European Credit Research Institute

Efficiency of Consumer Credit Companies in the European Union

A Cross-Country Frontier Analysis

Laurent Weill

ECRI Research Report No. 7

EFFICIENCY OF CONSUMER CREDIT COMPANIES IN THE EUROPEAN UNION

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The European Credit Research Institute (ECRI) is a non-profit international association established in March 1999 in partnership with the Centre for European Policy Studies (CEPS) in Brussels. Its principal goal is to promote the study of the retail financial services sector at the EU level. ECRI's activities include the creation of a database on consumer credit in the European Union, research and analysis of developments in retail financial markets and the organisation of seminars on all issues affecting the industry.

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Abstract

The aim of this work is to provide empirical elements on the performance of consumer credit companies in the European Union by applying efficiency frontier techniques. These techniques, widely applied in banking literature, provide sophisticated measures of performance – the efficiency scores. We measure the cost and profit efficiency of consumer credit companies in seven EU countries in the period 1996–2000.

After investigating the market structure of EU consumer credit industries, we provide evidence on quite a large level of cost and profit inefficiencies in the EU, but also on large differences among countries. We show, however, that cross-country differences in efficiency are significantly caused by the environment in which consumer credit firms operate. The analysis of the determinants of efficiency shows few significant correlates. Finally, the evolution of efficiency between 1996 and 2000 does not support the hypothesis of a process of convergence on cost and profit efficiency among EU countries. Thus, our results tend to support the absence of a positive impact of European integration on the efficiency of consumer credit companies.

Keywords: consumer credit, efficiency, European integration and stochastic frontier approach.

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1. Introduction

The last decade in the European Union was marked by efforts to implement an economic and monetary union. The objective in the financial sector was the creation of an integrated market for financial services. Towards this aim, several legal measures were put into place to favour cross-border entry and intra-country competition, such as the Second Banking Directive adopted in 1989. Since then, several works have estimated the effects of the integration process on the behaviour of financial companies, especially in retail banking (Kleimeier & Sander, 2000; Cabral, Dierick & Vesala, 2002; Weill, 2004b). Their conclusions are generally rather mitigated on a positive impact of the integration on competition and efficiency. Yet the evolution of the consumer credit industry was not investigated.

This loophole is hard to explain, when considering the greater importance of the analysis of the evolution of the consumer credit industry for the whole financial sector. Indeed the expansion of this industry has been particularly rapid in recent years, with an average growth rate of the consumer credit stock of 6.64% in the EU between 1990 and 2000. Furthermore, the share of consumer loans in the EU increased during this period from 8.1% to 9.1% of GDP (ECRI, 2003). Therefore, consumer credit represents an increasing activity among financial activities, underlining the importance of the analysis of this industry for the observers of the financial industry.

In addition, as consumer credit represents an important and increasing means of financing the demand for goods and services (Kösters, Paul & Stein, 2003), the evolution of efficiency is of utmost importance for macroeconomic gains. Indeed, the efficiency of consumer credit companies exerts an influence through loan rates, since the rates charged are all the higher as the consumer credit company is less efficient so as to cover their higher costs. Consequently, an increase in efficiency should entail a decrease of loan rates, favouring investment and thus growth and employment.

The aim of this study is to make up for this loophole in research by estimating the efficiency of consumer credit companies in the EU. By performing such an investigation of the cost and profit performance of this industry, we would be able to provide a wider view of the degree of integration of consumer credit markets in the EU. Indeed, the existence of strong and lasting cross-country differences in efficiency would suggest the absence of integration among EU markets.

To do so, we use the methodology of frontier efficiency techniques. Over the last two decades, a large amount of empirical literature has been devoted to the application of frontier efficiency techniques to financial institutions.[1] Berger & Humphrey (1997) surveyed 130 studies that apply

[1] Recent studies on the efficiency of European banks include Altunbas et al. (2001), Dietsch & Weill (2000), Vander Vennet (2002) and Weill (2004b).

these techniques to financial institutions. These methods provide sophisticated performance measures – the efficiency scores – to assess managerial performance. These measures have three advantages in comparison to usual performance indicators, such as cost or profitability ratios.

First, frontier efficiency techniques provide synthetic measures of performance. Indeed, unlike basic productivity measures (e.g. output per employee), the efficiency scores allow the inclusion of several input and output dimensions in the evaluation of performances. Second, efficiency scores are relative measures of performance. Namely, a cost frontier (or a profit frontier) is estimated that allows the comparison of each company to the best-practice companies. It then provides a relative measure of performance. Third, efficiency frontiers take the scale effects into account. Indeed, with standard cost ratios for instance, the existence of scale economies may benefit large companies in terms of performance. With cost-efficiency scores, the scale effects are disentangled from the 'pure' performance measures. Despite the advantages of this methodology, it was only applied once to our knowledge in the consumer credit industry (Kulasekaran & Shaffer, 2002, on US credit card banks). Therefore, we can highlight the lack of application of efficiency frontiers in the EU consumer credit industry, in spite of the relevant evidence it could provide.

Our work aims at filling this gap in the literature by applying efficiency frontiers to the EU consumer credit sector. We measure the cost and profit efficiency of consumer credit companies in seven EU countries (Belgium, France, Germany, Italy, the Netherlands, Spain and the UK) in the period 1996–2000.

Cost efficiency measures how close the company's cost is to that of a best-practice company producing the same bundle of outputs. It then provides information on wastes in the production process and on the optimality of the chosen mix of inputs. Profit efficiency measures how close a company's profit is to that of a best-practice company producing the same bundle of outputs. It then provides information on both cost and revenue inefficiencies – meaning wastes in the production process but also the optimality of the chosen mix of inputs and outputs.

Therefore these two measures of performance provide different information to assess the performance of consumer credit companies. Cost efficiency reveals the cost performance of companies, while profit efficiency is a broader concept as it includes performance on both the revenue and the cost side. Furthermore, profit efficiency is influenced by market power, which is at least partly exogenous to managers' decisions and thus does not reflect managerial effort alone. Consequently, this measure of performance provides less adequate information on managerial performance than cost efficiency.

Nevertheless, before investigating the efficiency of consumer credit companies, we present evidence on the structure of the consumer credit markets in the EU and its recent evolution, most notably the changes in competition in these markets. Indeed, changes in performance can be influenced by changes in competition. We then assess competition using the Rosse–Panzar measures of competition, widely applied in the financial industry (De Bandt & Davis, 2000; Weill, 2004a). After the presentation of the evolution of the consumer credit industry in the EU, this work answers four fundamental questions.

1) *Do consumer credit companies have different efficiency levels depending on their country?* More precisely, it is relevant to assess the cross-country differences in performance as it may provide pertinent information in view of the forthcoming cross-border mergers. Indeed, it is important to know the differences or similarities in efficiency among countries in order to predict or prepare for cross-border competition, as significant differences in efficiency across nations may be exploited by efficient outsiders.

2) *Does the environment explain cross-country differences in efficiency?* Even if lower efficiency exists in some countries, this gap may not be the result of a lower managerial

performance, but may instead come from a less favourable economic environment. For instance, countries with greater per capita income may have consumers using more consumer credit, which consequently facilitates the performance of consumer credit companies. It is therefore of utmost interest to assess the role of environment in the cross-country efficiency gap. We proceed to this analysis by estimating cost and profit frontiers that include environmental variables. We follow the procedure of Dietsch & Lozano-Vivas (2000), who have shown that environment may explain a substantial part of discrepancies in banking efficiency among EU countries.

3) *What are the determinants of cost and profit efficiency for consumer credit companies?* A key reason for using the frontier efficiency techniques is to provide a diagnosis to improve efficiency. Towards this end, it is useful to investigate the determinants of efficiency. We test the existence of a relationship between cost and profit efficiency and a set of variables including the ratio of equity to total assets (giving an insight into corporate governance in consumer credit companies) and size (revealing the potential effects of economies of scale).

4) *How have the cost and profit efficiency of consumer credit companies evolved in recent years?* The purpose here is to check if differences in efficiency have been reduced among countries. We then investigate if a convergence in efficiency has occurred among EU countries. As a consequence, this provides evidence on the recent integration of consumer credit markets.

It must be stressed that our results cannot be generalised because of the limits of data. Indeed, we use data for a short period (from 1996 to 2000) owing to limitations of available data, which means that our conclusions may be influenced by the economic conditions of this period.

Section 2 presents the recent evolution of the industry among EU countries between 1996 and 2000. We then show the main trends regarding the evolution of consumer credit, competition and standard measures of performance in the consumer credit industry to provide a first glance at this industry in the different countries. Section 3 outlines the methodology used for the cost and profit efficiency measures. Section 4 describes the data and variables. Sections 5, 6, 7 and 8 develop the empirical results, answering each question in the order in which it has been presented. Finally, we provide some concluding remarks in section 9.

2. The recent evolution of the industry (1996–2000)

This section presents the main evolutions in the EU consumer credit industries for the second half of the 1990s. It then provides evidence on the cross-country differences among national consumer credit industries and on the recent changes.

Consumer credit is defined as any loan taken out by a household to finance consumer goods, such as a car or home furnishings. Here we present statistics on the importance of consumer credit in EU countries to obtain information on the cross-country differences in the use of consumer credit, but also to learn whether a convergence has happened in recent years. We then study the average size and the average risk supported by consumer credit companies, which provides information on the cross-country differences and the recent evolution in both dimensions.

We then measure competition in the EU consumer credit industries. This aspect is particularly relevant for the assessment of firm performance, as the degree of competition is expected to be a key determinant of firm behaviour. Indeed, it can be argued at first sight that greater competition should be associated with greater efficiency. We show, however, that the relationship between competition and efficiency in the financial sector is more ambiguous, as observed in Weill (2004a). Finally, we present some standard cost and profit measures of

performance to provide a first glance at the comparative performance of consumer credit companies in the EU. Statistics are either taken from ECRI data or from own computations using the Bankscope database as described below.

2.1 The evolution of consumer credit

Here we present evidence regarding the development of consumer credit in EU countries between 1996 and 2000. We then describe the recent extension of consumer credit in the EU, but also the cross-country differences in the importance of consumer credit.

The existence of large differences in the extension of consumer loans across developed countries has been shown notably by Crook (2003). These differences may result either from supply effects – such as the development of the financial sector – or from the efficiency of the judiciary system as underlined by Guiso (2003) to explain differences between northern and southern Italy. They may also result from demand effects, such as cultural differences, i.e. the hesitations of consumers to use consumer credit. Indeed, Lea, Webley & Walker (1995) underlined the importance of psychological factors in the use of consumer credit.

Two ratios are presented in Tables 1 and 2 for EU countries: the ratio of consumer credit to GDP and the ratio of consumer credit to household income. We observe large differences among EU countries for both ratios – in 2000, the ratios vary between 3.1% and 12.0% for the ratio of consumer credit to GDP and between 4.54% and 17.77% for the ratio of consumer credit to household income. These are the greatest in Germany and the UK, comparatively high in France and Spain, and the lowest in Belgium, Italy and the Netherlands. Kösters et al. (2004) underlined the large domination of consumer credit in Germany and the UK in comparison to the whole EU, by observing that both countries represented 37.7% of the EU's population but 60% of the EU's total consumer credit in 2000.

Table 1. Ratio of consumer credit to GDP (in percentages)

	1996	2000	Evolution
Belgium	4.7	5.1	+8.51
France	6.3	7.9	+25.40
Germany	11.1	11.0	-0.9
Italy	1.9	3.1	+63.16
Netherlands	3.5	3.5	0.0
Spain	6.5	8.4	+29.23
UK	12.1	12.0	-0.83

Source: ECRI statistics.

Table 2. Ratio of consumer credit to household income (in percentages)

	1996	2000	Evolution
Belgium	7.70	8.79	+14.16
France	9.66	12.46	+28.99
Germany	16.82	17.11	+1.72
Italy	2.91	4.54	+56.01
Netherlands	6.63	7.19	+8.45
Spain	9.76	13.11	+34.32
UK	17.33	17.77	+2.54

Source: ECRI statistics.

The dynamic analysis broadly shows an increase of both ratios between 1996 and 2000 in all countries, except in two countries where we observe a stagnation (Germany and the UK). Therefore, as Germany and the UK are the countries with the greatest consumer credit ratios in

1996, and the only ones with no improvement of these ratios between 1996 and 2000, this evolution tends to suggest a catching-up process in the development of consumer credit among EU countries.

This observation is very interesting to investigate as to its causes and consequences. The cause might be the relative saturation of the markets with the greatest consumer credit ratios. By comparison, the ratio of consumer credit to GDP was 13.4% in 2000 in the US. The cause may also be the convergence of consumer credit behaviours of customers across the EU. Nevertheless, it is not the aim of this work to present a wide investigation of the convergence process in consumer credit across EU countries. The consequences of such phenomena may influence the evolution of performances of consumer credit companies in the EU, as the environment may play a role on the performances of companies. Indeed, a company operating in a country with a high development of consumer credit may have a greater degree of performance than a company operating in a country with a low development of consumer credit, even if both companies provide the same level of effort. Therefore, by reducing the cross-country differences in the environment, the catching-up process for the development of consumer credit may have also reduced the cross-country differences in firm performance.

2.2 The evolution of size and loan-loss provisions

How have size and risk in consumer credit industries evolved in recent years? Are there large differences among countries in terms of size or risk? To answer these questions, we present some evidence regarding size and risk by country for 1996 and 2000 in Tables 3 and 4. We computed the measures that follow. Size is defined as the total balance sheet in thousands of euros. The sample used is composed of all consumer credit companies as defined later in section 4, having the information available for either variable for both years.

Table 3. Evolution of size between 1996 and 2000 (size is measured in € thousands)

	Number	1996	2000	Evolution
Belgium	5	1,016,900.0	1,878,973.8	+84.77%
France	45	2,335,597.8	3,404,353.3	+45.76%
Germany	30	1,707,363.3	2,518,650.0	+47.52%
Italy	6	2,115,933.3	3,186,866.7	+50.61%
Netherlands	4	4,357,900.0	5,544,850.0	+27.24%
Spain	9	2,669,888.9	4,011,700.1	+50.26%
UK	15	1,687,383.4	2,869,957.0	+70.08%
Total	114	2,112,932.0	3,145,662.5	+48.88%

Source: Own calculations.

Size increased between 1996 and 2000 in all countries, as can be suggested by the expansion of consumer credit in these countries during this period (+48.88%). This evolution should be related to the strong increase of the volume of consumer credit in the EU during the 1990's: +41.34% between 1996 and 2000 (ECRI, 2003).

The evolution of the risk supported by consumer credit companies is investigated with the ratio of loan-loss provisions to loans in Table 4. It is highly interesting to observe large discrepancies among countries: the mean ratio is largely greater in the UK than in other countries. These differences in risk have to be considered when comparing the standard measures of performance among companies to have a satisfactory view of their performance.

The evolution of the mean ratio suggests no general trend among EU countries between 1996 and 2000: a reduction happened in four countries (Belgium, Germany, Italy and Spain) and an increase occurred in three countries (France, the Netherlands and the UK).

Table 4. Mean ratios of loan-loss provisions to loans by country in 1996 and 2000

	Number	1996	2000	Evolution
Belgium	3	1.4068	1.1194	-20.43%
France	29	0.9340	1.0725	+14.83%
Germany	2	0.3334	0.1556	-53.33%
Italy	6	1.0054	0.6412	-36.22%
Netherlands	2	0.3019	0.4707	+55.91%
Spain	8	1.3438	1.0669	-20.61%
UK	12	1.9563	2.7042	+38.23%

Source: Own calculations.

The main consequence of the analysis of the risk ratio is the importance of including this dimension in our estimation of efficiency scores, as there are cross-country differences in risk behaviour that may influence performance measures, and as these differences were not generally reduced in recent years.

2.3 The evolution of competition

We now measure competition in the EU consumer credit industries. The evaluation of competition is of utmost importance for the assessment of performance, notably for two reasons. The first reason is the investigation of the impact of the efforts to promote integration in the financial sector in the EU. Indeed, many efforts were made to favour financial integration, particularly the implementation of the Second Banking Directive, which aims at making cross-border expansion of banks easier. The consumer credit industry was concerned by these measures. It is therefore relevant to study whether the recent changes favoured competition in consumer credit markets, as the integration of markets in the EU should promote welfare gains through increased competition.

The second reason is based on the relationship between competition and efficiency. Indeed, there is a commonly accepted view according to which greater competition should result in greater efficiency, principally because of the stronger incentives to managers to exert a higher effort. The literature has shown however that the link between competition and efficiency in the financial sector was far less obvious, as underlined in Weill (2004a). Nevertheless, a complete analysis of the efficiency of the EU consumer credit industry should go with the study of the evolution of the competition in these markets, as interdependence between both dimensions may exist.

We seek to measure competition by computing the so-called Rosse–Panzar model (Rosse & Panzar, 1977 and Panzar & Rosse, 1987). This model has been widely applied in banking (e.g. Molyneux et al., 1994; De Bandt & Davis, 2000; Bikker & Groeneveld, 2000; Bikker & Haaf, 2002 and Weill, 2004a, for applications to European countries). It is a non-structural test, as it assesses the competitive behaviour of companies without using information on the market structure. Furthermore, it does not request information on output prices, which partly explains its numerous applications in banking, as output prices are hard to collect in this industry. The major advantage of such a test in comparison to structural measures of competition such as the concentration ratio C5 or the Herfindahl index is that it takes the actual behaviour of the company into account by including contestability. Indeed, as observed by Claessens & Laeven (2003), the actual behaviour of a company is not only related to market structure but also to the barriers to entry influencing the likelihood of the entry of new competitors and therefore the behaviour of incumbents forecasting such an entry.

This non-structural test is based upon the estimation of the H-statistic, which aggregates the elasticities of total revenues to the input prices. The H-statistic determines the nature of market

structure: it is equal to 0 in monopoly, between 0 and 1 in monopolistic competition and 1 in perfect competition. Former studies using this test of competition generally conclude that there is monopolistic competition in EU banking markets (Molyneux et al., 1994; De Bandt & Davis, 2000; Bikker & Groeneveld, 2000; Bikker & Haaf, 2002 and Weill, 2004a). Our aim is to have a measure of competition for each year and each country so that we can assess the evolution of competition by country. Therefore, we need to separately run the Rosse–Panzar model for each country and each year to obtain estimates of input prices that are specific to each country and each year.

The problem of this approach is the small size of some national samples, meaning that the estimations of the Rosse–Panzar model would be very poor on a statistical basis. Therefore, we need to perform this test on our whole sample for each year. Yet we need to have country-specific estimates of the coefficients of input prices to analyse competition for each country and not for the EU as a whole. Towards this aim, we include interactive terms for each input price, jointing the variable with a dummy variable for each country. Consequently, we estimate the following equation for the measurement of the Rosse–Panzar statistic:

$$ln\ REV = \alpha_0 + \alpha_1\ ln\ assets + \beta\ ln\ equass + \sum_{k=1}^{4} (\alpha_k * (ln\ w_1) * country_k + \beta_k * (ln\ w_2) * country_k + \gamma_k * (ln\ w_3) * country_k) \quad (1)$$

where *rev* is total revenues, w_1, w_2 and w_3 are the prices of labour, physical capital and financial capital respectively, *assets* is total assets, *equass* is the ratio of equity to total assets, k is country, $country_k$ is the dummy variable for the country k ($country_1$=1 if the country is France, 0 otherwise; $country_2$=1 if the country is Belgium, 0 otherwise). The variables *assets* and *equass* take differences in size and risk into account respectively, as in Molyneux et al. (1994) and Bikker & Haaf (2002). Indices for each company have been dropped in the presentation for simplicity.

To estimate the Rosse–Panzar measures of competition, we use three input prices: the price of labour, defined by the ratio of personnel expenses to total assets, the price of physical capital, measured by the ratio of other non-interest expenses to fixed assets and the price of financial capital, defined by the ratio of interest paid to borrowed funds. This choice is motivated by the fact that these three inputs represent the vast majority of costs supported by consumer credit companies. Further, they are widely used in the studies measuring competition in the financial sector with the Rosse–Panzar methodology (e.g. Bikker & Haaf, 2002 and Weill, 2004a).

We estimate Rosse–Panzar measures of competition only for those countries with enough observations to have satisfactory estimates. Namely, we provide measures of competition for France, Italy, Spain and the UK. The estimation results of the Rosse–Panzar model for each year are reported in Tables A.1 and A.2 in the Appendix. The measures of competition are displayed in Table 5.

The analysis of the competition measures provides several interesting observations. First, the values of the H-statistic in 2000 are rather high, ranging from 0.78 to 1.43 in 1996 and from 0.77 to 0.95 in 2000. As mentioned above, a value between 0 and 1 means a monopolistic competition structure in consumer credit markets, while a value above 1 means perfect competition. It is interesting to compare the estimated values for the H-statistic for consumer credit markets to those obtained for banking markets in former studies. Bikker & Haaf (2002) and Weill (2004a) found H-statistic values mainly between 0.50 and 0.60 for most EU countries. Therefore, we can underline that consumer credit markets seem more competitive than banking markets.

Table 5. Competition measures

Country	1996	2000	Variation
France	0.95	0.95	0.00
Italy	1.43	0.77	-0.66
Spain	0.86	0.84	-0.02
UK	0.78	0.84	+0.06

Source: Own calculations.

Second, the H-statistic slightly varies between 1996 and 2000 in France, Spain and the UK, if we accept a strong reduction in Italy (-0.66). The Italian evolution seems to result from a convergence of measures of competition across countries. Indeed the H-statistic was largely greater in Italy than in the other countries in 1996, while in 2000 the measures were rather close across countries. Therefore, we do not support a positive influence of EU integration on competition in consumer credit markets. But competition was already high in these markets in 1996, especially when compared to banking markets. Further, European integration seems to have had an impact on the convergence of competition measures among countries, but not towards a higher degree of competition.

2.4 The evolution of standard cost and profit measures of performance

The major focus of this study is the estimation of cost and profit efficiency scores of consumer credit companies. Nevertheless, it seems relevant to us to present a first glance on the comparative performance of EU consumer credit companies with standard measures of cost and profit performance. To do so, we use three measures of cost performance and two measures of profit performance.

The three measures of cost performance are:

- the average cost ratio, defined as the sum of operating costs, financial costs and loan-loss provisions, divided by total assets;
- the average operating cost ratio, defined as operating costs divided by total assets; and
- the average financial cost ratio, defined as financial costs divided by total assets.

We do not separately analyse the risk costs here for two reasons. The first reason is that the ratio of loan-loss provisions to loans was already analysed in subsection 2.2, which focused on risk. The second reason is the very small share of these costs in total costs, in comparison to operating costs or financial costs. The two measures of profit performance are:

- the return-on-assets (ROA), defined as profit before tax divided by total assets; and
- the return-on-equity (ROE), defined as profit before tax divided by total equity.

When computing both of the latter measures, we prefer to use profit before tax rather than profit after tax, because of cross-country differences in taxation that may bias the cross-country comparison of performance. We compute these measures for the same sample of companies used for the efficiency measures below. The sample is composed of 98 companies for 1996 and 93 companies for 2000 and is described in the section 4. Tables 6 and 7 show information on standard cost and profit measures of performance for 1996 and 2000.

The analysis of the average cost ratios shows on the one hand large discrepancies among countries with ratios ranging from 6.09% to 12.39% in 2000, on the other hand it shows a reduction of cost ratios between 1996 and 2000 for all countries except for the Netherlands (+30.15%). This improvement in cost performance widely varies among countries from -0.76% for Belgium to –37.72% for Spain.

Table 6. Cost measures of performance (in percentages)

	Average cost ratio		
	1996	**2000**	**Evolution**
Belgium	7.90	7.84	-0.76
France	13.40	10.67	-20.37
Germany	6.52	6.09	-6.60
Italy	22.02	12.39	-43.73
Netherlands	7.13	9.28	+30.15
Spain	9.81	6.11	-37.72
UK	10.64	10.44	-1.04
Total	12.30	9.96	-19,02

	Average operating cost ratio		
	1996	**2000**	**Evolution**
Belgium	2.59	3.16	+22.01
France	3.21	3.59	+11.84
Germany	1.52	2.14	+40.79
Italy	3.03	3.12	+2.97
Netherlands	1.90	4.81	+153.16
Spain	2.69	2.05	-23.79
UK	4.31	4.18	-3.02
Total	3.23	3.30	+2,17

	Average financial cost ratio		
	1996	**2000**	**Evolution**
Belgium	4.25	3.81	-10.35
France	9.23	6.19	-32.94
Germany	4.71	3.67	-22.08
Italy	17.97	8.76	-51.25
Netherlands	4.97	4.17	-16.10
Spain	6.27	3.15	-49.76
UK	5.17	4.71	-8.90
Total	8.14	5.81	-28.62

Source: Own calculations.

The decomposition of the average cost ratio between the average operating-cost ratio and the average financial-cost ratio aids the understanding of the observed evolution. It appears that the decrease in average costs over the period was largely caused by the fall of average financial costs in all countries. Indeed, while the average financial costs were reduced in all countries, the average operating costs increased in most countries, with the exceptions of Spain and to a lesser degree the UK. It has to be stressed that the evolution of financial costs is largely exogenous to the behaviour of firm managers, as they are greatly involved in the evolution of interest rates. Therefore, the evolution of the average operating costs seems more relevant to a satisfactory view of the development of the managerial performance to control costs. Consequently, the positive decrease in average costs can not be interpreted solely as an improvement of the managerial performance to control costs.

We turn now to the analysis of the standard measures of profitability, ROA and ROE. Profitability considerably varies among countries with some differences between both measures. We particularly observe that Germany and to a lesser extent Spain are the countries with the lowest profitability. In dynamic terms, we observe a reduction of profitability between 1996 and

2000 in most countries. There is only an improvement in profitability for the Netherlands, although an improvement can also be seen for France in terms of the return-on-equity.

In summary, the analysis of the standard measures of performance has shown:

- strong cross-country differences in cost and profit performance;
- a reduction of average costs between 1996 and 2000, mainly caused by the decrease of average financial costs;
- an increase of average operating costs in most EU countries; and
- a reduction of profitability in most countries between 1996 and 2000.

Therefore this section has provided very important results for the analysis of the evolution of consumer credit companies' performance.

Table 7. Measures of profitability (in percentages)

	ROA		
	1996	**2000**	**Evolution**
Belgium	2.17	2.08	-4.15
France	1.07	0.99	-7.48
Germany	0.65	0.04	-93.85
Italy	1.18	1.02	-13.56
Netherlands	0.94	1.21	+28.72
Spain	1.14	0.43	-62.28
UK	3.58	2.70	-24.58
Total	1.62	1.15	-29.01

	ROE		
	1996	**2000**	**Evolution**
Belgium	27.96	27.05	-3.25
France	12.89	29.48	+128.70
Germany	15.06	1.94	-87.12
Italy	26.46	19.26	-27.21
Netherlands	13.20	20.33	+54.02
Spain	11.08	7.78	-29.78
UK	22.61	13.76	-39.14
Total	16.13	20.89	+29.51

Source: Own calculations.

In comparison to these standard measures of performance, the efficiency measures derived from the application of efficiency frontiers offer more sophisticated information on firm performance. These provide measures allowing the aggregation of different inputs. They are directly relative measures, meaning that the scale effects are taken into consideration, unlike the application of cost or profitability ratios. In other words, a company is compared with a virtual company that supports the same costs and profits on the efficiency frontier, to observe the difference in outputs between both companies. This allows us to disentangle the scale effect that may come from (dis)economies of scale, whereas standard ratios compare each company with all other companies irregardless of their size.

In considering the evolution of standard measures of performance, the influence of exogenous variables on the whole set of companies has some impact on the standard ratios, but does not affect the efficiency measures. For instance, a reduction of interest rates allowing the decrease of the financial costs results in the reduction of the average cost ratios, but does not lead to the improvement of the cost efficiency scores, as these latter measures are relative and consequently

do not change when all companies evolve in the same direction. Finally, the impact of variables that are exogenous to the managerial performance can be extracted from the efficiency scores. This issue is of utmost interest to our investigation, as the cross-country differences among countries may be the result of differences in environment.

As a result, while the analysis of standard measures of performance has provided a first glance on the cost and profit performance of consumer credit companies, the application of efficiency frontiers gives a more relevant view on these issues.

3. Methodology for the efficiency measures

Several techniques have been proposed in the literature to measure efficiency using frontier approaches. The distance to the frontier for each observation can be divided between an inefficiency term and a random error. The techniques mainly differ in the distributional assumptions used to disentangle inefficiency terms from random errors. Here we choose the stochastic frontier approach, which disentangles inefficiency from random error by assuming a normal distribution for the random error and a one-sided distribution for the inefficiency term. Other approaches include the distribution-free approach, the thick frontier approach and the Data Envelopment Analysis (DEA). The distribution-free approach does not allow the assessment of the evolution of efficiency, as it assumes that efficiency is stable over time. The thick frontier approach only provides average efficiency scores for the whole sample tested, whereas we aim here at comparing efficiency across countries. Finally, the DEA leads to a more tricky control of variables in the estimation of a frontier, relative to the stochastic frontier approach. As we test the presence of environmental variables and risk in the cost frontier, we are then inclined to favour the stochastic frontier approach rather than the DEA, taking into consideration that the literature considers both techniques as equally satisfactory.

Thus, we use the stochastic frontier approach, seminally developed by Aigner et al. (1977), to estimate cost and profit efficiency scores following the applications from Dietsch & Weill (2000) and Altunbas et al. (2001) among others. Cost efficiency measures how close the cost for a company is to that of a best-practice company producing the same bundle of outputs. It then provides information on wastes in the production process and on the optimality of the chosen mix of inputs.

The basic model assumes that total cost deviates from the optimal cost by a random disturbance, v, and an inefficiency term, u. Thus the cost function is TC = f(Y, P) + □ where TC represents the total cost, Y is the vector of outputs, P is the vector of input prices and □ is the error term that is the sum of u and v. Here u is a one-sided component representing cost inefficiencies, meaning the degree of weakness of managerial performance; v is a two-sided component representing random disturbances, reflecting bad (or good) luck or measurement errors. Both u and v are independently distributed and v is assumed to have a normal distribution. We assume a gamma distribution for the inefficiency terms as per Greene (1990). Following Jondrow et al. (1982), firm-specific estimates of inefficiency terms can be calculated by using the distribution of the inefficiency term conditional to the estimate of the composite error term. Greene (1990) has then provided the estimate of the cost inefficiency term with a gamma distribution.[2]

We estimate a system of equations composed of a Fourier-flexible function and its associated input cost share equations, derived using Shepard's lemma. Estimation of this system adds degrees of freedom and results in more efficient estimates than the mere single-equation cost function. Since the share equations sum to unity, we solve the problem of singularity of the disturbance covariance matrix of the share equations by omitting one input cost share equation

[2] See Kumbhakar & Lovell (2000) for further details on the stochastic frontier analysis.

from the estimated system of equations. Standard symmetry constraints are imposed. Homogeneity conditions are imposed by normalising total costs, price of labour and price of physical capital by the price of borrowed funds. Thus, the complete model is the following:

$$\begin{aligned}\ln\left(\frac{TC}{w_3}\right) &= \beta_0 + \sum_m \alpha_m \ln y_m + \sum_n \beta_n \ln\left(\frac{w_n}{w_3}\right) + \frac{1}{2}\sum_m\sum_j \alpha_{mj} \ln y_m \ln y_j \\ &+ \frac{1}{2}\sum_n\sum_k \beta_{nk} \ln\left(\frac{w_n}{w_3}\right)\ln\left(\frac{w_k}{w_3}\right) + \sum_n\sum_m \gamma_{nm} \ln\left(\frac{w_n}{w_3}\right)\ln y_m \\ &+ \sum_k \left[\delta_k \cos Z_k + \theta_k \sin Z_k\right] + \sum_k\sum_{l=k} \left[\delta_{kl} \cos(Z_k + Z_l) + \theta_{kl} \sin(Z_k + Z_l)\right] \\ &+ \sum_k\sum_{l=k}\sum_{m=l} \left[\delta_{klm} \cos(Z_k + Z_l + Z_m) + \theta_{klm} \sin(Z_k + Z_l + Z_m)\right] + \varepsilon\end{aligned} \tag{2}$$

$$S_n = \partial \ln\left(\frac{TC}{w_3}\right) \Big/ \partial \ln w_n = \beta_n + \sum_k \beta_{nk} \ln\left(\frac{w_k}{w_3}\right) + \sum_m \gamma_{nm} \ln y_m + \eta_n$$

$$\text{with } Z_i = 0.2\pi + (1.6\pi) * \frac{\ln Y_i - \ln Y_{i,min}}{\ln Y_{i,max} - \ln Y_{i,min}}$$

where TC is the total costs, y_m m^{th} is output (m=1,2), w_n n^{th} is the input price (n=1,2), w_3 is the price of borrowed funds, S_n is the input cost share[3] (n=1,2) and ε_n is the error term (ε_n is independent from ε). Indices for each company have been dropped in the presentation for simplicity. The system of equations is estimated using the Iterative Seemingly Unrelated Regression (ITSUR) estimation technique.

Profit efficiency measures how close the profit of a company is to that of a best-practice company producing the same bundle of outputs. It then provides information on both cost and revenue inefficiencies – meaning on wastes in the production process but also on the optimality of the chosen mix of inputs and outputs. It also provides information on the efficiency of the pricing of outputs, as we estimate an alternative profit-efficiency frontier in which output prices are free to vary.

To estimate profit efficiency, we use a very similar methodology to the one chosen to estimate cost efficiency by estimating an alternative profit frontier following Humphrey & Pulley (1997), Berger & Mester (1997) and Dietsch & Weill (2000) among others. An alternative profit frontier employs the same dependent variable as a standard profit frontier (the profit). But while a standard profit frontier considers the output prices as exogenous and the output quantities as endogenous, an alternative profit frontier assumes that output quantities are given, while output prices are free to vary. This kind of profit frontier has the advantage of not requiring the output prices, which are hard to obtain in credit activity. Furthermore, as output prices are free to vary, an alternative profit frontier allows us to measure the ability to manage market power.

Therefore, in comparison with the cost frontier, the only changes when estimating the profit frontier are the replacement of total costs by profit as the dependent variable in the estimated function, and the use of the Hotelling's lemma instead of the Shepard's lemma to generate the profit-share equations. The dependent variable here is the profit. We take the profit before taxes as the profit variable in order to avoid the bias of differences in tax regimes among countries. In

[3] S_n is equal to the expenses for the input n divided by total costs.

order to obtain a positive value of the logarithmic expression of profit, we add the absolute value of the minimum of the profit variable computed in the sample to each value of profit.

4. Data and variables

Data have been taken from the Bankscope database of BVD-IBCA. The main issue was how to define a consumer credit company. Indeed, consumer credit is provided by specialised companies but also by universal banks. In many EU countries, universal banks dominate the consumer credit market. For instance, universal banks have a market share of 63% in the Spanish consumer credit market (ECRI, 2004). Nevertheless, we could not include universal banks in our analysis as their activities are too different from those of consumer credit companies. It should be recalled that efficiency scores are relative measures of performance. As a consequence, efficiency scores have to be estimated in a homogenous sample in terms of activities.

So we decided not to exclude all banks, but to include only those banks that are largely involved in loan activity and are receiving few deposits. Our criteria have been the following: i) the share of loans in total assets should be above 70%, ii) the share of demand deposits in total assets should be below 15% and iii) the information for all variables used for efficiency scores for the concerned year.

We have therefore created a sample that includes 93 companies for the year 2000, with the following breakdown by country: 5 from Belgium, 38 from France, 4 from Germany, 19 from Italy, 3 from the Netherlands, 13 from Spain and 11 from the UK.

The efficiency scores required the estimation of efficiency frontiers, meaning the definition of inputs and outputs. We then considered one output, loans. As observed by Kulasekaran & Shaffer (2002) for credit card banks, the consumer credit companies have a relatively homogenous output – loans – which affords a potentially purer test of efficiency that is possible for a sample of universal banks.

The inputs, whose prices are used to estimate the cost frontier, include labour, physical capital and risk. We decided not to include the financial costs of borrowed funds and to include the risk as an input. The inclusion of risk as an input is unusual in the wide literature on efficiency in banking. This inclusion, however, appeared particularly relevant to us for measuring the efficiency of consumer credit companies.

Risk is indeed a core input in the activities of consumer credit companies, as their activity is limited to loans – unlike universal banks, which also receive deposits and hold a significant share of investment assets in their total assets. Furthermore, the cross-country differences in risk were underlined above when the mean ratios of loan-loss provisions to loans were presented. Therefore, cross-country differences in risk may have an impact on performance measures, which means that they should be taken into account in the estimation of efficiency scores.

Moreover, we decided not to include borrowed funds as an input, in spite of the wide use of this item as an input in studies on banking efficiency. We do not consider it as a relevant input for comparing the performance of consumer credit companies for two reasons. The first reason is that all consumer credit companies have broadly the same cost of borrowed funds in the EU. Indeed, as these companies cannot rely on received deposits in order to make loans, they all need to borrow funds in financial or banking markets at very similar rates. The second reason is that there is no substitutability between borrowed funds and the other inputs. Indeed, labour and physical capital can be substituted to produce consumer loans. There is also substitutability between risk and both of these inputs, as each consumer credit company manages a trade-off

between risk and the means to assess credit risk (through labour and physical capital). But neither risk, labour nor physical capital can replace borrowed funds to finance loans.

As data on the number of employees are not available in all countries, the price of labour is measured by the ratio of personnel expenses to total assets, following Dietsch & Weill (2000), Altunbas et al. (2001) and Weill (2003a) among others. As observed by Maudos et al. (2001), this variable can be interpreted as labour cost per worker (personnel expenses/number of employees) adjusted for differences in labour productivity (number of employees/total assets), since it is the product of these ratios.

The price of physical capital is defined as the ratio of other non-interest expenses to fixed assets. The price of risk is measured by the ratio of loan-loss provisions to loans. The dependent variable in the cost frontier, total costs, is the sum of personnel expenses, other non-interest expenses and loan-loss provisions. The dependent variable in the profit frontier, profit, is profit before tax.

5. Cross-country comparison of efficiency

This section describes estimated cost and profit efficiency scores in order to assess the cross-country differences in performance. We can therefore have some information regarding the hierarchy of countries in terms of performance, notably for the prospects of cross-border expansion of companies in the EU. Indeed, the discrepancies in efficiency among countries may exert some influence on the host and home countries concerning such expansion.

5.1 The efficiency scores of consumer credit companies

Descriptive statistics for the cost-efficiency scores are presented in Table 8. The cross-country analysis shows that mean efficiency scores range from 32.50% in the Netherlands to 70.68% in Germany. In fact, if we accept both extreme cases, the remaining five countries have very similar levels of efficiency.

Table 8. Descriptive statistics for cost-efficiency scores (in percentages)

	Number	Mean	Standard deviation
Belgium	5	53.34	10.40
France	38	52.54	15.74
Germany	4	70.68	17.77
Italy	19	49.82	16.88
Netherlands	3	32.50	20.20
Spain	13	54.37	14.51
UK	11	47.48	15.55
Total	93	52.64	16.35

Source: Own calculations.

Furthermore, we observe a greater inefficiency in the consumer credit industry than in banking. Indeed, empirical studies in banking efficiency generally find cost-efficiency means that range between 70% and 80% (e.g. Berger & Humphrey, 1997; Dietsch & Weill, 2000), while we observe a mean efficiency score of 52.64% for the full sample. But this difference may result from the unusual inclusion of risk as an input. Indeed, banking efficiency studies only consider labour, physical capital and financial capital as inputs. Therefore, the large discrepancies in risk behaviour may exacerbate differences in efficiency.

Descriptive statistics for the profit-efficiency scores are presented in Table 9. The cross-country analysis shows that mean efficiency scores range from 36.98% in Germany to 75.73% in

Belgium. We can in fact distinguish three groups of countries: there are three countries with a high degree of profit efficiency (Belgium, Italy and Spain); three countries with an intermediate degree of profit efficiency (France, the Netherlands and the UK); and Germany, which has the lowest degree of profit efficiency.

Studies measuring profit efficiency in banking generally observe profit-efficiency scores lower than cost-efficiency scores. Notably Berger & Mester (1997) and Maudos et al. (2002) find profit-efficiency means to be around 50% below cost-efficiency means. Our results differ from these results, as profit-efficiency means are above cost-efficiency means for all the countries analysed, if we accept the special case of Germany. How do we explain this difference with banking studies? As there is no better cost efficiency but only greater efficiency for consumer credit companies than for banks, this should come from the better revenue efficiency of consumer credit companies. Namely, consumer credit companies may have, for instance, a better efficiency for the pricing of outputs than banks.

Table 9. Descriptive statistics for profit-efficiency scores (in percentages)

	Number	Mean	Standard deviation
Belgium	5	75.73	11.15
France	37	60.99	17.52
Germany	4	36.98	16.95
Italy	19	71.76	12.05
Netherlands	3	56.18	18.43
Spain	12	69.23	19.97
UK	11	63.82	15.06
Total	91	64.26	17.62

Source: Own calculations.

5.2 The relationship between cost and profit efficiency scores

It is of the highest interest to compare the hierarchy of cost and profit efficiency scores to obtain an initial view of the possible relationship between both variables. Indeed, several assumptions exist about this link. On the one hand, a positive link between cost and profit efficiency should be expected as profit efficiency is a broad concept including performance on the cost side and on the revenue side. Therefore, greater cost efficiency should lead directly to greater profit efficiency. On the other hand, the literature has suggested the 'quiet-life hypothesis', according to which companies with monopoly rents are inclined to relax their efforts to control costs. Therefore, there should be a negative relationship between cost and profit efficiency, as higher revenues would allow managers to have higher costs.

Our first results, presented above, tend not to corroborate the existence of a positive link between cost and profit efficiency scores, as the rankings of countries are very different between both measures of efficiency. There is first the case of Germany, with the highest cost-efficiency mean and the lowest profit-efficiency mean. Furthermore, the remaining countries also have various rankings depending on the efficiency concept analysed.

We investigate this issue by computing the Pearson correlation but also the Spearman rank correlation between cost- and profit-efficiency scores for 2000, which are displayed in Table 10. We observe no significant link between the variables. This result tends to suggest that opposing effects between cost efficiency and profit efficiency play a role in the relationship between the variables. Even if these tests are not enough to support the quiet-life hypothesis, they provide some evidence that does not counter this assumption.

Table 10. The correlation between cost- and profit-efficiency scores

	Pearson correlation (standard correlation)	**Spearman correlation (rank correlation)**
Coefficient	0.0060 (0.9546)	-0.0272 (0.7981)

Note: (p-value in parentheses).
Source: Own calculations.

This result is not unusual in the literature on banking efficiency. We can notably mention the results of Berger & Mester (1997), who compared the efficiency scores obtained using a cost frontier, a standard profit frontier (i.e. with exogenous output prices and endogenous output quantities) and an alternative profit frontier (i.e. with endogenous output prices and exogenous output quantities, as estimated in this study). They found an absence of any significant correlation between cost-efficiency scores and profit-efficiency scores estimated with the standard profit frontier, but also a surprising negative and significant correlation between cost-efficiency scores and profit-efficiency scores estimated with the alternative profit frontier.

Therefore, this section has evidenced the existence of large discrepancies in cost and profit efficiency between countries. Consequently, we have to investigate the origin of these discrepancies. The first answer could be the differences in managerial performance across countries. Nevertheless, before accusing managerial performance, a satisfactory conclusion on the sources of the different efficiency levels in EU countries needs an analysis of environment, as the same managerial performance in two different environments may lead to different efficiency levels. This is the object of the following section.

6. Role of environment on the cross-country differences in efficiency

We now test the role of the environment for explaining the observed differences in efficiency between EU countries. Indeed it could be that cross-country differences in efficiency may result from differences in environment. Dietsch & Lozano-Vivas (2000) have demonstrated that the efficiency gap between French and Spanish banks was reduced when environmental variables taking macroeconomic and banking structure into account were introduced in the cost-efficiency frontier.

Consequently, the estimation of efficiency scores without taking environment into account could be misleading when assessing the cross-country managerial performance of consumer credit companies according to their country. Furthermore, it would also be misleading as an insight with respect to the forthcoming expansion of consumer credit companies. Indeed, consumer credit companies from the most efficient countries would have an advantage in the future when entering the least efficient countries, only if this advantage does not come from a better environment in their home country. Otherwise, this advantage may be not exportable and therefore a greater degree of efficiency would not be associated with higher chances of successfully entering foreign markets.

Therefore, we estimate the same cost- and profit-efficiency frontiers as above, but now including several environmental variables. We test seven environmental variables. We first test two variables for the macroeconomic conditions, including per capita income and population density. Per capita income is obtained by dividing GDP by the number of inhabitants. The density of population is measured by the ratio of inhabitants per square kilometre.

We then test four variables for the market structure conditions, including the density of demand (the ratio of total deposits per capita), the accessibility of banking services (the number of branches by the number of square kilometres), the intermediation ratio (the ratio of total loans to total deposits) and the banking presence (the number of banks per capita). Those variables give

information on the different features of banking markets in which consumer credit companies compete. We finally test one variable for the development of consumer credit: the ratio of consumer credit to GDP. This variable includes several structural differences among EU consumer credit markets, such as credit culture or practices.

The data for this analysis come from OECD and ECRI. The estimation of the efficiency frontiers with these environmental variables showed that only three environmental variables were significant. We decided to keep only these three variables for our estimation of efficiency scores with environmental variables: per capita income, banking presence and the development of consumer credit.

Per capita income may influence the supply and demand of consumer credit. Banking presence is a variable of the supply of consumer credit. Several influences of this variable may be observed in the efficiency scores. On the one hand, a positive influence on bank efficiency is expected, as the banking presence may be associated with customers demanding more banking products. On the other hand, a negative influence may also come from a higher banking presence, as it makes the work of consumer credit companies harder and thus increases their costs and reduces their profits. The development of consumer credit is measured by the ratio of consumer credit by GDP. This variable takes supply and demand elements into account. We include it in our estimation, particularly as it includes the inter-country cultural differences in the use of consumer credit. The environmental variables are displayed by country in Table 11. The estimates for the environmental variables in the new estimated efficiency frontiers are displayed in Table A.2 in the Appendix.

Table 11. Environmental variables for EU countries in 2000

	Belgium	**France**	**Germ.**	**Italy**	**Netherlands**	**Spain**	**UK**
Per capita income	24648.5	23000.7	23191.0	21724.9	24828.5	17879.4	20920.0
Banking presence	0.01160	0.01890	0.03543	0.01454	0.01057	0.00696	0.00687
Dev. of consumer credit	5.1	7.9	11	3.1	3.5	8.4	12

Sources: OECD and ECRI.

The results of the estimation of the cost frontier and the profit frontier with environmental variables are respectively reported in Tables 12 and 13. Cost-efficiency means are greater in all countries with the environmental variables. Consequently, when environment is taken into account in the estimation of efficiency scores, the cost-efficiency scores of consumer credit companies have a closer order of magnitude than those obtained by banks in the empirical literature.

Moreover, the discrepancies in efficiency between countries are undoubtedly reduced when environment is taken into account. For instance, Germany, which had a mean score largely exceeding the mean scores of all other countries when environment was not considered, now has a score slightly exceeding those of Belgium or Spain. Therefore, it appears that a significant part of the cost inefficiency was caused by environment.

When turning to the profit-efficiency scores, we observe that the inclusion of environmental variables in the estimation of the efficiency frontier did not modify all the mean efficiency scores in the same direction. Indeed, an increase of the mean efficiency scores occurred for four countries (Belgium, France, Germany and the UK), but a reduction was seen for the three remaining countries (Italy, the Netherlands and Spain). Therefore, the environment favours profit efficiency in the three latter countries, while it has a negative impact on profit efficiency in the four former countries.

Table 12. Cost-efficiency means with and without the impact of environment (in percentages)

	Mean scores without environment	Mean scores with environment
Belgium	53.34	69.67
France	52.54	63.37
Germany	70.68	72.04
Italy	49.82	61.94
Netherlands	32.50	50.27
Spain	54.37	68.06
UK	47.48	65.18
Total	52.64	64.23

Source: Own calculations.

Table 13. Profit-efficiency means with and without the impact of environment (in percentages)

	Mean scores without environment	Mean scores with environment
Belgium	75.73	79.22
France	60.99	71.22
Germany	36.98	72.10
Italy	71.76	67.45
Netherlands	56.18	50.51
Spain	69.23	63.81
UK	63.82	68.72
Total	64.26	68.95

Source: Own calculations.

There is a slight reduction of the cross-country differences in profit efficiency among countries, as observed by the decrease of the standard deviation of the mean efficiency scores (from 12.91 to 8.71). This trend is however less obvious than for the cost-efficiency scores. Indeed, the country with the least profit-efficient consumer credit companies when environment is not considered, Germany, has a very large increase of profit efficiency. But at the same time, the country with the second-least mean profit efficiency, the Netherlands, has a lower mean profit efficiency when environment is accounted for.

In summary, the inclusion of environmental variables in the efficiency measures undoubtedly shows the influence of environment on the cross-country differences in efficiency. Both cost- and profit-efficiency scores are strongly modified when environment is included. Nevertheless, the major impact is on the cost-efficiency scores, where the cross-country differences in efficiency are considerably reduced.

This is an important result from the perspective of cross-border expansion of consumer credit companies. Indeed, it can be argued that the companies aiming at installing themselves abroad will come from the countries with the greatest efficiency scores and will move into countries with the least efficient consumer credit industries, as they can use their advantage in efficiency to gain market shares in foreign markets. From this point of view, cost efficiency may even play a larger role than profit efficiency, as profit efficiency may be linked to some market power in the domestic market that may not be exported abroad. Then, following our first analysis of the cost-efficiency scores without taking environment into account, we would have suggested that the large cross-country differences in efficiency would lead to an important cross-border expansion by companies wishing to benefit from their advantage in efficiency. Nevertheless, the estimation of the cost-efficiency scores with the environment taken into account has shown that cross-country differences in efficiency were largely the result of differences in environment. Therefore, a significant share of the advantages in cost efficiency is not exportable and cross-

border movements in the consumer credit industry motivated by differences in cost efficiency should be less numerous than our first estimations of the efficiency scores had suggested.

7. Determinants of the efficiency of consumer credit companies

A key motivation to use measures of performance is to provide a useful tool to define the determinants of efficiency, so that managers or shareholders have information regarding the tools on which they can exert influence to improve firm performance. Towards this objective, we test four determinants of efficiency. The first tested variable is size, measured by total assets. The basic question is whether size favours performance, which not only reveals the possible existence of economies of scale, but also the ability of companies to exploit these economies of scale. Yet the absence of a positive correlation between size and efficiency does not mean that there are no economies of scale in the EU consumer credit industries. It can indeed happen that these economies of scale exist, but consumer credit companies do not succeed in exploiting them.

Apart from this hypothesis on the impact of size on efficiency, we also have to refer to a hypothesis in favour of the reverse causality of efficiency on size: the efficient-structure hypothesis. As suggested by Demsetz (1973), this hypothesis considers that the best-managed companies have the lowest costs and therefore the largest market shares, which leads to a higher level of concentration. Thus, efficiency would positively determine size.

The second variable tested is capitalisation, defined by the ratio of equity to total assets. Several hypotheses on the relationship between this ratio and efficiency are suggested by theoretical literature. We present the three main hypotheses. One major hypothesis, based on agency costs, is in favour of an impact of capitalisation on efficiency. As mentioned by Jensen & Meckling (1976), significant agency costs can indeed arise from conflicts of interest between categories of agents within the firm, notably from the conflicts of interest between shareholders and managers. The key problem is the moral hazard behaviour of managers, who can waste firm resources or minimise their effort rather than increasing firm value, as they have their own objectives. In this way, debt financing increases the pressure on managers to perform (meaning to reduce their waste of resources and to increase their effort) as it reduces the 'free cash-flow' at the disposal of managers (Jensen, 1986). Indeed, debt implies interest payment obligations that must be satisfied by managers under the threat of bankruptcy if these obligations are not satisfied. Consequently, we should observe a negative link between the capitalisation ratio and efficiency.

Two competing hypotheses with opposite predictions are, however, in favour of the reverse causality of efficiency on capitalisation. The first hypothesis is based on the idea that more efficient companies choose lower equity ratios than other companies, because higher efficiency reduces the expected costs of financial distress. Therefore, there should be a negative relationship between efficiency and capitalisation. The second hypothesis assumes that more efficient companies have higher profitability and thus have a higher ratio of equity to total assets, because of the accumulated profits. The influence of efficiency on capitalisation should then be positive. Consequently, we have several hypotheses on the link between capitalisation and efficiency.

In a similar way, two papers have analysed the relationship between financial structure and efficiency. Berger & Bonaccorsi di Patti (2002) tested the relationship between capitalisation and profit efficiency for a sample of US banks. They concluded rather in favour of a negative relationship. Weill (2003b) investigated the link between cost efficiency and the leverage ratio, being the complement to one of the capitalisation ratios, for a sample of companies in several European countries. He found that this link varies according to the institutional framework of

each country, even if the relationship is generally positive. Therefore, empirical evidence using efficiency measures tends to support a negative link between capitalisation and efficiency.

The two variables tested last have been less well-investigated in the former empirical literature on the determinants of firm performance. Nevertheless, it seems relevant to obtain information on their potential link to the performance of consumer credit companies. The third tested variable is interest revenues, defined by the ratio of interest revenues in total revenues. We aim here at investigating the impact of the breakdown between interest and commission revenues on cost and more particularly on profit efficiency, as the breakdown of revenues is notably influenced by pricing decisions. The fourth variable tested is personnel expenses, measured by the share of personnel expenses in total operating costs (i.e. the sum of personnel expenses, other operating costs and loan-loss provisions). We then test if the choice to have a more labour-intensive production is in favour of a better performance.

We consider these four variables as potential determinants of efficiency. Nevertheless, it has to be stressed that the relationship may have a reverse causality. Indeed, efficiency may influence one of the tested variables, as explained below.

7.1 The determinants of cost efficiency

We investigate the firm-specific determinants of cost efficiency, by estimating the correlations of cost-efficiency scores with each variable. We then pool together all the countries. The results are described in Table 14.

Table 14. Determinants of cost-efficiency scores

	Coefficient
Size	-0.2259** (0.0295)
Capitalisation	0.0043 (0.9674)
Interest revenues	0.0949 (0.3711)
Personnel expenses	0.4257*** (0.0001)

Notes: *, ** and *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level, p-values are in parentheses.

Source: Own calculations.

We find a negative relationship between size and cost efficiency. This result is rather in favour of the existence of diseconomies of scale, suggesting that mergers in the EU consumer credit industries would not improve cost efficiency. Yet care should be taken when considering this finding as the existence of economies of scale in the EU consumer credit industries needs further analysis to provide final conclusions on this issue. It also goes somewhat against the efficient-structure hypothesis, as according to this view we should have observed a positive link between size and efficiency.

The coefficient for personnel expenses is significantly positive, suggesting that a more labour-intensive production favours performance. We observe no significant link between cost efficiency and capitalisation or interest revenues. The lack of a significant relationship with capitalisation may result from the contrasting effects of this variable and those of cost efficiency. Regarding interest revenues, our results tend to show that loan activities dealing with more interest revenues are not more or less costly than loan activities dealing with more commission revenues.

7.2 The determinants of profit efficiency

We now present the results of the correlations of profit-efficiency scores with the four tested variables, pooling together all the countries for the correlations, in Table 15. Our main conclusion is the absence of a significant relationship for all the tested determinants.

Table 15. Determinants of profit-efficiency scores

	Coefficient
Size	-0.1014 (0.3388)
Capitalisation	0.0005 (0.9964)
Interest revenues	0.1543 (0.1488)
Personnel expenses	-0.1361 (0.1983)

Notes: *, ** and *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level, p-values are in parentheses.

Source: Own calculations.

It is then particularly interesting to explain why we observe different results for the relationship between size and personnel expenses with cost efficiency or profit efficiency. While size is negatively linked to cost efficiency, its relationship with profit efficiency is not significant. The reason may come from the existence of some synergies on the revenue side, which offset the diseconomies of scale on the cost side. It may also come from the effects of the efficient-structure hypothesis, which counterbalance the diseconomies of scale on the cost side. Indeed, the efficient-structure hypothesis, according to which the most efficient companies have the largest market shares, is more likely to be observed with profit-efficiency measures than with cost-efficiency measures, as profitability is expected to influence market share according to this hypothesis.

The lack of a significant result for the personnel expenses variable with profit efficiency, following the positive and significant link with cost efficiency, tends to suggest that a labour-intensive production allows a reduction of costs, but not a significant increase in revenues. This may for instance result from the fact that customers do not have a preference concerning seeking credit by phone rather than having an employee from a consumer credit company in front of them.

Therefore, this section has given an insight into the determinants of cost- and profit-efficiency scores. These results may appear disappointing, as few of the tested variables have a significant link with efficiency and none of them has the same relationship with cost and profit efficiency, clearly showing the direction in which managerial performance could be improved. Nevertheless, the absence of significant results is also a relevant result itself for obtaining information on the possible determinants of efficiency. We have however observed a negative link between cost efficiency and size, suggesting the existence of diseconomies of scale. But, as there are no other studies investigating the economies of scale in the EU consumer credit markets to our knowledge, this result needs further research to be confirmed.

8. Evolution of the efficiency of consumer credit companies

This section is devoted to the analysis of the evolution of cost and profit efficiency of consumer credit companies between 1996 and 2000. The main question here is whether or not any convergence of the efficiency measures occurred among countries during that period. Indeed, this period was marked by the effects of the implementation of the legal changes that sought to favour banking and financial integration, notably through the Second Banking Directive, but also by the preparation of financial companies for the forthcoming single market of consumer credit with the expected cross-border expansion.

Therefore, the observation of reduced cross-country differences in efficiency would suggest a process of integration of consumer credit markets, even if markets are still separate as shown notably by Diez Guardia (2000), who underlined the absence of a cross-border provision of consumer credit. We present the evolution of cost efficiency and profit efficiency respectively between 1996 and 2000.

8.1 The evolution of cost efficiency between 1996 and 2000

The evolution of cost efficiency means is displayed in Table 16. Our results underline an important reduction of cost efficiency between 1996 and 2000 in all the countries analysed. These reductions in cost efficiency range from -11.47% for Germany to -35.38% for the Netherlands. Consequently, our first main conclusion is that the efforts to integrate consumer credit markets in the EU did not succeed in increasing cost efficiency.

Table 16. Evolution of cost efficiency

	1996		**2000**		**Evolution**
	Number	Mean	Number	Mean	
Belgium	3	72.68	5	53.34	-19.34
France	47	69.32	38	52.54	-16.78
Germany	3	82.15	4	70.68	-11.47
Italy	7	77.85	19	49.82	-28.03
Netherlands	4	67.88	3	32.50	-35.38
Spain	14	63.41	13	54.37	-19.04
UK	20	69.78	11	47.48	-22.30
Total	98	69.62	93	52.64	-17.04

Notes: All scores are in percentages and evolution is in points.

Source: Own calculations.

Regarding the possible convergence in efficiency, our results tend to suggest the absence of any phenomenon of cross-country convergence on cost efficiency. Indeed, the mean scores seemed closer in 1996 with a range between 63.41% and 82.15%, than in 2000 with scores ranging between 32.50% and 70.68%.

Nevertheless, a test of convergence is of utmost interest so as to analyse the reality of a movement of convergence on efficiency for consumer credit companies in the EU during the 1990s. We thus proceed to β-convergence tests on efficiency for the whole sample of countries between 1996 and 2000, i.e. the period of our study.

We also proceed to these tests of convergence at the country level. The β-convergence test aims at regressing the growth rate on the initial rate for any variable. We consequently estimate the following equation:

$$\left[ln\left(EFF_{i,2000}\right)-ln\left(EFF_{i,1996}\right)\right]/t=\alpha+\beta\cdot ln\left(EFF_{i,1996}\right)+\varepsilon_i \quad (3)$$

where $EFF_{i,1996}$ is the efficiency score of country i in 1996, $EFF_{i,2000}$ is the efficiency score of country i in 2000, t is the number of years, ε_i is the error term of country i, and α and β are the parameters to be estimated. There is then β-convergence if the coefficient β of the initial level is negative. The values diverge from each other as quickly as from their initial level (meaning that the gap between $EFF_{i,2000}$ and $EFF_{i,1996}$ is as large) and consequently countries converge all the faster as β is high.

We then test convergence at the country level to analyse if the countries with the least cost-efficient consumer credit industries in 1996 had a lower reduction in performance between 1996 and 2000 than those with the most cost-efficient consumer credit industries in 1996. This is the most relevant point relative to the efforts integrate consumer credit markets among EU countries. The results of this test are presented in Table 17. We provide evidence regarding the absence of convergence on cost efficiency among EU countries. Indeed, the coefficient of the logarithm of the efficiency level in 1996 is significantly positive. This result confirms our observation mentioned above regarding the absence of any relationship between the increase of efficiency during the period of our study and the initial efficiency observed in 1996.

Table 17. Test of convergence of efficiency scores at the country level

	Coefficient	**t-value**
Intercept	-0.9142**	-2.80
Log (efficiency 96)	0.1987**	2.61
Adjusted R^2	0.4931	

Notes: *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level.

Source: Own calculations.

We then conduct the same tests of convergence but at the company level. Indeed, even if there was no convergence at the country level because of the absence of cross-border consolidation, a convergence of efficiency may take place in each country because of domestic consolidation. Therefore, this movement of national consolidation may have favoured a convergence within countries, even if no convergence took place at the country level, owing to the lack of effective or possible cross-border expansion in the consumer credit markets. The results of the tests of convergence at the country level are presented in Table 18. These tests were performed on all companies simultaneously present in both yearly samples.

Table 18. Test of convergence of cost-efficiency scores at the firm level

	Number	**Intercept**	**Log (eff.96)**	**Adjusted R^2**
France	22	0.0971	-0.0356	-0.0175
		(0.52)	(-0.80)	
Italy	6	0.2242	-0.0632	-0.2433
		(0.12)	(-0.15)	
Spain	8	0.1603	-0.0529	-0.1407
		(0.26)	(-0.37)	
UK	9	-1.0379	0.2241	-0.0552
		(-0.84)	(0.76)	

Notes: *, ** and *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level, p-values are in parentheses.

Source: Own calculations.

We bear in mind that we have very small national samples for three of the seven countries of our sample. Consequently, we only estimate these tests of convergence for the four countries with the largest samples: France, Italy, Spain and the UK.

Here again, we observe no convergence on cost efficiency among the four countries. Indeed the coefficient of the logarithm of the efficiency level in 1996 is not significant for all the countries analysed. Thus, the conclusion of these tests is that there is an absence of convergence of cost efficiency within countries.

8.2 The evolution of profit efficiency between 1996 and 2000

We now investigate the evolution of profit efficiency between 1996 and 2000. The evolution of profit efficiency means is displayed in Table 19. We observe a reduction in profit efficiency for all countries, except Italy, which has a slight improvement (+2.17%). This general trend of reduction is rather similar to the one observed for cost efficiency, even if decreases are generally weaker ranging from –5.91 for Belgium to –36.90 for the Netherlands.

Table 19. Evolution of profit efficiency

	1996		2000		Evolution
	Number	**Mean**	**Number**	**Mean**	
Belgium	3	81.64	5	75.73	-5.91
France	46	73.45	37	60.99	-12.46
Germany	3	58.16	4	36.98	-21.18
Italy	7	69.59	19	71.76	+2.17
Netherlands	4	93.08	3	56.18	-36.90
Spain	14	85.90	12	69.23	-6.67
UK	20	75.80	11	63.82	-11.98
Total	98	76.04	91	64.26	-11.78

Notes: All scores are in percentages and evolution is in points.

Source: Own calculations.

Furthermore, regarding the possible convergence in profit efficiency, our results tend again to suggest the absence of any phenomenon of cross-country convergence on profit efficiency. We investigated this observation with a test of β-convergence. We proceeded to this test of convergence at the country level by regressing the growth rate of efficiency on the initial level of efficiency. We then tested if the countries with the least profit-efficient consumer credit industries had a lower reduction between 1996 and 2000 than those with the most profit-efficient sectors in 1996. The results of this test are presented in Table 20. As for our analysis of the convergence of cost efficiency, we provide evidence regarding the absence of convergence in profit efficiency among EU countries. The coefficient of the logarithm of the efficiency level in 1996 is not significant. We can thus underline the similarities in the evolution of cost and profit efficiency for consumer credit industries.

Table 20. Test of convergence of profit-efficiency scores at the country level

	Coefficient	**t-value**
Intercept	-0.0650	-0.38
Log (efficiency 96)	0.0054	0.14
Adjusted R^2	-0.1955	–

Notes: *, ** and *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level, p-values are in parentheses.

Source: Own calculations.

We also proceeded to the same tests of convergence at the firm level in the four countries with the largest samples. The results of these tests are shown in Table 21.

It is highly important to underline a strong difference in the cost-efficiency results: indeed we observe the phenomenon of convergence inside three of the four countries (the only exception being Italy). Consequently, a convergence occurred in profit efficiency inside France, Spain and the UK, even if no convergence took place among countries.

Table 21. Test of convergence of profit-efficiency scores at the company level

	Number	Intercept	Log (eff.96)	Adjusted R^2
France	22	0.7495***	-0.1808***	0.9932
		(49.80)	(-54.21)	
Italy	6	0.3616	-0.0891	0.3803
		(1.91)	(-2.02)	
Spain	8	0.7130**	-0.1652**	0.6836
		(3.67)	(-3.74)	
UK	9	0.7135*	-0.1703*	0.3557
		(2.24)	(-2.33)	

Notes: *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level; t-value is in brackets.
Source: Own calculations.

This section has provided evidence regarding the reduction of cost and profit efficiency between 1996 and 2000. This is an important result, as one could have expected that the efforts to promote financial integration in the EU from the European Commission as well as the preparation efforts of the consumer credit companies for the forthcoming single financial market would have favoured an increase of efficiency. Nevertheless, there was no improvement, which can be associated with the absence of increased competition. Indeed, this lack of increased competition can also be interpreted as the absence of any consequences from EU integration. In a similar vein, we also observe no convergence among countries on efficiency. In summary, these results do not support the existence of positive effects of EU integration on the efficiency of consumer credit companies.

9. Conclusion

The aim of this work was to provide new empirical elements on the performance of companies in the EU consumer credit industries. Indeed, the market structure of EU consumer credit industries has rarely been analysed in the empirical literature, in spite of the rapid expansion of this industry in recent years. Furthermore, it is of the highest interest to have information on the cross-country differences in efficiency and on the recent evolution of the efficiency of consumer credit companies, in view of the current integration of the EU consumer credit markets.

We measured the evolution of competition in the consumer credit markets using the Rosse–Panzar model and observed no increase of competition between 1996 and 2000. These estimations also suggest a rather high degree of competition in these markets, in comparison to the EU banking markets. Therefore, we do not find that there is a positive influence of EU integration on competition in consumer credit markets.

We used the methodology of frontier efficiency techniques to estimate the cost and profit performance of consumer credit companies in seven EU countries in the period 1996–2000. We then measured cost- and profit-efficiency frontiers to assess the ability of a consumer credit company to minimise costs and to maximise profits. We observed large differences in cost and profit efficiency among EU countries. Nevertheless, a striking result is the fact that the inclusion of environmental variables in the estimation of efficiency scores reduces the cross-country differences in efficiency. This means first that the gaps in efficiency among countries are not only the result of differences in managerial performance, but also differences in economic environment.

Furthermore, this result has important consequences for the possible cross-border expansion of consumer credit companies. Indeed, we could expect that consumer credit companies from the most efficient countries would have an advantage in the future when entering the markets of the least efficient countries. Nevertheless, if this advantage results from the economic environment, it is not exportable abroad. Therefore, as the inclusion of environment in the estimation of

efficiency scores reduced the cross-country differences in efficiency, this leads to the conclusion that those cross-border movements in the consumer credit industry motivated by cross-country differences in efficiency will be less numerous that what could have been expected after our first estimations.

Regarding the test of several determinants of cost and profit efficiency, the tested determinants are generally not linked to efficiency measures. We notably do not observe any significant relationship between the capitalisation ratio and efficiency measures, in spite of the various theoretical arguments regarding such a link. This may signify opposing influences on the variables. Nevertheless, we have to stress the observed negative relationship between cost efficiency and size, suggesting the possible existence of diseconomies of scale in EU consumer credit companies. Such results should be regarded with care, however, as this issue needs further analysis to strengthen any conclusion.

Finally, the evolution of the cost and profit efficiency of consumer credit companies between 1996 and 2000 undoubtedly shows a reduction in efficiency. Moreover, there is no cross-country convergence in the area of efficiency. These are rather unexpected results, as the efforts to integrate the EU consumer credit markets were expected to favour efficiency. Nevertheless, we can put together these conclusions with the observed absence of change in competition during the same period.

These results have two very important implications. First, we do not support the view that EU integration has had any influence on the behaviour of companies in consumer credit markets. Neither efficiency nor competition seems to have changed in recent years. Second, the consumer credit markets in the EU appear to still be segmented, as the cross-country differences in efficiency remained prevalent among the countries.

In summary, this work provides a large set of results on the cost and profit performance of companies in the EU consumer credit industries. It then shows the usefulness of frontier efficiency techniques to estimate measures of performance in these industries. Furthermore, it has put forward a major conclusion concerning the absence of positive effects of EU integration on the behaviour of consumer credit companies. This last result may have an impact on the forthcoming changes in the legislation of consumer credit in the EU. A harmonisation of consumer protection could lead to some convergence in efficiency among countries, as the performance of consumer credit companies is likely to be influenced by such legislation. Thus, while our study has shown potential efficiency gains in the consumer credit industries, we may expect an increase in the efficiency of this sector with the upcoming developments in the environment of the consumer credit activity.

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Annexes

Annex A.1 Estimation of the Rosse–Panzar model for the measures of competition

Table A.1 Estimation of the Rosse–Panzar model for 1996 and 2000

		1996	2000
	Intercept	0.57* (1.96)	0.84** (2.33)
France	Price of labour	0.27*** (6.95)	0.35*** (6.70)
	Price of physical capital	0.13*** (4.47)	0.08* (1.76)
	Price of financial capital	0.54*** (13.90)	0.52*** (7.99)
Italy	Price of labour	0.15** (2.08)	0.34*** (6.51)
	Price of physical capital	0.31** (2.31)	-0.02 (–0.34)
	Price of financial capital	0.97*** (5.29)	0.45*** (5.29)
Spain	Price of labour	0.30*** (3.86)	0.30*** (3.20)
	Price of physical capital	0.09 (1.09)	-0.04 (–0.80)
	Price of financial capital	0.47*** (4.42)	0.58*** (3.75)
UK	Price of labour	0.31*** (4.63)	0.24*** (3.33)
	Price of physical capital	0.05 (1.27)	-0.07 (–0.88)
	Price of financial capital	0.42*** (3.50)	0.67*** (5.26)
	Assets	0.96 (26.79)	0.88*** (17.33)
	Equass	0.03 (0.79)	-0.12** (2.19)
Adjusted R^2	–	0.9815	0.9797

Notes:
i) the dependent variable is total revenues;
ii) *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level;
iii) t-value is in brackets.

Annex A.2 Estimation of the efficiency frontiers with environmental variables

The following tables display the results for the OLS and ITSUR estimations of the cost and profit functions with the three environmental variables. We only report the coefficients of these latter variables to assess their influence on the efficiency measures.

Table A.2 OLS estimation of the cost function system

Parameter	Coefficient	t-value
Per capita income	0.24E-5	0.84
Banking presence	-0.8938	-0.11
Development of consumer credit	-0.0303*	-1.95
Adjusted R^2 on OLS equation	0.9613	–

Notes: *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level.

Table A.3 ITSUR estimation of the cost function system

Parameter	Coefficient	t-value
Per capita income	0.39E-5**	2.12
Banking presence	-9.8892*	-1.83
Development of consumer credit	0.0080	0.78

Notes: *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level.

Table A.4 OLS estimation of the profit function system

Parameter	Coefficient	t-value
Per capita income	0.1E-5	-0.14
Banking presence	-46.8886	-1.55
Development of consumer credit	-0.1084*	-1.90
Adjusted R^2 on OLS equation	0.4518	–

Notes: *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level.

Table A.5 ITSUR estimation of the profit function system

Parameter	Coefficient	t-value
Per capita income	-0.7E-5	-0.66
Banking presence	-51.2103	-1.64
Development of consumer credit	-0.1009*	-1.74

Notes: *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level.

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- Carry out systematic research and analysis of developments in the retail finance sector with a view to developing a comprehensive picture at European level;
- Construct a comprehensive data base of relevant and current statistics in order to fill important information and analytical gaps in the study of the field; and
- Bring to the attention of policy-makers national differences in the regulation of retail financial markets that inhibit the completion of a truly pan-European single market.

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