Compensation in the Financial Sector: Are all Bankers Superstars?

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Abstract

Based on a survey among French engineers, I find that employees in the financial sector are highly paid. I also find large pay differences within the sector and that a large share of compensation is variable. I develop a simple partial equilibrium model where employees in the financial sector acquire heterogeneous industry specific skills in the first part of their career. In the second part, firms compete over this industry specific human capital and financers are matched to heterogeneously scaled projects. This model has empirical implications concerning wages, firm size per employee and career dynamics. First, the variance and skewness of wages are high and increase over the career. Second, returns to seniority are large and there is persistence in career in the sector. Third, wages can be explained by size effects. I test these implications and find that the premium in the financial sector could be explained by the combination of very specific industry human capital and a higher sensitivity to talent.

Keywords: Finance, compensation, wage distribution, wage structure, incentives, superstars

JEL codes: G2, G24, J3, J31, M5

1 Introduction

Since the beginning of the financial crisis, compensation in the financial sector has been at the center of the public debate. And it is the object of a strong disagreement between the public opinion and bank lobby groups. While the former finds the level of compensation outrageous, the latter fight for not having them regulated. In this debate, governments' opinion is shared. For electoralist reasons, financiers' compensation is a good subject to tackle. It has made politicians react, and Barack Obama, on February 4 2009, is only one example: "For top executives to award themselves these kinds of compensation packages in the midst of this economic crisis is not only bad taste, it's bad strategy, and I will not tolerate it as President". It was even on top of the agenda of the first international meetings on the regulation of the financial sector (G 20 London summit, 2 April 2009). However, so far global coordination is limited and governments are concerned by the "first mover disadvantage": varying rules on pay raise risks of regulatory arbitrage and banks migration across countries. But the initial question remains: why is compensation in the financial sector so high?

To answer the question I use a periodic survey among French engineers. Focusing on the educational elite is useful as rents in finance are concentrated in highly educated people (Philippon & Reshef, 2009). With a response rate of nearly 6%, each survey comprises on average 30,800 individuals. Respondents are volunteers, and they are not identified across surveys. Thus these data are cross sectional. The survey gathers several advantages. First, it covers 25 years, from 1983 to 2008. Second, information concerning careers and compensation is very detailed. There is information on the amount and structure of compensation, current job and career history, and personal data. This allows us to provide new stylized facts on compensation in the financial sector. I find not only that there is a premium for working in the financial sector, which amounts to 20% on average from 2005 to 2007, but also that wage heterogeneity and variable compensation are higher in this sector than in the rest of the economy. I then develop a model of "superstars" (Rosen, 1981) where firm competition for industry specific human capital can lead to rents. This happens in industries where the specificity of industry human capital and its impact on profits are high. The model generates empirical predictions on wage distribution, career dynamics and the structure of compensation that are verified in the financial sector.

The literature has explored several aspects of compensation in the financial sector. A first one is the level of compensation relatively to the rest of the economy. Philippon & Reshef (2009) use data of the Census Population Survey (CPS) to compute the premium of working in the financial sector. Based on a Stanford MBAs survey, Oyer (2009) compares MBA graduate compensation over the career in the financial sector to other sectors. Finally, Goldin and Katz (2008) use data 2005 earnings from a survey among Harvard alumni. All of them find that there is a premium for working in the financial sector, from up 10% in Philippon and Reshef (2010) up to more than 100% in Oyer (2009) and Goldin and Katz (2008). The second aspect is the increase of relative compensation since the early 1990s. Philippon & Reshef (2009) describe how, since the 1990s, financial sector's compensation has increased compared to the rest of the private sector. Kaplan &

Rauh (2009) find that the share of Wall Street employees in top end brackets of the U.S. income distribution has significantly increased. All these papers try to understand what factors account for these observations. Philippon & Reshef (2009) find that financial deregulation and corporate activities linked to IPO and credit risk increased the demand for high skilled-paid employees. Nevertheless, they assess that skills would only account for 40% of the wage differential between the financial sector and the rest of the private sector. Oyer (2009) shows that the premium cannot be due to unobserved innate talent. However, data availability constraints have clearly limited empirical research on compensation in the financial sector.

The paper proceeds as follows. In the following section I describe the data used and provide stylized facts on compensation in the financial sector. The third section develops a model of superstars with industry specific human capital. In the fourth section, I test the empirical implications of this model. The fifth section discusses two alternative models: a model of compensating wage differential and a model of moral hazard.

2 Compensation in the Financial Sector: Stylized Facts

Based on a compensation survey among French engineers, lead by the French Engineer and Scientist Council (CNSIF - Conseil National des Ingénieurs et des Scientifiques de France), I draw the following stylized facts. First, relative to the rest of the private sector, there is a premium for working in the financial sector. This premium is particularly high in investment banking and is associated with a high variance in wages. Second, this premium has increased since the beginning of the 1980s, contributing to the rise in the share of financiers in the top of the income distribution. Finally, a large share of compensation is variable, more than in the rest of the economy.

2.1 Data

The data are based on a postal survey among French graduated engineers lead by the French Engineer and Scientist Council (CNSIF - Conseil National des Ingénieurs et des Scientifiques de France). The CNISF unites French engineer school alumni organizations. It designs the survey and each participating alumni organization sends it to engineers they have personal information on. The survey has been conducted every five years from 1983 to 1998, every two years from 1998 to 2004 and then every year from 2004 onwards. In 2002 the survey is both postal and e-mailed. From 2004 on, the survey is only e-mailed. As respondents are not identified over time, these are cross sectional data. Partly due to the use of the internet, the size of the sample increases over time and amounts to more than 40,000 respondents from 2007 onwards. As at the end of 2008, the number of French graduated engineers of less than 65 years is estimated at around 681,400 (CNISF, 2008), the response rate among French graduated engineers is nearly 6%. More precisely, the response rate varies over the period from 4% to 7%, and each survey comprises on average 30,800 individuals. Table 1 provides summary statistics.

Table 1:
Data description

	1983	1986	1989	1992	1995	1998	2000	2002
Number of individuals	25,712	30,132	32,993	30,550	20,588	23,353	28,698	21,842
Frequence in banking	307	455	533	491	294	372	780	848
% in banking	1.19	1.51	1.62	1.61	1.43	1.59	2.72	3.88

	2004	2005	2006	2007	2008
Number of individuals	25,846	32,303	39,863	46,290	41,937
Frequence in banking	866	928	1,099	1,313	1,078
% in banking	3.35	2.87	2.76	2.84	2.57

The survey has many unique specificities. First, due to the size of the sample it provides unique data on French workers with a high level of education. If I compare it with the French Employment Survey, from the year 2003 to 2005 there are on average only 3,400 individuals a year graduated from a French engineer school in the French Employment Survey, against 25,000 engineers in the CNISF survey, among which 10 on average work in the financial sector, against more than 800 in the CNISF survey. Second, it includes French engineers working abroad. They represent 9.4% of the total sample, 15% of the sample of engineers working in finance. Third, it gathers a great range of variables that can be classified into six groups: personal data, job description, compensation, firm description, satisfaction, job history. For example, I have information on variable compensation, type of the engineer degree etc. See Annex C for the year 2000 survey (in French) and Annex A for more statistics on the data. Table 2 gives some statistics on the population in the 2006, 2007, 2008 and 2009 surveys. In these surveys I can distinguish investment banking and a variety of jobs in investment banking.

Table 2:
Jobs in investment banking: population, wage and experience - 2006-2009

	Population	Experience	Gross wage	% working abroad
Total Economy	96,765	11.3yrs	63,166	8.4%
Financial Sector	4,811	10.9yrs	115,019	26%
Investment Banking	766	6.6yrs	204,015	51%
Trading	253	6.6yrs	333,247	60.5%
Hedge funds	14	4.4yrs	157,454	70%
Mergers and Acquisition	51	7.6yrs	180,856	41%
Structured Finance	116	7.2yrs	213,226	51%
Quants	95	5.1yrs	141,150	52.6%
Analysts	159	5.8yrs	86,888	46.6%
Back and Middle Office	30	9.7yrs	103,901	23%
Project Finance	48	8.2yrs	106,792	39%
Information Technologies	433	10.8yrs	67,319	7%
Risk Management	53	11yrs	74,433	9.4%
Other	559	13yrs	113,390	6%

There are three sources of selection bias in the data. First, respondents are volunteer and unfortunately, I do not know the response rate. Second, only half of alumni organizations have taken part in the survey. Thus, in 2008, whereas 220 schools provided an engineer degree, only 112 alumni organizations participated. I find that this restricted sample concerns most of top engineer schools. Indeed, according to 2010 Towers Perrin's ranking in terms of wages [1], the panel of participating engineer schools represents 75% of the 92 top engineer schools. 71% of respondents are graduated from these top schools. Third, alumni organizations send the survey to alumni whose name and address they have. As a result, respondents are younger and more likely to be women than in the total population of engineers.

In order to assess the selection bias, I first compare the population of respondents in the CNISF survey with the population of engineers in the French Employment Survey, for which the sample is randomly selected. As engineers are identified in the French Employment Survey only from 2003, I compare the sample using data from 2003 to 2005. The samples gather respectively 10,292 individuals in the French Employment Survey and 45,994 in the CNISF survey.

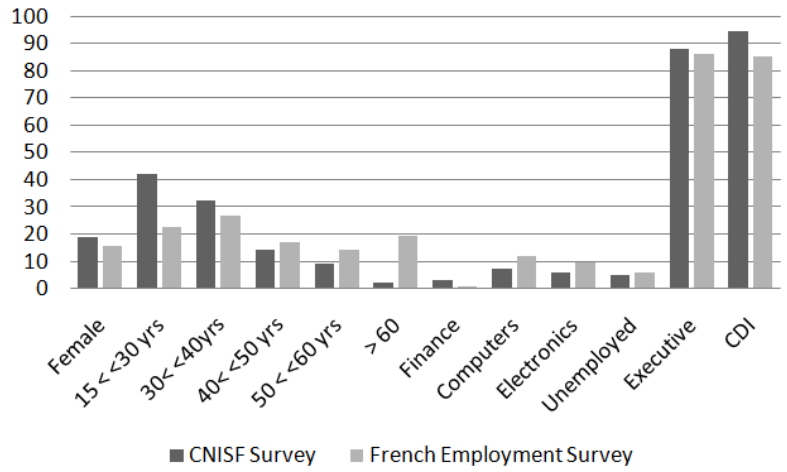

Figure 1:
Comparative statistics between the French Employment and the CNISF surveys (2002 - 2005). Frequences are reported on the vertical axis.

I find that engineers in the CNISF survey are more likely to work in finance, younger and more on permanent employment contracts.

Second, I use Towers Perrin's survey on newly graduated French engineers (2009). Towers Perrin is a leading compensation consulting company. Based on a survey among 79 French and foreign companies that have hired on average 500 French newly graduated

[1] Palmarès l'Expansion - Towers Perrin, 2009

in 2009, they compute the median gross wage, including bonuses, of three year experienced engineers. I compare it to the median gross wage including bonuses of the corresponding engineer population in the CNISF survey. I consider engineers working in the private sector, in companies with more than 2000 employees (more likely to be surveyed by Towers Perrin) and with three years of experience. Graph 2 displays the results. I find that there is a downward but negligible bias in the CNISF survey.

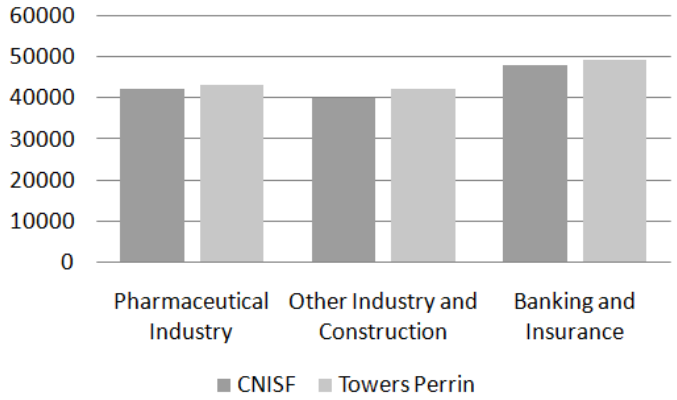

Figure 2:
Total gross wage including bonuses of three year experienced engineers in Towers Perrin and CNISF's surveys, in euros

To conclude, there exists a selection bias in the CNISF survey. However, when controlling for observable variables such as age, experience and sex this bias is minimized.

2.2 Premium

The econometric strategy is the following. I observe compensation for employees aged more than 20 but less than 65 and in activity. The control variables include seven education dummies among which 5 are, from the less selective to the more selective admission process: 2 or 3 year university degree, 4 and more year university degree, competitive exam after two years of prep school, competitive exam after high school, Ecole Polytechnique and its 11 related application schools. The two other education dummies refer to double graduated engineers, first, in science, second, in management or economics. Demographic controls include sex, marital status and sex $\times$ marital status. I control for occupation with eight dummies, standing for production, studies, IT, commercial, administration, top executive, education and else. There are five different dummies for the firm type: individual firm, private sector, public firm, public administration and others (non-governmental organization ect), and four dummies for the firm size. Finally, the job characteristics are represented by a working in "Ile de France" dummy (Paris and region around Paris), a working abroad dummy and a hierarchical responsibility dummy. As each industry has a dummy variable, the coefficient is the deviation from the weighted mean of wages in other sectors. Results are robust to adding a dummy for working in

the United States.

The income data have two limitations. First, people are asked their wage which could lead to both measurement errors and bias. Concerning measurement errors, the risk is limited as the amount declared is closely defined: it is the gross salary declared on the tax declaration, and it includes variable compensation in the form of bonuses (but excluding stock options). Moreover, I find that the data are in line with Towers Perrin's survey. The second limitation is that I do not dispose of data on hours worked: income data concern the annual gross wage. As a result, a hourly wage cannot be computed. However, people declare if they work full time or not, and if not, they declare the percentage of a full time job their part time job corresponds to. Hence there are two possibilities: Either to reconstruct full time compensation, or to only work on data concerning full time jobs. To limit measurement errors, the choice made was to work only on full time employees. Hence, 8.2% of the variables are dropped. I also drop data that do not concern employees (liberal professions, individual entrepreneurs...) and of individuals of 65 or more.

In the first regression, I assess the premium of working in the financial sector and I compare it to other industries' wage differential. The wage equation I use is the following

$$w_{i,t} = X_{i,t}\beta + S_{i,t}\gamma + D_t\alpha + \epsilon_{i,t}$$

where $w_{i,t}$ is the log yearly gross wage, $X_{i,t}$ is a vector of individual characteristics, $S_{i,t}$ stands for the vector of industry dummies, and D_t for the vector of year dummies. $\epsilon_{i,t}$ is the error term. Results from 1998 to 2007 are presented in Table 3. Unfortunately, as the industry code is not provided in 2002, data for this year are dropped in this regression. I find that the premium in the financial sector increases from 15% in 1995-1998 up to 27% in the period 2005 - 2007. I observe only two other sectors with a premium significantly higher than 10% on average over the sample 1995 - 2007: the oil industry (13%) and consulting (13% on average). On the contrary, agriculture, education and public administration offer compensation significantly more than 10% lower than the rest of the economy, even after controlling for the type of the firm (individual firm, private sector, state firm, state, other and year dummies).

Table 3: The dependant variable is the log of the yearly gross wage - Each industry has a dummy variable. Decomposition in 38 sectors

	1995 - 1998	2000 - 2004	2005 - 2007
Finance	0.15^{***}[10.2]	0.20^{***}[7.4]	0.27^{***}[12.3]
Insurance	0.08^{***}[3.7]	0.05[1.3]	0.06^{**}[2.4]
Holding	0.11^{***}[7.8]	0.15^{***}[5.2]	0.06^{***}[2.9]
Consulting	0.14^{***}[8.4]	0.20^{***}[7.2]	0.10^{***}[4.8]
IT	−0.01[-0.8]	0.04[1.3]	−0.01[-0.5]
Engineering	-0.02^{**}[-2.1]	−0.03[-1]	-0.04^{**}[-2]
Construction	-0.04^{***}[-3.5]	-0.07^{**}[-2.4]	-0.08^{***}[-3.9]
Car	−0.005[-0.5]	0.02[0.6]	−0.01[-0.6]
Textile	−0.03[-1.4]	−0.02[-0.5]	0.00[0.2]
Cement	0.02[1.4]	0.07^{**}[2]	0.04[1.6]
Sewage	-0.08^{**}[-2.1]	-0.1^{***}[-2.6]	-0.1^{***}[-3.7]
Air industry	-0.05^{***}[-4.3]	-0.05^{*}[-1.7]	-0.05^{**}[-2.2]
Processed food	0.06^{***}[4.3]	0.0[0.0]	−0.03[-1.4]
Furniture	−0.00[-0.1]	−0.03[-0.9]	-0.05^{*}[-2.0]
Paper	0.10^{***}[5.3]	0.09^{***}[2.8]	0.02[0.7]
Metal	0.0[0.2]	−0.01[-0.5]	−0.01[-0.7]
Public administration	-0.13^{***}[-8.9]	-0.12^{***}[-3.9]	-0.05^{**}[-2]
Research	-0.04^{***}[-3.3]	-0.05^{*}[-1.7]	-0.06^{***}[-2.6]
Real Estate	0.02[1]	0.04[1.1]	0.00[0.2]
Restaurant	−0.02[-0.02]	−0.2[-1]	−0.09[0.1]
Electronic	-0.04^{***}[-4.45]	−0.01[-0.5]	-0.04^{*}[-1.8]
Machin	-0.02^{**}[-2.2]	-0.05^{*}[-1.7]	-0.04^{*}[-1.8]
Electricity	0.04^{***}[3.3]	0.02[0.8]	0.06^{**}[2.8]
Nuclear	0.06^{***}[3.2]	0.04[1]	0.13^{***}[4.9]
Printing	−0.03[-0.9]	0[0]	−0.00[-0.1]
Mining	0.08^{***}[3.3]	0.1[1.6]	0.07[1.6]
Transport	0.01[0.9]	−0.03[-0.9]	−0.03[-1.2]
Air transport	0.06^{***}[2.8]	0.03[0.8]	−0.04[-1.3]
Oil	0.12^{***}[6.3]	0.15^{***}[3.7]	0.13^{***}[4.3]
Chemicals	0.06^{***}[5.7]	0.06^{**}[2.1]	0.04^{*}[1.8]
Plastic	0.01[0.9]	0.02[0.2]	0.005[0.2]
Agriculture	-0.15^{***}[-6.4]	-0.10^{**}[-2.3]	-0.13^{***}[-3.7]
Education	-0.15^{***}[-7.7]	-0.22^{***}[-6.1]	-0.17^{***}[-6.1]
Health and social	-0.11^{***}[-5]	-0.16^{***}[-5.2]	-0.08^{***}[-2.9]
Other services	-0.03^{*}[-1.9]	−0.02[8.4]	−0.01[-0.5]
Media	0.03[0.8]	−0.02[0.6]	0.0[0.0]
Sample Size			
Total	24330	22450	60339
Finance	618	1462	2937
R^2	0.66	0.65	0.66

The model includes a female dummy, a married dummy, a female × married dummy, a Paris area dummy, seven education dummies, a working abroad dummy, years of professional experience and its square, a hierarchic responsibility dummy, 7 occupation dummies (production, studies and conception, IT, commercial and marketing, administration, executive, others), 4 firm size dummies (less than 20 employees, from 20 to 500 employees, from 500 to 2000 employees, more than 2000 employees), a firm type dummy (individual firm, private sector, state firm, state, other and year dummies).

In a second step, I examine the distribution of the residuals from the wage equation described above excluding the sectoral dummies over the 2005-2007 sample. Figure 3 shows the standard deviation of residuals per sector as a function of the mean of residuals. It suggests a positive correlation between inter sector wage differentials and within variance in sectors. However, this positive correlation is mainly due to the extreme value (24%, 0.58), which corresponds to the financial sector. Thus, the financial sector is not only an outlier in terms of average earnings but also in terms of earnings heterogeneity within the sector.

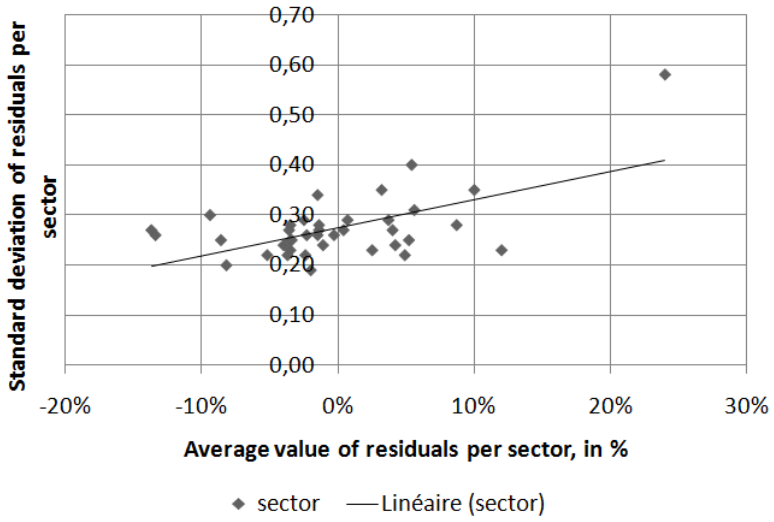

Figure 3:
Mean and standard deviation of residuals per sector in the 2005 - 2007 wage equation - 51,743 observations

In a third step, I estimate how the premium varies across subsectors of the financial industry. For that purpose, I use the exact description of jobs interviewees have provided in the 2006, 2007 and 2008 surveys. Using key words, I have identified up to ten categories of jobs: trading, hedge fund, merger and acquisition, structured finance, quant, analyst, back and middle office, project finance, Information Technology (IT), risk management and others. I restrict the sample to individuals working in the financial industry and control for the same variables as before. Each specific job is assigned a dummy variable. The wage equation is now:

$$w_{i,t} = X_{i,t}\beta + J_{i,t}\gamma + D_t\alpha + \epsilon_{i,t}$$

where $J_{i,t}$ stands for the vector of jobs within investment banking. I find that the premium varies significantly across jobs (Figure 4). It ranges from 1% in project management up to 84% in trading. Finally, I create an investment banking sector including only activities that are specific to investment banking: trading, hedge fund, merger and acquisition, structured finance, quant, analyst, back and middle office and project finance. I find that

engineers working in investment banking earn 60% more than engineers working in other sectors. To conclude, the premium in the financial sector is partly due to extremely high paid jobs, which is consistent with the high variance in residuals.

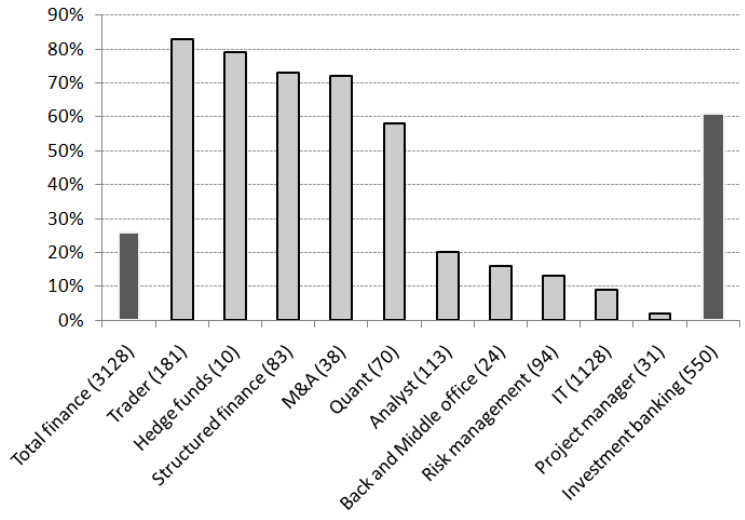

Figure 4:
Compensation premium across professions in the financial sector, in % - 2006, 2007, 2008 - 39,883 observations. The number of individuals by profession is given into brackets

2.3 Wage Heterogeneity

As the survey covers a long period, from 1983 to 2008, I can estimate the evolution of the premium over 25 years. Controlling for the same variables as before when possible, I find that the premium increases from 5.9% in 1986 up to 27% in 2007 (Figure 5). One of the limitations of this result is that some control variables were not available across all surveys. More precisely, both in 1998 and 1995, I cannot control for the marital status, from 1983 to 1989 I can only use one education dummy and finally in 1983 I cannot drop part time workers as I do for the other years. However, I find that not controlling for these variables leads to an overestimation of the premium of less than 0.5%. This is probably due to the fact that the only education dummy I keep (best engineer schools) absorbs most of the impact of education on wages in the financial sector, and that the marital status is dominated by the gender dummy.

Figure 5:
Evolution of the wage premium in the Financial Industry from 1983 to 2008. Boxes represent the premium estimated for each survey

Figure 6 draws the evolution of the share of individuals working in the financial sector in the total sample and in the top 1% of the income distribution of the CNISF survey. The share of financiers in the top 1% of the income distribution has increased significantly, from 6% in 1983 up to more than 50% in 2007. Why has this share increased so much? In the following section I consider three possible explanations: worsening working conditions, a size effect in a competitive market for human capital and increased moral hazard.

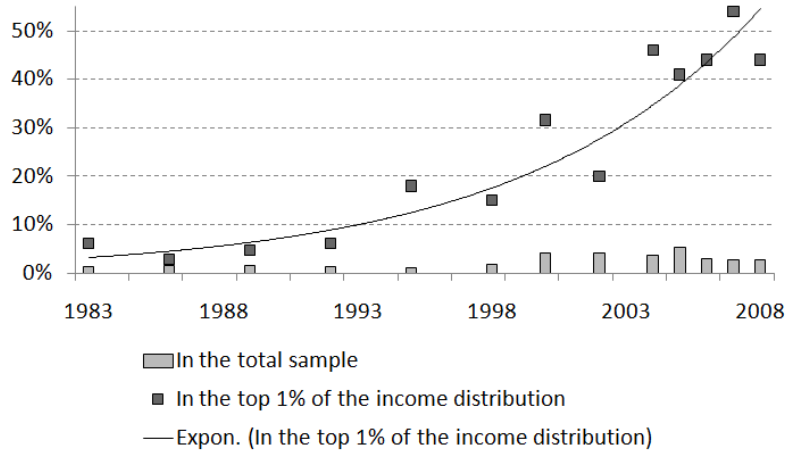

Figure 6:
Evolution of the share of individuals working in the financial sector in the total sample and in the top 1% of the income distribution, from 1983 to 2008

2.4 The Use of Variable Compensation

One of the specificities of the CNISF survey is that it provides some information on the compensation structure. Interviewees are asked to provide the percentage of total compensation which is variable from the year 2000 survey onwards. As stock options are not included in total compensation, the variable share includes only bonuses and firm specific incentive schemes. Table x gives some summary statistics on the components of variable compensation. Focusing on the 2006 to 2008 period, due to data availability on jobs in investment banking over this period, I find that variable compensation represents 30% of compensation in the financial sector and 50% in investment banking, against 14% in the rest of the economy (Figure 7).

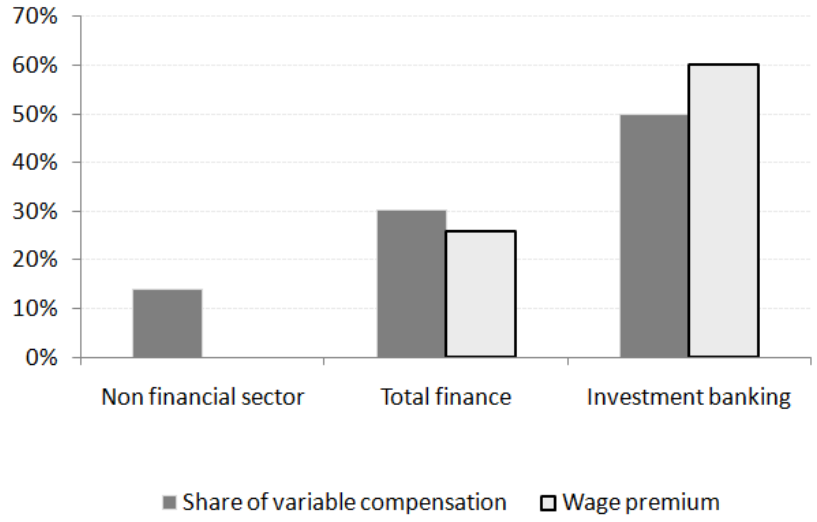

Figure 7:
Ratio of variable compensation to total compensation in the non financial sector and in the financial sector, in %. 2006 - 2008

In order not to assimilate individuals who have not answered the question and individuals with no variable compensation, I only keep individuals who declare a variable share. I also drop individuals who declare a variable share higher than 85% of their total annual compensation (1% of the sample). Table 4 describes the evolution of the share of variable compensation with deciles of revenue within the financial sector and in the rest of the economy. Deciles are computed in 2000, 2002, 2004, 2005, 2006, 2007 and 2008. I have computed the average share of variable compensation per decile over these years. Table 4 suggests that part of the premium of top wages is paid through variable compensation, more in the financial sector than in the rest of the economy.

Table 4:
The share of variable compensation across wage deciles

Deciles	Financial Sector	Rest of the economy
1	11%	7.5%
2	11%	7.1%
3	12.5%	7.6%
4	14.4%	8.4%
5	17.5%	9%
6	19.3%	9.7%
7	23.9%	11%
8	27.9%	11.8%
9	36.4%	14.8%
10	55%	22.1%

Finally, I create a new variable w_{fixed} such that:

$$w_{fixed} = (1 - var/100) \times w$$

which is the fixed part of the compensation declared in the survey. I regress the log of this new variable on the control variables described above and the sector dummy variables. There are 58,023 observations covering the years 2000, 2002 and 2004 - 2008. I obtain the following result. The premium in the financial sector is still significant, but amounts only to 5.3%. It is now lower than in other sectors such as oil industry (11%), nuclear industry (10%), consulting (10%) and mining (9%). Figure 8 shows that the increase in the premium from the year 2000 to 2008 is due to an increase in variable compensation.

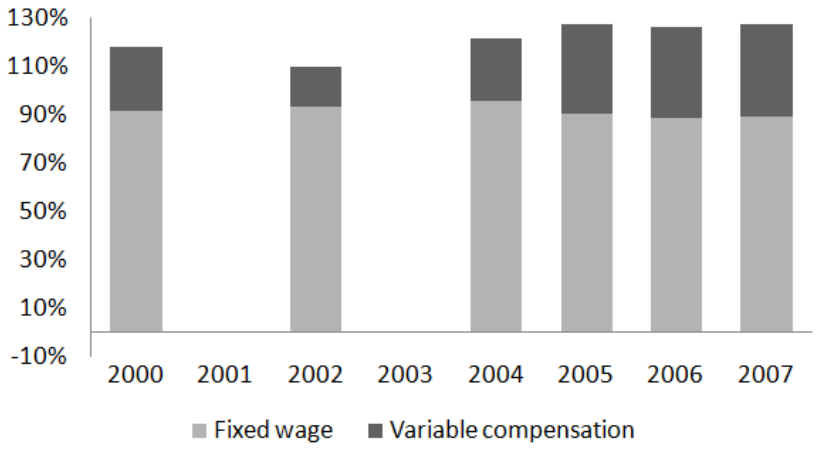

Figure 8:
Decomposition across time between fixed and variable compensation in the financial sector, relatively to the rest of the economy. 2000 - 2007

3 A model of Superstars

3.1 Literature Review

As Rosen (1981) has shown for "superstars" and Gabaix & Landier (2008) for CEOs, heterogeneity in talent can lead to higher heterogeneity in compensation, with very high extreme values.
Rosen (1981) observes that there exist jobs where very few individuals share most of the market and benefit from very large incomes. These individuals are for example comedians, soloist in classical music, authors of economic best sellers, etc. He argues that this is due to two facts. First, in their markets, these individuals are imperfectly substitutable by others. Indeed, three less talented comedians will not replace a very talented one. Secondly, there are scale economies on these markets: it requires the same effort to produce for 1 or 1000 consumers. For example, it is the same cost for a singer to register a CD that will be sold to 1000 individuals or 1 million of individuals. These two facts result in a convex function of returns to talent: compensation increases more than proportionally with talent and spreads up to extreme values.
The model described by Gabaix & Landier (2008) is more general and applies to CEOs. As traders' compensation today, CEOs' compensation has long been a subject of debate. In this model, CEOs' high compensation is the result of first, the constant return of CEO talent on firm profits and second, the competition among firms to hire the best possible CEO. This model supposes that there is a finite number of CEOs with heterogeneous talent and a finite number of firms. To conclude, both models rely on the assumptions that there is heterogeneity across talent and that the production function of the jobs is either convex or linear in talent.

Oyer (2009) shows that innate talent cannot account for the premium in the financial sector. First, the probability of working in investment banking depends on the conditions on the Stock Exchange market; second, career persistence does not vary with the state of the market at graduation. He supports the idea that investment bankers are rather "made" than "born". Based on this result, I assume that investment bankers would develop high valued specific human capital over their career.

I develop a model where firms compete on "industry specific" human capital. Indeed, the human capital acquired over a career in investment banking may be "industry specific" rather than "firm specific". Kostovetsky (2008) shows that the development of the hedge fund industry has led to an increase in the turnover of managers in the mutual fund industries that cannot offer as high wages as the hedge fund industry. Clarke et al. (2005) examine what happens when "all stars" analysts move from one investment bank to another. They find that the new investment bank does attract a significantly larger industry market share of capital raising and M&A deals after the arrival of the all-star, relative to the bank the analyst leaves. These papers show that human capital in investment banking can be easily transferred from a firm to another and that it can impact firm profits. Finally, practitioners also admit that talent retention is a challenge in the financial industry. Retention issues would have been one of the hedge funds' motivations for going public: "We believed having tradable equity would provide a valuation

mechanism that will help us succeed in the intense competition for talented investment professionals." (Frank, Oaktree Capital Management, 2007).

The main assumption of the model I developed is that profit elasticity to "industry specific human capital" varies across sectors. Not only would human capital be highly specific in the financial industry but profits should be more sensitive to it. Murphy, Shleifer and Vishny (1991) developed a model where elasticity to talent differs across sector. This would account for talent misallocation that could deter growth.

When talent is general to a whole industry, can only be revealed or acquired on the job, and once revealed becomes public information then in a competitive labor market workers grab all the benefits from the talent discovery process. Indeed, if individuals were able to pay for starting these kind of careers or to commit in long-term wage contracts then this would not be the case. But under the more realistic assumptions of of limited liability and commitment ability, rents arise (Terviö, 2009).

What differs with other models

- The size is endogeneous
- Variable compensation
- The firm can choose or not to compete for industry specific human capital
- The production function is not the same for junior or senior which simplify the definition of the equilibrium

The objective is to define why some industries are superstar industries, to analyze the impact on career dynamics and on variable compensation.

3.2 The model

I develop a simple partial equilibrium of the labor market where individuals live for $T+1$ periods. In the first period of their career, workers are considered as junior and are homogeneous in talent, whereas in the following periods they are considered as senior and their talent can differ. There are two sectors in the economy: the superstar sector and the commoner sector. In the commoner sector, the production function is the same across periods and worker types (junior or senior). It is neither sensitive to talent nor to seniority and the wage w is equal to the marginal productivity of labor, which is homogeneous across periods and workers. The superstar sector differs from the commoner one when workers become senior. Indeed, for a junior, the production function and the marginal productivity of labor are the same as in the commoner sector. But when the worker becomes a senior, either he exits the sector or he is assigned to a new production function. Indeed, firms in the superstar sector also produce output through projects combining capital y and a senior worker's industry specific human capital s. In particular, a project i using an amount y_i of capital produces

$$F(s, y_i) = s \times c \times y_i^{\alpha} - r y_i$$

with $\alpha < 1$, $r < 1$ and $c > 0$. c quantifies the effect of industry specific human capital on earnings. The amount of capital y_i is specific to the project. Figure 9 describes this basic set up.

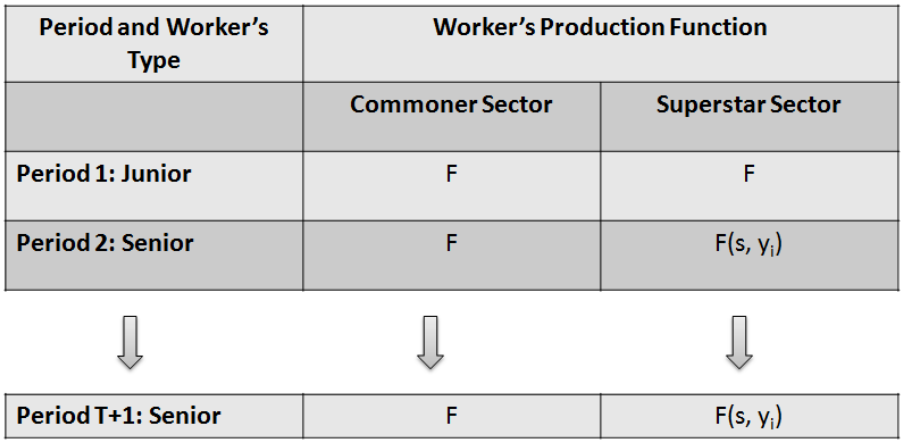

Figure 9:
Model's basic set up

Only a worker who has worked in the superstar sector when junior has developed industry specific human capital. It is equivalent to assume that his talent is revealed only after having worked as a junior in the superstar sector (Terviö, 2009). In this case, s is distributed with density $g(s)$ over $[\underline{s}; \overline{s}]$. The outside worker (who worked in the commoner sector as a junior) has a talent $s = \underline{s}$ [2]. All firms can observe the amount of industry specific human capital s of every senior workers. After the first period of their career, workers live for T more periods. Long term wage contracts are not enforceable because workers cannot commit to decline higher offers from other firms in the future. Firms and workers are risk neutral, and there is no discounting. In this section there is no uncertainty concerning the production function (r is constant over time), so the results would be the same if workers were risk neutral. However, in 3.4 I will introduce uncertainty in the cost of capital r.

Individual careers proceed in a simple manner. After the first period of its career, when he is a senior, a worker of the superstar sector can either exit the industry definitely and earn a wage w in the commoner sector, or stay in the industry for T more periods. This depends on the level of talent s he has acquired as a junior. I denote by $w(s)$ the market wage for a senior worker with industry specific human capital s who stays in the superstar sector. Concerning the decision process of the firms, it can be described as follows. In each period of the economy, a firm of the superstar sector can develop a new

[2]Terviö (2009) assumes that $s = \overline{s}$, with $\overline{s} > \underline{s}$ and that the production function is the same over careers, which leads to inefficiencies in the allocation of workers

project freely combining capital y_i and a senior's talent s. Either it can hire a senior from the superstar sector with talent s, or it can hire a senior from the commoner sector, with talent $s = \underline{s}$. The profit of a project i from hiring in the commoner sector is:

$$\pi(\underline{s}, y_i) = \underline{s} c y_i^{\alpha} - r y_i - w$$

Indeed, the outside wage for a commoner is the wage he can get in the commoner sector w. Moreover, because there is an unlimited supply of workers from the commoner sector at a wage rate w, firms in the superstar sector do not compete through wages for this kind of workers. Alternatively, the firm can fill the professional position from the market for industry specific human capital. In this case, the firm can pick the professional with the best level of industry specific human capital for its size, $s_i^{\star}$, such that:

$$s_i^{\star} = \max_{s} s c y_i^{\alpha} - r y_i - w(s)$$

Clearly, larger firms are optimally managed by higher industry specific capital professionals. In this case, the firm's profit is given by

$$\pi(s_i^{\star}, y_i) = s_i^{\star} c y_i^{\alpha} - r y_i - w(s_i^{\star})$$

The firm chooses to hire in the market for industry specific human capital if

$$s_i^{\star} c y_i^{\alpha} - r y_i - w(s_i^{\star}) > \underline{s} c y_i^{\alpha} - r y_i - w$$

Due to the free entry assumption, firms recruiting in the superstar sector and competing for industry specific human capital earn zero profit. As a result, it is optimal for the firm not to compete for industry specific human capital and recruit in the commoner sector if there exists a y_i such that

$$\pi(\underline{s}, y_i) \geq 0$$

Indeed, I assume that there is an infinite supply of workers from the commoner sector at a wage w. In contrast, if there is no y_i such that $\pi(\underline{s}, y_i) \geq 0$, industries will compete for industry human capital. As $\pi(\underline{s}, y_i) \geq 0$ is an increasing function of $\underline{s}$, this leads us to the following proposition:

Proposition 1 *Firms in the superstar sector will compete for human capital if and only if the level of human capital acquired in the commoner sector and transferable in the superstar sector $\underline{s}$ is lower than $\underline{\underline{s}}$. $\underline{\underline{s}}$ is defined such that*

$$\pi(\underline{\underline{s}}, y^{\star}(\underline{\underline{s}})) = 0$$

where $y^{\star}$ is the project size which maximizes profits for $\underline{\underline{s}}$. As $\pi(\underline{s}, y_i)$ is an increasing function of $\underline{s}$, firms in the superstar sector will compete for human capital if the level of required industry specific human capital is so high ($\underline{\underline{s}} \geq \underline{s}$) that hiring an outsider will entail negative profits.

Now that I have described the recruitment strategy of the firm, I can define the wage of a senior worker in the superstar sector. Free entry of projects implies that any senior

worker of the superstar sector with a level of industry specific human capital s can find a project of size $y^\star$ that is the best match for his level of specific human capital.

$$y^\star = \max_y scy^\alpha - ry = (\frac{\alpha sc}{r})^{\frac{1}{1-\alpha}}$$

Moreover, competition among firms for professional ensures that equilibrium profits for any existing project are equal to zero. Therefore,

$$w(s) = scy^{\star\alpha}(s) - ry^\star(s) = (\alpha sc)^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}}(1-\alpha)$$

The wage function is thus increasing and convex in s.
I now define $\hat{s}$ such that

$$w = \hat{s}cy^{\star\alpha}(\hat{s}) - ry^\star(\hat{s})$$

Since all senior workers of the superstar sector can also choose to work in the common sector, their wage is defined by

$$\max\{w, (\alpha sc)^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}}(1-\alpha)\}$$

As a result, only projects with $s^\star(y_i) > \hat{s}$ will recruit on the superstar sector and only senior workers from the superstar sector with industry human capital $s > \hat{s}$ will be recruited in the superstar sector.

Proposition 2 *If a worker has worked in the superstar sector in the first period and if he has acquired industry specific human s such that $s \geq \hat{s}$, he will stay in the superstar sector in the second period and his wage $w(s)$ will be:*

- *Convex in talent*
- *Proportional to the size of the project*

Indeed, $w(s) = (\alpha sc)^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}}(1-\alpha)$ or $w(s) = yr^\alpha(1-\alpha)$.
Otherwise, if the worker has acquired industry specific human capital s such that $s \leq \hat{s}$ in the first period he will move from the superstar sector to the commoner sector in the second period and will be paid w.

I have shown that there exists a threshold value $\hat{s}$ that defines the share of workers from the superstar sector that will stay in the same sector in the second period of the economy. $\hat{s}$ is a decreasing function of c. Which are the implications in terms of the distribution of wages and the dynamics of the superstar effect?

Proposition 3 *The superstar effect increases when sensitivity to talent increases. Indeed, if c increases, then $\hat{s}$ decreases. As a result, there is a higher share of workers that will stay in the superstar sector in the second period of the economy. The average premium and the variance in wages will increase in the superstar sector.*

To conclude, there exists a superstar effect when the specificity of human capital in the superstar sector is high enough and this superstar effects increases when sensitivity to talent increases. In a multi-sector world, the key to this theory would be the higher c and the lower $\underline{s}$, the higher the superstar effect.

3.3 Rents in the Superstar Sector

In this section, I show why rents appear in the superstar sector. Individual careers consist essentially of two periods, and T is the relative length of the senior period. I first assume that juniors are financially unconstrained. Juniors'wage in the first period of the economy is w_1. In the absence of rents, workers must be indifferent between entering the superstar sector or the commoner sector, taking into account the option to exit for the commoner sector at the second period of its career. Junior workers would pay to enter the superstar sector:

$$w_1 + T\Big[w\int_{\underline{S}}^{\hat{s}} g(u)\,du + \int_{\hat{s}}^{\bar{s}} w(u)g(u)\,du\Big] = (1+T)w$$

I assume that $w_1 = w - b$ where b is the price of starting a career in the superstar sector.

$$b = T\Big[w\int_{\underline{S}}^{\hat{s}} g(u)\,du + \int_{\hat{s}}^{\bar{s}} w(u)g(u)\,du\Big] - Tw$$

I assume now that individuals are credit constrained. In this case, junior cannot accept a wage lower than $w - \overline{b}$, where $\overline{b}$ is an exogeneous ability to "pay" for a job. In that case, workers in the superstar sector will earn rents R that will amount to:

$$R = T\Big[w\int_{\underline{S}}^{\hat{s}} g(u)\,du + \int_{\hat{s}}^{\bar{s}} w(u)g(u)\,du\Big] - Tw - \overline{b}$$

3.4 Variable Compensation

In this section I assume that there are two states of nature λ, $\lambda\epsilon\{\lambda_l, \lambda_h\}$. c, the impact of talent on profits, varies over time, depending on the state of nature. Variations are identic across firms. $c = c_h$ if $\lambda = \lambda_h$, or $c = c_l$ if $\lambda = \lambda_l$, with $c_h > 0$ and $c_l > 0$. I assume that λ and c are publicly observed once profits are realised. The model unfolds as follows:

1. The worker sarts his career in the superstar sector
2. His talent s is revealed, $s > \hat{s}$
3. He receives a wage offer composed of a fixed wage $F(y_{i,l})$, and a variable share $F(y_{i,h}) - F(y_{i,l})$ if $\lambda = \lambda_h$, or 0 if $\lambda = \lambda_l$, where we have:

$$F(y_{i,l}) = sc_l y_{i,l}^{\alpha} - ry_{i,l}$$

$$F(y_{i,h}) = sc_h y_{i,h}^{\alpha} - ry_{i,h}$$

4. λ is observed, the worker receives his variable pay

As a result, variable share increases when profits increase. According to this model, variable share is indexed on profits and not on individual performances.

Proposition 4 *The share of variable compensation is constant over wages at a given period t, but it is an increasing function of profits over periods.*

Let consider an individual of talent s. If $\lambda = \lambda_h$ he receives a wage

$$w(s) = (\alpha s c_h)^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}} (1-\alpha)$$

The share of variable compensation S is::

$$S = \frac{(\alpha s c_h)^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}} (1-\alpha) - (\alpha s c_l)^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}} (1-\alpha)}{(\alpha s c_h)^{\frac{1}{1-\alpha}} r^{\frac{-\alpha}{1-\alpha}} (1-\alpha)}$$

$$S = 1 - \frac{(\alpha s c_l)^{\frac{1}{1-\alpha}}}{(\alpha s c_h)^{\frac{1}{1-\alpha}}}$$

$$S = 1 - (\frac{c_l}{c_h})^{\frac{1}{1-\alpha}}$$

The share of variable compensation is an increasing and concave function of c_h.

3.5 Empirical Implications

Propositions 1, 2, 3 and 4 imply the following concerning the superstar sector:

1. Wage distribution prediction. There is a premium in the superstar sector. The variance in wages in the superstar industry should be higher and the distribution is skewed to the right.

2. Career dynamics prediction. The premium in the superstar sector should increase over the career, as well as the variance in wages. Careers should be persistent meaning that the superstar sector does not recruit from other sectors.

3. Size distribution prediction. The size of projects per employee is higher in the superstar sector than in the rest of the economy

4. Cross-sectional and cross industry predictions. Project size per employee is correlated with the wage premium. The returns to size at stake should be higher in the superstar sector than in the rest of the economy.

5. Time series prediction. Wages should increase in line with project size per employee.

6. Variable compensation prediction. The variable share of total compensation should increase with profits

Wage Distribution According to the model described above, the average wage of senior workers in the superstar sector is of the form:

$$\overline{w(s)} = \int_{\hat{s}}^{\bar{s}} w(s) g(s) ds$$

By definition, $w(s) \geq w$, that is why there is a premium in the financial sector. As the wage is convex in talent in the superstar sector, the variance should be high and the distribution of talent skewed to the right. The premium and the variance in wages in the

superstar sector increases with c

Career Dynamics An individual who has worked in the superstar sector in the first period is either fired at the end of the first period if his talent is too low, kept at a wage w if the firm does not compete for industry specific human capital, or kept at a wage $w(s)$ if his talent is well matched with project size. As a result, the premium and the variance in wages increase in over periods as $w(s) \geq w$ and $w(s)$ is convex in talent, whereas w is constant over workers. In a multi period world, where s increases over period, returns to seniority should be higher in the superstar industry than in the rest of the economy. Finally, as specificity of human capital is high in the superstar sector, careers are persistent in that sector.

Size distribution If the distribution of s is the same across industries but c is higher in the financial sector, then project size per employee should be higher in the superstar sector. Indeed, project size $y^\star$ is an increasing convex function of c.

Cross-sectional and cross industry prediction Wages in the superstar sector should increase with project size, as $w(s)$ is an increasing function of y. In contrast, the commoners' wage w is constant over project size. As a result, return to project size should be higher in the superstar sector than in the rest of the economy.

Time series prediction If c increases, the average project size per employee increases and wages should increases. As a result, wages should increase in line with project or firm size per employee.

In the fourth section of the paper I test whether these empirical implications are verified in the financial sector.

4 Some Empirical Evidence

In this section I test the empirical predictions of the model.

4.1 Wage Distribution Evidence

Wage Skewness. In the first section, I show that the variance in wages is high in the financial sector. According to the model, skewness should also be observed. Figure 9 displays the distribution of residuals in the financial sector. I observe that indeed the distribution is skewed to the right. It is confirmed by the skewness statistics. The latter amounts to 1.8 in the financial sector, whereas it amounts to 1.2 in the rest of the economy.

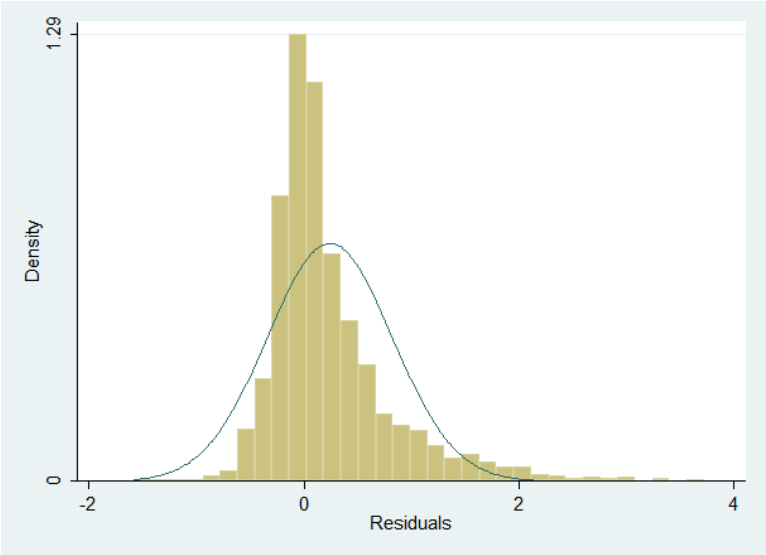

Figure 10: *Residual distribution in the financial sector (2,446 observations)*

Quantile regression. If the premium in the financial sector is due to a higher talent sensitivity, it should be higher in the top of the wage distribution. To test this assumption, I estimate the same wage equation as in section 1 by quantile regressions (Koenker and Basset, 1978). Rather than fitting the equation through the mean of the dependant variable, quantile regression considers the impact of the regressor at specific quantiles of the distribution of the dependant variable. Figure 10 describes the evolution of the premium in investment banking across deciles of the wage distribution.

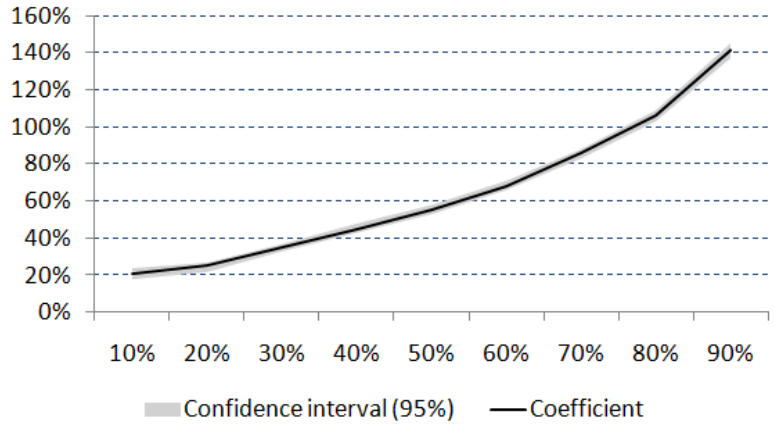

Figure 11:
Evolution of the premium in investment banking over deciles of the wage distribution - Quantile regression

In table 5, I present the industry premia of the wage equation at the mean (estimated with an OLS), at the median and at the 10th and 90th percentiles (estimated with

quantile regressions). I find that the premium is more than 8 times as high at the top of the wage distribution as at the bottom in the financial sector. On the contrary, in the oil and nuclear industries the premium is lower at the top than at the bottom of the wage distribution. The only industry which displays the same patterns is the consulting industry, with a premium 7 times as high at the top as at the bottom of the wage distribution.

Table 5:
The dependant variable is the log of the yearly gross wage - Each industry has a dummy variable. Decomposition in 38 sectors. 2005-2007

	OLS coefficient	50th percentile	10th percentile	90th percentile
Finance	0.27^{***}[12.3]	0.14^{***}[18]	0.07^{***}[6.2]	0.61^{***}[44]
Oil	0.13^{***}[4.3]	0.16^{***}[9.4]	0.19^{***}[8.5]	0.11^{***}[3.7]
Nuclear	0.13^{***}[4.9]	0.13^{***}[9.6]	0.21^{***}[11.2]	0.08^{***}[2.9]
Consulting	0.10^{***}[4.8]	0.08^{***}[9.7]	0.03^{***}[2.6]	0.21^{***}[14]
Mining	0.07[1.6]	0.04[1.5]	0.02[0.5]	0.10^{***}[2]
Holding	0.06^{***}[2.9]	0.06^{***}[7.4]	0.03^{***}[2.7]	0.08^{***}[5.2]
Insurance	0.06^{**}[2.4]	0.05^{***}[3.6]	0.03[1.3]	0.10^{***}[4]
Electricity	0.06^{**}[2.8]	0.09^{***}[9.6]	0.07^{***}[5]	0.08^{***}[5.2]
Chemicals	0.04^{*}[1.8]	0.04^{***}[5.9]	0.06^{***}[5.7]	-0.01^{***}[-0.5]
Cement	0.04[1.6]	0.04^{***}[3]	0.06^{***}[3.3]	0.02[0.8]
Paper	0.02[0.7]	0.03^{*}[1.9]	0.08^{***}[4.1]	−0.01[-0.6]
Plastic	0.005[0.2]	0.02^{**}[2.6]	0.05^{***}[3.9]	-0.04^{**}[-2.5]
Textile	0.00[0.2]	−0.02[1.4]	0.00[-0.1]	0.01[0.2]
Real Estate	0.00[0.2]	0.01[0.4]	-0.05^{**}[-2.4]	0.03[1]
Media	0.0[0.0]	0.0[0.3]	−0.02[-1.1]	0.01[0.3]
Printing	−0.00[-0.1]	−0.02[-1.3]	-0.04^{*}[-1.7]	−0.04[-1.2]
Car	−0.01[-0.6]	0.0[0.9]	0.06^{***}[6]	-0.08^{***}[-5.6]
Sewage	-0.1^{***}[-3.7]	-0.1^{***}[-4.5]	-0.08^{***}[-3.8]	-0.10^{***}[-3.4]
Computers	−0.01[-0.5]	-0.03^{***}[-4.6]	-0.05^{***}[-5.9]	−0.00[-0.3]
Metal	−0.01[-0.7]	0[0]	0.01[0]	-0.06^{***}[-3.6]
Other services	−0.01[-0.5]	0[-1.1]	-0.04^{***}[-4.1]	0.0[0]
Processed food	−0.03[-1.4]	−0.03[-2.9]	-0.04^{***}[-3.5]	-0.05^{***}[-3.2]
Transport	−0.03[-1.2]	-0.2^{**}[-2.2]	-0.03^{***}[-2.7]	-0.05^{**}[-2.4]
Air transport	−0.04[-1.3]	-0.04^{**}[-2.4]	−0.01[-0.5]	0.02[0.7]
Electronic	-0.04^{*}[-1.8]	-0.03^{***}[-4.6]	0.01[0.1]	-0.09^{***}[-6.9]
Machin	-0.04^{*}[-1.8]	-0.03^{***}[-3.6]	0.01[0.3]	-0.08^{***}[-5.2]
Engineering	-0.04^{**}[-2]	-0.05^{***}[-6.7]	-0.02^{***}[-2.9]	-0.08^{***}[-6.2]
Air industry	-0.05^{**}[-2.2]	-0.04^{***}[-4.6]	0.03^{***}[2.8]	-0.11^{***}[-8]
Furniture	-0.05^{*}[-2.0]	-0.04^{***}[-3.5]	−0.01[-1.1]	-0.09^{***}[-3.7]
Public administration	-0.05^{**}[-2]	−0.02[-1.3]	-0.05^{***}[-2.9]	-0.08^{***}[-2.9]
Research	-0.06^{***}[-2.6]	-0.03^{***}[-3.5]	-0.06^{***}[-6.2]	-0.06^{***}[-3.5]
Construction	-0.08^{***}[-3.9]	-0.07^{***}[-8.5]	-0.06^{***}[-6.1]	-0.09^{***}[-6.3]
Health and social	-0.08^{***}[-2.9]	-0.07^{***}[-4.8]	-0.01^{***}[-5.9]	-0.07^{***}[-2.9]
Restaurant	−0.09[0.1]	−0.05[-1.1]	-0.09^{*}[-1.9]	-0.02^{***}[-0.3]
Agriculture	-0.13^{***}[-3.7]	-0.14^{***}[-6.1]	-0.13^{***}[-4.8]	-0.13^{***}[3.2]
Education	-0.17^{***}[-6.1]	-0.17^{***}[-10.9]	-0.22^{***}[-11]	-0.15^{***}[-5.4]

The control variables are the same as in table 2

4.2 Career Dynamics Evidence

The model predicts higher returns to seniority, an increasing premium and variance in wages over seniority, and persistence in career in the financial sector.

Decomposition of the premium: the role of seniority. In order to explain to which extent the wage gap between the financial sector and the rest of the economy is due to higher returns to seniority, I use a Blinder-Oaxaca decomposition (Blinder, 1974; Oaxaca, 1973). Using this model I can separate what in the wage differential is due to differences in average characteristics, and what is due to differences in returns to similar characteristics. I first estimate wage equations within each subsample: the financial sector and the rest of the economy. Let w_i and x_i be respectively the wage and the vector of observable characteristics of individual i in the rest of the economy. The wage equation relative to this group takes the form:

$$\ln(w_i) = \beta x_i + \epsilon_i$$

where β is defined so that $E(\epsilon_i|x_i) = 0$ In the same manner, the wage equation in the financial sector is written:

$$\ln(w_i^\phi) = \beta^\phi x_i^\phi + \epsilon_i^\phi$$

w_i^ϕ is the yearly gross wage of individual i in the financial sector, x_i^ϕ the set of his observable characteristics and β^ϕ is defined so that $E(\epsilon_i^\phi|x_i^\phi) = 0$. The difference in the average value of the logarithms of wages can be written:

$$\ln(w^\phi) - \ln(w) = \beta(x^\phi - x) + x^\phi(\beta^\phi - \beta)$$

where x^ϕ and x are the mean observable characteristics for all individuals in each groups. The first term of the decomposition represents the wage differential due to observable characteristics. The second term is the wage differential due to differences in returns to individual characteristics.

The first column of table x gives the results of this decomposition. I use data from 2006 to 2008. The population amounts respectively to 107,850 in the rest of the economy and 3,129 individuals in the financial sector. The r squared of the wage equation is 67% and all coefficients are significant at the 1% threshold. The second column uses the same decomposition for investment banking. I use data from 2006 to 2009. The population amounts respectively to 109,506 in the rest of the economy and 656 individuals in investment banking. The r squared of the wage equation is 60% and all coefficients are significant at the 1% threshold. I first observe that the wage differential explained by observable characteristics is close to 0 both in total finance and in investment banking. Second, in both subsectors returns to experience explain the biggest share of the wage differential. In investment banking, it explains more than half of the wage differential. The second contribution is the coefficient of the working abroad dummy. Finally, a large share of the coefficient effect comes from a higher intercept term.

Table 6: Decomposition of the premium

	Finance vs rest	Investment banking vs rest
Log(hourly wage) difference	0.436	0.774
Amount due to		
Characteristics	0.008	0.003
Coefficients	0.316	0.746
Differences due to characteristics		
Sexe	0.002	0.006
Paris area	0.03	0.01
Married	-0.000	-
Married women	0.001	-
Experience	-0.007	-0.262
Experience squared	0.011	0.106
Top Education	0.012	0.028
Engineer school after prep years	0.004	0.013
Double degree in management	0.008	-
Double degree in science	0.000	0.003
Hierarchical responsabilities	0.002	-0.025
Working abroad	0.045	0.132
Private sector	0.015	-
Production occupation	0.016	-
Studies occupation	0.035	-
IT occupation	-0.025	-
Sales occupation	-0.000	-
Administrative occupation	-0.005	-
Top executive occupation	0.000	-
Large firm	0.015	0.005
Differences due to coefficients		
Sexe	-0.095	-0.188
Paris area	0.099	0.021
Married	0.023	
Married women	-0.003	-
Experience	0.199	0.485
Experience squared	-0.109	-0.180
Top Education	0.032	0.014
Engineer school after prep years	0.033	0.072
Double degree in management	-0.004	-
Double degree in science	0.035	0.071
Hierarchical responsabilities	0.036	0.075
Working abroad	0.132	0.177
Private sector	0.001	-
Production occupation	-0.021	-
Studies occupation	-0.009	-
IT occupation	-0.144	-
Sales occupation	-0.024	-
Administrative occupation	-0.035	-
Top executive occupation	0.007	-
Large firm	0.003	0.070
Intercept	0.176	0.128

This result is in line with the market for industry specific human capital model.

Evolution of the premium over the career. Is the premium constant over the career? In a labour market of superstars, the premium should increase over time, as the talent of the worker is revealed. But at the same time, the variance in wages should also increase due to the heterogeneity of talents. If the premium is due to moral hazard, I could expect that an increase in the premium goes along with an increase in variable share.

Because the data are cross sectional, I cannot directly estimate the evolution of the premium over an individual's career. However, as respondents provide information on their work experience at the date of the survey, it is possible to compute an estimation of the evolution of the premium. For this purpose, I divide the samples of the 2006, 2007, 2008 and 2009 surveys into groups based on years of experience (less than two years, from 2 to 4 years of experience etc.). I then regress the log wage on sectorial dummies for each group, using the same control variables as before. I find that the premium of working in investment banking increases significantly in the first twelve years of the career and then stabilizes around 90%. If we compare it with the nuclear sector, which is also a highly paid industry with a premium of 17% over the period, we observe that the premium is much more stable over years of experience.

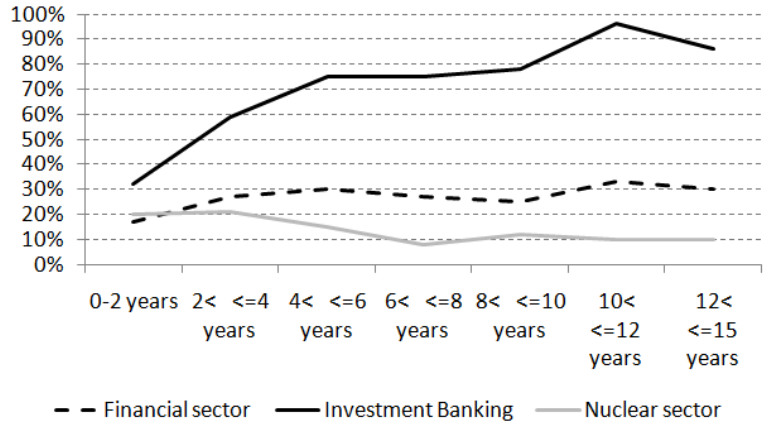

Figure 12:
Evolution of the premium over careers in investment banking. Each regression was based on more than 4,000 observations with more than 40 individuals in investment banking. I control for the same variables as described before

In a second step, I study how the variance in wages evolves over the career. To take into account control variables, I use the residuals of the wage equation and compute their distribution for different sectors and years of experience. I obtain that the wage residual standard deviation increases significantly over the career in investment banking, which is not the case in the rest of the economy.

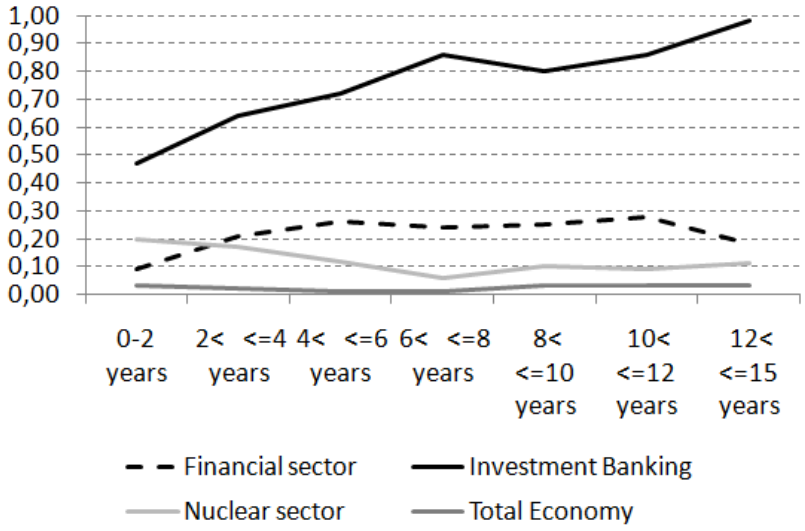

Figure 13:
Evolution of the standard deviation of residuals of the wage equation over careers in investment banking, the financial sector, the nuclear and the total economy (2006 - 2009, 78,145 observations)

Finally, I observe the evolution of the variable share over the career, and compare it with the evolution of the premium. I find that the increase in the premium is not due only to an increase in variable share. Moreover, variance in variable share is not as high as the variance in wages.

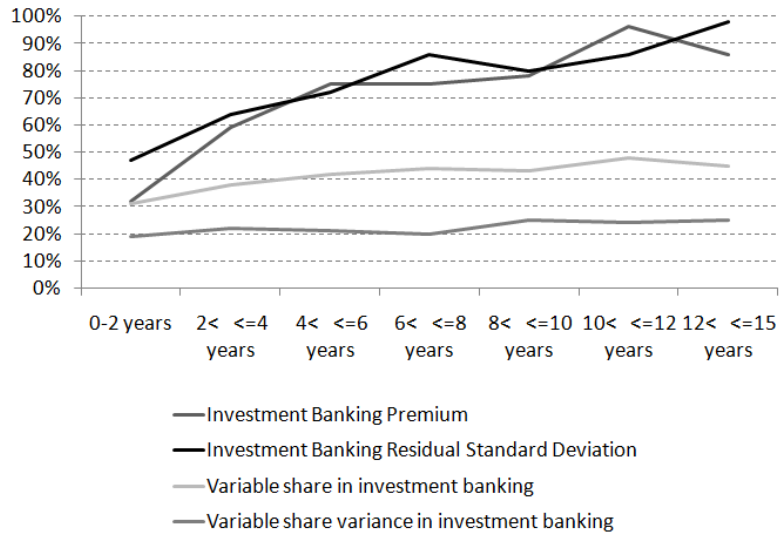

Figure 14:
Evolution of the level and variance of variable shares in investment banking over the career (2006 - 2009).

Persistence in careers. In the CNISF survey interviewees indicate the sector in which they worked five years before. I use this question in a logistic model where the dependant variable is one if the individual has worked in a different sector five years before, and 0 if not. The explanatory variables are age, experience and its square, sex, two education dummies, a hierarchical responsibility dummy, a working abroad dummy and the sectoral dummies. The sample includes 45,478 individuals, from 2006 to 2008. After computing marginal effects, I find that working in investment banking reduces the probability of having worked in another sector five years before by 15%. This is the sector with the lowest downward marginal effect along with the oil sector. Figure 13 displays the relation between the average value of residuals in the wage equation over the same period and the marginal effects of the logistic regression described above, when the latter are significant. I observe a negative correlation between sectoral mobility and the premium.

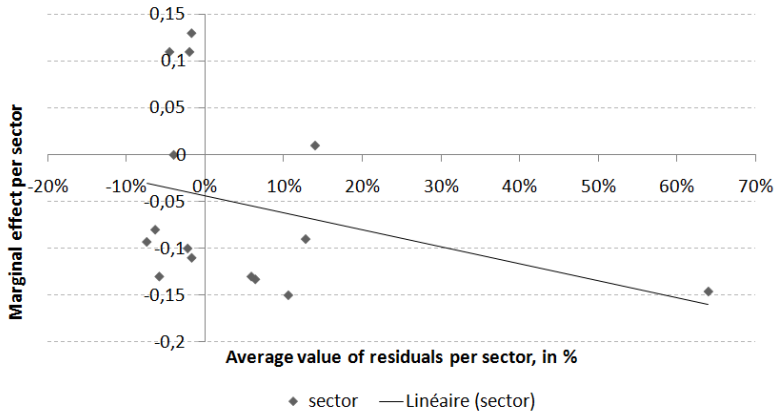

Figure 15:
Marginal effect per sector on the probability to have worked in a different sector five years before and the average value of residuals (2005 - 2008)

4.3 Size Distribution Evidence

According to the model, the average project size per employee should be higher in the superstar sector than in the rest of the economy. I use two different proxys for "project size". The first one is the firm's total asset value per employee, the second one is operating income before depreciation per employee.

I define the firm's total asset value as the market value of equity plus the book value of debt. Based on Compustat data for the U.S. economy, the formula I use is, as in Gabaix & Landier (2009):

$$mktvalue = data199 * abs(data25) + data6 - data60 - data74$$

For each sector, I compute the average total asset value per employee for the largest 50 firms of the sector. SIC codes are used to define industry groups. Table X in annex listed sectors and corresponding SIC codes.

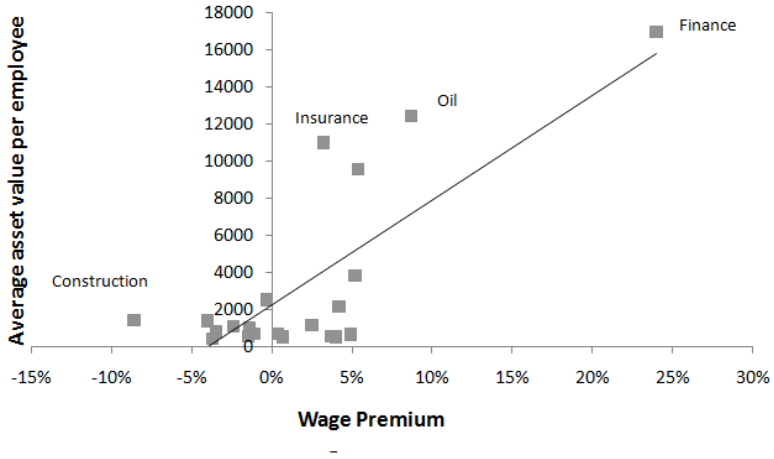

Figure 16:
Sectoral wage premium versus average firm asset value per employee

Figure 11 displays the average asset value per employee versus the wage premium across sectors over the period 2005-2007 (for the 50 biggest firms of the sector). The sector with the highest asset value per employee are the oil, insurance and mining sectors, all of them having high premium. However, the financial sector largely dominates, with a higher asset value per employee than in the rest of the economy.

I now to refer to the survey to see what is the operating income before depreciation declared by interviewees. (To be developed)

4.4 Time Series Evidence

According to the model, the increase in compensation in the financial sector may be explained by an increase in sensitivity to talent. The later would imply an increase in project size per employee. In order to assess whether a size effect has came along with the increase in compensation in the financial sector, I compute the average asset value per employee across sector over the period 1982-2008. I use the same method as in section 4.3.

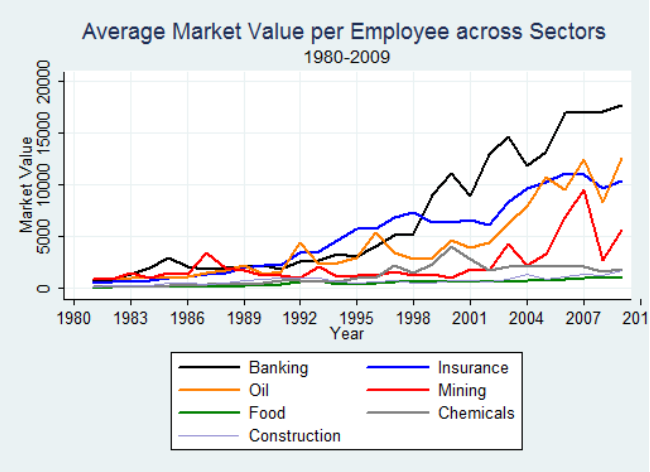

Figure 17:
Firm size is the average market value per employee of the top 50 firms per sector, computed using Compustat.

I observe that indeed the average asset value per employee has increased in the financial sector, more than in the rest of the economy.

4.5 Cross-Sectional and Cross-Industry Evidence

The model predicts that wages increase with project size and that returns to size should be higher in the financial industry.

4.6 Variable Compensation Evidence

According to the model, variable compensation should increase in line with profits and be indexed on the overall performance of the firm. I find that variable compensation is highly correlated with bank profits. Figure 14 shows that the variable share has evolved in line with banks profits from 2000 to 2008.

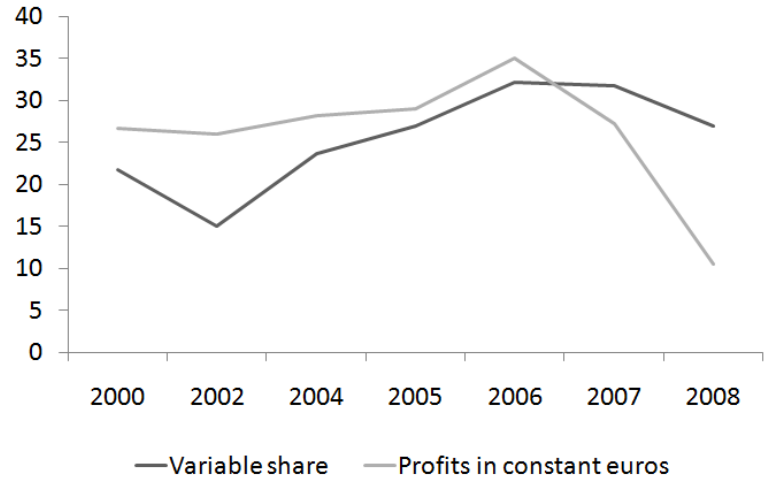

Figure 18:
The evolution of the variable share (in %) and profits in the financial sector (in billion of constant euros) - 2000-2008 - Data are from the French Commission Bancaire

5 Discussion

In this section I discuss other possible explanations for the high level of compensation in the financial sector.

5.1 Compensating Wage Differential

5.1.1 Theory

The theory of compensating differentials predicts a negative relation between wages and good working conditions. It is based on the theory of hedonic wages (Rosen, 1974, Lucas, 1977). Wage differentials equalize the total monetary and non monetary advantages or disadvantages among jobs. Jobs with favorable conditions offer lower compensation than jobs with unfavorable working conditions. Unfavorable working conditions are for example stress, job insecurity etc. The wage gap for the same level of productivity is maximum if all workers have the same utility function. However, we can consider a matching equilibrium model where workers' utility functions are heterogeneous. More tolerant to unfavorable working conditions workers would accept a lower premium than others to work in an industry with unfavorable working conditions. They would be matched to jobs in this industry.

Compensating wage differential models are difficult to test empirically. Indeed, working conditions should be measurable. Because of the matching equilibrium result, one cannot rely on perceived working conditions. Indeed, workers more tolerant to unfavorable working conditions may be matched to industries with lower working conditions than

others but perceive a lower level of disutility due to working conditions. However, such a model have the following implications:

- If the premium compensates for hard working conditions, the financial sector should not attract students so much.
- In this model, hard working conditions are exogeneous and not endogenously chosen by the firm (Axelson and Bond, 2009).

5.1.2 Data

I propose here to exploit one of the questions of the CNISF survey to test whether bad working conditions would account for the premium. Individuals are asked whether their job is a source of dissatisfaction because of stress, job insecurity, lack of autonomy or little task diversity. I proceed as follows. Let $insat_{it}$ be an indicator of the job being a source of dissatisfaction at time t. I fit the following regression of the probability of being not satisfied by a job.

$$insat_{it} = f(X_{it}, 1_{it})$$

where f is the logistic function, X_{it} contains the same vector of observable variables used before and 1_{it} is an indicator for working in finance. The coefficient to the indicator 1_{it} captures the additional risk of being unsatisfied for workers in finance. I fit this regression for the sample 2004 - 2008. I also test it with 1_{it} as an indicator of working in investment banking, and then in consulting, oil industry, engineering and the car industry as benchmarks. Finally, I switch the dependant variable to also capture the additional risk of suffering from job insecurity, stress, lack of autonomy or little task diversity for workers in finance. Results are described in table 3.

I find that working in the financial sector contributes negatively or not significantly to interviewees declaring to suffer from hard working conditions. Compared with consulting for example, employees in the financial sector suffer less from stress than consultants. As it could be the result of an optimal matching between individuals and firms, as explained in the third secton, I cannot conclude.
Focusing on investment bankers, respondents suffer significantly more from job insecurity and stress in 2008 than in the year 2007, which could be due to the beginning of the financial crisis. As I also find that the premium was at its highest level in 2007 (27%), it is an argument against the idea that the premium compensates only for working condition or stress. Indeed, the premium decreases in 2008 (down to 20%) whereas the latter worsen. Figure 8 displays the evolution from 2004 to 2008 of the contribution of the financial sector in general in the risk of perceiving job insecurity. It is clearly negatively correlated with the evolution of the premium in the sector.

Concerning the assumption that the premium would compensate for hours worked, unfortunately, there is no information on hours per week in our data. However, in 2007 and 2008, respondents declare whether on average they work or not overtime, and if yes, less than 5 hours, more than 5 hours or more than 10 hours per week. Whereas 32% of the respondents declare working more than 10 hours per week overtime, they are 39% in the financial sector in its whole and 60% in investment banking. However, when I

Table 7:
In your job is "" a source of insatisfaction? - Coefficient of sector dummies in the logit regression - 2004 to 2008 (2006 to 2008 for investment banking)

	the job	job insecurity	stress	autonomy	task diversity
Sectors					
Total Finance	-0.15^{***}	-0.3^{***}	-0.08^{**}	0.07	0.05
Consulting	-0.08^{**}	0.09	0.13^{***}	-0.19^{***}	-0.03
Oil industry	-0.21^{*}	-0.08^{**}	0.09	0.23	-0.13
Engineering	0.11^{***}	0.09^{**}	0.09^{***}	-0.01	0.1^{**}
Car industry	0.02	-0.4^{***}	0.08^{***}	0.16^{***}	0.13^{**}
Investment Banking (2007)	0.16	0.5^{**}	0.22	0.3	-0.6
Investment Banking (2008)	0.5^{***}	1.1^{***}	0.28^{*}	0.04	0.3

*The model includes a female dummy, a married dummy, a female*married dummy, a Paris area dummy, six education dummies (prépa intégrée, classe prépa, ecole d'appli de l'X, fac, bac+4, autres), a working abroad dummy, years of professional experience and its square, a hierarchic responsibility dummy, 7 occupation dummies (production, studies and conception, IT, commercial and marketing, administration, executive, others), 4 firm size dummies (less than 20 employees, from 20 to 500 employees, from 500 to 2000 employees, more than 2000 employees), a firm type dummy (individual firm, private sector, state firm, state, other).*

focus only on investment bankers, I find that working more than 10 hours overtime only explains 2% of the variation in wages in investment banking. To obtain this result, I regress the log of the gross wage in investment banking on a dummy variable of value 1 when working more than 10 hours over time or 0 if not, and on the same control variables as before. If working more than ten hours per week should account for the investment banking premium it may also account partly for the large heterogeneity in compensation observed within the sector, which is barely the case.

Figure 19:
Coefficient of Finance dummy in the logit regression of the risk of suffering from job insecurity and evolution of the premium of the finance sector from 2004 to 2008. Controls are the same as in section 1.)

5.2 Moral Hazard and Incentive rents

One of the reasons for high compensation in the financial sector could be that this industry faces a particularly strong moral hazard problem. Moral hazard emerges when the firm cannot observe the actions of the employee. The latter can choose either to exert effort or not to increase the value of a project. As this effort is not observable and costly for the worker, the firm will have to give him incentives to exert it. There could be three potential reasons for why moral hazard is higher in the financial sector: benefit to the employer of the employee's effort is high, cost of effort for the employee is high and effort is difficult to monitor. Under specific conditions, which are limited liability and participation constraints, moral hazard can lead to rents in an industry (Laffont and Martimort, 2002).
In a high moral hazard industry, the compensation scheme must provide strong incentives. Incentive schemes depend on the way effort impacts results that are verifiable. I consider three kinds of incentive schemes. The first one relies on the assumption that effort impacts results that are verifiable, such as profits of a trading desk or the number of deals of a merger and acquisition activity. In this case, the value of the project can be used as a noisy signal of the agent effort. This would account for the high level of variable compensation in the financial sector. Here, limited liability can lead to incentive rents. The second and the third ones rely on the assumption that there exists a category of efforts that are not verifiable through results. There are two possible reasons. First, there is discontinuity between results and effort. For example, fraud on accounting figures cannot be verifiable in yearly profits but can induce huge losses for a firm in a specific year. Second, results may be a too noisy signal of the employee's effort to be used as an incentive device. For example, in an investment bank a computer expert does not have a direct impact on any sales or profit indicators. In the efficiency wage theory, the firm uses a supervising technology to control for the agent's effort. In case of shirking,

the worker is fired. Here, high wages increase the opportunity cost of being unemployed (Shapiro and Stiglitz, 1984). Rents in a specific sector increase the cost of being fired, and thus reduce shirking. This is the second kind of incentive scheme I consider. Finally, the deferred payment mechanism and the tournament model take into account the wage profile as an incentive mechanism (Lazear, 1981). In this case, limited liability can lead to an equilibrium with rents that increase with experience.

5.2.1 Variable compensation and incentive rents

I consider two industries; one has a moral hazard problem, the other not. In the high moral hazard industry, I suppose that the employee is in charge of a project of size I. The project yields either 0 or $R \times I$. The distribution of returns depends on the effort exerted by the employee. If the employee exerts effort, the project yields $R \times I$ with a probability p_H. If not, the project yields $R \times I$ with a probability p_L. The employee's effort is not observable by investors. Moreover, the employee receives a private benefit from shirking $B(I)$ which is an increasing function of the size of the investment I. Here arises the moral hazard problem. In the industry with no moral hazard problem, the employee receives a wage w equal to his marginal productivity. First, I study the equilibrium when effort is observable and the employee is risk neutral. Then when effort is not observable, I show how due to limited liability and risk aversion rents can emerge.

When effort is observable, the employer can force the employee to exert effort. I suppose that in case of success, the employee receives $\overline{R_e} \times I$. In case of failure, he receives $\underline{R_e} \times I$. Let u be the utility of the employee. If the employer wants the employee to exert effort, the problem is to maximize profit under the participation constraint of the employee:

$$\max(R - \overline{R_e})p_H I + (R - \underline{R_e})(1 - p_H)I$$

Under the constraint:

$$u(\overline{R_e}I) \times p_H + u(\underline{R_e}I) \times (1 - p_H) \geq u(w)$$

In that case the participation constraint is binding $\overline{R_e} = \underline{R_e} = \frac{w}{I}$. When effort is observable the employee receives full insurance from the principal.

Now I suppose that effort is not observable. As the agent is risk neutral we assume that $u(R_e) = R_e$. If the employer wants the employee to exert effort, he chooses the contracts that solves the following problem:

$$\max(R - \overline{R_e})p_H I + (R - \underline{R_e})(1 - p_H)I$$

$$\overline{R_e}p_H I + \underline{R_e}(1 - p_H)I \geq w$$

$$\overline{R_e}p_H I + \underline{R_e}(1 - p_H)I \geq \overline{R_e}p_L I + \underline{R_e}(1 - p_L)I + B(I)$$

As the incentive constraint is binding, I obtain:

$$\overline{R_e}I = w + \frac{(1 - p_H) \times B(I)}{\Delta p}$$

and

$$\underline{R_e}I = w - \frac{(p_H) \times B(I)}{\Delta p}$$

In this case, the expected transfer to the employee is w, and moral hazard is costless to the employer. There are no incentive rents.

In the model I have described above, in case of failure the transfer to the employee can be negative. However, because of limited liability it is considered as impossible to have a negative wage. As a result, there is a limited liability constraint. Let $\overline{w}$ the minimum wage. Now I have the following limited liability assumption:

$$\underline{R_e}I \geq \overline{w}$$

If the limited liability constraint is not binding, then I have the same result as before and the employee receives no incentive rents. However, if the limited constraint is binding, i.e. if

$$w - \frac{p_H B(I)}{\Delta p} \leq \overline{w}$$

then I obtain:

$$\underline{R_e}I = \overline{w}$$

And

$$\overline{R_e}I = \frac{B(I)}{\Delta p} + \overline{w}$$

As a result, the employee receives a rent which amounts to $\overline{w} - w + \frac{B(I)}{\Delta p}$. The employer faces a tradeoff between limited liability rent extraction and efficiency. The employer will induce effort if and only if:

$$p_H(R - \overline{R_e})I \geq p_L RI$$

Which implies:

$$\Delta pR \geq \frac{B(I)}{I\Delta p} + \frac{\overline{w}}{I}$$

As a result, the employer will induce effort if and only if the benefit to the employer of effort is sufficiently large (Δp is high): wages will be indexed to measures of performance in jobs were effort has a sufficient impact on. These measures of performance could be objective (sales in a trading desk) or subjective (measured by the superior). In this case discretionary bonuses or profit sharing could be used as incentive devices.

In this model I have assumed that the employee is risk neutral. However, under risk aversion, the employee should receive a premium to compensate for variation in wages.

I describe now what are the testable implications of this model. In this model, it is optimal for the employer to induce effort if efforts are verifiable through specific indicators. As a result, variable compensation may be indexed on individual performance rather than collective performance, as collective performance is a more noisy signal of the individual's effort (Δp will be too small).

Further, incentive rents increase with the size of projects. It increases more or less rapidly depending on the concavity of the function $B(I)$. This model would account for the increase in compensation in the financial sector if on average, the size of deals per employee has increased.
Finally, heterogeneity in wages is due to heterogeneity in moral hazard

5.2.2 The efficiency wage theory and rents

Under specific conditions, the employee's effort may not be verifiable through any indicators. Either because it will have too little impact on these indicators (Δp is small), or because it has not a continuous impact on indicators. In this case, the firm may want to choose another way to induce effort. The "efficiency" wage theory considers that when results are not verifiable, a possibility is to use a monitoring technology. As this technology is costly, there is a tradeoff between monitoring and efficiency. This monitoring technology detects shirking with a probability q. If an employee is caught shirking, he is fired. He then receives a wage $\overline{w}$ that corresponds to the outside opportunity. The employer will set a wage w higher than the outside opportunity $\overline{w}$ to increase the cost of being fired.
Here is a simplified version of the model. Let w be the wage in the high moral hazard industry, q the probability of a shirker to be fired, and $\overline{w}$ the outside opportunity. As before, I consider that the employee has a private benefit B from shirking. The incentive compatibility constraint is the following:

$$w \geq \overline{w} \times q + (1 - q) \times w + B$$

Which implies

$$w \geq \overline{w} + \frac{B}{q}$$

In this model, the employee receives a rent $\frac{B}{q}$. The employer will decide to induce effort if the cost of failure is higher than the cost of monitoring added to the cost of the rent. That is why this model would account for rents for air controllers, notarians or financiers. In these professions the cost of failure is high. It is illustrated by Jerôme Kerviel's case. The cost of his failure overpassed 5 billion dollars.

What are the empirical implications of the model? In this model, the rent increases with the benefit from shirking B and decreases with the probability q of being caught. If I consider that the benefit for shirking increases with the money at stake, I have the following testable implication:

- Rents increase with the size of investment per employee
- The probability q of being caught should decrease with the complexity of the industry and rents increase with the complexity of financial activities.

5.2.3 Data

Fact 7 shows that variable compensation is higher in investment banking than in other sectors of the economy. I also observe that the share of variable compensation varies across professions within the sector, and is in line with the level of compensation. Oyer develops a model where variable compensation are used to ajust wages when firms compete for workers and profits vary over time. Indeed, indexing wage on profits, when the firm's profits are correlated with the industry's profits, can be less expensive than negotiating wage each year. To be developpped. In this section I would like to observe the individual variance in wages ect.

6 Conclusion

Employees in investment banking are paid 60% more than they would be in another sector. If I consider the financial sector as a whole, the premium amounts to 27% in 2007 and has increased from 1980 on. I find that competition for industry specific talent may account for this premium. In a historical perspective, technological progress and finance deregulation would have made skills in the financial sector more general within the sector but more industry-specific, increasing competition for the best employees in the sector. They may have also increased the sensitivity of profits to talent. This result has implications concerning wage inequalities, talent allocation, risk taking and their impact on growth. It predicts that laws on the structure of compensation in the financial sector, restricting bonuses for example, may have no impact on the level of compensation. Only progressive income taxation may offer a solution to the problems of talent misallocation or wage inequalities.

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A Statistics on data

A.1 Individual data

Table 8: *Statistics on the controle variables (1983-2008, 247,546 observations)*

Variable	Frequence
Gender	
Men	86.5%
Women	13.5%
Marital status	
Maried	74.8%
Single	25.2%
Working place	
Paris and region around	40.6%
Abroad	9.4%
Other	50%
Experience	
≤ 3 years	20%
≤ 6 years	38%
≤ 10 years	55%
≤ 15 years	68%
≤ 20 years	78%
≤ 25 years	87%
≤ 30 years	94%
≤ 45 years	100%
Education	
2 or 3 year University Degree and Engineer School	15.9%
4 year or more University Degree and Engineer School	7.8%
5 year Engineer School	20.5%
3 year Engineer School (after a competitive exam)	54.1%
Other	1.7%
Polytechnique Engineer Schools	14.7%
Occupation	
Hierarchic responsabilities	51.8%
No hierarchic responsabilities	48.2%
Production	21.4%
Research, studies, engineering	34.6%
Computer science	15%
Commercial	10.9%
Administration, holding	5.6%
Executive	5.3%
Teaching	2.2%
Other	5.3%
Firm type	
Individual firms	4.1%
Private sector	73.2%
State firms	10.9%
The state	9.5%
Other	2.2%

A.2 Sectoral data

Table 9: *Statistics on sectors, 1998 - 2008, 122179 observations*

Sector	Individuals	Frequence	Volatility	Homogeneity	Education
Finance	6550	5.3%			0.25
Insurance	1015	0.8%			0.18
Holding	3554	2.9%			0.19
Consulting	4644	3.8%			0.21
IT	13038	10.6%			0.13
Engineering	11382	9.3%			0.11
Construction	4359	3.6%			0.07
Car	7220	5.9%			0.11
Textile	589	0.5%			0.04
Cement	955	0.8%			0.08
Sewage	492	0.4%			0.09
Air industry	4773	3.9%			0.25
Processed food	2786	2.3%			0.11
Furniture	801	0.7%			0.02
Paper	825	0.7%			0.02
Metal	3755	3.1%			0.06
Public administration	2421	2%			0.24
Research	4177	3.4%			0.23
Real Estate	595	0.5%			0.09
Restaurant	89	0.07%			0.04
Electronic	13028	10.7%			0.17
Machin	3972	3.3%			0.06
Electricity	3669	3%			0.22
Nuclear	673	0.6%			0.09
Printing	438	0.4%			0.07
Mining	199	0.2%			0.13
Transport	1862	1.5%			0.16
Air transport	4773	3.9%			0.23
Oil	462	0.4%			0.24
Chemicals	5209	4.3%			0.07
Plastic	2243	1.8%			0.08
Agriculture	384	0.3%			0.21
Education	1478	1.2%			0.13
Health and social	1598	1.3%			0.14
Other services	3342	2.7%			0.13
Media	815	0.7%			0.13

A.3 Residual distribution

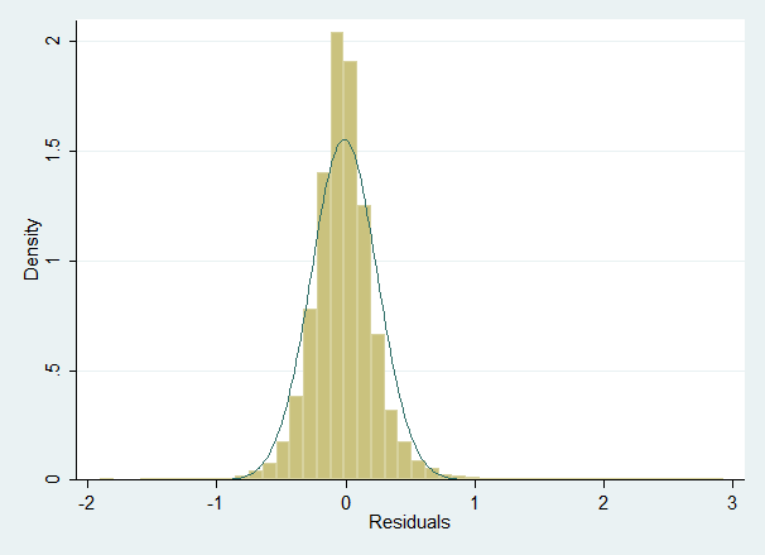

Figure 20: *Residual distribution in the whole economy excluding finance (46,197 observations)*

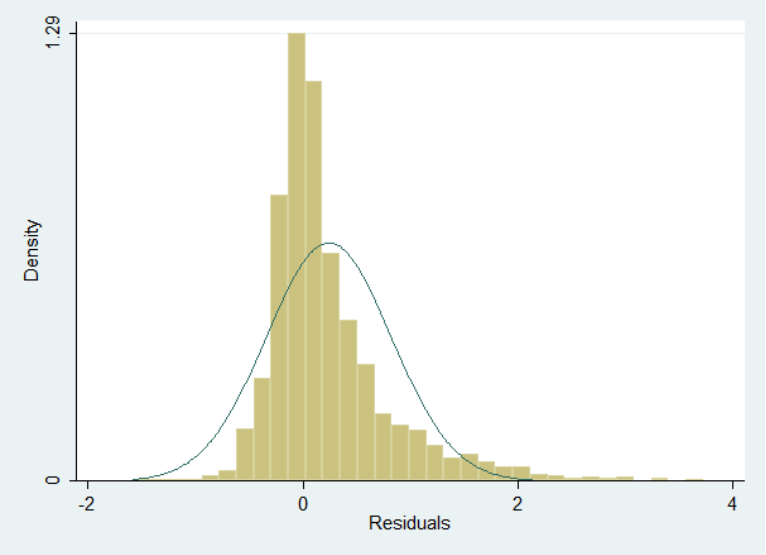

Figure 21: *Residual distribution in the financial sector (2,446 observations)*

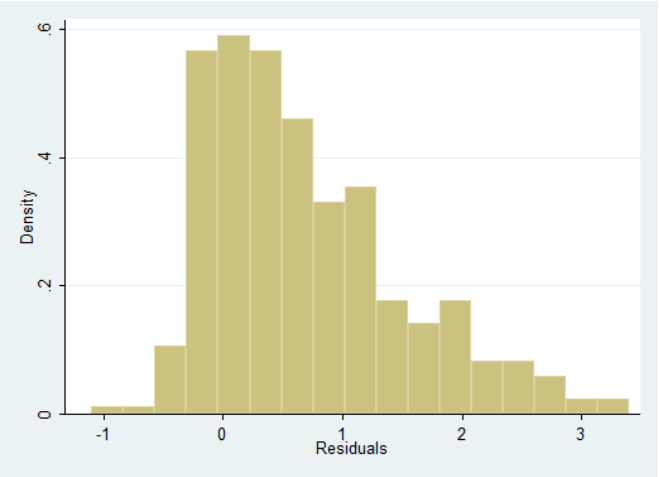

Figure 22: *Residual distribution in investment banking (*

A.4 Wage Equation

Table 10: *The dependant variable is the log of the yearly gross wage*

Variables	2000-2008
Sexe	$-0.05^{***}[-10.3]$
Maried	$0.05^{***}[19.3]$
Maried women	$-0.05^{***}[-4.4]$
Paris	$0.13^{***}[66.9]$
Working abroad	$0.39^{***}[83.8]$
Experience	$0.05^{***}[138]$
Experience (square)	$-0.0008^{***}[-70]$
Education	
Best Engineer degree	$0.11^{***}[40.5]$
5 years Engineer School	$-0.004^{***}[-10.3]$
3 years Engineer School	$0.03^{***}[15]$
Engineer school after university	$-0.03^{***}[-9]$
Occupation	
Hierarchic responsabilities	$0.12^{***}[59.9]$
Production	
Research, studies, engineering	$-0.11^{***}[-14]$
Computer science	$-0.10^{***}[-9]$
Commercial	$0.004^{***}[22]$
Administration, holding	$0.12^{***}[39]$
Executive	$0.27^{***}[61]$
Teaching	$-0.18^{***}[-8]$
Other	$0.01^{***}[11]$
Firm type	
Individual firms	
Private sector	$0.11^{***}[4.5]$
State firms	$0.05^{***}[1]$
The state	$-0.11^{***}[-21]$
Other	$-0.13^{***}[-13]$
Number of observations	87637
Firm size	
Less than 20 employees	0
20 to 500 employees	$-0.04^{***}[-4.5]$
500 to 2000 employees	$0^{***}[0]$
More than 2000 employees	$0.14^{***}[-36.6]$
R^2	63.7%

A.5 Variable share

B Compensation in the financial sector: data description

Contrary to data regarding top executives' compensation of public firms, compensation on investment bankers, hedge fund employees, private equity (PE) and venture capital (VC) partners is not systemati-

cally disclosed. As a result, it is difficult to estimate the structure, the evolution and the distribution of compensation in the financial industry. Table 1 shows the sources of the data that has been used in the literature on the subject.

Table 11: *Data on compensation in the financial sector*

Paper	**Variable**	**Databases**	**Sample**	**Sector**
Philippon, Reshef (2009)	Total of wages and suplements (full-time equivalent)	Annual Industry Accounts of the U.S. Bureau of Economic Analysis, Kuznets (1941), Martin (1939)	1909-2006	The financial sector including credit intermediation, insurance and other finance
Kaplan, Rauh (2009)	Total compensation of managing directors including bonuses and stock options	Estimations on reported total global employee compensation by publicly traded firms	1994-2004	Investment banking
Kaplan, Rauh (2009)	Total compensation of partners including management and incentive fees	Hennesse Group, Hedge Fund Research, TASS and Thomson Financial's Venture Economics	1994-2004	Private Equity, Hedge funds and Venture Capital
Oyer(2009)	Total compensation including bonuses	1996 and 1998 Stanford MBA survey	1998	Investment banking, money management Venture capital

B.1 Data on VC, HF and PE compensation

The typical compensation is composed by a fixed share (management fees), which is usually between 1.5% and 3% of the net asset value, and a variable share (incentive fees), which is about 20% of fund profits (Gompers, Lerner (1999) and Metrick & Yasuda (2007)). Concerning the hedge fund industry, Kaplan & Rauh (2009) use the Hennesse Group, Hedge Fund Research and TASS hedge fund database to gather information on assets under management and the average return for the year to compute total fees in the industry (the sum of management fees and incentive fees). Then they use SEC Investment Advisor Public Disclosure for information on the number of employees to translate total fees into compensation. Concerning VC or PE funds, they consider that assets under management are the sum of capital commitments over the previous seven years (including the current year). They use the data on capital committed to U.S. VC and PE funds from Thomson Financial's Venture Economics database. To translate total fees into compensation, they use the estimation of Metrick and Yasuda (2007) that the average number of partners in a typical VC and PE funds is six. They provide the mean of the compensation of an alternative asset management partner (more than $0.48 million).

C The survey

Code CNISF (ne rien inscrire) — *Codes pour le CNISF*

I Signalétique personnelle

N° compl.

1. Êtes-vous membre de l'association des anciens élèves de votre école ?

1 Oui 2 Non 3 Il n'en existe pas — MASS

2. Année de naissance : 19 ⌊_⌊_⌋ — GEN

3. Sexe : 1 Homme 2 Femme — SX

4. Utilisez-vous un e-mail ? 1 Oui, personnel 2 Oui, au bureau 3 Oui, aux deux 4 Non — EM

Si la prochaine enquête se faisait à l'aide d'internet, y participeriez-vous ? 1 Oui 2 Non — EMP

II Formation d'ingénieur

5. Votre diplôme d'ingénieur a-t-il été obtenu par :

1 Formation initiale (de base) 2 Apprentissage 3 Formation continue* — FORM

(*) Si réponse **3** : Depuis combien d'années travailliez-vous quand vous avez entrepris ce diplôme ? ⌊_⌊_⌊_⌋ — ANFC

6. Votre formation à l'entrée en école d'ingénieur :

1 Bac (prépas intégrées) 2 Classes préparatoires

3 Bac + 2 ou 3 (DUT, BTS, Licence) 4 Bac + 4 (Maîtrise) ou plus 5 Autre — FOPR

7. Diplôme d'ingénieur : *(Ne rien inscrire dans la case grisée)*

Première école : Sigle ..... Ville ..... Année de sortie ⌊_⌊_⌊_⌋ — ASS1 / PROMO 1

Deuxième école : Sigle ..... Ville ..... Année de sortie ⌊_⌊_⌊_⌋ — ASS2 / PROMO 2

8. À l'issue de votre formation d'ingénieur, quelle était votre spécialité de sortie ?

Reprenez les chiffres de la liste ci-dessous : Spécialité 1 ⌊_⌋ Spécialité 2 ⌊_⌋ — SPE 1 / SPE 2

1 Généraliste, sans spécialité dominante
2 Agronomie, sciences de la vie, agro-alimentaire
3 Chimie, génie des procédés
4 Électronique, télécommunications
5 Électrotechnique, automatique, électricité
6 Génie civil , BTP, mines, géologie
7 Informatique, génie logiciel, math. appliquées
8 Mécanique, production, productique
9 Physique, matériaux
10 Autre

III L'entreprise qui vous employait au 31-12-2000

9. Secteur d'activité :

Code APE au 31-12-2000 *(ce code en 3 chiffres et une lettre figure sur vos bulletins de salaire)* : ⌊_⌊_⌊_⌋ — NAF

1 Agro-alimentaire, agriculture
2 Industrie, énergie
3 BTP/construction
4 Sociétés de conseil, audit, études non techn.
5 SSII, sociétés de services informatiques
6 Bureaux d'études techniques, ingénierie
7 Finance, banque, assurance
8 Télécommunications
9 Commerce, ditribution, transport
10 Fonction publique : État, territoriale ou hospitalière
11 Autre — SEC

Travaillez-vous dans le secteur de la nouvelle économie (télécoms, e-business) ? 1 Oui 2 Non — EBU

(Codes CNISF)

10. Nature de l'entreprise au 31-12-2000

1 Travailleur indépendant
2 Secteur privé
3 Secteur nationalisé, d'économie mixte, EPIC
4 État, collectivités locales, autre secteur public

NATEM

11. Taille de l'entreprise (nombre de salariés) au 31-12-2000

1 Pas de salarié
2 1 à 20 salariés
3 21 à 499 salariés
4 500 à 4 999 salariés
5 5 000 salariés et plus

TAILE

12. Lieu de travail *(indiquez : le numéro à 2 chiffres du département ; DOM : 97 ; TOM : 98 ; étranger : 99)* ⌊_⌋⌊_⌋ DT

13. Pour l'étranger : *indiquez le code postal international (D, CH, UK, USA...)* ⌊_⌋⌊_⌋⌊_⌋ ETR

14. S'agit-il d'une entreprise que vous avez créée ? 1 Oui **Ou d'une reprise ?** 2 Oui CRE

Depuis combien d'années ⌊_⌋⌊_⌋ Dans quel secteur d'activité *(cf. les codes d'activité de la question 9)* ⌊_⌋⌊_⌋ ACRE SCRE

IV Caractéristiques de votre activité principale au 31-12-2000

15. Situation professionnelle au 31-12-2000 *(choix unique)* SITU

1 Fonctionnaire
2 Salarié en contrat à durée indéterminée
3 Salarié en contrat à durée déterminée
4 Salarié à employeurs multiples
5 Intérim, vacations ou contrat précaire
6 CSN
7 Travailleur indépendant
8 Gérant ou dirigeant majoritaire
9 Contrat lié à une thèse : CIFRE, ATER...
10 Demandeur d'emploi
11 Pré-retraité ou retraité
12 Autre (étudiant, congé sans solde, service national...)

16. Temps partiel. Si cette activité est à temps partiel, indiquez-en le pourcentage : ⌊_⌋⌊_⌋ % TPS

17. Activité dominante au 31-12-2000

(Un seul choix : cochez la case correspondant à l'activité que vous avez exercée directement ou celle dont vous aviez la responsabilité)

1 **Production, fabrication, chantiers**

2 **Approvisionnement, logistique, qualité, sécurité, organisation, maintenance, environnement...**

3 **Études, recherche, projets :**
- 3.1 Recherche fondamentale
- 3.2 Recherche, essais, développement
- 3.3 Projet, ingénierie, études techniques
- 3.4 Conseil, audit, études non techniques
- 3.5 Management de projets techniques

4 **Informatique, systèmes d'information, réseaux :**
- 4.1 Exploitation, production
- 4.2 Études, projets et développement
- 4.3 Administration, maintenance, support
- 4.4 Technico-commercial, commercial, marketing

5 **Technico-commercial, marketing, vente :**
- 5.1 Technico-commercial (sauf informatique)
- 5.2 Commercial, vente, marketing (sauf informatique)

6 **Administration des entreprises : finances, juridique, communication, ressources humaines...**

7 **Direction générale**

8 **Administration dans la Fonction publique**

9 **Enseignement, formation**

10 **Autre**

ACTD

18. Si vous êtes informaticien, est-ce dans le domaine de :

1 Informatique industrielle
2 Informatique des systèmes et réseaux
3 Informatique des systèmes d'information
4 Internet

INF

(Codes CNISF)

19. Niveau hiérarchique au 31-12-2000

1 Pas encore cadre
2 Cadre sans responsabilité hiérarchique
3 Responsable d'une équipe
4 Responsable d'un service ou d'un département
5 Directeur de fonction centrale, d'établissement, de division, de branche
6 PDG ou DG

PH

20. Nombre de salariés sous votre responsabilité hiérarchique : ⌊_⌊_⌊_⌊_⌋ RESS

21. Si vous n'êtes pas dans la ligne hiérarchique, avez-vous un titre professionnel (expert...) conféré par votre entreprise ? 1 Oui 2 Non EXP

V Ressources professionnelles en 2000

*Il s'agit du **revenu complet** lié à l'activité que vous venez de décrire, primes et avantages en nature compris.*
Si vous n'avez pas travaillé à temps plein ou toute l'année, merci de calculer le revenu en équivalent année pleine.

22. Revenu professionnel brut annuel 2000 (en kF) : ⌊_⌊_⌊_⌊_⌋ kF REVA0
Sur ce total, quel pourcentage représente la part variable : ⌊_⌊_⌋ % VAR

23. Bénéficiez-vous en outre de stock-options ? 1 Oui 2 Non STOC

24. Revenu professionnel brut annuel 1999 (pour rappel) : ⌊_⌊_⌊_⌊_⌋ kF REVA9

25. Revenu professionnel brut annuel prévisible pour 2001 (en kF) : ⌊_⌊_⌊_⌊_⌋ kF REVA1

VI Parcours professionnel

26. En quelle année avez-vous commencé à travailler comme ingénieur ? ⌊_⌊_⌊_⌊_⌋ ANCE

27. Nombre d'années d'ancienneté. Dans l'entreprise : ⌊_⌊_⌋ ; dans l'activité dominante : ⌊_⌊_⌋ ANCP

28. Parcours professionnel :
Indiquez vos trois derniers emplois caractérisés par une activité dominante et un niveau hiérarchique.

NOP	Vos 3 derniers emplois	PINT Intitulé du poste en clair	PACTD Activité dominante *(utilisez les codes de Q17)*	PPH Position hiérarchique *(utilisez les codes de Q19)*	PDM Durée *(en mois)*	NOP
1	Aujourd'hui	.....	⌊_⌊_⌋	⌊_⌊_⌋	⌊_⌊_⌊_⌋	PACTD
2	Emploi *n* – 1	.....	⌊_⌊_⌋	⌊_⌊_⌋	⌊_⌊_⌊_⌋	PPH
3	Emploi *n* – 2	.....	⌊_⌊_⌋	⌊_⌊_⌋	⌊_⌊_⌊_⌋	PDM

Combien d'emplois avez-vous occupés au total depuis que vous êtes ingénieur ? ⌊_⌊_⌋ NBPST
Dans combien d'établissements au total ? ⌊_⌊_⌋ NBETB

VII Réduction du temps de travail (RTT)

29. La RTT a-t-elle été mise en place dans votre entreprise ? 1 Oui 2 Non 3 Ne sait pas RTTE

30. Que comporte l'accord de RTT pour vous *(plusieurs réponses possibles)* **:**

1 Réduction quotidienne
2 Réduction par 1/2 journées ou journées sur une courte durée
3 Des jours de congés supplémentaires
4 Mise en place d'un Compte épargne temps
5 Modulation, annualisation
6 Autre modalité
7 Non concerné (cadre dirigeant)
8 Autres

ART

31. Estimez-vous que, pour vous, la RTT se traduit réellement par :
1 Une réduction de votre durée hebdomadaire de travail ; 2 Une réduction de votre nombre de jours de travail ERT

32. Êtes-vous satisfait de ces modalités ? 1 Oui 2 Non SAT

(Codes CNISF)

VIII Travail à l'étranger (hors CSN)

33. Quand vous avez quitté la France pour la 1re fois, quelles étaient vos motivations ? MOTET

(Choix multiples possibles)

	Rôle déterminant	Rôle accessoire	Aucun rôle
1 Liens familiaux, personnels	1	2	3
2 Perfectionner la langue	1	2	3
3 Déroulement de carrière, demande de l'employeur	1	2	3
4 Vous n'avez pas trouvé de travail en France	1	2	3
5 Création d'entreprise plus facile	1	2	3
6 Après un stage durant vos études	1	2	3
7 Après un séjour en coopération (VSN, CSN)	1	2	3
8 Poursuite d'étude ou post doc	1	2	3
9 Niveau de rémunération plus élevé	1	2	3
10 Recherche de dépaysement, autre culture	1	2	3
11 Recherche d'autonomie dans le travail	1	2	3
12 Projet humanitaire	1	2	3

34. Quel a été le premier pays étranger où vous avez travaillé *(indiquez le code postal international)* **:** ⌊_⌊_⌊_⌊_⌋ TETA

35. S'agissait-il aussi de votre premier emploi ? 1 Oui 2 Non PETR

36. Depuis que vous êtes ingénieur, combien de mois avez-vous travaillé à l'étranger ? ⌊_⌊_⌊_⌋ TTR

37. Le cas échéant, votre conjoint(e) travaille-t-il (elle) à l'étranger ? 1 Oui 2 Non CJET

Si vous travailliez à l'étranger au 31-12-2000 (hors CSN) :

38. Quel était votre statut ? TETST

1 Salarié du privé sous contrat local	5 Fonctionnaire local
2 Salarié du privé de droit français	6 Travailleur indépendant
3 Contrat de chantier ou CDD	7 Bénévole
4 Fonctionnaire international ou français	8 Autre : .....

39. Depuis combien de mois travaillez-vous dans ce pays ? ⌊_⌊_⌊_⌋ mois TETAP

40. Combien de temps encore pensez-vous travailler à l'étranger ? ⌊_⌊_⌋ années *(si vous ne savez pas, notez 99)* TETEN

41. Travaillez-vous pour une entreprise française ? 1 Oui 2 Non TREF

Si vous résidez en France, faites-vous des déplacements à l'étranger ? 1 Oui 2 Non DPL

42. Combien de semaines avez-vous passé hors de France en 2000 : ⌊_⌊_⌋ SEME

IX Renseignements complémentaires

43. Vivez-vous en couple ? 1 Oui 2 Non COUP

44. Votre conjoint(e) a-t-il (elle) une activité professionnelle ? 1 Oui 2 Non CJAP

45. Combien d'enfants vivent dans votre foyer ? ⌊_⌊_⌋ ENF

46. Lorsque vous avez commencé vos études d'ingénieur, quelle était la profession de vos parents ?

père PRM	*mère* PRP
1 Cadre ou profession intellectuelle supérieure	1 Cadre ou profession intellectuelle supérieure
2 Profession intermédiaire (technicien, instituteur, contremaître)	2 Profession intermédiaire (technicien, institutrice, infirmière)
3 Employé	3 Employée
4 Ouvrier	4 Ouvrière
5 Travailleur indépendant	5 Travailleuse indépendante
6 Autre (retraité...)	6 Autre (femme au foyer, retraitée...)

Merci pour votre collaboration

Visitez le site du CNISF **(http://www.cnisf.org)** *à partir du 30 juillet 2001 pour découvrir les premiers résultats de l'enquête.*