1. Introduction

Several empirical studies across the literature investigate the market conditions in OECD economies focusing on their pricing decisions and their market performance overall (Christopoulou and Vermeulen, 2012; Afonso and Costa, 2013; Polemis and Fotis, 2016). Emphasis is being placed on the production and pricing strategies of the manufacturing and services industries as they are the most significant contributors to domestic GDP. The UK economy is the fifth strongest economy in this group in terms of nominal GDP and thus, it is expected that the importance of the two aforementioned industries will be critical in its performance.

This argument is supported by Görg and Warzynski (2003, 2006) who investigated the market structure and conditions of the 2-digit ISIC manufacturing sectors in the UK in terms of pricing decisions over 1989-1997. However, there is hardly any study that covers the period following the financial crisis of 2008 and its effect on the UK markets. This particular shock resulted in diminishing demand and production in many economies, thus leading to the introduction of contractionary fiscal policies as a mean of balancing the budget and fiscal accounts (Batini et al., 2012; Bird and Mandilaras, 2013). As the UK adopted such policies to meet particular targets, public spending and aggregate demand fell, resulting in sluggish growth rates (Farnsworth, 2011; O'Hara, 2015).

The most influential industry in the UK economy is the services industry as it accounts for 78% of gross value added, while the manufacturing industry accounts only for 11% (World Bank database, 2016). This gap shows the importance of the services industry in the UK economy because it is the major contributor to growth and thus, the welfare improvement of the whole economy. For this reason, there is a growing need in the literature

for the investigation of competitive interactions among services firms in order to identify their pricing behaviour and whether there is any form of market power exploitation.

The present study takes into account 19 4-digit NACE Rev.2 classification wholesale and retail food, beverages and tobacco industries in order to analyse their pricing decisions over 2007-2016[1]. As the manufacture of food, beverages and tobacco have an important contribution in the UK economy (Görg and Warzynski, 2003, 2006), the wholesale and retail counterparts are expected to have an important role in economic activities as well. In particular, the wholesale and retail food and beverages industries earn 42 billion pounds in gross value added employing more than 1,350,000 people across the UK. Additionally, total consumer expenditure on food and drink is approximately equal to 200 billion pounds annually, thus reflecting their vital role in primary consumption needs (Department for environment food and rural affairs, 2016).

The Hall-Roeger methodology is employed under a three-step approach similar to the one developed by Rezitis and Kalantzi (2011, 2016) calculating the markup ratio as the difference between the growth rate of value added and the growth rate of inputs. In particular, the first step estimates the markup ratio for the wholesale and retail food, beverages and tobacco sector over 2007-2016. The second step provides the price-cost margin of the 19 constituent industries of the panel set individually applying the cross-sectional approach.

Lastly, the third step investigates the relationship between the markup estimates of the second step and the structural effects of concentration and liquidity provision over 2007-2016. It is expected that market power and liquidity constraints will significantly influence pricing decisions according to the nature of competitive conduct in the market (Braun and Raddatz, 2016). Therefore, the main scope of this study is to identify the pricing decisions of

[1] This period is important to the UK economy as three major effects emerged: the global financial crisis in 2008, the introduction of fiscal contraction initiated in 2010 and the EU referendum conducted in 2016.

the wholesale and retail food, beverages and tobacco industries and whether they exert a significant relationship with the aforementioned effects.

The main contribution of this study to the literature of pricing decisions is quite significant as it tries to investigate the price-cost margin set by the wholesale and retail food, beverages and tobacco industries and test whether their relationship is significant with the aforementioned structural effects. Under this perspective, the findings of Görg and Warzynski (2003, 2006) and Amountzias (2018) will be tested according to which the degree of concentration and liquidity constraints influence the price setting decisions of firms.

In addition, given the lack of empirical studies for this particular segment of the UK services industry, it is rather important to identify how the wholesale and retail sectors correspond to fluctuations in domestic demand. As the UK economy prepares to depart from the European Union, consumer confidence and economic uncertainty have dramatically slowed down growth rates and aggregate demand, thus influencing the production decisions and the short-run perspectives of the UK firms (Begg and Mushövel, 2016; Los et al., 2017). To this end, it is expected that the wholesale and retail firms will try to attract consumers by reducing the selling price level in the short-run so that they can build a satisfactory market share that will provide additional revenue[2].

This paper is organised as follows: Section 2 consists of the empirical literature of the markup ratio approach; Section 3 presents the formulation of the Hall-Roeger model and data collection; Section 4 provides and discusses the empirical results; and section 5 offers a conclusion.

2. Literature Review

[2] It should be mentioned that online retail services have rapidly grown over the last years, thus contributing to an internal conflict between online and high-street stores (Chen et al., 2018) significantly influencing supply chains and market concentration through changing consumer behaviour (Nguyen et al., 2018).

An important contribution in the price-cost margin approach was introduced by the seminal work of Solow (1957) who argued that labour and capital are not the only major inputs used in the production process. Technical change also parts a crucial role in the final output of every firm which is incorporated indirectly in the production factors. Consequently, a new form of production function was introduced and tested in the United States over 1909-1949 where output per hour approximately increased by 100%.

The results showed that only 12.5% of the increment in labour productivity could be explained due to additional capital per hour. The remaining 77.5% was attributed to factors other than labour and capital identified as the Solow Residual. This particular notion incorporates all those factors that contribute to the production process but they are not easily observable. Consequently, such unobservable factors may not be calculated directly by restricting the estimation of the markup ratio that reflects the difference between the price level and the cost of production.

Hall (1988) extended this approach by taking into consideration the assumption that under perfect competition the selling price of a product is equal to the marginal cost of production. When the former measure exceeds the latter, imperfect competition persists as producers exploit part of consumer surplus. Nevertheless, the marginal cost of production is not easily observable, thus rendering the calculation of the markup ratio quite difficult. For this reason, Hall argued that the nominal growth rate of the Solow Residual is not dependent on the nominal growth rate of capital productivity. This means that the price-cost margin can be estimated without knowing the value of the marginal cost of production directly. The model was applied in the United States manufacturing industry and provided significant evidence in favour of imperfect competition through positive markup ratios.

The final formulation of this model was provided by Roeger (1995) by taking into account the difference between the production-based (i.e. primal) Solow Residual (*PRS*) and the cost-based (i.e. dual) Solow Residual (*DSR*) in the markup equation. The result of this modification eliminates the unobservable productivity shock from the equation, thus providing an unbiased estimate of pricing decisions reflecting competitive conduct. Consequently, the markup ratio is denoted as the difference between the growth rate of value added and the growth rate of inputs.

The empirical approach developed by Hall (1988) and Roeger (1995) is known as the Hall-Roeger approach and has been employed by many studies to evaluate the pricing behaviour of the manufacturing and service industries of various economies. Martins et al. (1996) employed the Hall-Roeger approach in 14 OECD manufacturing industries over the period 1970-1992[3]. The results provided an outcome consistent with imperfect competitive conduct reflected by positive price-cost margin showing that the manufacturing industry overall exercised its market power on its pricing decisions. Dobbelaere (2004) also supported this outcome for the Belgian manufacturing firms over 1988-1995 by taking into account the presence of heterogeneity in the pricing decisions and bargaining power across the constituent firms. The main argument is that imperfect competitive conduct highly depends on the conditions of the labour market and thus, it must be included in the analysis of the product market to obtain unbiased and efficient estimates.

In a similar analysis, Molnár (2010) estimated the markup ratios of the Slovenian manufacturing and services industries over 1993-2006 showing that the latter industry is less competitive compared to the former industry. A similar outcome was provided by Molnár and Bottini (2010) for a number of OECD countries over the same period. Evidence showed that

[3] As output was expressed in terms of gross value added, the factor of intermediate inputs was also included in the markup equation.

the markup ratio tends to be higher in sectors such as professional and real estate services and lower across the wholesale and retail industry. Moreover, competitive conduct is stronger in the United Kingdom and the Scandinavian countries (excluding Sweden), and lower in the Central European countries (Polemis, 2014c). Christopoulou and Vermeulen (2012) also carried out an investigation of market power in a panel set of European countries. The results support the outcome that the manufacturing industries appear to be more competitive compared to the service industries.

Moreover, the importance of pricing decisions is also connected to structural effects, such as competition and liquidity constraints. Chevalier and Scharfstein (1994, 1995) found that markups in the manufacturing industry are significantly influenced by financial constraints. When those constraints increase, their behaviour tends to be more countercyclical suggesting that firms may choose to charge a higher price-cost margin in times of depression to increase their profit by exploiting consumer surplus. However, Botasso and Sembenelli (2001) and Busse (2002) argued that financial constrained firms have more incentives to lower their price and engage in an all-out competition.

Braun and Raddatz (2016) also showed that markup ratios are significantly influenced by the degree of competition and liquidity constrains in markets. They argued that markups are procyclical, especially in markets facing higher competition and financial constraints. Consequently, firms engage in price wars to secure their market share and increase their revenue by attracting more customers.

Similar studies have also investigated the pricing decisions of several UK sectors and firms focusing on the effects of competition, export-orientation and liquidity constraints. In particular, Görg and Warzynski (2003, 2006) focused their analysis on the UK manufacturing sectors showing that exporting firms tend to charge a higher price-cost margin compared to

non-exporting firms as a result of interaction with foreign markets. This happens due to consumer preferences about product differentiation under which they are willing to pay a higher price to obtain a higher-quality product. Moreover, the Single European Market (SEM) contributed to the fall of the manufacturing markup ratio over 1989-1997 suggesting that global trade has a significant effect in both foreign and domestic markets.

Amountzias (2018) complements those findings arguing that market concentration, liquidity constraints and revenue generated by exports significantly influence the pricing decisions of the UK food and beverages sector. In particular, larger and more concentrated industries tend to charge a higher markup ratio as they are able to reflect their market power on the price level and thus, extract consumer surplus. Export-oriented industries are also able to increase the price-cost margin because they utilise additional revenue and innovative techniques obtained in international markets in order to increase their power in domestic markets (Crowley et al., 2018).

However, liquidity constraints have an uncertain effect on pricing decisions over the years as market conditions significantly influence the decisions of firms to either invest on market share or short-run revenue acquisition. This implies that when competition is intense, the markup ratio falls in order to increase market share and any losses occurring from this strategy are covered by using liquidity reserves. On the other hand, firms may invest in innovation and generally, in the production process, reflecting those costs in the final price level and ultimately, increasing the price-cost margin. Finally, Turner (2018) supports that the UK manufacturing and services industries overall tend to charge monopolistic markup ratios as they exercise their market power on the selling price level, thus exploiting consumer surplus.

Overall, the empirical literature of pricing decisions implies that industries charge a higher selling price compared to the marginal cost of production whenever there is an opportunity. They intend to increase their profits by exploiting consumer surplus which results in inefficient social welfare. For this reason, the Hall-Roeger approach is a useful empirical tool of investigating the market power exercised by various sectors through manipulating the selling price level.

3. Model formulation and data collection

The Hall-Roeger approach of evaluating the degree of market power in terms of pricing decisions will be employed in the current analysis to identify the markup ratio across the panel sample. The main assumption of the model refers to an industry that produces output (y_t) according to a homogeneous production function f using three inputs: intermediate inputs (m_t)[4], labour (l_t) and capital (k_t)

$$y_t = \theta_t f(m_t, l_t, k_t) \quad (1)$$

where θ_t is a total factor productivity index (Hicks neutral productivity term) reflecting technical progress over time and *t* is the time interval. Disembodied changes in technology cause output fluctuations to be independent to input variations. This is the main element that Hall (1988) took into consideration and showed that the production-based (primal) Solow Residual can be denoted as the difference between the growth rate of output and inputs weighted by their shares in value added. Given that the present study considers output in terms of turnover, the addition of intermediate inputs is necessary to avoid any biased overestimated results[5] (Polemis, 2014a, 2014b).

[4] Intermediate inputs correspond to the goods and services used in the production process to obtain the final product. Such inputs include raw materials, semi-finished goods and energy costs.

[5] Basu and Fernald (1997) argued that value added can be viewed as an output indicator only under perfect competition.

Moreover, the industry is assumed to operate under imperfect competition in the market of products, but the labour market is characterised by perfect competitive conduct. Given that the production function of equation (1) also highlights that the industry is subject to constant returns to scales, the Solow Residual is obtained by

$$SR = \frac{\Delta y_t}{y_t} - a_{mt}\frac{\Delta m_t}{m_t} - a_{lt}\frac{\Delta l_t}{l_t} - (1 - a_{mt} - a_{lt})\frac{\Delta k_t}{k_t} =$$

$$= LI_t\left(\frac{\Delta y_t}{y_t} - \frac{\Delta k_t}{k_t}\right) + (1 - LI_t)\frac{\Delta \theta_t}{\theta_t} \quad (2)$$

where $a_{m_t} = pm_t m_t / p_t y_t$ corresponds to the share of intermediate inputs in output, pm_t is the price of intermediate inputs, $a_{l_t} = w_t l_t / p_t y_t$ is the share of labour compensation in output, w_t is the wage rate and p_t is the price level of output. The parameter LI_t refers to the Lerner index that captures the degree of market power in the industry denoted as $LI_t = (p_t - mc_t)/p_t = 1/(1 - \mu_t)$, where mc_t is the marginal cost of production and μ_t is the price-cost margin[6].

However, as Roeger (1995) pointed out, the estimation of LI_t in equation (2) is rather problematic due to the presence of correlation between the growth rate of productivity and the error term. If this problem is not eliminated, the markup ratio estimates will be biased and inconsistent. For this reason, Roeger argued that the difference between fluctuations in the price level and any weighted change in the price of inputs must be reflected in the model as this is the main element of the price-cost margin. Thereby, one obtains

$$DSR = a_{mt}\frac{\Delta pm_t}{pm_t} + a_{lt}\frac{\Delta w_t}{w_t} + (1 - a_{mt} - a_{lt})\frac{\Delta u_t}{u_t} - \frac{\Delta p_t}{p_t}$$

[6] When the Lerner index is equal to zero, the industry operates under perfect competitive conduct as $p_t = mc_t$. If the value ranges over $0 < LI < 1$, it reflects pricing decisions consistent with imperfect competition and lastly, if it is equal to one, the industry is characterized by monopolistic conditions.

$$= -LI_t\left(\frac{\Delta p_t}{p_t} - \frac{\Delta u_t}{u_t}\right) + (1 - LI_t)\frac{\Delta \theta_t}{\theta_t} \quad (3)$$

where u_t is the rental cost of capital. If equation (3) is subtracted from (2), the productivity shock θ_t is cancelled out, thus obtaining the final markup equation

$$\left(\frac{\Delta y_t}{y_t} + \frac{\Delta p_t}{p_t}\right) - a_{mt}\left(\frac{\Delta m_t}{m_t} + \frac{\Delta pm_t}{pm_t}\right) - a_{lt}\left(\frac{\Delta l_t}{l_t} + \frac{\Delta w_t}{w_t}\right) - (1 - a_{mt} - a_{lt})\left(\frac{\Delta k_t}{k_t} + \frac{\Delta u_t}{u_t}\right) =$$

$$= LI_t\left[\left(\frac{\Delta y_t}{y_t} + \frac{\Delta p_t}{p_t}\right) - \left(\frac{\Delta k_t}{k_t} + \frac{\Delta u_t}{u_t}\right)\right] \quad (4)$$

If the difference between the growth rate of output and the growth rate of inputs is re-arranged, it is obtained

$$\left(\frac{\Delta y_t}{y_t} + \frac{\Delta p_t}{p_t}\right) - \left(\frac{\Delta k_t}{k_t} + \frac{\Delta u_t}{u_t}\right) = \mu_t[a_{mt}\left[\left(\frac{\Delta m_t}{m_t} + \frac{\Delta pm_t}{pm_t}\right) - \left(\frac{\Delta k_t}{k_t} + \frac{\Delta u_t}{u_t}\right)\right] +$$

$$a_{lt}\left[\left(\frac{\Delta l_t}{l_t} + \frac{\Delta w_t}{w_t}\right) - \left(\frac{\Delta k_t}{k_t} + \frac{\Delta u_t}{u_t}\right)\right]] \quad (5)$$

This is the final form of the Hall-Roeger equation which will be utilised in this study as formulated by Rezitis and Kalantzi (2011) with the addition of the growth rate of intermediate inputs. For simplicity, it is set

$$\Delta Y_t = \left(\frac{\Delta y_t}{y_t} + \frac{\Delta p_t}{p_t}\right) - \left(\frac{\Delta k_t}{k_t} + \frac{\Delta u_t}{u_t}\right) \quad (5a)$$

$$\Delta X_t = a_{mt}\left[\left(\frac{\Delta m_t}{m_t} + \frac{\Delta pm_t}{pm_t}\right) - \left(\frac{\Delta k_t}{k_t} + \frac{\Delta u_t}{u_t}\right)\right] + a_{lt}\left[\left(\frac{\Delta l_t}{l_t} + \frac{\Delta w_t}{w_t}\right) - \left(\frac{\Delta k_t}{k_t} + \frac{\Delta u_t}{u_t}\right)\right] \quad (5b)$$

where ΔY_t captures the growth rate of output per unit of capital and ΔX_t reflects the growth rate of intermediate inputs and labour compensation per unit of capital.

Consequently, equation (5) will be employed to investigate the market conditions in the UK wholesale and retail food, beverages and tobacco industries over 2007-2016 through the identification of pricing decisions. The difference between (5a) and (5b) reflects the price-cost margin charged by the sector. If this value is equal to unity, it suggests the presence of perfect competition in the market as the growth rate of output is equal to the growth rate of inputs. Any value higher than one highlights the presence of imperfect competitive conduct as the constituent firms have the ability to pass a higher selling price to consumers compared to the cost of production. This means that firms choose to increase their profits through overpricing decisions resulting in underproduction.

According to equation (5), the first step of this study investigates the markup ratio of the wholesale and the retail industries of the panel set as an aggregate sector and as two separate sectors over 2007-2106. Thereby, the price-cost margin is obtained by

$$\Delta Y_t = \mu \Delta X_t + \varepsilon_t \quad (6a)$$

$$\Delta Y_t = \mu_w \Delta X_t + \mu_r \Delta X_t + \varepsilon_t \quad (6b)$$

where μ captures the price-cost margin of the aggregate wholesale and retail food, beverages and tobacco sector, μ_w and μ_r reflect the price-cost margin of the wholesale and retail segments respectively and ε_t is the error term of the equation.

The second step refers to the cross-sectional Hall-Roeger specification under which the markup ratio of each industry individually is going to be estimated over 2007-2016. Thereby, equation (6a) is transformed into

$$\Delta Y_t = \sum_{i=1}^{N} \mu_i DS_i \Delta X_t + \varepsilon_t \quad (7)$$

where μ_i is price-cost margin of each constituent 4-digit level industry i and DS_i is a cross-sectional dummy variable which is set to one for industry i and zero otherwise. The latter variable allows the estimation of potential individual effects reflected by the constituent industries on the sectorial price-cost margin μ obtained in the first step.

The third and last step tests the relationship between the cross-sectional markup estimates and the structural effects of concentration and liquidity across the constituent wholesale and retail industries over 2007-2016. As market concentration and available liquidity appear to have a significant effect on pricing decisions (Olive, 2008; Lane, 2012), it is important to investigate the aforementioned relationship in the panel set of this study. Consequently, the markup formulation is captured by

$$\mu_i = c + c_1 h_i + c_2 es_i + c_3 lr_i + v_i \quad (8)$$

where c is the constant term, h_i reflects the Herfindahl-Hirschman index of each 4-digit level industry i which is equal to the sum of squares of the market share of each constituent firm in terms of turnover, es_i denotes the ratio of each industry's establishments to the number of total establishments in the sector, lr_i is the liquidity ratio of each industry i expressed as the sum of net current assets over the sum of current liabilities of each firm and v_t is the independent error term of the equation.

The Herfindahl-Hirschman index and the ratio of establishments are included in equation (8) as indicators of market concentration[7]. It is expected that industries enjoying higher concentration will tend to exhibit a higher price-cost margin as they can exploit consumer surplus from their customers. The liquidity ratio is an indicator of the available liquid assets that industries use in order to finance their liabilities per year. For this reason, it

[7] It is expected that a higher ratio of establishments results from increased demand for the products of a particular industry.

expresses the short-run behaviour of firms whenever they have to meet their current liabilities[8]. Consequently, the estimates obtained by equation (8) capture the market conditions in the wholesale and retail food, beverages and tobacco industries and reflect how the structural effects of concentration and liquidity influence their pricing decisions.

Lastly, by applying individual effects in the markup formulation, the time-series specification of the aforementioned parameters can be estimated for each year over 2007-2016. This is obtained by

$$\mu_i = c + \sum_{t=2007}^{2016} c_{1t} DT_t h_i + c_2 es_i + c_3 lr_i + v_i \quad (8a)$$

$$\mu_i = c + c_1 h_i + \sum_{t=2007}^{2016} c_{2t} DT_t es_i + c_3 lr_i + v_i \quad (8b)$$

$$\mu_i = c + c_1 h_i + c_2 es_i + \sum_{t=2007}^{2016} c_{3t} DT_t lr_i + v_i \quad (8c)$$

where DT_t (t=2007,…,2016) is a time-series dummy variable which is set to one for year t and zero otherwise. Similar to the second step, this variable introduces individual time effects in the markup equation in order to observe the annual pattern of the three structural parameters on the price-cost margin.

The formulation of equations (8a)-(8c) is based on the studies of Braun and Raddatz (2016) and Amountzias (2018) as they utilize a conceptual framework under which market concentration and liquidity constraints significantly shape the markup ratio. Given that competitive interactions and liquidity reserves are crucial elements in market operation, they are employed as important elements that can affect the pricing decisions of the constituent

[8] Lane (2012) argued that when sectors face significant liquidity constraints and limited investment actions, they may choose to charge a relatively high selling price to acquire additional revenue through consumer surplus exploitation.

wholesale and retail UK firms[9]. Moreover, the panel estimation techniques under which dummy variables are employed intend to capture variations across the years and whether the effects persist throughout the underlying time period of the study.

The dataset has been obtained from the FAME, the AMECO, the World Bank databases and the IBISWorld reports. The panel sample comprises of annual data on 19 4-digit level NACE Rev.2 classification industries over 2007-2016[10]. The number of firms included in the sample is 1,535 across the UK over the period 2007-2016 and all of them satisfy the availability of nominal data for estimating equations (6)-(8c). The FAME database, which is the major source of this study, stores information of companies registered at Companies House in the UK. It also covers corporate structures, company financials and information on shareholders and subsidiaries with up to 10 years of history. Therefore, it consists of 7 million companies across the UK, where only 200,000 are in a summary format[11].

The dataset consists of firm-level balance sheets, profit and loss accounts and financial ratios of the constituent UK wholesale and retail food, beverages and tobacco firms. The output variable is expressed as operating revenue or turnover, given that total value added excludes intermediate inputs from the production function (Rezitis and Kalantzi, 2016). The factor of intermediate inputs is denoted by the cost of sales as it reflects the direct costs attributable in the production process[12]. The cost of labour is measured as the wages and salaries of the employed and the volume of labour corresponds to the number of employees.

[9] Moreover, additional liquidity indicators could have been employed in order to validate the robustness of the liquidity ratio, such as financial underdevelopment (Braun and Raddatz, 2016).
[10] See Table A in appendix.
[11] Nevertheless, only large companies are obliged to report to Companies House any information about turnover, assets and employment. As a result, financial and profit (loss) account data of medium and small firms may not always be available.
[12] The cost of sales includes the cost of materials and services used in the production process, minus any indirect expenses such as distribution costs.

Lastly, capital is measured as the value of fixed assets and the user cost of capital is obtained by

$$u_t = [(i - \pi_e) + \delta]F_t \quad (9)$$

where $(i - \pi_e)$ is the real interest rate, F_t is the deflator of fixed asset investment and δ reflects the depreciation rate which is set equal to 5% across all industries[13] (Martins et al., 1996). The observations were acquired by the AMECO and the World Bank databases over 2007-2016 and have been fixed across the sectors[14]. Consequently, the Hall-Roeger approach will shed light to the market structure of the constituent industries and identify whether market concentration and liquidity constraints exert a significant effect on pricing decisions.

The formulation of the model and the inclusion of concentration and liquidity indexes aims to complement the existing literature on how the effects of competition and funding restrictions influence the production process and ultimately, the price-cost margin. Moreover, the importance of the UK wholesale and retail food, beverages and tobacco sector is rather significant because it reflects the last link of the supply chain that consumers engage before purchasing a product. This implies that the markup ratio of the constituent firms reflect the costs of manufacture and transportation embedded in the final selling price. To this end, consumers form their expectations and adjust their decisions according to the price level provided by those firms.

Moreover, the empirical findings of this model will also shed light to the real world decisions of the underlying UK firms as the level of uncertainty surrounding the aggregate economy has had a significant effect on aggregate demand and consumption decisions (Los et al., 2017). To this end, the estimation of the price-cost margin will reflect the pricing

[13] The value of δ could also be reflected by the firm-specific depreciation ratios. They are calculated by the depreciation costs available in the FAME database (see Molnár and Bottini, 2010).
[14] All variables are expressed in natural logarithms.

decisions and competitive interactions across the industries and how liquidity constraints have shaped their production and pricing decisions.

4. Results and Discussion

The scope of the analysis is to identify the markup ratio exercised by the wholesale and retail food, beverages and tobacco sectors along with the 19 4-digit level constituent industries. These values reflect the pricing decisions of the whole sector and whether, market conduct is consistent with perfect competition. In order for this outcome to be valid, the growth rate of output must be equal to the growth rate of inputs. If however, that ratio exceeds unity, there is evidence of imperfect competition in the market as overpricing decisions persist in the sector. Consequently, the first and second steps employ the Hall-Roeger approach denoted by equations (6a), (6b) and (7) to identify the pricing behaviour in the sector and each constituent industry over 2007-2016.

Table 1: Diagnostic test results of the Hall-Roeger approach for the UK wholesale and retail food, beverages and tobacco sector.

	Hall-Roeger model (6a)	Hall-Roeger Model (6b)	Hall-Roeger cross-sectional model (7)
Estimation technique	FGLS	FGLS	FGLS
Pesaran scaled test[a]	20.34** [0.00]	13.73** [0.00]	3.32** [0.00]
Hausman test[b]	1.349 [0.24]	1.470 [0.47]	-
White's test[c]	5.814* [0.02]	31.53** [0.00]	7.489 [0.76]
LM test[d]	41.234** [0.00]	40.83** [0.00]	11.265** [0.00]
F-statistic	1186.17** [0.00]	954.32** [0.00]	1205.74** [0.00]

Notes: The numbers in brackets indicate *p-values.*

[a] H_0: Cross-sectional independence (OLS) versus H_1: Cross-sectional dependence (Random Effects Model).

[b] H_0: Random Effects Model versus H_1: Fixed Effects Model.

[c] H_0: Homoskedasticity versus H_1: Heteroskedasticity of unknown form.

[d] H_0: No serial correlation versus H_1: Serial correlation of at least $k=2$ order.

* Significant at the 5% level of significance.

** Significant at the 1% level of significance.

Table 1 presents the diagnostic tests of the Hall-Roeger approach for the aforementioned specifications. In particular, given that the panel set consists of 19 heterogeneous industries, the presence of cross sectional dependence must be tested in order to proceed with the formulation of the model. For this reason, Pesaran's scaled (LM) test (Pesaran, 2004) is employed as corrected by Pesaran, Ullah and Yamagata (2008). The results suggest the presence of significant cross section dependence, thus rendering the use of pooled least squares estimation technique as infeasible.

Equations (6a), (6b) and (7) are estimated under the random and fixed effects models. The random effects model is formulated by applying the generalized least squares (GLS) estimation technique, given the assumption that serial correlation persists between the error term and the individual effects of each equation. On the other hand, the fixed effects model is formulated by applying the least squares dummy variables (LSDV) technique assuming the presence of within correlation between the individual effects and the explanatory variables.

For this reason, the test developed by Wu (1973) and Hausman (1978) is employed under which the null hypothesis suggests the presence of between correlation and thus, the use of the random effects model. The alternative hypothesis indicates the presence of within correlation, meaning that the fixed effects model is more suitable. As a result, the Hall-Roeger model is estimated under the random effects model, while the cross sectional specification is estimated under the fixed effects model.

However, given the presence of serial correlation and heteroscedasticity, the final estimation technique employed for both steps corresponds to the feasible generalized least squares (FGLS) in order to take into account those issues and provide robust standard errors (Rezitis and Kalantzi, 2011, 2016).

Table 2: Markup estimations for the UK wholesale and retail food, beverages and tobacco sector.

Parameters	Hall-Roeger model	Parameters	Hall-Roeger cross-sectional model
μ	1.1131**	μ_{4631}	1.0610**
	(264.73)		(162.73)
μ_w	1.1015**	μ_{4632}	1.0612**
	(142.31)		(442.29)
μ_r	1.1242**	μ_{4633}	1.1123**
	(65.03)		(80.21)
		μ_{4634}	1.1542**
			(38.80)
		μ_{4635}	1.1542**
			(72.93)
		μ_{4636}	1.1929**
			(113.04)
		μ_{4637}	1.0548**
			(78.85)
		μ_{4638}	1.0782**
			(99.43)
		μ_{4639}	1.0748**
			(28.47)
		μ_{4711}	1.0504**
			(264.69)
		μ_{4719}	1.3221**
			(54.46)
		μ_{4721}	1.1280**
			(51.42)
		μ_{4722}	1.0901**
			(131.45)
		μ_{4723}	1.0606**
			(184.15)
		μ_{4724}	0.9730**
			(75.79)
		μ_{4725}	1.4919**
			(38.54)
		μ_{4726}	1.4593**
			(58.24)
		μ_{4729}	1.0122**
			(99.40)
		μ_{4781}	1.2629**
			(24.48)

Notes: The values in parentheses are *t*-statistics.
* Significant at the 5% level of significance.
** Significant at the 1% level of significance.

Table 2 presents the price-cost margin estimates for the wholesale and retail food, beverages and tobacco sectors along with the constituent industries. Overall, the price-cost margin over 2007-2016 is equal 1.11 suggesting that the growth rate of output has been exceeding the growth rate of inputs by 11%. This captures a profit opportunity for the aggregate sector as it reflects the presence of overpricing decisions; however, those decisions are very close to perfect competition. Christopoulou and Vermeulen (2012) suggest that the average price-cost margin in the European Economic Area (EEA) retail sector does not exceed 42%[15], while in the US it is even lower, equivalent to 19%[16]. Such results are in accordance with the estimates obtained from equations (6a) and (6b) as the wholesale sector seems to be marginally more competitive compared to the retail sector.

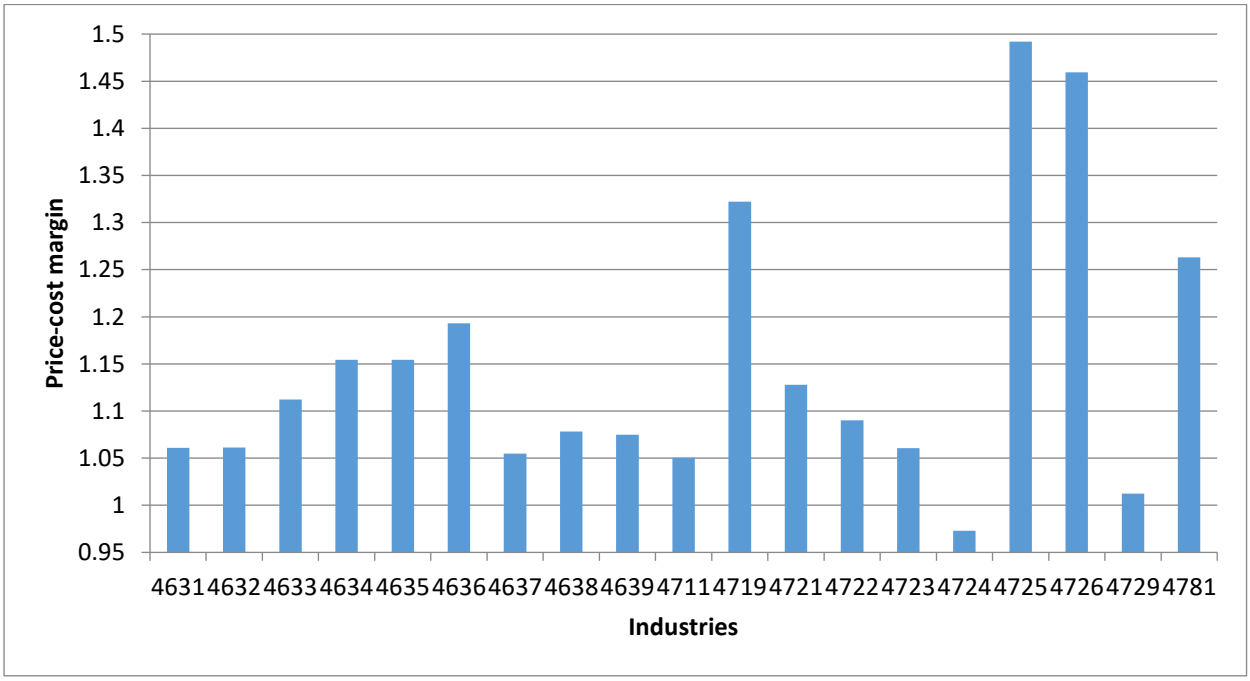
In particular, the supply chain between producers, wholesalers and retailers is very crucial in the food, beverages and tobacco market as the final selling price is influenced by those transactions. If every intermediate agent in this process charges a price slightly above the cost of production, the final price consumers have to pay will reflect all those markups and thus, the final price-cost margin will be higher. For this reason, large retailers sometimes bypass wholesale firms dealing directly with producers (Fisher, 2016a). This may be beneficial for consumers but wholesale firms face a decline in their transactions and thus, their profitability. To this end, they try to become more competitive and offer appealing prices to buyers in order to secure their market share. On the basis of this reasoning, it is clear why the wholesale sector is more competitive compared to the retail sector.

On the other hand, the retail sector is responsible for selling products directly to consumers. For this reason, the final selling price of such products is determined by the retail firms. This means that prices must incorporate the costs of production, but they must also

[15] This outcome is also supported by Polemis and Fotis (2016) arguing that the wholesale and retail sector in the Eurozone appears to be highly competitive.
[16] However, it is worth noting that the aforementioned study includes every wholesale and retail industry in the EEA economy, while the present study includes only the food, beverages and tobacco segment.

meet the purchasing power parity of consumers. A significant part of the retail segment refers to the supermarkets and their influence on the pricing decisions of both manufacturing and wholesale firms (Fisher, 2016b). As competition is intense, especially among the strongest players, supermarkets try to lower the cost of their purchased products as much as possible, forcing many manufacturing and wholesale firms to comply with such strategies. As a result of competition, there are firms who cannot abide by such agreements and utlimately, they either change their supply chain or they exit the market as supermarkets are the major buyers of manufacturing products (Dumitru, 2015; Scanlan, 2016a). For this reason, competitive pressures in the retail market are transferred in the wholesale and manufacturing counterparts because retail firms behave as oligopsonists.

Figure 1: The price-cost margin of the wholesale and retail food, beverages and tobacco industries over 2007-2016.



Source: Estimates of equation (7).

Given that the markup ratio for the aggregate sector suggests the presence of weak imperfect competitive conduct, the cross sectional estimates also reflect similar behaviour adopted by the constituent industries. In particular, the wholesale industries exercise a markup ratio ranging over 1.05-1.19 which is close to perfect competition. The wholesale

industries of coffee, tea and cocoa (i.e. 4637), of fruit and vegetables (i.e. 4631) and of meat (i.e. 4632) exhibit the lowest price-cost margin.

According to Fisher (2016a, 2016b) and Clutterbuck (2017), these industries face many constraints restraining their growth rate and their economic activities. A major characteristic of sluggish or even declining growth lies on the ability of retail firms to bypass wholesalers in order to reduce purchasing costs and deliver the final product under a lower price to consumers. Moreover, close monitoring by regulatory authorities restrict the investment decisions of the constituent firms. This leaves them vulnerable to foreign competition as global supply usually flows from low-labour cost developing countries. Nevertheless, market research and understanding of the latest technological improvements provide a competitive advantage to the UK firms as distribution and collection networks are major elements of supply chains between wholesalers and retailers or manufacturers.

On the other hand, the wholesale industry exercising the highest markup ratio is the industry of sugar and chocolate (i.e. 4636). The growth rate of the industry is similar to the one of the whole economy which can be justified by the growing intensity of demand from downstream markets (Edwards, 2016a). Competition among the constituent firms is high, but product differentiation is the main key of competitive interactions resulting in a relatively higher markup equivalent to 19%. In addition, such differentiation is achieved when market analysis is conducted, thus alerting firms about the needs and tastes of buyers in key markets. For this reason, there is a cost effective distribution system providing market power to this industry rendering it able to reflect cost increases on the selling price and increase profit acquisition.

The wholesale industry of beverages (i.e. 4634) also exhibits similar behaviour setting a price-cost margin equal to 1.15. The utilisation of skilled labour and the well-established

networks with retail firms provides the opportunity to communicate and negotiate various trade agreements which are beneficial for the value added of the whole industry. However, the two major threats of the wholesale food, beverages and tobacco sector overall refer to the wholesale bypass and the oligopsonistic power of some retail firms. Such actions neglect the role of the wholesale firms in the supply chain networks, thus reducing their value added along with their activities and ultimately, they may be forced to exit the market.

On the other hand, the retail sector of food, beverages and tobacco exhibits a price-cost margin over 0.97-1.49. It is evident that the industries with the highest markup ratio are part of the retail sector, but this also holds for industries complying with perfect competition. The retail industry of bread, cakes, flour and sugar confectionery (i.e. 4724) exhibits a markup slightly below unity, suggesting that over 2007-2016, this particular industry was behaving according to perfect competition[17]. Even if competitive interactions are not very intense as in other retail industries, there are well established networks rendering products attractive to customers (Breeze, 2016). The markets of products and consumers are very well defined and segmented and for this reason, the constituent firms have kept on charging a relatively low selling price in order to sustain their market share.

The industries exercising the highest price-cost margin are the ones of beverages (i.e. 4725) and tobacco products (i.e. 4726) equal to 1.49 and 145 respectively. Both industries experience market advantages such as product differentiation, stable supply contracts and access to technical knowledge allowing them to observe consumer tastes and adjust their products accordingly (Edwards, 2016c; Scanlan, 2016b). However, even if the increased number of existing consumers allows firms to exercise their power on their pricing decisions, both industries are expected to decline over the following years due to intense price wars

[17] Given that the markup ratio is slightly below one, this means that the industry has been experiencing marginal losses over 2007-2016.

from the supermarkets. For this reason, many beverages retail firms have exited the market over the last years as a result of reduced profit opportunities.

Consequently, the major industries in the retail food, beverages and tobacco sector are the non-specialised retail stores or otherwise, the supermarkets (i.e. 4711 and 4719). According to Edwards (2016b, 2017), competition in both industries is very high as firms compete to increase their market share through various pricing strategies, such as discounts and premium sales in particular products. This means that lower selling prices will decrease profits as long as the purchase cost of such products remains the same. Supermarkets have bargaining power over wholesalers and manufacturers because they are the main buyers of their products. In order for supermarkets to offer an appealing price to customers as a mean of competition, they have to minimise their losses through cost reduction, resulting in lower revenue for wholesale and manufacturing firms. Increased competition among supermarkets exhibits a negative externality on wholesalers and manufacturers as sometimes they are forced to set a price level below the marginal cost of production. To this end, it is not surprising that the price-cost margin of both industries is equal to 1.05 and 1.32 respectively, showing that competitive interactions are accurately reflected on the retail selling price.

Overall, the estimates of the first and second step of this study provide evidence in favour of a relatively low price-cost margin close to perfect competition. The wholesale industries of food, beverages and tobacco have been found to be more competitive compared to the retail industries; however, the lowest price-cost margin has been estimated for the retail industry of bread, cakes, flour and sugar confectionery (i.e. 4724). Moreover, the competitive interactions of supermarkets and their influence on wholesale firms is evident as externalities force many industries to keep a low markup ratio as a result of oligopsonistic power. Consequently, the third and last step investigates how the industry-level markup ratios are influenced by the structural effects of concentration and liquidity.

According to Braun and Raddatz (2016) the price-cost margin is significantly influenced by competitive interactions and liquidity constraints as they are crucial determinants of pricing and production decisions. They argue that industries facing higher liquidity constraints tend to exhibit procyclical markups and in times of depression, liquidity constrained firms are willing to charge a lower markup in order to secure their market share. According to this theoretical framework, the system of equations (8)-(8c) has been formulated in order to test the effects of concentration and liquidity constraints on the price-cost margin exercised by the constituent industries.

Table 3: Estimates of the markup formulation (8) for the UK wholesale and retail food, beverages and tobacco sector.

Parameters	Markup formulation
Constant term	0.2684** (34.19)
Herfindahl-Hirschman Index	-0.0156** (-2.96)
Establishments ratio	-0.0155** (-7.69)
Liquidity ratio	-0.1677** (-6.80)
Diagnostic tests	
Pesaran scaled test	63.60** [0.00]
Hausman test	4.15 [0.24]
White's test	19.44** [0.00]
LM test	18.73** [0.00]
F-statistic	7.74** [0.00]

Notes: The values in parentheses are *t*-statistics. The numbers in brackets indicate *p-values.*
* Significant at the 5% level of significance.
** Significant at the 1% level of significance.

Equation (8) reflects the markup formulation for the aggregate wholesale and retail food, beverages and tobacco sector over 2007-2016. Given the presence of cross sectional dependence, the random effects model has been applied along with feasible generalised least squares (FGLS) estimation technique. This process has been chosen in order to take into account the presence of serial correlation and heteroskedasticity in the error terms.

Table 3 presents the overall estimated coefficients of the markup formulation. In particular, the elasticity of markup with respect to market concentration is significant and negative for both indexes included in equation (8). This outcome suggests that more concentrated industries tend to charge a lower markup ratio, suggesting that market power is not exercised on the pricing decisions of the constituent firms. As additional demand creates a higher market share, firms engage in price wars to attract more customers by keeping the price-cost margin at a low level[18]. Moreover, the elasticity of markup with respect to the ratio of establishments in each industry validates the aforementioned relationship. As additional demand may require additional supply, the number of establishments will increase in order to meet the needs of consumers, thus boosting competition in the sector[19].

This intuition is supported by Edwards (2016b, 2017) because competition is very high across the wholesale and retail sector. In particular, as retail firms engage in price wars to secure or increase their market share, wholesale firms are also forced to sell their products under a lower price level (Fisher, 2016b). This implies that even if wholesalers are not willing to keep their markup ratio low, they are forced to in order to keep their customers. Therefore, it can be concluded that industries with higher market share in the sector tend to charge a lower markup ratio in order to increase their market share.

Moreover, the elasticity of markup with respect to the liquidity ratio is also significant and negative. This means that firms with lower liquidity constraints tend to charge a lower markup ratio in order to secure their market share. In particular, the liquidity ratio reflects the ability of firms to meet their short-run liabilities according to the net value of their assets. Firms with lower liquidity ratio will be more constrained compared to firms with a higher

[18] This outcome is consistent with the suggestions of Rotemberg and Saloner (1986). When a lower price level creates additional demand, then firms might force their competitors to exit the market resulting in additional power and liquidity. Therefore, profit cushions can be used as a tool of facing uncertainty or times of constrained access to liquidity.

[19] This is in accordance with the study of Rezitis and Kalantzi (2011), but contradicts the outcome of Bloch and Olive (2003).

ratio. For this reason, liquidity constrained firms tend to charge a higher price-cost margin in order to increase their revenue through consumer surplus exploitation. This outcome is in accordance with Chevalier and Scharfstein (1994, 1995) arguing that liquidity constrained firms have less incentives to invest in lower prices. As firms gain access to liquidity provision, they are able to cover any unexpected losses that might emerge from a price war or an exogenous shock. For this reason, they are willing to engage in such strategic behaviour in order to increase their market share and thus, their revenue.

The aforementioned estimates are also tested in the system of equations (8a)-(8c) where individual time-effects are included. In particular, the period 2007-2016 is very crucial for the UK economy as three significant shocks emerged. The first shock refers to the financial crisis of 2008; the second one is the initiation of austerity policies in 2010; and the last one corresponds to the EU referendum that took place in 2016. Therefore, given the importance of these shocks, it would be useful to investigate the annual fluctuations of the structural effects on the markup ratio charged by the constituent industries.

Table 4a: Estimates of the time-series specification of the markup formulation for the UK wholesale and retail food, beverages and tobacco sector.

Parameters	Markup formulation (8a)	Parameters	Markup formulation (8b)
c	0.2862** (15.28)	c	0.2868** (30.15)
es	-0.0169** (-6.30)	h	-0.0181** (-2.83)
lr	-0.2130** (-8.15)	lr	-0.2130** (-7.82)
h (2007)	-0.0307** (-9.75)	es (2007)	-0.0122** (-5.44)
h (2008)	-0.0214** (-10.69)	es (2008)	-0.0051** (-4.35)
h (2009)	-0.0414** (-12.59)	es (2009)	-0.0107** (-7.34)
h (2010)	-0.0245** (-11.80)	es (2010)	-0.0205** (-8.40)
h (2011)	-0.0225** (-11.18)	es (2011)	-0.0259** (-9.79)
h (2012)	-0.0129** (-7.68)	es (2012)	-0.0221** (10.75)
h (2013)	-0.0123** (-5.72)	es (2013)	-0.0207** (-12.31)
h (2014)	-0.0130** (-5.61)	es (2014)	-0.0241** (-12.95)

h (2015)	-0.0113** (-9.44)	es (2015)	-0.0080** (-8.39)
h (2016)	-0.0225** (-5.82)	es (2016)	-0.0194** (19.63)
Diagnostic tests			
Pesaran scaled test	61.13** [0.00]	Pesaran scaled test	61.00** [0.00]
White's test	21.02 [0.05]	White's test	20.08 [0.05]
LM test	19.98** [0.00]	LM test	20.32** [0.00]
F-statistic	11.33** [0.00]	F-statistic	11.32** [0.00]

Notes: The values in parentheses are *t*-statistics. The numbers in brackets indicate *p-values.*
* Significant at the 5% level of significance.
** Significant at the 1% level of significance.

Table 4b: Estimates of the time-series specification of the markup formulation for the UK wholesale and retail food, beverages and tobacco sector.

Parameters	Markup formulation (8c)
c	0.2814** (15.16)
h	-0.0181** (-2.98)
es	-0.0164** (-5.75)
lr (2007)	-0.3177** (-47.86)
lr(2008)	-0.3100** (-54.04)
lr(2009)	-0.2424** (-43.61)
lr(2010)	-0.2351** (-22.60)
lr(2011)	-0.1907** (-26.28)
lr(2012)	-0.2249** (-29.00)
lr(2013)	0.1689** (10.59)
lr(2014)	-0.0129 (-0.97)
lr(2015)	-0.1492** (-36.03)
lr(2016)	0.1683** (22.91)
Diagnostic tests	
Pesaran scaled test	61.25** [0.00]
White's test	24.22* [0.04]
LM test	20.41** [0.00]
F-statistic	11.43** [0.00]

Notes: The values in parentheses are *t*-statistics. The numbers in brackets indicate *p-values.*
* Significant at the 5% level of significance.
** Significant at the 1% level of significance.

Tables 4a and 4b present the results of the time series specification of the markup formulation (8). Three equations are included in the system where individual time-effects are applied to one variable each time, constraining the remaining two variables to their average value. The concentration indexes appear to have the expected negative value over the years, once again suggesting that more concentrated industries charge a lower price-cost margin as a mean of competition.

However, the results of equation (8c) are rather interesting. In particular, it is supported that liquidity constrained industries tend to charge a higher markup ratio over 2007-2016, except from 2013, 2014 and 2016. Over these years, the elasticity of markup with respect to liquidity is positive (i.e. 2013 and 2016) or insignificant (i.e. 2014). This outcome can be interpreted according to the economic conditions of the market. As these years follow the three significant shocks, it may be assumed that firms had already realised the adverse effects of austerity, thus acquiring a clear perception of their market share and customers. When no additional intervention is expected in the market, firms with lower liquidity constraints will start charging a higher price-cost margin. This occurs because when the degree of uncertainty is relatively low, firms may perceive their market share as secured. This means that any potential consumer loss resulting by a higher selling price will be offset by increased profit cushions.

Overall, the empirical results of this study show that the UK wholesale and retail food, beverages and tobacco industries exhibit a price-cost margin value equal to 11% which is close to perfect competition. In addition, more concentrated firms tend to charge a lower markup ratio, while firms with higher liquidity ratio are also willing to charge a lower price-cost margin to increase their market share. To this end, the intense competitive interactions and price wars emerging in this segment of the UK services industry are empirically supported by the underlying model.

5. Conclusion and policy implications

The present study provides an investigation of the price-cost margin in the UK wholesale and retail food, beverages and tobacco sector over 2007-2016 considering 19 4-digit level NACE Rev.2 classification industries. The findings support the presence of a markup ratio equal to 11%, with the retail segment being slightly less competitive than the wholesale segment. Similar behaviour is also reflected by the constituent industries, thus validating the presence of intense competition.

This outcome is also supported by the indicators of concentration as more concentrated industries tend to charge a lower price-cost margin as a tool of increasing their market share. Finally, firms with lower liquidity constraints tend to invest in lower markups overall, but there are exceptions when market share is not the major concern of firms. Therefore, it is supported that the UK wholesale and retail food, beverages and tobacco sector appears to be competitive where liquidity constraints is a significant contributor to the pricing decisions of the industries.

The results of this study could provide support to market policies targeting this sector over the following years. Given that the exit of the UK from the European Union is imminent, there is a high degree of uncertainty on how trade agreements and supply chains are going to be influenced. As the UK manufacturing industry is the main supplier of the wholesale and retail counterpart, any disruption in manufacturing exports will have an immediate effect on domestic trade. According to IBISWorld (2017a, 2017b, 2017c), the majority of the constituent industries depend on imported products from the EU. As the value of the sterling is expected to depreciate, those products are going to be relatively more expensive, thus increasing the purchase costs of the sector. Given that the price-cost margin of the constituent industries is already close to unity as a result of competition, domestic firms may either

absorb the cost increase by sacrificing part of their profits or they will transfer that change in the selling price. In the latter case, the price-cost margin will not be affected but consumers will have to pay more for the same product.

Moreover, the erection of potential trade barriers will also affect the trading agreements between UK and EU firms, thus disrupting supply chains and creating uncertainty. If those factors are taken into consideration, consumer confidence is expected to fall as consumers will suffer a decrease in their purchasing power parity (IBISWorld, 2017b). Consequently, demand for cheap substitute products will increase as high-quality products will be too expensive. If this condition persists for some time, overall consumer demand might shift to such substitutes that might dominate the market.

To this end, domestic UK firms will have to negotiate new agreements or they could shift to domestic producers increasing domestic production overall. This may be an opportunity for the UK firms to invest and improve the production of some products which have been heavily imported over the last years, thus creating a comparative advantage against EU competitors. Moreover, the UK firms will have to rely on domestic institutions for funding as innovation and investment are the main drivers of growth (Edwards, 2017). For this reason, liquidity must be provided in order to overcome the short-run trade obstacles as a result of Brexit and grasp trading opportunities that will arise. This also means that young entrepreneurs must not be discouraged from entering the wholesale and retail sector as such investment will introduce innovation and new products in markets boosting profitability.

Overall, this study supports the presence of competitive interactions in the UK wholesale and retail food, beverages and tobacco industries, where competitive interactions and liquidity constraints are essential factors in the formation of pricing decisions.

Appendix

Table A: Classification of industries according to NACE Rev.2 classification.

4631	Wholesale of fruit and vegetables
4632	Wholesale of meat and meat products
4633	Wholesale of dairy products, eggs and edible oils and fats
4634	Wholesale of beverages
4635	Wholesale of tobacco product
4636	Wholesale of sugar and chocolate and sugar confectionery
4637	Wholesale of coffee, tea, cocoa and spice
4638	Wholesale of other food, including fish, crustaceans and molluscs
4639	Non-specialised wholesale of food, beverages and tobacco
4711	Retail sale in non-specialised stores with food, beverages or tobacco predominating
4719	Other retail sale in non-specialised stores
4721	Retail sale of fruit and vegetables in specialised stores
4722	Retail sale of meat and meat products in specialised stores
4723	Retail sale of fish, crustaceans and molluscs in specialised stores
4724	Retail sale of bread, cakes, flour confectionery and sugar confectionery in specialised stores
4725	Retail sale of beverages in specialised stores
4726	Retail sale of tobacco products in specialised stores
4729	Other retail sale of food in specialised stores
4781	Retail sale via stalls and markets of food, beverages and tobacco products

Source: *FAME* database.

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