0.020]
Dr.	0.094	0.162**	0.093	0.086**
	[0.058]	[0.065]	[0.058]	[0.041]
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	19,788	19,320	19,843	63,669
R-squared	0.581	0.603	0.583	0.555

Notes: Estimation by OLS. Column 1 rereports the baseline findings from Table 2. Column 2 uses an alternate executive total compensation measure (TDC1) as the dependent variable also in logs. Column 3 uses sales to measure firm size. Finally, column 4 uses the larger sample size. Exports, imports, employment, sales, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 4
The First Stage Estimation Results

	Exports$_{-1}$		
	(1)	(2)	(3)
Export IV$_{-1}$	0.411***	0.382***	0.382***
	[0.109]	[0.099]	[0.099]
Imports$_{-1}$	0.157	0.151	0.152
	[0.133]	[0.133]	[0.133]
Employment$_{-1}$		-0.015	-0.015
		[0.030]	[0.030]
Capital Expenditure$_{-1}$		0.072*	0.072*
		[0.043]	[0.043]
Interlock		0.067	0.067
		[0.076]	[0.076]
Top Tax Rate$_{-1}$		-0.312*	-0.312*
		[0.173]	[0.173]
Experience			0.001
			[0.001]
Male			0.004
			[0.019]
Dr.			-0.011
			[0.032]
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	19,738	19,473	19,473
SW F-Stat on Instrument	14.11	14.77	14.76

Notes: First stage of two-stage least squares regressions. Dependent variable is log exports lagged by one year. The export IV, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 5
The Impact of Export Shocks on Executive Compensation

	Executive Compensation		
	(1)	(2)	(3)
Exports-1	0.335***	0.225***	0.212***
	[0.086]	[0.079]	[0.077]
Imports-1	0.004	0.005	0.014
	[0.030]	[0.026]	[0.028]
Employment-1		0.116***	0.084**
		[0.040]	[0.038]
Capital Expenditure-1		0.080***	0.066***
		[0.028]	[0.025]
Interlock		0.144*	0.137*
		[0.081]	[0.076]
Top Tax Rate-1		-0.073	-0.095
		[0.165]	[0.166]
Experience			0.089***
			[0.003]
Male			0.152***
			[0.045]
Dr.			0.094
			[0.059]
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	19,738	19,473	19,473
R-squared	0.472	0.486	0.577
SW F-Stat on Instrument	14.11	14.77	14.76

Notes: Second stage of two-stage least squares regressions. The dependent variable is the ln of total compensation (TDC2) of the executive. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 6
The Impact of Export Shocks on Alternate Compensation Measures

	Total Comp.	Salary	Bonus	Options	Stocks	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Exports-1	0.212***	-0.029	0.407**	0.000	0.198	0.102
	[0.077]	[0.020]	[0.168]	[0.307]	[0.339]	[0.137]
Imports-1	0.014	0.019*	-0.032	0.020	-0.023	-0.010
	[0.028]	[0.010]	[0.047]	[0.077]	[0.061]	[0.041]
Employment-1	0.084**	0.131***	0.232**	0.417**	0.280**	0.228***
	[0.038]	[0.014]	[0.107]	[0.181]	[0.122]	[0.047]
Capital Expenditure-1	0.066***	0.010	-0.142*	0.092	0.001	-0.072
	[0.025]	[0.007]	[0.076]	[0.125]	[0.080]	[0.047]
Interlock	0.137*	0.001	0.578***	-0.350	-0.104	-0.018
	[0.076]	[0.023]	[0.178]	[0.272]	[0.261]	[0.132]
Top Tax Rate-1	-0.095	-0.026	-0.170	0.829	0.225	-0.120
	[0.166]	[0.079]	[0.330]	[0.696]	[0.825]	[0.262]
Executive Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,473	19,475	19,475	19,475	19,475	19,475
R-squared	0.577	0.503	0.323	0.315	0.523	0.432
SW F-Stat on Instrument	14.76	14.76	14.76	14.76	14.76	14.76

Notes: Second stage of two-stage least squares regressions. Column 1 re-reports the baseline results from column 3 of Table 5. Columns 2-6 use salary, bonuses+long term incentive plans, options, stocks, and other compensation as the dependent variable (in logs). Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 7
The Impact of Export Shocks on Bonuses at Poor Governance Firms

	Executive Bonuses			
	(1)	(2)	(3)	(4)
Exports-1	0.407**	0.407**	0.432***	0.401**
	[0.168]	[0.161]	[0.163]	[0.160]
Exports-1*Interlock		0.370***		0.327***
		[0.089]		[0.101]
Exports-1*Insider Board			0.168**	0.152**
			[0.068]	[0.077]
Imports-1	-0.032	-0.038	-0.043	-0.045
	[0.047]	[0.044]	[0.046]	[0.044]
Employment-1	0.232**	0.228**	0.247**	0.241**
	[0.107]	[0.110]	[0.110]	[0.109]
Capital Expenditure-1	-0.142*	-0.136*	-0.150*	-0.144*
	[0.076]	[0.077]	[0.079]	[0.077]
Interlock	0.578***	-7.399***		-6.452***
	[0.178]	[1.927]		[2.213]
Insider Board			-3.690**	-3.369**
			[1.509]	[1.710]
Top Tax Rate-1	-0.170	-0.205	-0.163	-0.210
	[0.330]	[0.322]	[0.337]	[0.325]
Executive Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	19,475	19,475	19,475	19,475
R-squared	0.323	0.324	0.321	0.325
SW F-Stat on Instrument	14.76	15, 4051	22, 1691	24, 5009, 2012

Notes: Second stage of two-stage least squares regressions. Dependent variable in all columns is the log of bonuses. Exports and the interaction terms are instrumented throughout using the Bartik style instrument and the interaction of this instrument and the poor governance variables. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 8
The Impact of Export Shocks on Powerful Managers at Poor Governance Firms

	Executive Bonuses								
	CEOs	Non-CEOs	Top 2	Execs 3-5	Exec Interlock	CEOs	Non-CEOs	Top 2	Execs 3-5
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Exports-1	0.427**	0.406**	0.385**	0.426***	0.431***	0.445**	0.430**	0.416**	0.445***
	[0.171]	[0.170]	[0.178]	[0.158]	[0.164]	[0.178]	[0.171]	[0.179]	[0.161]
Exports-1*Interlock	0.796***	0.270***	0.475***	0.304***	0.586***				
	[0.184]	[0.080]	[0.110]	[0.100]	[0.181]				
Exports-1*Insider Board						0.207**	0.165**	0.210***	0.147**
						[0.084]	[0.069]	[0.076]	[0.068]
Imports-1	-0.106**	-0.028	-0.039	-0.04	-0.036	-0.104**	-0.034	-0.044	-0.044
	[0.047]	[0.046]	[0.055]	[0.039]	[0.046]	[0.050]	[0.048]	[0.058]	[0.041]
Employment-1	0.246	0.235**	0.236*	0.241**	0.235**	0.265*	0.252**	0.259**	0.256**
	[0.163]	[0.104]	[0.121]	[0.108]	[0.110]	[0.158]	[0.107]	[0.120]	[0.110]
Capital Expenditure-1	-0.315***	-0.084	-0.162*	-0.113	-0.142*	-0.337***	-0.096	-0.180**	-0.124
	[0.094]	[0.080]	[0.086]	[0.076]	[0.078]	[0.093]	[0.082]	[0.087]	[0.078]
Interlock	-16.585***	-5.235***	-9.545***	-6.046***	-11.741***				
	[4.069]	[1.717]	[2.372]	[2.189]	[4.017]				
Insider Board						-4.488**	-3.604**	-4.633***	-3.178**
						[1.877]	[1.533]	[1.679]	[1.510]
Top Tax Rate-1	-0.257	-0.191	-0.178	-0.203	-0.175	-0.193	-0.159	-0.127	-0.168
	[0.480]	[0.303]	[0.367]	[0.318]	[0.329]	[0.494]	[0.316]	[0.387]	[0.327]
Executive Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,819	15,656	7,790	11,685	19,475	3,819	15,656	7,790	11,685
R-squared	0.375	0.322	0.310	0.346	0.323	0.368	0.319	0.305	0.343
SW F-Stat on Instrument	15, 3872	15, 4004	14, 3970	15, 4011	15, 2773	21, 1732	21, 1677	21, 1679	21, 1671

Notes: Second stage of two-stage least squares regressions. Dependent variable in all columns is the log of bonuses. Exports and the interaction terms are instrumented throughout using the Bartik style instrument and the interaction of this instrument and the poor governance variables. Column 5 uses an executive-level measure of interlock. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 9
The Impact of Export Shocks on Executive to Average Worker Compensation Ratio

	Execu / Worker Compensation		
	(1)	(2)	(3)
Exports-1	0.648***	0.426**	0.414**
	[0.201]	[0.202]	[0.207]
Imports-1	-0.140**	-0.120*	-0.111*
	[0.067]	[0.063]	[0.065]
Employment-1		-0.106	-0.138*
		[0.077]	[0.083]
Capital Expenditure-1		0.307***	0.294***
		[0.068]	[0.071]
Interlock		0.045	0.038
		[0.084]	[0.082]
Top Tax Rate-1		-0.520*	-0.538*
		[0.286]	[0.287]
Executive Controls	No	No	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	19,633	19,368	19,368
R-squared	0.337	0.365	0.423
SW F-Stat on Instrument	14.08	14.77	14.77

Notes: Second stage of two-stage least squares regressions. Dependent variable is the log of the ratio of total executive compensation (TDC2) to average worker compensation at the firm. Average worker compensation is measured by the firm's labor expenses per employee, and if this data is missing, by the detailed industry average of compensation per employee. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 10
The Impact of Foreign Affiliate Sales on Executive Compensation

	Executive Compensation			
	(1)	(2)	(3)	(4)
Foreign Sales$_{-1}$	0.045***	0.038**	0.044***	0.048***
	[0.015]	[0.016]	[0.012]	[0.012]
Employment$_{-1}$		0.152	0.079	-0.022
		[0.107]	[0.107]	[0.108]
Capital Expenditure$_{-1}$		-0.080*	-0.103**	-0.123***
		[0.046]	[0.041]	[0.038]
Top Tax Rate$_{-1}$		-0.119	-0.128	-0.100
		[0.175]	[0.175]	[0.160]
Domestic Sales$_{-1}$			0.035***	0.046***
			[0.008]	[0.011]
Executive Controls	No	No	No	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	3,220	3,210	3,210	3,210
R-squared	0.502	0.508	0.509	0.667

Notes: Dependent variable is log total executive compensation. Estimation by OLS. Included years are 2010-2013, for which information on foreign affiliate sales is available. Foreign sales, employment, capital expenditure, top tax rate, and domestic sales are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 11
The Impact of Exports on Executive Compensation - Returns to Experience and Education

	ln (Executive Compensation)					
	(1)	(2)	(3)	(4)	(5)	(6)
Exports-1	0.071**	0.090***	0.084**	0.077**	0.072**	0.094***
	[0.033]	[0.034]	[0.032]	[0.035]	[0.033]	[0.035]
Exports-1*Experience		-0.004*				-0.003
		[0.002]				[0.003]
Exports-1*Firm Experience			-0.001			-0.001*
			[0.001]			[0.001]
Exports-1*Firm CEO Experience				-0.001		0.000
				[0.003]		[0.002]
Exports-1*Dr.					-0.074	-0.048
					[0.047]	[0.052]
Experience	0.089***	0.181***			0.089***	0.123**
	[0.003]	[0.053]			[0.003]	[0.059]
Firm Experience			0.043***			0.031**
			[0.016]			[0.015]
Firm CEO Experience				0.085		0.038
				[0.060]		[0.037]
Male	0.150***	0.150***	0.236***	0.241***	0.149***	0.138***
	[0.043]	[0.043]	[0.048]	[0.049]	[0.043]	[0.042]
Dr.	0.094	0.103*	0.110	-0.056	1.794	1.093
	[0.058]	[0.060]	[0.078]	[0.117]	[1.122]	[1.205]
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,788	19,788	19,788	19,788	19,788	19,788
R-squared	0.581	0.582	0.548	0.562	0.581	0.606

Notes: Estimation by OLS. The dependent variable is the ln of total compensation (TDC2) of the executive. Column 1 re-reports results from column 6 of Table 2. Columns 2 includes the interaction between exports and experience (measured as the number of years the executive has worked for any S&P firm). Columns 3-4 measures experience as the number of years the executive has been at the firm and the number of years the executive has been CEO at the firm, and includes the analogous interaction terms. Column 5 includes an interaction between exports and education (measured as whether the executive has a doctorate). Finally, column 6 includes all the experience and education variables together with the relevant interaction terms. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

TABLE 12
The Impact of Export Shocks on Executive Compensation - Alternative Instrumental Variable Models

	Bartik	Exchange Rate	Gravity
	(1)	(2)	(3)
Exports-1	0.212***	0.270**	0.237**
	[0.077]	[0.135]	[0.114]
Imports-1	0.014	0.005	0.000
	[0.028]	[0.034]	[0.117]
Employment-1	0.083**	0.080**	0.079**
	[0.038]	[0.035]	[0.037]
Capital Expenditure-1	0.066***	0.066***	0.070***
	[0.025]	[0.025]	[0.023]
Interlock	0.137*	0.157**	0.165**
	[0.076]	[0.076]	[0.076]
Top Tax Rate-1	-0.095	-0.064	-0.077
	[0.166]	[0.179]	[0.168]
Executive Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	19,473	19,788	19,578
R-squared	0.577	0.575	0.573
First Stage Results: %			
Bartik IV-1	0.382***		
	[0.099]		
Exchange Rate IV-1		-0.067***	
		[0.021]	
Gravity IV-1			0.593***
			[0.184]
SW F-Stat on Instrument	14.76	9.78	10.38

Notes: First and second stage results of two-stage least squares regressions. The dependent variable in the second satge is the log of executive compensation (TCD2) and in the first stage it is the lagged log of exports. Column 1 re-reports the baseline results using the Bartik instrument. Column 2 uses an instrument that is constructed using exchange rate fluctuations and presample bilateral export flows. Column 3 uses an instrument that identifies, using the gravity equation, shocks to bilateral export flows driven by conditions in the foreign importing country. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

A Appendix

A.1 Endogeneity of Poor Governance

Our earlier results indicate that poor corporate governance allows executives to personally benefit from exogenous export shocks. However, one concern is that poor governance itself is not exogenous and could be correlated with unobserved firm characteristics. If these firm characteristics are in turn correlated with executive compensation, this could influence our results.

This potential issue may be less problematic in our context for a couple reasons. First, our measures of poor governance reflect longer-run changes in the structure of the firm's board of directors, which should be less responsive to short-run fluctuations in unobserved firm characteristics. Second, as noted in the text, the direction of this endogeneity bias should work against our findings. Poor governance is likely correlated with poor firm performance which all else equal (i.e. in the absence of rent-capture) will lower executive compensation.

Nonetheless, this section examines this issue more formally by constructing measures of poor governance that are less susceptible to changing firm characteristics. Specifically, we calculate firm-level averages of our *interlock* and *insider board* variables over time in order to break the potential link between governance and short-run fluctuations in firm performance.[54] The results from interacting these average poor-governance measures with export shocks are reported in Table A1. Consistent with our earlier results (see Table 7), we find that exogenous export shocks disproportionately increase executive bonuses at poor-governance firms. These interaction results hold after defining poor governance using the *interlock* average (column 1), the *insider board* average (column 2), or to a lesser extent both measures simultaneously (column 3). The important point from Table A1 is that potential endogeneity associated with our poor governance measures does not seem to be a main driver of our findings. If anything, the point estimates on these interaction coefficients are larger in magnitude than the analogous coefficients reported in Table 7.

[54] Firm-level averages over the entire sample are time-invariant and thus subsumed by the firm fixed effects. Instead, we split the sample into thirds by taking seven year averages of *interlock* and *insider board* over the periods 1993-1999, 2000-2006, and 2006-2013. The results are similar using different subperiod definitions.

TABLE A1
The Impact of Export Shocks on Bonuses at (on Average) Poor Governance Firms

	Executive Bonuses		
	(1)	(2)	(3)
Exports-1	0.393**	0.432***	0.388**
	[0.160]	[0.164]	[0.159]
Exports-1*Interlock Average	0.608***		0.526**
	[0.183]		[0.212]
Exports-1*Insider Board Average		0.209**	0.167
		[0.089]	[0.117]
Imports-1	-0.043	-0.046	-0.05
	[0.042]	[0.046]	[0.043]
Employment-1	0.235**	0.252**	0.249**
	[0.111]	[0.111]	[0.111]
Capital Expenditure-1	-0.147*	-0.152*	-0.154*
	[0.080]	[0.079]	[0.079]
Interlock Average	-12.264***		-10.476**
	[3.928]		[4.583]
Insider Board Average		-4.626**	-3.717
		[2.023]	[2.594]
Top Tax Rate-1	-0.214	-0.162	-0.213
	[0.321]	[0.336]	[0.323]
Executive Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	19,475	19,475	19,475
R-squared	0.325	0.320	0.326
SW F-Stat on Instrument	15, 2123	20, 608	20, 2881, 1079

Notes: Second stage of two-stage least squares regressions. Dependent variable in all columns is the log of bonuses. Exports and the interaction terms are instrumented throughout using the Bartik style instrument and the interaction of this instrument and the poor governance variables. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Interlock and Insider Board are now firm-level averages over seven year periods. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

A.2 Executive Turnover

An appealing feature of the *ExecuComp* data is that it is possible to track executives over time and across firms (conditional on them moving to another firm in the data set). This section examines whether turnover, measured at either the firm-level or at the executive-level, influences our results. Specifically, at the firm level, we construct a binary variable indicating whether the top five highest paid executives at a given firm changed in a given year. At the executive level, we construct a binary variable indicating

whether the individual recently became one of the top five highest paid executives at the firm (in other words, the individual was not one of the top 5 highest paid executives at this specific firm the year before).

Table A2 reports specifications that include these measures of executive turnover. The significant negative coefficient on *Exec Turnover* in column 2 of Table A2 indicates that executives earn significantly lower pay when there is a change in the top five executives at the firm. The change in leadership could be a signal of declining fortunes at the firm which could reduce executive compensation. Alternatively, it could be that the new executive is earning less then their predecessor, which reduces average executive compensation at the firm. The results in column 3 support this latter interpretation. Controlling for other factors, the significant negative coefficient on *Exec Switch* indicates that individuals that were not a top five executive at the firm last year earn less than individuals that were.[55] Finally, column 4 includes both the firm and executive level measures of turnover. The coefficient on *Exec Switch* again shows that individuals who recently became a top five executive earn less. However, the now insignificant coefficient on *Exec Turnover* indicates that a new executive does not adversely affect the compensation of other executives at the firm.

These results provide some insights into how compensation evolves as executives move across firms. While this is interesting and worthy of additional study, the key finding in the context of our analysis is that the export coefficient in Table A2 does not change much after taking account of executive turnover in a variety of ways. The important point is that these findings indicate that our results are unlikely to be strongly driven by executive turnover. This concern is also addressed in Appendix A.4 where we show that the results are robust to the exclusion of executives who are in the sample for only a few years.

[55]Note, this negative coefficient does not indicate that executives earn less at their new firm relative to their old firm.

TABLE A2
The Impact of Export Shocks on Executive Compensation - Executive Turnover

	Baseline	Turnover	Switch	Both
	(1)	(2)	(3)	(4)
Exports-1	0.212***	0.215***	0.217***	0.218***
	[0.077]	[0.078]	[0.078]	[0.078]
Imports-1	0.014	0.014	0.013	0.013
	[0.028]	[0.028]	[0.028]	[0.028]
Employment-1	0.084**	0.087**	0.088**	0.088**
	[0.038]	[0.038]	[0.038]	[0.038]
Capital Expenditure-1	0.066***	0.066***	0.067***	0.067***
	[0.025]	[0.025]	[0.026]	[0.026]
Interlock	0.137*	0.137*	0.135*	0.135*
	[0.076]	[0.076]	[0.076]	[0.076]
Top Tax Rate-1	-0.095	-0.095	-0.088	-0.088
	[0.166]	[0.166]	[0.165]	[0.165]
Exec Turnover		-0.040**		-0.006
		[0.019]		[0.019]
Exec Switch			-0.141***	-0.139***
			[0.017]	[0.017]
Executive Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	19,473	19,473	19,473	19,473
R-squared	0.577	0.577	0.579	0.579
SW F-Stat on Instrument	14.76	14.69	14.74	14.68

Notes: Second stage of two-stage least squares regressions. Column 1 rereports the baseline results. Column 2 includes a binary variable ('Exec Turnover') identifying whether the composition of the firm's top 5 highest paid executives has changed from the previous year. Column 3 includes a binary variable ('Exec Switch') identifying whether the individual was not a top 5 executive at the firm last year. Column 4 controls for both turnover and last year. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

A.3 Absence of Relative Performance Evaluation

The principle of Relative Performance Evaluation (RPE) says that executive compensation contracts should account for performance measures that are useful in assessing the effectiveness of the executive and should ignore factors that are unrelated to the executive's actions (Holmstrom 1979). Our results showing that executive pay is sensitive to exogenous export shocks cast doubt on the empirical validity of this principle. However, these findings do not necessarily invalidate assignment models of executive compensation common in the literature (Gabaix and Landier 2008, Tervio 2008). It is well-known that under certain conditions, contracts that do not exhibit RPE can be efficient (see the discussion in EGJ

2017). While some reasons are rarely observed and thus difficult to assess empirically, such as potential limits on the set of feasible contracts, we can shed light on the importance of other explanations for non-RPE. Specifically, Edmans, Gabaix, and Jenter (2017) propose making assignment models more empirically relevant by including frictions such as firm-specific human capital and turnover costs, which can generate rents that powerful executives could expropriate. This hypothesis is explored in this section.

First, we measure firm-specific human capital using data on the average firm-level experience of executives at the firm. Using this information, a *Human Capital* binary variable is constructed indicating whether the firm has average firm-specific experience that exceeds the overall sample average. Second we measure turnover costs using our *Exec Turnover* variable, which as discussed in Appendix A.2 is a binary measure indicating whether the top five highest paid executives at a given firm changed in a given year. Table A3 then interacts these frictions with exogenous export shocks. Column 1, re-reports out main results from Table 7, while columns 2 and 3 add the human capital and executive turnover interactions respectively. The results indicate that neither firm-specific human capital nor turnover costs cause executives to disproportionately benefit from export shocks. The point estimates on the interaction terms in both columns are close to zero and not significant at standard levels. However, in both columns 2 and 3, we observe that poor governance, measured using our *interlock* variable, still has an important impact on the relationship between export shocks and executive bonuses. Finally, in column 4 all three instrumented interaction variables are included simultaneously, and again poor governance is the only factor that is statistically significant.

While market frictions could theoretically influence rent-capture opportunities, in our setting we find that neither firm-specific human capital nor turnover costs are that important. In contrast, Table A3 reinforces our finding that poor corporate governance is key to understanding the relationship between export shocks and executive pay.

TABLE A3
Firm-Specific Human Captial and Turnover Costs

	Executive Bonuses			
	(1)	(2)	(3)	(4)
Exports-1	0.407**	0.377**	0.407**	0.376**
	[0.161]	[0.157]	[0.164]	[0.161]
Exports-1*Interlock	0.370***	0.376***	0.373***	0.380***
	[0.089]	[0.088]	[0.087]	[0.086]
Exports-1*Human Capital		0.048		0.048
		[0.051]		[0.051]
Exports-1*Exec Turnover			0.026	0.028
			[0.025]	[0.026]
Imports-1	-0.038	-0.038	-0.043	-0.043
	[0.044]	[0.044]	[0.045]	[0.045]
Employment-1	0.228**	0.229**	0.237**	0.239**
	[0.110]	[0.109]	[0.109]	[0.109]
Capital Expenditure-1	-0.136*	-0.137*	-0.134*	-0.135*
	[0.077]	[0.077]	[0.077]	[0.076]
Interlock	-7.398***	-7.540***	-7.473***	-7.621***
	[1.927]	[1.905]	[1.894]	[1.868]
Top Tax Rate-1	-0.208	-0.212	-0.202	-0.205
	[0.322]	[0.327]	[0.321]	[0.326]
Human Capital		-1.092		-1.099
		[1.106]		[1.116]
Exec Turnover			-0.727	-0.760
			[0.558]	[0.568]
Executive Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	19,475	19,475	19,475	19,475
R-squared	0.325	0.325	0.325	0.326
SW F-Stat on Instrument	15, 4051	30, 4571, 86	16, 4137, 115	29, 4710, 531, 158

Notes: Second stage of two-stage least squares regressions. Dependent variable in all columns is the log of bonuses. Exports and the interaction terms are instrumented throughout using the Bartik style instrument and the interaction of this instrument and the other variables. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Human Capital is a binary variable indicating whether the executive's firm-specific experience at the firm is on average higher the sample mean. Exec Turnover is a binary variable indicating whether the composition of the firm's top 5 highest paid executives has changed from the previous year. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

A.4 Sample Selection

The main analysis includes firms that span the entire 21 years of the sample. This approach alleviates concerns that firm entry or exit from the sample could influence the results. In this section we explore

whether the results are robust to the use of alternate samples of firms and executives.

Column 1 of Table A4 reports results on the effect of export shocks using the full sample of firms and executives and shows that the findings are largely unchanged. The results are also robust to employing smaller, not larger, samples. Specifically, columns 2-5 then restrict the sample to those firms and executives that have at least ten or fifteen years of data.[56] We see that exports have a significant and positive impact on executive compensation which remains remarkably similar in magnitude despite large changes in the sample. For instance, focusing on executives that are in the sample for at least fifteen years reduces the number of observations to about five thousand (see column 5), and yet despite this much smaller sample the export point estimate remains exactly the same (compared to the full sample in column 1).

Columns 6-10 replicate this analysis but excludes the top tax rate variable which has relatively low coverage due to missing information on the headquarter location of the firm. This increases the sample size from thirty seven thousand observation in column 1 to about sixty thousand observations in column 6, with the sample sizes in columns 7-10 increasing accordingly. Again the point estimates on exports remain remarkably consistent despite these large changes in sample size. Overall, Table A4 shows that exports remain an important predictor of top incomes using a wide variety of different samples of firms and executives.[57]

[56] In this sample, the average number of years that a firm is in the data set is 14.4 years while the average number of years an executive is in the sample is 5 years. Therefore as we restrict the sample to longer tenured firms and executives, the number of observations falls more rapidly in the executive regressions (columns 3 and 5). In fact, very few executives are in our sample for all years and thus it is not possible to restrict our analysis to executives that span the full 21 years.

[57] A related issue is the role that executive mobility across firms plays in executive compensation, which was examined in Appendix A.2.

TABLE A4
The Impact of Export Shocks on Executive Compensation - Alternate Samples

	Full Sample	Firms 10+	Execs 10+	Firms 15+	Execs 15+	Full Sample	Firms 10+	Execs 10+	Firms 15+	Execs 15+
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Exports-1	0.192***	0.189***	0.205***	0.171***	0.193**	0.240***	0.235***	0.265***	0.204***	0.198***
	[0.045]	[0.045]	[0.075]	[0.049]	[0.085]	[0.054]	[0.050]	[0.074]	[0.041]	[0.072]
Imports-1	0.003	0.004	0.020	0.013	0.037	0.003	0.004	0.009	0.008	0.011
	[0.022]	[0.021]	[0.028]	[0.021]	[0.046]	[0.018]	[0.018]	[0.019]	[0.016]	[0.019]
Employment-1	0.101***	0.101***	0.022	0.119***	0.014	0.083***	0.091***	0.011	0.104***	0.006
	[0.037]	[0.038]	[0.045]	[0.040]	[0.061]	[0.029]	[0.030]	[0.037]	[0.034]	[0.059]
Capital Expenditure-1	0.050**	0.055***	0.076***	0.058***	0.090***	0.049***	0.051***	0.075***	0.060***	0.094***
	[0.020]	[0.021]	[0.023]	[0.020]	[0.034]	[0.016]	[0.016]	[0.020]	[0.018]	[0.028]
Interlock	0.088	0.090	0.169	0.063	0.295*	0.088**	0.096*	0.210**	0.086	0.297*
	[0.064]	[0.064]	[0.120]	[0.063]	[0.175]	[0.044]	[0.050]	[0.099]	[0.064]	[0.172]
Top Tax Rate-1	0.073	0.067	0.265	0.082	0.607*					
	[0.136]	[0.142]	[0.222]	[0.148]	[0.332]					
Executive Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,109	32,861	13,447	29,570	5,137	59,552	45,075	17,264	35,255	5,933
R-squared	0.548	0.550	0.580	0.552	0.634	0.550	0.545	0.573	0.547	0.627
SW F-Stat on Instrument	21.53	21.15	32.62	19.80	24.15	27.44	26.00	32.02	22.70	22.10

Notes: Second stage of two-stage least squares regressions. Column 1 includes the full sample of firms and executives. Columns 2-5 restrict the sample to firms with 10+ years of data, executives with 10+ years of data, firms with 15+ years of data, and executives with 15+ years of data respectively. Finally, columns 6-10 replicate these specifications but exclude the tax rate variable which increases the sample size throughout. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

A.5 Measuring Firm Size

This section demonstrates that our findings are not sensitive to alternate measures of firm size. As in EGJ (2017, Table 2), we examine the relationship between firm size and executive compensation using an OLS specification that includes executive level measures and year fixed effects. Instead of industry fixed effects, to be conservative we utilize firm fixed effects. Columns 1-6 of Table A5 show how executive compensation responds to a variety of firm size measures, in particular employment, sales, assets, costs, stock price, and market value. All variables enter with a positive and significant coefficient and the magnitude of the size effect is quite narrow (with a range of 0.16 to 0.28 across six measures). Note that the latter two measures have the largest coefficients, which is consistent with the observation that executive compensation and these two size proxies are closely related to the firm's stock price (one proxy actually is the stock price).

Next we examine whether exports matter for executive compensation above and beyond firm size. We begin by including exports without controlling for size (see column 8), finding that a ten percent increase in exports is associated with a 1.2% increase in executive compensation. In columns 9 to 14 we then add one size measure at a time to the specification, while in column 15 all size measures are included jointly. Including exports in the specification causes every one of the size coefficients to fall (compare columns 1 to 9, 2 to 10, etc.). Furthermore, the inclusion of each of the size measures causes the export point estimate to decrease too (compare columns 8 to 9, 8 to 10, etc). These results provide additional confirmation that a portion of the globalization effect operates through firm size.

Importantly the magnitude of the export effect is remarkably stable after the inclusion of a variety of different proxies for firm size. Specifically, there is no statistical difference between the export coefficients using any or all of the size measures. The fact that the export coefficient is positive, significant, and similar in magnitude in every specification indicates that our finding that globalization increases executive pay conditional on size is robust. We conclude from Table A5 that all measures of firm size generate similar results.

TABLE A5
The Impact of Firm Size on Executive Compensation - Without and With Exports

	Executive Compensation														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Exports-1								0.124***	0.104**	0.098**	0.091***	0.102**	0.097***	0.068***	0.085***
								[0.046]	[0.040]	[0.044]	[0.032]	[0.041]	[0.029]	[0.021]	[0.026]
Employment-1	0.172***						0.010		0.159***						0.022
	[0.034]						[0.063]		[0.032]						[0.061]
Sales-1		0.161***					0.058			0.150***					0.047
		[0.038]					[0.068]			[0.040]					[0.064]
Assets -1			0.180***				-0.134**				0.163***				-0.150**
			[0.037]				[0.067]				[0.032]				[0.064]
Costs-1				0.162***			0.031					0.151***			0.039
				[0.028]			[0.065]					[0.030]			[0.063]
Price-1					0.269***		0.108*						0.263***		0.127**
					[0.031]		[0.055]						[0.027]		[0.052]
Market Value-1						0.277***	0.216***							0.269***	0.196***
						[0.025]	[0.052]							[0.023]	[0.050]
Executive Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,993	20,048	20,048	20,043	20,003	19,768	19,738	20,053	19,993	20,048	20,048	20,043	20,003	19,768	19,738
R-squared	0.575	0.577	0.577	0.577	0.59	0.594	0.596	0.574	0.577	0.579	0.579	0.579	0.592	0.595	0.597

Notes: Dependent variable is log of total executive compensation. Estimation by OLS. Exports, employment, sales, assets, costs, price, and market value are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

A.6 Top 1% in Other Developed Countries

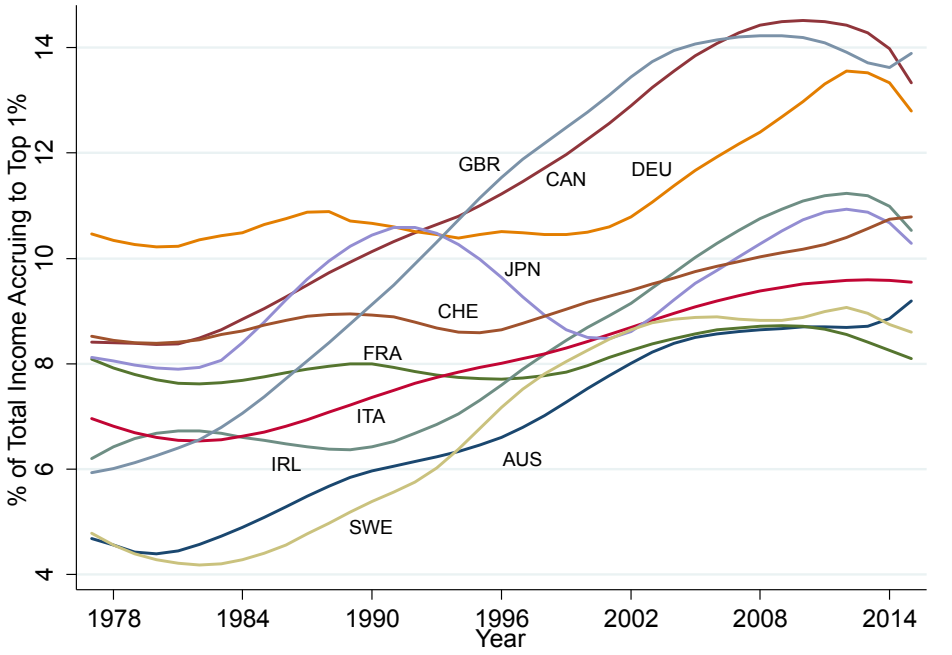
Our analysis examines why top incomes in the U.S. have increased so dramatically, as illustrated in Figure 1. This section provides some evidence on trends in top incomes in other developed countries.

Employing data from the World Wealth and Income Database (WID: Alvaredo, Chancel, Piketty, Saez, and Zucman), the evolution of the top 1% fiscal income shares for a variety of OECD countries is shown in Figure A6. The share of income going to the top 1% has increased in all ten of these countries.[58] While the share of income going to top earners has evolved in different ways across these countries, a clear upward trend is evident in Figure A6. In particular, the share of income going to the top earners ranged from 4-10% early in the sample but by the end of the sample it was in the 8-14% range. The growth in top incomes is not a phenomenon specific to the U.S. and while there are institutional differences across countries, we see little reason to believe that the main relationship between globalization and executive compensation identified in this paper does not apply to other countries as well.

[58] We focus on a group of OECD countries that have available data, that are similar to the U.S., or that have been used for comparison purposes in the literature (Piketty and Saez 2006; Alvaredo et al. 2013).

FIGURE A6

Top 1% in Other Developed Countries



Notes: Kernel-weighted local polynomial smoothed data from World Wealth and Income Database (WID).

A.7 Import Shocks

So far our analysis has focused on the impact of exports on executive compensation, while adding imports as a regressor throughout. Import competition may adversely affect firm performance which in turn could reduce executive compensation. However, imported inputs may increase firm profits and thus increase executive compensation. While recent studies have found an adverse impact of imports on workers, this may not be the case for top-level executives (Cunat and Guadalupe 2009). This section extends our previous analysis by examining the impact of exogenous import shocks on executive compensation.

We construct an analogous Bartik style instrumental variable for imports. Specifically, this import instrument is constructed using presample bilateral import flows and the growth in industry-level imports in other developed countries.

Column 1 of Table A7 reports our earlier results that instrument for exports. Column 2 then instruments for imports instead, using our Bartik inspired import instrument. While the import instrument is successfully predicting actual import flows, the second stage coefficient on imports is close to zero,

indicating that exogenous import shocks have no effect on executive compensation. Notice that the uninstrumented export coefficient is now less precisely estimated than in the main text but the point estimate is actually larger (see Table 2, column 7 for comparison). Column 3 then simultaneously instruments for both exports and imports and finds that both first stages are strong (the SW robust F-statistics are above 10). However, in the second stage, only the export coefficient is statistically significant (and it is quantitatively larger in absolute value). Imports do have a negative point estimate, but in our analysis it is not significantly different from zero. Overall, we find that exports and export shocks both significantly increase executive compensation, while imports of any type have little effect on top incomes.

TABLE A7
The Impact of Export and Import Shocks on Executive Compensation

	Export IV	Import IV	Export and Import IV
	(1)	(2)	(3)
Exports-1	0.212***	0.081	0.370**
	[0.077]	[0.051]	[0.177]
Imports-1	0.014	0.020	-0.285
	[0.028]	[0.101]	[0.209]
Employment-1	0.083**	0.080**	0.109**
	[0.038]	[0.037]	[0.047]
Capital Expenditure-1	0.066***	0.085***	0.064**
	[0.025]	[0.029]	[0.027]
Interlock	0.137*	0.153**	0.137*
	[0.076]	[0.072]	[0.077]
Top Tax Rate-1	-0.095	-0.139	0.005
	[0.166]	[0.161]	[0.205]
Executive Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	19,473	19,473	19,473
R-squared	0.577	0.580	0.546
SW F-Stat on Instrument	14.76	13.73	11.3, 10.8

Notes: Second stage of two-stage least squares regressions. Column 1 reports the baseline results that instrument for exports. Instead, column 2 instruments for imports using an analogous Bartik style import instrument. Finally, column 3 instruments for both exports and imports simultaneously. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

A.8 Additional Robustness: Compensation, Industry, and Rent-Capture

Table A8 presents a couple of additional sensitivity checks. Column 1 re-reports our earlier results from the main text, using total compensation realized by an executive in a given year (TDC2) as the dependent variable, for comparison purposes. The *ExecuComp* data set also provides an alternate measure of total compensation (TDC1), which includes compensation awarded but not necessarily realized in the given year using a Black-Scholes calculation.[59] Despite the differences in how compensation is calculated, column 2 of Table A8 shows that the export coefficient remains similar when using this alternate measure of total executive compensation.

Column 3 relies on a time-varying measure of the firm's NAICS industry (from *Compustat*) rather than using the time-invariant NAICS code provided in the *ExecuComp* data set, which is used in the main analysis. The benefit of using this time-varying industry measure is that it accounts for the possibility that a firm's primary industry may change over the sample.[60] The downside is that potentially small changes in a firm's composition of production, which shift it from one NAICS primary industry to another, could translate into large changes in measured global exposure. This may generate noisy swings in the data, when in fact the firm's switch from one NAICS industry to another may represent a rather small readjustment of the firm's activities.[61] Column 3 uses this time-varying measure of the firm's industry, includes industry fixed effects, and we see that the effect of export shocks on compensation remains largely unchanged.

Finally, rather than relying on board-based measures of poor governance, column 4 uses an entirely different measure based directly on the co-movement of the firm's stock price and executive compensation. Specifically, we define the binary variable *rent* to equal one if the firm's stock price fell but average executive compensation at the firm rose in a given year. The results indicate that defining poor governance in this way also generates a significant positive coefficient and does not alter the coefficient on export shocks that is of particular interest. Thus, we see that our results are robust to using proxies for poor governance that are not based on the structure and composition of the board of directors at the firm.

[59] See Kaplan and Rauh (2010) for a discussion of how TDC2 and TDC1 differ and why TDC2 is a better measure of adjusted gross income.

[60] However, it turns out that the majority of firms in the sample do not switch NAICS industries.

[61] See Keller and Yeaple (2009) for an example of how a firm's changing primary industry may have major implications for the results.

TABLE A8
The Impact of Export Shocks on Executive Compensation - Sensitivity

	Baseline	Alt Execu Comp	$NAICS_t$	Rent
	(1)	(2)	(3)	(4)
$Exports_{-1}$	0.212***	0.192***	0.303**	0.211***
	[0.077]	[0.057]	[0.131]	[0.078]
$Imports_{-1}$	0.014	-0.007	-0.024	0.014
	[0.028]	[0.021]	[0.062]	[0.029]
$Employment_{-1}$	0.084**	0.137***	0.096**	0.081**
	[0.038]	[0.030]	[0.040]	[0.040]
$Capital\ Expenditure_{-1}$	0.066***	0.079***	0.039	0.067**
	[0.025]	[0.021]	[0.030]	[0.027]
Interlock	0.137*	0.075	0.172**	
	[0.076]	[0.055]	[0.076]	
$Top\ Tax\ Rate_{-1}$	-0.095	-0.230*	0.013	-0.087
	[0.166]	[0.136]	[0.189]	[0.166]
Rent Capture				0.126***
				[0.020]
Executive Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry FE	No	No	No	Yes
Observations	19,473	19,011	18,408	19,473
R-squared	0.577	0.596	0.579	0.578
SW F-Stat on Instrument	14.76	14.89	13.51	15.15

Notes: Second stage of two-stage least squares regressions. Column 1 reports the baseline results. Column 2 uses an alternate executive total compensation measure (TDC1) as the dependent variable. Column 3 uses a time-varying measure of the firm's NAICS industry (which has implications for export and import exposure). Finally, column 4 uses a different measure of rent-capture that equals one in a given year if the firm's stock price fell while the average compensation of executives rose. Exports, imports, employment, capital expenditure, and top tax rate are all in logs. Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1.

A.9 Gravity Instrumental Variable Details

This section provides additional details and results from the industry-specific regressions that are used to construct the gravity instrumental variable. To reiterate, using the specification outlined in equation 4, this approach identifies variation in bilateral exports driven by changing economic conditions in the foreign importing country.

To eliminate extensive margin entry or exit into foreign markets that could be driven by endogenous factors, the bilateral pair sample of foreign countries is restricted in two ways to reduce the sporadic

exports of goods to some small foreign countries. First, as before, the sample only includes the top 100 foreign trading partner countries. Second, within each industry, the sample only includes foreign countries to which the U.S. exports a positive amount in all years.[62] This ensures that the set of foreign trade partners does not change over time within an industry.[63]

Equation (4) is separately estimated for each six-digit NAICS industry. Reporting results from all of these individual regressions is impractical given the large number of industries but Table A9 reports findings from a few industries. Two things are noteworthy. First, the number of observations varies by good, which indicates that the U.S. exports different goods to different sets of countries. Thus an import demand shock in one particular foreign country will affect U.S. exports of good x but may not affect exports of good y. Second, Table A9 shows that there is variation across industries in terms of how responsive they are to changing economic conditions in the foreign country. For instance, exports in some industries, such as soft drinks, asphalt shingles, and small arms, are relatively less responsive to growth in GDP in the foreign country. However, the exports of other types of goods, such as pharmaceuticals, semiconductors, and medical instruments, increase substantially in response to foreign GDP growth. Table A9 confirms that there is variation across industries in terms of how they respond to foreign import demand shocks.

[62] Unlike the baseline and exchange rate instruments, this approach does not make out-of-sample predictions and thus it is necessary to first balance the sample.

[63] However, the set of foreign countries can vary across industries. For instance, one industry may export to 98 foreign countries in all years but another may only export to 81 foreign countries in all years. This variation is not problematic, and is actually, useful for the subsequent analysis.

TABLE A9
The Construction of Gravity Instrument using U.S. Bilateral Trade Data

	Exports					
NAICS Code:	312111	324122	325411	332994	334413	339112
NAICS Description:	Soft Drinks	Asphalt Shingles	Pharmaceutical & Medicine	Small Arms	Semiconductors	Surgical & Medical Instruments
	(1)	(2)	(3)	(4)	(5)	(6)
Real GDP	0.247***	0.257***	1.171***	0.610***	1.270***	1.128***
	[0.045]	[0.033]	[0.019]	[0.023]	[0.026]	[0.016]
Distance	-0.814***	-0.597***	-1.033***	0.159*	-0.320**	-1.323***
	[0.125]	[0.110]	[0.069]	[0.087]	[0.124]	[0.067]
Contiguous	3.118***	2.824***	-0.456***	1.685***	2.303***	-0.135
	[0.281]	[0.274]	[0.129]	[0.221]	[0.198]	[0.120]
Observations	798	819	1,533	1,302	1,722	1,743
R-squared	0.316	0.329	0.730	0.448	0.572	0.700

Notes: The dependent variable is the log of exports in that particular six-digit NAICS industry. Estimation by OLS. Both real GDP and distance are in logs as well. Only six industries are reported in this table due to space constraints but this same exercise is repeated for all of the six-digit NAICS industries in the sample. Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.