# Capital Structures and Compensation Policies

Kaïs Dachraoui and Georges Dionne*

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**Abstract**

*We study the interactions between leverage and compensation policies within firms. Recent works have shown that there exists heterogeneity in compensation policies across firms (Abowd, Kramarz and Margolis, 1999 and Margolis, 1996). We introduce firms' capital structure in order to explain part of this heterogeneity. Estimation results show, in fact, that the composition of the labor force affects significantly firms' leverage which in turn affects the compensation policy of the firms. Empirical evidences also indicate that controlling for leverage reduce the estimated trade-off between starting compensations and returns to seniority. These results support strong interactions between the financial market and the labor market explained by asymmetrical information in both markets.*

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*Kaïs Dachraoui is a Post-doctoral fellow, Risk Management Chair and Statistics Canada (kais.dachraoui@statcan.ca). Georges Dionne is Chairholder, Risk Management Chair, and Professor, Finance Department, HEC Montreal. The data for this study are confidential and come from INSEE-CREST. We thank Francis Kramarz for his collaboration and CREST for its hospitality. Corresponding author: Georges Dionne, Risk Management Chair, HEC-Montréal, 3000 Chemin de la Côte -Sainte-Catherine, Montréal, Canada H3T 2A7, Phone: (514) 340-6596; Fax: (514) 340-5019; e-mail: georges.dionne@hec.ca .

# 1 Introduction and motivation

In this paper we study the interaction between firms leverage and compensation policies in presence of asymmetrical information in labor and financial markets. In a first step we analyze how the composition of the labor force may influence capital structure. We then test how the estimated capital structure affects firms' compensation policies.

Optimal capital structure, if there is any, should be explained by the trade-off between the costs and the benefits of debt versus equity financing in the firm's capital structure. In finance theory, variables like cash flow variability, bankruptcy costs and tax advantage have been stressed to explain variations in capital structure. Other works rely on agency costs and signaling theory to show how the relative bargaining power of owners vis-à-vis workers or how the specificity of human and physical capital could alter the composition of capital structure (Hart and Moore, 1994, Dasgupta and Sengupta, 1993 and Jaggia and Thakor, 1994). Empirical work in this area was most often compromised by the absence of suitable data for the attributes that may affect capital structure. In fact, most empirical studies done in this direction (Bronars and Deere, 1991, Titman and Wessels, 1988, Bradley et *al.*, 1984 and Rajan and Zingales, 1995) used data that does not consider the labor force within firms. In the recent theoretical literature, it was shown, however, that this variable may affect considerably the composition of firm's capital structure under asymmetrical information. It is now also documented that firm's compensation policies and labor contracts in general are heavily related to firm's leverage (Farmer, 1985, Khan and Scheinkman, 1985, Jaggia and Thakor, 1994, and Dachraoui and Dionne, 1997).

This study extends empirical work on capital structures and compensation policies in two ways. First, we are able to enhance the range of theoretical determinants of capital structure by introducing some recently developed theories that have not been yet analyzed empirically. This contribution is possible since our data contains new informations that were not available in previous studies. Second, we make a linkage between firms' financial structure and compensation policies within these firms. We do this by linking wage contracts component estimates to firms predicted leverage which helps us to test the effect of firms leverage on wage contracts.

A further motivation for this empirical study is to explain a part of the heterogeneity that exists in compensation policies across firms. In fact, as shown in Abowd, Kramarz and Margolis [1999] and Margolis [1996], imposing identical returns to seniority across different firms (Topel, 1991) is a restrictive assumption that has to be reconsidered. When heterogeneity in returns to seniority across firms is considered, Abowd et *al.* [1999] found a standard error that is relatively large (0.1167 relative to the mean across firms of 0.0156, page 297). More generally, they obtained that person effects are statisticaly more important than firm effects. This result may be explained, in part, by the absence of control for financial conditions of the firms.

As discussed in Margolis [1996], models with implicit contracts and costless mobility (Beaudry and DiNardo, 1991) can accommodate for this variance if we permit firm-specific shocks. In fact, as mentioned by Lamont [1994], debt overhang creates a minimal threshold value for investment returns. Below this threshold the firm cannot attract investors even if the net present value for the investment is positive. Expectations about the economy are then crucial in investment decisions, and more levered firms, in stagnant economies, are those who suffer the most, leading to a loss in investment efficiency.

In this paper we are more concerned with compensation effects. We will see how controlling for leverage ratio by firm affects the variance of returns to seniority across firms as well as the covariance between the firm specific intercept (starting compensation) and the seniority coefficient. Abowd et *al.* [1999] found a negative correlation (-0.56, page 295), which is in favor of a trade-off between starting salary and wage growth as predicted by human capital theory (Becker and Stigler, 1974). However, the residual correlation should be lower once we control for firms leverage.

The rest of the paper is organized as follows. In Section 2 we present the model. Section 3 analyzes the determinants of capital structure and Section 4 establishes the empirical link between capital structure and compensation policies. The last section is devoted to conclusions.

# 2 Capital structure and compensation policy in a joint framework

Traditional econometric modelling of wage determination did not allow for heterogeneity in firm compensation policy neither for temporal variation[1]. As already mentioned, Abowd, Kramarz and Margolis [1999] and Margolis

[1] See Topel [1991], Murphy and Topel [1987].

[1996] improved strongly the methodology by showing empirical evidences from French data in favor of firm-specific seniority effects. One important finding is that a wage contract $(\phi, \gamma)$, where $\phi$ is the compensation at the beginning of the contract and $\gamma$ is the seniority coefficient over the life contract[2], should be indexed by firm and by cohort: $(\phi_{j,T}, \gamma_{j,T})$, where $j$ is a firm indicator and $T$ denotes cohorts. Our objective is to show how leverage by firm can explain part of the heterogeneity.

## 2.1 Theory

In the theory of human capital, firms and workers share the cost and the return of investment. Suppose for example that the worker bears the total cost of the investment (lower starting salary) and then gets the total return in his investment. If the firm faces a probability of bankruptcy then the return on the investment in human capital is risky and it becomes profitable for the worker and the firm to share this risk (implicit contract theory). This is the idea behind the work of Jaggia and Thakor [1994] who show that leverage weakens the force of long term contractual commitment by the firm and creates ex ante costs which are increasing with leverage. If the firm has to choose both capital structure and labor contracts, then we should observe firms with higher specificity having steeper tenure-earning profiles for their managers and lower debt-equity ratios. Titman [1984] proposed a similar model but applied to the relationship between a firm and its customers. He shows that if the firm's product is durable and requires future services such as parts and repairs, the customer is paying not only for ownership of the product but also for an expected future stream of services. Consequently customers must assess the probability of the firm bankruptcy in both their decision to purchase the durable good as well as the price they are willing to pay. In Jaggia and Thakor [1994] model, if a firm's labor force has acquired specific skills which cannot entirely be transferred to alternate employment, then workers bear costs if the firm goes bankrupt. Employees need to search for new jobs and learn new skills. We may identify this type of model as "asymmetric information with endogenous types."

In Dachraoui and Dionne [1997], labor contract and capital structure are determined simultaneously in a pure adverse selection model for the labor market and ex-post moral hazard for the financial market (debt with costly

[2] The notations are the same as in Abowd *et al.* [1999].

state verification). One finding is that the returns on seniority depends on information structure in the labor market. In fact they prove that when workers have private information about their ability, a long term contract with low wage at the beginning of the contract, associated with both a higher wage in the subsequent period and a predetermined risk of bankruptcy, is optimal since only high ability workers will accept such labor contract. The reason is that high ability workers are expected to produce more and hence the firm has less chance to be liquidated. This argument is true under the hypothesis that liquidation is associated with a job loss, which is a real cost since workers will have a lower alternative wage. The analogy can be made with models on deferred compensation (Becker, 1975), where the initial low wage period is called the period where a worker 'posts a bond'. This bond depends on ability which induces a *'self-selection'* from workers' side.

Dachraoui and Dionne [1997] have also shown that if firms and workers share the same information in the labor market, workers are offered higher wage at the beginning of the contract and the slope of wage over time is lower than under the asymmetrical information cases. The intuition is that the firm cannot use wage contracts as a strategy to discriminate over workers and the risk of liquidation is compensated by a higher initial wage leading to a lower return on seniority. In this environment only *spot* contracts are observed. The optimal labor contract offered, as well as workers' decision to join the firm, are independent of the capital structure of the firm. Formally the model proposed is the following:

We may observe two types of labor contracts; a pooling one that we denote $C_p$ and a separating one that we denote $C_s$. The expected payoff for the worker with $C_p$ is

$$E\left(C_p\right) = u_1 + u_2,$$

where $u_1$ and $u_2$ are the alternative wages in period one and two respectively. Note that under "symmetric information," this labor contract would be accepted by all kind of workers.

Under "adverse selection," separating labor contract offers a low payment in the first period and a higher wage in the second period. In expectation this contract offers

$$E_z\left(C_s\right) = u_2 + E\left(x/x > D,\ z > z^*\right),$$

where $z$ is the type (ability) of the worker, $x$ is the output, $D$ is the strategic debt face value of the firm, and $z^*$ is an endogenous variable of the firm's optimization problem[3]. As we can see from the previous equation

$$\frac{dE_z\left(C_s\right)}{dD}\begin{cases}\geq 0 \text{ if } z\geq z^* \\ \leq 0 \text{ if } z\leq z^*.\end{cases}$$

At the equilibrium only the workers of quality $z \geq z^*$ accept the offered labor contract, and then the expected payment is increasing in $D$.

Consequently we then have two new situations. One in which the firm offers a pooling contract and where the parameters of the labor contracts are independent of the firm's leverage. The second is a separating contract to the more qualified workers such that the tenure earning profile is increasing in the leverage of the firm.

The next table summarizes the three different testable predictions discussed previously:

Table 1

| Model | Predictions |
|---|---|
| Asymmetrical information and endogenous types (Jaggia and Thakor, 1994) | Low leverage, steeper tenure earning profile and a negative correlation between leverage and wage growth. |
| Adverse selection (Dachraoui and Dionne, 1997) | High leverage, steeper tennure earning profile and a positive correlation between leverage and wage growth. |
| Symmetric information (Dachraoui and Dionne, 1997) | Flatter tenure earning profile and zero correlation between leverage and wage growth |

## 2.2 Empirical model

In this section, we extend the model of Abowd, Kramarz and Margolis [1999] in order to take into account the leverage of the firms in the determination of the workers' compensation.

[3] $z^*$ is defined by

$$E\left(C_p\right)=E_{z^*}\left(C_s\right).$$

Abowd, Kramarz and Margolis [1999] used a sample of over one million French workers to extimate the compensation policies of the firms. The data includes individual's age, sex, location of job and occupation. Workers and employers were followed across years and each worker was assigned to the employer for which he has the largest number of paid days in a given year. The authors estimated this following specification among many others:

$$w_{i,t} = x_{it}\beta + \theta_i + \psi_{J(i,t)} + \varepsilon_{it}$$

where $w_{it}$ is the compensation of individual $i$, for time $t$, $x_{it}$ represents observed person-specific characteristics, $\theta_i$ is the time-invariant individual-effect and $\psi_{J(i,t)}$ is the firm effect at which the individual $i$ is employed at time $t$.

The firm effect was decomposed as

$$\psi_{J(i,t)} = \phi_{J(i,t)} + \gamma_{1J(i,t)} S_{J(i,t)} + \gamma_{2J(i,t)} T_1 \left( S_{J(i,t)} - 10 \right),$$

where $\phi_{J(i,t)}$ and $\gamma_{1J(i,t)}$ are parameters representing respectively the firm specific intercept and the seniority coefficient by firm to be estimated, $S_{J(i,t)}$ is individual $i$'s seniority at date $t$ in firm $J(i,t)$, $T_1(z)$ is a piece-wise polynomial function where $T_K(x) = 0$ when $x \leq 0$ and $T_K(x) = x^K$ when $x > 0$ and $\gamma_{2J(i,t)}$ is the coefficient for change in firm-specific seniority that occurs after ten years of seniority. The estimation method proposed by the authors allowed them to account for individual and firm specific intercept effects as well as for firm-specific returns to seniority.

The implication from the theory presented in the previous section is that compensation policies are strongly affected by leverage either because of the threat of bankruptcy (adverse selection) or because debt can help firms to become credible (endogenous types). In this section we are looking to test the existence and the way wage contract are affected by leverage. We study the regression of labor contract components as a function of firm's capital structure. Writing $J(i,t) \equiv j$ from now to simplify the notation, we will make the regression of starting compensation $(\phi_j)$ and the seniority coefficient by firm $(\gamma_j)$ over leverage ratio $\left(\frac{L_j}{V_j}\right)$ that have to be estimated. Our specifications are the following:

$$\begin{aligned} \phi_j &= \alpha_0 + \alpha_1 \left( \frac{L_j}{V_j} \right) + \Gamma_1 Y_j + u_j \qquad (1) \\ \gamma_j &= \beta_0 + \beta_1 \left( \frac{L_j}{V_j} \right) + \Gamma_2 Y_j + v_j, \end{aligned}$$

where $Y$ is a vector of firms characteristics and $\Gamma$ a vector of parameters. These characteristics[4] are the size of the firm (EFFEC) and the labor force composition (PING). In fact, in large firms a job entails team production or varied task so that an output index is difficult to implement. This difficulty creates incentives for life-cycle contracts that define payments scheme between workers and firms. At the same time in large firms, direct supervision is less effective than in small firms in which management is closer to the workforce. Consequently large firms are more likely to have higher starting compensations and lower sensivity effects. In small firms it is usually easier to monitor workers productivity and pay them according to their marginal product. The workforce composition has also an impact on the payment scheme since it is an indicator of the production procedure. Firms with more qualified workers should have higher starting compensations and higher seniority effect.

The direct estimation of the above two equations using ordinary least squares estimation would introduce an endogeneity bias since the financial structure of the firm and the labor contract can be chosen simultaneously. Under these circumstances, the Ordinary Least Squares regression produces inconsistent results. One way to avoid this problem is to use the Two-Stage Least Squares ($2SLS$) estimation method. The leverage ratio is replaced by the estimates obtained from the regression results in the next section. The new specification to be estimated is then,

$$\phi_j = \alpha_0 + \alpha_1 \widehat{\left(\frac{L_j}{V_j}\right)} + \Gamma_1 Y_j + u_j \tag{2}$$

$$\gamma_j = \beta_0 + \beta_1 \widehat{\left(\frac{L_j}{V_j}\right)} + \Gamma_2 Y_j + v_j, \tag{3}$$

Equations (2) and (3) can be estimated separately to see how firms leverage can affect wage contract components. A more natural way of estimating these equations is to pool the whole information in the sample and test the above equations as a single linear statistical model:

$$\begin{cases} \phi_j = \alpha_0 + \alpha_1 \widehat{\left(\frac{Lj}{Vj}\right)} + \Gamma_1 Y_j + u_j \\ \gamma_j = \beta_0 + \beta_1 \widehat{\left(\frac{Lj}{Vj}\right)} + \Gamma_2 Y_j + v_j. \end{cases} \tag{4}$$

[4] See next section for detailed definitions.

Given the matrix form that accommodates for the correlation that may exist between $u$ and $v$, we need a statistical model that will use this additional information and increase the level of sampling precision. In order to take into account both dependent regressors and cross-equation correlation of the errors we used the Three-Stage Least Squares ($3SLS$) procedure.

The error covariance matrix is estimated as:

$$\widehat{\sigma}_{uv} = \frac{u'v}{N} \tag{5}$$

where $u$ and $v$ are column vectors of the disturbance terms $u_j$ and $v_j$ respectively.

# 3 Determinants of capital structure

## 3.1 Data

The data set in this empirical work is similar to that of Abowd, Kramarz and Margolis [1999] in their analysis at the firm level. In this study we focus more on financial data. Some differences on the nature of the data set have to be mentioned: their number of firms is 14,717 for the period 1978-1988 while we have data on 10,824 firms for the period 1978-1992.

Another important difference concerns the utilization of the estimated values of the firm specific intercept ($\phi$) and the firm seniority slope effect ($\gamma$) obtained for their large sample of over one million of french workers. In their study they estimated these parameters to explain different relationships at the firm level between compensation policies and productivity and profitability, while we use them as dependent variables to explain the effect of firms leverage on compensation policies.

Our sample of 10,824 firms comes from the *entreprise* sample of INSEE (EE, Echantillon d'Entreprises). Details on the sampling procedure are presented in Section 4 in Abowd et *al.* [1999]. One important variable that can be used to yield a measure of leverage in taking into account of past financing decisions is the stock of capital. In the French accounting system, total capital is equal to total assets. The information was obtained from the Benefices Industriels et Commerciaux (BIC) of INSEE. We also obtained other statistical information from BIC: Net Operating Income, Net Benefits, Nonequity Liability, Total Full-Time Employment, Real Value Added, and Corporate Amortizement.

Our data set also contains information on employment structure in order to measure the effect of labor quality on leverage. Two variables were created from data in Enquête sur la Structure des Emplois (ESE): Proportion of engineers, technicians and managers in the work force and Proportion of skilled workers. Definitions of financial and employment variables and summary statistics are presented in Section 3.2.

## 3.2 Determinants of capital structure

As pointed out by Rajan and Zingales [1995] there is no unique measure of leverage and the chosen measure should depend on the objective of the analysis. In our case, we are interested to the interaction between capital structure and compensation policies in a long term relationship. Therefore we have chosen to use the broadest definition of leverage (nonequity liability over total capital) in order to take into account of the fact that, in France, current liabilities are particularly high which may effect compensation policies.

The value of this aggregate leverage ratio in our data set is 0.83 while it is equal to 0.78 in Rajan and Zingales [1995] (Table 3, page 1430) for their sample of 225 firms in France. As usual in this literature, these aggregates ratios were obtained by summing the numerator (nonequity liabilities) over all reported firms in the data set and dividing by the denominator (total assets or total capital) summed across the same firms. We have to point out that they differ from the average of the individual ratios $\left(\frac{L_j}{V_j}\right)$ as presented in Table 3 due to the aggregation method.

### 3.2.1 Theory of optimal capital structure

A traditional view in constructing a theory of optimal capital structure is to make a trade-off between the gain from leverage because of the tax deductibility of interest expenses and bankruptcy costs[5]. Even if these factors seem to affect capital structure, the use of debt for other motivations than taxes and bankruptcy costs remains a stylized fact. One explanation is that operations within firms or between firms and markets (input or output markets) are not like what the existence of a representative agent or perfect market would predict which leads to models with agency costs or signaling hypothesis. For

[5] Bankruptcy costs include models with human specific capital (Jaggia and Thakor, 1994) and those with transaction costs (reorganization costs, legal fees,...).

example, if financial markets are not perfect in the sense that market prices do not reflect all information, then it is possible that managers use financial policy decisions to convey information to the market (Ross, 1977). Capital structure can also be a strategy for the firm when competing in the product and input markets (Titman, 1984, Brander and Lewis, 1986). In models with agency costs (Jensen and Meckling, 1976, Diamond, 1989, Harris and Raviv, 1992), it is argued that the ownership structure of the firm may affect the probability distribution of cash flows. These models give rational for bond covenants that make restrictions on dividend payments or subsequent financing such as restrictions on the issuance of new debt.

Suppose now that firms' and workers' payoffs are the outcome of bilateral bargaining[6], then the issuance of debt can be profitable to the firm since it reduces the divisible surplus in the bargaining game by the amount of its face value, *ceteris paribus.* Rising debt is then Pareto improving in situations where investment is sunk since it lightens the underinvestment problem (see Dasgupta and Sengupta, 1993 and Bronars and Deere, 1991). In a model where the dynamic use of debt is allowed, Perotti and Spier [1993] show that altering the firm leverage is advantageous if the current earnings cannot cover senior obligations. Hart and Moore [1994] studied the link between the maturity of debt and the degree of assets intangibility (such as specific human capital). They showed how an increase in the degree of intangibility makes the debt longer term.

In a model where financial structure is a strategic firm's behavior towards the implementation of optimal labor contracts, Dachraoui and Dionne [1997] obtained that firms requiring workers with higher ability maintain higher leverage ratios than do comparable firms where ability is less relevant. One significant empirical prediction comes from the model. If workers have more information about their ability than the firm then the quit rates among workers assigned to tasks where the impact of ability is more important should be lower in high levered firms. At this stage we do not have information about quit rates to test directly this prediction. However, we can measure the firm's needs in terms of ability by using the percentage of engineers, technicians and managers in its work force. The reason is that those kinds of workers are usually assigned to tasks where the impact of ability is more important. We also have information for the proportion of skilled workers in the firm. These variables may also control for the specificity of the firm since

[6] See Abowd and Lemieux [1993] for supporting empirical evidences.

it may be costly for the firm to replace these inputs (Hart and Moore, 1994).

In summary, traditional predictions in the financial literature are that leverage is inversely related to the expected cost of financial distress, to the level of non-debt tax shields and to the variability of the firm value when the bankruptcy costs are high. These variations can be industry specific. In this study we add that leverage can be affected by the composition of employment structure under asymmetrical information in both markets.

### 3.2.2 Empirical model

We study the determinants of nonequity liabilities over total assets by estimating the following regression:

$$\begin{aligned}\frac{L_j}{V_j} &= \gamma_0 + \gamma_1 EFFEC_j + \gamma_2 PING_j + \gamma_3 POQA_j \\ &\quad + \gamma_4 RECO_j + + \gamma_5 VOLA_j + \gamma_6 PROF_j + \gamma_7 WW_j \\ &\quad + \gamma_8 ICA_j + \sum_j \alpha_j T_j + u_j, \end{aligned} \tag{6}$$

where $L_j$ is nonequity liability and $V_j$ is for total capital or total assets. Definitions of variables in equation (6) are presented in Table 2.

*ICA* is the amortizement of corporate immobilization. This variable may capture the specificity of physical capital in the sense that more specific capital has a higher rate of amortizement. Amortizement of corporate immobilization is also a measure of tangible assets that may serve as collateral. For this second effect, the predicted sign is negative since a higher *ICA* means less tangible assets. Finally, this variable may capture the effect of accelerated depreciation in order to reduce taxes, so the previous negative predictions should be reinforced. *PING* is the proportion of technicians, engineers and managers in the labor force, whereas *POQA* is that of skilled workers. These variables are proxies for specific human capital. Jaggia and Thakor [1994] predicted a negative sign for the effect of these variables on leverage while Dachraoui and Dionne [1997] predicted a positive sign, in a model with a strategic use of debt.

Other variables are introduced as proxies for the different attributes that the theory of capital structure suggest they may affect the firm's leverage[7].

[7] For other discussions see Titman and Wessels [1988] and Harris and Raviv [1992].

A first variable is rentability, measured by $RECO$, which is the ratio of net benefits plus financial fees net of tax shields to total assets. In fact rentability can be viewed as capital assets that can add value to the firm; this added value makes the agency cost in equity-controlled firms more important and then reduce leverage. Since part of this value is net of tax shields, this variable may also be a proxy of tax shields. However, there is no direct prediction for that effect since contradictory theories are proposed in the literature (Bradley et *al.*, 1984 and Smith and Watts, 1992). This ratio can also serve as a signal of the firm's performance to external investors. Another indicator is profitability (measured by $PROF$) since it seems that firms prefer rising capital first from retained income. Consequently, a negative sign is predicted for that variable. The size of the firm is measured by $EFFEC$ which has an ambiguous effect: large firms are more diversified and go bankruptcy less often so a positive effect is predicted. However, this variable may also be a proxy for agency problems and more equity may be preferred (Rajan and Zingales, 1995). In equation (6) we also control for the volatility of the firm ($VOLA$). In fact, as argued in Bradley et $al$. [1984] the greater the variability of the earnings, the greater the present value of leverage costs and hence the lower the optimal level of debt. The variable $WW$ measures the wage-profit sharing and accounts for negotiating power of workers against firms, and the greater this variable the greater is workers' benefits share. According to Dasgupta and Sengupta [1993] this variable should be positively correlated with leverage. However, we expect our estimate to be upward biased. In fact, Abowd [1989] finds that an unexpected increase in union rents decreases equity by the same amount.

Equation (6) contains dummy variables for industry classification ($T_j$) in order to control for industry effect on leverage. Titman [1984] shows that industries where products are durable and require future services such that parts and repair have higher bankruptcy costs which reduce leverage. Bradley et $al$. [1984] have shown that there is more variation in mean leverage ratios across industries than within industries. The industry classification will also be used in interaction with $PING$ and $POQA$ in order to isolate the effects of these variables from the industry effect. In Table 3 we report descriptive statistics of the data.

Table 2
Variables Definition

| | |
|---|---|
| $\frac{L}{V}$ | The ratio of nonequity liability over total capital. It is obtained by summing the numerator over1978-92 for each firm and devinding by the sum of total capital over the same period. |
| *EFFEC* | Total full-time employment in thousands. |
| *PING* | Proportion of engineers, technicians and managers in *EFFEC.* |
| *POQA* | Proportion of skilled workers in *EFFEC.* |
| *RECO* | Ratio of net benefits plus financial fees net of tax shields to total assets. |
| *VOLA* | Standard deviation of the first difference in net operating income over the period 1978-92 devided by the average value of total assets over the same period. |
| *PROF* | Net operating income net of financial fees net of dividends net of amortizement over total assets. |
| *WW* | Operating income over the real value added inclusive of labor cost. |
| *ICA* | Total amortizement of corporate immobilization over total assets. |
| *T* | Dummy variable for industry. |

Notes: PING corresponds to categories 37 and 38 and POQA corresponds to categories 52-65 in the PCS ( Professions et Catégories Socioprofessionelles).

Table 3
Mean and Standard Deviation of Variables

| Variable | Mean | Standard Deviation |
|---|---|---|
| $\frac{L}{V}$ | 0.773 | 0.185 |
| $EFFEC$ | 0.395 | 1.716 |
| $PING$ | 0.248 | 0.187 |
| $POQA$ | 0.466 | 0.240 |
| $RECO$ | 0.25 | 5.99 |
| $VOLA$ | 0.125 | 0.453 |
| $PROF$ | 0.08 | 0.103 |
| $WW$ | 1.236 | 1.605 |
| $ICA$ | 0.05 | 0.107 |
| Number of observations | $10,824$ | |

## 3.3 Estimation results

Table 4 shows the estimates from equation (6). The first column reports the $OLS$ estimation of the equation. In the second column we added interaction terms between industry classification and the proportion of engineers, technicians and managers. Those with skilled workers were not significant, so they are not reported. We are then able to relax the assumption that labor force composition has the same effect on leverage across industries. Empirical evidences from the two regressions are in favor of theoretical predictions.

In the first regression we found that the composition of the work force has a direct impact on leverage. In fact, we observe that the proportion of managers, engineers and technicians is negatively correlated to leverage. Once we add the interactions terms to the regression the coefficient of skilled workers ($POQA$) remains non significant while that of the proportion of managers, technicians and engineers ($PING$) remains significant with a higher coefficient (in absolute value). The negative correlation may confirm that firms with more human specific capital use less debt in their financial decisions as argued in Jaggia and Thakor [1994].

Volatility *(VOLA)* has the predicted sign meaning that higher volatility implies higher expected value of bankruptcy costs and lower leverage. $PROF$

has a negative sign implying that firms use internal cash-flow to finance their investment projects because this is the cheapest source of funds. *RECO* has a positive sign but the coefficient is very weak. *ICA* has a negative sign which is consistent with both the tangible asset and the tax predictions while *WW* has a positive sign in accordance with the prediction of Dasgupta and Sengupta [1993] on the negotiation power of workers. Finally the size effect *(EFFEC)* has a negative sign taking into account of the fact that larger firms have lower expected bankruptcy costs.

Table 4
Results of Nonequity Liabilities to Capital Ratios Estimates

| Independent Variable | Coefficient ($t$-statistic) | Coefficient ($t$-statistic) |
|---|---|---|
| *Intercept* | 0.798 (72.656) | 0.827 (47.439) |
| *EFFEC* | −0.003 (−3.665) | −0.003 (−3.645) |
| *PING* | −0.115 (−11.651) | −0.294 (−3.828) |
| *POQA* | −0.006 (−0.800) | 0.001 (0.199) |
| *VOLA* | −0.013 (−3.392) | −0.013 (−3.487) |
| *RECO* | 0.0006 (1.912) | 0.0006 (1.843) |
| *PROF* | −0.115 (−6.863) | −0.123 (−7.306) |
| *WW* | 0.007 (6.482) | 0.007 (6.346) |
| *ICA* | −0.003 (−2.385) | −0.003 (−2.295) |
| Other Food Industries (T03) | −0.023 (−1.723) | 0.015 (0.678) |
| Electricity and Gas Production (T06) | −0.234 (−7.769) | −0.289 (−4.107) |
| Iron and Steel Primary Manufring (T07) | −0.079 (−3.366) | −0.147 (−2.415) |
| Nonferrous Metal Manufacturing (T08) | −0.125 (−4.557) | −0.110 (−1.884) |
| Building Materials Production (T09) | −0.092 (−5.846) | −0.120 (−3.472) |
| Glass Production (T10) | −0.119 (−4.736) | −0.199 (−3.097) |
| Basic Chemical Production (T11) | −0.104 (−5.280) | −0.200 (−4.197) |
| Pharmaceuticals (T12) | −0.055 (−3.694) | −0.155 (−4.667) |
| Foundries and Intermediate Steel (T13) | −0.021 (−1.747) | −0.054 (−2.357) |
| Heavy Equipement Manufacturing (T14) | −0.017 (−1.421) | −0.090 (−4.123) |
| Electronics and Electrical Equipment (T15) | −0.002 (−2.207) | −0.085 (−3.724) |

| Independent Variables | Coefficient (*t*-statistic) | Coefficient (*t*-statistic) |
|---|---|---|
| Automobile Manufacturing (T16) | −0.037 (−2.376) | −0.074 (−2.275) |
| Ship and Space Manufacturing (T17) | 0.023 (0.976) | −0.055 (−1.224) |
| Textiles and Apparel (T18) | −0.046 (−3.814) | −0.057 (−2.763) |
| Leather and Shoe Manufacturing (T19) | −0.070 (−3.977) | −0.127 (−3.988) |
| Wood and Fourniture Products (T20) | −0.038 (−2.895) | −0.052 (−2.180) |
| Paper and Paper Products (T21) | −0.058 (−3.448) | −0.138 (−3.537) |
| Printing and Publishing (T22) | −0.007 (−0.498) | −0.072 (−2.991) |
| Rubber and Plastic Manufactring (T23) | −0.032 (−2.174) | −0.047 (−1.641) |
| Construction and Building (T24) | 0.073 (6.044) | 0.055 (2.580) |
| Wholesale Food (T25) | 0.045 (4.349) | 0.021 (1.200) |
| Automobile Repair and Sales (T29) | 0.071 (4.991) | 0.0626 (1.999) |
| Hotels, Restaurants, and Cafés (T30) | 0.016 (1.034) | 0.057 (2.068) |
| Transportation Services (T31) | 0.025 (2.009) | 0.007 (0.353) |
| Telecommunication and Postal Sevices (T32) | 0.073 (1.075) | 0.046 (0.468) |
| Business Services (T33) | 0.045 (3.698) | −0.007 (−0.388) |
| Household Services (T34) | 0.021 (1.681) | 0.012 (0.625) |
| Real Estate (T35) | −0.034 (−0.896) | −0.079 (−1.202) |
| Insurance (T36) | −0.544 (−25.870) | −0.686 (−12.419) |
| Financial Service (T37) | 0.204 (14.111) | 0.103 (3.031) |
| *PING**T11 | | 0.368 (2.541) |
| *PING**T12 | | 0.345 (3.455) |
| *PING**T14 | | 0.330 (3.708) |
| *PING**T15 | | 0.257 (2.974) |

| Independent Variables | Coefficient ($t$-statistic) | Coefficient ($t$-statistic) |
|---|---|---|
| *PING**T17 | | 0.326 (2.352) |
| *PING**T19 | | 0.358 (2.056) |
| *PING**T21 | | 0.436 (2.287) |
| *PING**T22 | | 0.290 (3.221) |
| *PING**T30 | | −0.286 (−2.094) |
| *PING**T33 | | 0.234 (2.932) |
| *PING**T36 | | 0.389 (3.213) |
| *PING**T37 | | 0.326 (3.336) |
| $F$-statistics | 62.757 | 37.230 |
| $R$-square | 18.51% | 19.48% |
| $n$ =10,824 | | |

Notes:
1-Non reported coefficients in column 3 are not significant.
2-Meat and Milk Products (T02) is the omitted industry, and *PING**T02 is the omitted interaction category.

# 4 Estimation of the compensation equation

Estimates of system (4) are given in Table 7. They show that firms leverage affects positively and significantly the returns to seniority coefficient ($\gamma$) within firms while the effect on the starting compensation ($\phi$) is negative significant. These evidences indicate that more levered firms hiring workers pay a lower starting wage and a promise of higher growth in wage for the future. A theoretical model that accommodates for these findings is that of Dachraoui and Dionne [1997] who show that debt can be a strategy for the firm in order to create a self selection entry by workers. This result contrasts with that of Jaggia and Thakor [1994] prediction. As discussed in Section 2.1 a negative sign is predicted by their model for the relationship between firms leverage and returns to seniority or wage growth.

In Tables 8, 9 and 10 we report estimates of equation (4) for random subsamples. The results added for sick of robustness goes in the same direction as for the effect of predicted leverage on wage contracting on the whole sample.

The covariance matrix of the dependent variables ($\phi$ and $\gamma$) and that of the predicted values for the wage contracting show that controlling for firms leverage reduces the correlation of starting salary and returns to seniority from -0.630 to -0.335 (Table 11) witch indicates that leverage is responsible in a big part for the trade-off between wage at the beginning of the contract and the future compensation, no matter the approach we take. Table 11 also indicates that the standard deviation of the predicted value for $\phi$ dropped from 0.096 to 0.006, while that of $\gamma$ dropped from 0.044 to 0.002 confirming again the information power of the ratio of nonequity liability to total capital to explain workers' compensation.

Table 7
Estimates, the whole sample
10824 observations

| Parameter | Intercept | $\frac{L}{V}$ | *EFFEC* | *PING* |
|---|---|---|---|---|
| Estimates:$\phi$-equation (*t-statistics*) | 0.004 (1.03) | $-0.024$ ($-4.56$) | 0.002 (3.96) | 0.013 (2.49) |
| Estimates:$\gamma$-equation (*t-statistics*) | $-0.006$ ($-3.00$) | 0.006 (2.77) | $-0.0004$ ($-1.80$) | 0.008 (3.41) |

Table 8
Estimates, subsample 1
7000 observations

| Parameter | Intercept | *RATIO* | *EFFEC* | *PING* |
|---|---|---|---|---|
| Estimates: $\phi$-equation ($t$-*statistics*) | 0.012 (1.85) | $-0.024$ ($-3.04$) | 0.001 (2.65) | 0.009 (1.09) |
| Estimates: $\gamma$-equation ($t$-*statistics*) | $-0.004$ ($-2.21$) | 0.005 (2.00) | $-0.0002$ ($-1.31$) | 0.008 (3.18) |

Table 9
Estimates, subsample 2
6000 observations

| Parameter | Intercept | *RATIO* | *EFFEC* | *PING* |
|---|---|---|---|---|
| Estimates: $\phi$-equation ($t$-*statistics*) | 0.004 (0.73) | $-0.025$ ($-3.80$) | 0.003 (3.97) | 0.019 (2.98) |
| Estimates: $\gamma$-equation ($t$-*statistics*) | $-0.007$ ($-2.67$) | 0.008 (2.32) | $-0.0007$ ($-1.79$) | 0.008 (2.41) |

Table 10
Estimates, subsample 3
5000 observations

| Parameter | Intercept | *RATIO* | *EFFEC* | *PING* |
|---|---|---|---|---|
| Estimates: $\phi$-equation ($t$-*statistics*) | $-0.0006$ ($-0.09$) | $-0.026$ ($-3.20$) | 0.007 (3.64) | 0.025 (3.47) |
| Estimates: $\gamma$-equation ($t$-*statistics*) | $-0.01$ ($-2.36$) | 0.012 (2.34) | $-0.003$ ($-2.66$) | 0.01 (2.34) |

Table 11
Summary Statistics from the Covariance Matrix

| | Without controlling for leverage | Controlling for leverage |
|---|---|---|
| $\sigma_u$ | 0.096 | 0.006 |
| $\sigma_v$ | 0.044 | 0.002 |
| $\sigma_{uv}$ | -0.630 | -0.335 |
| | $n = 10,824$ | |

# 5 Conclusion

In this study we put the emphasis on information problems in financial and labor market. We tested a linkage between labor and financial markets that may be explained by lack of perfect information in both markets. This interaction was done in two ways. First, we have shown that the composition of the labor force within a firm affects its capital structure. In fact, every things being equal, firms with more managers, engineers and technicians use less debt in their capital structure than do other comparable firms. Second, we focused on the effect of firms leverage level on compensation policies, and found that more levered firms offer a lower starting wage and a higher returns to seniority. We also found that leverage accounts for a big part of the heterogeneity in compensation policies across firms. Specifically, we showed that leverage explains a part of the trade-off between starting wage and wage growth.

The implication from our empirical evidences is a strong interaction between the financial market and the labor market. This result cannot been obtained in markets without distortion and so needs to be supported by strong asymmetrical information in both markets (see also Ravid, 1988 and Dionne et *al*., 1997 for similar conclusions). It also indicates that financial variables of the firm are important to understand the structure of labor contracts and must be taken into account by the various participants to these markets, particularly the workers with specific human capital.

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