Globalization and Executive Compensation*

Wolfgang Keller† William W. Olney‡

Abstract

This paper examines whether globalization has increased executive incomes, thereby contributing to inequality driven by the top 1%. Using a comprehensive data set of thousands of executives at top U.S. firms from 1993-2013, we find that both market forces which raise the executives' marginal product (exports, technology, and firm size) and their ability to capture rents (including through insider board relationships) have increased executive compensation. Focusing on the causal effect of exports provides a unique opportunity to distinguish between these market and rent channels because by construction firm executives do not affect the exogenous variation of exports that our instrumental variables approach yields. We find that export shocks have a significant impact on executive compensation, which is often larger in settings that facilitate the capture of rents. Overall, these results suggest that globalization has played a more central role in the rapid growth of executive compensation and inequality in this country than previously thought.

Keywords: Inequality, Executive Compensation, Globalization, Exports

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

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†University of Colorado, NBER, and CEPR; kellerw@colorado.edu.

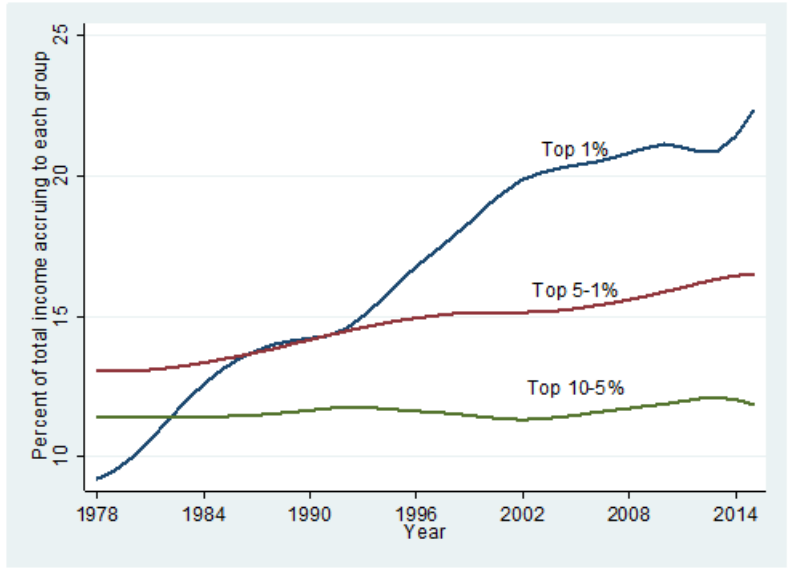
‡Williams College; wwo1@williams.edu.

1 Introduction

It is well-known that the top-1% are important in the recent rise of income inequality in the US, and top business executives figure prominently in this development:[1]

FIGURE 1

Decomposing the Top Decile of U.S. Income Shares



This is an updated version of Piketty and Saez (2003) Figure 2. Data available at Emmanuel Saez's website: http://eml.berkeley.edu/~saez/. Top 1% are incomes above $443k, Top 5-1% are incomes between $181k and $443k, and top 10-5% are incomes between $125 and $181 in 2015. Incomes include capital gains. Kernel-weighted local polynomial smoothing is used.

While these income trends have been well-documented, the cause of this growth in inequality has remained controversial. Some may not care why inequality has increased – they object (or not) to inequality for any reason – but for most it matters greatly whether rising compensation reflects the executive's true value to the economy, or whether the executive simply captures rents. Compensation for productive effort is usually more palatable in most societies.[2] Despite many explanations that emphasize how technical change, scale, and globalization have increased the marginal product of executives, it has been challenging to distinguish these market explanations from rent-seeking behavior. This paper fills this gap by examining whether the growth in exports, and in particular

[1] Kaplan and Rauh (2013) show that executives are both representative of and an important part of the top 1%.
[2] We exclude outright "stealing" which is frowned-upon in most places.

growth in exports that is unrelated to managerial decisions, have led to rising executive compensation.[3]

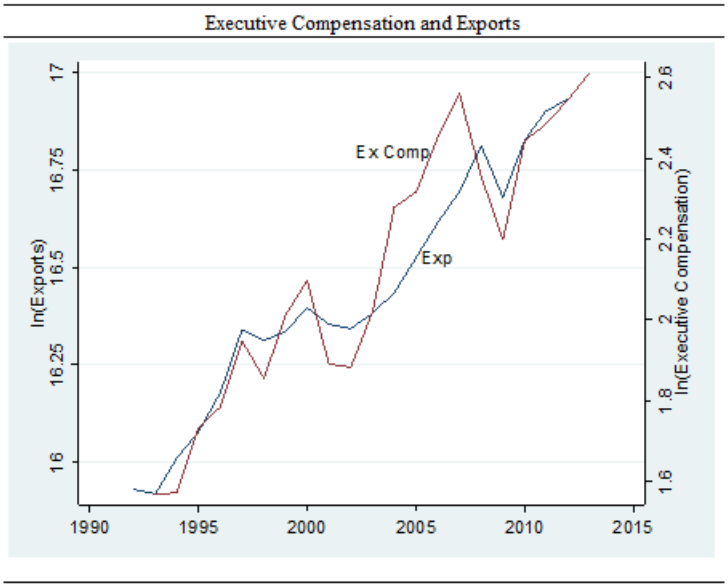
Globalization can affect top incomes because not only does access to new foreign markets increase overall sales but it reallocates market shares from less to more productive firms (Melitz 2003, Bernard et al 2007), thus providing a case of increasing rewards to the most talented individuals (Rosen 1981; Gabaix and Landier 2008; Tervio 2008). The tasks facing managers, executives, and other top income earners may have become increasingly complex due to globalization. Successful firms no longer just serve domestic markets but now they must increasingly navigate the logistics of selling to many foreign markets, the complexity of setting up production stages that span numerous countries, and deal with bargaining and contractual issues that come with pursuing foreign operations. This requires savvy and talented managers that can navigate and run these large multinational corporations. Firm operations become increasingly reliant on information, communication, and other advanced technologies that requires higher skills (Katz and Murphy 1992, Goldin and Katz 2002, Kaplan and Rauh 2013). So perhaps globalization is reshaping the role and importance of top income earners, the demand for these talented individuals is increasing, and thus compensation is rising as a result. While this is a common explanation in policy and media circles, it has received less attention within the economics profession.[4]

A preliminary check of the data offers some support for this hypothesis. Specifically, over the last twenty five years there has been a rapid increase in the average real executive compensation and the average real exports, as seen in Figure 2:

[3]See Kaplan and Rauh (2013) for an introduction to many of these concepts.

[4]For instance, the New York Times Editorial said "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" (April 3, 2006).

FIGURE 2



Average executive compensation and average exports are plotted over time. Compensation data for the 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 U.S. Census Bureau via Schott's International Economics Resource Page (Schott 2008).

There are many factors that could influence both executive compensation and exports, and thus the goal of this paper is to examine to what extent these trends reflect a causal relationship.

We study the relationship between globalization and income inequality by examining the effect of export growth on the compensation of executives over the years 1992 to 2015. Our analysis focuses on top executives at publicly traded U.S. firms from Compustat's comprehensive Execu Comp data set. This is a useful measure of top income earners because the majority of top income earners are executives, managers, supervisors, and financial professionals (Bakija, Cole, and Heim 2012), and the majority of the growth in top incomes has been driven by increases in salary and business income rather than growth in capital income (Piketty and Saez 2008). Consistent with our hypothesis, we estimate a significant positive effect of exports on executive compensation after accounting for unobserved firm and year fixed effects. We also find that technology (Kaplan and Rauh 2013) and firm size (Gabaix and Landier 2008; Tervio 2008) lead to a significant increase in executive compensation. The ability to simultaneously test these explanations represents an important contribution of our analysis.

While our results on exports, technology, and size all suggest that market forces play an important role in shaping top incomes, part of the rise in top incomes may not be related to productive efforts in the market as much as it constitutes rents or returns to non-market efforts. Lower top marginal tax rates may have increased the return to executives to bargain for higher compensation, which is acceptable due to weaker social norms (Piketty, Saez, and Stantcheva 2014), or executives may be able to capture a larger part of the firm's earnings through insider board relationships (Bertrand and Mullainathan 2001). In fact, executives may see an increase in their relative compensation through sheer luck of being in the right place at the same time. These market versus rents explanations are not mutually exclusive. In particular, executives may simply be able to capture a greater part of firm earnings when they export to foreign markets, with the new technology and size growth that comes with it, than when they operate in a non-globalized world.

Our analysis offers a unique opportunity to distinguish between these competing hypotheses. The estimation of the causal effect on exports on executive compensation using instrumental variables yields exogenous variation in exports. These export shocks are unrelated to domestic industry or firm changes, and in particular they are not affected by actions of the firm's executives. Because the instrumental-variables estimate does not reflect the actions of the executive, they reflect the executives marginal product in the market. A key condition for this is that the executive's behavior does not change, say towards greater rent capture, once the export shock is observed; we will provide evidence for this below. Furthermore, we shed light on the extent to which globalization increases the executive's ability to appropriate rents by contrasting compensation increases in environments conducive to rent-capture, such as insider board relationships, compared to when they are not present.

We utilize a variety of instrumental variable approaches to estimate the causal effect of exports on executive compensation. First, we construct an instrumental variable, popularized by Autor, Dorn, and Hanson (2013), that relies on multilateral exports from other developed countries as an exogenous source of variation for U.S. exports in the same industry. While this approach utilizes information on multilateral exports, our other two instruments utilize the detailed bilateral dimension of our export data set. Specifically, our second Bartik-style instrument is constructed using the presample bilateral export flows and exogenous industry level growth. Finally, using the insights from the gravity model, our third approach uses variation in bilateral U.S. exports that

are driven by exogenous shocks in the foreign importing country. Each of these IV approaches identify slightly different sources of exogenous variation but they all alleviate endogeneity concerns and they ultimately generate similar results. Specifically, these findings indicate that a ten percent increase in exports leads to a 2-3% increase in the compensation of executives. This indicates that globalization has played an important role in explaining growing income inequality in the U.S. over the last few decades. Executive compensation through exports tends to increase in the presence of insider board relationships, indicating that higher executive compensation appears to reflect both their marginal product in the market and the appropriation of rents.

Early evidence on the determinants of growing inequality found that globalization played a relatively minor role with skill-biased technical change the more import factor (Feenstra and Hanson 1999, Katz and Autor 1999). However, due to data constraints this literature typically focused on production vs non-production, blue collar vs white collar, or skilled vs unskilled distinctions between workers. While certainly informative, none of these comparisons are particularly well suited at explaining the rapid growth of the top 1% of income earners which is, as Piketty and Saez (2003 and 2006) have pointed out, the primary determinant of growing inequality.

Our paper is similar in spirit to a new and influential body of research that seeks to reexamine the impact of globalization on inequality (Krugman 2008), although it differs in emphasis. This existing work examines whether the recent surge in imports from low-wage countries (in particular China) adversely affects employment and earnings at the low end of the skill distribution. However, our paper focuses on whether globalization contributes to the rapid growth of incomes at the top end of the distribution. Given that the vast majority of inequality growth is driven by gains among the top 1% of income earners, this seems like an especially important focus.

While globalization is a popular explanation for growing inequality, it has recently been dismissed based on simple comparisons across countries (Alvaredo, Atkinson, Piketty, and Saez 2013; Piketty, Saez, and Stantcheva 2014) and across occupations (Kaplan and Rauh 2013). For instance, Alvaredo et al. (2013) and Piketty, Saez, and Stantcheva (2014) argue that globalization is ubiquitous but the trends in top income shares differ across countries. In contrast, Kaplan and Rauh (2013) argue the exact opposite - globalization differs across sectors but the trends in top incomes across occupations are the same. We are apprehensive about ruling out globalization based on summary statistics across a handful of countries and sectors. Certainly the strength and effect of globalization depends

on a variety of idiosyncratic country and sector specific factors. Using a comprehensive data set and rigorous empirical specifications, we show that globalization has played an important role in the growth of executive compensation.

The remainder of the paper proceeds as follows. Section 2 discusses the data used in this analysis and presents some descriptive statistics. Section 3 discusses the empirical specification including the instrumental variable approach. Section 4 presents the OLS and IV results, while Section 5 reports a variety of extensions and sensitivity results. Finally, Section 6 concludes.

2 Data

To examine these issues, this paper combines executive compensation data, firm level information, and detailed trade data from the following sources.

2.1 Executive Compensation

Compensation information of the top five executives within each S&P firm was obtained from the Compustat Execu Comp data set. To the best of our knowledge this is the most comprehensive data set on executive compensation with over 254k executive-firm-year observations spanning more than 44k executives, 3.5k U.S. firms, and the years 1992-2015. The data set has information about each executive, including their name and id, their company's name and id, and detailed compensation information based on SEC reporting rules.

The analysis uses total compensation (TDC2) which includes salary, bonuses, non-equity incentive plan compensation, value realized from stock options exercised, grant-date fair value of stock awards, deferred compensation earnings, and other compensation. This measure captures the total compensation realized by an executive in the given year and is similar to their adjusted gross income (Kaplan and Rauh 2009). An alternate measure of total compensation (TDC1), which includes compensation awarded but not necessarily realized in the given year, is used in an extension and generates similar results.[5] Nominal compensation values are converted to real U.S. dollars using the Consumer Price Index (CPI) provided by the Bureau of Labor Statistics.

To ensure that selection issues are not biasing the results, the sample is restricted in two ways.

[5]The ExecuComp data set has other compensation measures but few of them span the entire sample.

First, the relatively few firms that report compensation information for fewer than five executives are dropped. 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 sample has compensation information for exactly their five highest paid executives. Second, only firms that span all the years in the sample are included in the analysis. This alleviates concerns that exit or entry into the sample could be driving the results.[6]

2.2 Trade Data

Detailed U.S. export and import data at the HS 10 industry level for the years 1989-2012 comes from the U.S. Census Bureau via Schott's International Economics Resource Page (Schott 2008). These nominal trade flows are converted to real U.S. dollars using the CPI.

An appealing aspect of this data set is that the HS 10 export data are linked to NAICS 6 digit industry codes. This proves useful when merging this trade data with the Execu Comp data set which reports the 6 digit NAICS industry of the executive's firm. The Compustat and Execu Comp data sets do not report firm level trade. However, even if they did the decision to export at the firm level is highly endogenous to firm characteristics, and thus industry level exports may actually be preferable.

In addition to detailed industry level information, this data set also reports the foreign destination of these exports. This dimension of the data set will prove useful in order to identify an exogenous source of variation driven by conditions in the foreign importing country.

2.3 Other Variables

The Execu Comp data set is linked to the companion Compustat data set using a unique firm level identifier. Thus, it is possible to merge the data sets in order to include a variety of other firm level measures. Most importantly, this enables us to measure insider board relationships, technology, firm size, and top marginal tax rates which may be important drivers of executive compensation.

Insider board relationships is measured as a binary variable indicating whether any executive at the firm in a given year serves on the board making their compensation decisions (or serves on another company's board that has an executive serving on their board). Following Feenstra and

[6]However, results using all firms generates similar results as discussed in section 5. 3.

Hanson (1999), real capital expenditures is used as a proxy for technology. Firm size is measured using employment. We prefer using employment rather than proxying for firm size using market value (Gabaix and Landier 2008). Both the market value of the firm and the compensation of executives are a function of stock price, and thus are positively correlated purely for mechanical reasons (Himmelberg and Hubbard 2000).

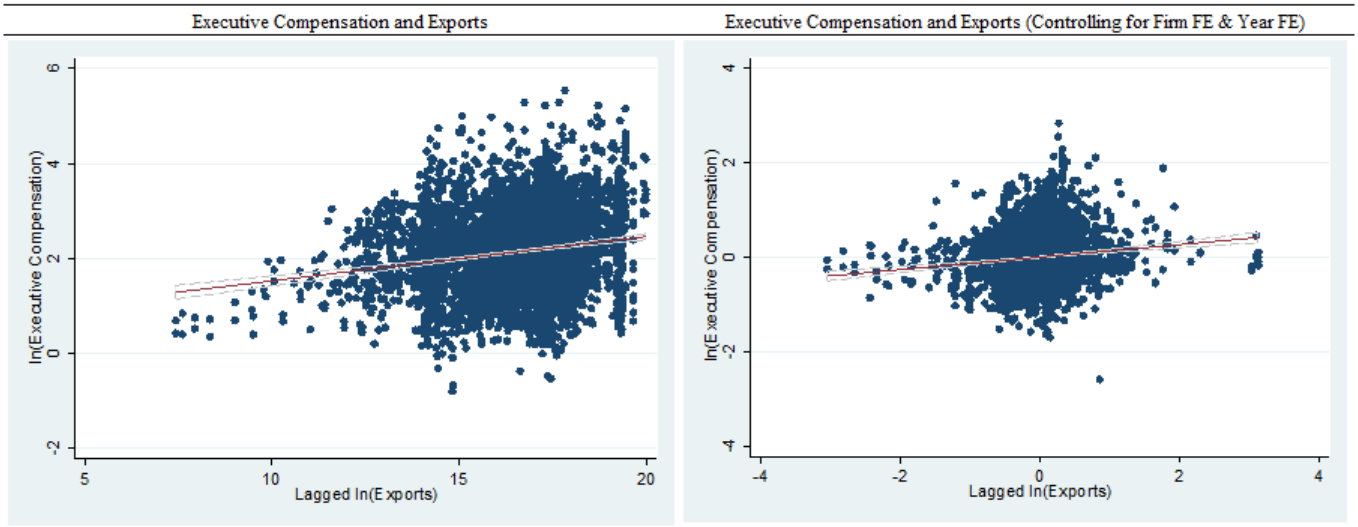
Finally, using data from Taxsim we measure top marginal income tax rates in the state in which the firm is headquartered. All the U.S. executives in our data set face the same federal income tax rates but they also pay state income taxes which can vary significantly across states and over time. For instance, the top marginal income tax rate in California has increased 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 this state variation in top marginal tax rates has contributed to the growth in top incomes.

2.4 Descriptive Statistics

Combining these variables generates a panel data set which includes 19,788 observations and spans 3,821 executives, 191 firms, 93 6-digit NAICS industries, and 21 years (1993-2013). Table 1 reports the summary statistics of the key variables used in our empirical analysis.

To gain insight into the data, the left panel of Figure 3 plots the average log real executive compensation at the firm level against lagged log real exports. A highly significant positive relationship emerges, which is consistent with our hypothesis that firms that are more integrated into global markets pay their executives more. However, this relationship could be a bit misleading if both variables are increasing over time and/or are correlated with firm size. To account for these and other factors, the right panel controls for both firm and year fixed effects and plots the residuals. Again a significant positive relationship is evident.

FIGURE 3



The left panel plots average real executive compensation at the firm level against lagged real exports. The right panel is an analogous scatter plot after controlling for firm fixed effects and year fixed effects.

It is encouraging that these relationships emerge in such a raw cut of the data. The remainder of the paper examines whether these findings survive a more rigorous econometric analysis.

3 Empirical Strategy

3.1 Baseline Specification

Our empirical specification examines how trade, insider board relationships, technology, firm size, and top marginal tax rates affect executive compensation using the following specification:

$$\begin{aligned} \ln comp_{ifnt} &= \beta_0 + \beta_1 \ln exp_{nt-1} + \beta_2 \ln imp_{nt-1} + \beta_3 insider_{fnt} + \beta_4 \ln cap\_exp_{fnt-1} \\ &+ \beta_5 \ln empl_{fnt-1} + \beta_6 \ln tax\_rate_{fnt-1} + \beta_7' F_{fnt-1} + \beta_7' I_{ifnt-1} + \gamma_f + \gamma_t + \varepsilon_{ifnt}. \end{aligned} \tag{1}$$

The dependent variable is the total compensation of executive i, at firm f, in industry n, and in year t. The key independent variables of interest are logged real exports (exp), logged real imports (imp), insider board relationships ($insider$), technology measured as real capital expenditures (cap_exp), firm size measured as employment ($empl$), and the top marginal state tax rate faced by the executive

(tax_rate). Firm fixed effects (γ_f) and year fixed effects (γ_t) are included in all specifications.[7] Standard errors are clustered at the industry level throughout.

If, as expected, growth in exports increases executive compensation then $\beta_1 > 0$. Import competition may adversely affect lower-skilled domestic labor (Autor, Dorn, Hanson 2013), however the implications for executives is less clear. Nonetheless, imports are included throughout as an important control. Firms where an executive serves on the board making compensation decisions likely pay their executives more ($\beta_3 > 0$). New capital expenditures may substitute for less-skilled labor and complement skilled labor and thus increase the returns to executives ($\beta_4 > 0$). Increasing firm size may increase executive compensation ($\beta_5 > 0$). Finally, lower top marginal tax rates may increase incentives for executives to bargain for higher wages ($\beta_6 < 0$).

We then focus more carefully on exports, which is the goal of our analysis. While the lag structure, the firm and year fixed effects, and the firm and individual level controls alleviate endogeneity concerns, they do not eliminate them entirely. Thus, the next section turns to the instrumental variable approach used to identify a causal relationship between exports and executive compensation.

3.2 Instrument

Reverse causality could be problematic in this context since more talented and thus highly compensated executives may be relatively more successful at promoting exports.[8] Similarly, omitted variable bias could be problematic if there are some unobserved firm characteristics that are correlated both with executive compensation and with exports.[9] To address these concerns, a variety of instrumental variables approaches are utilized. We begin with an ADH (2013) style instrument which utilizes multilateral exports in other developed countries. We then utilize the bilateral nature of our export data to construct a Bartik style instrument and to identify an exogenous source of variation in bilateral exports using insights from the gravity model.

[7] Industry fixed effects are unnecessary since they are completely subsumed by the firm fixed effects because no firms switch industries during this period.

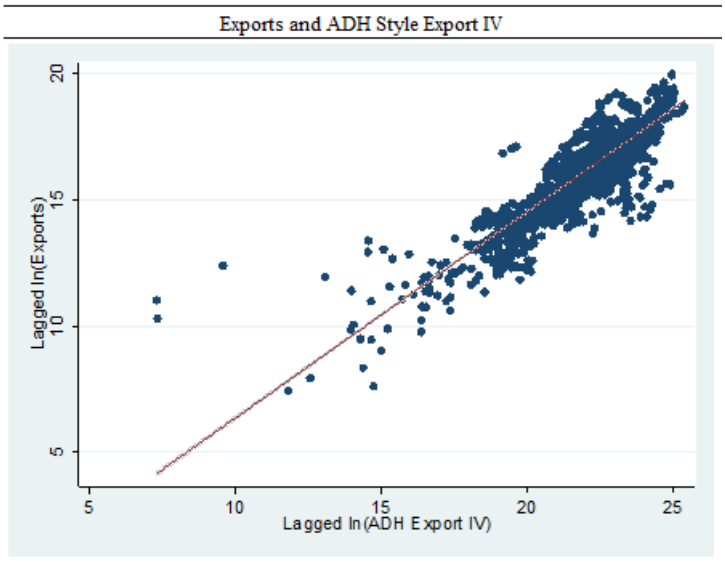
[8] Given the different units of observation, for this reverse causality story to be problematic in this context it would need to be the case that the executive is increasing exports at their firm to such an extent that overall industry level exports are increasing. This seems unlikely.

[9] Again the different units of observation, as well as the firm fixed effects and firm level controls minimizes this concern.

3.2.1 ADH Style IV

Following ADH (2013) we use multilateral exports from other developed countries as an instrument for U.S. multilateral exports in the same industry.[10] This strategy identifies common import demand shocks for a particular good and/or falling trade costs in this sector. For instance, the growth of China could lead to an increase in exports from both the U.S. and from other developed countries. Or perhaps, transportation and communication improvements makes it easier to export this particular good for both the U.S. and other developed countries. Importantly, this approach eliminates concerns that a particular firm within this industry is exporting more and paying their executives more. In other words, by utilizing variation in other developed countries, this strategy eliminates concerns that unobserved firm characteristics in the U.S. are driving both exports and executive compensation. Figure 4 plots actual exports against this ADH style export IV:

FIGURE 4



Lagged real exports are plotted against the lagged real ADH export IV.

[10] We follow ADH (2013) and use trade data from the following 8 high-income countries: Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland.

3.2.2 Bartik Style IV

In contrast to the ADH style IV, which simply uses total multilateral exports, the Bartik style IV utilizes the detailed destination market information available in our export data set. First, we identify the presample 1991 bilateral export flows for each detailed industry. Then these bilateral export flows are interacted with the exogenous growth of industry level exports in other developed countries.[11] Finally, we sum across all foreign destination markets to obtain predicted U.S. exports abroad in a particular industry and year. More specifically, this Bartik IV is constructed in the following way:

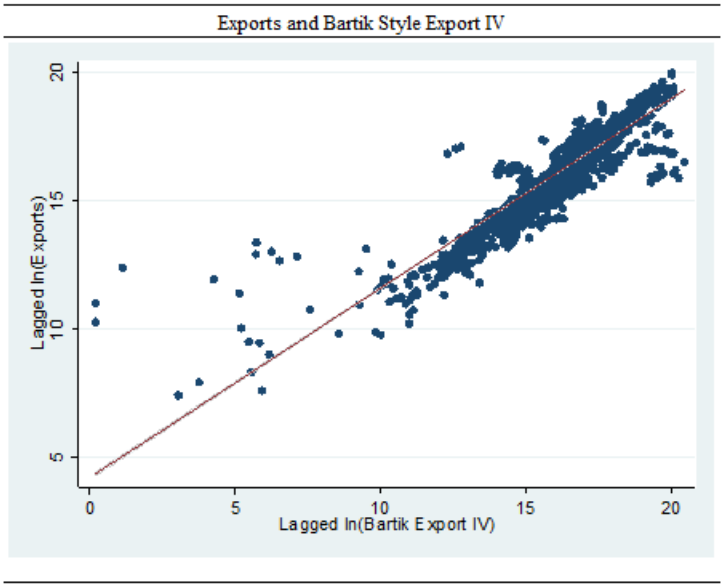
$$bartik\_exp\_iv_{nt} = \sum_{c}(exp_{nc1991} * (1 + g_{nt})), \tag{2}$$

where g is the growth rate of exports from other developed countries from 1991 to year t in industry n. Note that this IV can be constructed for years in which no actual bilateral trade exists, since the IV only relies on presample bilateral exports and the industry level growth from other developed countries. Thus, this instrument is balanced and does not pick up extensive margin adjustments into or out of foreign destination markets which occur in the actual data set and could be endogenous.

This approach exploits pre-determined bilateral industry exports and contemporaneous industry level export growth in other developed countries. Like the ADH styles IV, this strategy also identifies variation in foreign import demand shocks and falling trade costs within a sector. However, in addition this approach also utilizes and exploits exogenous variation in the initial distribution of U.S. exports to foreign destination markets. Figure 5 shows the relationship between actual exports and this Bartik style export IV:

[11] Again we use the 8 high-income countries utilized by ADH.

FIGURE 5



Lagged real exports are plotted against the lagged real Bartik export IV.

3.2.3 Gravity IV

The final IV approach uses bilateral export flows and insights from the gravity model to identify an exogenous source of variation in exports. Specifically, variation in bilateral exports driven by changing economic conditions in the foreign importing country and time invariant geographic characteristics is identified. 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 Feyrer (2009) but applies these principles to an industry level exports as in Blanchard and Olney (2016). The ability to use the same foreign shock to separately identify industry variation in exports implicitly takes advantage of a two important sources of variation. First, the U.S. does not export all goods to all countries. So it is entirely possible that a shock in a foreign country could affect exports in one industry but not another. Second, the impact of the shock could be very different across industries. For instance, economic growth in one foreign country may increase U.S. exports of semiconductors much more

quickly than it would increase U.S. exports of soft drinks.

More specifically, U.S. exports for each 6 digit NAICS industry are regressed on real GDP in the foreign country and on geographic characteristics in the following manner:

$$ln(x_{nct}) = \alpha_1 ln(rgdp_{ct}) + \alpha_2 ln(dist_c) + \alpha_3 contig_c + \varepsilon_{ct}, \tag{3}$$

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.[12] In addition, the specification includes the population weighted distance ($dist$) between the U.S. and the foreign country and a dummy for whether they share a border. These time-invariant factors will not affect changes in executive compensation over time and thus do not pose a problem for the exclusion restriction.

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, the sample only includes the top 100 foreign trading partner countries (identified using total exports sales). Second, within each industry, the sample only includes foreign countries to which the U.S. exports a positive amount to in all years. This ensures that the set of foreign trade partners does not change over time within an industry.[13]

Equation (2) is separately estimated for each 6-digit NAICS industry. Reporting results from all of these individual industry level regressions is impractical but Table 2 reports findings from a few industries. Not surprisingly, 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. These results indicate that there is substantial variation across industries in response to conditions in the foreign trading partner countries.

[12] GDP data comes from the World Bank.

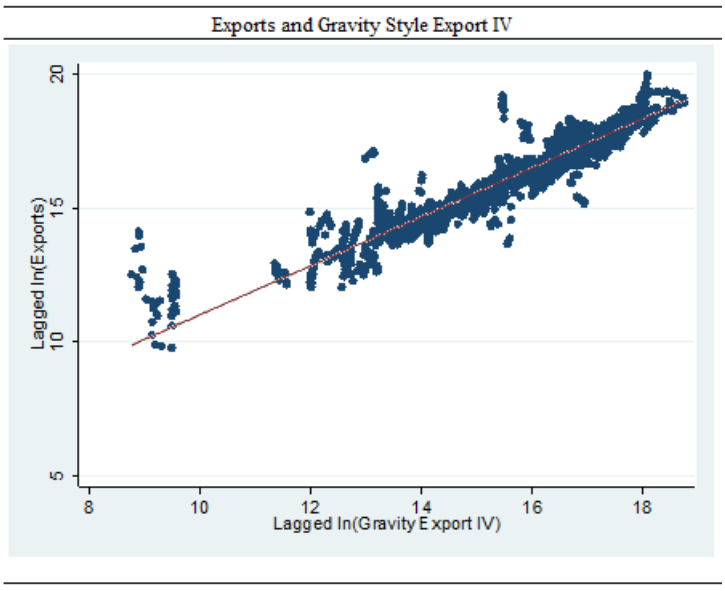
[13] However, the set of foreign countries can vary across industries. For instance, industry X may export to 98 foreign countries in all years but industry Y may only export to 81 foreign countries in all years. This variation is not problematic for the subsequent analysis.

The fitted values from each of these industry level regression are captured and used to construct the instrument. Note, by construction these fitted values are not a function of conditions in the US. 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:

$$gravity\_exp\_iv_{nt} = \sum_{c} e^{\widehat{\alpha_1} ln(rgdp_{ct}) + \widehat{\alpha_2} ln(dist_{ct}) + \widehat{\alpha_3} contig_c} \tag{4}$$

Like the other IV strategies, goal of this approach is to construct an instrument that identifies an exogenous source of variation in exports. Similar to the Bartik IV, this analysis also exploits the bilateral nature of the export data. However unlike these previous two strategies, this IV does not rely on exports from other developed countries to identify important demand shocks and changes in sector level trade costs. Instead this approach carefully identifies the shock in the specific foreign country that is driving the change in demand for U.S. exports using bilateral export data and insights from the gravity model. Figure 6 plots actual exports against this gravity inspired export IV.

FIGURE 6



Lagged real exports are plotted against the lagged real gravity export IV.

4 Results

4.1 OLS

Table 3 reports the OLS results all of which include firm and year fixed effects and cluster the standard errors at the industry level. Columns 1-5 begin by separately examining the impact of trade, insider board relationships, technology, firm size, and top tax rates on executive compensation. Each of the first four factor have a positive and significant impact on total compensation. However, in column 5, top marginal state income tax rate has a negative but insignificant effect on executive compensation in our sample.

Relative to the existing literature, which tends to focus on one potential explanation at a time, an important contribution of our analysis is the ability to simultaneously test these explanations in column 6. The results indicate that market forces, such as globalization, technology, and size, as well as non-market forces such as insider board relationships are significant drivers of top incomes. Interestingly, we see that exports is just as important in determining executive compensation as the other more common explanations of technology (Kaplan and Rauh 2013), firm size (Gabaix and Landier 2008), and insider relationships (Bertrand and Mullainathan 2001) and actually more important than differences in top tax rates (Piketty, Saez, and Stantcheva 2014).[14]

Table 3 also provides insight into the channel through which globalization influences executive compensation. Comparing columns 1 and 6, we see that when firm characteristics such as firm size are controlled for, the coefficient on exports falls. This indicates that roughly half the effect of exports on executive compensation operates through its effect on firm size. However, interestingly after controlling for firm size and other firm characteristics, exports still has a significant positive impact on executive compensation (column 6). This indicates that, conditional of firm-level characteristics, the complexity and difficulty of engaging in world markets is influencing executive compensation. This also indicates that the positive relationship between exports and compensation is not simply driven by a mechanical relationship where firms growing in size also pay their executives more. After controlling for firm characteristics, including assets and sales in a robustness analysis, exports still have a significant positive impact on executive compensation.

[14] Admittedly, the lack of a significant effect for top tax rates may be due to our reliance on state level variation or the sample of firms in our analysis.

4.2 IV

We now focus more carefully on the causal effect of globalization on top incomes. This analysis is appealing because it allows us to focus on variation in exports that is totally unrelated to firm and executive level characteristics and decisions. Instead our IV analysis identifies variation in exports that is driven by exogenous factors in importing countries. To the extent this increases executive compensation it will indicate that the executive simply happened to be in the right place at the right time and not that they actively pursued strategies that encouraged exports. To identify this causal effect of exports, we turn to the ADH, Bartik, and gravity IV approaches discussed earlier. Given the unclear implications of imports on executive compensation and the fact that they are never significant in Table 3, we focus our analysis on the export side.

Table 4 reports the first stage IV results for the baseline specification reported in columns 6 from Table 3. Consistent with the scatter plots shown in Figure 4-5, the export IVs are strong predictors of actual export flows. The coefficient on each export instrument is positive and significant in columns 1-3 of Table 4. Furthermore, the F-stats on the excluded instrument is above 10 in all specifications.

Table 5 reports the subsequent second stage IV results. Regardless of which IV approach is used, the coefficient on export is positive, significant, and similar in magnitude. The results indicates that a one percent increase in exports leads to a 2-3% pay increase for executives that work in that industry. In addition, insider boards, technology, and employment are also still significant.

The magnitude of this affect is similar to the OLS results but is more significant. Of the potential explanations for growing executive compensation over the last quarter century, it appears that exporting is one of the most important determinants. This paper diverges from previous globalization studies by focusing on the primary source of inequality growth (i.e. top incomes), and finds that exporting is playing a central role in this rising inequality.

5 Extensions

5.1 Additional Controls

The baseline analysis controls for time invariant firm characteristics using firm fixed effects. This section examines whether the inclusion of additional time varying firm and executive level controls alter the main findings. Data on firm level characteristics are obtained from the Compustat data set and linked to the Execu Comp data using a unique firm level identifier. A few executive level controls are directly obtained from the Execu Comp data set, although the available data is more limited along this dimension.

Column 1 reports the baseline results for comparison purposes, while columns 2-4 control for firm sales, assets, and costs respectively. These firm level controls are insignificant due to their high correlation with employment. When these controls are included individually in lieu of employment, each is significant. Column 5 then includes all of these firm level controls simultaneously and shows that each is insignificant due multicollinearity.

More importantly, after conditioning on firm size and performance in Column 5, the other three key independent variables remain positive and significant. Globalization, insider boards, and technology have a significant impact on executive compensation above and beyond their effect on firm size and performance. Thus, it is not simply the fact that these variables are picking up a mechanical relationship driven by positive firm performance. All three potential explanations for growing executive compensation are important even after controlling for time varying firm-level controls.

Column 6 includes these firm characteristics as well as individual executive-level controls.[15] Experience and gender have a significant positive effect on executive compensation. Importantly, exports, insider board relationships, and technology all still have a significant positive impact on executive compensation even after controlling for these numerous firm and executive level controls. Overall, our baseline results are robust to the inclusion of a variety of firm and executive level

[15]The coverage of these individual level control variables tend to be less comprehensive in the ExecuComp data set. The three controls that have reasonably good coverage include experience (which is defined as the number of years the individual has been a top five executive at any firm in the ExecuComp dataset), and binary variables for whether the executive is male and whether they have a doctorate. Alternatively, age can be used as a proxy for experience, but the coverage is much worse for this variable. When both are included at the same time, the coefficient on experience is larger in magnitude and more significant.

controls.

Finally, column 7 also controls for the stock price of the firm. We anticipated the stock price to be highly correlated with both firm level performance and with executive compensation (which includes stock options for instance). Consistent with this intuition, we see in column 7 that the coefficient on stock price is highly significant and not surprisingly the inclusion of this control weakens some of the other results. However, exports still have a positive and significant impact on executive compensation. Given the IV analysis identifies variation in exports that is exogenous to firm characteristics, controlling for additional firm level characteristics, including even the stock price, does not alter the main findings much.

5.2 Type of Compensation

The baseline analysis uses total compensation realized by an executive in a given year (TDC2). Alternatively, the Execu Comp data set also provides an alternate measure of total compensation (TDC1), which includes compensation awarded but not necessarily realized in the given year. As seen in column 2 of Table 7, the results using this alternate measure are similar.

Next we investigate the channels through which globalization, insider relationships, technology, and scale effect total compensation. For instance, it is possible that shocks to exports or changes in insider relationships would predominantly affect bonuses given the short run nature of these changes. However, technology and scale are more likely to effect long run salary changes.

Columns 3-5 examine these hypothesis but using different components of executive compensation as the dependent variable.[16] As expected, exports and insider board relationships have a significant positive impact on bonuses while technology and firm size have a significant positive impact on salaries. These contrasting results are interesting and indicate that these forces affect the compensation of executives through different but intuitive channels.

5.3 Sensitivity Analysis

Table 8 reports a variety of robustness checks that test the sensitivity of our results. In column 1, the gravity inspired instrument is constructed using variation in population rather than real

[16] Note these compensation components do not sum to the total compensation variable used in the baseline analysis due to measurement and consistency issues in the data set.

GDP. The concern is that the foreign country's GDP could be driven by U.S. industry-level exports or correlated with U.S. GDP which, although unlikely, could pose a problem for our exclusion restriction. Thus, fluctuations in the foreign country's population, which isn't affected by variation in industry-level U.S. exports, is used instead. The coefficient on exports in column 1 is, if anything, slightly larger than the baseline result.

The baseline analysis only includes firms that span the entire 21 years of the sample. This reduces concerns about selection into or out of the sample, but it discards a lot of data. Instead, columns 2 and 3 include all firms. Column 2 includes the top tax rate variable while column 3 excludes it given that the headquarter location variable does not have great coverage (the number of observations increases from 37k to 60k when the tax rate variable is excluded). The results show that all four factors remain important predictors of top incomes when the full sample of firms are included.

The baseline sample includes the top five highest paid executives at each firm. However, column 4 of Table 8 reports results using just the CEO of each firm. This reduces the sample size significantly and thus weakens the instrument, but amazingly the coefficient on exports remains positive and significant (although only at the ten percent level).

Column 5 uses foreign sales of the firm rather than the detailed NAICS 6-digit industry level exports used in the baseline analysis. The down side of firm level foreign sales is that this variable is only available in the Compustat data set after 2009. Thus, the sample is dramatically reduced to include only four years of data (2010-2013). Nonetheless, the results in column 5 of Table 8 indicate that foreign sales increases executive compensation despite the small sample size.[17] This provides an additional piece of evidence confirming once again that globalization is an important driver of executive compensation.

Finally, column 6 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 Execu Comp data set and used in the baseline analysis. The benefit of using this time-varying industry measure is that it accounts for the possibility that a firm's primary business may change over the sample.[18] The downside is that when a firm shifts from one NAICS industry to another within the sample there may be large

[17] Given the limited sample and thus weak first stage, it is not possible to run an IV analysis.

[18] The majority of firms in the sample do not switch NAICS industries.

changes in the firm's exposure to industry level exports. This will generate noisy swings in exports in the data set, when in fact the firm's switch from one NAICS industry to another may represent a rather small readjustment in production activities. Column 6 uses this time varying measure of the firm's industry, includes industry fixed effects, and shows that the results remain unchanged.

5.4 Placebo Test

As a further check on our identification strategy, we experiment with some placebo tests. More specifically, we are interested in gauging the importance of GDP relative to the geographic controls of distance and contiguous in equation 3. In other words, how important is GDP for the ultimate success of the gravity inspired instrument? To answer this question, we first construct an alternate IV that excludes GDP entirely from equation 3. Thus, bilateral exports are regressed on distance and on the contiguous dummy only. The fitted values are summed to construct the instrument which we use in our standard first and second stage IV specifications. However, this IV specification cannot be estimated because there is no time variation in the instrument. Since, the instrument is constructed using only time-invariant geographic factors, the instrument is ultimately absorbed by the firm FE in the main IV specification. This exercise illustrates the need to exploit a time-varying shock in the foreign country in order properly identify the instrument. In addition, it indicates that time-invariant factors are absorbed by the fixed effects in the main IV specification and should not pose a problem for the exclusion restriction.

Continuing with this theme, our second placebo exercise entails randomizing GDP. Specifically, we take the actual GDP values and randomly assign them to different countries and years. The bilateral export regressions are then re-estimated using the random GDP values, the fitted values are summed across foreign countries, and the first and second stage IV analysis is pursued. Since there is now time variation in the construction of our instrument, the main IV analysis can be estimated. However, this time variation in the instrument is purely random and so we should not expect to see significant results in this placebo exercise.

Table 9 reports the IV results using nine different randomization draws of GDP. Not surprisingly, the results vary a little bit depending on the realization of the randomization process, however in all specifications the coefficient on exports is insignificant. Thus, this placebo exercise verifies that changes in GDP over time and across foreign trading partner countries is crucial for the success of

our IV analysis.

6 Conclusion

Earlier studies typically found that globalization did not play a central role in explaining growing wage inequality in the U.S. The recent influential work of Autor, Dorn, and Hanson (2013) has indicated that this may no longer be true by examining the effect that Chinese imports has on the employment and wages of low-skilled domestic labor. However, the vast majority of inequality in this country is driven by the growth in incomes of the top 1% (Piketty and Saez 2003, 2006). Thus, any plausible explanation for the growing wage inequality in this country, needs to be able to explain the growth of these top income earners. This paper diverges from the existing literature by focusing on this key source of inequality and examines whether globalization has contributed to this rapid growth in executive compensation.

We construct a panel data set spanning thousands of executives, from hundreds of U.S. firms, over nearly the last quarter century. The results indicate that exporting, insider board relationships, technology, and firm size have all contributed to the growth in executive compensation. Specifically, a one standard deviation increase in exports, insider boards, technology, and firm size leads to a 7%, 18%, 11%, and 11% increase in executive compensation respectively. Focusing more specifically on exports, subsequent IV analyses identify exogenous sources of variation in U.S. exports. These different IV results confirm our OLS results and indicate that a ten percent increase in exports leads to a 2-3% increase in compensation for executives employed in that industry.

The results of this paper suggest that globalization is playing a more central role in rising top incomes than previously thought. The importance of globalization in explaining the growth of top incomes is often dismissed using basic comparisons across countries and occupations. Instead we use a comprehensive data set and rigorous empirical analysis to show that globalization has played an important role in the growth of executive compensation.

Identifying why top incomes are increasing so quickly is an important step forward. However, we remain cautious about interpreting these findings as a rational to restrict international trade. Globalization has generated enormous benefits that likely dwarf the distributional consequences highlighted here. In addition, the rapid increase in executive compensation, while startling, seems

to be at least partly driven by the increasing difficulty of the job in a global economy. Instead policy makers concerned about these distributional implications, should think more carefully about how to ensure that the gains from trade are more equitably distributed.

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TABLE 1
Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ln (Executive Compensation)	19,788	2.1	1.1	-5.4	7.4
ln $(\text{Exports})_{t-1}$	19,788	16.4	1.8	7.4	20.0
ln $(\text{Imports})_{t-1}$	19,788	16.7	2.1	0.0	21.3
Insider Board	19,788	0.05	0.21	0.00	1.00
ln $(\text{Capital Expenditure})_{t-1}$	19,788	13.5	1.7	7.1	18.8
ln $(\text{Employment})_{t-1}$	19,788	9.1	1.5	3.2	13.1
ln $(\text{Top Tax Rate})_{t-1}$	19,788	1.3	1.5	-2.3	2.7

TABLE 2
Construction of Instrument using U.S. Bilateral Trade Data

	ln (Exports)					
NAICS Code:	312111	324122	325411	332994	334413	339112
NAICS Description:	Soft Drinks	Asphalt Shingles	Pharmaceutical and Medicine	Small Arms	Semiconductors	Surgical & Medical Instruments
	(1)	(2)	(3)	(4)	(5)	(6)
ln (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]
ln (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

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the ln (exports) in that particular 6-digit NAICS industry. Only six industries are reported in this table due to space constraints but this same exercise is repeated for all of the 6-digit NAICS industries in the sample.

TABLE 3
Impact of Exports on Executive Compensation (OLS)

	ln (Executive Compensation)					
	(1)	(2)	(3)	(4)	(5)	(6)
ln (Exports)$_{t-1}$	0.114**					0.074**
	[0.048]					[0.035]
ln (Imports)$_{t-1}$	0.068					0.048
	[0.048]					[0.043]
Insider Board		0.215**				0.184**
		[0.088]				[0.078]
ln (Capital Expenditure)$_{t-1}$			0.175***			0.107***
			[0.030]			[0.032]
ln (Employment)$_{t-1}$				0.218***		0.105***
				[0.032]		[0.040]
ln (Top Tax Rate)$_{t-1}$					-0.189	-0.119
					[0.168]	[0.156]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20,053	20,053	19,843	19,993	20,053	19,788
R-squared	0.481	0.478	0.488	0.484	0.477	0.491

Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the ln of total compensation of the executive. Exports and imports are measured at the 6-digit NAICS level. Insider board, capital expenditure, employment are measured at the firm level. The top marginal tax rate in the state in which the firm is headquartered is obtained from Taxsim.

TABLE 4
First Stage IV Results

	ADH IV	Bartik IV	Gravity IV
	(1)	(2)	(3)
ln (ADH Export IV)$_{t-1}$	0.376***		
	[0.091]		
ln (Bartik Export IV)$_{t-1}$		0.426***	
		[0.080]	
ln (GDP Export IV)$_{t-1}$			0.594***
			[0.185]
ln (Imports)$_{t-1}$	0.18	0.164	0.600***
	[0.153]	[0.154]	[0.094]
Insider Board	0.065	0.061	0.014
	[0.076]	[0.073]	[0.054]
ln (Capital Expenditure)$_{t-}$	0.07	0.065	0.048
	[0.043]	[0.041]	[0.040]
ln (Employment)$_{t-1}$	-0.016	-0.016	-0.018
	[0.030]	[0.029]	[0.031]
ln (Top Tax Rate)$_{t-1}$	-0.315*	-0.310*	-0.371**
	[0.170]	[0.171]	[0.151]
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	19,473	19,473	19,578
F-Stat on Instrument	17.2	28.3	10.3

Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is ln (Exports)t-1.

TABLE 5
Impact of Exports on Executive Compensation (IV)

	ADH IV	Bartik IV	Gravity IV
	(1)	(2)	(3)
ln (Exports)$_{t-1}$	0.223***	0.213***	0.318***
	[0.080]	[0.077]	[0.118]
ln (Imports)$_{t-1}$	0.011	0.013	-0.054
	[0.033]	[0.034]	[0.114]
Insider Board	0.144*	0.145*	0.172**
	[0.081]	[0.081]	[0.082]
ln (Capital Expenditure)$_{t-1}$	0.080***	0.081***	0.079***
	[0.028]	[0.028]	[0.025]
ln (Employment)$_{t-1}$	0.116***	0.116***	0.115***
	[0.040]	[0.040]	[0.038]
ln (Top Tax Rate)$_{t-1}$	-0.075	-0.079	-0.015
	[0.165]	[0.164]	[0.175]
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	19,473	19,473	19,578
R-squared	0.486	0.486	0.479

Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the ln of total compensation of the executive. Exports and imports are measured at the 6-digit NAICS level. Insider board, capital expenditure, employment are measured at the firm level. The top marginal tax rate in the state in which the firm is headquartered is obtained from Taxsim.

TABLE 6
Impact of Exports on Executive Compensation with Additional Controls (IV)

	ln (Executive Compensation)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln (Exports)$_{t-1}$	0.318***	0.337***	0.305***	0.329***	0.319***	0.249**	0.185**
	[0.118]	[0.122]	[0.117]	[0.118]	[0.122]	[0.116]	[0.092]
ln (Imports)$_{t-1}$	-0.054	-0.071	-0.049	-0.061	-0.066	-0.017	-0.001
	[0.114]	[0.114]	[0.112]	[0.112]	[0.113]	[0.116]	[0.101]
Insider Board	0.172**	0.160*	0.168**	0.167**	0.157*	0.153**	0.123*
	[0.082]	[0.082]	[0.084]	[0.083]	[0.083]	[0.076]	[0.066]
ln (Capital Expenditure)$_{t-1}$	0.079***	0.064**	0.072***	0.067**	0.059**	0.051*	-0.018
	[0.025]	[0.029]	[0.026]	[0.028]	[0.029]	[0.027]	[0.028]
ln (Employment)$_{t-1}$	0.115***	0.053	0.092	0.059	0.036	0.005	0.033
	[0.038]	[0.044]	[0.058]	[0.049]	[0.056]	[0.060]	[0.058]
ln (Top Tax Rate)$_{t-1}$	-0.015	-0.005	-0.017	-0.008	-0.012	-0.077	-0.034
	[0.175]	[0.174]	[0.174]	[0.175]	[0.173]	[0.167]	[0.152]
ln (Sales)$_{t-1}$		0.081			0.133	0.106	0.073
		[0.056]			[0.098]	[0.092]	[0.060]
ln (Assets)$_{t-1}$			0.034		0.009	-0.001	-0.104
			[0.065]		[0.070]	[0.060]	[0.066]
ln (Costs)$_{t-1}$				0.072	-0.034	-0.003	0.028
				[0.046]	[0.090]	[0.095]	[0.065]
Experience						0.088***	0.087***
						[0.003]	[0.003]
Male						0.150***	0.149***
						[0.045]	[0.043]
Dr.						0.094	0.103*
						[0.062]	[0.059]
ln (Stock Price)$_{t-1}$							0.263***
							[0.030]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,578	19,578	19,578	19,573	19,573	19,573	19,553
R-squared	0.479	0.478	0.48	0.479	0.48	0.574	0.589
F-Stat on Instrument	10.3	10.3	10.0	10.2	9.8	9.8	10.1

Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1. Column 1 reports the baseline results. Columns 2-7 add additional firm level and executive level controls.

TABLE 7
Impact of Exports on Alternate Compensation Measures (IV)

	Baseline	Alt. Execu. Comp.	Salary	Bonus	Other Comp.
	(1)	(2)	(3)	(4)	(5)
ln (Exports)$_{t-1}$	0.318***	0.279**	-0.066	1.599**	0.06
	[0.118]	[0.135]	[0.109]	[0.727]	[0.218]
ln (Imports)$_{t-1}$	-0.054	-0.094	0.06	-0.824*	-0.053
	[0.114]	[0.104]	[0.071]	[0.446]	[0.161]
Insider Board	0.172**	0.097*	-0.016	0.459**	0.025
	[0.082]	[0.054]	[0.031]	[0.230]	[0.127]
ln (Capital Expenditure)$_{t-1}$	0.079***	0.091***	0.019***	-0.149	-0.047
	[0.025]	[0.024]	[0.007]	[0.115]	[0.045]
ln (Employment)$_{t-1}$	0.115***	0.159***	0.156***	0.195	0.243***
	[0.038]	[0.029]	[0.014]	[0.122]	[0.047]
ln (Top Tax Rate)$_{t-1}$	-0.015	-0.18	-0.028	0.366	-0.133
	[0.175]	[0.146]	[0.095]	[0.733]	[0.257]
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Observations	19,578	19,112	19,580	19,580	19,580
R-squared	0.479	0.528	0.378	0.549	0.416
F-Stat on Instrument	10.3	10.1	10.3	10.3	10.3

Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1. Column 1 reports the baseline results. Column 2 uses the ln of an alternate compensation measure (TDC1) produced by ExecuComp (instead of TDC2). Columns 3-5 use different components of compensation as the dependent variable (all in logs).

TABLE 8
Impact of Exports on Executive Compensation - Sensitivity Analysis (IV)

	Population IV	All Firms	All Firms	CEOs	Foreign Sales	Time varying NAICS
	(1)	(2)	(3)	(4)	(5)	(6)
ln (Exports)$_{t-1}$	0.442***	0.332***	0.428***	0.343*		0.428**
	[0.077]	[0.123]	[0.155]	[0.181]		[0.182]
ln (Foreign Sales)$_{t-1}$					0.038**	
					[0.016]	
ln (Imports)$_{t-1}$	-0.131	-0.101	-0.116	-0.129	0.026	-0.089
	[0.087]	[0.112]	[0.111]	[0.158]	[0.020]	[0.146]
Insider Board	0.170**	0.121*	0.092**	0.260**		0.169**
	[0.086]	[0.064]	[0.045]	[0.124]		[0.083]
ln (Capital Expenditure)$_{t-1}$	0.069**	0.054**	0.055***	0.032	-0.081*	0.048*
	[0.027]	[0.021]	[0.015]	[0.039]	[0.046]	[0.027]
ln (Employment)$_{t-1}$	0.116***	0.156***	0.135***	0.147***	0.148	0.120***
	[0.039]	[0.039]	[0.031]	[0.057]	[0.108]	[0.043]
ln (Top Tax Rate)$_{t-1}$	0.036	0.126		-0.075	-0.129	0.098
	[0.186]	[0.141]		[0.226]	[0.177]	[0.199]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE						Yes
Observations	19,578	37,347	60,085	3,840	3,210	18,443
R-squared	0.47	0.467	0.474	0.554	0.508	0.483
F-Stat on Instrument	16.3	14.7	8.5	9.4		6.187

Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the ln of total compensation of the executive. Column 1 uses population in the bilateral pair country to construct the instrument (rather than GDP). Columns 2 and 3 use all firms rather than just those that span the entire sample. Column 4 only includes CEOs in the sample of executives. Column 5 uses the limited post-2009 firm level export data as the independent variable rather than using firm level exports. Finally, Column 6 allows the firm's NAICS industry code (and thus exports and imports) to vary over time within the sample, rather than assigning firms to one industry for the duration of the sample.

TABLE 9
Impact of Exports on Executive Compensation - Placebo IV

	Placebo IV1	Placebo IV2	Placebo IV3	Placebo IV4	Placebo IV5	Placebo IV6	Placebo IV7	Placebo IV8	Placebo IV9
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln (Exports)$_{t-1}$	0.104	-0.032	1.042	0.460	7.262	0.859	-5.092	-0.350*	0.255
	[0.504]	[0.403]	[0.698]	[0.363]	[37.639]	[2.686]	[19.224]	[0.193]	[0.343]
ln (Imports)$_{t-1}$	0.077	0.161	-0.501	-0.142	-4.340	-0.388	3.284	0.358**	-0.016
	[0.323]	[0.263]	[0.426]	[0.253]	[23.439]	[1.686]	[11.921]	[0.144]	[0.243]
Insider Board	0.175**	0.177**	0.161	0.170**	0.064	0.164	0.256	0.182**	0.173**
	[0.079]	[0.076]	[0.103]	[0.085]	[0.615]	[0.107]	[0.469]	[0.075]	[0.082]
ln (Capital Expenditure)$_{t-1}$	0.095	0.106***	0.022	0.067**	-0.468	0.036	0.505	0.131***	0.083**
	[0.059]	[0.028]	[0.082]	[0.031]	[2.716]	[0.207]	[1.794]	[0.050]	[0.042]
ln (Employment)$_{t-1}$	0.112***	0.110***	0.125***	0.117***	0.213	0.122*	0.038	0.105**	0.114***
	[0.041]	[0.037]	[0.048]	[0.039]	[0.573]	[0.063]	[0.423]	[0.043]	[0.040]
ln (Top Tax Rate)$_{t-1}$	-0.104	-0.160	0.285	0.044	2.868	0.209	-2.262	-0.292*	-0.041
	[0.286]	[0.219]	[0.382]	[0.226]	[15.690]	[1.127]	[8.034]	[0.171]	[0.201]
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,578	19,578	19,578	19,578	19,578	19,578	19,578	19,578	19,578
R-squared	0.487	0.487	0.385	0.469	-4.672	0.419	-2.088	0.474	0.482
F-Stat on Instrument	0.73	0.92	2.13	6.66	0.03	0.25	0.07	7.12	1.94

Robust standard errors clustered at the industry level in brackets. *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the ln of total compensation of the executive. Each placebo instrument is constructed using a different randomization of GDP across foreign countries and years.

7 Appendix

Our results suggest that top marginal income tax rates are not a significant determinant of increasing executive compensation. How then do we reconcile our findings with other papers that argue that top marginal rates are the most important explanation for top income growth? For instance, both Alvaredo, Atkinson, Piketty, and Saez (2013) and Piketty, Saez, and Stantcheva (2014) show the following influential figure plotting changes in top income shares against changes in top tax rates across OECD countries:

FIGURE 7

Changes in Top Income Shares and Top Marginal Income Tax Rates since 1960

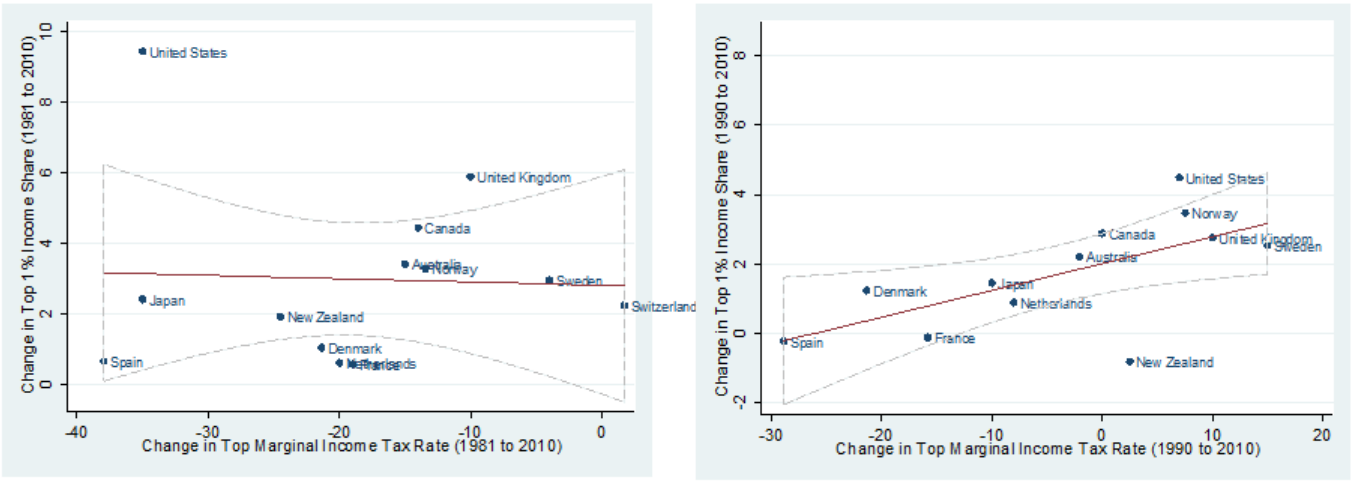
This is Figure 3 in Piketty, Saez, and Stantcheva (2014) and Figure 4 in Alvaredo, Atkinson, Piketty, and Saez (2013).

This is an important piece of evidence in both papers supporting their claim that changing top marginal income tax rates have played a key role in shaping top incomes. However, as these papers point out, all of the growth in top income has occurred since 1980 and a lot has occurred even post-1990. So rather than examining the changes in top income shares and tax rates from 1960, we replicate this figure using 1980 and 1990 as the initial year instead. Figure 6 plots the change in the top 1% income share and changes in top marginal tax rates using the same data sources as

Alvaredo, Atkinson, Piketty, and Saez (2013) and Piketty, Saez, and Stantcheva (2014) but using 1981 and 1990 start dates.[19]

FIGURE 8

Changes in Top Income Shares and Top Marginal Income Tax Rates since 1981 | Changes in Top Income Shares and Top Marginal Income Tax Rates since 1990



Top income share data comes from the World Top Income Database and the top income tax rates data come from the OECD.

Admittedly there are lots of ways to construct these scatter plots. However, it seems safe to say that the conclusions one draws from these scatter plots is highly dependent on the initial year used in the analysis.

[19]The first year of OECD tax data is 1981.