Risk Sharing and the Rise in Firm Level Uncertainty Real Effects of Growing Foreign and Institutional Ownership*

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Abstract

This paper posits that firms can choose the degree of risk inherent to their technological / marketing / organisational strategies. Financial markets development, by improving risk sharing between firms listed on the stockmarket and investors, increases the willingness of firms to take risky bets. This in turn rises firm level uncertainty in sales, employment and profits. In equilibrium, this effect diffuses to non listed firms, a group not directly involved in risk sharing. The effect is larger when competition increases, and when labor market institutions are flexible.

This paper thus provides a finance based rationale for the increase of firm level uncertainty that has recently been documented in France and the US. We then use the French stockmarket reforms of the late 1980s to test our predictions, using listed firms as the treated group and privately held firms as a control group. Consistently with our model's testable predictions, we find that (1) for listed firms, firm sales volatility has increased markedly after the reforms (2) this effect is stronger where product market competition is the strongest. Such evidence holds in front of various robustness checks.

1 Introduction

This paper argues that financial markets development promotes a pervasive rise in firm level uncertainty. Theoretically, we focus on the role of risk sharing among investors. Financial globalization and Stockmarkets' developments, by broadening the pool of potential investors, promote risk sharing within the economy; this enables the firms listed on the stock exchange to adopt more profitable and riskier strategies. But in equilibrium, *all* firms compete on the labor and product markets. In order to maintain their market shares in front of more aggressive listed firms, non listed firms are induced to bear more risk as well. The overall result is a pervasive increase in sales volatility and labor market reallocations, amplified by the extent of product market competition. We then find supportive empirical evidence for our theory on looking at French data, using the 1984-1990 stockmarket's reform as an

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experiment. This event is interesting because it permitted a significant improvement of risk sharing among French investors themselves, and also between French and foreign investors.

Since the 1970s, many developed economies experienced a drastic development of their financial markets which led to a more diversified pool of equityholders (see figure 1 for the US, the UK and France). Financial globalization, unleashed capital flows, technological and institutional stockmarket innovations, and a mix of socio-demographic factors made the average investor has become more and more diversified over years. In the US, the dominant post war trend has been the rising institutionalization of equity ownership[1] (Friedman [1996]): the share of outstanding equity directly held by households has declined from over 90% in 1950 to about 50% in the mid 1990s; pension and mutual funds, who are sophisticated and diversified investors, have progressively replaced households as the real owners of corporate America. In France, the main stockmarket evolutions occurred in the mid 1980s, as the state sought ways to finance its debt and help firms to raise much needed equity capital. Within a few years, capital controls were lifted, the Paris stock brokers' monopoly was dismantled, tax incentives were provided to equity investors and stock issues were made simpler. This resulted in a massive increase in the number of shareholders, as well as a sharp rise of institutional investors presence, both domestic and foreign, on the French stock market (see section 5.1 of this paper).

This paper proposes a new form of interaction between financial and product markets. In our model, the emergence of diversified shareholders encourages the adoption by listed firms of riskier business strategies but whose profits are larger on average. This direct effect comes, however, with an *indirect* effect that appears in general equilibrium and affects *both* listed and non listed firms. By adopting more ambitious strategies, listed firms gain market shares from each other and from privately held firms. To recover their profits, all firms choose to increase the size of their project, at the expense of more risk taking. Hence, the rise in firm level uncertainty is pervasive and goes beyond those firms directly involved in risk sharing (listed firms here). Secondly, we show that product market competition enhances this diffusion effect, and therefore amplifies the effect of stockmarket development.

Two of the predictions of our model are easily testable: (1) compared to privately held firms, the uncertainty borne by listed firms should increase more following financial development; (2) this effect should be stronger when product market competition is tougher. We use the 1984-1990 French stockmarket reforms as an experiment with which we test these predictions. We have a panel of large firms over the 1984-1999 period, which we break down into listed and non listed firms. We argue that shareholders of listed firms have become more and more diversified over the period, while this trend has been much less marked among privately held firms. We then measure firm level uncertainty as the elasticity of own sales to industry sales shocks. We first show that listed firms become more sensitive to industry shocks after liberalization, much more so than privately held firms. This result is

[1] This trend is partly due to demographic factors that have gained momentum in the 1970s: the baby boom cohorts started to accumulate for retirement and they planned to live longer on their pensions. In addition, some categories of workers who were not saving for their pensions before - like women - started to do so (Mitchell [1999]). This propped up the demand for equity through funds. Secondly, defined contribution retirement plans, with a bias toward equity, were given a favorable tax treatment when the 1978 ERISA law was enacted.

robust to numerous checks. Then, we show that most of the effect occurs in industry where traditional measures of product market competition are high. Last, we show that this result is not driven by the firms taking part to foreign product market (not a globalization effect), nor by the subset of very large firms listed in the main stockmarket index.

We view this paper as a contribution to both the finance and labor literatures. In a celebrated paper, Campbell, Lettau, Malkiel and Xu (2000) have shown that the idiosyncratic volatility of stock returns has sharply increased over the past decades. This could partly reflect the fact that listing costs have sharply decreased over the period allowing younger but more risky firms to list on stockmarkets (the NASDAQ was created in 1971). But as shown by Pastor and Veronesi [2002] and Malkiel and Xu [2001], this line of explanation cannot account for the full rise in idiosyncratic volatility. Alternatively Morck, Yeung and Yu [2000] argue that the US financial markets have become more efficient, such that investors use more firm specific information, and less industry level information when they trade; hence, stock returns become less correlated. However, as Wei and Zhang [2003] point out, such a statement ignores the causes of the increase in the absolute level of idiosyncratic volatility. In contrast to this "pure finance" view, some very recent contributions (Wei and Zhang [2003], Pastor and Veronesi [2002]) suggest that the rise in stock returns volatility is in fact driven by real effects since it seems that firms' real profits became more uncertain.[2] Our paper contributes to this literature by providing an explanation for this increase in idiosyncratic volatility of real profits.

This paper also contributes to the macro-labor literature on the rise in labor market insecurity. This literature suggests that the increased dispersion of wages is in great part due to an increased dispersion of the transitory component of wages (see for example Gottshalk and Moffit [1994], Haider [1999] for the US, Blundell and Preston [1998], and Dickens [2000] for the UK). No such evidence is available for continental Europe, but there is evidence of rising job insecurity, instead of wage uncertainty (Givord and Maurin [2004]).

Overall, a natural candidate for the rise in the volatility of both returns to capital and labor is the rise of firm level uncertainty.[3] Our explanation of this trend puts finance at the centre: new, diversified, investors value more volatile returns, and this explains the rise in real, firm level, uncertainty. Hence, we claim that technical change might not be the sole driving force behind the past rise in firm level uncertainty and wage inequality (in English speaking countries) or unemployment (in continental Europe).

Some papers have been investigating the changing relations between capital and labor, but it had

[2]Two empirical facts support this view: (1) the volatility of firm's profitability has increased over the past three decades, and (2) the volatility of profitability is strongly correlated with stock price uncertainty in cross section empirical analyzis.

[3]Thus far, the evidence for such a trend is sparse, but convincing: Chaney, Gabaix and Philippon [2001] have documented a rise in the volatility in total sales for American listed firms from COMPUSTAT. This upward trend is strong whether the variance of sales growth is computed cross sectionnally (growth dispersion across firms in a same year), or in the time dimension using quarterly accounts (variance of sales growth at the firm level, for 20 consecutive quarters). Focusing again on COMPUSTAT firms, Pastor and Versonesi [2002], and Wei and Zhang [2003] find that the volatility of US firms' return on equity has shown a strong upward trend over the past thirty years.

mostly focused on changes in the balance of power between workers and capitalists.[4] This literature is thus silent on the rise in wage inequality and instability that took place over the past decades. To tackle this issue, this paper takes another, complementary, approach: central to our view of finance is that it allows to share risk, not that it affects the sharing rule between labor and capital. In doing this, we rely on an insight already emphasized in the development literature: diversified owners are more likely to accept corporate risk. This is the reason why a sound financial industry may be a key engine of growth (Greenwood and Jovanovic [1990], Saint Paul [1993]) and why development might be a virtuous circle (Acemoglu and Zilibotti [1997]).[5]

The next section lays out the model, section 3 solves it and section 4 draws the main predictions. Section 5 brings some of these predictions to the test and section 6 concludes.

2 The Model

We consider a static economy endowed with L risk-averse workers. There are three markets: the financial market, the labor market and the product market on which n firms compete imperfectly. These firms are initially owned by some workers that we call entrepreneurs. Among these firms, a share μ_L is listed on the stockmarket while the remaining share μ_P is privately held. For the moment we assume n, μ_L and μ_P to be exogenously fixed.

The sequence of events is broken down into three periods. At date 1, each entrepreneur (whether her firm is public or private) chooses a strategy indexed by $0 \leq s \leq 1$. A strategy defines both the mean and the variance of the demand addressed to the firm, and we assume that a larger average demand comes at the expense of more uncertainty. While this trade-off can be interpreted in many ways, we will hereafter refer to it as an aspect of the marketing policy of the firm: the degree of product customization. Under this interpretation, selling standardized products allows firms to face a low and safe demand, while selling a highly customized good means a potentially high, but uncertain demand. At date 2, the financial market clears and risk sharing takes place: $\mu_L n$ entrepreneurs sell the shares of their firms to investors. At date 3, demand uncertainty is revealed and production takes place; the product and labor markets clear; the savers obtain the earnings from the securities they hold; everyone consumes.

[4] Along these lines, a small literature had emerged after the 1980s wave of LBOs and MBOs in the US, whose main argument was that the use of debt allowed firm owners to extract more rent from the workers (Bronars and Deere [1991], Perotti and Spier [1993], Ichino [1994]). More recently, Blanchard and Philippon [2004] have argued that the rising cross border capital mobility has weakened the unions' bargaining power in the 1980s; in countries where unions did not acknowledge it, unemployment shot up as a result. Closer to our approach is Perrotti and Von Thadden [2003]'s analysis of the political economy of bank versus market based finance: in their model, the median voter will be biased toward bank dominance, because this is a guarantee that firm will seek stable, but less profitable, markets.

[5] This very same insight has also been applied in the area of international macroeconomics, where the main line of argument is that international capital mobility allows to take full advantage of international trade. The reason is that ricardian specialization is risky for members of a single countries if they cannot diverisify part of their income by buying claims contingent on the output of other countries (Helpman and Razin [1978], Obstfeld [1994]). The relation between capital flows and specialization has recently been tested by Kalemli-Ozcan, Sorensen and Yosha [2000].

2.1 Demand Side

Each agent $k \in (0, L)$ in the economy has a CARA utility

$$U_k = -e^{-aC_k} \tag{1}$$

where C_k is a consumption index which depends on the consumption levels $y_{k,i}$ of the n different goods i which are produced under monopolistic competition. The consumption index is given by the usual Dixit Stiglitz formulation:

$$C_k = \left(\sum_{j=0}^{n} (1 + \tilde{\delta}_i)^{\frac{1}{\sigma}} . y_{k,i}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \tag{2}$$

where we assume n to be large and $\sigma \geq 2$. The difference with the standard Dixit Stiglitz framework is that consumers experience taste shocks, modelled by random coefficients $\tilde{\delta}_i$. These shocks are the *only* source of uncertainty in the model and for the sake of simplicity we will assume that they are small and Gaussian.[6] The $\tilde{\delta}_i$'s are assumed to be good-specific, small and uncorrelated: hence all agents k experience the same taste shocks on the good i. This extreme form of correlation structure is not necessary; what matters here is that there is some scope for risk sharing among entrepreneurs. Finally the specific mean-variance profile of the taste shock $\tilde{\delta}_i$ is a choice variable of the firm i (cf. infra). Obviously, the standard Dixit-Stiglitz framework correspond to $\tilde{\delta}_i = 0$.

Given these assumptions about preferences, the total demand y_i addressed to each industry i, can be easily derived by aggregating the individual demand functions $y_{k,i}$ over the whole population $k \in (0, L)$:

$$y_i = (1 + \tilde{\delta}_i) . \frac{E}{P} . (\frac{p_i}{P})^{-\sigma} \tag{3}$$

where p_i is the price charged by the monopoly producing the good i, $E \equiv \sum_0^L E_k$ is the aggregate nominal expenditure and P is a price index equal to:

$$P \equiv \left(\sum_{j=0}^{n} (1 + \tilde{\delta}_j) . p_j^{1-\sigma} \right)^{1/1-\sigma} \tag{4}$$

2.2 The Strategy: Standardization vs Customization

Each good i is produced by a monopoly owned by an entrepreneur. At date 1, the entrepreneur chooses her marketing strategy $0 \leq s \leq 1$; this choice impacts the distribution of demand shocks $\tilde{\delta}_i$ that the firm experiences at date 3. We posit that the demand shock is drawn from a Gaussian distribution with mean s and variance Σs^2 :

$$\tilde{\delta}_i \sim N(s, \Sigma s^2) \tag{5}$$

[6] Rigorously speaking $\widetilde{\delta_i}$ is drawn in a *truncated* gaussian law of shock since the demand $1+\widetilde{\delta}$ has to be always positive. However $\widetilde{\delta_i}$ is assumed to be small such that we can ignore the fact that this gaussian law is truncated on the left tail. This simplifies exposition without affecting the main insights of the model.

While such strategies could receive many alternative interpretations, we will refer to the choice of s as the "marketing policy"[7]. Under this interpretation, $s = 0$ can be thought of as the design of a standardized good whose market demand is fully safe but remains small. On the contrary, $s = 1$ corresponds to the design of a fully customized, potentially highly valuable, good but whose demand is difficult to predict because of erratic trends and fashions. Hereafter, we call s the degree of *customization*. Interpreting the reduced form [5] this way is close to Piore and Sabel [1984]'s vision of modern manufacturing. Their basic line of argument was that the targeting of uncertain product niches was to be the hallmark of the third industrial revolution, because of excess competition and insufficient demand for standardized goods. The development of new, flexible, production technologies was to be key in fostering the "second industrial divide", where firms would have to evolve in more uncertain environment. In order to cope with this changes, firms would have to adopt more flexible, skilled intensive organizations. These organizations share common feature with the dominant production mode of the XIXth century, *craft production*. Piore and Sabel describe industrial districts of small, cooperating, reactive firms (like Boston's route 128) as epitomizing how production should be structured after the "second industrial divide". Twenty years later, it is unclear whether new craft production has become the dominant organizational paradigm, but casual empiricism suggests that firms now operate on more uncertain markets, that reactivity matter, and that product marketing has become much more important than ever (on this see e.g. Askenazy, Thesmar and Thoenig [2004]).

Finally, whatever the choice of s, each firm exploits a constant return to scale technology; it uses labor l paid at a wage w to produce:

$$y = l \tag{6}$$

2.3 The Financial Market

The $\mu_L n$ entrepreneurs who own a listed corporation may sell equity (claims of their firms' profits) on the financial market. The pool of investors consists of an exogenous number $\phi L < L$ of agents that are given access to security trading on a domestic financial market. To make analysis tractable, we follow Pagano [1993] and assume that these agents are also given the right to borrow or buy an infinite amount of savings from international capital markets at a given risk free rate R.

The financial market allows to trade two types of securities. First, it allows the ϕL investors to issue bonds at the exogenous risk free rate R: hence there is no restriction on short sales or borrowing, like in Pagano [1993]. Second, claims on listed firms' profits can be sold by entrepreneurs, and bought by investors with access to the financial markets. These securities give to their holders a right to a fraction of profits. In the following, we use for these securities the labels "equity" or "shares" interchangeably, although the exercise of control rights usually attached to the possession of equity is not explicitly modelled here. In addition, entrepreneurs do not need external capital to produce. Hence, in this model, the sole role of financial markets is to share risk.

[7] This trade-off and its interpretation in term of customization is also analyzed (but in a very different context) by Benabou (2003).

Given our assumptions, there are ϕL investors on the demand side of the stockmarket. On the supply side, there are $\mu_L n$ firms going public. In the rest of the analysis, we interpret ϕ as the *degree of risk sharing* within the economy.

3 Basic Results

We solve the model by backward induction. At period 3, after observing its idiosyncratic demand shock $\tilde{\delta}$, each firm maximizes its own monopoly profit. At period 2, trade of financial assets takes place: listed firms sell shares to the pool of ϕL investors, who can themselves issue perfectly safe bonds bearing interest R. At period 1, both listed and privately held firms choose their degree of customization s.

3.1 Firm Profits

At date 3, after the idiosyncratic demand shock $\tilde{\delta}$ is revealed, each entrepreneur chooses the amount of production in order to maximize her monopoly profit:[8]

$$\tilde{\pi} = \max_{l}(1+\tilde{\delta})^{1/\sigma}.(P^{\sigma-1}E)^{1/\sigma}l^{\frac{\sigma-1}{\sigma}} - wl \tag{7}$$

which depends on demand shock $\tilde{\delta}$. Solving this maximization problem gives the following reduced form for the firm's profits:

$$\tilde{\pi} = (1+\tilde{\delta}).\underbrace{\frac{(\sigma-1)^{\sigma-1}}{\sigma^{\sigma}}.\left(\frac{P}{w}\right)^{\sigma}.\frac{E}{P}}_{\equiv\pi_0} \tag{8}$$

where π_0 corresponds to the profits of a fully standardized firm (ie. with no uncertainty):

Given the mean-variance trade-off [5], the mean and variance of the firm's profits are increasing in s and are given by:

$$\begin{cases} E\tilde{\pi}(s) = (1+s).\pi_0 \\ VAR\tilde{\pi}(s) = \Sigma s^2.\pi_0^2 \end{cases} \tag{9}$$

In this set-up, a risk neutral firm owner would always choose the largest s; what prevents it to happen is that owners are risk averse.

3.2 Risk Sharing On The Stockmarket

In this section we derive the equilibrium price level of shares sold by listed firms at period 2. As entrepreneurs are risk averse, they gain from being listed because the sale price of their firm is larger than the utility they would derive from holding it: financial markets enable entrepreneurs to share risk with the investors.

Portfolio Selection by Investors

[8] We assume that, even when the firm is widely held, there are no agency costs of separation of ownership and control

On the supply side there are $\mu_L n$ listed firms, indexed by j; each one issuing a measure 1 of shares. Each share j is traded at price ρ_j. On the demand side there are ϕL investors, indexed by k: each one borrows on international market b_k units of savings at rate R in order to buy x_{kj} shares of each firm j. Investor k's budget constraint thus writes as:

$$\sum_{j=0}^{\mu_L n} x_{kj}\rho_j \leqslant b_k \tag{10}$$

Her ex post consumption is equal to the labor and net financial incomes taken in real terms:

$$\tilde{C}_k = \frac{w}{P} + \frac{1}{P}\left[\sum_{j=0}^{\mu_L n} x_{kj}\widetilde{\pi}_j - (1+R)b_k\right]$$

Plugging back the budget constraint [10] into the consumption expression leads to:

$$\tilde{C}_k = \frac{1}{P}.\left[\sum_{0}^{\mu_L n} x_{kj}\left(\widetilde{\pi}_j - \rho_j R\right) + w\right] \tag{11}$$

The program of investor k consists of maximizing her expected CARA utility [1] with respect to her portfolio $\{x_{kj}\}_{j=0}^{\mu_L n}$, taking equity prices ρ_j, the risk free rate R and ex post deterministic wage w as given. As the $\tilde{\delta}$ demand shocks are gaussian, so are the profits $\tilde{\pi}_j$ and therefore the consumption level $\tilde{C}_k$. As it is standard in such a CARA -gaussian framework, solving this investor's problem amounts to maximizing the following mean-variance criterion:

$$\max_{\{x_{kj}\}_{j\in(0,\mu_L n)}} \quad \frac{w}{P} + \sum_{j=0}^{\mu_L n}\left[x_{kj}\frac{E\tilde{\pi}(s_j) - \rho_j R}{P} - \frac{a}{2}\frac{x_{kj}^2.VAR\tilde{\pi}(s_j)}{P^2}\right] \tag{12}$$

Given the quadratic forms, the problem is well defined and demand for share j by investor k is given by:

$$x_{kj} = P.\left\{\frac{E\tilde{\pi}(s_j) - R\rho_j}{a.VAR\tilde{\pi}(s_j)}\right\} \tag{13}$$

where $E\tilde{\pi}(s_j)$ and $VAR(\tilde{\pi}(s_j))$ as functions of s_j are given by equations [9]. Demand for risky asset j is a decreasing function of risk aversion a, its risk $VAR(\tilde{\pi}(s_j))$ and of its price ρ_j. It is, of course, an increasing function of its expected return $E\tilde{\pi}(s_j)$.

Equilibrium on the Stockmarket

We assume that entrepreneurs taking their firms to the public do not behave like monopolies when they supply securities to the stockmarket.[9] The price of their firm is therefore taken as given and lies at the intersection of the demand and supply curves of share of firm j. X_j^d is the aggregate demand for shares j and can be easily obtained through adding individual demands given by [13] for all ϕL investors:

$$X_j^d = \phi L.P.\left\{\frac{E\tilde{\pi}(s_j) - R\rho_j}{a.VAR\tilde{\pi}(s_j)}\right\}$$

[9] This assumption allows us to suppress an unwanted market imperfection, but does not affect our qualitative results.

As the overall supply of shares is equal to one, we get that in equilibrium:

$$\rho_j = \frac{1}{R}\left\{E\tilde{\pi}(s_j) - \frac{a}{\phi L}\frac{VAR\tilde{\pi}(s_j)}{P}\right\} \tag{14}$$

This equilibrium condition illustrates the benefits of risk sharing for the entrepreneur: by selling her firm to the market, she will receive the amount ρ_j of savings. In doing so, she will behave as if she had reduced her risk aversion from a to $a/\phi L$.

3.3 The Choice of s

At period 1, entrepreneurs choose their marketing strategies s_j in order to maximize their own utilities. However, this utility takes a very different form whether the entrepreneur will take her firm to the public or not. For future listed firms, the choice of s_j will affect the sales price of the firm ρ_j. For firms remaining privately held, this choice of s_j will affect the entrepreneur's utility through both expectation and variance of her ex post income, as can be seen from equation [12].

Given our CARA assumption, the utility of an entrepreneur who does not take her firm to the public writes as:

$$U_j^P = \frac{w}{P} + \underbrace{\left(\frac{E\tilde{\pi}(s_j)}{P} - \frac{a}{2}\frac{VAR\tilde{\pi}(s_j)}{P^2}\right)}_{\text{utility derived from own firm}} \tag{15}$$

As her firm j is not listed, the entrepreneur bears all the specific risk specific linked to it. She chooses a degree of customization s such as to maximize her utility U_j^P. Given the definitions of $E\tilde{\pi}$ and $VAR(\tilde{\pi})$ (see equations [9]), maximizing the utility with respect to s_j leads to:

$$s_P = \frac{1}{a\Sigma}.\frac{1}{\pi_0/P} \tag{16}$$

When the entrepreneur sells her firm to the market, her utility writes:

$$U_j^L = \frac{w}{P} + \underbrace{\left(\frac{E\tilde{\pi}(s_j)}{P} - \frac{a}{2\phi L}\frac{VAR\tilde{\pi}(s_j)}{P^2}\right)}_{\text{utility derived from own firm, after IPO}} \tag{17}$$

In contrast to an entrepreneur that did not list, she is able to partly diversify her risk with other entrepreneurs and ϕL investors. Hence, she acts as if her risk aversion were smaller. Again, given the definitions of $E\tilde{\pi}$ and $VAR(\tilde{\pi})$, the strategy maximizing her utility is:

$$s_L = \frac{\phi L}{a\Sigma}.\frac{1}{\pi_0/P} \tag{18}$$

We thus have that entrepreneurs of listed firms choose riskier projects than private ones:

$$s_P < s_L = \phi L.s_P \tag{19}$$

At this point, two remarks are in order. First, while it is fairly intuitive, the positive relation we obtain between risk taking and risk sharing is not theoretically robust. It depends on the type of

utility function that we use and more importantly on the correlation structure of the different assets. In constraining the model to produce this result, we follow insights from both development and international finance literatures, who actually tend to use simpler correlation structures (Greenwood and Jovanovic [1990], Saint-Paul [1993], Obstfeld [1994] and Acemoglu-Zilibotti [1997]). The reader must bear in mind that our purpose in this theoretical analysis is to study this mechanism in general equilibrium and its interaction with product market competition, not to establish that diversification may be good for risk taking. Secondly, given our CARA specification, the relation between risk taking and risk sharing we exhibit here rests on a plain size effect: listed firms generate larger, and therefore much more volatile incomes (see the trade-off embodied in [9]). Non listed firms do not want this and prefer lower, but less uncertain, incomes.[10]

4 Financial Market Development in General Equilibrium

We now study the impact of financial market development, which the model describes as a broadening of the pool of investors ϕL. From the previous analysis, we know that in partial equilibrium - for given wage w and price P - a larger ϕ will make owners of listed firms behave more like risk neutral investors. As a consequence, the risk taken by public firms s_L will increase. An increase in ϕ has, however, no direct effect on s_P since owners of privately held firms are not directly affected by the stock market liberalization. Hence, a broadening of the shareholder base ϕL has *a direct effect* on listed firms *only*. However a look at [16] and [18] shows that s_L and s_P also depend on aggregate variables (the term π_0/P in each equation) which are affected by a change in ϕ. Therefore, we expect stockmarket development to have an *indirect effect* on both listed *and* private firms through its general equilibrium effect on wages w and price P. This is what the following analysis will make clear.

4.1 The Indirect Effect

To compute the values of s_L and s_P in equilibrium, we need to obtain π_0/P, the real profit of a firm adopting a riskless strategy. This requires to clear both product and labor markets. At the firm level, labor demand is easily derived from program [7]. By aggregating on the whole set of firms, the labor market clearing condition writes:

$$L = \frac{(\sigma-1)^\sigma}{\sigma^\sigma}.\frac{E}{P}.(\frac{P}{w})^\sigma.[n\mu_L(1+s_L)+n\mu_P(1+s_P)] \tag{20}$$

Similarly profit maximization [7] leads to the price charged by each monopoly. Using its definition [4], we derive the consumption price index:

$$P = \frac{\sigma}{\sigma-1}.w.[n\mu_L(1+s_L)+n\mu_P(1+s_P)]^{1/(1-\sigma)} \tag{21}$$

[10] Using a CRRA utility function and lognormal distributions for product specific demand shocks, we are in a position to obtain the same effect without a size effect. In such a model however, we have to dramatically simplify the correlation structure.

Given these two equations, profits are easily given by:

$$\frac{\pi_0}{P} = \frac{L}{\sigma}.\left[n\mu_L(1+s_L) + n\mu_P(1+s_P)\right]^{(2-\sigma)/(\sigma-1)} \tag{22}$$

As $\sigma \geq 2$, the profit π_0/P is decreasing with respect to the average degree of customization within the economy, $(\mu_L s_L + \mu_P s_P)$. The intuition for this is that a standard pro competitive effect is at work. Firms compete for resources on the labor market: an increase in $(\mu_L s_L + \mu_P s_P)$ means that the average demand shock $\tilde{\delta}$ is larger. This props up aggregate labor demand, and as labor supply is inelastic, wages go up and profits fall.[11]

Now that we computed the equilibrium level of riskless profits π_0/P, we obtain the values of s_L and s_P from equations [18] and [16]. They are implicitly given by the following two equations:

$$s_P = \frac{\sigma}{L.a\Sigma}.\left[n\mu_L(1+s_L) + n\mu_P(1+s_P)\right]^{(\sigma-2)/(\sigma-1)} \tag{23}$$

$$s_L = \frac{\sigma}{L.a\Sigma}.\phi L.\left[n\mu_L(1+s_L) + n\mu_P(1+s_P)\right]^{(\sigma-2)/(\sigma-1)} \tag{24}$$

Using these equations, we immediately obtain that:

Result 1: *After a broadening of the shareholder base ϕ, both listed and non listed firms adopt more risky strategies.*

$$\frac{ds_P}{d\phi} > 0 \; ; \; \frac{ds_L}{d\phi} > 0 \text{ and } \frac{d(s_L - s_P)}{d\phi} > 0$$

As is apparent from [23-24], financial development affects the economy through two channels. The direct channel, acting only on listed firms s_L corresponds to the *improvement of risk sharing*: more numerous investors are on average smaller equity holders, who are therefore willing to pay more for a larger s_L. It is the ϕL term in equation [24], which corresponds to the effect already discussed in the development and international finance literatures. The indirect effect corresponds to the s_L terms on the right hand sides of [23-24]: both s_L and s_P are increasing functions of s_L. More risk taking s_L from listed firms implies that the average firm will want to produce more and therefore hire more. Real wages go up and profits π_0/P decline. As firms' profits become smaller, owners of all firms are willing to bear more risk because their risk aversion is constant. This increases the willingness of privately held firms to take on risk and amplifies the direct effect for listed firms. Finally $d(s_L - s_P)/d\phi > 0$ means that the difference between listed and non listed firms in term of risk taking increases with ϕ; this last result will be useful for our empirical analysis which relies on a *difference-in-difference* strategy.

[11] In fact two countervailing effects are at work. As usual in monopolistically competitive frameworks, more production reduces prices through the standard demand externality of Dixit Stiglitz models, which props up aggregate demand and therefore profits. Given that $\sigma \geq 2$, this demand externality effect is however dominated by the pro competitive effect described in the text.

4.2 Firm Level Uncertainty

It is straightforward to see that the *size-adjusted variances* of labor demand $\tilde{l}$ and sales $\tilde{y}$ for listed and private firms are increasing with their degrees of customization s_L and s_P. Indeed basic computations give for listed and private firms respectively:

$$\frac{VAR(\tilde{y}_L)}{E(\tilde{y}_L)^2} = \frac{VAR(\tilde{l}_L)}{E(\tilde{l}_L)^2} = \frac{\Sigma.s_L^2}{(1+s_L)^2} \tag{25}$$

$$\frac{VAR(\tilde{y}_P)}{E(\tilde{y}_P)^2} = \frac{VAR(\tilde{l}_P)}{E(\tilde{l}_P)^2} = \frac{\Sigma.s_P^2}{(1+s_P)^2} \tag{26}$$

As a consequence, all the results related to s_L and s_P can be expressed in terms of firm level uncertainty of sales and labor demand.

Result 2: *After a broadening of the shareholder base ϕ, the size adjusted uncertainty of sales, employment and profits rises in both listed and non listed firms.*

Hence, the size adjusted uncertainty borne by listed firms increases when their own shareholders become more diversified. Less obviously, this rise in uncertainty arises *even for those firms who are not directly related to the stockmarket*. Hence, because of product market competition, the rise in firm level uncertainty can be both large and pervasive even if the share of listed firms is a priori small.

We think that the *domestic* development of the stock market as it is here modelled is a good candidate to explain the recent rise in firm level uncertainty within industrialized economies: as more domestic investors are thrown into the stockmarket, firms change strategies and uncertainty increases. Our model however also suggests, we believe, that the *globalization* of capital flows across countries can be seen as a factor of rising firm uncertainty. Take the following extension of our model: there are now two small open economies A and B, each with firms facing uncorrelated shocks. These two economies are identical. When investors of these two economies are prevented from investing in foreign equity, the economies replicate the results described above. Assume now that cross border equity investment between A and B become feasible. In this case, the number of investors with access to the stock market in each country rise from ϕL to $2\phi L$; in both countries, both listed and non listed firms change strategies and uncertainty rise.

Hence, both stock market development and equity flow globalization can be seen as credible factors behind the rise in firm level uncertainty. A good reason to believe in this thesis is the historical sequence of events in France and the US: even though they happened at different times in history, in both countries stockmarket development and globalization actually *preceded* the rise in firm level uncertainty.

In the US, the rise of the capitalization based retirement system, starting in the 1960s, can be argued to have triggered the rise in firm level uncertainty. As a result from this new demand for equity from unsophisticated investors, pension and mutual funds emerged as large owners of stocks in the 1960-70s (see figure 1). The volatilities of sales and employment are grossly stable in the 1960s. They

start to increase approximately in the late 1970s up until the late 1980s, after which they become stable again (see figure 1 in Chaney, Gabaix and Philippon [2002]). This increase in firm level stock return volatility evidenced by Campbell et alii [2001] taken place roughly at the same moment. Gottschalk and Moffit [1994] locate the increase in wage volatility in the 1980s. Other labor market evidence surveyed by Neumark [2001] also confirm that all the changes occurred in the 1980s. As opposed to the evolution of the retirement system, the rise of foreign investment in US equities is less likely to have mattered because it has been both late (most of it took place in the 1980s) and much weaker than the institutionalization of ownership (see figure 1).

The same is likely to be true for France: as we will argue below, most stockmarket reforms took place in the mid 1980s and resulted in increased participation on the equity market by both domestic and foreign investors from the late 1980s onwards. The increase in job turnover documented by Maurin and Givord [2002] mostly took place in the next decade. In sharp contrast to the US, however, the dominant factor seems to have been the progressive replacement of French households by *foreign* investors (see figure 1). The rise in domestic financial institutions, while sizeable, has remained moderate when compared to this movement. In the next section, we will provide more details on the French case from both historical and microeconomic viewpoints.

4.3 Product Market Competition

We have just shown that stockmarket development may have both large and pervasive effects on the economy because firms compete with each other for resources - here labor. Hence, it seems natural to ask whether the effect of liberalization on firm level uncertainty is *amplified* when competition between firms is tougher. In a standard way, we will measure product market competition as the total number n of firms on the product market. We obtain easily that:

Result 3: *The effects of stockmarket liberalization are stronger when competition on the product market is tougher.*

$$\frac{d^2 s_L}{d\phi dn} > 0 \; ; \; \frac{d^2 s_P}{d\phi dn} > 0 \text{ and } \frac{d^2(s_L - s_P)}{d\phi dn} > 0 \tag{27}$$

The economic intuition of this result is fairly straightforward: as n increases, competition becomes more intense and a given increase in average customization decreases the scale of firm profits even more; this fosters a further increase in risk taking both among listed and private firms. Moreover $d^2(s_L - s_P)/d\phi dn > 0$ means that for a given increase in ϕ, the difference between listed and non listed firms in term of risk taking is larger in competitive industries; this is of interest for our diff-in-diff empirical analysis.

This effect is robust to the way we interpret the degree of competition: Similar comparative statics obtain with respect to σ, the market power of firms. Taking one step back it's possible to endogenize the number of firms n by allowing for free entry. In appendix we analyze this situation by introducing

an entry cost Γ; this cost can be considered as a measure of competition. We find that the previous result still applies but in a mitigated way; this is the case because free entry limits the indirect effect of financial development on non listed firms.

4.4 Job Protection

In a large number of countries, some institutions on the labor market are specifically designed to protect existing jobs and prevent their excessive destruction (firing costs for instance). The existence of such institutions limits the gains that firms may experience by choosing riskier strategies. If labor market rigidity augments the costs of choosing a risky strategy, it is likely that the rise in uncertainty caused by stockmarket liberalization is smaller in countries with rigid labor markets. If this theoretical prediction is correct, we expect to see empirically a larger effect of stockmarket liberalization on corporate uncertainty in economies with flexible labor markets (such as UK and US), rather than in economies with rigid labor markets (such as Continental Europe). In particular, it would mean that our empirical investigation, based on French evidence, underestimate the effects of financial liberalization that we should observe in the US or the UK.

From a theoretical point of view, this argument is rather intuitive. Consider two firms, one, denoted $flex$, operating under flexible labor contracts the other (denoted rig) operating under rigid contracts. Flexible contracts means that labor force can be chosen at date 3, after demand is revealed. Rigid contracts are such that employment has to be chosen at date 1, before uncertainty is resolved. The choice of s at date 1 depends on the nature of the labor contracts the firm is operating under. Under flexible labor contracts, firms' decisions remain the same as the ones described in the basic model. Let $U^{flex}(s)$ be the utility of such a flexible entrepreneur The maximization program of firms operating in rigid industries is however, different[12]. Let $U^{rig}(s)$ be the utility of these entrepreneurs; provided demand shocks are small, this utility can be written as:

$$U^{rig}(s) \simeq U^{flex}(s) - C(\underset{(+)}{s})$$

where $U^{flex}(s)$ is given by [17] and $C(s) > 0$ is an increasing function which corresponds to the *second-order costs due to ex-post misallocation of labor under rigid contracts.*

Hence, the utility of an entrepreneur operating in a "rigid" industry is equal to that of a "flexible" entrepreneur *minus* a term that is an increasing function of s. The reason for this is that, when s increases, the variance of demand shock $\tilde{\delta}$ increases. Under rigid contracts however, the labor force is chosen ex-ante. Hence the discrepancy between initially chosen and ex post optimal employment increases. On average, the rigid firm makes more mistakes when it chooses a riskier strategy. s therefore induces additional costs to the firm. Therefore listed firms choose less risky strategies when they operate in rigid industries.

[12] Of course all the computations are available from the authors upon request.

5 Evidence

We have proposed a theory of the relation between the degree of financial market development and firm level uncertainty, and argued it might apply to explain the rise in firm level uncertainty documented in France, the US and the UK. This section focuses on the French case: we start by providing detailed historical evidence about the reforms carried out on the French stockmarket in the mid 1980s. In particular, we explain why these reforms have fostered the emergence of new, more diversified, domestic and foreign holders of listed shares.

We then use firm level data to test two predictions of the model: (i) firm level uncertainty increases with risk sharing; (ii) this effect is stronger when product market competition is fiercer. These two predictions apply to both listed and non listed firms. However we are not in a position to test these predictions on both groups since the French economy has been hit by many other shocks during the past 20 years: trends in uncertainty could be the result of many different historical forces. We thus focus on the *differential effect* between listed and non listed firms.[13] The model indeed shows that (i) uncertainty rises more for listed firms following risk sharing improvement (see result 1); (ii) the amplifying effect of competition is stronger for listed firms(see result 3). In our empirical approach, privately held firms will thus serve as a *control group*.

5.1 Big Bang of the Paris Bourse: 1984-1988

In this section, we explain how the French stockmarket reforms which took place in the 1980s really fostered a change in the nature of the holders of French shares, by making them smaller and more diversified. It therefore constitutes a natural experiment to test our theory of the relation between risk sharing and the riskiness of firm's' strategies.

5.1.1 Content

Reforms affected both capital markets and the banking industry (Bertrand, Schoar, Thesmar [2004]), but we focus here on the stock market reforms since these are the ones most likely to affect risk sharing among investors. In appendix we give more details about the historical context in which these reforms took place.

The first change in legislation came as soon as 1982 ("Plan Delors"). Savings in the stockmarket were encouraged : tax on bonds and stocks were reduced by a significant amount (25% for bonds), while tax free schemes were set up for those willing to hold stocks and investment certificates for long enough. Simultaneously, it was made fiscally interesting, and simpler for corporations to raise equity and bonds. Finally, the "second marché", designed for the public listing of safe, medium sized, mature

[13] Such a difference in difference approach allows to alleviate some endogeneity concerns associated with testing of our main mechanism. We seek to find a relation between uncertainty and shareholder concentration. Concentration is, however, itself endogenous; a riskier firm is going to be, in equilibrium, more likely to be held by diversified shareholders. As a result, the relation between risk and shareholding concentration could be the result of the firm's change in strategy. By comparing listed and privately held firms before and after the stockmarket liberalisation, we can attribute the differential change in firm's risk as being caused by the change of shareholders.

corporations, was created in 1983, partially in order to fill the gap created on the French stockmarket by nationalizations.

The second wave of reforms came in 1984 and 1985: The process of bond issue was further relaxed, issue of commercial papers was authorized and the financial market was modernized through greater transparency and computerization. Commercial paper for banks were allowed in 1985. A market for future, the MATIF, was created - the first one in continental Europe. Then competition among intermediaries on the financial market was promoted: brokers on the Paris Bourse were until then "state officers", and there were a few of such positions (61 in 1986). This quasi monopoly was broken up in 1987: entry was made easier, and it became possible for banks - French or foreign - to become brokers too. The increase in competition was further promoted by allowing commercial banks to have investment banking activities, which was before forbidden.

Transparency - in particular for small shareholders - was further improved in 1988, by reinforcing the powers held by the Commission des opérations de bourse (the French SEC). It approves a code of good behavior for brokers, based on the duty of loyalty to investors. It even sets up punishment for offenders, that are largely accepted by the financial community. Takeover procedures are also made more transparent. The stockmarket index was reformed and simplified in order to encompass the 40 largest capitalizations.

In parallel with reforms of the stockmarket itself, foreign investment inflows were stimulated through a progressive lifting of capital controls. After a temporary tightening in 1982-1983, capital controls were progressively relaxed from 1984 to 1990. In October 1984, a law was passed removing the tax on interests paid to non residents. The market for eurofrancs - closed in may 1981 - was reopened that same year, allowing Franc denominated bonds to be traded outside France. In 1985, French corporations were allowed to purchased derivative on foreign currencies to shelter from risk. The duration of these derivatives was progressively extended until 1986. When elected in 1986, the right wing government went on relaxing capital control, allowing French residents to purchase real estate abroad and simplifying the process to buy securities listed abroad. The final step toward complete liberalization was taken on January 1st, 1990, six month ahead of the deadline set by the European commission.

5.1.2 Consequences

These stockmarket reforms, we argue, had the effect of making the average shareholder of French firms smaller and better diversified.

[Insert figure 2]

First, the share of listed equity in total equity increased as a delayed consequence of the liberalization. The timing of this increase in provided in figure 2, which displays the ratio of listed equity to total equity as given the macroeconomic Flow of Funds published by the Bank of France for the 1977-2001 period. If we are willing to admit - this will be checked in the microeconomic data - that

shareholders in private companies tend to be more concentrated, financial liberalization thus had the impact of reducing the average stake held by the major shareholder in the average firm. This increase is first moderate following the first set of measures (1982-1983), and the trend is slightly positive until the early 1990s. It then accelerate from 1992 onwards, where the share of equity that corresponds to listed security jumps from 20% in 1992 to nearly 35% in 2001. It can be noticed from figure 2 that such an upward trend and acceleration is not so sensible for bonds, whose share in total financial debt (bonds plus bank credit) goes up only from 10 to 15% over the past 20 years.

[Insert figure 3]

Second, as the result of lifting capital controls, the share of foreign owners in total equity went up dramatically, also mostly in the 1990s. The figure 3 uses the Flow of Funds published by the Bank of France to display the evolution of the share of foreign owners in private and listed firms. Both types of firms have experienced a rise in foreign owner in their capital, but the increase has been much more dramatic for listed corporations (from 5 to 35% between 1984 and 2000) than for private ones (from 10 to 15%). The lifting of capital, in addition to other stockmarket's reforms, resulted in a bias toward foreign investment (direct and portfolio) in favor of listed firms. Given that the bulk of foreign investment is done by multinationals (direct) and foreign institutional shareholders (portfolio), we view the rise of foreign ownership as further evidence that the average shareholder is more diversified over the years. As figure 3 shows, the trend is stronger for listed firms.

Some international comparisons give reasons to believe that a large chunk of the rise in foreign ownership is actually due to the financial reforms. Among continental European countries, financial liberalization went the furthest in France (as a result, the share of stockmarket capitalization over GDP is the highest among those countries). As it turns out, France is also the country where the share of stockmarket capitalization held by foreign investors is the highest (see, for example, Plihon and Ponssard [2001]).

[Insert figures 4,5]

Third, these reforms resulted also in a broadening of the shareholder base among French households. While the share of French households owning French equity declined, the share of outstanding equity held by mutual funds went up over the past 25 years from 7 to 20% of the total. Hence, the new French owners of equity tend to be more diversified than the former ones. They also tended to be smaller: the dismantlement of the Paris brokers monopoly on the Paris stock exchange, as well as the string of privatization fostered a shareholder culture in France and simplified access to the stockmarket, even for moderate amounts of savings. As a result, the number of French owners of listed shares went up from less than 2 millions before 1980 to some 6 millions after 1988 (see figure 4 and 5, from Chocron, Grandjean and Vernois [2001]).

All in all, we are going to interpret the financial liberalization as fostering the emergence of smaller, more diversified shareholders. Although the reforms that were taken were spread over the 1983-1990

period, we are going to take 1990 as the date after which these reforms had their full effect. This choice is partly inspired by the timing of the reforms (most of the financial market deepening was done in 1987, but capital controls were fully lifted in 1990) and partly by what we observe in the macroeconomic data from the Bank of France (which tend to place the break in trend in 1990 for foreign ownership and 1992 for the share of listed equity).

5.2 Data

5.2.1 Sources

We have accounting data for all large French firms whose total sales exceed 30 million euros or whose labor force exceeds 500 employees. These accounting data are extracted from tax files used by the Ministry of Finance to collect the corporate tax. We restrict ourselves to firms that are present at least three years in a row between 1984 and 1999, which corresponds to a period without any change in the accounting framework for French corporations. This restriction leaves us with some 126,007 observations, corresponding to some such 8,000 firms per year. These accounting data provide very detailed information on the balance sheet, the breakdown of the operating profit, the industry and employment of these firms.

Our empirical strategy is based on the comparison between private and listed firms. As it turns out, only some 700 firms each year are listed on the French stockmarket, and only some 400 of them are in our database.[14] This comparison, however, does not do full justice to the size of the French bourse, since many of the firms in our sample are affiliated to a group, whose controlling entity is itself listed. Hence, in order to have a proper idea of whether the firm belongs to a listed group or not, we need to recover, for each firm, the identity of its group leader when there is one.

This is done by using the Financial Relation Survey (LIFI in French), conducted each year from 1985 to 1999 by the French Statistical office (INSEE). This survey is exhaustive on all firms whose sales are worth more than 30 million euros or whose employment exceeds 500 employees (this is why we chose this threshold to select our basic sample of accounting data). These firms are sent questionnaires to, and are required to fill them by law. The information thus collected is of two forms. First, respondents provide the structure of their ownership by large category: shares held by known French individuals, known French firms, known Foreign firm, known foreign individuals and the state. The rest corresponds to shares held by people or firms that are unknown to the firm when it fills in the form. Second, firms are required to provide the identity of the firms that hold more than 50% of their equity ("mothers") as well as the identity of other corporations in which they hold more than 50% of the capital ("daughters"). This identity is coded using a 9 digit number that is also available in the accounting data. In addition to surveying the firms that cut one of the two thresholds referred to above, firms that were either daughters or mothers of firms surveyed a year earlier are included in the sample the year after. This data thus allows to get a fairly detailed information on the structure

[14] Many firms listed on the French bourse take the form of open ended funds ("sociétés de portefeuille") that holds tiny amounts of share in various listed or private firms. These are not part of our data.

of French groups.

[Insert Table 1]

Table 1 presents simple information on the firms present in the base sample. We have approximately 8,000 firms each year, some 380 (less than 4.8%) of them being directly listed each year (out of a total of some 600-700). This, however, underestimates the relation of large French firms with the stockmarket: among these 8,000 firms, 61% belong to a group, i.e. at least 50% of their capital is owned by another firm. Group leaders, in turn, tend to be more often listed. All in all, roughly 19.5% of all observations correspond to firms (1) that are affiliate to a group and (2) whose group leader is listed. Thus, if we consider as listed a firm that is either directly listed or belongs to a listed group, the percentage of listed firms in our sample totals some 24% over the years.

Finally, we want to abstract from the vast movement of privatization that took place after the general elections of 1986, which brought a centre right coalition, economically liberal, into the power. To do this, we restrict the sample to firms (1) where the state never held any equity and (2) who never were in a group where the state ever had any equity. This removes 22,271 observations from the sample, or an equivalent of 1,420 firms each year. This is not surprising given the importance of the public sector before 1986 in France.[15]

5.2.2 Consistency With Macroeconomic Evidence

Before turning to the empirical tests of our theory, it is important to check whether these macroeconomic trends which we discussed previously, are present in our micro economic sample. First, we can check whether there actually is an increase in the fraction of listed equity in the sample. To do this, we simply compute the total book value of equity for firms that are listed and then divide it by the total equity of all firms. Given that many firms tend to belong to groups and are therefore not directly listed, we focus ourselves on firms that lead their group - those that are not controlled by another company - or firms that do not belong to any group. Table 2 reports the share of listed independent firms and the share of their equity in the total. While the share of listed independent firms is low, some 3%, even below the share of listed firms in the whole sample. This suggests that in many groups, the listed vehicle is not the group leader, i.e. there is another, privately held entity that controls the listed vehicle. Within this set of independent firms, listed ones are, however, very large. Over the 1984-1999 period, listed firms account for some 40% of total equity - in terms of book value, not of stockmarket capitalization. This figure is clearly pro-cyclical (higher than the trend in the late 1980s and the late 1990s). In addition to being larger, the equity of listed firms has risen more over the period than the equity of non listed firms. The share of listed equity begins around 30-40% before 1990 and goes up progressively to 50% in the end of the 1990s. Hence, the share of capital that corresponds to listed securities went up in the past 15 years in our sample.

[15] Only part of which was due to the application of 1981 left wing platform; the bulk of the public sector came from the nationalisations of some key actors of the financial sector and industry in 1945 by the De Gaulle government of national union.

[**Insert Table 2**]

Let us now turn to foreign ownership. In addition to ownership relations that allows us to track group leaders of firms in the sample, the financial relation survey provides us with a breakdown of each firm's ownership structure by five categories: foreign firms and individuals, French firms and individuals, and the State. We know from macroeconomic data that the rise of foreign ownership has been stronger among listed firms. To test this conjecture within our data, we run the following regression, for firm i at date t:

$$\%\text{foreign}_{it} = \alpha_i + \beta \text{list}_{it} + \gamma \text{list}_{it} \times 1_{\{t>1990\}} + \sum_T \delta_T 1_{\{t=T\}} + \sum_T \delta'_T \log(\text{assets}) \times 1_{\{t=T\}} + \varepsilon_{it} \quad (28)$$

where $\%\text{foreign}_{it}$ measures the share of foreign owners (individuals and corporate, *known to the firm*), list_{it} a dummy variable, equal to one when the firm is currently listed. Year dummies have been included to capture possible year to year changes in the sampling methodology or short term fluctuation of foreign ownership. Note that this equation allows for time varying size effects, in order to disentangle as much as it is possible the impact of being listed from the mere impact of being large onto the share of foreign ownership.

[**Insert Table 3**]

Table 3 reports the regression results of (28). The first column includes no fixed effect α_i, no year dummy nor any time varying size effects, and shows that an aggregate effect is indeed there: on average, the share of foreign owners in listed firms' equity increases by 5 more percentage points then for privately held firms. The second column confirms that there is some endogeneity is this point estimate, part of it is due to the fact that foreign owners tend to prefer large firms, be they public or private (captured by the time varying size effects in (28)). Another part of this upward bias is due to the fact that some firms that are owned by foreigners tend, in general, to go public after 1990 (this is captured by the firm effects in the second column). All in all, however, the share of foreign ownership goes up by a strongly significant 3 percentage points for listed firms after the financial liberalization took place. This figure seems small but conceals at least two important facts about foreign ownership. First, our dataset underestimates foreign ownership, in particular for listed firms, since this variable corresponds to the share of foreign owners that *are known to the firm*. However, nothing forces owners of listed equity below 5% of capital to signal themselves to the company. Given that foreign institutional shareowners tend to hold very small stakes, they are invisible in our dataset. Second, an equity weighted regressions (not reported) gives a larger coefficient (5 percentage points instead of 3): given that listed firms tend to be larger, the unweighted point estimate underestimates the real effect of foreign ownership.

5.3 Foundations of Our Empirical Strategy

In the next section, we test our general claim that firms more exposed to stockmarket's liberalization - i.e. listed firms - experience a larger increase in uncertainty. The most direct way to test this is to

break our dataset down into two subperiods: 1979-1989 and 1990-1999. We then compute the variance of sales growth, at the firm level, for each period. We then ask whether listed firms experienced a larger increase in variance than non listed ones. This amounts to running the following regression:

$$\text{STD}\ (\Delta \log sales_{it}) = \alpha_i + \beta \text{list}_{it} + \gamma \text{list}_{it} \times (an > 1990)_t + (an > 1990)_t + \varepsilon_{it} \tag{29}$$

where $\text{STD}(\Delta \log sales_{it})$ stands for the standard deviation of sales of firm i in period t, $(an > 1990)_t$ is a dummy equal to 1 if the period t is after 1990. Results of this regression for various specifications are provided in table 4.

[Insert Table 4]

Column 1 presents the estimation of equation (29) without fixed effect: as it turns out, the standard deviation of sales growth rose by 1 percentage point more among listed firms than for non listed ones. This represents one fifth of the overall standard deviation in sales volatility in the overall sample. This estimate is robust to fixed effects, as column 2 attests: hence, the effect is not driven by a change in the composition of firms, but a change within firms themselves. Listed status is, however, not exogenous. It could well be that some privately held firms experienced an exogenous increase in uncertainty after 1990. Since the price of risk is lower for listed equity - this is after all the mechanism we rely on in our theory - these firms could have *chosen* to be listed on the stockmarket. This would however have nothing to do with financial markets liberalization, but be triggered by a rise in real uncertainty. To answer this concern, column 3 uses a "listing status" dummy equal to 1 if the firm is listed once before 1990, and zero else. Along the same lines, column 4 provide an estimate of (29) on the sample of firms either continuously listed, or continuously non listed. The estimates remain robust to these tests. In non reported regressions, we tried to shift the sample breakdown from 1990 to 1988 but this did not affect the results. This should come to no surprise given that only some 1,000 observations correspond to firms changing listing status. Moreover, we also tried to filter macro shocks and firm fixed effects from the sales growth process, but this did not affect the results at all.

This approach however suffers from the fact that, given our annual data, and our 20 year coverage, we end up computing variances with at most 10 points for each subperiod. Hence, firm level variances are computed with a very large measurement error. This is why we focus instead on the relation of firm sales to industry demand shocks (see Bertrand, Mehta, Mullainathan (2001), Thesmar and Thoenig (2003)). We argue that firms reacting more closely to industry shocks face more uncertainty - the equivalent of an increase in s. Before proceeding we show why this can be derived from a theoretical framework.

We keep a framework most similar to our theoretical analysis, except that we now assume that firm compete monopolistically in industries that face common shocks. At date t, firm i operating within a given industry faces the following demand shock:

$$1 + \tilde{\delta}_{i,t} = 1 + s_i.\tilde{\delta}_t$$

where the industry-level taste shock is such that $\tilde{\delta}_t \sim N(1, \Sigma)$. As in our main model each firm i fixes optimally its monopoly price such that its sales are given by:

$$\tilde{y}_{i,t} = (1 + s_i.\tilde{\delta}_t).\Omega \tag{30}$$

where $\Omega \equiv (\frac{\sigma-1}{\sigma})^{\sigma} \frac{P^{\sigma-1}E}{w^{\sigma}}$ is determined in equilibrium. Hence, denoting $\Delta\tilde{y}_{i,t}$ the time difference $(\tilde{y}_{i,t} - \tilde{y}_{i,t-1})$, and using the fact that $s_i\tilde{\delta}_t$ is small, we have:

$$\Delta \log \tilde{y}_{i,t} = s_i.\Delta\tilde{\delta}_t.\Omega$$

which tells us how much the firm reacts to the industry level structural shock $\tilde{\delta}_t$.

We cannot, however, directly observe $\tilde{\delta}_t$, but we can observe changes in industry sales. Aggregating [30] at the industry level, taking the logs and differentiating leads to the following value for the industry-level variations of sales:

$$\Delta \log \tilde{y}_{\text{sec},t} = (\mu_L s_L + \mu_P s_P).\Delta\tilde{\delta}_t$$

Combining the two relations, we obtain the relation between firm's sales variations and industry's sales variations:

$$\Delta \log \tilde{y}_{i,t} = \frac{s_i}{(\mu_L s_L + \mu_P s_P)}.\Delta \log \tilde{y}_{\text{sec},t} \tag{31}$$

As it turns out, the elasticity of firm sales to industry sales depends on the ratio of firm's choice of customization s_i to industry average level of customization $(\mu_L s_L + \mu_P s_P)$. From which we derive two insights. Straightforwardly, (1) if a firm's degree of customization s_i increases more than the average, the elasticity of own sales to industry sales should increase. This is what we expect to happen to listed firms after stockmarket liberalization. Less obviously, (2) if a firm's degree of customization increases less than the industry average, its elasticity of own sales to industry should *decrease*. This exactly what our main model predicts for privately held firms.

5.4 Main Tests

We now turn to the test of our two main theoretical claims. First, did stockmarket's reforms result in more risk taking by French firms, in particular among listed firms. Secondly, was this effect amplified by the degree of competition on the product market.

5.4.1 Sales and Labor Demand

We have shown in our basic model that the effect of stockmarket liberalization was larger for listed firms, even though privately held ones were also experiencing an increase. The reason for this was that listed firms were subject to a direct effect of liberalization in addition to the indirect, general equilibrium one. In our empirical analysis, we will not be able to test the induced effect of privately held firms, since we use them as a control group, i.e. a set of firms that have been affected by

other shocks to the economy (for instance, globalization) in a way similar to "treated" (listed) firms. Put otherwise, *comparing* listed and privately held firms allows to look at the "pure" effect of the liberalization, but looking at each group *separately* is misleading because other shocks happened to the economy.

Following the semi structural analysis above, the test of the first conjecture requires to run the following regression:

$$\begin{aligned}\log \text{sales}_{it,s} &= \alpha_i + \beta \text{list}_{it} \times 1_{\{t>1990\}} \times \log \widehat{\text{sales}}_{st} + \gamma \text{list}_{it} \times \log \widehat{\text{sales}}_{st} + \eta 1_{\{t>1990\}} \times \log \widehat{\text{sales}}_{st} \\ &+ \nu \log \widehat{\text{sales}}_{st} + \beta' \text{list}_{it} \times 1_{\{t>1990\}} + \gamma' \text{list}_{it} + \sum_T \delta_T 1_{\{t=T\}} + \sum_T \delta'_T . \log(\text{assets}_{it}) 1_{\{t=T\}} + \varepsilon_{it} \quad (32)\end{aligned}$$

where it, s denotes firm i at date t within industry s. $\widehat{\text{sales}}_{st}$ represent total sales in the industry s the firm belongs to. The regression includes firm and year fixed effects, as well as time varying size effects given that one might expect listed firms to be larger and large firms to have experienced a different history over the past 20 years. All in all, this regression amounts to computing the elasticity of one firm's sales with respect to the aggregate industry sales. This elasticity is estimated in first differences (hence the firm fixed effect), i.e. it measures the average percent change of one firm's sales when total industry sales increase by 1%. In addition, this elasticity corresponds to the response of the firm to the the part of the industry shock that is *orthogonal* to macro shocks, given that we include year dummies in the estimating equation (the δ's). In the above regression, this elasticity is allowed to depend on the listing status of the firm and the period of observation. For listed firms, it equals $\gamma + \beta + \eta + \nu$ after liberalization, and $\gamma + \nu$ before. For privately held firms, the elasticity is given by $\eta + \nu$ after reforms and ν before. If our theory has some empirical relevance, we should therefore observe a larger elasticity for listed firms (γ and $\gamma + \beta$ should be positive), and more so after the end of the financial liberalization (β should be positive).

[Insert Table 5]

Within estimates of equation (32) are given in table 5. Industry sales were computed using the two digit classification, excluding own firm's sales and industries that have less than 50 observations. Standard errors account for firm level heteroskedasticity using White's method. The first column sets all coefficients in (32) to zero but ν, in order to prove that there indeed is a correlation between changes in firm and industry sales - this checks the relevance of the industry classification. The second column constrains β and η to zero, and thus merely compares the response of firms that are listed to those that are not listed. The last column corresponds to the estimation of the full model.

Reading the first column confirms the fact that there is a strong, positive correlation between industry level changes in sales and firm sales: our industry definition is therefore not spurious. On average, an increase by 1% of industry sales, that is not macroeconomic (i.e. captured by the year dummies), leads to an increase by 0.14% of firm sales. As column 2 shows, there is no significant difference between listed and non listed firm over the 1984-1999 period. This, however, conceals

important time differences, which appear in column 3. After the financial reforms, this elasticity increases by 0.08 for listed firms, while decreases slightly but significantly by 0.01 for privately held ones. This is consistent with our discussion above: while the absolute level of customization is supposed to increase even for private firms, it increases by less than the industry's average. Moreover, privately held firms are a control group in our empirical methodology; they may be subject to all sorts of shocks beside financial liberalization.[16] Economically, the difference between listed and non listed firms is sizeable since on average across time and listing status this elasticity is 0.14. This estimation is robust to the selection of the period (post reform period after 1988 instead of 1990), of the sample (non financial industries, manufacturing only).

Columns 4, 5 and 6 of table 3 focus on the reaction of employment to sales shocks. We replaced firm sales growth by firm employment growth in regression [32] as a dependent variable. As it turns out the effect of liberalization goes in the right direction, but is weakly significant and economically small. Part of the reason might be that (1) there is a large level of employment protection in France and (2) our empirical model is not adapted, since employment growth is not even correlated to industry sales shocks (column 4).

5.4.2 The Competition - Finance Nexus

In our,model, the impact of liberalization on firm level uncertainty has been shown to be amplified by product market competition. The reason is that product market competition tends to reduce firm profits more after liberalization. As a result, each competitors is willing to take on more risk. It can be shown that this effect should be more apparent among listed firms, because they react more to a given decline in size. As a consequence, we expect to see the results from table 3 to be more pronounced in more competitive industries.

We thus broke down our sample into competitive and non competitive industries, and ran regression (32) separately on each of the samples. To do this, we took three different measures of competition computed *in the first year of the firm's existence*. The first measure is the industry sales concentration using the Herfindahl index. The second measure is the number of firms in the industry. Both measures were computed at the 2 digit industry level (our results carry out at the 4 digit level). Our last measure is the firm's mark up computed as (value added - labor costs - 0.08*tangible assets) / sales. This measure avoids the shortcomings of industry classification and has the advantage of being computed at the firm level. The problem is that we have to make an assumption over the cost of capital that is most likely to be wrong. For all the measures, we broke down the sample into firm facing above the median and under the median competition.

[Insert Table 6]

[16] As it turns out, one of them might be purely statistical in nature; the industry classification that we use here was defined in 1973 and became more and more obsolete after the years. Hence, the probability that two firms from the same industry according to this classification are actual competitors declines over the period. As a result, the correlation between industry and firm sales declines for the sample as a whole.

In table 6, regressions (32) for each half sample are reported. The last line of the table. presents the t probability that the effect of liberalization - the β coefficient in regression (32) - is the same in both equations. This test has been performed through running this regression on the whole sample, interacting all coefficients with a dummy variable equal to one when competition was "high". As it turns out, almost all of the effect of liberalization discussed in table 3 is located in competitive industries. The coefficient of the effect of financial liberalization drops to zero for firms facing low competition, while it reaches some 0.10 for firms in competitive industries. It is fairly stable across competition measures and is economically large. This difference is however not statistically very significant.

5.5 Robustness Checks and Alternative Interpretation

5.5.1 A VAR-like Approach

We propose here an alternative model to identify the firm's reaction to shocks: instead of looking at the correlation between industry and firm sales *growth*, we focus at the relation between *innovations* on these process. This approach is a little more subtle than the previous one because it might well be that a large part of sales growth can be predicted using past information. This predicted part does not reflect risk and our theoretical argument therefore does not apply to it. Hence, we have a noisy measure of the firm's reaction to uncertainty, and are likely to underestimate the effects we are looking for.

To take out the predictable part, we first regressed firm log sales on past firm log sales (using two lags) including firm and year fixed effects, and took the residuals $Esales_{it}$ of this regression. The realizations of this residual are likely to be containing a larger part of "true" uncertainty, that is unexpected realizations from the entrepreneur's viewpoint. We then do the same thing for industry sales, including year and industry fixed effects; the residual $\widehat{Esales}_{st}$ of this equation. Again, this might be closer to the unexpected part of the realization. Although we could have added other likely predictors in both equations, or have estimated on prediction equation per firm/industry, we preferred to keep the method as simple as possible.

We then directly regress $Esales_{it}$ on $\widehat{Esales}_{st}$ as ask whether the coefficient has increased more for listed firms after liberalization:

$$\begin{aligned} Esales_{it} &= \alpha_i + \beta \text{list}_{it} \times 1_{\{t>1990\}} \times \widehat{Esales}_{st} + \gamma \text{list}_{it} \times \widehat{Esales}_{st} + \eta 1_{\{t>1990\}} \times \widehat{Esales}_{st} \\ &\quad + \nu \widehat{Esales}_{st} + \beta' \text{list}_{it} \times 1_{\{t>1990\}} + \gamma' \text{list}_{it} + \sum_T \delta_T 1_{\{t=T\}} + \sum_T \delta'_T . \log(\text{assets}_{it}) 1_{\{t=T\}} + \varepsilon_{it} \end{aligned} \quad (33)$$

where this modified version of [32] simply replaces sales shocks by residuals from their forecasting autoregressions.

[Insert Table 7]

Table 7 provides the estimates of equation [33] looking at the effect of industry sales shocks on firm sales and employment. For sales, these results simply confirm table 3; they are larger, in part because the correlation of unexpected firm and industry sales shocks is a priori larger (0.19 instead of 0.14). The effect of liberalization also appears much larger (an increase in elasticity by 0.22 instead of 0.08), both in absolute terms and with respect to the initial value of the elasticity. As could be expected, the estimation is, however, slightly less precise and we lose some statistical significance. Interesting news also come from employment. Employment is a very inert variable, more so than sales. hence, the past evolution of employment is a good predictor of the current one and employment growth as we used it above is therefore likely to be a very poor measure of unexpected shocks. As columns 3 and 4 of table 5 show, employment regression do indeed work much better with this new methodology. The "natural" correlation between unexpected employment and industry sales shocks is significantly positive, albeit small (0.06) compared to sales. The effect of liberalization on labor demand uncertainty also turns out to be both economically large and significant (an increase by 0.20).

5.5.2 Globalization

It may be argued that listed firms are the one that are the most exposed to the trend in globalization faced by French firms over the 1990s. Some of these firms have become very large multinational corporations and now operate on truly global markets, facing more competition and product market uncertainty as a result. In addition, because of globalization, their subsidiaries in France may have become more sensitive to shocks in other parts of the world: they export to and import from numerous foreign affiliate firms and shocks can easily transmitted.

It may be argued that such a picture is likely to be more representative of the very biggest French firms, a subgroup we focus on in the next section, than of little "second marché" firms, whose equities do not even trade every day. To answer this concern more systematically, we performed several robustness checks using the firm's export available from the accounting data.[17] First, we showed that it was indeed true that listed firms increased the share of export in total sales to a larger extent than non listed firms. This effect did, however, vanish once we included time varying size effects in the regression. Hence, it is large firms, not listed firms, who went global over the period. This gave us further confidence in our results since our regressions all control for time varying size effects. Second, we reran regression [32] on firms who do not export at all; with only 28,800 observations left, we lost some significance (though the effect of liberalization β remained significant at the 1.4% level) but the magnitude of the effect remained the same (0.09 instead of 0.08). Third, we reran regression [32] using the share of exports in total sales as an additional control, and this did not affect our results at all.

5.5.3 Technical Change

Another, plausible, explanation for our findings could also be that the rise of uncertainty was an event triggered by the emergence of new technologies, with no link with financial market development. This

[17] All the econometric results we refer to hereafter are available from the authors upon request.

is, for example, the view held by Comìn [2000], or Aghion, Howitt and Violante [2002]: information technologies had the effects of increasing the amount of workplace flexibility and of increasing the speed of information processing; this improved firm reactivity and their ability to take advantage of volatile niches. In previous papers, we ourselves argued along similar lines (Thesmar and Thoenig [2000,2003]), but insisted more on organizational innovations, themselves possibly triggered by technical change or product market globalization.

If technical change increased the ability of firms to cope with uncertain environments, a natural reaction for firms with low listing costs would be to go public. Such a move would help them to raise cheap capital, while using new technologies would help them to reach uncertain markets. Firms with high listing costs would remain private and would thus be reluctant to seek uncertain, although more profitable, niches. Hence, the emergence of flexible technologies would lead us to observe more risk among listed firms than among non listed ones, because going public is an *endogenous decision*. Financial market development could have no role at all, and we would still observe results consistent with ours.

[Insert Table 8]

One solution out of this problem is to estimate equation (32) separately for firms whose listing status did not change and for firms who went public or delisted. This is done in the first three columns of table 8. Column 1 replicates the results for the whole sample and is therefore identical to estimates presented in table 5, column 3. Columns 2 and 3 breaks the sample down into firms who never changed listing status (some 72,000 observations) and firms who changed listing status at least once between 1984 and 1999 (some 13,000 observations). The effect of the reform turns out to be slightly, though not significantly, stronger among firms who were either continuously listed or never listed (0.09 against 0.08). However, as column 3 shows, firms going public experienced a small, barely significant, increase in their variance too. Hence, our estimating strategy really seems to capture a causal effect of financial development on firm risk taking. Our theory therefore seems able to explain part of what was behind the rise in uncertainty, but notice that our empirical strategy does not exclude other technological, pervasive causes, like a generalized adoption of flexible technologies and/or flexible organizations.

Still, this robustness check might not evacuate all concerns about the "technical change hypothesis". As it turns out, it might have been that before the IT revolution, listed firms were contrained in their choice of s, such that both listed and non listed firms happened to choose the same, maximal level of $s = \overline{s}$. Against this background, technical change simply set the maximal level of flexibility much higher. Because they were the ones whose owners were diversified, listed firms only could take advantage of the expanded set of technical possibilities, and increased their level of s, while privately held firms remained inflexible. Such a technology driven explanation could account for the evidence from table 8.

We adress this concern by adding on the right hand side of equation (32) an interaction term between firm level technology adoption and log sales. Hence, if the adoption of new technologies is

the driving force, this term is going to capture the increase in response ot industry shocks that we see for listed firms and the coefficient β in equation (32) should vanish to zero. To proxy for the level of IT use at the firm level, we use the share of skilled workers from the Employment Structure Survey, available for all establishments of more than 20 employees, from 1982 until 1998 (for a description of this source, see Maurin and Thesmar [2004]). We do this because we do not have direct information about technology adoption at the firm level, and that there is now a very large literature in labor economics documenting the fact that IT adoption is in general accompanied with skill upgrading at the firm level (see for example Berman, Bound and Machin [1998]).

[Insert Table 9]

Table 9 reports estimates of (32) adding proxies of IT use as further control. Column1 is the main model, to be compared with table 5, column 3; we redid the estimation on the sub sample of firms for which the ESE gave us information about the skill structure (68,000 observations out of 85,000). The estimate turned out not to be very different from the full sample estimate (0.07 instead of 0.08, still very significant). The next four columns use four different proxies of IT use; this is feasible because the employment structure survey provides us with information, at the employee level, about function (R&D, logistics, production, administration, sales) and about skill (Very High, High, Medium, Low). Column 2 uses the share of employees involved in R&D or marketing. Column 3 uses the share of very high skilled employees; Column 4 uses the share of high and very high skilled employees; column 5 uses the share of medium, high and very high skilled employees. As it turns out, in all specifications, even controlling for changes in skill at the firm level, listed firms still experienced a larger increase in elasticity to industry sales than other firms. For two specifications though, skill upgrading was accompanied with higher sales responsivity, which suggests that IT adoption still accounts for part of the story about firm level uncertainty.

5.5.4 Firms Belonging to the Leading Stock Market Index

This last test singles out the 40 firm listed in the CAC40 leading index of the Paris bourse for two very different reasons. First, these firms could be argued to be very atypical of the usual French listed firm, because they are the 40 largest and are, by definition successful multinationals. These firms may have implemented a new strategy of risk taking that has been specific to them, and no other French firm has experienced. Secondly, since these firms belong to a very visible index they are privileged targets for foreign investors who want to diversify their portfolio (Plihon and Ponssard [2001] note that on average in 2000, some 50% of the equity of these firms was held by foreign mutual funds). Because of their sheer size and exposure, these firms are, among those listed in the Paris stock exchange, the one who came to be held by the most diversified shareholders of all.

Thus, we expect two things. First, we expect that our effect survives if we remove these CAC40 firms from the sample, but we *also* expect it to be larger among these firms than it is for other listed firms, whose ownership remains sometimes fairly concentrated (one family holding 70%, for instance).

This leads us to create two estimation samples: the first one contains all privately held firms and non CAC40 listed firms. The second one contains privately held firms as well as CAC40 firms only.

Regression [32] has been run on these two samples and results are reported in table 8, columns 5 and 6. Columns 3 repeats this estimation on all observations corresponding to firms after 1987, the year the CAC40 index was created. This sample restriction does not affect the result too much (the effect of liberalization drops from 0.08 to 0.06, an insignificant difference). Column 5 report the estimation procedure for non CAC40 firms. The estimated effect is not really different from column 2, but is a little less well estimated. By removing CAC40 firms, we removed a lot of observations corresponding to subsidiaries of listed firms (these groups tend to have more affiliate companies than the average listed firm). Last, from column 6, we can see that the estimated effect on firms who were part of the CAC40 in 1987 is very large and highly significant (0.38 instead of 0.05 for non CAC40 firms). This is consistent with the idea that CAC40 had more and more diversified shareholder over the period.

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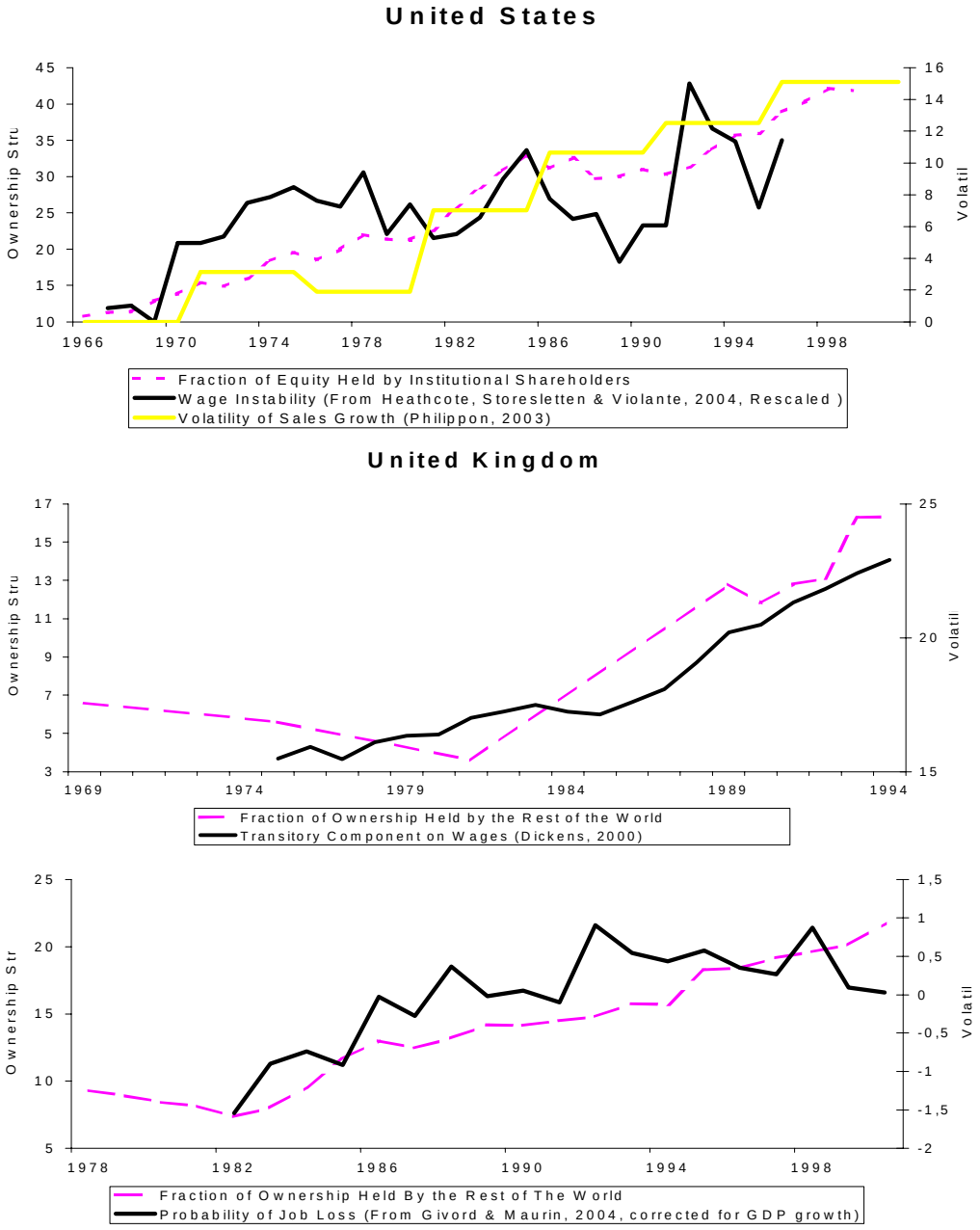
7 Figures



Note: For the US, the dotted line represents the evolution of the share of institutional owners (pension and mutual funds) in total share ownership (Source, Federal Reserve). The volatility of sales growth is the mean firm level variance of sales, computed over five year periods, using quarterly accounts from Compustat (Philippon, 2004). Wage instability is the part of the variance of wage distribution that is attributed to the transitory compnent of the wage process, as computed by (Heathcote, Storesletten and Violante, 2004), rescaled. For the UK, the pink dotted line represents the evolution of the share of foreign ownership in total outstanding equity (Source: ONS), before 1989, such information is available only for years 1963,1969,1974 and 1981). The plain line represents the evolution of the part of the variance of wage distribution that is attributed to the transitory compnent of the wage process, as computed by (Dickens, 2000). For France, the dotted line outlines the evolution of the share of foreign owners in outstanding equity (source: Banque de France). The plain line represents the residual of the regression of the average probability of job loss (from Maurin and Givord, 2004), on GDP growth.

Figure 2: Rise in Uncertainty and Changes in Equity Ownership for the US, the UK and France

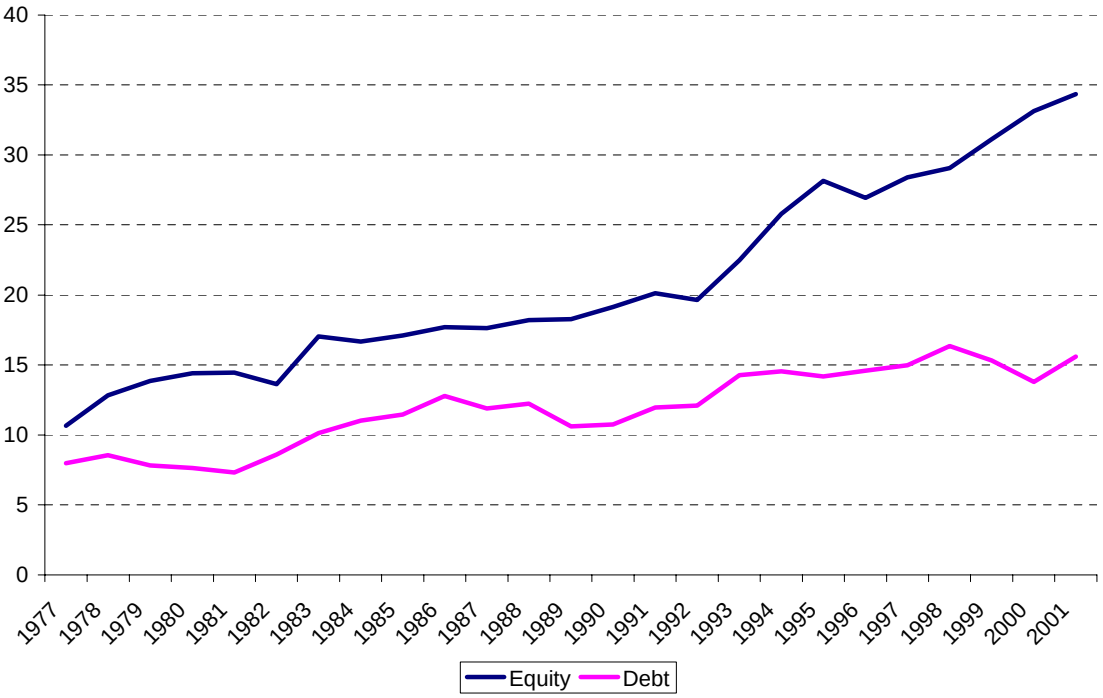


Figure 2: Share of Listed Securities By Category of Liability: France 1977 - 2002 (Source: Banque de Franc

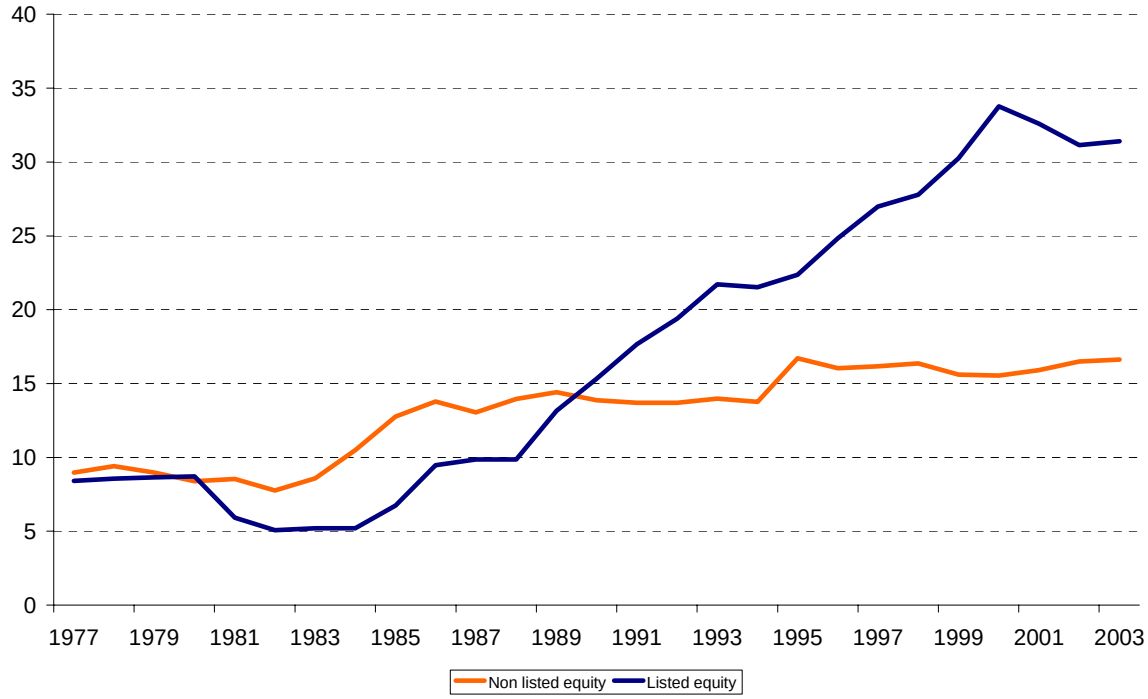


Figure 3: Share of Foreign Ownership by Category of Equity: France 1977 - 2002

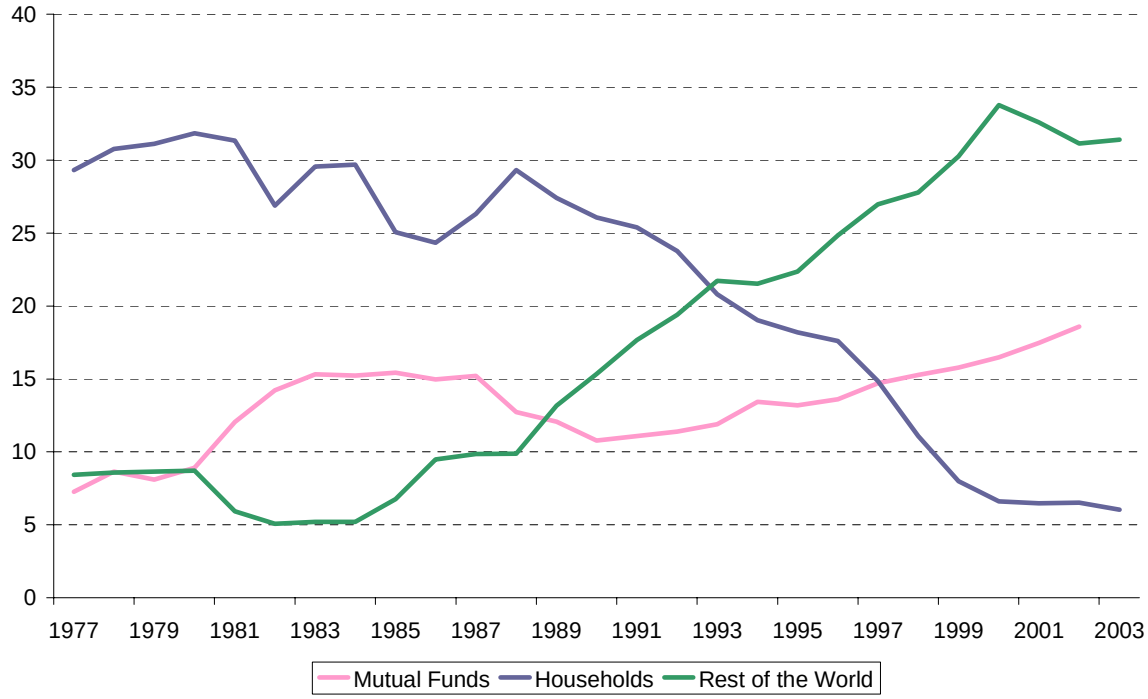


Figure 4: Ownership of Listed Equity: France 1977 - 2002 (Source: Banque de France)

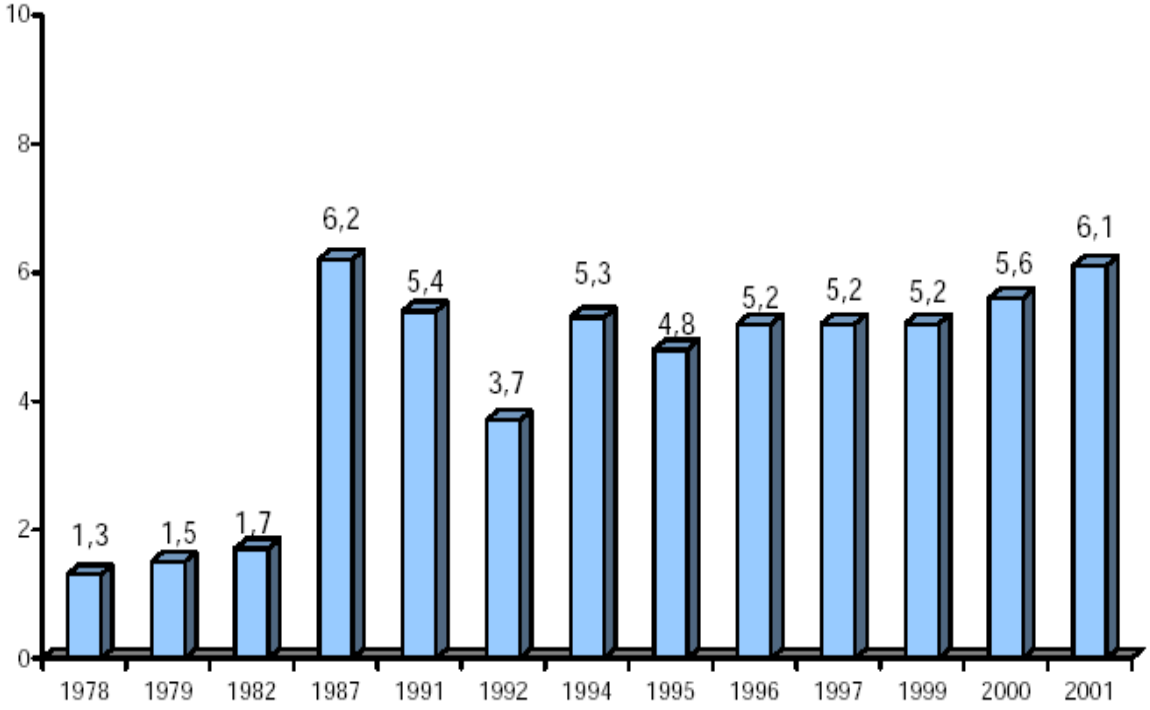


Figure 5: Number of French Holders of Listed Shares (Source: Chocron, Grandjean and Vernois (2001))

8 Tables

Table 1: Sample Description

	Number of Firms	% Directly Listed	% Affiliate To a Group	% Affiliate Listed Group
1984	5,621	5.3	-	-
1985	6,182	5.4	49.4	18.4
1986	6,722	5.3	49.9	21.0
1987	7,096	5.3	50.0	21.7
1988	7,196	5.2	-	-
1989	7,906	5.0	50.9	24.8
1990	7,906	4.9	53.1	23.7
1991	8,283	5.0	54.4	23.9
1992	8,608	4.7	57.3	21.1
1993	8,747	4.6	60.0	20.6
1994	8,817	4.6	62.9	20.5
1995	8,896	4.8	67.0	20.7
1996	8,850	4.7	69.8	19.9
1997	8,728	4.7	71.9	19.7
1998	8,381	4.5	73.2	18.8
1999	8,068	4.4	74.1	17.9
Observations	126,007	6,038	68,942	16,762

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. In 1984 and 1988, the financial relation survey was not conducted.

Table 2: Listed Firms and Listed Equity

	Indpt Firms	% Firms Listed	% Equity Listed
1984	-	-	-
1985	3,541	3.3	26.1
1986	3,842	3.2	18.8
1987	4,051	3.0	32.5
1988	-	-	-
1989	4,569	2.9	40.5
1990	4,546	2.7	39.3
1991	4,680	2.6	32.4
1992	4,764	2.4	31.7
1993	4,744	2.7	33.1
1994	4,714	3.0	42.7
1995	4,549	3.3	46.1
1996	4,443	3.3	51.1
1997	4,343	3.4	44.3
1998	4,137	3.3	50.0
1999	3,990	3.1	50.1
Observations	60,913	2.9	41.6

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. In 1984 and 1988, the financial relation survey was not conducted. Firms that were at any point state owned were removed from the sample. The sample is restricted to firms that are either independent or lead a group (are not controlled). Column 1 presents the fraction of firms that are listed within this sample. Column 2 presents the total book value of equity of listed firms as a fraction of the total.

Table 3: Foreign Ownership of Listed Firms

	% Foreign Owners	
	Model 1	Model 2
Listed × (an>1990)	5.6***	3.7***
	(0.9)	(1.3)
Listed	-1.1	-2.5
	(0.7)	(1.6)
(an>1990)	-0.2	-0.6
	(0.3)	(4.4)
Time varying size effects	no	yes
Firm effects	no	yes
Observations	17,476	15,318

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependant variable is the percentage of equity held by foreign owners known to the firm. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for firm level heteroskedasticity using the White's method.

Table 4: Standard deviation of Annual Sales Growth in the 1980s and the 1990s and Listing Status

	Model 1	Model 2	Model 3	Model 4
Listed × (an> 1990)	0.009***	0.008***	0.008***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)
Listed	-0.009***	-0.005	-	-
	(0.002)	(0.003)		
an> 1990	-0.011***	-0.010***	-0.009	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)
Firm effects	no	yes	yes	yes
Observations	11,232	11,232	11,232	10,676

Source: Tax files and Financial relation survey (INSEE). The standard deviation of annual sales growth is computed separately over 1979 - 1989 and 1990 - 1999 for each firm. In column 1 and 2, the listing status dummy equals one if the firm is said to be listed at least one year during the period considered. Column 1 is the basic model. Column 2 includes firm fixed effects. In column 3, the "listed" dummy equals 1 when the firm is listed in the 1984-1989 period, and zero else. In column 4, the sample if restricted to firms continuously listed or continuously private. Standard errors correct for firm level heteroskedasticity using the White's method.

Table 5: Sales Response to an Industry Shock

	Sales			Employment		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
$\widehat{\log \text{sales}}_{st}$ ×Listed × (an>1990)	-	-	0.08***	-	-	0.03
			(0.02)			(0.03)
$\widehat{\log \text{sales}}_{st}$ ×Listed	-	-0.01	-0.04*	-	0.02	0.01
		(0.02)	(0.02)		(0.03)	(0.04)
$\widehat{\log \text{sales}}_{st}$ × (an>1990)	-	-	-0.01**	-	-	0.05
			(0.01)			(0.01)
$\widehat{\log \text{sales}}_{st}$	0.14***	0.13***	0.13***	-0.01	-0.02	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Listed × (an>1990)	-	-	-1.53***	-	-	-0.61
			(0.38)			(0.50)
Listed	-	0.17	0.81*	-	-0.33	-0.18
		(0.34)	(0.43)		(0.50)	(0.65)
Time Varying Size effects	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes
Observations	90,968	85,550	85,550	88,820	83,559	83,559

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependant variable is the logarithm of the sales at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for observation level heteroskedasticity using the White's method.

Table 6: Sales Response to an Industry Shock: 2 digit Level Measure of Competition

Measure of Competition	1/Herfindahl		# of firms		1/Mark-up	
Intensity of Competition	Low	High	Low	High	Low	High
$\widehat{\log \text{sales}}_{st}$ ×Listed × (an>1990)	0.00	0.09***	-0.01	0.08***	0.01	0.12***
	(0.03)	(0.02)	(0.04)	(0.03)	(0.04)	(0.04)
$\widehat{\log \text{sales}}_{st}$ ×Listed	0.00	-0.05**	0.01	-0.06***	-0.06	0.03
	(0.04)	(0.02)	(0.05)	(0.02)	(0.04)	(0.04)
$\widehat{\log \text{sales}}_{st}$ × (an>1990)	0.00	-0.02*	0.01	-0.03***	0.00	-0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\widehat{\log \text{sales}}_{st}$	0.26***	0.07***	0.29***	0.10***	0.15***	0.20***
	(0.05)	(0.02)	(0.05)	(0.02)	(0.03)	(0.03)
Listed × (an>1990)	-0.28	-1.57***	-0.06	-1.49***	-0.39	-2.32***
	(0.59)	(0.56)	(0.71)	(0.48)	(0.64)	(0.84)
Listed	0.24	0.86*	0.06	1.17***	1.20	-0.57
	(0.73)	(0.45)	(0.93)	(0.40)	(0.69)	(0.75)
Time Varying Size effects	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes
Test equality (t-prob)	0.11		0.15		0.01	
Observations	37,332	48,218	39,448	46,102	38,040	47,510

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependant variable is the logarithm of the sales at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for observation level heteroskedasticity using the White's method.

Table 7: Correlation Between Innovation on Sales and Industry Sales

	Log Sales		Log Empl.	
	Model 1	Model 2	Model 1	Model 2
$\widehat{\log \text{sales}}_{st}$ ×Listed × (an>1990)	-	0.22**	-	0.20**
		(0.12)		(0.09)
$\widehat{\log \text{sales}}_{st}$ ×Listed	-	-0.16	-	-0.05
		(0.11)		(0.05)
$\widehat{\log \text{sales}}_{st}$ × (an>1990)	-	-0.11***	-	-0.05**
		(0.03)		(0.02)
$\widehat{\log \text{sales}}_{st}$	0.19***	0.25***	0.06***	0.08***
	(0.02)	(0.02)	(0.02)	(0.02)
Listed × (an>1990)	-	-0.02*	-	-0.01
		(0.01)		(0.01)
Listed	-	-0.00	-	-0.00
		(0.01)		(0.01)
Time Varying Size effects	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes
Observations	79,017	78,636	71,035	68,306

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependent variable is the logarithm of employment at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for observation level heteroskedasticity using the White's method.

Table 8: Being initially part of the Leading Stock Market Index

	Listing Status Changes			Stockmarket Index		
	All	Stayers	Changers	Post 1987	Not CAC40	CAC40
$\widehat{\log \text{sales}}_{st}$ ×Listed × (an>1990)	0.08***	0.09**	0.04*	0.06***	0.05**	0.38***
	(0.02)	(0.04)	(0.03)	(0.02)	(0.02)	(0.14)
$\widehat{\log \text{sales}}_{st}$ ×Listed	-0.04*	-0.02	-0.04*	-0.00	0.01	-0.31**
	(0.02)	(0.11)	(0.02)	(0.03)	(0.02)	(0.16)
$\widehat{\log \text{sales}}_{st}$ × (an>1990)	-0.01	-0.01	-0.01	-0.01	-0.00	-0.35***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.14)
$\widehat{\log \text{sales}}_{st}$	0.13***	0.11***	0.22***	0.14***	0.13***	0.52***
	(0.02)	(0.02)	(0.06)	(0.02)	(0.02)	(0.18)
Listed × (an>1990)	-1.53	-1.77***	-0.79*	-1.11***	-1.07***	-6.54***
	(0.38)	(0.71)	(0.46)	(0.40)	(0.45)	(2.48)
Listed	0.81	-	0.67*	0.27	-0.21	5.70**
	(0.44)		(0.34)	(0.50)	(0.57)	(2.82)
Time Varying Size effects	yes	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes	yes
Observations	85,550	72,420	13,130	44,890	42,687	2,203

Source: Tax files and Financial relation survey (INSEE) over the 1984-1999 period. The dependant variable is the logarithm of the sales at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. In model 2, year dummies are interacted with log(assets) to control for time varying size effects are included. Standard errors correct for observation level heteroskedasticity using the White's method.

Appendix

A The Entry Decision

We perform here a robustness check of our model by allowing for free entry on the product market and on the stockmarket: the total number of firms n, the share of publicly listed firms, μ_L, and private firms, μ_P, are now endogenously determined. Most of our results are robust to this change.

The entry decision and the decision to go public are made at period 0. The timing is now: $t = 0$, entrepreneurs enter on the market and decide to list or not on the stockmarket; $t = 1$: entrepreneurs choose their customization strategy s; $t = 2$: financial market clears up; $t = 3$: uncertainty is revealed and production takes place.

In a very standard way, the entry decision entails a fixed cost κ (labelled in term of foregone consumption units). In the same way going public entails an extra fixed IPO cost, $\Gamma\mu_L$, that is increasing in the share of listed firms μ_L. An entrepreneur therefore decides to enter on the market and to list (resp. not to list) if her net consumption gain of managing a public firm (resp. a private firm) is larger than the consumption of being a worker only:

$$U^P - \kappa \geq \frac{w}{P} \tag{34}$$

and

$$U^L - (\kappa + \Gamma\mu_L) \geq \frac{w}{P} \tag{35}$$

At equilibrium those conditions hold as equality and using [15], [17] and [22] this gives μ_L, the fraction of listed firms:

$$\mu_L = \frac{\phi L - 1}{2a\Sigma\Gamma} \tag{36}$$

which is increasing in the number of investors ϕ and decreasing in the agents' risk aversion a, the taste shocks' variance Σ and the cost of listing Γ. Using [16], [18], [22], [34], [35] and [36], we get:

$$n = \left(\frac{(\kappa a\Sigma - 1/2)\sigma}{a\Sigma L}\right)^{(\sigma-1)/(2-\sigma)} \cdot \left[1 + (\frac{(\phi L - 1)^2}{2a\Sigma\Gamma} + 1)\frac{1}{\kappa a\Sigma - 1/2}\right]^{-1} \tag{37}$$

and

$$s_P = \frac{1}{\kappa a\Sigma - 1/2} \text{ and } s_L = \frac{\phi L}{\kappa a\Sigma - 1/2} \tag{38}$$

Result: Under free entry, the impact of financial liberalization on non listed firms disappears: the pro-competitive effect is counterbalanced by the decrease in the number of active firms n.

The intuition is the following. An increase in ϕ promotes s_L, customization among listed firms; this makes π_0/P smaller and thus promotes s_P, customization among non listed firms (this is the pro-competitive effect). All in all, this makes π_0/P smaller which discourages entry on the product market: as a consequence, the total number of active firms, n, decreases (see equation [37]); this in turn makes π_0/P increase until reaching its level before financial liberalization (the pro-competitive effect cancels out); and so s_P goes back to its pre-liberalization level.

This discussion shows that under free entry, financial liberalization has no impact on s_P because the pro-competitive effect vanishes out as the increase in s_L is exactly compensated by the decrease in n. We believe that this extreme result is due to the functional form of entry costs assumed here for facilitating computations. A more general form (such as entry costs increasing and convex in n) would keep active the pro-competitive effect but in a attenuated way. Hence we would get that under free entry, the impact of financial liberalization on non listed firms is partially reduced with respect to the basic framework.

Table 9: The Technology Hypothesis: Controlling for Skill Upgrading

Measure of Skill Upgrading	None	"Development"	Skill>High	Skill>Very High	Skill>Medium
$\widehat{\log \text{sales}}_{st}$×Listed × (an>1990)	0.07***	0.07***	0.07***	0.07***	0.07***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
$\widehat{\log \text{sales}}_{st}$×Share of Skilled	-	-0.03	0.09***	0.09***	0.04*
		(0.06)	(0.03)	(0.04)	(0.02)
$\widehat{\log \text{sales}}_{st}$×Listed	-0.04*	-0.04*	-0.04*	-0.04*	-0.04*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
$\widehat{\log \text{sales}}_{st}$× (an>1990)	-0.00	-0.00	-0.01	0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$\widehat{\log \text{sales}}_{st}$	0.12***	0.12***	0.07***	0.09***	0.08***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Listed × (an>1990)	-1.31***	-1.31***	-1.27***	-1.29***	-1.30***
	(0.34)	(0.34)	(0.34)	(0.34)	(0.34)
Listed	0.87**	0.88**	0.84*	0.87**	0.86**
	(0.42)	(0.43)	(0.42)	(0.42)	(0.42)
Share of Skilled	-	0.38	-1.81***	-1.82***	-0.89**
		(1.08)	(0.52)	(0.68)	(0.44)
Time Varying Size effects	yes	yes	yes	yes	yes
Firm effects	yes	yes	yes	yes	yes
Observations	67,995	67,995	67,995	67,995	67,995

Source: Employment Structure Survey (ESE), Tax files and Financial relation survey (INSEE) over the 1984-1999 period. These estimates use the fraction of skilled workers as a control. Column 1 reproduces estimation of the basic model for the subsample of firms for which the Employment Structure survey allowed us to retrieve the skill structure. Column 2 uses the share of workers invovled in R&D and marketing as the measure of skill. Column 3 uses the fraction of very high skilled workers ("Managers"). Column 4 uses the fraction of high and very high skilled workers ("Managers" and "Supervisors"). Column 5 uses the fraction of medium, high and very high skilled workers ("Manager", "Supervisors" and "Skilled Employees/workers"). The dependant variable is the logarithm of the sales at the firm level. The "listed" dummy equals one when the firm is itself listed on the French stock market or when its group leader is. Sample: To control for privatizations, we removed from the sample all firms that were at some point state owned, even partially. Standard errors correct for observation level heteroskedasticity using the White's method.

B Context of the French Stockmarket Reforms.

France has experienced in the 1980s one of the deepest and most comprehensive financial reforms in Europe (Melitz [1990]). The irony is that it was started by a socialist government, that had nationalized most of the banking system in 1982, and was therefore not known for being friendly to the financial industry. The reasons why such reforms were undertaken then were at the same time institutional, macroeconomic and microeconomic in nature. First, there had already been an attempt to open capital markets of member states of the European Union in the early 1960s, but by the late 1960s, further attempts were blocked by France, while Germany and the Benelux countries seemed to be relatively compliant. By 1984, the european comission took charge again and urged the reluctant member states to comply with a detailed process of deregulation of capital flows that would yield to total freedom of movement by 1990. But this time, the commission's interests coincided with that of the French government, for economic reasons.

After the failed stimulation of 1981-1982, the French economy was entering a severe crisis that had both short and long run causes; the French industry was quickly loosing competitiveness, partly because part of the necessary restructuring had been delayed (as opposed to, for example, Germany), and partly because of a chronic high inflation since the second oil shock. As a result, the French franc lost 20% with respect to the DM in 1981-1982, and the country was quickly accumulating a large external debt. External debt was as high as 9% of GDP in 1984, and while this ratio was small compared to Sweden, Norway, or even Italy, the absolute size of France's GDP made its external debt one of the largest in the world. As often happens in these cases, the rise in external debt was paralleled by a quick rise of the government debt, as successive governements had tried to stimulate the economy, without generating sustainable growth.

The high level of government spending, as well as the increase in interest rates that was required to sustain the Franc's parity with the DM, raised concerns that corporate investment was never going to recover, crowded out by public debt and monetary policy. This was particularly a problem for the then large public sector which needed equity finance to restructure and clean its balance sheets, while a heavily indebted state was not in a position to provide the needed fresh capital. That is why Jacques Delors and Pierre Bérégovoy, its successor as finance minister, undertook reforms of the financial system: the purpose was to channel saving to investment bypassing the banking system, who also needed to get rid of its poorly performing loans and whose ability to lend to the productive sector was temporarily impaired.