GLOBALIZATION AND THE PROVISION OF INCENTIVES INSIDE THE FIRM:
The Effect of Foreign Competition

Vicente Cuñat
The London School of Economics

Maria Guadalupe*
Columbia University and CEPR

April 2009

Abstract

This paper studies the effect of changes in foreign competition on the structure of compensation and incentives of U.S. executives. We measure foreign competition as import penetration and use tariffs and exchange rates as instrumental variables to estimate its causal effect on pay. We find that higher foreign competition leads to more incentive provision in a variety of ways. First, it increases the sensitivity of pay to performance. Second, it increases whithin-firm pay differentials between executive levels, with CEOs typically experiencing the largest wage increases, partly because they receive the steepest incentive contracts. Finally, higher foreign competition is also associated with a higher demand for talent. These results indicate that increased foreign competition can explain some of the recent trends in compensation structures.

Keywords: Incentives; Performance-related-pay; Wage Structure; Promotions; Demand for talent; Globalization; Product Market Competition.

*We would like to thank Nick Bloom, Alex Mas, Enrico Moretti, Francisco Perez-Gonzalez, Tano Santos, Luca Stanca, John Van Reenen, Kathryn Shaw for their insightful comments and suggestions, as well as seminar participants at Berkeley, Columbia, EUI, HBS, LSE, Rochester, Saïd-Oxford, Stockholm School of Economics, IIES, Stanford, UC Santa Barbara, USC, Wharton, the SOLE meetings, the NBER Summer Institute, Universidad Carlos III, MILLS Workshop and UPF. This paper was awarded the 2007 Jaime Fernandez de Araoz Corporate Finance prize. Vicente Cuñat gratefully acknowledges the support from Universitat Pompeu Fabra and Barcelona Graduate School of Economics. The usual disclaimer applies.

1 Introduction

The structure of wages and compensation in the United States changed substantially over the 1980s and 1990s: earnings inequality and returns to skill increased, with a particularly dramatic rise in pay at the top of the wage distribution (Katz and Autor, 1999; Autor, Katz and Kearney, 2006). The executive labor market replicated the trends for workers in general, with inequality between executives and job mobility increasing, and CEO pay going up disproportionately (Frydman, 2005). Simultaneously, firms increased their use of incentives and performance-related pay (such as piece rates, bonuses, and stock options) in the overall compensation of executives and workers (Murphy, 1999; Lemieux, MacLeod and Parent, 2007), significantly altering the structure of pay and the relative importance of fixed versus variable pay. This last fact has received much less attention, and there is limited knowledge of the causes behind the changes in incentive contracts and compensation structures inside firms.[1] In this paper, we show that a major force behind some of these changes is the increase in foreign competition resulting from reductions in trade barriers and the globalization of economic activity.

A number of theoretical papers have shown that product market competition can directly affect the provision of incentives by firms in a principal-agent setting because of its impact on profits and, therefore, on the returns to effort (Hermalin, 1992; Schmidt, 1997; Raith, 2004). The globalization of economic activity and trade is associated with a number of phenomena –higher imports, reductions in trade barriers, lower costs of transport, and information diffusion –all of which tend to increase the degree of competition that firms face.[2] While there are other sources of increased product market competition, in order to identify a clear causal effect that is not confounded by overall trends, we focus on a particular channel through which competition may operate –namely, foreign competition, measured as the degree of import penetration faced by U.S. firms. A common problem with other standard measures of competition (such as Herfindahl indices and price-cost margins) is that they are endogenous and difficult to measure or interpret systematically across firms over time, and that their levels are not necessarily indicative of the degree of competition (Schmalensee 1989).

Import competition allows us to overcome some of these problems. To the extent that

[1] Murphy and Zabojnik (2004a and b), Frydman (2005) and Gabaix and Landier (2006) provide a rationale for and evidence on the increase in total CEO pay.

[2] The term "globalization" is also sometimes used to refer to facts other than the increase in trade (such as higher migration or FDI flows) and even to the trend towards cultural homogenization across countries. Here, we restrict ourselves to its meaning as higher trade integration. See Tybout (2003) for a comprehensive survey on the effect of increased foreign competition on the decrease in domestic markups, and on the increase in competition in general.

it varies over time and across industries, we can assess how different U.S. manufacturing firms, with different evolutions in their trade exposure in the 1990s, changed the incentive structures they offered their executives. Furthermore, in order to isolate fluctuations in foreign competition that are exogenous to the firms' incentive policies and uncorrelated with potential omitted variables, we use import tariffs and exchange rates as instrumental variables.[3]

Compensation is measured using a matched employer-employee panel dataset (Execucomp) of large U.S. manufacturing firms, with five executives per firm between 1992 and 2000. It contains very detailed information on both firm characteristics and executive pay, providing a fairly comprehensive picture of internal labor markets and incentive provision. One can track executives as the extent of foreign competition faced by the firm evolves, and evaluate how incentives change over time and across industries. Although we restrict the analysis to changes in import penetration in order to be able to identify a precise causal mechanism, the dataset allows us to be more general regarding the aspects of compensation that we analyze. Incentives to exert effort and to improve the manager´s contribution to the productivity of the firm can be provided in several ways. Some are explicit and contractual, such as agreeing on a bonus or a performance-related pay scheme. Others are implicit (without an explicit written contract) and enforced on the basis of commitment and reputation. These include discretionary bonuses or the commitment of the firm to a given promotion scheme. Finally, some incentives may not be provided directly by firms but, rather, are implicit in labor market conditions (e.g., the good performance of one executive in a given firm may lead another firm to offer this same executive a better job).[4] We relate changes in foreign competition to a number of wage and labor market outcomes, including fixed and variable pay, performance-pay sensitivities and within-firm wage differentials between executive ranks. Furthermore, exploiting the panel dimension of the dataset, we are also able to assess whether firms seek to hire more "able" or "talented" executives as foreign competition changes (with talent measured as the permanent unobserved component of wages). These measures, taken together, give us a good description of the wage structure and the provision of incentives among top executives.

Our main finding is that higher foreign competition substantially changes the structure of compensation: it reduces the level of non-performance-related pay and increases the

[3] We are able to compute the level of import penetration faced by the firm itself by taking into account the fact that it may have products in different four-digit SIC industries. Exchange rates and tariffs are also firm-specific and weighted by the relative importance of each currency (trading partner) in total industry imports.

[4] See Prendergast (1999), Gibbons (2005) and Gibbons and Waldman (1999) for a broad survey of theoretical and empirical results on the different channels for incentive provision.

sensitivity of pay to performance, such that incentive provision is higher. This increase in performance-pay sensitivities is more pronounced for the highest-paid executives, and as incentive provision goes up with foreign competition, wage differentials between executives also increase. Finally, we also find that the overall increase in wage differentials between executives is driven partly by the fact that, faced with more competition, firms are hiring more "talented" executives at the top.

Even though executives comprise a particular subsample of workers, they are an ideal group in which to study performance-related pay because one has a clear measure of their performance: firm performance as reflected by the stock market. Furthermore, this particular group of employees allows us to better identify the effect of changes in foreign competition on firm contracting behavior independent of its effects on labor markets. This is because the boundaries of labor and product markets are relatively independent for executives, who more frequently change firms between industries rather than within industries.[5] Finally, even though executives constitute a very specific subset of highly-skilled workers, they are representative of the higher end of the wage distribution, and understanding how their contracts have evolved may shed light on the mechanisms behind the polarization of earnings (Autor, Katz and Kearney, 2006). In fact, Lemieux, MacLeod and Parent (2009) empirically establish the link between the growing use of performance-related pay and the increase in wage inequality in the U.S. between the 1970s and 1990s. They argue that the increase in performance-related pay accounts for nearly all of the increase in compensation above the 20th percentile of the distribution. Our paper provides one explanation for why the use of performance pay has increased.

This paper also contributes to the literature on the positive relationship between wage inequality and trade openness. We show that foreign competition may affect the provision of incentives within firms in two ways that raise inequality: by increasing wage dispersion and through the use of performance-related pay. This is important because most of the mechanisms explored to link inequality and trade have failed to fully account for the overall positive correlation, including the effects of openness on total labor supply, total labor demand, skill-biased labor demand, and institutions (Slaughter, 1999). Here, we suggest an additional mechanism.

The rest of the paper is as follows. In Section 2, we present the motivation of the paper and the related literature; Section 3 presents the data used; Section 4.1 shows the

[5] For example, 71 percent of the transitions of executives between firms included in Execucomp are between four-digit SIC industries (64 between three-digit SIC industries). Moreover, collective bargaining is virtually non-existent among executives. Therefore, it is unlikely that individual executives internalize the effect of their joint compensation packages on firm profits.

specification and the results relative to fixed and variable pay; Section 4.2 presents the results on promotion ladders; Section 4.3 explores how firms demand talent differently according to the degree of foreign competition; and Section 5 provides an overall picture and concludes.

2 Background and Related Literature

The trend towards globalization of trade and the increase in foreign competition imply that firms are increasingly exposed to competitive pressure (Tybout, 2003). An increase in import penetration in an industry means that domestic firms face more competition because goods from foreign firms have a bigger presence in the market. Furthermore, changes in foreign competition can permanently reshape the general competitive configuration of an industry –in the presence of fixed entry costs, once foreign firms decide to export into a market, they are unlikely to exit.[6] Therefore, one can think of the increase in foreign competition as an increase in competitive pressure for the industry.

A number of theoretical papers have examined the effect of competition on incentive provision within the principal-agent framework (e.g., Schmidt, 1997; Raith, 2003; Vives, 2008). A general result in most competition models is that, with more competition, the residual demand that a firm faces becomes more elastic and shifts down.[7] This generates two counteracting effects in terms of incentives: on the one hand, more competition raises the reward to market stealing activities due to the higher elasticity of market shares to productivity differentials. Everything else equal, this implies a higher marginal return to managerial and workers' effort and leads firms to introduce steeper incentive packages. On the other hand, the residual demand that a firm faces shrinks, reducing markups and the profitability/value of a given market share, thus making market stealing less attractive. This leads the firm to reduce the steepness of its incentive contracts. The composition of these two opposing forces implies that, a priori, the overall effect is ambiguous.

However, when one allows for endogenous entry of firms into the industry, since firm profits are constant and dictated by a zero-profit condition, the second effect is not present. Raith (2003) models competition and incentive pay allowing for free entry and exit of firms and shows that, in that case, competition –measured as increased elasticity of substitution or larger market size that leads to further entry– always leads to an increase in the provision of incentives. The effect is, however, reversed when competition increases due to a fall in entry costs.

[6] See Baldwin (1988), Dixit (1989) and Baldwin and Krugman (1989).

[7] See Vives (2004) and Boone (2000) for an overview of these two effects.

Competition may also have other effects on firms. For instance, it may affect implicit incentives to the extent that it increases the risk of the firm going bankrupt, and, lead workers to exert more effort to avoid losing their job, thus reducing the need for the firm to provide explicit incentives. Schmidt (1997) explicitly models this incentive, and several empirical papers (Nickell, 1996; Galdon-Sanchez and Schmitz, 2002) show that if additional competition leads to more pressure on profits, employees tend to work harder.

An increase in competition also may increase the available information about market conditions and help firms to better assess the contribution of an executive to profits (Hart, 1983; Scharfstein, 1988; Hermalin, 1992). This may lead to a change in the steepness of incentive schemes and, more generally, to increased use of relative-performance evaluation. However, this literature makes no clear predictions regarding the effect of competition on the provision of incentives based on a firm's *own* performance.

Overall, the total effect of competition on incentive pay is theoretically ambiguous, which makes this an interesting empirical question.[8] Our analysis asks: what is the net effect that dominates empirically?

To the extent that firms can increase performance (cut marginal costs of production) either by inducing more effort or by hiring a more skilled/talented manager, many of the arguments for rewarding managerial effort are also valid for rewarding skill (Guadalupe, 2007) and managerial talent. Marin and Verdier (2003) present a model in which globalization affects the hierarchical structure of the firm and the reward for talent. Firms change their hierarchical structure –and, thus, the explicit and implicit incentives that executives face– and increase their demand for talented CEOs. Murphy and Zabojnik (2004a and b) and Frydman (2005) argue that the increase in CEO pay is due to higher demand for general skills; and Gabaix and Landier (2008) suggest that the increase in firm size has increased the impact of CEO skills and, therefore, that small differences in skill can lead to larger differences in compensation. Our analysis is complementary to theirs since foreign competition could be an additional reason for why general skills are more important, and for which small differences in talent matter more. We also analyze explicitly the empirical effect of competition on within-firm inequality (section 4.2) and the reward for talent (section 4.3).[9]

Our findings also complement those in Black and Strahan (2001) and Bertrand and Mullainathan (2003). These papers find that competition (from easier market entry or deregulation) seems to improve governance and leads managers to focus on increasing firm

[8] There is surprisingly little evidence on the effects of competition on incentive provision within the firm. Some related papers that analyze the effects of the product market on incentives are Cuñat and Guadalupe (2005) on U.K. workers and managers, and Cuñat and Guadalupe (2009) on U.S. banking deregulation.

[9] A related argument on globalization and pay can be found in Feenstra and Hanson (1997). They show that an increase in foreign direct investment increases the returns to skill in Mexican firms.

profits. The use of more high powered incentives that we find in this paper could be a way through which this happens.

The present paper is related to several others that associate foreign competition with the *level* of wages for regular workers. For workers in general, there is evidence that higher foreign competition leads to higher unemployment and lower wages (Revenga, 1992), and to a replacement of implicit contracts by spot contracting (Bertrand, 2004). There is also evidence of rent sharing between workers and firms. Abowd and Lemieux (1993) using Canadian data, and Abowd and Allain (1996) and Kramarz (2006) using French data, find a positive elasticity of salaries to firms' quasi-rents, when the latter are instrumented using shocks to foreign competition. The idea behind these articles is that foreign competition exogenously modifies the rents available to be split in the industry and, therefore, affects collective-bargaining conditions and rent-sharing. For executives, it has been argued that rent extraction may be a determinant of executive pay (Bebchuk and Fried, 2005; Bertrand and Mullainathan, 2001). To the extent that product market competition and governance interact, as we discuss later, rent extraction issues may be relevant to our analysis.

This paper also differs from the ones mentioned above because we study not only pay levels, but also changes in the structure of compensation within firms (fixed pay versus performance-related pay), changes in wage differentials between executives, and the demand for talent. To the best of our knowledge, there is no paper that systematically explores how all these aspects of employment contracts have changed over time with competition. We also extend the identification strategy in Bertrand (2004) by using tariffs as an additional instrument for import penetration and by calculating *firm-specific* import penetration, exchange rates, and tariffs.

3 Data

3.1 Compensation Data

We use the Standard&Poor's Execucomp dataset. This is a panel (starting in 1992) of all firms in the S&P 1500 index.[10] Each firm reports detailed yearly information on the pay structure of the five most highly paid executives in the firm (ranked by salary and bonus), as well as some individual characteristics of the executives. The data also contain information from financial statements on firm characteristics and performance. For our purposes, one unique feature of this data is that they allow us to follow firms and executives over time, in a panel setting. The Execucomp data start in 1992, and 2000 is the last year for which we are

[10] The index includes firms in the S&P 500, S&P MidCap 400, and S&P SmallCap 600 indices, so it represents a stratified sample of listed firms of all sizes.

able to compute import penetration. Since we have trade data only for the manufacturing sector, we are able to use yearly data from 1992 to 2000 for all manufacturing industries. This leaves us with 831 firms and 7,571 executives (25,146 unique observations).

From these data, we use a comprehensive measure of total yearly compensation for each executive, including the components of pay that are related to performance and those that are not. Our measure of total compensation is the natural logarithm of the sum of salary, bonus, total value of stock options granted (valued using the standard Black-Scholes formula), total value of restricted stock granted, long-term incentive payouts and other annual compensation.[11]

3.2 Discussion of Foreign Competition and its Instruments: Identification

The data analysis in the next section evaluates the effect of lagged foreign competition ($ImportPen_{fjt-1}$) for firm f in industry j at time $t-1$, on a number of aspects of individual i's compensation and incentives.[12] To evaluate the effect of import penetration and, eventually, its interaction with some variables X_{ifjt}, we estimate regressions of the form:

$$\ln(W_{ifjt}) = \alpha + \gamma_1 ImportPen_{fjt-1} + ImportPen_{fjt-1} * X'_{ifjt}\gamma_2 + X'_{ifjt}\gamma_3 + v'_{ifjt}\beta + u_{ifjt} \quad (1)$$

where W_{ifjt} is total compensation and v'_{ifjt} are control variables such as firm size or CEO status, and the variables included in X_{ifjt} (firm performance, pay-rank dummies) depend on the outcome of interest. We allow for different specifications of the error term u_{ifjt} that include firm or firm-specific individual fixed effects (see each individual model below). The measure of import penetration $ImportPen_{fjt-1}$ used in what follows is defined at the firm level and takes into account that a firm may operate in different industries. Standard errors are clustered by firm in all specifications (to allow for autocorrelation of the error term within firms across years, since the import penetration variable is defined at the firm level).

To derive this firm-specific measure of import penetration, we first define industry-level import penetration as imports (into the four-digit SIC market), divided by the total value of internal production plus imports, and take its deviation with respect to the industry mean for all years. This measures the extent to which foreign competitors are present in the domestic market. Taking the deviation and including industry dummies in all the

[11] This is the standard measure of total executive compensation as described in Murphy (1999), and Jensen and Murphy (1990) among many others.

[12] We evaluated whether firms respond more to contemporaneous or lagged imports in setting contracts by including both variables in our regressions. Even though, when introduced separately, they are both significant, we found that, when considered together, lagged imports is what drives the results, so we use lagged imports in all our analysis.

regressions ensures that $\widehat{\gamma_2}$ does not capture unobserved differences by industry that are correlated with import penetration. Over the sample period, average import penetration goes from 0.16 to 0.20, but it increases for some sectors and decreases for others such that, in any given year, one may find a rich combination of changes for different sectors. As an example, Figure 1 shows this variation for three selected industries.

However, since many firms sell goods in more than one industry, import penetration into the firm's main industry may be a misleading measure of the actual import penetration that the firm faces. To account for this, we define a firm-specific import penetration measure, $ImportPen_{fjt-1}$, as the weighted average of the industry-level import penetration (computed as above), where the weights are constructed as the fraction of total sales associated with each SIC4 industry in which the firm operates (declared business segments from Compustat Segments data).[13] Because the industries in which the firm operates may change endogenously over time, the weights are based on the firm's operations in 1991 (pre-sample). Here, the identification arises from import penetration changing within a firm over time. The advantage of this choice is that it is a good reflection of the firm's industries of operation and is immune to endogenous production decisions. The disadvantage is twofold. First, if firms tend to radically change their industries of operation, by the end of the sample, and given the fixed 1991 weights, variations in this measure may not be highly correlated with the actual import penetration that the firm faces in a particular year; and second, the segment weights can introduce measurement error.[14]

Notice that we will be exploiting the panel nature of the dataset, such that we can include firm and individual fixed effects to control for unobserved heterogeneity. However, no matter how rich the variation of import penetration is in the panel, its use still can be subject to a number of criticisms in terms of possible endogeneity problems. For example, reverse causality may arise if changes in compensation structure drive the behavior of executives and, therefore, the degree of competition in the market (Aggarwal and Samwick, 1999) and the extent to which foreign firms enter. Further, if firms anticipate import fluctuations, actual changes in a given year may under-estimate their effective reaction. Finally, our weighted import penetration may be measured with error, thus leading to attenuation bias. For all of these reasons, our results on the effect of import penetration may be biased towards zero. To deal with these endogeneity concerns, we use exchange rates and import

[13] While 56 percent of the firms in the sample declare only one segment, 17 percent declare two, 15 percent declare three, and 8 percent declare four. Only 3 percent declare five or more.

[14] The results are not substantially different if we use "running" firm-specific weights (where the weights vary as the firm changes its product mix), suggesting that the changes in business mix have a limited effect. We also ran all of the specifications where each firm is assigned to its primary SIC4 code, and our results –albeit smaller in magnitude– were qualitatively similar to the ones using the firm-based variable.

tariffs as instrumental variables.

We construct industry-specific import-weighted exchange rates (Bertrand, 2004) and tariffs, where the weights on the bilateral exchange rates and tariffs between the U.S. and its trading partners are the share of imports from each partner country in a base year (average of 1990-1991 for exchange rates and 1993 for tariffs). By choosing static weights, we avoid any possible endogeneity that could arise from the joint determination of the import weights and exchange rates or tariffs. We use both current and one-lag exchange rates, as well as lagged tariffs.[15] The final instruments are calculated at the firm level using the (fixed) weights from the Compustat segments data, as we did with the import penetration measure.

Table 2 shows the different first stage regressions used for different specifications of equation 1 in the paper. Columns 1 and 2 begin by showing the basic correlation between (firm-weighted) import penetration and the (firm-weighted) instruments when we use one observation per firm and year (instead of the full dataset with all executive observations) and only control for year dummies, log assets and firm fixed effects. Column 1 presents the results for current and lagged weighted exchange rates and shows that a dollar appreciation significantly reduces import penetration in the same year and one year later.[16] Column 2 replaces exchange rates with lagged tariffs and shows that import penetration is lower the higher the tariff rate. These regressions are at the base of our IV strategy. Columns 4 to 6 present the first stage regressions for the specifications in Tables 4, 5 and 6, using the whole sample. To provide two-stage least-squares estimates of equation 1, both $ImportPen_{fjt-1}$ and $ImportPen_{fjt-1} * X_{ifjt}$ must be instrumented. Given an instrumental variable vector for import penetration Z_{fjt}, the appropriate instruments are Z_{fjt} and $Z_{fjt} * X_{ifjt}$ (Z_{fjt}, in our case, includes the current and lagged source-weighted exchange rate, as well as lagged tariffs). Columns 4 and 5 show the first stage when X_{ifjt} is log firm performance. Column 6 presents the first-stage results when X_{ifjt} are pay-rank dummies (the interaction of pay-rank dummies and performance is not reported).

For an instrument to be valid, it must be exogenous and satisfy the exclusion restriction. To the extent that exchange rates are determined in international financial markets, and tariffs are determined either at trade negotiation rounds or by federal policy, they are

[15] Note that exchange rates are superior to other measures, such as terms of trade, because the latter also includes domestic prices. Domestic prices are arguably not exogenous to executives' decisions, thus not satisfying the exclusion restriction. By constructing our instruments using aggregate exchange rates and fixed weights, we do not capture sector-specific demand shocks. Aggregate shocks should be captured by the year dummies.

[16] We found that it significantly raises imports with a two-year lag, which reflects the J-curve effect discussed in the trade literature (unreported).

possibly uncorrelated with firms' compensation policy and, therefore, arguably exogenous.[17] One might still be concerned about endogeneity of tariffs if executives could lobby for increases in tariffs when imports go up. However, over this period, most of the tariff variation occurs around 1995, when the Uruguay round was implemented. This can be seen in Figure 2, which shows a 36 percent drop in tariffs after the Uruguay round for firms in our sample. The exogeneity of the trade liberalization and the use of lagged tariffs alleviates the concern of tariff endogeneity. One advantage of using both sets of instruments is that the over-identifying restriction can be tested using two very different sources of variation in imports. In the Hansen-Sargan over-identification test, we cannot reject the joint null hypothesis that the instruments are valid instruments (in Column 4, Hansen J-statistic has a P-value of 0.42). The tests for the joint significance of the endogenous regressors (both the classic F-test and the modified Anderson-Rubin test) show that they are highly significant jointly.

Using static import weights helps in addressing the exclusion restriction since they increase the explanatory power of exchange rates and tariffs for imports and reduces their explanatory power for potential confounding factors (to the extent that the firm weights are uncorrelated with these other factors). In fact, we find that import-weighted exchange rates and tariffs are poorly related to export openness (that is, exports over total production at four-digit SIC, demeaned by industry) (see Column 2 of Table 2). This suggests that the instrumented regressions are unlikely to be capturing an indirect effect through changes in exports, which lends some support to the exclusion restriction.

All the trade information comes from the NBER trade database[18] and the tariff information from the UNCTAD TRAINS dataset. Total production at the industry level comes from the Bureau of Economic Analysis Industry Shipments data. Further details of all the variables and their construction can be found in the Appendix. Since tariff data are available only from 1993 onwards, and because we use lagged tariffs, our instrumented regressions effectively cover the period 1994-2000.[19]

[17] Tariff data come from the UNCTAD TRAINS dataset (available from 1993 to 2000 for the U.S.) that contains scheduled tariffs. Scheduled tariffs are superior to calculated average tariffs (available in the NBER database) to prevent the instrument from being mechanically correlated with imports. Since calculated average tariffs are measured as duties paid over total import value by industry and year, and import penetration is calculated from the same total import value, any measurement error on tariffs would mechanically improve the fit on the instrumented variable, and not necessarily through changes in actual tariff rates, which is the variation we want.

[18] "US Imports, Exports and Tariff Data, 1989-2001 (NBER 9387)." See Feenstra et al (2002) for a detailed description of the construction of each of these variables.

[19] We present results using all observations for which we have data available (from 1992 in the OLS specifications and from 1994 in the instrumented regressions). Similar results were obtained when restricting

Even though globalization is a pervasive trend, the effect identified here is deliberately much narrower and focuses only on import penetration. Focusing on this narrow channel using the panel and instrumental variables has the advantage that we know where the variation is coming from, and it provides a clear channel for the effect. However, there are many other reasons why competition may change, and foreign competition is just one that we can easily identify, measure, and find instrumental variables for. U.S. firms have also experienced the pressure of market deregulation, direct entry of domestic and foreign firms into the market, and reductions in information and communication costs. While these may be important, our identification strategy remains silent about these channels.

4 Results

4.1 Pay Structure

Executive pay typically has a part that is fixed and a component that is related to performance. Therefore, in order to estimate the effect of foreign competition on the structure of compensation, we model incentive contracts as follows. Total compensation for each executive i in firm f, in industry j, in year t, can be written as

$$\begin{aligned}\ln(W_{ifjt}) = a_0 + a_1 ImportPen_{fjt-1} + b_0 \ln Perf_{ft} + b_1 ImportPen_{fjt-1} * \ln Perf_{ft} + \\ + v'_{ifjt}\beta + d_t + d_f + \eta_i + \epsilon_{ifjt}\end{aligned} \tag{2}$$

The dependent variable $ln(W_{ifjt})$ is a comprehensive measure of compensation; $\ln Perf_{ft}$ is firm performance measured as the logarithm of the total market value of the firm, when this value includes the reinvestment of dividends and excludes mergers, share buyouts, spin-offs, and seasoned equity offerings.[20] The variable $ImportPen_{fjt-1}$ is lagged import penetration defined as in the previous section; v_{ifjt} includes other determinants of pay structure such as firm size (logarithm of assets), and a CEO dummy; d_t and d_f are time and firm dummies; η_i are individual fixed effects; and ϵ_{ifjt} is a white noise.[21]

The coefficient $\widehat{a_0}$ captures the baseline fixed component of the incentive contract, and $\widehat{b_0}$ its variable component, which is a function of performance. Since all regressions include

the sample in all the specifications to post-1994 .

[20] Given that the estimation includes firm fixed effects this performance measure is equivalent to using the log of total annual shareholder returns including dividends. This specification is similar to the ones in Bertrand and Mullainathan (2001) and Murphy (1986) among others.

[21] Unfortunately, the data contain only limited biographical information about the executives. Data items such as gender, age, or tenure are available for only a subset of individuals. The fixed-effect regression will capture gender, education, and other time-invariant characteristics.

firm (and individual) dummies, the estimated coefficient $\widehat{b_0}$ captures the baseline elasticity of pay to firm performance, or the percentage change in compensation from a percentage change in firm performance. The main coefficients of interest are $\widehat{a_1}$, which measures the effect of foreign competition on the fixed component of pay, and $\widehat{b_1}$, which captures the differential slope of the performance-related-pay agreement with respect to different levels of import penetration.[22] Ideally, one would like to have direct measures of b_0 and b_1, but these are not available, even when we have detailed information on the different components of compensation (salary, bonus, etc.), because even though salaries are conventionally considered fixed, raises and promotions are performance-related. And, while bonuses are considered variable, executive contracts often have a guaranteed (e.g., sign-in) bonus or a minimum bonus (Murphy, 1999). So, estimating equation 2 lets the data speak and provides us with direct estimates of the fixed component and the slope of the incentive contract. Standard errors are clustered at the firm level.

Table 3 shows the effect of foreign competition on performance-pay sensitivities. Increases in import penetration are generally associated with a lower fixed component of pay ($\widehat{a_1} < 0$) and a variable component of pay that is more sensitive to firm performance ($\widehat{b_1} > 0$).

Column 1 includes firm fixed effects, while columns 2 to 7 include firm-specific individual fixed effects, so that results are identified from within firm and individual changes in pay, not from individuals moving between firms with different compensation structures.[23] Columns 1 to 5 pool all executives, and Columns 6 and 7 restrict the analysis to CEOs. The effect of import penetration is sizeable. For all executives, and controlling for executive and firm fixed effects (column 2), a one standard deviation increase in (within-firm) import penetration generates an average drop in fixed pay of 8.8 (0.02*4.38) percent and an increase in the sensitivity of pay to performance of 1.7 percentage points (0.02*0.85), or 6.8 percent

[22] We evaluated whether systematic changes in imports, exchange rates or tariffs on firm profits could be driving the results. This can arise if, for example, rent extraction is a significant determinant of pay, and executives are paid for changes in firm value beyond the contribution of their effort (an effect known as "pay-for-luck", as in Bertrand and Mullainathan, 2001). Similarly, if log pay were a concave transformation of returns (as with some bonus schemes) or a convex one (as in options), then any systematic effect of exchange rates or tariffs on firm value would change the sensitivity of pay to performance. We instrumented the performance measure with our instrumental variables (tariffs and exchange rates), and found no significant relationship between the unexpected component of performance and pay, suggesting that it is unlikely that changes in incentives are driven by systematic changes in performance associated with the shocks to competition.

[23] In this case, the firm and the individual effects are not separately identified, but this does not affect the other coefficients. We found very similar results when controlling for individual and firm effects separately. The results are also robust to including interaction between Import Pen* lnPerf with firm/individual dummies.

relative to the baseline sensitivity (0.017/0.25).[24] For CEOs only (column 6), the changes are even larger and correspond to a 14.4 percent fall in fixed pay and a 2.5 percentage point increase in the sensitivity of pay to performance.

Column 3 includes a large set of additional controls to allow for the possibility that compensation may be changing for reasons other than competitive pressure. Our basic result could be driven by changes in the demand for labor if foreign competition leads to an increase in the demand for skilled (and, therefore, managerial) labor. To control for this, we include a set of variables that will likely capture this increased demand for skills. These are the log of property plant and equipment, investment over assets and the log of the number of employees. We also control for other determinants of executive compensation as in Himmelberg et al. (1999) (these are log of sales, the ratio of long-term assets to sales, operating income to sales, R&D intensity, advertising intensity, and the ratio of capital expenditures to property plant and equipment). The main result is unaltered by the inclusion of these variables, but since many of them are potentially outcome variables themselves, we omit them in what follows.

To allow for the base sensitivity of pay-to-performance to change over time for all firms, and for different sensitivities across industries, in columns 4 and 5, we interact the performance measure with year dummies and with industry dummies. We also allow for industry-specific trends in pay levels (column 4), and, finally, we include industry-specific trends in performance (column 5), with results similar to column 2 and coefficients also statistically similar in magnitude. This highly saturated model alleviates the concern that all we are capturing are concurrent trends in imports and incentives, since it identifies not only from within firm and individual variation in performance-pay sensitivities, but also from deviations from the industry-specific parametric trends (in levels and slopes).

We find that more competition leads to steeper incentives, so that, to the extent that competition is likely to depress the average rent of firms, this result is at odds with some of the rent-extraction literature, in which rent extraction is camouflaged in the variable component of pay, and executives appear to get paid for luck (Bebchuk and Fried, 2004; Bertrand and Mullainathan, 2001). If present, the rent-extraction mechanism actually would tend to reduce the size of our incentive-related coefficients, thus pushing our results downwards.[25]

[24] The standard deviation of import penetration in our sample is 0.14, but this includes both the between- and within-firm deviation. The origin-weighted within-firm standard deviation is 0.02.

[25] More generally, we tested explicitly for the possibility that a systematic effect of changes in imports, exchange rates or tariffs on firm profits could be driving the results (for instance, in the presence of non-linearities in performance pay-elasticities), and could find no evidence for this hypothesis. Results available upon request.

In terms of the magnitude of these effects, while import penetration increased by 6 percentage points in the economy over our sample period, in our sample, average (origin-weighted, firm-specific) import penetration increased by 4.3 percentage points. This implies, using the results in column 5, a fall in the level of compensation of 23 percent (0.043*4.54) and an increase in the slope of 3.5 percent (0.043*0.81), or around 14 percent of the baseline.

Because potential endogeneity is always a concern in these regressions –either because different pay structures lead to management strategies that may preempt foreign competition or because both may be co-determined by some omitted variable– we go on to provide instrumental variable results in Table 4. Since the sample size is reduced because of the limited availability of tariff data for the early part of our sample, we present the OLS results on the IV sample in column 1 for comparability and show that they are quite similar.

Column 2 presents the basic IV results. We find that the effect of a one standard deviation increase in import penetration coming from changes in the exchange rate and tariffs is to reduce the average intercept by 3.6 percentage points (0.02*1.8) and to increase the slope of contracts by 4.7 (0.02*2.37) percentage points. For CEOs (column 6), the intercept falls by 13.4 percent, and pay sensitivity increases by 5.9 percentage points.

The IV estimate for the slope of the contract is larger than the OLS equivalent, which, as mentioned earlier, is not surprising, given that all the sources of bias mentioned would tend to attenuate the coefficient. The estimated effect for the intercept is not significant in column 2, but it becomes so when we account for secular trends in the fully saturated specification of column 3. Columns 4 and 5 show the results when using only one instrument at a time (exchange rates or tariffs, respectively). It is worth underscoring that our results are not qualitatively different if we use just one set of instrumental variables, such that if one had a preference for using one instrument over the other this would yield similar results. However, the point estimates are different, suggesting a different local treatment effect in the different regressions.

All the results above use the estimated slope of the contract as our variable of interest. In doing so we are implicitly treating option grants as a cash award. To the extent that managers can rebalance their portfolios of non-restricted options and stock, this is the right approach. An alternative to this would be to use explicitly the performance-pay sensitivity implied by the option grants and restricted stock as a dependent variable (Core and Guay, 1999; Aggarwal and Samwick, 2003). When doing this we obtained evidence consistent with the overall results in the paper, but often with large standard errors. In the instrumental variables regressions, we found a significant increase from competition in the sensitivity of restricted stock, but not from options grants.[26]

[26] **Results are available upon request.**

Overall, Tables 3 and 4 show an important result: when firms face additional foreign competition, their pay structure shifts towards more performance-related pay and less fixed pay. That is, competition leads to an increase in incentives, and firms shift the different components of pay in a way that should induce executives to increase firm performance. This is true both if we control for individual fixed effects and if we saturate the model with interactions of year and industry dummies with performance. The use of instrumental variables deals with the endogeneity concerns and allows us to confirm that the causality of this effect goes from foreign competition to pay, not the other way around.

4.2 The Wage Ladder

Incentives can be provided through performance-pay contracts, as in the previous section, but also directly with pay levels, through efficiency wages, or wage differentials between executives in tournament-like mechanisms.[27] This section analyzes the net effect of import penetration on total compensation, and on wage differentials between executives within a firm: the wage ladder. Unfortunately, we do not have a precise description of reporting relationships or promotion profiles, and our data are insufficient to assess potential changes in organizational structure induced by competition, such as "delayering" (Rajan and Wulf, 2006), but we are able to analyze the pay hierarchy.

To measure changes in the wage ladder, we rank each executive within the firm according to total compensation in a given year, as in Barron and Waddell (2003). We construct five dummy variables, h_k with $k \in \{1, 2, .., 5\}$, where h_1 takes value 1 if the executive is the highest-paid executive in the firm in a given year and zero otherwise; h_2 takes value 1 if the executive is the second-highest-paid executive in the firm in that year; and so on up to h_5. We then run regressions with the following specification.

$$\ln(W_{ifjt}) = a_0 + \sum_{k=2}^{5} \beta_k h_k + \sum_{k=2}^{5} \theta_k h_k ImportPen_{fjt-1} + v'_{ifjt}\chi + d_t + d_f + \eta_i + \epsilon_{ifjt} \quad (3)$$

where the variables are as described in Section 4.1. The coefficients β_k represent the average wage differential between the highest- and the k^{th} highest-paid executive. Given that the pay measure is in logs, these differentials should be interpreted as total pay ratios between executives. Therefore, they do not capture the fact that pay increased for all executives during the period. The coefficients of interest are θ_k, a measure of the change in these differentials with competition. If the difference in pay between executives increases with $ImportPen_{fjt-1}$, we would expect to find that θ_k is negative and decreases in k (increases

[27] Eriksson (1999) and Main et al. (1993) study wage differentials and the tournament nature of executive promotions as a way to provide incentives

in absolute value); this indicates that the wage differentials are more marked with high foreign competition, conditional on controls and unobserved heterogeneity. The inclusion of individual fixed effects in these regressions implies that the estimated differences between pay levels, β_k, are not attributable to the different abilities of executives in the hierarchy. That is, if the highest-paid employee ($k = 1$) receives a higher wage than the others (reflected by $\beta_k < 0$), it is not because he or she is the most talented individual since unobserved ability, which we can think of as general skill or "talent," is accounted for in the fixed effect. We present and discuss the results with and without individual fixed effects. Section 4.3 exploits directly the information in the individual fixed effects of the executives that firms hire and how this changes with competition.

Table 5 shows the results of this specification. Before studying the effects of import penetration on wage differentials within the firm, we analyze the wage ladder itself (coefficients of variables second, third, fourth and fifth –the omitted category is always the highest-paid executive). The coefficients are all negative and increasing in absolute value as one goes down the wage ladder.[28] A comparison of columns 1 (with firm fixed effects) and 2 (with firm*individual fixed effects and industry*year effects) shows that the wage ladder is less steep when one controls for individual unobserved heterogeneity: the difference between the top and the fifth executive is reduced by one third (from -1.27 to -0.88). This indicates that one of the reasons for existing wage differentials among executives is that workers with different ability levels occupy different levels in the hierarchy. However, ability is only part of the explanation, since column 2 still shows significant and sizable differences between the different levels. Therefore, "advancing in the pay hierarchy" is associated with a wage increase and, thus, may provide, in itself, incentives.

Regarding import penetration, the results on $\widehat{\theta_2}$ to $\widehat{\theta_5}$ show how imports affect the differential between executive levels, net of all characteristics that are controlled for in X_{ifjt}, and individual unobserved heterogeneity. The coefficients $\widehat{\theta_2}$ to $\widehat{\theta_5}$ are generally negative and increasing in absolute value. As import penetration increases, the wage schedule becomes steeper, with the highest-paid executive earning proportionally more than the second-highest-paid executive, and so on, for all 5 categories. For the highest-paid executive, and accounting for firm (and not individual) unobserved heterogeneity (column 1), a single standard deviation (0.02) increase in foreign competition increases total pay by 4.7 percent and the differential between the first- and fifth-highest-paid executive by 2.6 percent. However, these numbers drop to 3.4 and a differential of 1.6 percent that ceases to

[28] This is by construction, as the dependent variable (log total compensation) is used to rank the executives: the coefficients on the dummies reflect the percentage difference from the highest-paid executive in total compensation.

be significant when controlling for firm-specific individual fixed effects and industry trends (column 2) showing a substantial reduction in the effect when we account for individual unobserved heterogeneity.

Next, since OLS may be biased downwards and to assess the causal effect of foreign competition, we use instrumental variables as before (columns 3 and 4). They yield a pattern similar to that in columns 1 and 2, although the magnitude of the effects, (but also the standard errors) is larger. Total pay and wage differentials between executives increase with instrumented imports for all executives (column 3) where one standard deviation increase in import penetration leads to a 21.8 (0.02*10.89) percent increase in pay for the highest-paid executive, and to a 9.2 or 12.1 percent increase for the third- and fourth-highest-paid. Therefore, the IV regressions indicate that total pay went up at all levels, but more at the top, such that there was a significant change in wage differentials within firms and that part of it was driven by changes in workers' skill.[29]

However, in light of the results in the previous section on incentive contracts, we expect changes in total pay to be a mixture of workers getting different levels of fixed pay and different performance-pay-sensitivities that induce different levels of effort. Thus, to provide a better interpretation of the mechanism behind the steepening of the wage ladder we investigate how the slope and level of pay changed with foreign competition at different levels of the pay hierarchy. Columns 5 and 6 of Table 5 report the results for this OLS regression. First, it shows that the baseline performance-pay-sensitivity is higher for executives closer to the top (elasticity of 0.25 for the most highly paid versus 0.22 for the fifth executive in column 1), which is consistent with the idea that the marginal contribution to firm performance is higher the higher up in the hierarchy the worker is (this is in line with results in Barron and Waddell, 2003 and Aggarwal and Samwick, 2003). Next, it shows that these performance pay sensitivities increased more with competition for top executives (interaction of pay-rank dummies, performance and import penetration in rows 7 to 11) and that the level of fixed pay also falls more for the highest paid executives with additional imports (interaction of pay-rank dummies and imports in rows 1 to 5).[30]

In sum, these results indicate that the ratio of the total pay of an executive to the total pay of the next-lower-paid executive grows with foreign competition (Columns 1 to 4), partly as a result of incentive contracts becoming steeper as the executive climbs within

[29] Murphy and Zabojnik (2004) and Frydman (2005) suggest that the increase in the level of CEO pay is the result of increased demand for general human capital or managerial talent. Our results complement their work since we provide evidence for changes in the observed distribution of talent at the top of the firm and are able to systematically test whether competition is one reason for this increase in the demand for managerial ability.

[30] For the fifth executive we find no significant decrease in pay.

the firm (Columns 5 and 6), and maybe also from the higher effort exerted with more high-powered incentives. This also suggests that there may be higher rewards for an internal promotion (for a given level of effort), which is also a way to provide incentives in addition to the increase in performance-pay-sensitivities documented in the previous section.[31]

The net result of all these changes is that total pay increases at the top of the firm as a result of more competition, and more so the higher up the executive is in the pay-rank hierarchy. This complements the results in Revenga (1992), Abowd and Lemieux (1992), and Abowd and Allain (1996), who analyze workers and find a negative effect on total pay from increasing foreign competition. We find that, for the very top executives, compensation actually may increase, and, thus, inequality within firms goes up.

4.3 Talent

The previous section showed that controlling for individual fixed effects changed our results significantly, and therefore that overall changes in wage differentials were partly attributable to firms hiring workers with what we called different ability or talent (measured as the unobserved fixed component of wages). The last thing we do in this section, is document how employees are sorted across firms and industries according to their "ability" as a function of import penetration. Finding good measures of executive ability is not straightforward. However, using the individual fixed-effects of a wage regression, that measure the fixed component of an executive's pay that is not explained by observables, can be interpreted as a fairly good proxy for ability or "talent". Strictly speaking, the fixed effects will include anything that affects wages, is constant over time for executives and not included in the regressions. Notice that this is typically interpreted as innate talent, ability, and education, but it will also include the fact that a specific managerial job/task becomes increasingly important, and commands a higher wage premium, as well as other characteristics that are not part of the usual definition of talent such as risk-aversion or the disutility of work for a given executive.

We model the natural logarithm of total compensation $\ln(W_{ifjt})$ as a function of some observable variables, time dummies, an individual fixed effect η_i, and a firm fixed effect d_f.[32]

[31] Alternatively, one could interpret these results as unrelated to tournaments and more in line with competition increasing the impact of talent at the top of the firm. If the results are interpreted in this way, our work can be seen as complementary to Gabaix and Landier (2008). While their argument is that the increase in corporate size has levered executive talent making it more valuable our paper would support a similar argument where the leverage comes from an increase in product market competition.

[32] This regression does not include performance, given that if an individual with higher ability leads the firm to perform better, we do not want to net this out of our ability estimate.

$$\ln(W_{ifjt}) = \alpha + \beta_1 ImportPen_{fjt-1} + \sum_{k=1}^{5} \beta_2^k h_k + \beta_3 \ln assets_{fjt} + d_t + d_f + \eta_i + \epsilon_{ifjt} \quad (4)$$

In this model, the estimated individual fixed effect $\widehat{\eta_i}$ is net of the effect of import penetration ($ImportPen_{fjt-1}$), firm size ($\ln assets_{fjt}$), position in the firm's wage ladder (h_k are pay-rank dummies) and aggregate time effects (d_t). It is also net of firm fixed effects, d_f. The individual fixed effect $\widehat{\eta_i}$ contains all the executive and job-specific characteristics that are not controlled for in the previous regression. As the fixed effect is measured in pay units, and to the extent that the market for executives is competitive, $\widehat{\eta_i}$ includes all the characteristics that increase compensation. Throughout the rest of the section we refer to this measure as talent.

With this estimate in hand, we can study how the $\widehat{\eta_i}$ of the top five executives hired at each firm (their talent) varies with import penetration within and across firms. So, we can define $\widehat{\eta}_{ikft}$ as the fixed effect estimated for the k^{th} executive of firm f at time t and estimate:

$$\widehat{\eta}_{ikft} = \lambda + \gamma \; ImportPen_{fjt-1} + d_t + u_{kft} \quad (5)$$

where d_t are year dummies, and u_{kft} is white noise. Firm effects and the effect of the level of imports, hierarchies and firm size on pay are already partialled out in equation 4.

Table 6 presents the results of the talent regressions. Column 1 shows a positive average effect of import penetration on talent (coefficient of 1.99). This reflects that more "talented" individuals sort to firms facing more competition. Given that we only have 203 observed firm movers in the sample, there is limited variation to identify changes within firms**.** Therefore in columns 2 to 5 we present results based on the non-demeaned (firm-origin-weighted) measure of import penetration, so that we also identify cross-industry differences in the sorting of talent. Column 2 confirms the sorting of talent (higher fixed effect) towards firms facing more import competition.

The results in columns 1 and 2 could hide heterogeneity in the response along the wage ladder, as we saw in the previous section. Column 3 interacts import penetration with the pay-rank dummies to show the differential change in "talent" for each hierarchy level. For the base category –highest-paid executive– the "talent" measure increases (coefficient of 0.61), and there is no substantial difference across pay-ranks. In the instrumented regressions (columns 4 and 5), we find a similar result.[33]

[33] Given that talent is measured through its impact on pay, the coefficient γ captures both demand effects, such as firms paying more for talent, and supply ones, such as the sorting of more talented executives towards more competitive industries.

In sum, we find some evidence that firms hire more talented workers at the top as they face more competition. Therefore, firms not only try to elicit more effort from workers through incentives (as shown in Section 4.1), but also pay them more (Section 4.2) and seem to attract more talented workers. Overall, these results are consistent with the predictions of the model in Marin and Verdier (2003) and suggest that there may be a war for talent playing out when markets are more globalized, specially at the very top of the firm.

5 Conclusion

In this paper, we identify the effect of foreign competition through imports on different aspects of executive pay and the provision of incentives within the firm. Eliciting the empirical relationship between competition and the provision of incentives is particularly important, as the existing theoretical predictions are largely ambiguous, and there is little evidence that explains the increased use of incentive contracts, for both executives and workers.

Our results show that, in U.S. manufacturing firms, increases in foreign competition lead to lower levels of fixed pay and a higher sensitivity of pay to performance. We estimate that the increase in import penetration over the studied period implied a 23 percent fall in the non-performance-related component of compensation and a 3.5 percent increase in the sensitivity of pay to performance (or 14 percent of the average elasticity). We also find, some evidence to suggest that increased competition is not associated with a consistent decrease in total pay across all executives. Instead, we observe that total compensation increases particularly for the highest-paid executives, and that the wage ladder of the firm becomes steeper; that is, the highest-paid executives in the firm tend to earn proportionally more when competition is high, and inequality within firms increases. The increase in foreign competition increased overall executive pay, as well as wage differentials between executives, with some of this increase being driven by changes in the composition of top executives. In fact, we find some evidence that higher foreign competition leads to a higher demand for talent.

There are certainly other reasons why compensation structures may have changed over time. We established that one important contributor is the extent of import penetration and the implied increase in product market competition: as they face more competitive pressure, firms demand more talent and are also willing to pay more for "effort." This explains the use of incentive contracts and also provides a rationale and potential causal explanation for the increased skewness and polarization of the wage distribution. There are many sources of increased competition other than foreign competition, and these are possibly contributing

further to the overall change in the wage distribution. Developing our understanding of these mechanisms further is left to future research.

References

[1] Abowd, John M., and Thomas Lemieux. 1993. The effects of product market competition on collective bargaining agreements: the case of foreign Competition in Canada. *Quarterly Journal of Economics* 108, no.4: 983-1014.

[2] Abowd, John M., and Laurence Allain. 1996. Compensation structure and product market competition. *Annales d'Economie et de Statistique* 41/42: 207-218.

[3] Aggarwal, Rajesh K., and Andrew A. Samwick. 1999. Executive compensation, strategic competition, and relative performance evaluation: theory and evidence. *Journal of Finance* 54, no.6: 1999-2043.

[4] Aggarwal, Rajesh K.and Andrew A. Samwick. 2003. Performance incentives within firms: The effect of managerial responsibility. *Journal of Finance* 58: 1613-1649.

[5] Autor, David H., Lawrence F. Katz, and Melissa S. Kearney. 2006. The polarization of the U.S. labor market. *American Economic Review Papers and Proceedings* 96, no.2: 189-194.

[6] Baldwin, Richard. 1988. Hyteresis in import prices: the beachhead effect. *American Economic Review* 78, no.4: 773-85.

[7] Baldwin, Richard, and Paul Krugman. 1989. Persistent trade effects of large exchange rate shocks. *The Quarterly Journal of Economics* 104, no. 4: 635-654.

[8] Bertrand, Marianne. 2004. From the invisible handshake to the invisible hand? How import competition changes the employment relationship. *Journal of Labor Economics* 22, no.4: 723-766.

[9] Bertrand, Marianne, and Sendhil Mullainathan. 2001. Are CEOs rewarded for luck? The ones without principals are. *The Quarterly Journal of Economics* 116, no.3: 901-932.

[10] Bertrand, Marianne, and Sendhil Mullainathan. 2003. Enjoying the quiet life? Corporate governance and managerial preferences. *Journal of Political Economy* 111, no.5: 1043-1075

[11] Bebchuk, Lucian, and Jesse Fried. 2004. Pay without performance: the unfulfilled promise of executive compensation *Harvard University Press*, Cambridge, Massachusetts.

[12] Black, Sandra E., and Philip E. Strahan. 2001. The division of spoils: rent-sharing and discrimination in a regulated industry. *The American Economic Review* 91, no. 4: 814-831.

[13] Core, John and, Wayne Guay. 1999. The use of equity grants to manage optimal equity incentive levels. *Journal of Accounting and Economics* 28, no. 2: 151-84.

[14] Cuñat, Vicente, and Guadalupe, Maria. 2005. How does product market competition shape incentive contracts? *Journal of the European Economic Association* 3, no.5: 1058-1082.

[15] Cuñat, Vicente, and Guadalupe, Maria. 2009. Executive compensation and competition in the banking and financial sectors. *Journal of Banking and Finance* 33, no.3: 495-504.

[16] Dixit, Avinash. 1989. Hysteresis, import penetration, and exchange rate pass-through. *Quarterly Journal of Economics* 104, no.2: 205-28.

[17] Eriksson, Tor. 1999. Executive compensation and tournament theory: Empirical tests on danish data. *Journal of Labor Economics* 17, no.2: 262-280.

[18] Feenstra, Robert C., Romalis, John and Schott, Peter K. 2002. U.S. imports, exports and tariff data, 1989-2001. *NBER Working Papers,* No.9387.

[19] Frydman, Carola. 2005. Rising through the tanks. The evolution of the market for corporate executives, 1936-2003. Harvard mimeo.

[20] Gabaix, Xavier, and Augustin Landier. 2008. Why has CEO pay increased so much? *Quarterly Journal of Economics,* 123, no.1: 49-100

[21] Galdon-Sanchez, Jose E., and Schmitz, James A. 2002. Competitive pressure and labor productivity: world iron-ore markets in the 1980s. *American Economic Review* 92: 1222-1235.

[22] Gibbons, Robert. 2005. Incentives between firms (and within). *Management Science* 51, no.1: 2-17.

[23] Gibbons, Robert, and Waldman, Michael. 1999. Careers in organizations: Theory and evidence. in *Handbook of Labor Economics*, Vol. 3, O. Ashenfelter and D. Card, eds., Amsterdam, The Netherlands, North-Holland: 2373–2437.

[24] Guadalupe, Maria. 2007. Product market competition, returns to skill and wage inequality. *Journal of Labor Economics* 95, no.3: 439-474.

[25] Hart, Oliver. 1982. The market mechanism as an incentive scheme. *Bell Journal of Economics* 74: 366-682.

[26] Hermalin, Benjamin E. 1992. The effects of competition on executive behavior. *RAND Journal of Economics* 23, no.3: 350-365.

[27] Huson, Mark R., Robert Parrino, and Laura T. Starks. 2001. Internal monitoring mechanisms and CEO yurnover: a long-term perspective. *Journal of Finance* 56: 2265-2297.

[28] Jensen, Michael C., and Kevin J. Murphy. 1990. Performance pay and top management incentives. *Journal of Political Economy* 98: 225-264.

[29] Katz, Lawrence F., and Autor, David H. 1999. Changes in the wage structure and earnings inequality. Handbook of Labor Economics, vol. 3A, O. Ashenfelter and D. Card, eds., North-Holland, 1999, 1463-1555.

[30] Kramarz, Francis. 2006. Unions, imports, and wages: Evidence from data matching imports, firms, and workers. mimeo

[31] Lemieux, Thomas; MacLeod, Bentley W., and Parent, Daniel. 2009. Performance pay and wage Inequality. *Quarterly Journal of Economics*124, no.1: 1-49.

[32] Main, Brian G. M. ;O'Reilly III, Charles A., and Wade, James. 1993. Top executive pay: Tournament or teamwork?. *Journal of Labor Economics* 11, no.4: 606-628.

[33] Marin, Dalia, and Verdier,Thierry. 2003a. Globalization and the new enterprise. *Journal of the European Economic Association* 1, no.2: 337-344.

[34] Marin, Dalia, and Verdier, Thierry. 2003b. Globalization and the empowerment of talent. CEPR Discussion Papers 4129, C.E.P.R. Discussion Papers.

[35] Murphy, Kevin J. 1986. Incentives, Learning, and compensation: A theoretical and empirical investigation of managerial labor markets. *Rand Journal of Economics* 17, no.1: 59-76.

[36] Murphy, Kevin J. 1999. Executive compensation. *Handbook of Labor Economics.* Volume 3b: 2485-2563.

[37] Murphy, Kevin J., and Zábojník, Ján. 2004a. CEO pay and appointments: a market-based explanation for recent trends. *American Economic Review* 94, no.2: 192-196.

[38] Murphy, Kevin J., and Zábojník, Ján. 2004b. Managerial capital and the market for CEOs. Working Paper. October.

[39] Nickell, Stephen J. 1996. Competition and corporate performance. *Journal of Political Economy* 104, no.4: 724-46.

[40] Prendergast, Canice. 1999. The provision of incentives in firms. *Journal of Economic Literature* 37, no.1: 7-63.

[41] Raith, Michael. 2003. Competition, risk and managerial incentives. *American Economic Review* 93: 1425-1436.

[42] Rajan, Raghuram, and Wulf, Julie. 2006. The flattening firm: evidence from panel data on the changing nature of corporate hierarchies. *Review of Economics and Statistics* 88, no.4: 759-773.

[43] Revenga, Ana L. 1992. Exporting jobs? The impact of import competition on employment and wages in U.S. manufacturing. *Quarterly Journal of Economics* 107, no.1: 255-284.

[44] Scharfstein, David. 1988. Product-market competition and managerial slack. *The RAND Journal of Economics* 19, no.1: 147-155

[45] Schmalensee, Richard. 1989. Inter-industry studies of structure and performance. *Handbook of Industrial Organization*, Vol. 2, edited by Richard L. Schmalensee and Robert D. Willig. North Holland.

[46] Schmidt, Klaus M. 1997. Managerial incentives and product market competition. *Review of Economic Studies* 64, no.2: 191-213.

[47] Slaughter, Matthew. 1998. International trade and labour-market outcomes: Results, questions, and policy options. *The Economic Journal*, 108: 1452-1462.

[48] Tybout, James R. 2003. Plant-and firm-level evidence on the new trade theories. in E. Kwan Choi and James Harrigan, ed., *Handbook of International Trade*, Oxford: Basil-Blackwell.

[49] Vives, Xavier. 2008. Innovation and competitive pressure. *The Journal of Industrial Economics* 56, no.3: 419-469.

6 Data Appendix

Execucomp dataset:

The Execucomp database is a panel that records information on at least the top five executives of the firms included in the S&P1500 index from 1992 onwards. We concentrate on the firms in industries for which we have import penetration (the manufacturing sector in 1992-2000). We also restrict the sample to the top five executives of each firm (ranked by salary-plus-bonus) and drop the observations where there is no information on total pay received by the executive.

Total Compensation: Sum of salary, bonus, total value of stock options granted (valued using the standard Black-Scholes formula), total value of restricted stock granted, long-term incentive payouts and other annual compensation. In real 1996 dollars (Execucomp variable TDC1).

Firm Performance: Firm performance is measured as the total market value of the firm, when this value includes the reinvestment of dividends and excludes mergers, share buyouts, spin-offs, and seasoned equity offerings. Since we take logs and include fixed effects in our regressions, this is equivalent to using as performance the return to shareholders that includes the market value of the firm and the monthly reinvestment of dividends (Computed from execucomp variables mktval and trs1yr).

Trade Data:

Import Penetration: Import penetration is defined at the industry level (four digit SIC) as the total value of imports (total import data by SIC4 come from the NBER dataset, available until 2001) divided by imports plus domestic production (domestic production is from Census Bureau's Annual Survey of Manufactures -Statistics for Industry Groups and Industries- provided by the Bureau of Economic Analysis and available until 2000) demeaned at the industry level. Next, for each firm, we construct weights that correspond to the fraction of sales associated with each industry (business segments in Compustat) in which it operated in 1991 (or the first year it appears in Compustat if not present in 1991). The final import penetration measure is the weighted average of all manufacturing industries in which the firm operates in the base year, available for 1992-2000. (Source: NBER database "US Imports, Exports and Tariff Data, 1989-2001 (NBER 9387)" and Compustat Segments data)

Tariffs: The average tariff measure is defined as the weighted average of the scheduled tariffs imposed by the U.S. on imports to each country, where the weights are the fraction of imports coming from each country in 1993. Tariffs are obtained from the UNCTAD TRAINS

dataset. These are defined by country and six digit HS product code and available for the U.S. for the years 1993, 1994, 1995, 1996, 1998, 1999 and 2000 (year 1997 is imputed from 1996). For each HS6 category, we construct a weighted average of tariffs by product, where the country weights within HS6 are kept constant over time and equal to the base year. To aggregate the HS6 average tariffs to the SIC4 industry level, we use a correspondence and weight each product by its share in the industry. Tariffs are also demeaned and weighted to obtain the firm-specific measure.

Exchange rates: The exchange rate index is defined as in Bertrand (2004) at the industry level (three digit SIC code) as the weighted average of the log real exchange rates of importing countries (expressed in foreign currency per dollar), where the weights are the share of each foreign country's import on total imports in a base period (1990-1991). Real exchange rates are nominal exchange rates multiplied by U.S. Consumer Price Index and divided by the trading partner CPI. Nominal exchange rates and foreign CPIs are obtained from the International Financial Statistics of the IMF. Exchange rates are also demeaned and weighted to obtain the firm-specific measure.

7 Tables and Figures

Table 1: Summary Statistics

	Mean	S.D.	25th Perc.	Median	75th Perc.	Observations
Total Comp.($1000s)	1668.12	4854.543	446.45	819.5	1658.6	25146
Salary ($1000s)	338.63	211.96	195.17	278.68	414.08	25146
Market Value($1,000,000)	6330.605	2.10E+04	372.26	1025.49	3464.99	25146
ln Tot.Comp	6.809	0.989	6.101	6.709	7.414	25146
ln Performance	7.106	1.708	5.92	6.933	8.15	25146
Import Pen. (raw)	0.156	0.142	0.056	0.125	0.21	25146
Import Pen.	0.003	0.02	-0.007	0	0.011	25146
ln Assets	6.886	1.591	5.778	6.764	7.909	25146
Assets ($1,000,000)	463.392	1.50E+04	323.179	865.799	2720.908	25146
CEO	0.191	0.393	0	0	0	25146
Talent FE	0.002	0.82	-0.482	-0.129	0.347	25146
Lag Exch.rate (raw)	2.225	0.894	1.566	2.231	2.835	18167
Lag Exch.rate	0	0.001	0	0	0.001	18167
Lag Tariff (raw)	0.031	0.06	0.011	0.025	0.04	18167
Lag Tariff	0.195	5.059	-0.232	0.033	0.82	18167
Export Open. (raw)	0.213	0.183	0.078	0.195	0.284	13277
Export Open.	0.013	0.058	0	0.009	0.029	13277

Notes: Total Comp is total yearly compensation that includes salary, bonus, total value of stock options granted (Black-Scholes value), total value of restricted stock granted, long-term incentive payouts and other annual compensation; ln Performance is the natural log. of shareholders value –includes the market value of the shares and reinvestment of dividends (in $1000); ln assets measures firm size; CEO is an indicator for who is the company CEO; Import. Pen (raw), Lag Tariff (raw) and Lag Exch. rate (raw) are firm-specific weighted averages of the industry measures (import penetration is imports divided by imports plus domestic production at four digit SIC; tariffs are tariffs paid on U.S. imports; and exchange rates are defined in foreign currency per dollar) where the weights are the fraction of sales in each of the firm's business segments in a base year. Import. Pen, Lag Tariff and Lag Exch. rate are the same measures, which have been demeaned by industry first (that is why the mean is close to zero). These demeaned variables are the ones used in our analysis. Export Openness is industry exports divided by industry output at four digit SIC, demeaned. See data appendix for further details and sources.

Table 2: First stage regressions

Dependent variable	Import Pen.	Import Pen.	Export Open.	Import Pen.	Import Pen.*lnPerf.	Import Pen
Specification	Basic	Basic		Pay Structure	Pay Structure	Pay-ranks
Second Stage Table				T4	T4	T5
	1	2	3	4	5	6
Exch.rate	-2.476		1.343	-2.196	-58.478	-3.19
	[0.092]***		[3.239]	[2.672]	[18.579]***	[1.040]***
Lag Exch.rate	-3.664		4.471	-1.687	-56.071	-3.299
	[0.93]***		[2.904]	[2.998]	[21.323]***	[1.087]***
Lag Tariff		-0.013	-0.001	-0.105	-0.162	-0.013
		[0.005]***	[0.001]	[0.058]*	[0.350]	[0.006]**
ln Perf.				0.0002	0.011	
				[0.001]	[0.005]**	
Exch.rate*ln Perf.				-0.088	5.086	
				[0.340]	[2.739]*	
Lag Exch.rate*ln Perf.				-0.211	4.314	
				[0.385]	[3.071]	
Lag Tariff*ln Perf.				0.01	0.004	
				[0.006]	[0.040]	
Unit of observation	firm/year	firm/year	exec./year	exec./year	exec./year	exec./year
Firm FE	yes	yes				
Indiv.*Firm FE			yes	yes	yes	yes
Observations	3715	3715	13237	18167	18167	18167
R-squared	0.221	0.214	0.03	0.208	0.222	0.208
Shea R-squared				0.08	0.149	0.026
F-test of excl. instr.				6.58***	12.54***	4.32**
Hansen J statistic (p-value)				0.24	0.24	0.43

Notes: Std. errors (in brakets) clustered by firm year in columns 3 to 6. Columns 1 and 2 only include one observation per firm and year, the other columns include the whole sample, all executive observations. Import Penetration is imports divided by imports plus domestic production at four digit SIC, demeaned and weighted at the firm level, where weights take into account the sectors of operation of the firm in a base year. Export Openness is industry exports divided by industry output at four digit SIC, demeaned. Performance is total shareholders' return, including shareholders' value at fiscal year end plus reinvestment of dividends. All regressions control for year dummies, ln assets and a CEO dummy. See Table 1 and data appendix for further details and sources. * significant at 10%; ** at 5%; *** at 1%.

Table 3: Pay Structure: Performance-related-pay

	Dependent variable is ln Total Compensation						
						CEOs	CEOs
	1	2	3	4	5	6	7
ln Perf.	0.22	0.25	0.24			0.32	
	[0.02]***	[0.02]***	[0.02]***			[0.03]***	
Lag Import Pen.	-3.4	-4.38	-4.49	-3.23	-4.54	-7.21	-10.25
	[1.90]*	[1.68]***	[1.71]***	[1.72]*	[1.98]**	[2.40]***	[3.66]***
Lag Import Pen.*lnPerf.	0.73	0.85	0.86	0.59	0.81	1.26	1.6
	[0.26]***	[0.24]***	[0.24]***	[0.25]**	[0.29]***	[0.33]***	[0.54]***
ln assets	0.21	0.15	0.1	0.19	0.2	0.2	0.25
	[0.03]***	[0.03]***	[0.04]**	[0.03]***	[0.03]***	[0.04]***	[0.04]***
CEO	0.86	0.26	0.26	0.26	0.26		
	[0.01]***	[0.02]***	[0.02]***	[0.02]***	[0.02]***		
Year Dummies	yes	yes	yes	yes	yes	yes	yes
Firm FE	yes						
Indiv.*Firm FE		yes	yes	yes	yes	yes	yes
Industry trends				yes	yes		yes
Indust.dummies*lnPerf				yes	yes		yes
Year dummies*lnPerf.				yes	yes		yes
Ind.dummies*Year*lnPerf					yes		yes
Observations	25146	25146	24543	25146	25146	4812	4812
R-squared	0.37	0.23	0.23	0.28	0.31	0.25	0.39

Notes: Std. errors clustered by firm in brackets. The dependent variable is the log of total yearly compensation that includes salary, bonus, total value of stock options granted (Black-Scholes value), total value of restricted stock granted, long-term incentive payouts and other annual compensation; Performance is total shareholders' return, including shareholders' value at fiscal year end plus reinvestment of dividends; Import Penetration is imports divided by imports plus domestic production at four digit SIC, demeaned and weighted at the firm level, where weights take into account the sectors of operation of the firm in a base year; ln assets measures firm size; CEO is an indicator for who is the company CEO. See data appendix for further details and sources. * significant at 10%; ** at 5%; *** at 1%.

Table 4: Pay Structure: IV Results

	Dependent variable is ln Total Compensation.						
	OLS	IV	IV	IV	IV	IV	IV
	OLSsample					CEOs	CEOs
	1	2	3	4	5	6	7
ln Perf.	0.24	0.21				0.26	
	[0.02]***	[0.03]***				[0.04]***	
Lag Import Pen.	-3.62	-1.8	-15.6	-10.82	-31.26	-6.72	-18.33
	[1.74]**	[8.25]	[9.08]*	[11.44]	[13.03]**	[10.54]	[13.75]
Lag Import Pen.*lnPerf.	0.73	2.37	4.21	3.93	5.91	2.97	5.04
	[0.24]***	[0.86]***	[1.66]**	[1.86]**	[2.59]**	[1.15]**	[2.17]**
ln assets	0.19	0.23	0.22	0.22	0.21	0.25	0.26
	[0.03]***	[0.04]***	[0.04]***	[0.04]***	[0.04]***	[0.06]***	[0.05]***
CEO	0.28	0.28	0.27	0.27	0.27		0.26
	[0.03]***	[0.03]***	[0.03]***	[0.03]***	[0.03]***		[0.04]***
Instruments:	all	all	all	exch.rates	tariffs	all	all
Year Dummies	yes	yes	yes	yes	yes	yes	yes
Indiv.*Firm Fixed Effects	yes	yes	yes	yes	yes	yes	yes
Indust.dummies*lnPerf			yes			yes	yes
Year dummies*lnPerf.			yes			yes	yes
Industry trends			yes			yes	yes
Indust.dummies*lnPerf*Year			yes			yes	yes
Observations	18167	18167	18167	18167	18167	3685	3685
R-squared	0.18	0.04	0.14	0.10	0.15	0.11	0.19

Notes: Std. errors clustered by firm in brackets. Columns 2 to 7 are two-stage least squares regressions of Table 3 where Lag Import Penetration and its interaction with ln Performance are instrumented with (lagged and double-lagged) exchange rates and lagged tariffs (see Table 2, columns 4 and 5, for the first-stage results). The dependent variable is the log of total yearly compensation that includes salary, bonus, total value of stock options granted (valued using the standard Black-Scholes formula), total value of restricted stock granted, long-term incentive payouts and other annual compensation; Performance is total shareholders' return, including shareholders' value at fiscal year-end plus reinvestment of dividends; Import Penetration is imports divided by imports plus domestic production at four-digit SIC, demeaned and weighted at the firm level, where weights take into account the sectors of operation of the firm in a base year; ln assets measures firm size; CEO is an indicator for who is the company CEO. See data appendix for further details and sources. * significant at 10%; ** at 5%; *** at 1%.

Table 5: Promotion and Wage Ladders

Dependent variable is ln Total Compensation						
	OLS	OLS	IV	IV	OLS	OLS
	1	2	3	4	5	6
Lag Import Pen.	2.33	0.72	15.74	10.89	-4.92	-6.1
	[0.70]***	[0.70]	[6.25]**	[5.20]**	[2.46]**	[2.53]**
Second*Lag Imp.Pen.	-0.66	0.71	-4.02	-0.61	1.29	2.6
	[0.49]	[0.53]	[2.22]*	[2.54]	[2.44]	[2.59]
Third*Lag Imp.Pen	-1.21	-0.06	-5.93	-6.13	2.56	3.76
	[0.52]**	[0.55]	[2.19]***	[2.23]***	[2.19]	[2.59]
Fourth*Lag Imp.Pen.	-1.25	-0.27	-7.04	-4.87	3.74	3.26
	[0.53]**	[0.57]	[2.27]***	[2.53]*	[2.23]*	[2.48]
Fifth*Lag Imp.Pen.	-1.31	-0.39	-7.6	-1.35	4.7	7.33
	[0.59]**	[0.68]	[2.47]***	[2.66]	[2.48]*	[3.47]**
ln Perf.					0.25	0.27
					[0.02]***	[0.02]***
Lag Import Pen.*lnPerf.					1.06	1.12
					[0.34]***	[0.34]***
Second*Lag Imp.Pen.*lnPerf.					-0.27	-0.29
					[0.33]	[0.36]
Third*Lag Imp.Pen.*lnPerf.					-0.54	-0.55
					[0.30]*	[0.35]
Fourth*Lag Imp.Pen.*lnPerf.					-0.72	-0.52
					[0.31]**	[0.34]
Fifth*Lag Imp.Pen.*lnPerf.					-0.87	-1.15
					[0.36]**	[0.47]**
Second (cols 1/4); Second*lnPerf. (cols 5&6)	-0.55	-0.37	-0.54	-0.35	-0.02	-0.03
	[0.01]***	[0.02]***	[0.02]***	[0.03]***	[0.01]***	[0.01]***
Third (cols 1/4); Third*lnPerf. (cols 5&6)	-0.88	-0.59	-0.86	-0.54	-0.03	-0.05
	[0.01]***	[0.02]***	[0.02]***	[0.03]***	[0.01]***	[0.01]***
Fourth (cols 1/4); Fourth*lnPerf. (cols 5&6)	-1.08	-0.73	-1.05	-0.69	-0.03	-0.05
	[0.01]***	[0.03]***	[0.02]***	[0.04]***	[0.01]***	[0.01]***
Fifth (cols 1/4); Fifth*lnPerf. (cols 5&67)	-1.27	-0.88	-1.24	-0.85	-0.03	-0.05
	[0.01]***	[0.03]***	[0.02]***	[0.04]***	[0.01]***	[0.01]***
Fixed Effects	Firm	Indiv.*Firm	Firm	Indiv.*Firm	Firm	Indiv.*Firm
Industry dummies*Year		yes		yes		
Observations	25146	25146	18122	18167	25146	25146
R-squared	0.52	0.31	0.47	0.22	0.55	0.32

Notes: Std. errors clustered by firm in brackets. Second is a dummy that records the second most highly paid executive, third is the third most highly paid, etc. (corresponding to dummies h_1 to h_5). The base category is the most highly paid executive in the firm. All regressions include ln assets, year dummies and pay-rank dummies (not reported in columns 5 and 6) as controls. The first stage for the IV regressions is in Table 3 column 6. See data appendix and Table 2 for further details and sources. * significant at 10%; ** at 5%; *** at 1%.

Table 6: Talent regressions

	Talent	Talent	Talent	Talent	Talent
				IV	IV
	1	2	3	4	5
Lag Import Pen.	1.99	0.58	0.61	0.78	0.83
	[1.08]*	[0.23]**	[0.23]***	[0.42]*	[0.43]**
Second*Lag Imp.Pen.			-0.05		-0.05
			[0.06]		[0.13]
Third*Lag Imp.Pen			-0.04		-0.08
			[0.08]		[0.14]
Fourth*Lag Imp.Pen.			-0.04		-0.13
			[0.08]		[0.16]
Fifth*Lag Imp.Pen			-0.04		-0.05
			[0.09]		[0.18]
Second			-0.19		-0.2
			[0.01]***		[0.02]***
Third			-0.03		-0.3
			[0.02]***		[0.02]***
Fourth			-0.35		-0.35
			[0.02]***		[0.03]
Fifth			-0.4		-0.41
			[0.02]***		[0.03]***
Year dummies	yes	yes	yes	yes	yes
Observations	25146	25146	25146	18167	18167

Notes: Standard errors clustered by firm in brackets. The dependent variable is the estimated individual fixed effect from a first-stage regression of log of total pay on firm size, hierarchy, year and firm dummies (see equation 4). Import Penetration is imports divided by imports plus domestic production at four-digit SIC defined at the firm level (demeaned in column 1). Second is a dummy that records the second most highly paid executive, third is the third most highly paid, etc. (corresponding to dummies h_1 to h_5). See data appendix for further details and sources. * significant at 10%; ** at 5%; *** at 1%.

Figure 1: Import Penetration (deviation from mean) in 3 selected industries

Figure 2: Average Tariff on US Imports