Delaying Payments in the European Union: An Empirical Dynamic Panel Data Analysis[1]

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Abstract

We analyse delaying payments of accounts receivable by combining macroeconomic shocks with firm characteristics controls. We use microeconomic dataset on financial statements of selected firms in European Union member states from AMADEUS for the period 2005 – 2014, and employ the system Generalized Method of Moments (GMM) framework to analyse the dynamic models. The empirical results show positive impact of the financial crisis on delaying payments. The two-step System GMM estimator obtain significance positive estimates of the coefficient of lagged late payment. Also, we identify significance positive relationship between late payment and firm performance measures of current ratio and gearing ratio, but negative relationship between late payment and firm turnover. The results suggest firms that delay in payments might have the tendency to delay in future payments.

Keywords: *delaying payments, late payment, accounts receivable, accounts payable, financial crisis, credit collection, credit period, macroeconomic shocks*

JEL Classification: M21

Introduction

The financial crisis of 2007 – 2008 could be seen as single most important factor influencing firm delaying payments in the European Union (EU). However, delaying payments of accounts receivable has received little attention in the literature (Zainudin, 2008; Paul, Devi and Teh, 2012), though management of accounts

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receivable influences firms liquidity and hence working capital. The current study contributes to the trade credit literature by analysing the pattern of firm delaying payments in the EU with the use of a dynamic panel data analysis. Previous researches reveal the continuous importance given to trade credit provisions as source of firm finance to aid in firm operations. Trade credit transactions even becomes more important in the wake of the financial crisis, when it is much difficult or too costly to access short term external finance in the form of loans (Ferrando and Mulier, 2013). The situation is even much difficult for financially constrained firms to economically access external finance, which make trade credit important alternative financial arrangement for those firms. Delaying payments makes trade credit costly (Wilson and Summers, 2002), but we find EU firms continues to record high delaying payments after the financial crisis.

The trade credit literature mostly analyse the relationship between trade credit and firm growth and usually finds the relationship to be positive (Fisman and Love, 2003; Paul, Devi and Teh, 2012; Ferrando and Mulier, 2013). Other researches also analyse trade credit by assessing the impact of firm working capital management on firm performance (see Haq et al., 2011). Also, some researchers find strong relationships between accounts receivable and/or accounts payable on firm performance (Ferrando and Mulier, 2013). Few researches did analyse the relationship between late payment and firm performance (see Zainudin, 2008; Paul, Devi and Teh, 2012). Nonetheless, none of these studies has analysed delaying payments of EU firms in terms of late payment of accounts receivable. The closest study Obeng (2017) though analyse delaying payments of EU firms, static panel data analysis was used, which the current study extends by employing dynamic panel data analysis of EU firms.

We contribute to the recent developments in the literature in three important ways. First, we provide a dynamic panel data analysis of the developed models, which deals with endogeneity biases that could have thwarted the vivid analysis of delaying payments of accounts receivable. Therefore, we analyse EU firms by combining firm characteristics controls of size, performance, sector and location with macroeconomic shocks. In which we analyse firm delaying payments by arguing that the level of firm‘s late payment positively depends on its previous realisations. We concentrate our analysis to determine how the variability of late payment has changed for the 10 years period between 2005 – 2014, which include the hits of the financial crisis of 2007 – 2008. The trade credit customers withheld payments due to reasons such as: poor working capital management practices and/or when the quality of products or services rendered by the suppliers are questionable (Pike and Cheng, 2001; Paul, 2007; Wilson, 2008). In addition, firms delay in payments are adversely influenced by previous payments

due to the domino effect exhibited by the characteristics of late payment of credit customers. Thus, firms delay in payments are characterised by poor working capital levels that may influence them to withheld payments to their suppliers (Chittenden and Bragg, 1997; Paul, Devi and Teh, 2012).

Second, we find late payment to be positively influenced by the financial crisis even when firm characteristics and sector differences are analysed. We take advantage of the long-time period of data after the financial crisis to assess the long-time effects of the financial crisis. Payments are much delayed during period of economic hardship and credit crunch, since firms experiencing financial difficulties might withheld payments in order to improve their liquidity levels (Wilson, 2008). Also, trade credit customers experiencing credit crunch find it a lot cheaper to delay payments than to access bank loans with higher interest, when accessible (Garcia-Teruel and Martinez-Solano, 2010). Third, we analyse dynamically delaying payments of accounts receivable across different sectors as well as across selected EU member countries and find late payment not only to be positively impacted by past late payment, but also the positive impact of the financial crisis is felt much more in the early years after the financial crisis than later years.

The remainder of the study is organized with next section as literature review, followed by the methodology as well as the description of data used for the analysis. Then main results are presented, followed by robustness analysis and finally discussion and conclusions.

Literature Review

The trade credit literature identifies several motives for provision of credit to the customer. Some studies believe trade credit is provided based on the goal to have product market position (see Wilson and Summers, 2002). Others also believe trade credit is provided based on the product characteristics such as the price elasticity of demand for the product (Petersen and Rajan, 1997). This enables the selling firm to increase sales through price discrimination. Giannetti, Burkart and Ellingsen (2011) and Mateut, Mizen and Ziane (2015) pointed out that trade credit transaction takes place a lot for products with specialized nature due to relationship that is created between the selling firm and the credit customer and the fact that it is not easy to find substitutes for such products. Boissay and Gropp (2007) explain that firms with liquidity concerns turns to trade credit as the preferred source of finance for their operations.

The trade credit literature also sees the provision of trade credit as a tool for inventory management. Bougheas, Mateut and Mizen (2009) pointed out that a well-managed accounts receivable could help reduce firm inventory. Also,

firms could analyse trade credit provision by analysing credit customers economic order quantities even under permissible delay payments (Teng et al., 2011). Zhang et al. (2014) explains that when the optimal order quantity is reached trade credit extension to customers should be reduced to avoid risk of default. Ferrando and Mulier (2013), however, pointed out that EU firms could insure trade credit against default risk. Delaying payments are sometimes permitted to allow credit customers to experience product quality in order to capture the market (Ng, Smith and Smith, 1999).

Some strand of researches concentrate on analysing the relationship between trade credit and firm performance and growth. The literature mostly find positive impact of accounts receivable on firm performance and well managed receivables could serve as competitive advantage for the firm (Petersen and Rajan, 1997; Ferrando and Mulier, 2013) but negative impacts of accounts payable on firm performance. So the credit customer delays accounts payable with the motive of increasing liquidity (Garcia-Teruel and Martinez-Solano, 2007).

The trade credit literature also focuses on trade credit transaction based on firm size. Studies such as Deloof and Jerger (1996) and Pike and Cheng (2001) focus on large firms and find firm size to be negatively related to late payment. Other studies such as Peel, Wilson and Howorth (2000) focusing on small firms believe late payment could be reduced with small firms. However, some studies find late payment to be a problem of small and medium size firms (Chittenden and Bragg, 1997; Zainudin, 2008).

Ferrando and Mulier (2013), in their analysis of non-financial firms in the Euro Area, pointed out that trade credit is much more used during financial crisis period when access to bank loans is limited. The two extended the static growth model of Fisman and Love (2003) with a dynamic growth model. The trade credit literature finds financial crisis to influence late payment (Zainudin, 2008; Wilson, 2008), which pushes firms to manage late payment of accounts receivable (Paul, Devi and Teh, 2012). Some studies in the trade credit literature perform dynamic analysis of trade credit with either the panel vector auto regression (VAR) models (Nilsen, 2002), or application of the Generalized Method of Moments (GMM) estimation (Kling, Paul and Gonis, 2014). The current study follows the literature and employs the GMM estimation of the developed dynamic panel data models.

Methodology and Data

In order to investigate the variability of firm delaying payments, we develop and estimate several dynamic models. We measure delaying payments with the use of firm late payment and define late payment in line with the study of Zainudin

(2008) by subtracting the credit period from firm collection period. We follow previous studies on trade credit extension and believe trade credit finance depends on firm level characteristics, industry specific characteristics and location characteristics (Petersen and Rajan, 1997; Wu, Firth and Rui, 2014). We use selected variables as measures of those firm characteristics and control for them in the developed models. We pay particular attention to the estimation of the main interest explanatory variable, lagged late payment. Also, we analyse late payment by considering impact of the financial crisis, and hence introduce year dummy variables to assess observed fixed effects. To analyse delaying payments, we begin by estimating the pooled OLS model specify in Equation 1.

$$\ln lp_{it} = \alpha + \beta_1 \ln lp_{i,t-1} + \beta_c \sum_{j=i}^{n} control_{ijt} + \theta_t + \varepsilon_{it} \quad (1)$$

where lp_{it} is firm late payment for firm i in time t, $control_{ijt}$ is a set of control variables: turnover, current ratio, gearing ratio, average collection period, credit period, subscript j, the control variable and prefix: ln is natural logarithm. The term θ_t is a set of time specific effects, assumed to be fixed coefficients of year dummy variables to be estimated, ε_{it} is idiosyncratic error component.

We initially estimate the model specify in Equation 1 to analyse firm delaying payments of accounts receivable without considering unobserved time-invariant firm-specific effects. Therefore, a pooled Ordinary Least Squares (OLS) estimator was used. To take advantage of the rich insights provided by using panel data regressions analysis, we control for the time-invariant firm-specific effects and estimate the model specify in Equation 2 with the fixed effects estimator, whereby we consider a robust two-way error component. Since, the model is dynamic with the inclusion of the lagged dependent variable, lagged late payment, as the key interest explanatory variable we employ the system GMM estimator to obtain the parameter estimates and to cater for the endogeneity of the lagged late payment variable (see Baltagi, 2008).

$$\ln lp_{it} = \alpha + \beta_1 \ln lp_{i,t-1} + \beta_c \sum_{j=i}^{n} control_{ijt} + \theta_t + \gamma_i + \varepsilon_{it} \quad (2)$$

where γ_i is included in the model to cater for unobserved time-invariant firm specific effects.

The baseline model specify in Equation 2 is augmented to group firms in terms of their liquidity levels. We do that by differentiating the firms into low liquidity firms and high liquidity firms. Liquidity is measured by current ratio with mean threshold created. Therefore, firms with current ratio lower than the

mean threshold are considered low liquidity firms and firms with current ratio higher than the mean threshold are termed high liquidity firms. Therefore, we create a dummy variable for firm liquidity and assign the value 1 for low liquidity firms and 0 otherwise. Since, low liquidity firms are highly motivated to increase their financial health, we expect low liquidity firms to be agile in collections of their accounts receivable compare to high liquidity firms.

Previous researches on trade credit have analysed sector differences in terms of trade credit extension (Zainudin, 2008; Mateut, Mizen and Ziane, 2015). So as robustness analysis, we follow those studies and analyse firm delaying payments across different sectors. To do that, we estimate the model specify in Equation 2 separately for each sector and compare those sectors. We employ the NACE Rev. 2 sector classification to aid in the analysis (NACE Rev. 2, 2008). We expect variability of late payment across different sectors, since trade credit management objectives differ in terms of sectors. Some sectors may even permit considerable delay in payments when certain conditions are met by the credit customer. In addition, sectors may have different trade credit arrangements, which may influence late payment. Also, we estimate the model specify in Equation 2 for each selected EU member countries, separately and compare delaying payments across those countries.

In order to estimate the dynamic panel data models, we employ the Arellano and Bond (1991) two-step GMM estimator and the two-step System GMM estimator of Arellano and Bover (1995) or Blundell and Bond (1998). We employ the xtabond2 version in STATA (Roodman, 2009) by using the two-step robust standard errors of Windmeijer (2005). However, we present the results of only the system GMM estimator, because the System GMM seems more efficient for our dynamic panel data models. This is because of our interest in estimating the level Equation 2 with first difference of explanatory variables used as instruments. The lagged late payment used as an explanatory variable for the developed models compromise the exogeneity of the variable. Since, lagged late payment correlates with the error term we require the best instruments that does not correlate with the error term. This makes the System GMM estimator most consistent and efficient for the developed models. So we prefer the System GMM estimator since the GMM estimator will eliminate the time-invariant specific effects. In order to be able to employ the System GMM estimator, there should be absence of second-order serial correlation in the error term (Arellano and Bond, 1991). So we perform the Arellano-Bond test for no autocorrelation in first-differenced errors, which should have a p-value greater than 0.05 to determine the absence of second-order serial correlation in the error term. In order to determine the best degree of moment conditions for the system GMM

estimations and to test the exogeneity of instruments, we perform the Hansen (J) test for overidentifying restrictions, which should have a p-value greater than 0.05 for the feasible system GMM estimator to be robust. Unlike the estimation of Equation 2, estimations of the augmented models employ the collapsed option for the system GMM estimator. However, for Equation 2, we use the full moment conditions, limited, as well as, the collapse options for the exogeneity of the lagged late payment explanatory variable. We choose 0.01, 0.05 and 0.1 levels of significance for statistical analysis of the estimated coefficient.

In addition, we analyse delaying payments of accounts receivable by using firm level data of EU member countries from AMADEUS, a commercial European firm-level database compiled by Bureau van Dijk Electronic Publishing. The data on non-financial firms is obtained from their financial statements on selected firm characteristics and financial variables. After cleaning the data and trimming off 1% tail of outliers, we remain with 542,770 observations covering 54,277 EU firms for 10 years span from 2005 to 2014. Time dummy variables were generated for each of the years under study and the year 2005 was left out to avoid multicollinearity. In addition, we created dummy variable interaction term for each time dummy variable with selected firm characteristics dummy variable.

Results

The results of the baseline model regressions estimations are presented in Table 1. The pooled OLS results presented in Table 1, show significance coefficient estimates of all explanatory variables, with the expected signs. But, the results show very low R-squared value of 0.006, which means only 0.6% of variations in late payment, can be explained by the explanatory variables. This estimation excludes both the firm and time specific effects, which was included in the fixed effects estimation. The results of the fixed effects estimation presented in Table 1, though, show a relatively higher R-squared of 0.011, the coefficient estimate of lagged late payment show the opposite sign indicating an endogeneity problem. Since, both the pooled OLS and fixed effects regressions ignore the endogeneity of the lagged dependent variable, late payment, as an explanatory variable.

The results of the system GMM estimations (xtabond2 with two-step robust standard errors) are presented in Table 1 (Model 1 – 3). The results are differentiated according to the degree of moment conditions used, which reflects the results of the Hansen (J) test statistic of overidentifying restrictions with the degree of the test results being highest for the use of all moment conditions. The

results of Hansen (J) test statistic for all estimated models are not rejected. For instance, the estimated p-value for Model 1 (full moment conditions) is 0.350; Model 2 (limited) is 0.174; and Model 3 (collapsed) is 0.271. Also, the results of AR (2) test of absence of second-order serial correlation in the error term was not rejected for all estimated system GMM models. As presented in Table 1 (Model 1 – 3, lagged late payment coefficient estimate for Model 2 is not significant), the response variable, late payment, is positively dependent on its past realizations. When controlling for the levels of firm turnover, current ratio, gearing ratio, credit period and collection period, late payment is positively dependent on past late payment. The numerical value of the coefficient of lagged late payment returns a long run elasticity of 0.016 for Model 1 and 0.015 for Model 3 and both significance level of 0.01. This means that a 1% increase in previous level late payment, on the average, leads to a 0.02% increase in current late payment of accounts receivable and vice versa. Therefore, the results show our sample EU firms on average records increase in late payment due to increase in previous level of late payment.

However, the magnitude of increase in late payment is less than proportionate to the increase in its previous level. This explains concerns by trade credit providers in improving collection of receivables, since payments are delayed in a reduced rate. Therefore, though dominant trade credit customers may have the tendency to delay payments, trade credit providers are putting measures in place to increase collection of receivables (Wilson, 2008).

All firm characteristics controlled for in the estimated models show the expected signs and significance at either the 0.01 or 0.05 levels. The estimation of the two-step system GMM regression models show the coefficient of firm performance measure of turnover as negative and significance. This implies negative effect of the turnover variable on firm late payment, when all other explanatory variables in the models are controlled for. The possible reason for the negative relationship between late payment and firm turnover could mean the drive for the sample EU firms to increase collections of accounts receivable through effective trade credit and working capital management. The observed negative relationship between late payment and firm turnover is only evident when the lagged late payment explanatory variable is control for in the model. This is clear in the study of Obeng (2017), whereby in a static regression analysis a positive relationship was observed between late payment and operational revenue of EU firms. Nonetheless, the results of all estimated models show positive effects of both firm liquidity measure of current ratio and leverage measure of gearing ratio on late payment of accounts receivable. Just that small numerical significance coefficient values were observed for both variables.

This result supports Chittenden and Bragg (1997) that late payment push selling firms to require more liquidity. The number of days given out by firms as credit period is controlled for in all models. The results show that given lagged late payment and all other control variables, the credit period positively impacts late payment of accounts receivable. This implies that when previous firm late payment is considered among other factors, on average, as EU firms increase the credit period provided to customers, they risk increase in late payment and vice versa. In addition, the results of all estimated models show the expected significance positive coefficient of firm average collection period. The average collection period positively influences late payment of accounts receivable. Thus, after controlling for all other explanatory variables, delay in collections of accounts receivable increases late payment. So, EU firms, in order to minimize the tendency for default by customers, facilitate collection of accounts receivable. This could explain the reason for recent attention of EU firms in trade credit management strategies that facilitates early collection of receivables.

T a b l e 1

Panel Data Fixed Effects Regressions

Dependent variable: late payment (ln)					
Variables (ln)	Pooled OLS	Within Effects	GMM Model 1	GMM Model 2	GMM Model 3
Late payment $t-1$	0.042*** (0.002)	–0.101*** (0.002)	0.016*** (0.004)	0.144 (0.177)	0.015*** (0.004)
Collection period	0.005*** (0.000)	0.007*** (0.000)	0.005*** (0.000)	0.005*** (0.001)	0.005*** (0.000)
Credit period	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.002*** (0.000)
Turnover	–0.049*** (0.010)	–0.044 (0.050)	–0.052*** (0.012)	–0.048*** (0.015)	–0.053*** (0.012)
Current ratio	0.124*** (0.023)	0.091** (0.045)	0.112*** (0.030)	0.105*** (0.031)	0.122*** (0.030)
Gearing ratio	0.025*** (0.009)	0.028* (0.017)	0.027** (0.011)	0.026** (0.011)	0.026** (0.011)
Year dummies	YES	YES	YES	YES	YES
No. of observations	420,536	420,536	420,536	420,536	420,536
No. of groups		52,140	52,140	52,140	52,140
No. of instruments			58	53	23
AR (2) test			0.323	0.449	0.355
Hansen (J) test			0.350	0.174	0.271
R-squared	0.006	0.011			

Note: * p < .1; ** p < .05; *** p < .01; Robust standard errors in parentheses. AR(2) show p-value for the Arellano-Bond test for second-order serial correlation (Arellano and Bond, 1991). Time effects not presented.

Source: Own estimation.

The results of the two-step system GMM estimations show the expected significance positive coefficients of the fixed year dummy variables for the years after the financial crisis (F-statistic is 4396.51 with a p-value of 0.0000, showing

the significance of including time dummies). This means that for the sample EU firms, the levels of delaying payments are, on the average, higher after the financial crisis compare to the crisis period.

Specifically, as presented in Table 2, payments are, on the average, much delayed after the financial crisis for the years 2010 and 2011 compare to the years 2008 and 2009. The main reasons could be due to negative working capital experienced by most trade credit customers, which pushed them to further delay payments to suppliers. In addition, trade credit providers might not take advantage of access to other sources of external finance such as bank loans when the financial crisis is over, mainly due to the flexibility of credit terms characterized by trade credit transactions and the tendency to delay payments with impunity or fewer penalties (Wilson, 2008). This implies that delaying payments are much delayed due to incidence of the financial crisis of 2007 – 2008. The results are in line with that of Obeng (2017), in which static (OLS) panel data fixed effects model was estimated using the same micro economic data set.

T a b l e 2

System GMM Showing Time Effects

Dependent variable: late payment (ln)		
Variables (ln)		Model
Late payment $t-1$		0.023*** (0.004)
Year06		0.636*** (0.004)
Year07		0.778*** (0.004)
Year08		0.690*** (0.004)
Year09		0.673*** (0.004)
Year10		0.719*** (0.004)
Year11		0.718*** (0.004)
Year12		0.647*** (0.004)
Year13		0.684*** (0.004)
Year14		0.640*** (0.004)
No. of observations		488,493
No. of groups		54,277
No. of instruments		18
AR (2) test		0.062
Hansen (J) test		0.132

Note: * p < .1; ** p < .05; *** p < .01; Robust standard errors in parentheses. AR(2) show p-value for the Arellano-Bond test for second-order serial correlation (Arellano and Bond, 1991). Reference: Year 2005.

Source: Own estimation.

The results of the system GMM estimation of the augmented model is presented in Table 3. The results are obtained by differentiating firms in terms of their liquidity levels. After controlling for all explanatory variables, coefficient of lagged late payment is positive and significance at the 0.01 level for both low liquidity and high liquidity firms. The numerical values of the coefficient of the lagged late payment of 0.015 for low liquidity firms and 0.016 for high liquidity firms implies a positive relationship between the response variable, late payment and its previous level for both groups of firms. This means a 1% increase in previous level late payment leads to 0.02% increase in current level of late payment when all other explanatory variables are controlled for. The results did not show substantial differences in late payment when low liquidity firms are compared to the high liquidity firms in terms of the relationship between the response variable, late payment and its previous level, collection period, credit period, current ratio and gearing ratio. Although, the results did not show significance impact of turnover of high liquidity firms on their late payment, low liquidity firms' late payment are negatively impacted by their turnover, when other explanatory variables are control for. Thus, the results show that unlike high liquidity firms, for low liquidity firms when late payment are positively related to explanatory variables of past late payment, collection period, credit period, current ratio and gearing ratio, late payment will be negatively impacted by turnover. This is shown by the significance numerical coefficient value of –0.063 of the turnover variable for low liquidity firms.

Two key important factors that could explain delay in payments are trade credit customers' financial health and selling firms' competence in management of working capital to an appreciable level. These may explain our findings of no much difference between delaying payments of low liquidity group of firms and the high liquidity group of firms. Since, records of delaying payments of both groups of firms are much more influenced by payment behaviour of their customers. The payment behaviour of trade credit customers tends to be a lot influenced by a host of factors, among which are regulations in place to enforce late payment penalties and macroeconomic shocks (Wilson, 2008).

Also, the results of the coefficients of year dummy variables show significance positive sign for all years for the low liquidity firms. However, the results of the estimated coefficients of high liquidity firms though returns the expected positive sign, none of them was significance even at the 0.1 level. The results show late payment are not only much delayed for low liquidity firms compare to high liquidity ones, late payment are much delayed after the financial crisis for low liquidity firms. This means that low liquidity firms are much hit by the financial crisis compare to high liquidity firms.

T a b l e 3

System GMM with Firm Liquidity Groupings

Dependent variable: late payment (ln)		
Variables (ln)	Liquidity levels	Model
Late payment $t-1$	High	0.016*** (0.005)
	Low	0.015*** (0.004)
Collection period	High	0.008*** (0.000)
	Low	0.005*** (0.000)
Credit period	High	0.001*** (0.000)
	Low	0.002*** (0.000)
Turnover	High	0.000 (0.030)
	Low	–0.063*** (0.015)
Current ratio	High	0.037 (0.087)
	Low	0.145*** (0.050)
Gearing ratio	High	0.027 (0.019)
	Low	0.037*** (0.013)
Year dummies		YES
No. of observations		420,536
No. of groups		52,140
No. of instruments		46
AR (2) test		0.339
Hansen (J) test		0.193

Note: * p < .1; ** p < .05; *** p < .01; Robust standard errors in parentheses. AR(2) show p-value for the Arellano-Bond test for second-order serial correlation (Arellano and Bond, 1991). Time effects not presented.

Source: Own estimation.

Robustness Analysis

Firms delaying payments are found to be dependent on past late payment when other explanatory variables are controlled for. The situation is not much different when low liquidity firms are compared to high liquidity firms. So, as a robustness check, we analyse delaying payments of accounts receivable across different sectors and across selected countries to ascertain the findings. The literature on trade credit reports that trade credit extension differ across sectors (Zainudin, 2008; Mateut, Mizen and Ziane, 2015). In addition, credit collections strategies differ across sectors. So, we analysed late payment variability across different sectors by estimating the baseline model specify in Equation 2 for each sector

classification with the two-step system GMM estimation. We use the EC NACE sector classification (NACE Rev. 2, 2008) to differentiate the sectors for the sample EU firms and presents only results with significance coefficient values for the year dummy variables to aid in the analysis. The results as presented in Table 4, shows significance positive coefficient value for lagged late payment for all sectors considered, when all other explanatory variables are controlled for.

T a b l e 4

System GMM Regressions: Effect of Sector Differences on Late Payment

Dependent variable: late payment (ln)					
	Sectors				
Variables (ln)	B, C, D, E	G, H, I	L	M, N	R, S, T, U
Late payment $t-1$	0.013* (0.007)	0.016** (0.007)	0.015 (0.020)	0.021 (0.018)	0.096*** (0.032)
Collection period	0.009*** (0.000)	0.002*** (0.000)	0.008*** (0.001)	0.007*** (0.001)	0.002*** (0.001)
Credit period	–0.003*** (0.000)	0.003*** (0.000)	0.008*** (0.001)	0.000 (0.001)	0.007*** (0.002)
Turnover	–0.065*** (0.022)	–0.124*** (0.027)	–0.019 (0.063)	0.012 (0.029)	–0.148 (0.097)
Current ratio	0.103* (0.058)	0.149** (0.064)	0.075 (0.072)	0.084 (0.087)	0.145 (0.223)
Gearing ratio	0.016 (0.021)	0.058*** (0.020)	0.002 (0.045)	0.000 (0.027)	0.043 (0.090)
Year dummies	YES	YES	YES	YES	YES
No. of observations	131,111	143,133	19,647	43,840	6,505
No. of groups	15,620	17,652	2,887	5,624	856
No. of instruments	23	23	23	23	23
AR (2) test	0.895	0.906	0.568	0.285	0.954
Hansen (J) test	0.367	0.048	0.750	0.370	0.675

Note: * p < .1; ** p < .05; *** p < .01; Robust standard errors in parentheses. AR(2) show p-value for the Arellano-Bond test for second-order serial correlation (Arellano and Bond, 1991). EC NACE Rev. 2 Sector classification: Manufacturing, mining and quarrying and other industry (B, C, D, E); Wholesale and retail trade, transportation and storage, accommodation and food service activities (G, H, I); Real estate activities (L); Professional, scientific, technical, administration and support service activities (M, N); Other services (R, S, T, U). Time effects not presented.

Source: Own estimation.

This means late payment of accounts receivable is positively impacted by previous level of late payment across all sectors analysed. The results show significance estimates of the numerical value of the coefficient of lagged late payment as 0.013 for B, C, D, E; 0.016 for G, H, I and 0.096 for R, S, T, U. Thus, for the aggregate sectors: Manufacturing, mining and quarrying and other industry (B, C, D, E); Wholesale and retail trade, transportation and storage, accommodation and food service activities (G, H, I) and other services (R, S, T, U), late payment positively depends on its previous level by 0.01%, 0.02%, and 0.10%, respectively. Also, the results show significance positive coefficient after the financial crisis across sectors. For instance, the numerical value of the coefficient

of the year dummy variable (year 2010) for sectors: Real estate activities (L); Professional, scientific, technical, administration and support service activities (M, N) and Other services (R, S, T, U) show 0.926, 0.939, and 0.875 respectively. The estimated coefficients of the control variables show the expected signs so the same explanation holds as with the estimation of the baseline model, but the results show variability across sectors. In addition, the estimated coefficient value of the credit period variable is –0.003 and significance at the 0.01 level for the aggregate sector: Manufacturing, mining and quarrying and other industry (B, C, D, E). The results unlike that of other sectors, implies negative correlation between the dependent variable, late payment and the credit period given to customers. This means, for the said sector compare to others, late payment is less delayed when, on the average, the number of days given as credit period to customer increases.

The sample EU member countries we analyse vary considerably in terms of financial developments and trade credit management. So we estimate the model specify in Equation 2 for each of the sample countries with the system GMM estimation, but presents the results of the countries that have significance coefficient of the year dummy variables to aid in the analysis. The results are to confirm and compare the analysis of late payment, when each country is analysed individually.

The results as presented in Table 5 show significance positive coefficient value for lagged late payment for the sample firms in both Spain and the UK as 0.030 and 0.028 respectively. This implies, for both countries, late payment are positively influenced by previous level of late payment, when we control for all other explanatory variables. On the average, firms in Spain have the highest delay in late payment influenced positively by past level late payment. Also, the results show that as the sample EU firms delays in the collection of accounts receivable, late payment delays across all the studied countries. Firms in Spain has the highest delay in late payment, followed by UK and Germany, then the Czech Republic, followed by Belgium and then France with the least delay in late payment due to delays in the collection period. This is evident when the lagged late payment variable is included as an explanatory variable with other control variables considered. Also, results of the estimated coefficients of year dummy variables across sample EU countries show that late payment are much delayed after the peak of financial crisis of 2008, and slowly reduces after the year 2011 across selected countries. This pattern is evident with selected firms in the Czech Republic and the UK. This could mean that for the two countries, incidence of the financial crisis in terms of delay in payments was felt earlier, but delay in late payment have consistently been reducing as the years gone by.

T a b l e 5

System GMM Regressions for Selected EU Member Countries

Dependent variable: late payment (ln)						
Variables (ln)	Belgium	Czech Republic	France	Germany	Spain	UK
Late payment $t-1$	0.001 (0.013)	0.013 (0.015)	0.009 (0.007)	–0.016 (0.025)	0.030*** (0.011)	0.028*** (0.010)
Collection period	0.003*** (0.000)	0.006*** (0.001)	0.002*** (0.000)	0.007*** (0.001)	0.009*** (0.001)	0.007*** (0.001)
Credit period	0.001 (0.001)	0.000 (0.001)	0.003*** (0.000)	0.004* (0.002)	0.000 (0.000)	0.002*** (0.001)
Turnover	–0.212*** (0.043)	–0.092 (0.063)	–0.082*** (0.021)	–0.158* (0.083)	0.002 (0.021)	0.046 (0.033)
Current ratio	0.184** (0.086)	0.057 (0.140)	0.113* (0.060)	0.109 (0.238)	0.069 (0.050)	0.018 (0.075)
Gearing ratio	0.031 (0.034)	–0.047 (0.049)	0.049*** (0.018)	0.267 (0.166)	0.013 (0.018)	–0.036 (0.030)
Year dummies	YES	YES	YES	YES	YES	YES
No. of observations	41,057	22,300	154,326	10,700	103,182	73,585
No. of groups	5,025	2,838	18,127	1,254	13,903	9,127
No. of instruments	23	23	23	23	23	23
AR (2) test	0.810	0.200	0.725	0.818	0.800	0.488
Hansen (J) test	0.144	0.631	0.603	0.073	0.504	0.156

Note: * p < .1; ** p < .05; *** p < .01; Robust standard errors in parentheses. AR(2) show p-value for the Arellano-Bond test for second-order serial correlation (Arellano and Bond, 1991). Time effects not presented.

Source: Own estimation.

Discussion

We find firm delaying payments to be positively influenced by its previous level realizations. This means firms that delay payments of accounts receivable have the tendency to continue to delay payments, unless accounts receivable is well managed. The increase in delaying payments is expected to be more after the financial crisis. This supports the argument of Ferrando and Mulier (2013) that the volume of trade credit transaction is much increased during the financial crisis. Since, during the crisis period bank loans gets difficult, costly or virtually impossible to access, most firms turn to use some form of trade credit, which is relatively cheaper (Petersen and Rajan, 1997; Fisman and Love, 2003; Wu et al., 2014). Financial constrained firms such as low liquidity firms even turn to use more trade credit as key source of working capital during the crisis period. Also, the results support the findings of Zainudin (2008), when Malaysian firms were studied, that late payment differs significantly when different sectors are considered. Zainudin (2008) find late payment to be significantly different for different subsectors of the manufacturing sector.

The findings in a more general sense supports the argument of Mateut, Mizen and Ziane (2015) that firm payments of accounts receivable are much delayed

under period of negative macroeconomic shocks. Since, the financial crisis is seen to have negative symmetric shocks on all EU member countries (Poměnková and Kapounek, 2013). It is true as we found that late payment is much delayed after the financial crisis. But, we also find incidence of the impact of financial crisis on late payment to be consistently reduced as the years gets far from the financial crisis period. These important results were found when we analyse individual EU member countries separately. Specifically, the analysis of firms in the Czech Republic and the UK provided that evidence. The results therefore show improvements in the collection of accounts receivable by firms in the Czech Republic and the UK. Future researches could take interest in these findings and analyse firm delaying payments of accounts receivable under negative macroeconomic shocks by considering the quality of the environments of which different firms operate.

Conclusions

The study argued that late payment variability is positively influenced by its past realizations. This claim was analysed by investigating a sample of 54,277 EU firms for the period 2005 – 2014. The System GMM estimator was employed to estimate our dynamic panel data models, whereby we controlled for firm characteristics of size, performance measures, liquidity measures, credit period, collection period, sector differences and country differences.

The results, by and large supported our claim even under negative macroeconomic conditions.

The results of the two-step system GMM estimation of all models show a significance positive coefficient of lagged late payment even when EU member countries were analysed separately. This implies that firm late payment is positively influenced by its previous level. This should be of crucial concern, because firms that delay in payments have the tendency to delay in future payments. The results show that, although, delays in late payment were less before the financial crisis of years 2007 – 2008, late payment is much delayed after the financial crisis. The situation was similar when low liquidity firms were compared to high liquidity firms. Low liquidity firms have late payment much delayed after the financial crisis period. This evidence explains the liquidity concerns faced by low liquidity firms compare to the high liquidity firms and the pressure on low liquidity firms to maintain appreciable financial health. However, low liquidity firms compare to high liquidity firms could be more agile in the collections of accounts receivable due to their observed negative relationship between late payment and turnover.

Since different sectors manage trade credit differently, late payment were analysed across sectors as a robustness check. The results show late payment positively depends on its previous level across sectors. Also, delay in late payment were found to be less for period before the financial crisis and much delayed after the crisis across all sectors, but with significant variability. Also, in a robustness analysis, we analysed firms in individual EU member countries separately, and the results show late payment are positively influenced by its previous level across analysed countries. Also, controlling for other explanatory variables, late payment of accounts receivable is much delayed for Spain, UK and Germany, compare to Czech Republic, Belgium and France base on the delay in collections of receivables. Although, late payment are much delayed for years after the financial crisis across analysed countries, both the Czech Republic and UK show delay in late payment to be less for most of the years after the financial crisis. More importantly, the results show delay in late payment to be consistently less as the years get far from the financial crisis period.

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Appendix

Table 6

Distribution of Sample Firms

Number of firms			
EU Country	Below average current ratio	Observed	Asset to GDP (%)
Austria	135	183	0.006
Belgium	4,032	5,190	0.170
Czech Republic	2,058	3,002	0.066
Finland	906	1,145	0.132
France	15,227	18,289	0.119
Germany	886	1,286	0.068
Ireland	190	336	0.045
Netherlands	238	274	0.037
Spain	10,375	14,655	0.089
United Kingdom	7,549	9,917	0.166
Total number of firms		54,277	
Number of years		10	
Number of observations		542,770	

Source: Own estimation.

Table 7

Description of Variables

Variable	Description
ln lp_{it}	Late payment = collection period-credit period (annual), 2005 – 2014
ln col_{it}	Firm's average collection period in terms of number of days (annual), 2005 – 2014
ln cre_{it}	Credit period given to credit customers to make payment in terms of number of days (annual), 2005 – 2014
ln tov_{it}	Operational revenue (annual), 2005 – 2014
ln cr_{it}	Current ratio = current assets/current liabilities (annual), 2005 – 2014
ln ger_{it}	Gearing ratio = leverage (annual), 2005 – 2014
ta	Total assets (annual), 2005 – 2014
GDP	Sum of all value added in the economy plus taxes minus subsidies, without accounting for depreciation (annual), 2005 – 2014

Source: Own estimation.

Table 8

NACE Rev. 2 Classification

No.	Sections	Description
1.	A	Agriculture, forestry and fishing
2.	B, C, D, E	Manufacturing, mining and quarrying and other industry
3.	F	Construction
4.	G, H, I	Wholesale and retail trade, transportation and storage, accommodation and food service activities
5.	J	Information and communication
6.	K	Financial and insurance activities
7.	L	Real estate activities
8.	M, N	Professional, scientific, technical, administration and support service activities
9.	O, P, Q	Public administration, defence, education, human health and social work activities
10.	R, S, T, U	Other services

Source: Own estimation.

T a b l e 9

Summary Statistics

Before transformation					
Variable	Unit	Mean	Std. Dev.	Minimum	Maximum
Late payment	days	30.09	76.52	–998.00	1000.00
Collection period	days	72.59	74.35	0.00	1000.00
Credit period	days	42.51	49.46	0.00	999.00
Turnover	EUR(mill)	145.05	2,469.72	0.00	372,513.40
Current ratio	ratio	2.62	4.76	0.00	99.96
Gearing ratio	%	73.09	112.17	0.00	999.77
Number of observations for each variable above is 542,770					
After transformation	Observation				
Late payment	542,770.00	0.99	0.10	0.00	1.00
Collection period	520,500.00	3.89	1.09	0.00	6.91
Credit period	503,826.00	3.41	1.00	0.00	6.91
Turnover	542,764.00	9.61	1.66	0.00	19.74
Current ratio	542,571.00	0.52	0.84	–4.61	4.60
Gearing ratio	508,876.00	3.23	1.92	–4.61	6.91

Source: Own estimation.