An International Portfolio Theory of Export Performance

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Noting the difficulties in measuring financial performance of export especially for small and medium companies, we develop a new measurement approach grounded on modern portfolio theory. Supposing that company managers are risk adverse and rational, they are supposed to export to obtain a better risk return relationship for their companies. Using modern portfolio techniques allows deducing the margin ratio, the risk and the correlation with domestic activities of export activities using only information contained in companies' financial statement. This information is: export intensity and global financial performance of exporting companies. Using a sample of 413 French exporting companies in the wine industry on the period 2002-2006, these implicit financial export performance characteristics are estimated. The mean of implicit margin ratios is higher for export activities than for domestic ones but the margin to risk ratios are similar. Implicit correlation between domestic and export activities are highly negative, exports seems to offer very important diversification gain.

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Introduction

Studies on export performance determinants are numerous testifying the importance of the issue in the literature (for different overviews, see Madsen, 1989; Aaby and Slater, 1989; Gemünden, 1991; Chetty and Hamilton, 1993; Zou and Stan, 1998; and Leonidou, Katsikeas, and Samiee, 2002). However, despite considerable research, the evidence on the factors affecting export performance is largely fragmented and often contradictory (Aaby and Slater, 1989; Cavusgil and Zou, 1994; Zou and Stan, 1998). One important explanation is the lack of agreement on how to conceptualize and make operational export performance. Researchers wonder if existing results are either a consequence of the variables related to export performance or of its operationalization (Zou, Taylor, and Osland, 1998).

Operationalization of performance measures seems often drive the definition itself, most likely because of issues related to data availability (Boulding and Staelin, 1995). It is difficult to access to archival data because companies do not report the financial details of their export activities (Katsikeas, Leonidou, and Morgan, 2000). Specification and assessment of costs and benefits associated with export activities are also problematic because such costs are inherently related to how a company views these activities (Leonidou, Katsikeas, and Samiee, 2002). Thus, both objective and subjective export performance data are dependent on companies' view of their export activities.

In the export performance literature, financial performance measures used are profit-related measures. Sousa (2004) built a review of empirical literature published between 1998 and 2004 about export performance measures. He gathered about 50 different export performance indicators and found that the most frequently used ones were "*export intensity (export-to-total sales ratio), export sales growth, export profitability, export market shares, satisfaction with overall export performance and perceived export success" (p. 8).* Objective measures of profitability are open to criticism because due to the lack of data, they may not be known with

any degree of certainty (Samiee and Anckar, 1998). When managers are unwilling or unable to provide objective financial data (Katsikeas, Piercy, and Loannidis, 1996; Haahti *et al.*, 2005; Brouthers and Nakos, 2005; Favre-Bonte and Gianellonni, 2007), subjective measures of profitability, i.e. perceived values of the variables, can be the solution but they are also subject to several sources of biases. Company officials are under no obligation to disclose information on exports and are often reluctant to disclose information on a single segment of their business. So, indicators used to represent export profitability are qualitative scales indicating the perceived profitability of exports in comparison to domestic activity or the export performance of competitors (Bilkey, 1982; Moini, 1992; Rose and Shoham, 2002). The majority of exporters are SMEs (this is the case in the French wine industry studied below), lacking of appropriate export accounting mechanisms. However, Bilkey (1982, p. 42) reported that "*management's perceptions of the relative profitability of exporting are somewhat "rubbery" but not necessarily erroneous yardstick for evaluating export marketing practices"*. We can find a confirmation of these results in the strategic literature where there is evidence of the reliability of subjective self-reported performance measures and of significant correlation between subjective and objective measures (Dess and Robinson, 1984; Pearce, Robbins, and Robinson, 1987; Venkatraman and Ramanujam, 1986, 1987; Dawes, 1999).

For many years, international portfolio theory has been mobilized to explain international business investment decisions. Following this approach, companies invest in different foreign markets to maximize their flow of profits while minimizing their risk exposure to the economic shocks arising from the domestic market (Rugman, 1971; Rugman and Verbeke, 1992). This risk management view of international diversification of companies' assets has been supported by numerous studies (Simpson and Kujawa, 1974; Cavusgil and Naor, 1987; Porter, 1990; Ogbuehi and Longfellow, 1994; Shrader *et al.*, 2000). But due to changes in currency value, foreign market taxes on dividend, risks in foreign countries that are not present in the domestic market some authors find that the diversification gain is low or even negative (Calvet, 1981; Globerman, 1986). Following this approach the profit due to export activities is an important dimension of financial performance but it is not the only one. Two other important dimensions for investors and managers are missing: the risk of export activities and their contribution to diversification gains (the contribution of export activities to the overall risk of the company). Those last two dimensions are sometimes taken into account in theoretical studies (Edmunds and Khoury, 1986) but are not used in empirical ones.

Assuming that company's managers are rational, and following portfolio theory (Markowitz, 1952, 1959), they must choose their various activities so as to maximize the global return to risk relationship of the company. Companies undertake export activities only if they contribute to improve the global return to risk ratio of the company. This objective can be achieved in two ways: the return to risk ratio of export activities is higher than that of domestic ones and/or export activities offer a diversification gain (their correlation with domestic activities justifies their introduction in the company's portfolio of activities). The more export activities are interesting (following these criteria), the more the company has to invest in them.

The measures of export performance we propose are a combination of the properties of financial export measures presented above. They are subjective in the sense that they are deduced from the behavior of company management (how much the company chooses to export) but used objective easily accessible data i.e. financial statements. More specifically, to measure the three dimensions of financial performance (profit, risk and diversification) of exports, it will be necessary to know return and risk generated by export activities and their

correlation with the domestic ones. Unfortunately, these data are hardly available to researchers and often to companies' managers themselves specifically in small and medium-sized companies. To overcome this difficulty, we propose a strategy directly inspired by a method commonly used in finance. The objective of the method is to deduce the value of anticipations made by investors of some parameters of interest by applying a quite generally accepted financial model to available data. A famous example of this strategy is the so-called implicit volatility (Latane and Rendleman, 1976) where the volatility of future asset returns anticipated by market participants is estimated by using market data on options pricing and inverting the famous Black and Scholes (1973) formula. In our case, we want to infer from data available in companies financial statements (export intensity, company profit), the return, risk and correlation of export activities using a simple model of portfolio theory. It is the reason why we will call our measures of financial performance of export, implicit financial performance. This method has already been used in the literature on international portfolio theory (French and Poterba, 1991; Glassman and Riddick, 2001; and Jeske 2001). The main difference is that in these studies the variance covariance matrix is known that is not the case here. One drawback of this approach is that the quality of the implicit performance measure depends on the validity of the international portfolio theory as a determinant to export.

In short, the present study contributes to the financial export performance measures in two ways. First, it proposes a more complete set of measures of financial export performance by introducing risk and diversification effects and second, a way to overcome the lack of data availability to make operational these measures.

The article is set out as follows. In the second section, we construct the portfolio optimization model applying to the combination of companies activities (domestic and export). In the third section the estimation procedure and some adaptations are presented to obtain a testable form of the theoretical model. The fourth section describes the sample selection method and data. Fifth section is devoted to results presentation and analysis. The sixth section offers conclusion.

Expected Utility of Profit Maximization

To know the success of exporting (particularly in SMEs), an important issue is how pleased the owner-manager is with the internationalization project. The management anticipation of the performance of exports seems to us one of the main drivers of export decisions. However, contrary to the qualitative methodology where anticipations of export performance and/or satisfaction of export activities are directly asked to managers, we will not use data on management anticipation or satisfaction but we will try to infer these variables from the actual decision taken. The problem is to choose an adequate decision model. Two important approaches exist in international portfolio theory, the classical expected utility maximization model assuming perfectly rational behavior of individuals and the behavioral approach. The last one is an important explanation of why export intensity could be lower than expected. Domestic investors consider foreign markets as more risky than they truly are, simply because they are foreign (Huberman, 2001; Solnik, 2006). Or, because they are overconfident, they overinvest in domestic assets because they are familiar with (Barber and Odean, 2001, 2002; Karlsson and Norden, 2007). In spite of several well known limitations we choose expect utility theory first because it appears to be more flexible (for instance familiarity driven investment decisions can be seen as a rational response to information constraint and not a

behavioral heuristic (Massa and Simonov, 2006)) and second because we want to obtain quantitative solutions to the sales diversification problem and hence quantitative performance measures of export.

Expected utility of profit

Companies seek the combination of domestic and export activities so as to maximize expected utility of global margin:

$$E[u(\tilde{m}_G)] = E[u(\tilde{m}_D S_D + \tilde{m}_X S_X)] \qquad (1)$$

With $\tilde{m}_G$: global margin, $\tilde{m}_D$: random unit margin of domestic activities (in % of sales), $\tilde{m}_X$: random unit margin of export activities (in % of sales), S_D : domestic sales, S_X : export sales, U(.) : utility function, E(.) : denotes expectation. The sales constraint is the following: $S_D + S_X = S$ or dividing by total sales, S: $s_D + s_X = 1$.
Total sales potential is given at this step, meaning that companies have the opportunity to sell their products on the domestic market and in various foreign countries. We suppose that the choice of these foreign countries has been made at a preceding step and depends on various internal and external factors that will not be studied here. In short, the opportunity set (the various export markets accessible to the company) is supposed given. We concentrate on the optimal combination of these given potential foreign markets.

Risk attitude

Taking into account the scarcity of information on risk attitude contained in financial statements, we choose to describe management risk attitude by using only one parameter. That choice means that flexible utility function methods cannot be used because they necessitate at least estimation of two parameters (Chavas and Holt, 1996; Saha, 1997; Kumbhakar 2001, 2002a, 2002b; Kumbhakar and Tveteras, 2003; Isik and Khanna, 2003; Abdulkadri, Langemeier, and Featherstone, 2003).
If database with more information were available, the methodology could take into account more sophisticated utility functions. However studies by Kallberg and Ziemba (1983) and Cerny (2004) suggest that, given the same level of risk aversion, differences in optimal decisions induced by different structures of risk aversion are negligible, except for very large and skewed risks. Moreover Lence (2008) cast doubt on the precision of risk parameters estimation using joint estimation of risk preferences and technology.
In consequence, we choose a very classical approach in the mean-variance portfolio theory. The expected utility function is transformed (Pratt, 1964) in a mean variance objective function, and equation (1) becomes:

$$E[u(\tilde{m}_G)] = E[(\tilde{m}_D s_D + \tilde{m}_X (1 - s_D))] - \frac{\lambda}{2} V[(\tilde{m}_D s_D + \tilde{m}_X (1 - s_D))] \qquad (2)$$

With λ : Arrow Pratt coefficient of risk aversion, $\lambda > 0$.

This utility function needs the elicitation of the Arrow Pratt risk aversion coefficient for each company. As we want to compare performance of individual companies we don't use an arbitrary constant coefficient of risk aversion as it is done in the literature on the inversion

problem (Glassman and Riddick (2001) and Jeske (2001) use a common coefficient of 3). We can separate methods used for the coefficient of risk aversion elicitation in three families:

- Direct elicitation from experimental data or responses to hypothetical questions by the decision maker (Binswanger, 1980; Arrondel, Masson and Verger, 2004),
- Indirect approach using marketed assets prices behavior (see Bliss and Panigirtzoglou (2004) table 7 for a synthetic review of this approach),
- indirect approach using the observation of production and/or investment choices under risk (Brink and McCarl, 1978; Love and Buccola, 1991; Saha, Shumway, and Talpaz, 1994; Chavas and Holt, 1996; Kumbhakar, 2002a).

Obviously the first two approaches are infeasible using only financial statements data information set. Financial statements do not provide information on volume or specific expenses needed to export so we cannot apply the production function approach. Finally we do not get enough data to make sophisticated estimation of these coefficients as proposed by Walls and Dyer (1996) in the context of the oil industry. The Walls and Dyer method supposes the capability to compute the certainty equivalent of risky prospect. In the oil industry, exploratory budgets are known and can be interpreted as the certainty equivalent of the risky prospecting activity. Such data as a certainty equivalent of risky activities are not available in the context of SMEs and specifically in the French wine industry. Moreover, such a sophisticated estimation will be out of the scope of this paper because our objective is not to obtain precise value of risk aversion coefficients but to have the possibility to compare the degree of risk aversion of companies in the sample. We develop a methodology directly inspired by portfolio theory simplifying the production/investment choice under risk approach. The technical aspects of elicitation of the coefficient of risk aversion are described in appendix1.

Optimal Proportion between Domestic and Export Activities

The optimal proportion of domestic activities for the company i in t are given by the first order condition of expected utility maximization:

$$s^{*}_{Dit} = \frac{E(\tilde{m}_{Dit}) - E(\tilde{m}_{Xit}) + \lambda_i [V(\tilde{m}_{Xit}) - \sigma_{Dit}\sigma_{Xit} Cor(\tilde{m}_{Dit}, \tilde{m}_{Xit})]}{\lambda_i [V(\tilde{m}_{Dit}) + V(\tilde{m}_{Xit}) - 2\sigma_{Dit}\sigma_{Xit} Cor(\tilde{m}_{Dit}, \tilde{m}_{Xit})]} \qquad (3)$$

The variation in time of the optimal proportion of domestic activities could depend on the evolution of expected domestic and export margins, margins risk and correlation and the coefficient of risk aversion. We suppose a constant risk aversion coefficient for a given company. We also suppose that the variance of domestic margin, the variance of export margin of each foreign markets and the correlation between each foreign market and domestic activities are structural properties of the domestic and foreign markets and therefore constant. However global export margin risk and correlation with domestic margin can vary due to the modification of the universe of the company. If the company expands its export universe the variance and correlation of global export margin should decrease. Supposing that the export universe is constant, the only remaining explanation to the variation in time of the optimal proportion of domestic activities is the variation of the anticipated margin gap between domestic and export activities. Because of the discrepancy between the economic cycles of domestic and export markets one can easily imagine that the margin gap is not constant. Company changes the optimal proportion of domestic activities depending on its anticipation of the margin gap between domestic and export activities in the period. In short, using the

portfolio management vocabulary, managers are timing the domestic and international markets.

We suppose that anticipation of the margin gap made by company i for period t ($mgap_{it}^{A}$) are unbiased. Technically, we have the following properties $mgap_{it}^{A} = mgap_{it} + \varepsilon_{it}$ with $E[\varepsilon_{it}] = 0$ and $V[\varepsilon_{it}] = \sigma_{\varepsilon i}^{2} > 0$ with $mgap_{it}$, actual margin gap for company i in t and ε_{it} unbiased error in prevision.

So the mean anticipated margin gap is equal to the mean of the actual one and the variance of the anticipated margin gap is superior to the actual one. Moreover we suppose that errors of prevision are uncorrelated with the level of margin gap to obtain:

$$V\left[mgap_{it}^{A}\right] = V\left[mgap_{it}\right] + \sigma_{\varepsilon i}^{2} \qquad (4)$$

The optimal proportion in t for t = 1,…,T can be now written as:

$$s_{Dit}^{*} = a \times mgap_{it}^{A} + b \qquad (5)$$

with $a = \dfrac{1}{\lambda_i V\left(mgap_{it}\right)}$ and $b = \dfrac{V\left(\tilde{m}_{X_i}\right) - \sigma_{D_i}\sigma_{X_i} Cor\left(\tilde{m}_{D_i}, \tilde{m}_{X_i}\right)}{V\left(mgap_{it}\right)}$

The optimal proportion of domestic activities is a linear function of the anticipated margin gap.

Determination of Financial Characteristics of Domestic and Export Activities

To obtain the financial characteristics and performance of export and domestic activities, we suppose that the actual proportion of domestic activities is equal to the optimal one and inverse equation 3. In effect from the T financial statements available for company, i, we can extract only two relevant series: the series of T export intensities and the series of T global margin ratios. In this section, we demonstrate that the information contained in this two series is sufficient to compute the six remaining unknowns appearing in equation five: expectation and variance of margin gap plus $E\left(m_{Xit}\right)$, $V\left(m_{Xit}\right)$, $Cov\left(m_{Xit}, m_{Dit}\right)$ and $\sigma_{\varepsilon i}^{2}$. To achieve this goal we must extract at least six equations from the two time series.

Taking expectation and variance of the optimal domestic proportion given in equation (5) permit to obtain the two first equations:

$$E\left(s_{Dit}^{*}\right) = aE\left(mgap_{it}^{A}\right) + b \qquad (6)$$

$$V\left(s_{Dit}^{*}\right) = a^{2}V\left(mgap_{it}^{A}\right)$$

$$\sigma\left(s_{Dit}^{*}\right) = \frac{1}{\lambda}\left[\frac{\sigma\left(mgap_{it}^{A}\right)}{V\left(mgap_{it}^{A}\right) - \sigma_{\varepsilon i}^{2}}\right] \qquad (7)$$

Optimal proportions fluctuations are a positive function of the variations of anticipated margin gap and of the variance of errors in prevision and a negative function of risk aversion.

From financial statements one can compute expectation, variance of global margin, and the covariance between global margin and optimal proportion of domestic activities.

For t = 1…T, global margin is equal to: $m_{Git} = m_{Xit} + s_{Dit} mgap_{it}$ (8)

In appendix 2 we demonstrate that expected global margin is given by

$$E(m_{Git}) = E(m_{Xit}) + Cov(s_{Dit}, mgap_{it}^{A}) + E(s_{Dit})E(mgap_{it}^{A}) - a\sigma_{\varepsilon i}^{2} \quad (9a)$$

The mean of global margin is equal to the mean of anticipated global margin (the three first terms in the right hand side of equation (9a)) less the impact of prevision errors on company global performance. Note that as the optimal proportion of domestic activities is a linear function of the margin gap, the correlation coefficient between the two random variables is equal to one:

$$Cor(s_{Dit}^{*}, mgap_{it}^{A}) = \frac{Cov(s_{Dit}^{*}, mgap_{it}^{A})}{\sigma(s_{Dit}^{*})\sigma(mgap_{it}^{A})} = \frac{aV(mgap_{it}^{A})}{a\sigma(mgap_{it}^{A})\sigma(mgap_{it}^{A})} = 1$$

Thus the covariance between the optimal proportion and the anticipated margin gap can be simplified as $Cov(s_{Dit}^{*}, mgap_{it}^{A}) = \sigma(s_{Dit}^{*})\sigma(mgap_{it}^{A})$, and using equation (7)

$$Cov(s_{Dit}^{*}, mgap_{it}^{A}) = aV(mgap_{it}^{A}) = \frac{1}{\lambda}\frac{V(mgap_{it}^{A})}{V(mgap_{it}^{A}) - \sigma_{\varepsilon i}^{2}} \quad (10)$$

By replacing the covariance in (9a) by its expression given in (10), we obtain another decomposition of global margin:

$$E(m_{Git}) = E(m_{Xit}) + \frac{1}{\lambda}\frac{V(mgap_{it}^{A})}{V(mgap_{it}^{A}) - \sigma_{\varepsilon i}^{2}} + E(s_{Dit})E(mgap_{it}^{A}) - \frac{1}{\lambda}\frac{1}{V(mgap_{it}^{A}) - \sigma_{\varepsilon i}^{2}}\sigma_{\varepsilon i}^{2}$$

$$E(m_{Git}) = E(m_{Xit}) + E(s_{Dit})E(mgap_{it}^{A}) + \frac{1}{\lambda} \quad (9b)$$

Expectation of global margin is equal to the expression in equation eight with all the random variables replace by their expectation plus a correction equal to the inverse of the coefficient of risk aversion.

From equation (8) and making the restrictive assumption that export intensity and the margin gap are multivariate normal random variables we can also deduce an approximation of the expression of the variance of global margin (see appendix 2):

$$V(m_{Git}) = V(m_{Xit}) + \left(\frac{1}{\lambda^2 V(mgap_{it})^2}\right) \{4E(mgap_{it})^2 V(mgap_{it}) - K^2\lambda^2 V(mgap_{it}) + \sigma_{\varepsilon i}^2 [V(mgap_{it}) + E(mgap_{it})^2]\} \quad (11)$$

With $K = V(m_{Xit}) - Cov(m_{Dit}, m_{Xit})$

In appendix 2, under the same assumptions of multivariate normality, the covariance between global margin and optimal proportion of domestic activities is found to be:

$$Cov(m_{Git}, s_{Dit}) = \frac{E(mgap_{it})}{\lambda^2 V(mgap_{it})}\left[2 + \frac{\sigma_{\varepsilon i}^2}{V(mgap_{it})}\right] \quad (12)$$

Up to this point we only have five equations; to obtain one more independent equation we make an Ordinary Least Square (OLS) of global margin on proportion of domestic activities, and take expectation of both side of the equation:

$$E(m_{Git}) = \alpha_i + \beta_i E(s_{Dit}) \quad (13)$$

From the definition of beta and using equations (7) and (12) we write:

$$\beta_i = \frac{Cov(m_{Git}, s_{Dit})}{V(s_{Dit})} = \frac{E(mgap_{it})}{\lambda^2 V(mgap_{it})}\left[2 + \frac{\sigma_{\varepsilon i}^2}{V(mgap_{it})}\right]\frac{(\lambda V(mgap_{it}^A))^2}{V(mgap_{it}^A)}$$

And after simplifications $\beta_i = E(mgap_{it})\left[2\frac{V(mgap_{it})}{V(mgap_{it}^A)} + \frac{\sigma_{\varepsilon i}^2}{V(mgap_{it}^A)}\right]$ (14)

Note that the term between brackets of equation (14) is roughly equal to two. So researcher only interested by an approximate measure of differential financial performance between domestic and export activities can use a very simple method to obtain the difference between the domestic and expected margin: implement an OLS of global margin on proportions of domestic activities and divide the beta by two. For a more complete analysis of domestic and exports financial characteristics we have to solve a non linear system of six equations (6), (7), (9), (11), (12) (13) with six unknowns: expectation and variance of margin gap plus $E(m_{Xit})$, $V(m_{Xit})$, $Cov(m_{Xit}, m_{Dit})$ and $\sigma_{\varepsilon i}^2$.

Sample Selection and Data

We investigate the feasibility of the approach presented above on a sample of companies in the French wine industry. The export performance determinants in this industry have already been investigate at the international level (Castaldi, Sengupta and Silverman, 2003; Woods and Kaplan, 2005). The specific case of the French wine industry was chosen for two reasons. First, the wine industry has been exposed for some years to the combined effects of globalization and of an exacerbated international competition (Anderson (2004)). For the

French wine industry, this process of globalization coming as it does in a context of oversupply that has become structural, offers both threats and opportunities. The major opportunity stems from the growth in foreign markets which offers an alternative to a stagnating, not to say declining, home market. Among other things, threats are due to an extended competition on all market segments, in particular that of quality wines which have developed a competitive advantage by implementing efficient commercial policies, as well as competitive costs also related to the size of firms and lighter regulations. Second, from a macroeconomic point of view, wine and spirits constitute the first exporting sector of the French food sector and one of the most important French exporting sectors with 9 billions euros in 2007 following the data of the French customs (DGDDI). Taking into account the strategic role of exports in the wine industry at the company and country level, it seems to us relevant to investigate the financial export performance of companies in this particular industry.

We used data from Diane database constructed by Bureau van Dijk (www.bvdep.com). It contains financial data on French listed and non listed companies; the European and World counterparts are Amadeus and Orbis. We used data from a quite short period (2002 to 2006) to be coherent with the hypothesis of constant exporting universe. We selected companies with activities linked to the production and selling (retailing or wholesaling) of wine. Our sample is composed of 413 exporting companies and 135 purely domestic companies. The main criteria to select export companies is the availability of their export intensity (ratio total sales to export sales) during the period. Only companies with mean export intensity on the period 2002-2006 superior to 10 per cents are chosen. They correspond to companies belonging to the active and committed internationalization stages (Cavusgil, 1980, 1984; Gankema, Snuif, and Zwart, 2000).
These companies export on average 35 per cents of their turnover. Close to 85 per cents of them have less than 50 employees and are thus small companies, according to the European definition (recommendation 2003/361/CE). Some of them are subsidiaries of groups. However, for 70 per cents of them, family represents the main source of funds (over half the capital).
Variables are defined as follows:

- Export intensity: the annual ratios $\frac{Export\,turnover}{Total\,turnover}$.
- Expected margin ratio: annual ratios $\frac{EBITDA}{Total\,turnover}$ (EBITDA, Earnings Before Interest, Taxes, Depreciation and Amortization).

Table 1.a. describes the main global characteristics of the exporting company sample compare to a sample of 135 purely domestic companies in the same industry.

[Insert table 1a about here]

As we can see, exporting companies are not significantly larger than domestic ones. There is no size effect between companies from the two sub-samples. The mean of global margin ratios of exporting companies is higher than that of domestic ones which shows that exporting companies are globally more profitable than domestic ones. Moreover, the financial performance ratio, i.e. the margin to risk ratio (MRR) is also higher for exporting firms but it is not significant.

The mean standard deviation of margin ratios is significantly higher for domestic companies. At first sight, it could be surprising because the export activity is said to be more risky and is supposed to increase the volatility of the global margin of exporting firms. However, this result can be interpreted as the fact that export activities come and diversify the risk and finally reduce the global risk of exporting companies.
So export activities generate higher (but not significant) margin expectation and a significant lower risk. Thus, the global financial performance appears to be better for exporting companies even if not statistically significant.
The following table (1.b.) comes and completes the description of the two sub-samples. One can see the composition of these samples according to the firm age, firm size, type of wine sold, legal form, capital structure and producing region.

[Insert table 1b about here]

Domestic and exporting firms appear to be quite similar on several features. They are composed by a majority of small companies aged below fifty years old and selling still wine. The legal forms which are the most commonly adopted by wine companies are stock companies forms followed by limited liability company forms. In more than half the firms, whether domestic or exporting, the majority of financial resources come from the family. The only characteristic enabling us to discriminate the two samples is the location of the firms. Exporting firms are more represented in such region as Burgundy and Bordeaux whereas they constitute a minority in the South West and Provence producing region, where the domestic market is the main target. Champagne, Languedoc-Roussillon and Rhone each gather hardly as many domestic firms as exporting ones.

Empirical Results

Using the solver of Excel we solve numerically 413 (one for each company) non linear systems. Statistical characteristics of solutions are presented in table 2. Export activities of exporting companies have higher implicit margin (8.35 % against 3.58 %, table 2) than their domestic activities. Implicit margin mean of domestic activities of exporting companies (3.58 %, table 2) is half of the observed margin of purely domestic companies (7.10 %, table 1a). Following these results, French wine companies are exporting essentially because they are less profitable in the domestic market than their purely domestic competitors and not because they expect big export margin. That can also explain why some companies choose to stay purely domestic.

Implicit risk of domestic and export activities are similar (35.50 % and 33.86 % respectively, table 2). This result seems to contradict the behavioural explanation of a much higher perceived risk of exports. Note that the implicit risk of domestic and export activities is much higher that the observed risk of global margin of exporting and purely domestic companies (table 1a). Moreover all the implicit coefficients of correlation are negative and their mean is below -0.9. Export appears to offer very important diversification gains. This result can be explained by the existence of a domestic bias. If investors are rational but face various obstacles to export, their export intensity is constrained to be low so the optimal strategy is to choose export markets offering the best diversification gain (Errunza and Losq, 1985; Eun and Janakiraman 1986; Hietala, 1989).

Despite this explanation, exporting companies seems to adopt a surprising strategy: to obtain relatively low global risk they combine very risky negatively correlated domestic and export activities. We know that domestic activities are not necessarily very risky because the mean standard deviation of purely domestic companies is relatively low, so exporting companies are not required to choose high domestic risk. To understand this result we must go back to the definition of the variance of the margin gap: high domestic and export risk and correlation highly negative means big margin gap.
From equation of the standard deviation of optimal proportion of domestic activities (equation (7)) it can be seen that high variance of the margin gap is associated with low standard deviation of s_D (in our sample coefficient of correlation are respectively of -0.1786 and -0.1787 for the anticipated and realized margin gap). The observed low fluctuations of s_D cannot be explained by our simple portfolio optimization model meaning that company managers are not portfolio optimizer or that transactions cost prevent export intensity to fluctuate as much as it should.

The margin to risk ratio of export is slightly inferior to the one of domestic activities. As expected, the performance of domestic activities of exporting companies is below the one of purely domestic companies. If company managers are supposed to be mean variance portfolio optimizer, exports seem better justified by the diversification gains than their intrinsic financial performance.

Table 3 shows that the simplified approach offers a very good approximation of the implicit margin gap. Sample statistics are very similar of those for the computed margin gap. The mean square error is very low meaning that individual approximate margin gaps are very close from the real implicit ones.

To explore if the implicit performance measures are redundant with existing performance measures of export, we calculate the coefficients of correlation of the expected implicit margin gap and the margin to risk ratio of export with two classical measures of export performance: export intensity and export intensity growth rate calculated for the 2002-2006 period (table 4). All coefficients of correlation are very low meaning that implicit measures are not redundant with traditional performance measures. Even if the mean of export intensity is a determining variable of the model, the correlation with margin to risk ratio is very low and negative with the implicit margin. The correlation between the variation of export intensity and the margin to risk ratio is positive during the period and quasi null for implicit margin gap.

Table 4. Correlation between performance measures

Coefficient of correlation	Export intensity	Export intensity growth rate
Implicit margin gap	-0.078	0.016
Margin to risk ratio of export	0.16	0.096

Conclusion

This study was aimed at operationalizing financial export performance using a simple model of modern portfolio theory and data available in financial statements. This was motivated by weaknesses of financial measures of export performance in the existing literature. Our

approach complements the traditional approach where financial performance of export is assessed through qualitative scales. Advantage of our approach is that we can obtain two important indicators giving information on the risk and the diversification gains of exporting activities. Moreover the use of data easily available to every researcher will improve the comparability of studies on export performance determinants.

Nevertheless, due to the fact that data specific to export activities are not available in financial statements, assessing their financial performance is difficult. Achieving this goal was constrained by several hypotheses: we considered that company managers are rational and risk adverse and choose export intensity following only modern mean variance portfolio theory. We also hypothesized that the coefficient of risk aversion of each company was only dependent on its choice of a specific point on the return to risk relationship. Even if these hypotheses appear to be highly constraining, our approach must be considered as a first attempt to deduce financial performance measure of purely “objective” data (financial statements).

The results of the empirical study on a sample of 413 French wine companies highlight the benefits of export activities in terms of diversification gains more than in terms of financial performance (MRR). However the implicit coefficient of correlation seems to be much lower that what we could expect for real ones and implicit risk of domestic and export activities higher that expected.

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Appendix 1. Estimation of the coefficient of risk aversion

We suppose that all exporting companies face the same opportunity set. This quite strong hypothesis is a little more acceptable in our case where all companies in our sample are in the same industry. For simplicity, the relationship between risk (standard deviation of margin) and expected margin is supposed linear. We conduct, using the sample of exporting companies, an Ordinary Least Square, (OLS), of margin ratios on standard deviation of these ratios:

$$m_{Gi}^{e} = \alpha_G + \beta_G \sigma_{Gi} \qquad \text{(A1-1)}$$

Supposing that each company chooses a point on the risk return line so as to maximize the mean variance expected utility (equation (2) in the text) [(1)], the following program has to be solved for company, i:

$$E\left(u\left(\tilde{m}_{Gi}\right)\right) = E\left(\tilde{m}_{Gi}\right) - \frac{\lambda_i}{2} V\left(\tilde{m}_{Gi}\right) \qquad \text{(A1-2)}$$

Using (A1-1), equation (A1-2) becomes: $E\left(u\left(\tilde{m}_{Gi}\right)\right) = \alpha_G + \beta_G \sigma_{Gi} - \frac{\lambda_i}{2}\sigma_{Gi}^2$ (A1-3)

The first order condition for the expected utility maximization is:

$$\frac{dE\left(u\left(\tilde{m}_{Gi}\right)\right)}{d\sigma_{Gi}} = \beta_G - \lambda_i \sigma_{Gi} = 0 \Leftrightarrow \lambda_i = \frac{\beta_G}{\sigma_{Gi}} \qquad \text{(A1-4)}$$

In the context of a linear relationship between risk and return, the coefficient of risk aversion has a very simple interpretation. A company has a low risk aversion if it chooses a high global risk level $\left(\sigma_{Gi}\right)$ even when risk is not well rewarded (β_G is low). In this context, the coefficient of risk aversion depends on the opportunity set (the same global line A1-1). Hence the method can be used here only because we compare risk aversion of companies facing the same opportunity set.

For each company i, the global margin ratio is computed as the mean on the period 2002-2006 of the annual ratios $\frac{EBITDA}{Total\,turnover}$ and the standard deviation of global margin ratios is computed over the same period.

Using the sample of exporting companies, we obtain the following relationship between global margin and global risk: $m_{Gi}^{e} = \underset{(0.000)}{0.046} + \underset{(0.000)}{1.060}\,\sigma_{Gi} \quad AdjR^2 = 0.163$ (A1-5)

The observed relationship is coherent with financial theory because the more a company takes risk; the higher is the expected margin it can obtain. The coefficient of risk aversion of each company is obtained by replacing β_G in (A1-4) by its value (1.06) given by (A1-5).

[1] Walls and Dyer (1996) used the same utility function to elicit risk aversion of oil companies.

Appendix 2. Expectation, variance of global margin and covariance between global margin and optimal proportion of domestic activities

A.1. Expectation of global margin

Using the properties of expectation and covariance operators and equation (8), expected global margin is:

$$E(m_{Git}) = E(m_{Xit}) + Cov(s_{Dit}, mgap_{it}) + E(s_{Dit})E(mgap_{it})$$

Replacing the margin gap by the anticipated margin gap we obtain:

$$Cov(s_{Dit}, mgap_{it}) = Cov(s_{Dit}, mgap_{it}^{A} - \varepsilon_{it}) = Cov(s_{Dit}, mgap_{it}^{A}) - Cov(s_{Dit}, \varepsilon_{it})$$

Replacing the optimal proportion by its expression given by equation (5):

$$Cov(s_{Dit}, \varepsilon_{it}) = Cov(a \times mgap_{it}^{A} + b, \varepsilon_{it}) = aCov(mgap_{it}^{A}, \varepsilon_{it}) = aCov(mgap_{it}, \varepsilon_{it}) + a\sigma_{\varepsilon i}^{2}$$

If we impose that the errors of prevision are uncorrelated with the level of the margin gap $Cov(mgap_{it}, \varepsilon_{it}) = 0$, the expected global margin is

$$E(m_{Git}) = E(m_{Xit}) + Cov(s_{Dit}, mgap_{it}^{A}) + E(s_{Dit})E(mgap_{it}^{A}) - a\sigma_{\varepsilon i}^{2}$$

A.2. Variance of global margin

From equation (8), the variance of global margin is:

$$V(m_{Git}) = V(m_{Xit}) + V(s_{Dit} mgap_{it}) + 2Cov(m_{Xit}, s_{Dit} mgap_{it})$$

First step: computation of the variance of the product

If export intensity and the margin gap are multivariate normal, Bohrnstedt and Goldberg (1969) demonstrate that:

$$\begin{aligned} V(s_{Dit} mgap_{it}) &= E^{2}(s_{Dit})V(mgap_{it}) + E^{2}(mgap_{it})V(s_{Dit}) + E\left[(\Delta s_{Dit})^{2}(\Delta mgap_{it})^{2}\right] \\ &+ 2E(s_{Dit})E\left[(\Delta s_{Dit})(\Delta mgap_{it})^{2}\right] + 2E(mgap_{it})E\left[(\Delta s_{Dit})^{2}(\Delta mgap_{it})\right] \\ &+ 2E(s_{Dit})E(mgap_{it})Cov(s_{Dit}, mgap_{it}) - Cov^{2}(s_{Dit}, mgap_{it}) \end{aligned}$$

With $\Delta s_{Dit} = s_{Dit} - E(s_{Dit})$
$\Delta mgap_{it} = mgap_{it} - E(mgap_{it})$

As $\Delta mgap_{it}$ time series is unknown we can't compute directly all the expectations of the product containing this variable. To overcome this difficulty we choose to use the classical Stein lemma ([2]) approximation.

$$E\left[(\Delta s_{Dit})^2(\Delta mgap_{it})^2\right] = Cov\left((\Delta s_{Dit})^2,(\Delta mgap_{it})^2\right) + E\left((\Delta s_{Dit})^2\right)E\left((\Delta mgap_{it})^2\right)$$

Using Stein lemma we get

$$Cov\left((\Delta s_{Dit})^2,(\Delta mgap_{it})^2\right) = 2E(\Delta mgap_{it})Cov\left((\Delta s_{Dit})^2,(\Delta mgap_{it})\right)$$

And using Stein lemma again: $Cov\left((\Delta s_{Dit})^2,(\Delta mgap_{it})\right) = 2E(\Delta s_{Dit})Cov(\Delta s_{Dit},\Delta mgap_{it})$

$$E\left[(\Delta s_{Dit})^2(\Delta mgap_{it})^2\right] = 4E(\Delta s_{Dit})E(\Delta mgap_{it})Cov(\Delta s_{Dit},\Delta mgap_{it}) + V(s)V(mgap_{it})$$

Finally, remembering that Δs_{Dit} and $\Delta mgap_{it}$ are centered random variables:

$$E\left[(\Delta s_{Dit})^2(\Delta mgap_{it})^2\right] = V(s)V(mgap_{it})$$

Using the same line of reasoning, it is straightforward to show that

$$2E(s_{Dit})E\left[(\Delta s_{Dit})(\Delta mgap_{it})^2\right] = 0 \text{ and } 2E(mgap_{it})E\left[(\Delta s_{Dit})^2(\Delta mgap_{it})\right] = 0$$

So the approximation of the variance of the product is:

$$\begin{aligned} &V(s_{Dit}mgap_{it}) = E^2(s_{Dit})V(mgap_{it}) + E^2(mgap_{it})V(s_{Dit}) \\ &+ V(s_{Dit})V(mgap_{it}) \\ &+ 2E(s_{Dit})E(mgap_{it})Cov(s_{Dit},mgap_{it}) - Cov^2(s_{Dit},mgap_{it}) \end{aligned}$$

Second step: computation of the covariance between the product of margin gap and export intensity with export margin.

Following Bohrnstedt and Goldberg (1969) we get:

$$Cov(s_{Dit}mgap_{it},m_{Xit}) = E(s_{Dit})Cov(mgap_{it},m_{Xit}) + E(mgap_{it})Cov(s_{Dit},m_{Xit})$$

We have already shown that $Cov(mgap_{it},m_{Xit}) = Cov(m_{Di},m_{Xi}) - V(m_{Xi})$.

$$\begin{aligned} &Cov(s_{Dit},m_{Xit}) = Cov\left(amgap_{it}^{A} + b, m_{Xit}\right) \\ &= aCov(m_{Di} - m_{Xi} + \varepsilon_i, m_{Xit}) \\ &= a\left[Cov(m_{Di},m_{Xit}) - V(m_{Xit}) + Cov(\varepsilon_i,m_{Xit})\right] \end{aligned}$$

Following the hypothesis of no correlation between the margin level and the prevision errors we obtain: $Cov(s_{Dit},m_{Xit}) = a\left[Cov(m_{Di},m_{Xit}) - V(m_{Xit})\right]$

[2] Stein (1981).

Finally $Cov(s_{Dit} mgap_{it}, m_{Xit}) = [Cov(m_{Dit}, m_{Xit}) - V(m_{Xit})][E(s_{Dit}) + aE(mgap_{it}^A)]$

Variance is equal to

$$\begin{aligned} &V(m_{Git}) = V(m_{Xit}) + \\ &E^2(s_{Dit})V(mgap_{it}) + V(s_{Dit})[E^2(mgap_{it}) + V(mgap_{it})] \\ &+ 2E(s_{Dit})E(mgap_{it})Cov(s_{Dit}, mgap_{it}) - Cov^2(s_{Dit}, mgap_{it}) \\ &+ 2[Cov(m_{Dit}, m_{Xit}) - V(m_{Xit})][E(s_{Dit}) + aE(mgap_{it}^A)] \end{aligned}$$

With $Cov(s_{Dit}, mgap_{it}) = Cov(s_{Dit}, mgap_{it}^A) - a\sigma_{\varepsilon i}^2 = \frac{1}{\lambda}$

and $K = V(m_{Xit}) - Cov(m_{Dit}, m_{Xit})$

we can write

$$\begin{aligned} &V(m_{Git}) = V(m_{Xit}) + E^2(s_{Dit})V(mgap_{it}) + V(s_{Dit})[E^2(mgap_{it}) + V(mgap_{it})] \\ &+ 2E(s_{Dit})E(mgap_{it})\frac{1}{\lambda} - \frac{1}{\lambda^2} - 2K[E(s_{Dit}) + aE(mgap_{it}^A)] \end{aligned}$$

Replacing expectation and variance of optimal domestic proportion by their expressions given by equations (6) and (7):

$$\begin{aligned} &E^2(s_{Dit})V(mgap_{it}) = a^2E(mgap_{it})^2V(mgap_{it}) + 2abE(mgap_{it})V(mgap_{it}) + b^2V(mgap_{it}) \\ &= \left(\frac{1}{\lambda^2V(mgap_{it})^2}\right)\{E(mgap_{it})^2V(mgap_{it}) + 2K\lambda E(mgap_{it})V(mgap_{it}) + K^2\lambda^2V(mgap_{it})\} \end{aligned}$$

$$\begin{aligned} &V(s_{Dit})[E^2(mgap_{it}) + V(mgap_{it})] = a^2(V(mgap_{it}) + \sigma_{\varepsilon it}^2)E(mgap_{it})^2 + a^2(V(mgap_{it}) + \sigma_{\varepsilon it}^2)V(mgap_{it}) \\ &= \left(\frac{1}{\lambda^2V(mgap_{it})^2}\right)\{V(mgap_{it})E(mgap_{it})^2 + \sigma_{\varepsilon it}^2E(mgap_{it})^2 + V(mgap_{it})^2 + \sigma_{\varepsilon it}^2V(mgap_{it})\} \end{aligned}$$

$$\begin{aligned} &2E(s_{Dit})E(mgap_{it})\frac{1}{\lambda} - \frac{1}{\lambda^2} = \frac{1}{\lambda}\left\{2aE(mgap_{it})^2 + 2bE(mgap_{it}) - \frac{1}{\lambda}\right\} \\ &= \left(\frac{1}{\lambda^2V(mgap_{it})^2}\right)\{2E(mgap_{it})^2V(mgap_{it}) + 2K\lambda E(mgap_{it})V(mgap_{it}) - V(mgap_{it})^2\} \end{aligned}$$

$$\begin{aligned} &-2K[E(s_{Dit}) + aE(mgap_{it}^A)] = -2K[2aE(mgap_{it}^A) + b] \\ &= \frac{-2K}{\lambda V(mgap_{it})}\{2E(mgap_{it}^A) + \lambda K\} \end{aligned}$$

Finally:

$$V(m_{Git}) = V(m_{Xit}) + \left(\frac{1}{\lambda^2 V(mgap_{it})^2}\right)\left\{4E(mgap_{it})^2 V(mgap_{it}) - K^2\lambda^2 V(mgap_{it}) + \sigma_{\varepsilon i}^2\left[V(mgap_{it}) + E(mgap_{it})^2\right]\right\}$$

A.3. Covariance between global margin and the optimal proportion of domestic activities

From equation (5) in the text we can write

$$Cov(m_{Git}, s_{Dit}) = Cov(m_{Git}, a \times mgap_{it}^{A} + b) = aCov(m_{Git}, mgap_{it}^{A})$$

and from equation (8)

$$Cov(m_{Git}, mgap_{it}^{A}) = Cov(m_{Xit} + s_{Dit} mgap_{it}, mgap_{it} + \varepsilon_{it})$$
$$= Cov(m_{Xit}, mgap_{it}) + Cov(s_{Dit} mgap_{it}, mgap_{it}) + Cov(s_{Dit} mgap_{it}, \varepsilon_{it})$$

Using the Bohrnstedt and Goldberg (1969) property

$$Cov(s_{Dit} mgap_{it}, mgap_{it}) = E(s_{Dit})V(mgap_{it}) + E(mgap_{it})Cov(s_{Dit}, mgap_{it})$$
$$Cov(s_{Dit} mgap_{it}, \varepsilon_{it}) = E(s_{Dit})Cov(mgap_{it}, \varepsilon_{it}) + E(mgap_{it})Cov(s_{Dit}, \varepsilon_{it})$$

Finally

$$Cov(m_{Git}, s_{Dit}) = a\left\{\begin{array}{l} Cov(m_{Xit}, mgap_{it}) + E(s_{Dit})[V(mgap_{it}) + Cov(mgap_{it}, \varepsilon_{it})] \\ + E(mgap_{it})[Cov(s_{Dit}, mgap_{it}) + Cov(s_{Dit}, \varepsilon_{it})] \end{array}\right\}$$

$$Cov(m_{Git}, s_{Dit}) = a\left\{\begin{array}{l} Cov(m_{Xit}, mgap_{it}) + E(s_{Dit})V(mgap_{it}) \\ + E(mgap_{it})[Cov(s_{Dit}, mgap_{it}) + Cov(s_{Dit}, \varepsilon_{it})] \end{array}\right\}$$

As $Cov(s_{Dit}, mgap_{it}) = Cov(s_{Dit}, mgap_{it}^{A} - \varepsilon_{it}) = Cov(s_{Dit}, mgap_{it}^{A}) - Cov(s_{Dit}, \varepsilon_{it})$

$$Cov(m_{Git}, s_{Dit}) = a\left\{\begin{array}{l} Cov(m_{Xit}, mgap_{it}) + E(s_{Dit})V(mgap_{it}) \\ + E(mgap_{it})Cov(s_{Dit}, mgap_{it}^{A}) \end{array}\right\}$$

$$Cov(m_{Git}, s_{Dit}) = \frac{1}{\lambda}\left\{\begin{array}{l} \dfrac{Cov(m_{Xit}, m_{Dit}) - V(m_{Xit})}{V(mgap_{it})} + \dfrac{E(mgap_{it})}{\lambda V(mgap_{it})} - \dfrac{Cov(m_{Xit}, m_{Dit}) - V(m_{Xit})}{V(mgap_{it})} \\ + \dfrac{E(mgap_{it})V(mgap_{it}^{A})}{\lambda V(mgap_{it})^2} \end{array}\right\}$$

$$= \frac{E(mgap_{it})}{\lambda^2 V(mgap_{it})}\left[1 + \frac{V(mgap_{it}^{A})}{V(mgap_{it})}\right]$$

$$Cov(m_{Git}, s_{Dit}) = \frac{E(mgap_{it})}{\lambda^2 V(mgap_{it})}\left[1 + \frac{V(mgap_{it}^{A})}{V(mgap_{it})}\right]$$

Table 1.a. Comparison of domestic and export companies of the sample

	Domestic companies	Exporting companies	Signification probability
Sample size (number of companies)	135	413	
% export			
- Sample mean	0.0091	0.4533	
- Standard deviation	0.0134	0.2412	
- Minimum	0	0.1032	
- Maximum	0.0478	0.9997	
Global turnover (mean 2002-2006)			
- Sample mean	16 829	20 472	0.907
- Standard deviation (cross section)	47 801	52 751	
- Minimum	1 030	831	
- Maximum	464 870	688 631	
Global margin mean			
- Sample mean	7.10%	8.92%	0.191
- Standard deviation (cross section)	10.17%	10.78%	
- Minimum	-14.76%	-11.79%	
- Maximum	48.43%	53.37%	
Global margin standard deviation			
- Sample mean	4.50%	3.35%	0.010*
- Standard deviation (cross section)	6.41%	2.88%	
- Minimum	0.10%	0.11%	
- Maximum	38.82%	19.98%	
Margin to Risk Ratio (MRR) (a)			
- Sample mean	2.689	3.545	0.206
- Standard deviation (cross section)	2.736	4.423	
- Minimum	-5.11	-2.26	
- Maximum	11.04	60.93	

(*) mean difference significant at 0.05 level.

(a) The margin to risk ratio is defined as: $MRR = \frac{\overline{m}}{\sigma(\tilde{m})}$.

Table 1.b. Two quite homogeneous sub-samples

		Domestic companies	Exporting companies
Firm age	until 1900	0.7%	3.7%
	From 1901 to 1950	6.7%	6.8%
	From 1951 to 1975	29.6%	30%
	From 1976 to 2006	63.0%	59.6%
Firm size (employees)	0 to 10 (micro)	42.4%	38.0%
	11 to 50 (small)	47.2%	45%
	51 to 200 (medium)	8.0%	14.9%
	201 to 500 (medium to large)	2.4%	2.0%
Type of wine	Still wine	79.3%	75.1%
	Effervescent wine	20.7%	24.9%
Legal form (a)	"*EURL*" and "*SARL*"	22.2%	22.5%
	"*SA*" and "*SA directoire*"	32.6%	37.8%
	"*SAS*"	43.0%	37.8%
	Others	2.2%	1.9%
Capital structure	Family-owned (>98%)	19.8%	18.3%
	Family majority (50 to 98%)	48.3%	53.4%
	Family minority (33 to 49%)	4.3%	11.8%
	Dispersed (<33%)	14.7%	8.1%
	Family capital non significant	12.9%	8.4%
Location	Bordeaux	11.9%	25.4%
	Burgundy	7.4%	14.0%
	Alsace	2.2%	6.1%
	Loire	12.6%	7.7%
	Rhone	5.2%	5.8%
	Languedoc Roussillon	10.4%	10.7%
	South West	5.2%	1.9%
	Provence	6.7%	1.9%
	Champagne	18.5%	21.3%
	Others	20.0%	5.1%

(a) EURL("*entreprise unipersonnelle à responsabilité limitée*") and *SARL* ("*société à responsabilité limitée*") are rather small companies with limited liability, *SA ("société anonyme*") can be considered as the approximate equivalent of British the public limited company, *SAS ("société par action simplifiée*") is a simplified form of SA.

Table 2. Export and domestic implicit financial performance

	Sample mean	Sample standard deviation	min	max
Implicit margin mean of export	8.35 %	18.10 %	-65.40 %	82,46 %
Implicit margin standard deviation of export (risk)	33.86 %	36.50 %	0.40 %	265.62 %
Implicit MRR (a) of exports	0.4736	0.8003	-1.1494	4.4216
Implicit margin mean of domestic companies	3.58 %	21.42 %	-142 %	148 %
Implicit margin standard deviation of domestic activities (risk)	35.50 %	54.54%	0.20 %	393 %
Implicit MRR (a) of domestic activities	0.5852	1.3245	-1.5383	14.90
Implicit coefficient of correlation	-0.91	0.15	-0.9998	-0.0625
(a) MRR: Margin to Risk Ratio = margin mean/margin standard deviation				

Table 3. Comparison between the approximate and exact implicit value of the margin gap (mgap = domestic margin – expected margin)

	Sample mean	Sample standard deviation	min	max
Exact implicit mgap	-4.77 %	29.13 %	-155.76 %	183 %
Approximate implicit mgap	-4.77 %	29.13 %	-155.76 %	183 %
Mean Square Error (MSE)	$1.54\ 10^{-7}$			