DOI: 10.55643/fcaptp.5.58.2024.4521

THE EFFECT OF (REVERSE) FACTORING TRANSACTIONS ON EUROPEAN COUNTRIES' LATE PAYMENT

Manuel Alves
PhD Student, Beira Interior University, Covilha, Portugal;
e-mail: manuel.joao.alves@ubi.pt
ORCID: 0000-0002-1459-7675
(Corresponding author)

Michele Jucá
PhD in Economics, Professor of the Post-Graduation in Administration, Mackenzie Presbyterian University, Sao Paulo, Brazil;
ORCID: 0000-0002-8610-6193

Zélia Serrasqueiro
PhD in Economics, Professor of Economics and Management, Beira Interior University, Covilha, Portugal;
ORCID: 0000-0003-1761-5426

Received: 12/08/2024
Accepted: 12/10/2024
Published: 31/10/2024

ABSTRACT

Late payment by companies is a quiz for managers and governments. Its occurrence, in all industries, has a negative impact on companies' liquidity and can even lead some of them to bankruptcy – especially the less structured ones. In macroeconomic terms, this situation also has adverse implications for countries' economic growth. Being confronted with these issues, banks provide financial instruments - such as factoring and reverse factoring - which potentially can mitigate these undesirable effects. Thus, the objective of this study is to analyze if companies' use of both financial instruments affects their late payment at the country level. To the best of our knowledge, this is the first paper to do so. Therefore, a final sample of 2,245 observations from 28 European countries is considered, being 16 from developed and 12 from emerging ones. The study hypotheses are tested by a logistic regression model. As a result, there is an unexpected positive relationship between both financial instruments and companies' late payments at a country level. It is possible that undercapitalized companies with inadequate credit practices consider late payment as an ordinary source of credit. This study contributes to academic knowledge by analyzing the effect of factoring and reverse factoring on companies' late payments in European countries. The results can also provide insights into firms' financing and supplier management policies. Moreover, countries and regulators can adjust their legislation in order to encourage a better level of governance in their markets.

Keywords: reverse factoring, factoring, late payment, European countries, logistic regression

JEL Classification: G20, G23

INTRODUCTION

Late payment (LP) is the time that exceeds the agreed payment terms. Rather, payment discipline refers to the company's policy of meeting its financial obligations to suppliers on schedule (Salamon et al., 2016). Buyers who fail to pay invoices by the contractually stipulated deadline can cause financial hardship for suppliers, also negatively impacting the supply chain industry (Caniato et al., 2016; Flinn & Li, 2023). Thus, it is reasonable to assume that extensions at payment lag impact countries' macroeconomic scenario (Checherita-Westphal et al., 2016).

Additionally, purchasing companies are under increasing institutional pressure to pay their suppliers within the invoice deadline. The market interest in fintech solutions - like supply chain finance (SCF) - has the potential to lessen suppliers' LP problems. Whether this actually happens in practice is questionable (Flinn & Li, 2023). Factoring and reverse factoring (RF) are supply chain financial instruments (FIs). Gelsomino et al. (2019) and Wu et al. (2019) point out that in order for businesses with less favourable risk evaluations to secure money for the expansion of their operations, these FIs can provide an alternative source of funding.

Factoring is defined as the process for firms raising immediate cash, either by selling their account receivables to a third party or by pledging these receivables as collateral on a loan. Nevertheless, it has an interest expense and may be used as a funding source (Bilgin & Dinc, 2019). As for RF, it offers suppliers access to short-term credit at a low

cost through the selling of the suppliers' accounts receivable to financial institutions at a reasonable discount in exchange for cash (Liebl et al., 2016; Huang et al., 2019). According to the annual review of Factor Chain International (2023), the turnover of factoring and RF in the world has increased from 2,598,298 in 2017 to 3,659,204 in 2022 - both numbers are in millions of euros. This represents an increase of 40.8%. In 2022, Europe alone accounted for 68.3% of total turnover.

There are empirical studies that seek to identify the main determinants of factoring and RF operations at the firm and country levels. In the first case, Huang et al. (2019) investigate the joint effects of lead time, information sharing and receivable period of RF adoption, based on the Chinese suppliers' perspective. Their findings imply that, while taking into account the accounts receivable period, lead time positively influences suppliers' RF adoption. Information exchange, on the other hand, influences suppliers' RF adoption both directly and indirectly.

With regard to the macroeconomic level, Klapper (2006) identifies that factoring is significantly larger in countries with greater economic development. The paper also suggests that RF is an alternative factoring technology in countries with poor credit information. Regarding Mol-Gómez-Vázquez et al. (2018), they examine if factoring is less reliant on subpar institutions and legislation. According to their findings, companies who operate in nations with political unpredictability, poor creditor protection laws, or expensive enforcement fees are more inclined to use factoring.

In turn, the literature also presents studies that analyze the main factors of LP at a micro and macroeconomic level. At the firm level, Obeng (2017) investigates the economic impact of delayed payments caused by the liquidity crisis in the European Union (EU). The findings corroborated the claim that EU businesses that postpone accounts receivable payments are significantly impacted by the financial crisis. On the other hand, Salamon et al. (2016) investigate if LP can be explained by firms' ethical culture. They confirmed that it does impact firms' payment discipline.

As for the macroeconomic level, Checherita-Westphal et al. (2016) studied the effect of changes in governments' payment discipline on the private sector of 25 European countries. The results have shown that payment delays appear to reduce profits, increase the likelihood of bankruptcies and reduce economic growth. The probability of defaults in the private sector rises with an increase in the average payment term. However, none of the studies investigate the effect of factoring and RF FIs on firms' LP.

Regarding the relationship between Factoring/RF and LP, there are arguments that support the existence of both positive and negative impacts. At first, the expectation is that by increasing businesses' working capital the impact will be positive in reducing LP. Using these FIs may lessen the likelihood of missing supplier payment deadlines – since it increases companies' ability to satisfy their financial responsibilities (Huang et al., 2019; Shou et al., 2021). Nevertheless, some empirical research has been unable to support the connection between liquidity and payment discipline. Some authors state that payment discipline is influenced by the company's ethics, and LP is not solely caused by the firm's financial circumstances (Praésnikar et al., 2004; Salamon et al., 2016). So, it is possible that the use of these FIs has no effect on the LP or even contributes to its increase.

LITERATURE REVIEW

Zainudin (2008) defines LP as the fulfilment of a debt at a date after the credit period. Credit customers' LP can negatively affect the company´s operations and this is not exclusive to any specific industry or country. His study's findings showed that the length of the collecting time and financial performance are negatively correlated. As for Paul et al. (2012), they claim that weak financial and working capital practices contribute to LP problems. Moreover, economic conditions also matter, as LP often increases when economies move into recession. Their study shows that there is a negative relationship between LP and firms' profitability.

In turn, Salamon et al. (2016) claim that countries in Europe differ more in terms of payment discipline than industries do. Their research provided empirical evidence that the organization's ethics influence payment discipline and that LP might arise for reasons other than the company's financial health. Additionally, Obeng (2017) studies the financial effects of payment delays brought on by the EU's liquidity crisis. His research indicated that there were payment arrears in all EU countries beyond the given credit term. Nevertheless, according to Flinn and Li (2023), the market believes that suppliers' LP issues may be lessened by fintech solutions like supply chain finance (SCF). However, it's doubtful if this actually occurs in reality. According to their findings, fintech and stakeholder-centred tech do not significantly affect payment timeliness, instead, institutional forces do.

Factoring is one of the financial instruments of SCF. According to Klapper (2006), it is a sort of supplier financing in which businesses sell their creditworthy accounts receivable at a discount and get instant cash. It is not a loan and there are no additional liabilities on the firm's balance sheet, although it provides working capital financing. All around the world, both

developed and emerging countries use this FI. The study's empirical results demonstrate the factoring relevance of economic expansion and countries' development. However, the success of this FI depends on good credit information.

Mol-Gómez-Vázquez et al. (2018), in turn, examine whether factoring financing can more successfully address market imperfections in poor legal and institutional economies. To this end, they examine whether the use of factoring financing in small and medium-sized enterprises (SMEs) differs across countries due to differences in the legal protection of creditors. According to their findings, factoring is more common among firms operating in countries that weakly protect the creditors' rights, have political instability or high enforcement costs.

Regarding Bilgin and Dinc (2019), their research aims to clarify factoring's role as a capital structure determinant and as an alternative external funding source to bank loans and equity financing. The empirical results show that factoring impacts the capital structure of leveraged firms. However, it has no effect on the firm's initial choice of indebtedness. Another relevant finding is that factoring and leverage are positively correlated. Based on the presented information, the following hypothesis is defined:

H1 – The use of factoring by companies affects their late payment at a country level

RF is another SCF financial instrument. Huang et al. (2019) claim that RF offers suppliers access to short-term credit, at a low cost, through the selling of the suppliers' accounts receivable to financial institutions. It does so at a reasonable discount in exchange for cash. Considering suppliers' point of view, they conduct an empirical investigation of the combined effects of lead time, information exchange, and the accounts receivable term on RF adoption. According to their findings, lead time has a direct positive impact on suppliers' adoption of RF. Furthermore, suppliers' adoption of RF is positively and directly impacted by information exchange. However, it has a negative and indirect impact on suppliers' use of RF.

Conversely, Shou *et al*. (2021) conducted an empirical investigation on the link and contingency conditions between RF and operating performance. According to their findings, RF improves the operating performance of buyer firms in terms of operating margin and cost-effectiveness. Furthermore, the relationship between RF and operating margin is positively moderated by both production and innovation capacities. But neither of them acts as a moderator in the RF-cost efficiency relationship. Thus, the following hypothesis can be formulated:

H2 – The use of reverse factoring by companies affects their late payment at a country level

Some researchers have analyzed these issues from a macro perspective. Klapper (2006), for instance, investigated the factoring determinants for 48 countries around the world. She also examined the reverse factoring program of the Nacional Financiera (Nafin) development bank in Mexico. She found that factoring is larger in countries with greater economic development and growth and developed credit information bureaus. Checherita-Westphal *et al.* (2016) studied the effect of changes in governments' payment discipline on the private sector of 25 European countries. They argue that increased delays in public payments can affect private sector liquidity and profits and, ultimately, economic growth.

In turn, Salamon *et al*. (2016) examined whether late payments can be explained by firms' ethical culture. To do so, they collected data from more than two thousand Slovenian private firms. The authors state that the more sanctionability and feasibility are expressed in firms, the better their payment discipline. They also claim that countries in Europe differ more in terms of payment discipline than among industries. As for Mol-Gómez-Vázquez et al. (2018), they examine whether the use of factoring differs across countries due to distinctions in the legal protection of creditors. To do so, they used a survey data set of more than four thousand SMEs from 25 European countries. However, none of these previous studies addresses all three issues of LP, factoring and RF at the country level. This study aims to mitigate this research gap.

AIMS AND OBJECTIVES

Given the above, the objective of this study is to analyze the effects of both FIs products – factoring and RF – upon European countries' late payment. This paper contributes to academic research since it addresses the effect of factoring and RF FIs on LP. There is a lack of studies that analyse this topic at the macroeconomic level. For firms operating in different European countries - or wishing to internationalize - this study provides insight into where these FIs are most used and what are their effects on LP. This information may help companies' decision-making. It also enables governments and regulators to analyze how they compare to one another in the European environment when it comes to the use of these FIs.

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METHODS

The sample consists of 28 European countries, and data were obtained between 2008 and 2022, totalling 2,245 observations. Among them, there are 16(12) that are developed (emerging), according to the S&P Capital IQ criteria (2023). Regarding data sources, figures on late payments were obtained from Intrum (2023), while the percentages of factoring and reverse factoring on each country's gross domestic product were obtained from Factor Chain International (2023). The remaining data for control variables were extracted from WHO (2023) and World Bank (2023).

Furthermore, there are two subsamples for both FIs - factoring and RF. In the case of factoring, the subsample is made up of 377 observations, whose data are obtained for a period of 15 years, from 2008 to 2022. Regarding RF, the data were made available by Factor Chain International (2023) only from 2017 on. Therefore, this subsample considers 6 years, from 2017 to 2022.

The data is analyzed via descriptive statistics and correlation analysis. In turn, the hypotheses are verified using a logistic regression model, being ratified via robustness tests – for the subsamples of developed and emerging countries. All analyses were carried out using Stata 18 software.

The goodness of fit of the logistic regression model can be assessed through estimates of the pseudo coefficient of determination (R^2) and likelihood value. As for post-estimation tests, the Hosmer-Lemeshow goodness-of-fit test (estat gof) and the classification table (estat classification) stand out to check the model's level of accuracy (Wooldridge, 2019). Equations 1 to 3 present the regression model analyzed in this study. Table 1 presents the description of its variables.

$$p_i = \frac{e^Y}{1+e^Y} \quad (1)$$

$$Y_i = \beta_0 + \beta_1 IV_i + \beta_2 Z_i + u_i \quad (2)$$

$$p_i = \frac{e^{\beta_0+\beta_1 IV_i+\beta_2 Z_i+u_i}}{1+e^{\beta_0+\beta_1 IV_i+\beta_2 Z_i+u_i}} \quad (3)$$

In which: p = the probability associated with the occurrence of the specified event; Y = dependent variable of late payment (DAYSLP); IV = independent variables (FACT, RFACT); Z = country control variables (COVID, GGDP, DCPS, WGI); β_0 = the coefficient for the intercept term; β_1 to β_2 = the coefficient of explanatory variables; i = firm; u = error term.

Table 1. Description of variables. Notes: ES = expected signal; WHO = World Health Organization; Ref = Reference: (a) Zainudin (2008), Paul *et al.* (2012), Salamon *et al.* (2016), Obeng (2017); (b) Klapper (2006), Bilgin and Dinc (2019); (c) Klapper (2006), Huang *et al.* (2019), Shou *et al.* (2021); (d) Jonker *et al.* (2022), Flinn and Li (2023); (e) Klapper (2006), Mol-Gómez-Vázquez *et al.* (2018); (f) Klapper (2006), Mol-Gómez-Vázquez *et al.* (2018); (g) Kaufmann *et al.* (2011), Uddin *et al.* (2020), Eldomiaty *et al.* (2023).

Acronym	Description	ES	Formula	Components	Source	Ref
Dependent variable						
DAYSLP	Late payment	n/a	DAYSLP = Dummy of late payment days	1 = if the number of late payment days is above the median 0 = if otherwise	Intrum (2023)	(a)
Independent variables						
FACT	Factoring	+/-	FACT = TFA/GDP	TFA = Total factoring GDP = Gross domestic product	Factor Chain International (2023)	(b)
RFACT	Reverse factoring	+/-	RFACT = TRF/GDP	TFA = Total reverse factoring GDP = Gross domestic product	Factor Chain International (2023)	(c)
Control variables						
COVID	COVID-19	+	COVID = Dummy of the years of Covid-19	1 = if the years are 2020 and 2021 0 = if otherwise	WHO (2023)	(d)
GDPG	Gross domestic product growth	-	GDPG = (GDPt/GDPt-1)-1	GDPt = Gross domestic product of the current year GDPt-1 = Gross domestic product of the previous year	World Bank (2023)	(e)
DCPS	Domestic credit to the private sector	-	DCPS = DC/GDP	DC = Domestic credit to the private sector GDP = Gross domestic product	World Bank (2023)	(f)
WGI	Worldwide governance indicators	-	WGI = It ranges between -2.5 and 2.5. The higher the regulatory environment index, the better	WGI score is the mean of six-dimensional estimates: i. control of corruption, ii. Government effectiveness, iii. Political stability and absence of violence/terrorism, iv. Regulatory quality, v. rule of law and vi. Voice and accountability.	World Bank (2023)	(g)

RESULTS

This section presents the factoring and RF analysis results. Tables of descriptive statistics, correlation analysis and logistic regression are presented and discussed for both financial instruments, separately.

Factoring

According to Table 2, the total sample presents a mean of 13.4 days of late payment (DAYSLP) for European companies. However, this average is slightly higher in developed countries (13.7), when compared to the emerging ones (13.1). This may be related to the fact that companies in developed economies are usually larger and older, allowing them to have a longer trading history. Moreover, these companies have a greater negotiating power with their suppliers to extend or even exceed the agreed payment terms, according to Paul and Boden (2011).

Table 2. Descriptive statistics – Factoring. Notes: (a) In number of days; Obs = Number of observations; SD = Standard deviation.

Sample	Total			Developed			Emerging		
	Obs	**Mean**	**SD**	**Obs**	**Mean**	**SD**	**Obs**	**Mean**	**SD**
DAYSLP (a)	377	13.466	8.031	230	13.704	8.832	147	13.095	6.598
FACT	377	0.071	0.045	230	0.086	0.045	147	0.047	0.033
GDPG	377	0.013	0.037	230	0.009	0.035	147	0.020	0.040
DCPS	360	0.890	0.416	222	1.124	0.355	138	0.514	0.141
WGI	377	1.065	0.519	230	1.321	0.439	147	0.664	0.354

As for the factoring transactions (FACT), developed countries use this FI almost twice as much as emerging ones. This may be due to the fact that developed countries have better information systems that facilitate the use of this type of FI. On the other hand, the GDP growth rate (GDPG) in emerging countries (2%) is more than double that of developed (0.9%) ones. In fact, during the sample period, the economies of emerging countries had greater prominence because most of them didn´t belong to the Eurozone. As a result, they still have their local currencies and implement monetary policies like currency devaluation. According to Bahmani-Oskooee and Kutan (2008), their goal is to outperform the developed countries - whose majority adopted the Euro - in terms of growth rates and competitiveness.

With regard to credit to the private sector (DCPS), the percentage is higher in developed countries than in emerging ones. This may be due to a more efficient banking sector or more favourable risk analysis in developed countries. As for the worldwide governance indicators (WGI), it is twice as high in developed countries, as expected. The regulatory environment in emerging countries is characterized by less control of corruption and accountability of top managers or decision-makers, as well as weaker regulatory quality at government and institutional levels (Uddin *et al.,* 2020).

Moreover, Table 3 presents the results of the correlation analysis. There is a positive correlation between the use of the Factoring FI and firms' late payment, contrary to what was expected. This may be related to the fact that in Europe, beyond financial reasons, companies delay their payments due to other factors such as cultural issues or even a lack of ethics, according to Salamon *et al.* (2016).

Table 3. Correlation analysis – Factoring. Notes: The upper values are the Pearson coefficient, while the lower ones show the correlation significance level. Values highlighted in bold have statistical significance at the level of 1%, 5% or 10%.

	DAYSLP	**FACT**	**COVID**	**GDPG**	**DCPS**	**WGI**
DAYSLP	1.0000					
FACT	0.0909 **0.0779**	1.0000				
COVID	-0.1048 **0.0420**	0.1113 **0.0308**	1.0000			
GDPG	-0.0169 0.7442	-0.0516 0.3180	-0.0409 0.4281	1.0000		
DCPS	-0.0740 0.1609	0.2256 **0.0000**	-0.1089 **0.0389**	-0.2819 **0.0000**	1.0000	
WGI	-0.2770 **0.0000**	0.0961 **0.0623**	-0.0600 0.2450	-0.0101 0.8458	0.5772 **0.0000**	1.0000

DOI: 10.55643/fcaptp.5.58.2024.4521

In turn, during the COVID years' (2020 and 2021), there was a reduction in firms' late payments. At the period, the economic activity was frozen due to the implementation of lockdown policies, for example. With the exception of some specific sectors - such as utilities, technology and health - companies presented restrictions to continue operating normally. Logistics chains were interrupted, causing a reduction in the acquisition of supplies, as well as in the sales to final consumers.

Nevertheless, in this same period, it is observed a positive relationship between COVID-19 and Factoring. This reveals the importance of this financial instrument as an alternative to the scarcity of bank credit at that time. The implementation of countercyclical policies by governments - via credit expansion - eventually did not have the expected effect on all sectors of the economy. This credit restriction can be observed by the negative correlation between domestic credit to the private sector (DCPS) and COVID-19, compromising economic growth (GDPG).

Regarding the worldwide governance indicators (WGI), it is observed that in countries that present high levels of regulatory quality and political stability, there is a reduction in the number of late payment days (DAYSLP), an increase in the use of factoring financial instrument (FACT), as well as an incentive to grant domestic credit to the private sector (DCPS).

Table 4 shows the results of the logistic regression for the independent variable factoring. Model 1 considers the total sample, while Models 2 and 3 present the results for the sub-samples of developed and emerging countries, respectively. All the models show statistical significance (Prob > chi2 = 0.0000 or 0.0908). Furthermore, the Pseudo R2 of Model 1 is 8.8%, while that of Model 2 is 15.6% and Model 3 is 5.1%. This means that the sub-sample of developed countries has a higher level of explanation of late payment days. Maybe this is due to its greater number of observations.

Table 4. Logistic regression – Factoring. Notes: Values highlighted in bold have statistical significance at the level of 1%, 5% or 10%.

Variables	Model 1 - Total sample			Robustness tests					
				Model 2 - Developed			Model 3 - Emerging		
DAYSLP	**Coef.**	**Odds Ratio**	**P>|z|**	**Coef.**	**Odds Ratio**	**P>|z|**	**Coef.**	**Odds Ratio**	**P>|z|**
FACT	6.897	989.888	**0.008**	4.110	60.952	0.301	0.462	1.587	0.941
COVID	-0.832	0.435	**0.011**	-0.631	0.531	0.171	-0.726	0.483	0.134
GDPG	1.148	3.153	0.726	8.118	3355.07	**0.078**	-2.822	0.059	0.614
DCPS	0.486	1.626	0.179	0.662	1.939	0.147	3.152	23.394	**0.045**
WGI	-1.514	0.219	**0.000**	-2.322	0.098	**0.000**	-0.281	0.754	0.612
Constant	0.889	2.433	**0.009**	1.888	6.611	**0.043**	-0.885	0.412	0.284
No. Obs	360			222			138		
Prob > chi2	0.0000			0.0000			0.0908		
Pseudo R2	0.0883			0.1560			0.0508		
Estat gof	0.3580			0.2127			0.3984		
Correctly classified	65.56%			69.37%			61.59%		

About Model 1, for every 1% increase in the factoring variable, there is an increase of 98,888.8% [100*(989.888−1)] in the chances of late payment. A possible explanation for this may be related to the fact that factoring is a type of short-term FI. Given this, some companies may be less committed to meeting the established payment deadlines. It is possible that they perceive late payments as an ordinary source of credit, being incorporated into their working capital. The companies that act like that, usually, are undercapitalized and do not adopt adequate credit management practices. Such aspects highlight the complexity of the relationship between factoring and DAYSLP, suggesting more specific analyses of the reasons for these companies' behaviour.

In its turn, the COVID variable indicates that during the years 2020 and 2021 there was a reduction in late payment days. In fact, during the pandemic, there was a slowdown in economic activity - average GDP growth was only 1% in 2020 and 2021 and 3.2% in 2017, 2018, 2019 and 2022. As a result, there have been fewer commercial operations and, consequently, fewer delays.

Still, about Model 1, there is a negative relationship between countries´ level of governance (WGI) and DAYSLP, as expected. An adequate general governance environment in a country favours the financial performance of the firms based

there, allowing them to meet the agreed payment deadlines. According to Eldomiaty *et al.* (2023), the specific WGI dimensions of voice and accountability, political stability and government effectiveness have poa sitive and significant impact on a firm's financial performance - in terms of liquidity and profitability. These aspects also contribute to the reduction of DAYSLP.

Model 2 shows a positive relationship between GDP growth and DAYSLP - at the 10% level. On the one hand, economy growth stimulates commercial trades and credit transactions. On the other hand, it can also lead to the occurrence of delays in payment and even default, resulting from a possible poor analysis of the companies' ability to pay, by creditors. In this heated economic scenario, firms could be more focused on selling than on receiving from their customers or paying suppliers. Moreover, Model 2 shows the same negative relationship between WGI and DAYSLP – as observed in Model 1 - reinforcing the already presented arguments.

As for Model 3, there is a positive relationship between domestic credit to the private sector (DCPS) and DAYSLP - at the 5% level of statistical significance. This may be related to the fact that, in emerging countries, there is a greater need for financing sources, as well as the rule of law and voice and accountability. These singularities could lead to a delay in payment deadlines.

Finally, the model adherence test - goodness of fit statistics (Estat gof) - shows a probability above 20% for all Models – Model 1 (35.8%), Model 2 (21.27%) and Model 3 (39.84%). This means that the test's null hypothesis cannot be rejected: *H0 - The predicted group classifications are the same as those observed.* As for the classification table - which checks the level of accuracy of the Models - all of them have an overall percentage of accuracy above 60%. In the case of Model 2, this figure is close to 70%. These results point to the models' good predictive capacity.

Reverse factoring

According to Table 5, the total sample presents a mean of 11.4 days of late payment (DAYSLP) for European companies. Just like factoring FI, this average is slightly higher in developed countries (11.5), when compared to the emerging ones (11.2). The reasons for this may be the same as those identified for factoring. Nevertheless, as expected, the average of LP days is lower using RF (11.4), than factoring (13.4). One possible reason is that RF is more used for suppliers' payment, while factoring is for customers' collection.

Table 5. Descriptive statistics – Reverse factoring. Notes: (a) In number of days; Obs = Number of observations; SD = Standard deviation

Sample	Total			Developed			Emerging		
	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD
DAYSLP (a)	156	11.435	5.294	90	11.544	5.522	66	11.287	5.003
RFACT	156	0.003	0.002	90	0.004	0.002	66	0.002	0.001
GDPG	156	0.024	0.041	90	0.019	0.043	66	0.030	0.037
DCPS	143	0.772	0.373	82	1.007	0.320	61	0.455	0.116
WGI	156	1 .007	0.523	90	1.293	0.419	66	0.617	0.382

Regarding RF transactions (RFACT), developed countries also use them twice as much as emerging countries. This may be related to the fact that RF is a recent FI that requires advanced financial knowledge. This financial innovation was introduced by developed economies, being subsequently adopted by emerging markets. Moreover, the GDP growth rate (GDPG) of emerging countries is over 50% higher than that of developed ones. The reasons for this are the same as presented in the analysis of Table 2 - Descriptive statistics – Factoring.

Concerning credit to the private sector (DCPS), it is more than twice as high in developed countries than in emerging ones. This may occur as a result of the increased availability and variety of credit offered by more established credit institutions in developed markets. As for the worldwide governance indicators (WGI), it is also more than twice as high in developed countries than in emerging ones. As expected, developed countries have better regulatory environments due to a greater number of anti-corruption laws, increased public responsibility, and increased public scrutiny. Besides, these countries tend to be more politically stable and secure (Khan *et al.*, 2020).

Furthermore, Table 6 presents the results of the correlation analysis. There is a positive correlation between the use of RF and firms' late payment (28%) - again, contrary to what was expected. It is three times higher than the factoring one (9%). This may be due to the lack of financial capacity and efficiency of the companies, as well as a fair attitude of the state toward timely payments and a better functioning of courts (Prašnikar *et al.*, 2004).

DOI: 10.55643/fcaptp.5.58.2024.4521

Table 6. Correlation analysis – Reverse factoring. Notes: The upper values are the Pearson coefficient, while the lower ones show the correlation significance level. Values highlighted in bold have statistical significance at the level of 1%, 5% or 10%.

	DAYSLP	RFACT	COVID	GDPG	DCPS	WGI
DAYSLP	1.0000					
RFACT	0.2811 **0.0004**	1.0000				
COVID	0.2162 **0.0067**	0.0072 0.9293	1.0000			
GDPG	-0.0017 0.9829	0.0924 0.2514	-0.2575 **0.0012**	1.0000		
DCPS	-0.0221 0.7935	0.2732 **0.0010**	0.0231 0.7841	-0.2546 **0.0022**	1.0000	
WGI	-0.0733 0.3629	0.1158 0.1500	-0.0238 0.7685	-0.0651 0.4197	0.6439 **0.0000**	1.0000

As for the Covid years', there was an increase in firms' late payments. This positive relationship, in addition to the reasons presented in the factoring analysis, may also be related to the smaller sample size of the RF. Regarding economic growth (GDPG) and COVID-19, there is a negative relationship between them, as expected. This is mostly due to the restrictions and lockdowns implemented by the countries' governments, mostly (König & Winkler, 2021).

Regarding domestic credit to the private sector (DCPS), there is a positive relationship with the use of RF. This indicates that RF is complementary to other forms of financing since it enables firms to transfer their credit risk and borrow greater amounts (Klapper, 2006). Besides, a negative relationship between DCPS and economic growth is observed. Concerning the worldwide governance indicators (WGI), countries with a better regulatory environment and less corruption present a favourable scenario for financing the private sector (DCPS) (Murta & Gama, 2023).

The results of the logistic regression with RF as the independent variable are summarized in Table 7. Just like Table 4, Model 1 considers the total sample, while Models 2 and 3 present the results for the sub-samples of developed and emerging countries, respectively. All three models are statistically significant (Prob > chi2) at 1% or 5% level. Furthermore, the Pseudo R2 of Model 1 is 14.7%, while that of Model 2 is 15.4% and that of Model 3 is 16.1%. This means that all models have a similar explanation capacity for late payment days.

Table 7. Logistic regression – Reverse factoring. Notes: Values highlighted in bold have statistical significance at the level of 1%, 5% or 10%.

Variables	Model 1 - Total sample			Robustness tests					
				Model 2 - Developed			Model 3 - Emerging		
DAYSLP	**Coef.**	**Odds Ratio**	**P>|z|**	**Coef.**	**Odds Ratio**	**P>|z|**	**Coef.**	**Odds Ratio**	**P>|z|**
RFACT	391.281	0.000	**0.000**	376.685	0.000	**0.010**	622.319	0.000	**0.015**
COVID	1.204	3.336	**0.005**	1.150	3.160	**0.057**	1.256	3.512	**0.050**
GDPG	1.539	4.661	0.772	3.766	43.240	0.592	-3.866	0.020	0.642
DCPS	-0.241	0.785	0.731	-0.092	0.911	0.920	-1.562	0.209	0.541
WGI	-0.606	0.545	0.223	-0.337	0.713	0.646	-1.354	0.258	0.136
Constant	-0.475	0.621	0.383	-0.955	0.384	0.479	0.328	1.388	0.791
No. Obs	143			82			61		
Prob > chi2	0.0000			0.0055			0.0202		
Pseudo R2	0.1474			0.1535			0.1606		
Estat gof	0.0217			0.0131			0.1281		
Correctly classified	74.13%			78.05%			75.41%		

Regarding Model 1, the financial instrument RF also presents a positive relationship with DAYSLP, contrary to expectations. However, due to the smaller number of observations (143), compared to Factoring (360) –Table 4, its odds ratio presents an almost irrelevant value. Regarding the positive relationship, it can also be observed in Models 2 and 3. It is possible

that financing to suppliers is being carried out using other sources of credit. However, a broader understanding of the reasons for this leads to qualitative future studies.

About COVID, unlike the results in Table 4, there is a positive relationship with DAYSLP in all three Models. In the case of Model 1, this means that in the years 2020 and 2021, there was an increase in the odds ratio of late payment of around 233.6% [100*(3.336-1)]. Unlike the factoring sample, the RF sample considers a shorter period of time (2017 to 2022), meaning that the years 2020 and 2021 have had a greater impact on the results. At last, regarding the level of accuracy of the Models, it can be seen that all of them have an overall percentage of accuracy above 74%. In the case of Model 2, this figure exceeds 78%. These results indicate the predictive capacity of the models.

DISCUSSION

In summary, both hypotheses were confirmed. The study shows that the use of both FIs –factoring and RF – impacts the LP of companies in European countries. However, the positive relationship identified is contrary to expectations. The literature indicates that a priori, the use of these FIs should help companies in fulfilling their financial responsibilities, reducing their LP (Klapper 2006; Huang et al. 2019; Shou et al. 2021). A possible explanation for this is that these FIs are short-term credits. Therefore, some firms can be less dedicated to fulfilling their payment dates. They may consider LP to be a regular source of credit that gets added to their working capital. It's also possible that credit from other sources is being used to finance suppliers. Thus, a qualitative study design should be considered for examining the reasons behind these findings. As for the limitations of this study, there is a small number of countries for which RF late payment statistics are available, in terms of time series.

CONCLUSIONS

Late payment of purchases from companies' suppliers harms the entire supply chain, having adverse effects at the macroeconomic level. Factoring and RF FIs offer a solution to these issues, being an alternative source of financing, in addition to enhancing a firm´s working capital. However, empirical studies on the topic show no consensus among them. Some authors argue that the use of these FIs increases companies' liquidity, reducing their LP. On the other hand, others believe that companies' compliance with payment deadlines is due to other aspects, such as ethics, for example. Therefore, the use of these FIs may not have any effect or even increase their LP.

Therefore, the aim of this study is to analyze the effect of factoring and RF on the LP of European companies. The hypotheses arising from this objective are: H1 – The use of factoring by companies affects their late payment at a country level and H2 – The use of reverse factoring by companies affects their late payment at a country level. To this end, a final sample of 2,245 observations from 28 countries is considered – being 16 from developed and 12 from emerging ones. In the case of factoring transactions, data is obtained for 15 years (2008 to 2022). RF data, on the other hand, are only available for a period of 6 years (2017 to 2022). The study hypotheses are tested using a logistic regression model.

As a result, the two hypotheses (H1 and H2) were confirmed. There is a positive - and statistically significant - relationship between both FIs and the LP of companies. In the case of the factoring transactions, this positive relation can be observed for the total sample (Model 1) - Table 4. As for RF, the increase in the ratio between total reverse factoring and the GDP of the countries contributes to an increase in the probability of LP, both for the total sample (Model 1) and for the two sub-samples (Models 2 and 3) - Table 7. It is possible that undercapitalized companies with inadequate credit practices consider LP as an ordinary source of credit. These features draw attention to the odd relationship between factoring/RF and LP, suggesting further analyses of the motivations behind these companies' behaviour.

This study contributes to academic knowledge by analyzing the effect of factoring/RF transactions on companies' late payments in European countries - developed or not. The results provide insights into firms' financing and supplier management policies. Moreover, countries and regulators can adjust their legislation in order to encourage a better level of governance in their markets.

Finally, concerning the evolution of this topic, future research could investigate the effect of other FI or alternative sources of financing on companies' LP, such as all types of leasing (IFRS 16/2024), export credit lines, revolving loans, peer-to-peer lending etc. It would be also interesting to analyze other supply chain aspects that may impact the companies' LP – e.g.: i. suppliers' credit rating, reputation, bargaining power, disclosure level, ii. companies' payment and ethical behaviour, iii. country culture. These researches could be done at either macro (countries) or micro (companies) levels. Besides, they could be carried out using quantitative or qualitative methodology.

DOI: 10.55643/fcaptp.5.58.2024.4521

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

FUNDING

The Authors received no funding for this research.

CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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Алвес М., Жука М., Серраскейро З.

ВПЛИВ ОПЕРАЦІЙ (ЗВОРОТНОГО) ФАКТОРИНГУ НА ПРОСТРОЧЕННЯ ПЛАТЕЖІВ У ЄВРОПЕЙСЬКИХ КРАЇНАХ

Прострочення платежів компаній – це вікторина для керівників та урядів. Його виникнення в усіх галузях негативно позначається на ліквідності компаній і навіть може призвести до банкрутства деяких із них – особливо менш структурованих. У макроекономічному розрізі така ситуація також має негативні наслідки для економічного зростання країн. Зіткнувшись із цими проблемами, банки надають фінансові інструменти, такі як факторинг і зворотний факторинг, які потенційно можуть пом'якшити ці небажані наслідки. Таким чином, метою цього дослідження є аналіз впливу використання компаніями обох фінансових інструментів на прострочення їхніх платежів на рівні країни. Наскільки нам відомо, це перша робота на цю тему. Таким чином, розглядається остаточна вибірка з 2245 спостережень із 28 європейських країн, із яких 16 розвинених і 12 – із тих, що розвиваються. Гіпотези дослідження перевіряються логістичною регресійною моделлю. Як наслідок, спостерігається несподіваний позитивний взаємозв'язок між обома фінансовими інструментами та простроченням платежів компаній на рівні країни. Не виключено, що недокапіталізовані компанії з неадекватною кредитною практикою розглядають прострочення платежу як звичайне джерело кредиту. Це дослідження сприяє зміцненню академічних знань шляхом аналізу впливу факторингу та зворотного факторингу на прострочення платежів компаніями в європейських країнах. Результати також можуть дати уявлення про політику компаній щодо фінансування та управління постачальниками. Крім того, країни та регулюючі органи можуть коригувати своє законодавство з метою заохочення кращого рівня управління на своїх ринках.

Ключові слова: зворотний факторинг, факторинг, прострочення платежу, країни Європи, логістична регресія

JEL Класифікація: G20, G23

DOI: 10.55643/fcaptp.5.58.2024.4521