Globalization and Executive Compensation*

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September 29, 2017

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. 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 due to positive export shocks but not decreasing due to 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

*We are grateful to Nick Bloom, Matilde Bombardini, Brian Cadena, Keith Head, Rod Ludema, Terra McKinnish, Ferdinando Monte, Jan Schymik, Daniel Tannenbaum, Karen Helene Ulltveit-Moe, and numerous other colleagues, as well as participants at a variety of presentations for helpful comments and suggestions. This research was supported by NSF grant 1360207 (Keller).

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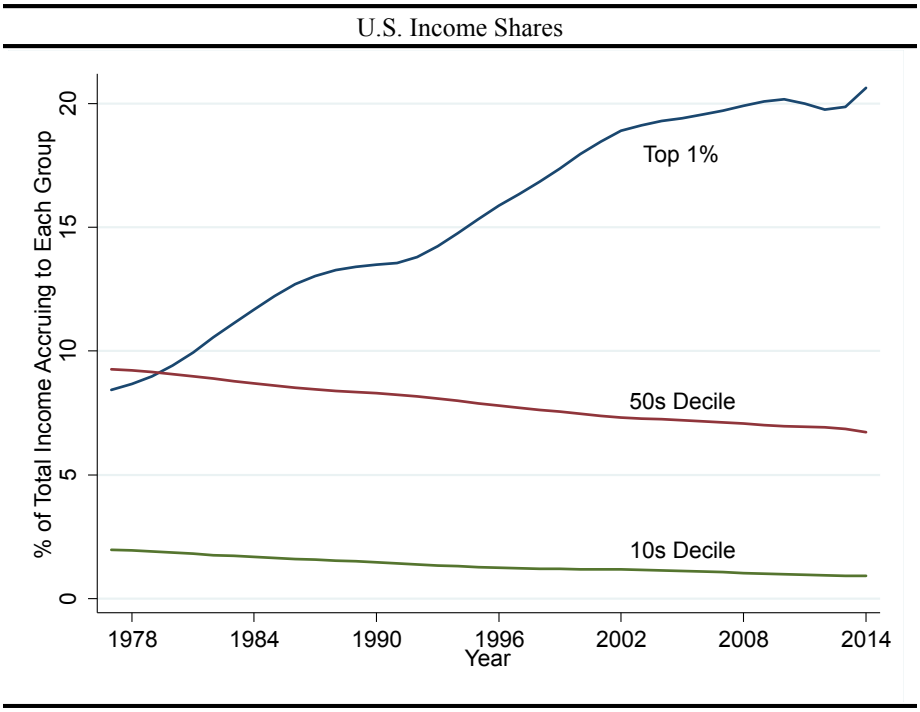
1 Introduction

"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 appear to drive U.S. inequality, as Figure 1 shows:

FIGURE 1



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

This paper examines the relationship between globalization and growing inequality by focusing on the incomes of top business executives. 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) made upwards of $9 million a year, putting both safely within the top 1% of all income earners.[1] Moreover, non-finance business executives represent the largest share of the top 1% (approximately a third of the total according to Bakija et al. 2012) and are representative of the top 1% more generally (Kaplan and Rauh 2013). Furthermore, executive compensation is rising quickly, with CEO pay increasing more than eight times as fast as average worker pay 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 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 Edmans, Gabaix, and Jenter 2017, Kaplan and Rauh 2013, and Bertrand 2009). Thus, our first goal is to examine whether globalization is a cause of 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 measure of globalization:[4]

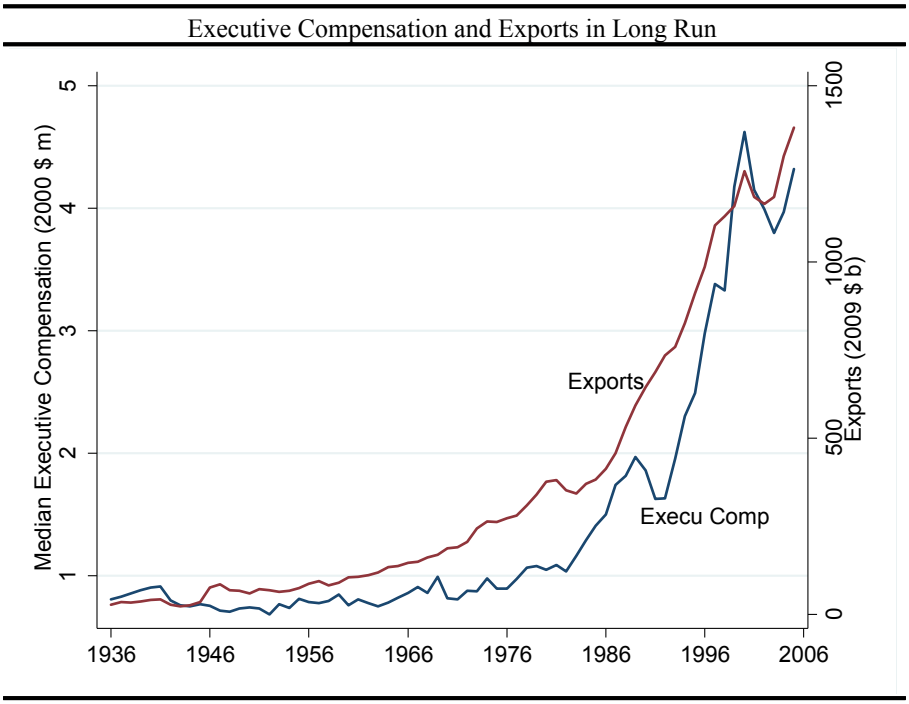
[1] Piketty, Saez, and Zucman (2017) note that $1.3 million is the *average* pre-tax income of the top 1% in 2014, with the cutoff lower than that. The threshold income depends to some extent on whether measures of total income or labor income are employed; Guvenen and Kaplan (2017) discuss a number 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] Entertainment and sports superstars have benefited from the ability to reach large global audiences, in contrast to other professions that still need to meet in person (Gordon and Dew-Becker 2008).

[3] Appendix A.6 shows that the share of income going to the top 1% is increasing in most OECD countries. Gordon and Dew-Becker (2008) and Edmans, Gabaix, and Jenter (2017) examine why the trend is quantitatively stronger in the US.

[4] Information on international trade is more readily available than other measures of globalization. At the same time, exports and imports are likely correlated with other forms of globalization and thus serve as useful proxies 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. Globally engaged firms reward talented executives that can 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 (Antràs and Rossi-Hansberg 2009). High-ability executives are being compensated for shrewd business decisions that promote sales abroad. Furthermore, globalization increases optimal firm size (Melitz 2003), which can expand the scope of the executive's job and drive up compensation (Gabaix and Landier 2008, Tervio 2008). Globalization can also affect the matching of heterogeneous managers and workers (Antràs, Garicano, and Rossi-Hansberg 2006, Caliendo, Monte, and Rossi-Hansberg 2017), lead to a bidding war for managerial talent (Marin and Verdier 2012), and change the scope of the manager's job by altering the firm's organizational structure

(Rajan and Wulf 2006, Caliendo, Monte, and Rossi-Hansberg 2015).[5] In short, globalization may change the nature of the executive's job, increase the importance of top talent, and thus pay rises accordingly (Rosen 1981).

Second, globalization may lead to pay-for-non-performance, where the executive is being rewarded for factors that are unrelated to their talent or actions. One possibility is that firms increase their exports 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.[6] Even more concerning, globalization may also increase the possibility for executives to capture rents (see 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 executives. By intensifying competition for talent, globalization may also make extreme salaries more acceptable by shifting social norms (Piketty and Saez 2003, 2006), which facilitates future rent-capture behavior.[7] Thus, due to both luck and rent-capture, 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 pay reflects market forces that optimally reward the executive's performance, inequality will be less objectionable than if executive pay increases due to factors, such as luck or worse rent-capture, that do not reward performance. In addition to the immediate distributional implications, executive compensation has long been a controversial topic (see Bertrand 2009, Edmans, Gabaix, and Jenter 2017) with broader ramifications. The reason for the recent increase in executive pay is especially important because well functioning societies depend to a certain extent on cohesion, which appears to be at risk because economic and political polarization have increased in many countries.[8]

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.

[5]There is also evidence that CEOs are increasingly externally recruited and have general, not firm-specific skills (Murphy and Zabojnik 2006, Frydman 2016). Guadalupe and Wulf (2010) present evidence on how import competition "flattens" the organization of the firm; our analysis below encompasses imports as well.

[6]Also Fabbri and Marin (2015) emphasize industry effects for executive compensation.

[7]Such contagion effects can also exist in competitive assignment models (Gabaix and Landier 2008).

[8]For an analysis of the impact of globalization on economic polarization, see Keller and Utar (2016), and for the link between globalization and political polarization, see Autor, Dorn, Hanson, and Majlesi (2016) and Che, Lu, Pierce, Schott, and Tao (2017), for example.

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 the simple correlation illustrated in Figure 2 we find 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), and insider board relationships (Bertrand and Mullainathan 2001) lead to higher executive compensation.[9] The result that exports increase compensation controlling for a number of well-established explanations of rising executive pay (in particular size) is an important contribution of our paper. While a portion of globalization's impact on executive compensation operates through firm size and technology, we find that exports lead to higher pay even conditional on these firm characteristics, and in an extension, that exports have raised executive pay more than the wage of the average worker. Quantitatively, we find that the magnitude of globalization's impact on executive compensation is similar to that of firm size and technology. This indicates that globalization has been a more important force behind the increase in executive compensation and inequality 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 performance by employing an instrumental variable approach that focuses on exogenous shocks to exports. Our strategy utilizes a Bartik (1991) style shift-share instrument that identifies shocks, which by construction are unrelated to the executive's talent and actions. Specifically, our instrument is constructed using presample industry-level bilateral export flows and exogenous industry-level export growth in other high-income countries.[10] We find that executives are also rewarded for exogenous increases in exports.[11] 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

[9] Interestingly, we do not find 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.

[10] 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).

[11] Related is the concept of relative performance evaluation (RPE; Holmström 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. The lack of RPE has been documented by Gibbons and Murphy (1990) and others. 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).

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 results show that export shocks primarily increase bonus payments, with little impact on less-discretionary forms of compensation.[12] 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 than others. 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 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.[13] 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 rising inequality (Katz and Autor 1999, Feenstra and Hanson 1999). However, this literature tended to focus on the distinction between skilled and unskilled workers, not the role of the top 1% of income earners. More recently there has been a growing consensus that rising import competition, driven in part by the integration of China into the world economy (Krugman 2008), 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.[14] This is important not least because high-income earners, especially

[12] In principle, the stock-option innovation of the 1990s may have been important for diverting additional rents to top executives (Bebchuk and Fried 2004, Bertrand 2009); in the context of globalization, however, pay-for-non-performance in the form of options has not been important according to our results (see Table 6).

[13] This includes dealing with the endogeneity of poor governance, exploring alternate explanations for why pay responds to export shocks, 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.

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

the top 1%, are arguably the most important driver of income inequality (see Figure 1, as well as Piketty and Saez 2003, 2006, Piketty, Saez, and Zucman 2017).[15]

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, rent-capture has been criticized as an explanation for the dramatic *rise* in executive pay since 1980 because by most measures corporate governance has *strengthened* since 1980.[16] Growth in firm size is another prominent explanation for the recent increase in executive compensation (Gabaix and Landier 2008). However, firm size also increased from the 1940s to the early 1970s when CEO compensation was almost constant (Frydman and Saks 2010). In contrast, globalization provides a compelling explanation for the evolution of executive compensation because the time series behavior of exports and executive compensation is similar before and after 1980 (see Figure 2).[17]

Third, while anecdotal evidence indicates that globalization may be an important driver of executive compensation, it has received little attention from researchers studying executive pay. One critique argues that globalization should be ubiquitous whereas the trends in top income shares across countries differ (Alvaredo, Atkinson, Piketty, and Saez 2013, Piketty, Saez, and Stantcheva 2014).[18] Another argument contends that globalization should affect occupations differently whereas the trends in top incomes across occupations are the same (Kaplan and Rauh 2013). In contrast, our analysis of the impact of globalization on top incomes is based on longitudinal, micro-level data that controls for many potential sources of spurious results.

Fourth, we provide a unifying analysis of executive compensation that combines pay-for-performance

[15]Gordon and Dew-Becker (2008) provide a survey of U.S. inequality both at the top and the bottom of the income distribution.

[16]See Murphy and Zabojnik (2004), Edmans, Gabaix, and Jenter (2017). 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, and in 2010 the Dodd-Frank Act strengthened this to stipulate that only independent consultants can be hired. Indeed, Chhaochharia and Grinstein (2009) find strong decreases in CEO compensation at firms affected by Sarbanes-Oxley (2002)-inspired legislation requiring that the majority of board directors are independent. In contrast, some argue that higher executive pay should be viewed as compensation for the hassle of increased regulatory requirements (Hermalin 2005).

[17]Cunat and Guadalupe (2009) present evidence that import competition increases the sensitivity of executive pay to performance but do not study non-performance pay. We also consider import competition, but this has a smaller and insignificant impact on executive compensation compared to exports (see Appendix A.7).

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

and rent-capture, which are often treated as mutually exclusive explanations. Our findings show that executive compensation is increasing in firm size and technology investments, 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.[19] At the same time, not all compensation is pay-for-performance because, as in Bertrand and Mullainathan (2001), executive pay increases with shocks not caused by the executive. Our approach of using globalization to identify these shocks to firm performance provides immediate advantages. For instance, some studies rely on changes in the firm's market value, which due to mechanical reasons may be linked to executive pay given that both are correlated with the firm's stock price (Himmelberg and Hubbard 2000, Frydman and Saks 2010). Suggestive evidence for rent-capture is presented by demonstrating that non-performance pay is asymmetric: positive shocks increase executive pay but negative shocks do not decrease pay.[20] We also provide direct evidence on rent-capture by showing that export shocks disproportionately increase discretionary pay to powerful managers at poorly governed firms.

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 relationship between executive pay and exports. Section 3 tackles our first key question of whether globalization is contributing to the rapid increase in executive compensation. Confirming this to be the case, we then proceed to our second main question: why is this occurring? Specifically, in Section 4 we rely on export shocks that are orthogonal to executive talent and actions to show that pay-for-non-performance is important in this observed relationship. By focusing on discretionary pay, poor governance firms, and managerial power, Section 5 then finds that rent-capture plays an important role in pay-for-non-performance. We explore a wide variety of extensions in both Section 6 and in the Appendix, which shed additional light on the relationship between globalization and executive pay as well as demonstrate that the results are robust to other specifications and samples.

2 Data

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

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

[20] See also Bertrand and Mullainathan (2001) and Garvey and Milbourn (2006) on asymmetry.

2.1 Executive Compensation

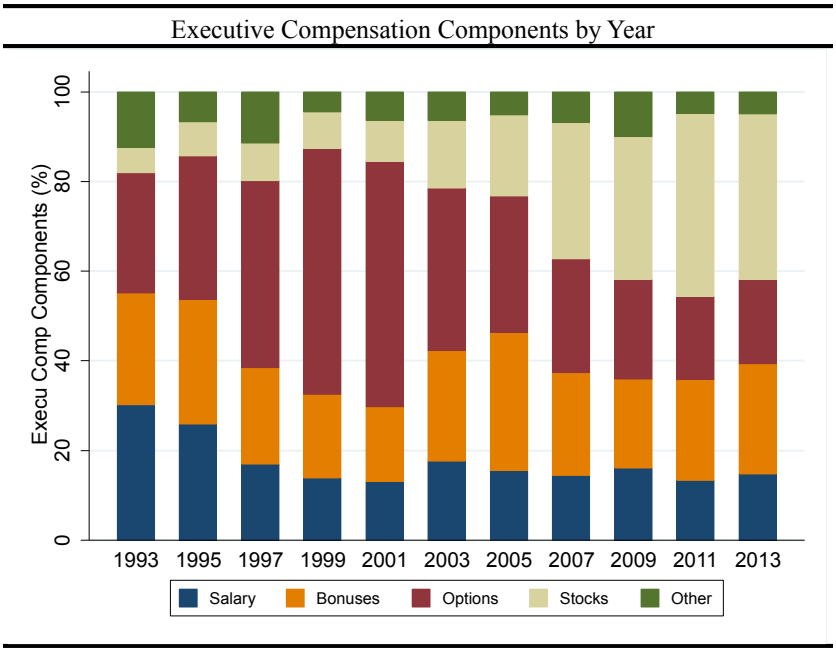
Compensation information of the top five executives within each Standard & Poor (S&P) firm was obtained from the *Compustat ExecuComp* data set. To the best of our knowledge this is the most comprehensive publicly available data set on executive compensation, with information about each executive, including 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 an alternate measure of total compensation (TDC1), which includes compensation awarded but not necessarily realized in the given year (see Tables 3 and A9). We also present results examining the impact of globalization on the ratio of executive compensation to the average worker wage (Table 9).

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 (Table 6). 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.[21] Note that all nominal compensation values are converted to real 2014 U.S. dollars using the Consumer Price Index (CPI) provided by the Bureau of Labor Statistics. Figure 3 reports these compensation components over time:

[21] 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 personal benefits, 401k plans, life insurance premiums, termination payments, and tax reimbursements among other things.

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.

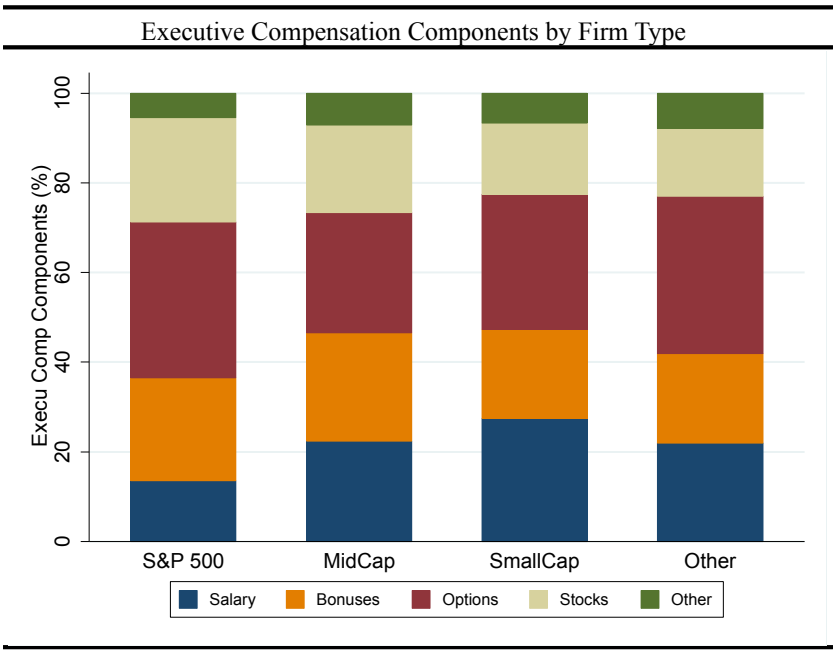
On average in 2013, a top five executive in our main sample earned $4.4 million which consisted of about $0.6m of salary, $1.1m of bonuses, $0.8m of options, $1.6m of stocks, and $0.2m of other compensation (using real 2014 dollars). By comparison, CEOs earned $9.1m overall which consisted of $1.1m of salary, $2.3m of bonuses, $2.0m of options, $3.5m of stocks, and $0.3m of other compensation. The growth of stock options since 1970 is often emphasized, however cash remunerations such as salary and bonuses have been factors as well (Bertrand 2009). 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).[22]

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

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

at S&P 500 firms (14%) and a 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 (see 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.

Our subsequent results are broadly similar across a range of different sample definitions, including those that are broader and narrower, as shown in Table A.4.

2.2 Globalization

Our main 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.[23]

Employing industry export data has a number of advantages. Most importantly, it reduces 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 (U.S. 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 (see section 6.2).

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 analyze the role of a variety of factors that are often found to affect executive pay.

Following the insights of Gabaix and Landier (2008), we include firm size as a key predictor of executive compensation. There is some disagreement in the literature on what is the best measure of firm size (e.g., Gordon and Dew-Becker 2008, Frydman and Saks 2010, EGJ 2017). Our main measure of size is the firm's number of workers. We prefer to proxy for size using employment rather than market value because both market value and executive compensation are typically a function of the firm's stock price, and thus a positive correlation is not surprising. However, we show that our findings are similar if we proxy for size using firm sales, assets, costs, stock price, or market value (see Tables 3 and A5).

Technological change, in particular in the form of information and communication technology, is also likely to be important for executive compensation (see Antràs and Rossi-Hansberg 2009). We follow the customary method of measuring technology investment using information on the capital expenditures of

[23]In the case of multi-industry firms, this measure reflects the primary industry of the company. For these large and diversified firms, relying on their main industry may introduce classical measurement error, which would attenuate our findings (as Keller and Yeaple 2009 show 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 exports. However, similar results are obtained in Appendix A.9 when the time-varying NAICS measure from *Compustat* is used instead.

the firm (Feenstra and Hanson 1999).

By encouraging skimming or rent-capture, poor corporate governance may be an important driver of executive compensation (e.g., Bertrand and Mullainathan 2001). Building on existing approaches, we measure governance using information on the relationship between the executives and the board of directors of the company, whose tasks include making compensation decisions.[24] Specifically, our *interlock* measure is defined as a binary variable indicating whether any executive at the firm (in a given year) serves on the board's compensation committee, 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.

We recognize that the corporate governance of the firm may itself be endogenous. However, we find that our results are similar when we eliminate all short-run fluctuations in governance within a firm by focusing on long-run changes (see Table A1). This suggests that the endogeneity of corporate governance is not the main driver of our results. Also note that the incidence of both *interlock* and *insider board* has declined towards the end of the sample period due to the 2002 Sarbanes-Oxley Act and other recent legislation designed to improve corporate governance. 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.[25]

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 executives in our data set face the same marginal federal (U.S.) income tax rate, 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

[24] There is clearly scope for conflicts of interest because, for example, directors receive compensation for serving on the company's board. Bebchuk and Fried (2004) report that directors in the largest 200 firms receive on average $152,000 annually.

[25] We have also considered corporate governance indices, including the "Governance Index" constructed by Gompers, Ishii, and Metrick (2003) and the "Entrenchment Index" constructed by Bebchuk, Cohen, and Ferell (2008). However the coverage of both of these variables is limited: 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.

explain part of the growth in top incomes.

Finally, compensation is related to the individual characteristics of the executive. While 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 relatively strong. 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.[26] Education is defined as whether the executive has a doctorate degree. Later we examine whether globalization increases the market returns to more experienced and educated executives, with the results in Table 11 showing that this is not the case. Finally, given the detailed nature of the data set, we can observe individuals entering and exiting the top echelon of the firm. This may be important because there is evidence that executive skills have become more portable which could influence executive pay (Frydman 2016, EGJ 2017). However, we find that the impact of globalization on non-performance pay is not strongly influenced by executive mobility and turnover (Appendix A2).

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.[27] 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.[28]

Columns 1-3 of Table 1 report summary statistics using the full sample. Columns 4-6 report summary statistics for the sample that has data on all variables.[29] Finally, columns 7-9 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-level, and executive-level variables are similar across these different samples. Firms in the balanced sample are

[26]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).

[27]For instance, services industries are excluded. Note that 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.

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

[29]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.

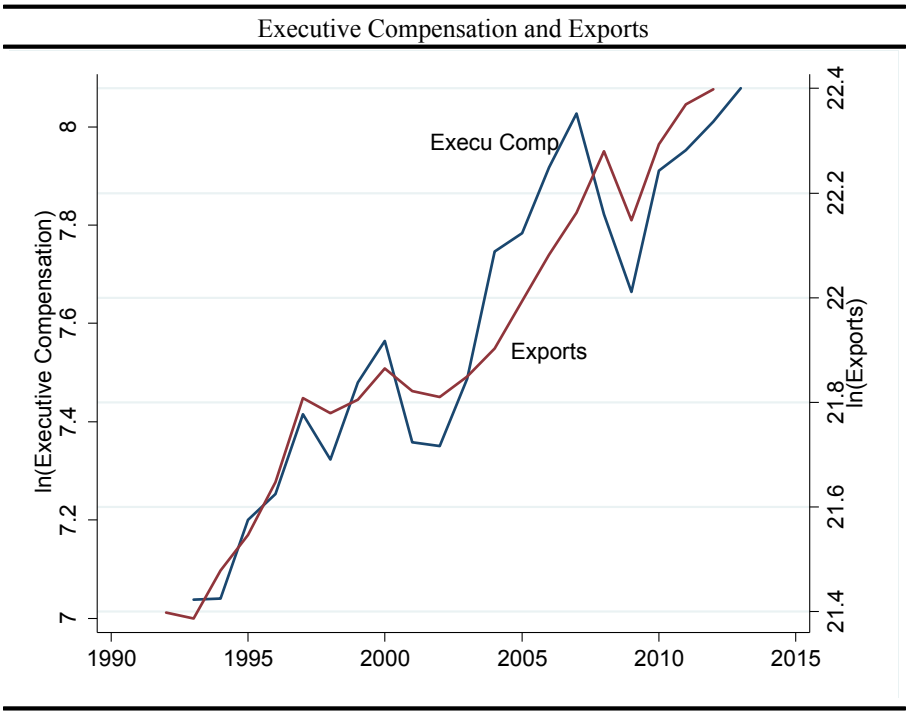
on average slightly larger in terms of employment and capital expenditures, but similar in terms of trade, governance, and the top tax rate. The average level of total executive compensation varies modestly, while the executive characteristics are very similar across samples. The similarity of these 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).[30] 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). As we see in Table 1, 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 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 manager, the large majority of executives in our sample are male, and a small fraction have a doctoral degree.

Figure 5 examines the 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.

[30] 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.

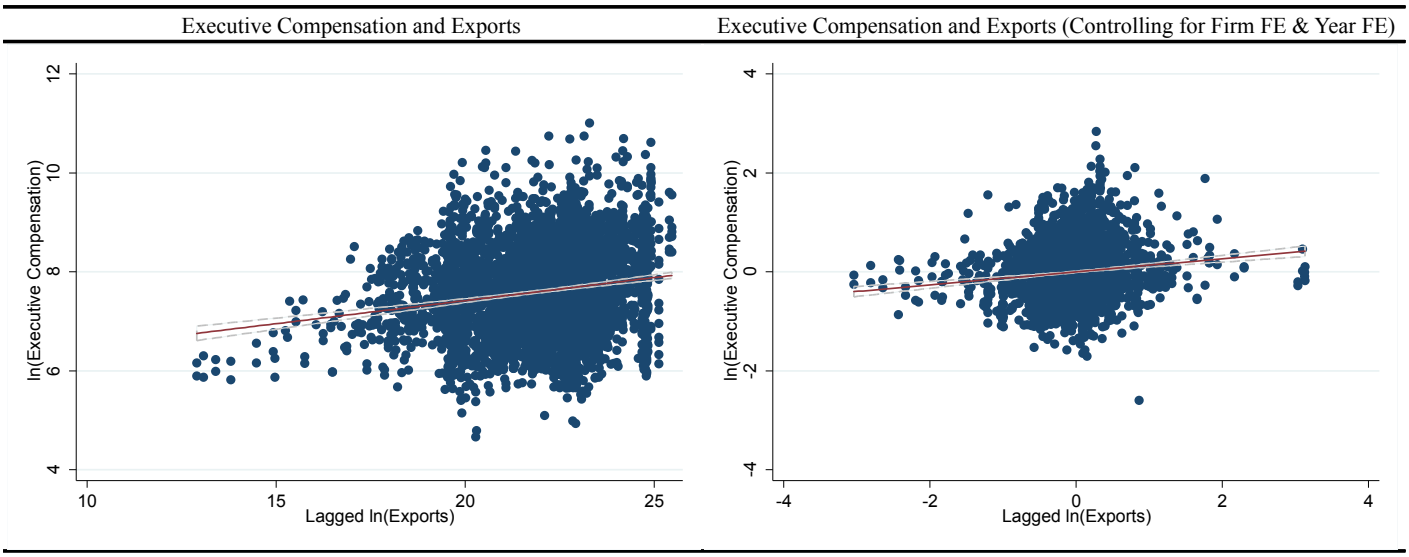
FIGURE 5



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, because 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 is on the left; an analogous scatter plot is on the right after controlling for firm fixed effects and year fixed effects.

It is encouraging that this finding 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 and industry 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 the general practice in the literature and include firm and year fixed effects (γ_f and γ_t, respectively).[31] 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 takes 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.[32] 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 exports affects compensation holding firm size constant. 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 may raise their compensation accordingly. The inclusion of both size and technology in 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 in an analogous way to exports.[33] 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 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.

[31] 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.9).

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

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

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. 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). There is also evidence that technology investments (*cap_exp*) raise executive compensation (see column 2). 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),[34] 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.[35]

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.[36] 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, affect 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. The coefficients on employment and capital expenditures also drop which provides further evidence that globalization is a deep determinant of executive compensation. These findings are not surprising, given

[34] Or a reciprocal relationship with another firm exists.

[35] This insignificant result may be due to our reliance on state tax variation.

[36] 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 abundance of evidence that shows trade liberalization increases firm size. However, 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 positive point estimates, 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 an alternate compensation measure (TDC1), which is pay awarded but not necessarily realized, and still finds this responds positively to exports. Furthermore, the results are not sensitive to our firm size proxy; column 3 shows that the inclusion of firm sales instead of employment does not alter our findings. Finally, column 4 utilizes the broadest possible sample, with more than three times as many observations, and finds similar results. This alleviates concerns about sample selection bias. If anything, our conservative reliance on a balanced sample attenuates the findings on the importance of exports (the point estimate is 0.07 in column 1 but is 0.08 in column 4). Additional results using different samples, alternate compensation measures, and employing different firm size variables are shown in the Appendix (see sections A.4, A.5, and A.9).

4 Pay-for-Non-Performance

Our 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 reflect the talent and actions 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 talent and actions. In practice both channels may be 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 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 high-income countries.[37] Specifically, we multiply presample 1991 bilateral export flows for each detailed industry by the growth in industry exports from eight other countries.[38] 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).[39]

This approach identifies variation in U.S. exports stemming from common import demand shocks for a particular good, 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

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

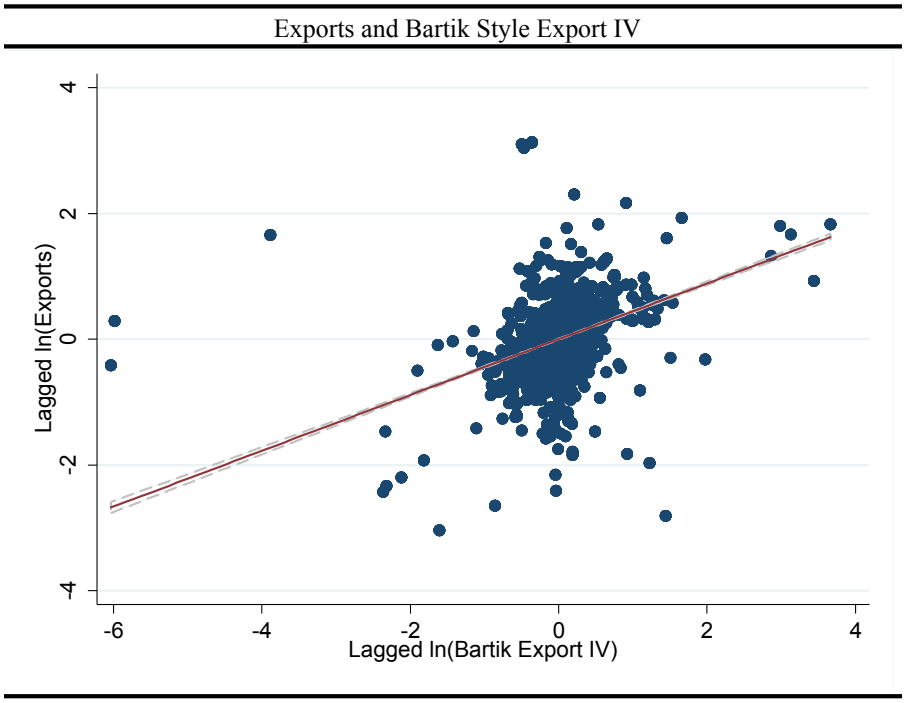
[38]The eight countries are Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland, as in Autor, Dorn, and Hanson (2013).

[39]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 in the actual data set and could be endogenous.

high-income countries. In addition, improvements in transportation and communication would typically make it easier to export particular goods for both the U.S. and other similar countries. Importantly, by relying on variation that is unrelated to executive or firm-level characteristics, this method eliminates fluctuations in exports that are due to the executive's talent or actions. Thus, if executives are rewarded solely for their actions, 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, this will provide evidence that the executive is being rewarded for something other than managerial performance (i.e. compensation reflects pay-for-non-performance). Below we will also explore whether the findings that pay responds to shocks can be explained in an optimal-contract setting, for example due to firm-specific human capital (see section A.3)

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.

One important threat to our identification strategy is that exports from the U.S. and other high-income 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 countries used to construct the instrument, is 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 in other 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 talent or actions, 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 their 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 (e.g., Bertrand and Mullainathan 2001). Furthermore, we find that the effect is sizable: 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 (i.e. relative performance evaluation, RPE; Holmström 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 (e.g. when there are limits on the set of feasible contracts or bounded rationality leads to the optimal adoption of rules-of-thumb).[40] 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 our results as evidence that luck and rent-capture are playing 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 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 complicate 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 are 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.[41] Furthermore, there is evidence that the response of compensation to positive and negative export shocks is not symmetric (see Figure 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

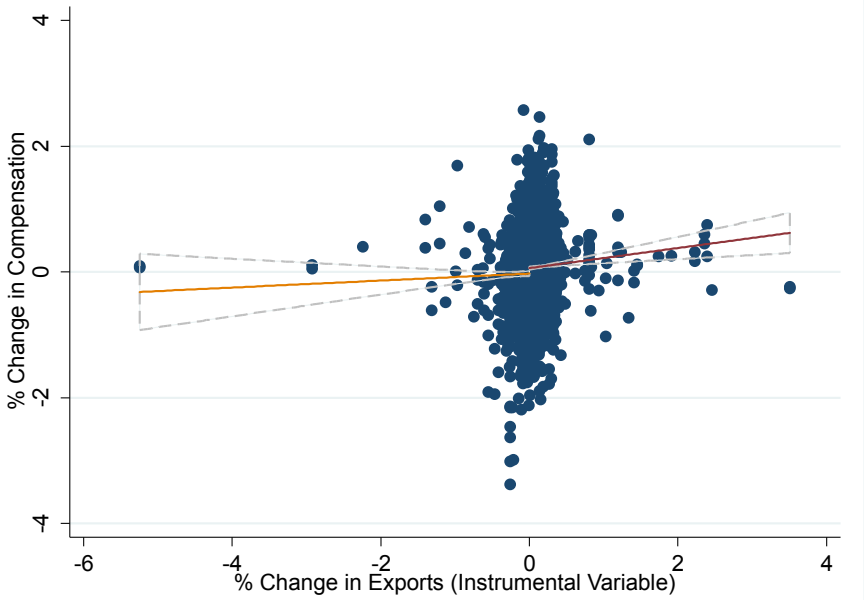
[40] See Edmans, Gabaix, and Jenter (2017) for more discussion.

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

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 at all (the slope of this line is 0.05 but the relationship is not statistically different from zero). Positive shocks, however, do significantly raise executive compensation (the slope is 0.16 which is significant at the one percent level). Overall, the impact of export shocks on executive pay is asymmetric, and thus pay-for-non-performance can explain rising executive compensation.

FIGURE 8

The Asymmetric Effect of Export Shocks on Executive Compensation



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.

The asymmetric effect in Figure 8 also raises the possibility that rent-capture is playing a role in the relationship between exports and executive pay. The fact that executives benefit from positive shocks but do not suffer the consequences of negative shocks is exactly what we would expect to see if rent-capture is important. Executives appear to successfully capture a portion of the proceeds associated with positive shocks but adverse shocks do not lead to rent-capture opportunities and thus do not affect executive pay. In the subsequent section, we examine more formally whether rent-capture is contributing to this observed relationship between globalization and executive compensation.

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 this finding. 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 rents associated with shocks that are not of their own making. Furthermore, the policy response to these alternate explanations differs.

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 CEOs, 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 therefore more responsive to exogenous export shocks.[42] In contrast, it is difficult to influence more permanent sources of income, such as salary, which should therefore be less responsive. 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 show 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

[42] 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).

hypothesis that export shocks should have a stronger impact on short-run, flexible forms of compensation that are more prone to rent-capture.

Interestingly, we also see that the presence of executives on the compensation committee (i.e. *interlock*) significantly increases bonus 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, one would expect that the direction of this endogeneity bias would attenuate the positive effect of poor governance illustrated in Table 6.[43] Nevertheless, the question of whether endogeneity of firm governance affects our results is pursued in an additional analysis in Appendix A.1, and shows little evidence that this is the case. In contrast to poor governance which only affects bonuses, firm size increases all types of compensation.[44] 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 if executives engage in rent-capture activities. In the subsequent sections, 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*)[45] and whether a firm has at least three executives on the board of directors (*insider board*). The first of these measures more directly reflects the executive's influence on the pay process itself, while the second reflects the general executive impact on 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

[43] 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.

[44] 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).

[45] Or a reciprocal relationship with another firm.

interaction of the export instrumental variable and *interlock*). The positive and significant interaction 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. Furthermore, in addition to year fixed effects which will capture general outside options for the executive, these results are largely unchanged when we control for industry-year level variation in aggregate output, (see Table A8).

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.[46] However, the coefficient on the *export*interlock* interaction term is 0.80 for CEOs (column 1), 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

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

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, 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 bonus paid to the executive on the compensation committee, rather than bonuses paid to all of the executives at the firm.[47] 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 find 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 power that are the ones that disproportionately reap the rewards from exogenous export shocks.

[47] 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 the poor governance measure is addressed in Appendix A1.

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 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 exports 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 *Compustat* 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.[48] 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.[49]

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

[48] 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.

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

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 on executive compensation as seen in Appendix A.7). Interestingly, employment has a significant positive impact on executive compensation (Table 5) but has no positive effect 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 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 in 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 provide 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 non-existent in terms of the destination of these sales (which makes it impossible to identify foreign affiliate sales shocks using our 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 (column 2).[50] Column 3 shows that executive compensation is responsive to domestic sales too, although interestingly the point estimate is slightly 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

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

of executive compensation. Finally, we see that the inclusion of executive-level variables (i.e. experience, gender, and education) do not change the finding that foreign affiliate sales raise executive compensation (column 4). Due to 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.

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 the rise in executive pay is that globalization changes the nature of the executive's job, increases the demand for high-ability managers, and thus raises their compensation accordingly.[51] Thus, this section complements our earlier analysis by examining whether globalization disproportionately increases compensation for more experienced and highly educated executives.

Table 11 reports these results. 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 include 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.[52] 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.[53]

Overall, the insignificant interaction terms indicate that globalization does not disproportionately

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

[52] 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.

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

increase the compensation of more experienced and educated executives.[54] 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 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 rate fluctuations over time, defined as the number of units of the foreign importing country's currency per U.S. dollar.[55] 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.[56] The difference is that now we multiply presample export flows by the percent change in the exchange rate

[54] 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 experience and education that is leading to insignificant interaction coefficients.

[55] 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.

[56] 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 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, a shock in a foreign country may affect exports in one industry but not in 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.[57] 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.10.

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 high-income 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, reported above, 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

[57] GDP data comes from the World Bank.

those obtained using 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 we cannot discuss in detail here. Specifically, we address concerns about the endogeneity of corporate governance by showing that the results are similar using long-run averages of our poor governance measures (Appendix A.1). Executive turnover is shown to be an important predictor of executive pay in Appendix A.2, but it does not alter our globalization results. Section A.3 investigates other explanations for the absence of Relative Performance Evaluation (RPE) 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 and the measurement of firm size by showing that our results are robust to other sample definitions and specifications in sections A.4 and A.5. Appendix A.6 shows that the increase in the top 1% observed in the U.S. is also qualitatively occurring in other OECD countries. Findings presented in Appendix A.7 show that import shocks, constructed in an analogous way as export shocks, have little impact on executive compensation. The inclusion of industry measures of aggregate output show that it is globalization in particular and not broader industry-level shocks that are leading to rising executive compensation (see section A.8). Finally, results from an alternate compensation variable, a time-varying industry definition, and an alternate rent-capture measure, as well as details about the gravity instrumental variable are reported in sections A.8 and A.9.

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 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 influence executive pay but they are 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 cross-country or cross-occupation comparisons, we show using a comprehensive data set and a rigorous empirical analysis that globalization is actually one of the more important drivers of the recent growth of executive compensation.

Second, this finding is not simply due to talented executives successfully expanding their firms abroad and thus being more highly compensated in return. 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 apparent gap between the public perception of globalization and research on globalization. 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	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 Online Appendix

A.1 Endogeneity of Poor Governance

Our results indicate that poor corporate governance allows executives to personally benefit from exogenous export shocks through higher compensation. 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 section examines this issue 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.[58] 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 message from Table A1 is that the 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.

[58] 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 in turn reduces 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.[59] 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 both 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. This means that our results are not influenced by executive mobility and switching. This conclusion is reinforced by the findings 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.

[59]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) implies that optimal executive compensation contracts should reward executives for their performance relative to their peers and should ignore factors that are unrelated to the executive's actions. 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 competitive 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 for this 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, because they may generate rents that powerful executives might 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 shows results where these frictions are interacted 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.

Thus we do not find evidence, in our setting, that firm-specific human capital or turnover costs are important in explaining our pay-for-non-performance result. In contrast, Table A3 reinforces the idea 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 findings 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.[60] 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 the export point estimate remains exactly the same (compared to the full sample in column 1).

Columns 6-10 replicate this analysis but exclude 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 have an important effect on top incomes using a wide variety of different samples of firms and executives.[61]

[60] 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.

[61] 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 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.

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 globalization's effect on executive pay 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 OECD Countries

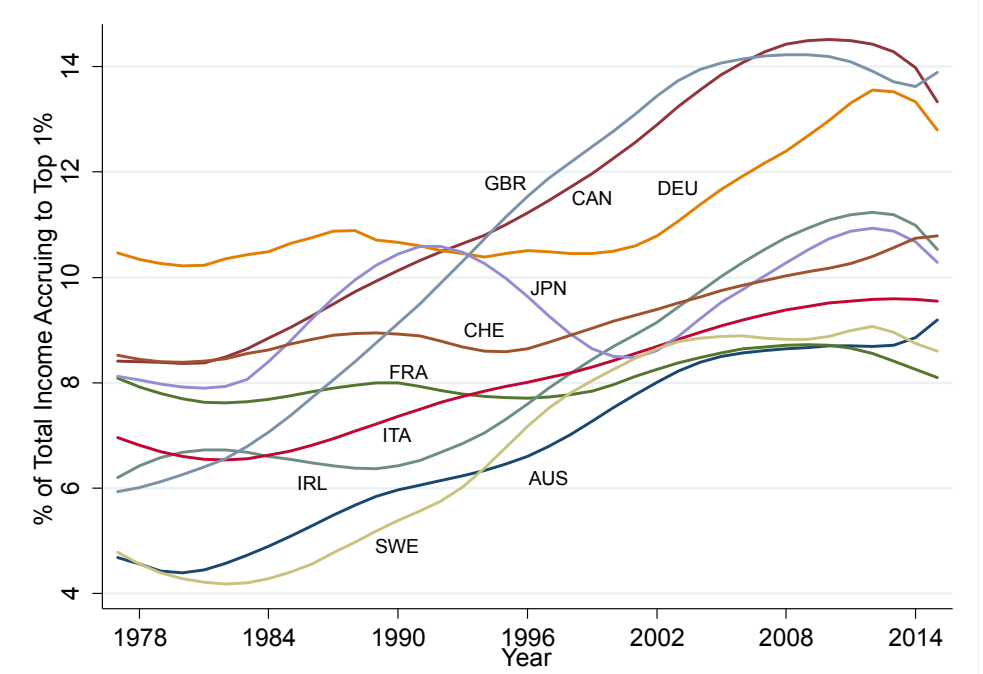
Our analysis examines why top incomes in the U.S. have increased so dramatically, as illustrated in Figure 1. This section provides some evidence on trends in top incomes in other high-income countries.

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.[62] 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.

[62] 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 OECD Countries



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

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 high-income 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 and import shocks 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 Industry Shocks

One might be concerned that our findings, which indicate that exports affect executive compensation conditional on firm and executive controls, may be in part due to broader industry level shocks. This could mean, for instance, that variation in exports is inadvertently picking up broader industry level changes in production and not just the impact of globalization. This section examines this potential issue by controlling for gross product at the industry-year level.

Data on value added for each approximately three-digit NAICS industry was obtained from the Bureau of Economics Analysis (BEA). Table A8 shows the results after adding this variable to our main specification. For example, columns 1 and 2 of Table A8 extend the results shown in columns 1 and 2 of Table 7 by including industry gross product. We find that aggregate output does not have a significant impact on executive pay in either specification, export shocks continue to increase executive pay (column 1 of Table A8), and this effect is larger at firms with poor corporate governance (column 2). Column 3 and 4 then extend the CEO and non-CEO specifications in columns 1 and 2 of Table 8 by also controlling for industry gross product. Again industry aggregate output has no significant impact on executive pay and we still find that CEO's at poor governance firms are the executives that disproportionately benefit from exogenous export shocks. Overall we conclude from Table A8 that it is exports in particular and not broader industry shocks that are driving our results.

TABLE A8
The Impact of Export Shocks on Executive Bonuses - Industry Gross Product

	All Execs	All Execs	CEOs	Non-CEOs
	(1)	(2)	(3)	(4)
Exports-1	0.489**	0.485**	0.666**	0.453**
	[0.235]	[0.231]	[0.293]	[0.229]
Exports-1*Interlock		0.365***	0.778***	0.267***
		[0.091]	[0.188]	[0.082]
Imports-1	-0.038	-0.045	-0.126**	-0.031
	[0.051]	[0.048]	[0.063]	[0.049]
Employment-1	0.234**	0.231**	0.254	0.237**
	[0.108]	[0.111]	[0.164]	[0.106]
Capital Expenditure-1	-0.136*	-0.130*	-0.293***	-0.081
	[0.077]	[0.078]	[0.097]	[0.081]
Interlock	0.587***	-7.278***	-16.166***	-5.165***
	[0.180]	[1.971]	[4.147]	[1.756]
Top Tax Rate-1	-0.148	-0.184	-0.181	-0.18
	[0.322]	[0.314]	[0.466]	[0.296]
Industry GDP-1	-0.188	-0.181	-0.564	-0.107
	[0.344]	[0.339]	[0.447]	[0.330]
Executive Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	19,475	19,475	3,819	15,656
R-squared	0.321	0.322	0.370	0.321
SW F-Stat on Instrument	8.22	9, 3481	9, 3252	9, 3461

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 interlock variable. Exports, imports, employment, capital expenditure, top tax rate, and industry GDP 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 Additional Robustness: Compensation, Industry, and Rent-Capture

Table A9 presents a number 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.[63] Despite the differences in how compensation is calculated, column 2 of Table A9 shows that the export coefficient remains similar when using this alternate measure

[63]See Kaplan and Rauh (2010) for more discussion on how TDC2 and TDC1 differ and why TDC2 is the preferred 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.[64] 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.[65] Column 3 uses this time-varying measure of the firm's industry, includes industry fixed effects, and we see that the impact 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. In some sense, this is an ex-post measure of poor governance. 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.

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

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

TABLE A9
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.10 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.[66] This ensures that the set of foreign trade partners does not change over time within an industry.[67]

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 A10 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 A10 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 A10 confirms that there is variation across industries in terms of how they respond to foreign import demand shocks.

[66] 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.

[67] 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 A10
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.