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Executive compensation and competition in the banking and financial sectors

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ABSTRACT

This paper studies the effect of product market competition on the compensation packages that firms offer to their executives. We use a panel of US executives in the 1990s and exploit two deregulation episodes in the banking and financial sectors as quasi-natural experiments. We provide difference-in-differences estimates of their effect on (1) total pay, (2) estimated fixed pay and performance-pay sensitivities, and (3) the sensitivity of stock option grants. Our results indicate that the deregulations substantially changed the level and structure of compensation: the variable components of pay increased along with performance-pay sensitivities and, at the same time, the fixed component of pay fell. The overall effect on total pay was small.

1. Introduction

The level and structure of executive compensation changed considerably over the 1980s and 1990s. There was a sharp increase in the level of CEO and executive pay, and in the sensitivity of pay to performance in executive contracts. Furthermore, the use of stock options grew substantially and now tends to dominate compensation packages for top executives (Murphy, 1999). There is substantial theoretical support for the idea that changes in the configuration of the product market are a potentially large contributor to changes in contracts. This theoretical literature shows how, in a principal–agent framework, firms may alter the structure of the incentive contracts they offer to their executives, as a response to changing product market competition (Schmidt, 1997; Raith, 2003; Hart, 1983; Scharfstein, 1988; Hermalin, 1992). However, these papers do not provide unambiguous predictions on the effect of competition on the sensitivity of pay to performance. Therefore, determining what are the relevant effects that dominate empirically is an important exercise.

In this paper, we study the extent to which changes in executive pay are driven by changes in the structure of the product market and, more generally, in competition. To assess the effect of changes in product market structure on executive pay, we focus on an industry – the financial sector – that went through sizeable changes during the 1990s. This has the advantage that, to the extent that these changes are exogenous to executive wage setting, we are able to provide a causal estimate of the effect of competition on the structure of pay. We study how both the overall level of pay and its composition changed over that period.

The financial sector underwent two substantial deregulations in the 1990s that considerably altered the nature and intensity of product market competition by lowering entry barriers. The first was the 1994 Riegle–Neal Interstate Banking and Branching Efficiency Act, which eliminated all restrictions to interstate banking and implied that all commercial banks were allowed to own and operate branches in different states. The second was the 1999 Gramm–Leach–Bliley Act, also known as the financial services modernization act. This repealed previous legislation that imposed barriers separating traditional banking, insurance and securities underwriting into three distinct industries, which, in practice, meant that commercial banks, insurance companies and investment firms were not competing with each other.

These deregulation episodes lowered barriers to entry, leading to an increase in competition in the deregulated sectors. We discuss post-deregulation evidence that suggests a substantial impact on the intensity of competition. These two major deregulations are then used as quasi-natural experiments to provide difference-in-differences estimates of their effect on compensation contracts. Difference-in-differences estimates compare the change in

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contracts between the deregulated industries and a control group before and after the deregulation, such that they are net of pre-existing differences in contracts or general time changes in performance-related pay.

We use a panel of firms that report detailed compensation information on at least their five most highly paid executives (the S&P Execucomp dataset) to measure the effect of the deregulations on the structure of compensation net of other aggregate changes. Estimating individual compensation equations that account for firm and individual characteristics we obtain an estimate of (1) the change in total pay, and (2) the level of fixed pay and the slope of performance-pay contracts, (3) the change in the performance sensitivity of stock options grants.

Our results show that, relative to the control group, total executive pay increases only marginally in deregulated sectors, following both deregulations. However, this masks a differential effect on the various components of pay. While fixed pay falls, performance-related pay rises and represents a larger fraction of total pay. In addition to this, we show that not only does the total amount of variable pay increase, but the sensitivity of pay to performance also increases. Firms in the deregulated industries provide more high-powered incentives following deregulation. This is true for different measures of sensitivity, and for alternative specifications of both deregulations.

The added value of our work is, therefore, to clarify the effect of changes in the competitive environment on various aspects of the compensation packages offered to executives. We show that the increase in pay sensitivities and the substitution of fixed for variable pay are results of increasing competition. We also complement and extend the results in Hubbard and Palia (1995) and Crawford et al. (1995). These studies analyze the effect of previous State banking deregulations in the 1980s on CEO compensation; they find a positive effect of State deregulations on total pay, and on the fixed component of compensation, as well as suggestive evidence of an increase in performance-pay sensitivities. We provide full difference-in-differences estimates on the effect of the 1990s' deregulations on the structure of compensation, on performance-pay sensitivities and on the sensitivity of stock options, and document the substitution away from fixed pay to variable pay.

The effect of deregulations, as well as the implied increase in product market competition, on the composition of pay is a relatively unexplored question at an empirical level. This is so, even though a number of theoretical papers have found implications regarding this interaction. Joskow et al. (1996) shows that regulated utilities pay lower wages than the unregulated sectors, and also indicates that they provide less sensitive compensation packages. Their evidence, however, relies mainly on cross-sectional differences between sectors. Cuñat and Guadalupe (2005, 2006) move away from deregulations and use a source of variation in competition based on international trade shocks to show that higher levels of competition increased the sensitivity of performance-related pay schemes in the UK and the US manufacturing sectors. This paper shows that deregulations can also have important consequences in terms of explaining recent trends in executive compensation – such as the increased reliance on stock options and the higher performance-pay sensitivities – and can do so with an econometric specification that allows us to claim that our estimates are plausibly causal.

2. Theoretical background

To the extent that deregulation reduces entry barriers, it leads to higher competitive pressure in the product market (we address the evidence on this in the next section). In what follows, we discuss the theoretical literature on the relationship between competition and compensation.

Schmidt (1997) and Raith (2003) start with the effect of competition on the distribution of profits across firms in the product market, and study the implied impact on executive compensation in a principal–agent setting. In Schmidt (1997), the explicit contract signed by a risk-neutral principal (shareholders) and a risk-averse agent that can exert effort in cost-cutting activities (CEO, executive) is influenced by the implicit incentives given by the competitive environment of the firm. Competition affects the contract offered to the agent through two channels. On the one hand, a higher level of competition increases the marginal return (in terms of an increased market share) to cost-cutting activities or productivity improvements (for instance, if the elasticity of substitution between goods is higher under higher competition), and therefore, the contract should provide steeper incentives to induce the manager to exert more effort. On the other hand, a higher level of competition reduces the average profits of the firm for a given share of the market. For this reason, firms should make their incentive contracts flatter under more competition. Overall, the effect of an increase in competition is ambiguous.

Raith (2003), by allowing entry and exit of firms, eliminates the ambiguity. Endogenous exit guarantees that the first effect dominates, because profits do not drop as in Schmidt (1997). Competition leads to steeper incentives due to more profitable market-stealing activities.

A related stream of literature explores the role of competition and its impact on information in relation to managerial incentives. Hart (1983) assumes that the role of competition is to tie the actions of managers more closely to the rest of the market and obtains that increased competition reduces managerial slack. Scharfstein (1988) shows that this result is very sensitive to the assumptions made, and Hermalin (1992) frames this result in a more general setting. In these papers, the increase in competition is modelled as an increase in market transparency and, therefore, in the intensity of agency problems, whereas in Raith (2003) and Schmidt (1997), the effect is induced by changes in the profit distribution and the implied returns to effort.

Competition may also increase bankruptcy risk, which, if there is a cost to managers losing their jobs, raises implicit incentives, thus reducing the need for explicit ones. This would reduce the slope of performance contracts. Changes in that slope may also occur if managers extract rents from their firms. Bebchuk et al. (2002) explore the evidence in the existing literature for rent-extracting activities in managerial compensation. They find a number of puzzles that cannot be explained using the standard principal–agent theory, but could be consistent with rent-extraction explanations.

Finally, it is important to note that the fixed component of pay may also be used to provide incentives. The efficiency wages theory argues that salaries should have a discipline effect if the fear of losing their jobs can discipline managers. This effect will be larger the larger the fixed pay that they receive. To capture these effects, we measure not only the interaction of the slope of the compensation packages with the competition measures, but also the effect of competition on the fixed component of pay.

Given the above, and the difficulty in disentangling the different simultaneous channels at work, our objective is to have a clear measure of the total effect of a change in competition on the fixed and the variable components of pay.

3. Data and identification strategy

Throughout the analysis, we use the Standard and Poor's Execucomp dataset. This is a panel dataset that covers the top five executives (ranked by salary and bonus) of all the firms included in the Standard and Poor's 1500 index, that provides exhaustive data on

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executive compensation schemes, as well as on some individual characteristics.[1] We use yearly data from 1992 to 2002. The individual-level data on compensation include yearly wage, bonus, stock options and other compensation. The data also contain information on firm characteristics and performance such as total assets, sales and shareholders value, among others. The full sample for the basic specification and all years has 29,994 observations that correspond to 5898 firm-executive pairs.

We now turn to discuss the deregulations and to what extent they can be interpreted as an increase in product market competition. Unfortunately, there is no unique and uncontroversial measure for product market competition. Measures of concentration (such as concentration ratios or Herfindahl indices) and price cost margins are (endogenous) outcome variables from the underlying competition parameters, or entry barriers. Furthermore, they are not monotonic in the underlying competition parameters: Reductions in entry barriers can lead to an increase in concentration in some industries as competition goes up (Sutton, 1991) – as in the consolidation in the banking industry following deregulation; and when firms have different productivities in an industry, the average or median price-cost margin may increase or decrease depending on the underlying productivity distribution, and the entry and exit patterns. Furthermore, concentration and price-cost margins can also be a response to the way in which compensation is set in the sector (if, for example, it leads to mergers), and, hence, be endogenous, or it may be correlated with some omitted variable. The advantage of the deregulations as direct measures of entry barriers (the underlying parameter of competition), is that they are not subject to these criticisms.

3.1. Two quasi-natural experiments: Financial deregulation in the 1990s

The decade of the 1990s is thought of as a major deregulation period for the financial sector in the United States. Two major acts were implemented that were designed to foster competition.

The first one was the 1994 Riegle–Neal Interstate Banking and Branching Efficiency Act, which eliminated two previous amendments that prohibited interstate banking. It implied that all commercial banks were allowed to own and operate branches in different states. Prior to that, there were restrictions for banks to operate across borders, although during the 1980s some states signed reciprocal agreements. Several papers explore how these previous bilateral deregulation agreements affected bank performance and show a clear increase in competitive pressure for banks in deregulated states. The deregulations led to a reallocation of assets to more efficient banks, to a higher exit rate and to relative performance becoming a much better predictor of future market share (Stiroh and Strahan, 2003). They also implied reductions in costs and prices of banking services (Jayaratne and Strahan, 1998) and an increase in the growth rates of banks (Jayaratne and Strahan, 1996). De Young et al. (1998) show how entry in deregulated states led to a decrease in cost efficiency of small urban banks in the short run, but generated cost efficiency gains in the long run. Nichols and Hendrickson (1997) show the impact of previous deregulation waves from 1929 to 1989 using Canadian banks as a benchmark for US reforms, and vice versa. The freedom to establish new branches seems to have contributed to higher levels of efficiency. These results are consistent with the view that banking deregulation reduces barriers to entry and, therefore, increases competition.

The 1994 Riegle–Neal Act (RNA) generated a nationwide lowering of entry barriers. For banks that already operated in states with some deregulation agreements, the RNA meant that they could now also operate in states that had not previously agreed to lower their barriers to entry, leading to an increase in their potential market. For banks operating in states that had not deregulated previously, the RNA meant, in addition to the enlargement of the relevant market, an increase in the number of potential competitors in the form of new entrants from other states. Both effects can be seen as an increase in competitive pressure.[2]

Dick (2006) provides evidence on indicators that suggest an increase in competition in banking following the RNA. Although, after the RNA, the total number of banks operating in the US decreased, the number of branches per person increased. The average number of banks operating at the state level grew significantly, as did the average number of states in which a bank operates. This shows that, at the relevant market dimension, competition increased. It also shows that the RNA changed the competitive environment not only of banks that operated in relatively closed states before and faced an increase in external competitors, but also of banks that already operated interstate and experienced a significant increase in their potential market size. The effects on more qualitative dimensions, such as the number of ATMs, operating costs and spreads (Dick, 2006), are also suggestive of an increase in competition.

This is the first natural experiment used. We use two different specifications for it. One is based on the year the act was announced and passed at the Federal level (called the 1994^{ANN} specification in the rest of the paper). The second and main specification (1994^{PASS} in the rest of the paper) uses the effective dates of passing of the Act by state, as in Dick (2006).

While in the 1994^{ANN} specification we compare the years before 1994 (period 1992–1994) to those after 1994 (1995–1998), in our preferred specification, 1994^{PASS}, the passing of the law differs by state, ranging from 1994 to 1997. This is a more precise estimate of the actual moment the law had an effect. Different states passed the law at different times, so we can create a treatment variable for each bank, depending on their reported location. The treated groups are the executives in the banking sector, and the control groups are the executives in the rest of the financial services sectors. Given that all commercial banks experienced the same deregulation, it is not possible to use as control group another set of banks in the 1994^{ANN} specification. The 1994^{PASS} specification partially does this, as in a given year some banks are considered as treated and some as not treated, depending on the state in which they operate. For these two specifications, the rest of the financial sector is the closest comparison group and a relevant labor market for executives in the commercial banking sector.

The second major change in the financial industry was brought about in 1999 with the Gramm–Leach–Bliley Act (GLBA), also known as the financial services modernization act. This repealed previous legislation (dating from the great depression in the 1930s) that imposed barriers separating traditional banking, insurance and securities underwriting into three distinct industries, which, in practice, meant that banks and investment firms were not competing with each other.

The perception that the GLBA would change the market structure of the financial sector can be seen in the share price reaction of the affected firms. Carow and Heron (2002) find that there was a significant price reaction on the stocks of firms involved in

[1] We control for individual unobserved heterogeneity in all specifications, as well as for CEO tenure in that position. However, given that other individual characteristics such as age and tenure as an executive are available only for a very limited number of observations, and the criteria of selection are not clear, we decided not to use them as controls.

[2] In our empirical specification, earlier differences across states will be differenced out, and the difference-in-differences coefficient will capture the average effect of the increase in competitive pressure across firms.

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the deregulation. Firms belonging to major sectors that were likely to increase their target markets (insurance companies and investment banks) experienced positive abnormal returns, while, more specialized firms that could see their narrow business niches under threat (thrifts and finance companies) experienced abnormal negative returns. Foreign banks that could previously have benefited to some extent from their ability to perform universal banking through their foreign branches also experienced abnormal negative returns. On top of this, large institutions seemed to have larger positive abnormal returns (or smaller negative ones). However, in principle, it is unclear that the GLBA benefited only larger companies. In fact, by 2001, the firms that had achieved the status of Financial Holding Company (necessary to benefit from the act) concentrated on two different types of banks: first, the top tier bank holdings that were already trying to overcome the existing regulation and be as "universal" as possible within the previous regulatory restrictions; and second, relatively small banks that were highly capitalized and healthy, but had no opportunity to expand within the previous regulation (Santomero, 2001). All of these results are consistent with the expected effects of lowering barriers between markets in models with heterogeneous firms. Our second test period, therefore, consists of the years between 1995–1999 and 2000–2002. The treated groups are the executives in the financial services sector, and the control group contains executives in the rest of the services sectors in the economy.

The deregulations can, therefore, be interpreted as increases in competition. However, the question remains as to the extent to which they can be seen as exogenous shocks. A potential concern in interpreting these deregulations as exogenous shocks to competition is to which extent they were anticipated by the industry and, therefore, may have started to have an effect prior to the deregulation year. On the one hand, if shareholders in the banking or financial services expected the deregulation to occur, then compensation contracts may have been changing prior to the deregulation date, and the coefficients would underestimate the impact of the deregulation. On the other hand, if the deregulations were not truly exogenous, but rather a reaction of regulators to changes in the industry, then the estimated coefficients could not be conclusively interpreted as causal. We found no evidence of significant pre-existing differential trends in performance-pay sensitivities or stock-option sensitivities between deregulated and non-deregulated sectors, which lends credibility to the identifying assumption that the deregulation was largely unanticipated.[3]

4. Specifications and results

We now turn to discuss the specifications and present the results. Section 4.1 starts with some general trends in executive pay in the deregulated sectors; Section 4.2 presents the effect of both deregulations on different magnitudes of executive pay; Section 4.3 shows the results regarding the effects of the experiments on fixed and variable pay; finally, Section 4.4 concentrates on how the sensitivity of the stock option packages granted to executives changed after the deregulation experiences.

4.1. General trends

Table 2 shows the general trends in total pay (columns 1 and 2), estimated fixed and variable pay (columns 3 and 4), and the share of the value of options granted over total compensation (columns 5 and 6), during the whole sample period for our treatment groups (commercial banks and the financial services sector). These are just descriptive of the overall change in compensation structures in our treatment groups. We will present the full difference-in-differences results using the deregulations later. For each treated group, we regress a measure of compensation W_{ifjt} on a linear trend, its interaction with our measure of performance Perf_{fjt}, a set of controls X^z_{ifjt}, time dummies d_t and firm-specific individual fixed effects η_{if}:

$$\ln(W_{ifjt}) = a_0 + \theta \text{trend}_t + \beta_0 \ln(\text{Perf}_{fjt}) + \beta_1 \ln(\text{Perf}_{fjt}) * \text{trend}_t + \sum a_z X^z_{ifjt} + \eta_{if} + d_t + \epsilon_{it}. \quad (1)$$

The standard errors in all specifications are clustered at the four-digit industry level to account for potential serial correlation. We use the natural logarithm of firm performance measured as total shareholders' value. We define total shareholders' value as the initial total value of the firm in the first sample period capitalized year by year using the total gross returns of holding the stock during the relevant period, including the reinvestment of dividends.[4] Assuming that markets are efficient, shareholders' value represents the total discounted value of the future profits of the firm. Given the fixed effects specification and the fact that both the dependent variable and performance are in natural logarithms, the coefficients β_0, β_1 measure the percentage change in pay associated with a percentage change in shareholders' value. This specification has the advantage of being less sensitive to outliers than one in levels, and the estimated coefficients can be directly read off as elasticities.[5] ϵ_{ifjt} is a white noise.

Columns 1–4 use total compensation as the dependent variable, defined as the sum of salary, bonus, total value of restricted stock granted, total value of stock options granted (using the standard Black and Scholes formula), long-term incentive payouts, and other annual payments (this is Execucomp variable TDC1). Columns 1 and 2 impose that $\beta_0 = 0$ and $\beta_1 = 0$ to reflect the overall trend in total compensation in the deregulated sectors. The results show that, the average annual increase in real terms of total compensation for Commercial Banks and Financial Services was 15% and 14%, respectively. The composition of this increase is shown in columns 3 and 4. By introducing performance explicitly, the regression captures the sensitivity of pay to performance in β_0 and the trend in this sensitivity in β_1, while θ now captures the trend in the fixed component of pay that is unrelated to firm performance. The results reveal that fixed pay decreased by 3.9% in banking and increased by 3.7% per year in financial services, while the dollar sensitivity of performance to pay, increased 2.3% and 1.2% per year, respectively, for each sector. It is important to note that these are estimated sensitivities and, therefore, also capture the sensitivity to performance of the parts of pay that are considered traditionally fixed. As an example, if promotions associated with higher salaries became more contingent on contemporaneous performance during

[3] We tested for the presence of pre-existing trends by running regressions that fully interacted the treatment variable (FIN) with year dummies. We found that, prior to the 1999 deregulation, there were no significant differential trends in contract slopes between deregulated and non-deregulated sectors. For the 1994 experiment, we found neither the evidence for pre-trends on the sensitivity of total compensation to performance nor on stock options sensitivities, but more mixed results on cash compensation, however, the power of this test is smaller since it is based on only two years before 1994. Results available upon request.

[4] This is equivalent to measuring firm performance as the log 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. Given that we estimate a fixed effects regression, the initial value of the firms gets absorbed by the fixed effect, and our regressions are equivalent to regressing log wage on log gross return rates.

[5] A log specification (Murphy, 1986) deals with non-linearities in performance-pay, as well as with potential outliers. It can be derived from a standard principal–agent model when executives have utilities that are isoelastic with respect to wealth and effort and exhibit CRRA (Himmelberg and Hubbard, 2000), or when preferences are Cobb–Douglas in leisure and money (Peng and Roell, 2008). An alternative would be a piece-wise linear specification in levels.

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Table 1
Descriptive statistics

	1999 Experiment sample			1994 Experiment sample		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
ln(Salary + bonus) (million US dollars)	13.14	13.04	0.95	13.23	13.16	0.98
ln(Total compensation) (million US dollars)	13.96	13.85	1.19	13.81	13.72	1.06
ln(Salary + bonus) (million US dollars) (CEOs)	13.77	13.74	1.20	14.00	13.96	1.15
ln(Total compensation) (million US dollars) (CEOs)	14.78	14.71	1.26	14.76	14.65	0.96
ln(Performance)	6.96	6.81	1.54	7.46	7.40	1.37
Stock option grants sensit. (cents per 1000 US$)	123	26	345	68	16.0	247
New executives, percentage	11.2			21.3	0	
CEO, percentage	15.0			13.1	0	
CEO, tenure	5.9	4		5.18	4	
Observations	16,453			7890		

(a) Sample period is 1995–2002 for 1999 sample and 1993–1999 for 1994 sample. Sectors included in 1999 experiment: all the services, the deregulated sector being the financial services (SIC 60–67). Sectors included in the 1994 experiment are only the financial services, the deregulated sector being Banking (SIC 60). Sample restricted to observations with non-missing data in all the shown categories.
(b) All nominal variables are in 1996 US dollars.
(c) Total compensation equals the sum of salary, bonus, total value of restricted stock granted, total value of stock options granted (using Black and Scholes), long-term incentive payouts, and other annual payments.
(d) Performance is measured as total shareholders' value, as the initial total value of the firm in the first sample period (variable mktval) capitalized year by year using the total gross returns of holding the stock during the relevant period including the reinvestment of dividends (variable trs1yr). It is defined in millions of US dollars and we use its natural logarithm. Stock option grant sensitivity is computed as in Yermack (1995).
(e) New executives dummy is defined as executives that move into a deregulated firm after the deregulation from outside the firm.

Table 2
General trends

	Pay composition					
	ln(Total compensation)		ln(Total compensation)		Options granted/Total pay	
	Commercial banks 1	Financial services 2	Commercial banks 3	Financial services 4	Commercial banks 5	Financial services 6
Trend	0.1505***	0.1359***	−0.0399**	0.0373***	0.0285***	0.0218***
	[0.0032]	[0.0026]	[0.0185]	[0.0137]	[0.0011]	[0.0009]
Trend * ln(Performance)			0.2059***	0.2155***		
			[0.0271]	[0.0191]		
ln(Performance)			0.0233***	0.0119***		
			[0.0024]	[0.0018]		
Individual-firm specific FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5663	12,686	5404	11,700	5663	12,686
R-squared	0.339	0.225	0.397	0.268	0.134	0.061

The dependent variable in columns 1–4 is the log of total compensation. The dependent variable in columns 5 and 6 is the ratio of the total value (using Black–Scholes pricing) of the stock options granted over total compensation in a given year.
ln(Performance) is measured as the log of shareholder wealth. Trend is a linear yearly trend. All regressions contain firm-specific individual effects, and, therefore account for sector, firm and individual permanent unobserved heterogeneity. Standard errors in brackets are clustered at the four-digit SIC level.
See notes to Table 1 for a definition of all other variables and exact samples.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

this period, even the fixed salary part of pay would contribute to the observed results. Columns 5 and 6 show an increasing trend in the share of the value of stock options granted over total compensation of about 2.9% and 2.2% per year in each sector.

Overall, the general trends show an increase in total pay due mainly to an increase in contingent pay and in spite of some reduction in fixed pay. To understand what part of these trends could be due to the general deregulation of the sector, in the next sections, we perform difference-in-differences estimates using the two deregulation experiments.

4.2. Total pay

Table 3 shows the effect of the two deregulations on different magnitudes of total pay in the deregulated sectors relative to non-deregulated ones.

To assess the effect of the deregulations on total compensation and on performance-related pay, we must define the treated firms (defined by the dummy variable Treated_j) and the treatment period (defined by the dummy variable post_t). Firms are classified according to their primary SIC code.[6] For the 1994 deregulation, the treated sector is the banking sector ($\text{Treated}_j = 1$ if SIC code at two digits is 60), and the comparison group is the rest of the financial services sector ($\text{Treated}_j = 0$ for SIC 61–69). For 1999, the treatment group consists of firms in sectors with SIC codes 60–64 and 67, and the control groups are the other services sectors in the economy. The treatment period is simply the years after 1994 (in 1994^{ANN}) and after

[6] In general, firms might operate in different industries, which might lead to misclassification and induce measurement error, that would tend to bias our results to zero. However, the same legal restrictions that we use as experiments make it relatively difficult for a firm to operate both in the treated and treatment group.

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Table 3
Effect of deregulation on total pay

	ln(Salary + bonus) 1	ln(Total compensation) 2	ln(Salary + bonus) 3	ln(Total compensation) 4	ln(Salary + bonus) 5	ln(Total compensation) 6
$FIN1994^{ANN}$	−0.0369	0.0703				
	[0.0352]	[0.0600]				
$FIN1994^{PASS}$			−0.0001	0.0578		
			[0.0243]	[0.0404]		
FIN99					0.0008	0.0173
					[0.0430]	[0.0534]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual-firm specific FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9916	8421	8826	7453	22,736	19,474
R-squared	0.306	0.267	0.296	0.247	0.256	0.114

$FIN1994^{ANN}$ takes value 1 if the individual is in the banking sector after 1994, 0 otherwise. $FIN1994^{PASS}$ takes value 1 if the individual is in the banking sector after the Riegle–Neal bill is passed in the state where the bank is incorporated and zero otherwise. FIN99 takes value 1 if the individual is in the financial services sector after 1999, 0 otherwise. All regressions contain firm-specific individual effects and, therefore, account for sector, firm and individual permanent unobserved heterogeneity. They also include year dummies, CEO-tenure interaction dummies, dummies that account for executives changing firm and position dummies. Standard errors are clustered at the four-digit SIC level.
See notes to Table 1 for a definition of all other variables and exact samples.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

1999 for the financial services deregulation. For specification 1994^{PASS}, we define the treatment period for each bank using the actual year of passing the law by the state. To avoid the interference between both natural experiments, we use the period 1992–1994 as the control sample for the first experiment and 1995–1998 as the treatment period. For 1999, we use 1995–1999 as the control sample and 2000–2002 as the treatment period. We use information on the fiscal year by firm, and the month in which the laws were passed, so the first treatment period is the one in which the full fiscal year happens after the deregulation.[7] Our main variable of interest is the variable FIN_{jt}, which takes value one for the treated sectors after the deregulation and zero otherwise (as the interaction of $Treated_j$ and $post_t$). Then, total compensation for executive i, in firm f, in sector j, in year t, can be written as

$$\ln(W_{ifjt}) = a_0 + a_1 FIN_{jt} + \sum a_z X^z_{ifjt} + \eta_{if} + d_t + \epsilon_{ifjt}. \quad (2)$$

The control variables X_{ifjt} include the log of assets to control for firm size, a dummy variable that takes value one if the executive has just joined the firm, to control for the impact of starting packages, dummy variables that control for both the executive being a CEO and his tenure as CEO,[8] and hierarchy dummies that control for the hierarchical position of the executives in the firm, measured as their ranking in salary and bonus (highest paid, second highest paid,...,fifth or lower). It also includes time dummies d_t, and firm-specific individual fixed effects η_{if}. ϵ_{ifjt} is a white noise.[9] The standard errors in all specifications are clustered at the four-digit industry level to account for potential serial correlation.

The dependent variable W_{ifjt} is one of two compensation measures. We first use cash compensation (salary + bonus). Then we use a more comprehensive measure, total compensation, which is defined as the sum of salary, bonus, total value of restricted stock granted, total value of stock options granted (using the standard Black and Scholes formula), long-term incentive payouts, and other annual payments (this is Execucomp variable TDC1). All the monetary values are in constant 1996 dollars.

Since all regressions include firm-specific individual fixed effects η_{if}, an executive that changes firm is considered as a different individual. Therefore, the identification comes purely from a within-individual change in the competitive environment, while the individual stays in the same firm. Given that no individual changes sector in our specification, η_{if} also captures the sector and firm effects. The inclusion of these firm-specific individual fixed effects η_{if} and year dummies d_t, produces a difference-in-differences estimate of the effect of the deregulations on total pay where pre-existing differences across industries are netted out: a_1 captures how much total pay changed in deregulated sectors relative to non-deregulated sectors after the deregulation.

The results of this specification are shown in Table 3, and are, in general, not statistically significant, showing that most of the effect of the deregulations might have been on the composition of pay and not quite on the size of total pay. However, the point estimates are revealing of the compositional change in executive pay following the deregulations. While the effect of both deregulations on salary plus bonus is small or negative (columns 1, 3 and 5), the effect is positive for the more inclusive pay categories (columns 2, 4 and 6), which include all the performance-related components of pay.

Since these are difference-in-differences specifications (all include year and firm-specific individual dummies), the coefficients on FIN99, $FIN94^{PASS}$ and $FIN94^{ANN}$ do not capture any pre-existing differences between the treated and the non-treated sectors, nor the general time evolution of pay.

These results are already suggestive of a shift from fixed to variable pay induced by the deregulations. Section 4.3 performs a more detailed analysis and explicitly estimate changes in the estimated fixed and variable components of executive pay.

4.3. Fixed pay and performance-related pay sensitivities

Next, to assess the effect of the deregulations on the fixed and the variable components of pay, we estimate explicitly how compensation changes with firm performance, $Perf_{fjt}$:

$$\ln(W_{ifjt}) = a_0 + a_1 FIN_{jt} + b_0 \ln(Perf_{fjt}) + b_1 FIN_{jt} \ln(Perf_{fjt}) + b_2 treat_j \ln(Perf_{fjt}) + b_3 post_t \ln(Perf_{fjt}) + \sum a_z X^z_{ifjt} + \eta_{if} + d_t + \epsilon_{it}. \quad (3)$$

[7] Given that a significant part of compensation packages is established at the beginning of the year (options granted, objective based bonuses,...), this should be the first year where compensation is fully affected by the deregulation.
[8] CEO dummies take value zero if the executive is not a CEO and value one if the executive is a CEO within a given tenure bracket. Tenure brackets are defined as smaller than three years, between three and eight years, larger than eight years, corresponding to the median and the highest quartiles respectively.
[9] The variables $treat_j$ and $post_t$ are implicitly included in all the regressions by introducing year and individual dummies. Furthermore, we have them interact in some specification to provide a full difference in differences structure whenever we have variables that interact with FIN_{jt} (see expression (2)).

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Table 4
Banking sector deregulation 1994: Effect on performance-pay sensitivities

	ln(Salary + bonus)		ln(Total compensation)		ln(Total compensation)	
	1994^{ANN} 1(a)	1994^{PASS} 1(b)	1994^{ANN} 2(a)	1994^{PASS} 2(b)	1994^{ANN} 3(a)	1994^{PASS} 3(b)
ln(Performance)	0.1104*	0.1057*	0.2897***	0.3005***	0.3046***	0.3150***
	[0.0570]	[0.0552]	[0.0767]	[0.0759]	[0.0264]	[0.0271]
FIN94 * ln(Performance)	0.0355***	0.0725***	0.0217	0.0322	0.0310*	0.0507**
	[0.0120]	[0.0119]	[0.0173]	[0.0195]	[0.0159]	[0.0205]
FIN94	−0.3643***	−0.6118***	−0.1726	−0.2476**	−0.2491**	−0.3885**
	[0.0859]	[0.0847]	[0.1306]	[0.1092]	[0.1242]	[0.1625]
Treated94 * ln(Performance)	0.0740	0.0505	0.0435	0.0089	0.0598	0.0156
	[0.0769]	[0.0638]	[0.0816]	[0.0940]	[0.0450]	[0.0532]
Post94 * ln(Performance)	0.0005	0.0019	0.0261*	0.0114	0.0283***	0.0126*
	[0.0069]	[0.0044]	[0.0148]	[0.0176]	[0.0067]	[0.0069]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sector dummies and individual FE					Yes	Yes
Individual-firm specific FE	Yes	Yes	Yes	Yes	no	no
Observations	9309	8244	7933	6990	7933	6990
R-squared	0.306	0.295	0.299	0.275	0.316	0.290

In the 1994^{ANN} specification, FIN94 takes value 1 if the individual is in the banking sector after 1994, 0 otherwise. In the 1994^{PASS} specification, FIN94 takes value 1 if the individual is in the banking sector after the Riegle–Neal bill is passed in the state where the bank is incorporated and zero otherwise. The dummy variable Treated94 takes value 1 if the firm belongs to the banking sector. ln(Performance) is measured as the log of shareholder wealth. All regressions contain firm-specific individual effects and, therefore, account for sector, firm and individual permanent unobserved heterogeneity (except columns 3(a) and (b) that contain standard individual fixed effects, not firm-specific, and sector dummies). They also include year dummies, dummies that account for executives changing firm, CEO tenure dummies, and position dummies. Standard errors (in brackets) are clustered at the four-digit SIC level.
See notes to Table 1 for a definition of all other variables and exact samples.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

The control variables X^z_{ijft} are the same as in the previous section. We use the natural logarithm of firm performance measured as shareholders' value, and defined as above. Here, again, given the fixed effects specification and the fact that both the dependent variable and performance are in natural logarithms, the coefficients b_0, b_1, b_2, b_3 measure the percentage change in pay associated with a percentage change in shareholders' value.

In this specification, a_1 is the difference-in-differences estimate of the change in the fixed component of pay following the deregulation. b_0 measures the basic sensitivity of pay to performance in the sample (the slope of the performance-pay contract). To provide a full difference-in-differences estimate, one must take into account that the sensitivity of pay to performance might have been different for deregulated and non-deregulated sectors throughout the sample period, or that it may have increased for all sectors after the deregulation. b_2 captures the fact that the deregulated sectors might have had different sensitivities throughout the sample period, and b_3 captures whether, after deregulation, all sectors had a change in their contract sensitivities. Therefore, b_1 captures the change in the slope following the deregulation in deregulated sectors relative to non-deregulated ones.

This last specification provides a difference-in-differences estimator of the effect of competition on both the level and the slope of pay to performance. It builds on standard estimations and measures of performance-pay sensitivities used in the literature, such that one can benchmark the results against stylized facts (Murphy, 1999), and it provides a comprehensive estimate of the structure of compensation. As usual, a maintained assumption of the difference-in-differences specification is the absence of a bias that affects differently deregulated and non-deregulated firms after the deregulation. Notice, also, that if performance leads to a promotion (and a raise) within the firm, this will be captured by the performance coefficient, along with standard variable compensation. Finally, we also perform a number of robustness checks on this basic specification.

Table 4 presents the results associated with the 1994 deregulation experiment. It shows results using the year of the announcement as the treatment year for all commercial banks (1994^{ANN} specification), and the results using the effective date of the Riegle–Neal bill in each state (1994^{PASS} specification). In principle, it is unclear whether one specification should be more relevant than the other, as it is possible that firms realigned their incentive schemes in 1994, anticipating that their state would eventually adopt the interstate branching deregulation, rather than the date of adoption.

Columns 1 and 2 show that deregulated sectors decreased the fixed component of cash compensation defined as salary plus bonus (negative coefficient on the "FIN94" variable) and, at the same time, increased its sensitivity to performance (positive coefficient on "FIN94 * Performance"). The base sensitivity of cash compensation to performance (coefficient on the "Performance" variable) increases by 0.11% for every 1% increase in firm performance. For deregulated sectors, this percentage increased by an additional 0.035 relative to non-deregulated sectors with the 1994^{ANN} specification, and 0.072 with the 1994^{PASS} specification. Simultaneously, the fixed component of pay decreases.

Columns 2(a) and (b) replicate this basic specification for total compensation, the results for the effect of the deregulation on performance-related pay are also positive, but fall short of being statistically significant. The effect on fixed pay is again negative, although only statistically significant with the 1994^{PASS} specification.

Finally, instead of including firm-specific individual fixed effects, we use standard individual fixed effects (such that the individual keeps his identity after changing firms) and sector dummies. On the one hand, identifying the coefficients from movers regression increases the variability of pay and performance and should, therefore, increase the precision of the estimates. On the other hand, the identified effects are a mix of the changes in existing pay agreements in deregulated firms and new agreements signed by executives switching firms. This is done in columns 3(a) and (b), and yields statistically significant results that match qualitatively earlier ones.

Overall, the results show that deregulated firms substituted fixed pay with more performance-related pay after the 1994

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Table 5
Financial services deregulation 1999: Effect on performance-pay sensitivities

	ln(Salary + bonus) 1	ln(Total compensation) 2	ln(Total compensation) 3
ln(Performance)	0.1363***	0.2455***	0.2537***
	[0.0178]	[0.0343]	[0.0153]
FIN99 * ln(Performance)	−0.0237	0.0587**	0.0598***
	[0.0195]	[0.0222]	[0.0149]
FIN99	0.1450	−0.3724**	−0.3936***
	[0.1443]	[0.1659]	[0.1089]
Treated99 * ln(Performance)	0.0429	0.0297	0.0192
	[0.0361]	[0.0493]	[0.0271]
Post99 * ln(Performance)	−0.0013	−0.0238**	−0.0219***
	[0.0072]	[0.0091]	[0.0059]
Year dummies	Yes	Yes	Yes
Sector dummies and individual FE			Yes
Individual-firm specific FE	Yes	Yes	no
Observations	19,487	16,800	16,800
R-squared	0.272	0.148	0.158

FIN99 takes value 1 if the individual is in the financial services sector after 1999, 0 otherwise. Treated99 takes value 1 for executives in the financial services sector, 0 otherwise. ln(Performance) is the log of shareholder wealth. All regressions contain firm-specific individual effects and, therefore, account for sector, firm and individual permanent unobserved heterogeneity (except column 3 that contains standard individual fixed effects, not firm-specific and sector dummies). They also include year dummies, CEO tenure dummies, dummies that account for executives changing firm and position dummies. Standard errors (in brackets) are clustered at the four-digit SIC level.
See notes to Table 1 for a definition of all other variables and exact samples.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

deregulation. This is the case for both specifications, but our preferred specification 1994^{PASS} (columns 2(b) and 3(b)) generally yields results much stronger in size and statistically more significant, showing that the adoption dates by state may be closer to the moment when banks adjusted their compensation than to the actual passing of the bill.

Table 5 shows the results associated with the 1999 deregulation experiment. Column 1 estimates the sensitivity of cash compensation to firm performance and shows a statistically insignificant effect of the 1999 deregulation on that sensitivity. Column 2, in turn, shows a substantial effect of the deregulation on the sensitivity of total pay to firm performance. The baseline elasticity (coefficient associated with the variable "Performance") is around 0.24%. Deregulation increased the performance-pay sensitivity an additional 0.06% of total pay for every 1% of increased shareholders' wealth. So, relative to the baseline sensitivity of 0.24%, deregulation led to an increase in the sensitivity of executive pay to increases in shareholders' wealth of 24% more with respect to the change in sensitivity experienced by non-deregulated sectors.

Two other interesting results in column 2 are worth mentioning. First, the coefficient associated with the variable Post99 * Performance is negative and statistically significant. This is due to the fact that the sensitivity of performance-related-pay fell from the year 2000. The coefficient associated with the experiment is slightly larger, so a more accurate interpretation of the results is that while the performance-pay sensitivity of the rest of the sectors went down after year 2000, the deregulated sectors maintained their previous sensitivity and even increased it slightly. Second, the coefficient associated with the variable FIN99 is negative and statistically significant, indicating a reduction in the fixed component of pay. Column 3 identifies the effect from both movers and stayers with similar results.[10]

We can conclude that both the 1999 and the 1994 deregulations led to executive pay packages that had a lower fixed component and a larger performance-based component relative to the sectors that were not deregulated. These results are consistent with the predictions of Raith (2003); or, in the spirit of Schmidt (1997), one should conclude that the effect associated with the additional elasticity of returns to managerial effort dominates the implicit discipline imposed by higher competition.[11]

4.4. Stock option grants sensitivity

In the previous section (and in most of the existing literature), options are evaluated by their value at inception and treated as a cash reward. This approach is simple and probably correct if executives have a portfolio of the firm's stocks and stock options that they can rebalance to keep their exposure to changes in the share price constant. However, if this rebalancing is not feasible, options are, in themselves, an instrument to provide incentives, and one should consider them long-term contingent payment. Therefore, an alternative measure of the sensitivity of executive compensation to changes in shareholders' wealth can be explicitly calculated using a formula and not an econometric estimation: This is the sensitivity of the stock option packages granted. The advantage of this method is that performance-pay sensitivities are directly calculated and not estimated. In particular, this takes into account any non-linearities in option values.[12]

The "delta" of each option measures the sensitivity of the value of that option to changes in share price. We can use this information to calculate the sensitivity of a particular stock option grant to changes in shareholders' value. Given that stock option grants have

[10] One potential concern is that the year when the deregulation was passed could be a non-typical post-deregulation year. For this reason, we also reproduced the main specifications of the model, excluding the fiscal year when deregulated firms where actually deregulated. The results are robust to this exclusion (details available upon request).

[11] We also checked the robustness of the results to allowing for relative performance evaluation (RPE) to interact with competition (Aggarwal and Samwick, 1999; Kedia, 2006). The inclusion of the extra RPE variables did not change the main results (the results are available upon request). The results are also not sensitive to dropping either the first or the last year of the observations for an executive, which could include one-time components.

[12] Note that the automatic reaction of options to share prices may induce to some perverse incentives, as pointed out by Chen et al. (2006), Burns and Kedia (2008) among others.

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Table 6
Option grant sensitivities

	Option grant					
	1	2	3	4	5	6
$FIN94^{ANN}$	0.29	0.53*				
	[0.19]	[0.29]				
$FIN94^{PASS}$			0.22	0.36**		
			[0.13]	[0.14]		
FIN99					0.37**	0.26
					[0.18]	[0.20]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual-firm specific FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector trend	no	Yes	no	Yes	no	Yes
Observations	8424	8424	7456	7456	19,500	19,500
R-squared	0.0082	0.0086	0.00812	0.0083	0.0074	0.0075

Columns 1 and 2 correspond to the 1994^{ANN} experiment. Columns 3 and 4 to the 1994^{PASS} experiment and columns 5 and 6 to the 1999 experiment.
The dependent variable "option grant" is the dollar sensitivity of the value of all the option grants received by the executive in a given year per 1000 dollars increase of shareholders' value.
$FIN94^{ANN}$, $FIN94^{PASS}$ and FIN99 captures the increase in the sensitivity of stock option grants following each experiment. $FIN94^{ANN}$ takes value 1 if the individual is in the Banking sector after 1994, 0 otherwise. $FIN94^{PASS}$ takes value 1 if the individual is in the banking sector after the Riegle–Neal bill is passed in the sate where the bank is incorporated and zero otherwise. FIN99 takes value 1 if the individual is in the financial services sector after 1999, 0 otherwise. Treated99 takes value 1 for executives in the financial services sector, 0 otherwise. All regressions contain firm-specific individual effects and, therefore, account for sector, firm and individual permanent unobserved heterogeneity. They also include year dummies, CEO-tenure interaction dummies, dummies that account for executives changing firm and position dummies. Standard errors are clustered at the four-digit SIC level.
See notes to Table 1 for a definition of all other variables and exact samples.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

become one of the main sources of contingent remuneration for executives, these are very relevant measures to see the evolution of performance-related-pay with competition.

We measure the sensitivity of the value of the option packages granted to the executive to changes in the value of the firm, using the measure introduced by Yermack (1995). It consists of multiplying the sensitivity of the price of each option to the share price (delta) by the percentage of total shares outstanding that the new issue of options represents. In practice, the sensitivity of executive pay to changes in shareholders' wealth associated with each option issue is measured as $\text{delta} \times \frac{\text{Number of shares represented by option award}}{\text{Number of shares outstanding}}$.[13] Then, we add the sensitivity of the different issues in a particular period to get the total sensitivity measure for that year. The measure is expressed in extra dollars of compensation for every 1000 extra dollars of shareholders' wealth.

In the data, the total number of grants is 82,912 and the weighted average delta of all grants is 0.77. The total number of year-executive observations that have at least one grant is 16,583, and the median sensitivity across individuals of all the granted packages is 59.1 cents per 1000 extra dollars of shareholders' value. If we include the individuals that are not granted any option packages, this median sensitivity drops to 10.4 cents.

To identify whether the change in competition in our experiments altered the sensitivity of the packages of options granted, we run the following regression:

$$\text{Option Grant Sensitivity}_{ijft} = \alpha + \beta \text{FIN}_{jt} + \sum a_z X^z_{ijft} + d_t + \eta_{\text{if}} + \varepsilon_{ijft}. \quad (4)$$

This is a standard difference-in-differences estimation in which β measures the differential change in sensitivity in sectors subject to a deregulation as compared to the sectors that were not. We include the same set of controls as before. The inclusion of year, d_t, firm-specific individual fixed effects η_{if}, and sector, d_j, dummies guarantees that we are not just capturing a general change after the deregulations or a compositional effect. Note that, given that the measure is a performance-pay sensitivity in itself, we need not interact the deregulation dummy with the performance measure.

As we want to measure the change in the compensation policy of the firm after the deregulation, most of the relevant information relative to options is contained in the new option grants. If firms want to increase the sensitivity of pay to performance of their executives, they can increase the number of options granted and also use options with higher delta. However, ideally, one would also want to measure the overall sensitivity of the stock option holdings. This measure cannot be calculated with the data available in Execucomp.[14]

Table 6 shows how the stock option grant sensitivity changed following the two deregulations. Columns 1 and 2 correspond to the basic 1994^{ANN} specification, the difference between them is that the specification in column 2 contains sector-specific time trends as controls. The results in column 1 are statistically insignificant. Column 2, however, strongly suggests that following the deregulation, commercial banking executives experienced an increase of 53 cents of additional option value per additional 1000 dollars of shareholders' value. Columns 3 and 4 show the results with respect to the 1994^{PASS} experiment and, again, only the specification with sector-specific time trends yields a statistically significant coefficient, with an increase of 36 cents of additional option value per additional 1000 dollars of shareholders' value. These are quite substantial effects, given that the median sensitivity is 10.4 cents.

Columns 5 and 6 show the results of the 1999 experiment. In this case, only the less saturated specification yields statistically

[13] We use exactly the same methodology as in Yermack (1995). The sensitivity is defined as $\text{delta} = \frac{\partial \text{Black–Scholes value}}{\partial \text{share price}}$. The derivative of the Black–Scholes value is calculated using the monthly volatility of the stock price over the last 60 months, the average dividend yield of the stock, and the risk-free interest rate. The maturity of new option grants with missing information about their time to maturity is set to 10 years, as this is the most frequent maturity (Hall and Liebman, 1998). Most options are granted at the money, but there is some variation in their end-of-year delta. See Palmon et al. (2008), for an analysis of optimal deltas in executive stock options.

[14] See Hall and Liebman (1998) for an attempt to measure the overall option portfolio sensitivity. This calculation requires a large number of data periods and relies on a set of assumptions to compensate for the lack of information on some aspects, such as which options are executed first.

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significant results, with an increase of 37 cents per additional 1000 dollars of firm value. When we saturate with time trends, the coefficient falls to 0.26 with a standard error of 0.20.

Overall, the results in Table 6 are consistent with the results in Section 4.3. Each approach has its own advantages: While the approach in Section 4.3 uses more comprehensive measures of pay, the approach in this section uses calculated and not estimated sensitivities. Given that both approaches are quite different and we reach similar conclusions, the results reinforce each other.

5. Conclusions

The determinants of managerial compensation have received a lot of attention, but little is known about how these are affected by the degree of product market competition that firms face. The competitive environment generates implicit incentives that determine the design of compensation packages and, hence, alter the need for and magnitude of explicit incentives. In this paper, we draw together the main theories explaining the impact of product market competition on compensation packages and empirically evaluate its effect.

We restrict the analysis to the financial sector and assess how two major deregulations, which we interpret as quasi-natural experiments for increases in product market competition, affected the level and structure of executive pay. Our results indicate that total pay stayed constant or marginally increased following the deregulations, but this moderate increase reflects strong differential trends in the fixed and variable components of pay. We provide substantial evidence of a reduction in the fixed component of pay and an increase in the sensitivity of pay to performance, implying that, as competition increases, managers are faced with steeper incentives to increase firm performance. This increased sensitivity is found when we compute the sensitivity of total compensation to firm performance explicitly, as well as when we use the sensitivity of stock option grants.

Therefore, the results indicate that both deregulations and the increase in competition they implied, led to a higher reliance on performance-related pay and provide a potential explanation for the trend over the past decades of an increased use of these compensation mechanisms. They indicate that competition may have an impact on the dispersion of earnings in the economy if, as product markets become more competitive, performance-related pay contracts become more pervasive for all levels of workers. Direct tests of these issues are left for future research.

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