Price-setting Behavior and Competition in Developing Countries: An Analysis of Retail Outlets in Lesotho*

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Abstract

We study the relationship between price-setting behavior and the degree of competition in a setting where markets and information flows are relatively imperfect. Using a unique dataset that combines survey data on retail outlets in Lesotho, and detailed historical information on their product prices, we find a non-monotonic relationship between the frequency of price changes and perceived competition, measured by the number of reported competitors. This non-monotonic relationship is consistent with a model of increasing costs of coordinating price changes under tacit collusion with few competitors, and a breakdown of collusion at higher levels of competition.

Key words: Price rigidity, Competition, Survey data, Micro price data, Emerging economies

JEL: E30, D40, D22, L21

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1 Introduction

Evidence of price rigidities is widespread. Prices are found to be sticky and price increases and decreases often respond asymmetrically to cost and demand shocks (Blinder *et al.*, 1998; Peltzman 2000). Accounting for these rigidities has key implications for economic theory (Carlton, 1986; Blinder, 1991; Blinder *et al.*, 1998; Peltzman, 2000), macro models (Klenow and Malin, 2011) and the conduct of monetary and other economic policies (Greenslade and Parker, 2012).

The literature posits that a firm's price-setting behavior is influenced by the degree of competition it faces (Rotemberg and Saloner, 1987). In competitive markets, a firm's pricing decision is expected to respond more closely to cost and demand shocks than in markets characterized by imperfect competition, where price adjustments may be delayed to avoid breaking tacit pricing agreements (Alvarez and Hernando, 2007b). Notwithstanding this theoretical prediction, the empirical literature that explores the link between price-setting behavior and the degree of competition is both diverse and contentious. While some empirical studies using high frequency product-level price data find supporting evidence for the positive association between competition and the frequency of price changes (Carlton, 1986; Hall *et al.*, 2000; Alvarez and Hernando, 2007b), other studies find the opposite effect (Domberger, 1979), or no effect at all (Weiss, 1993; Bils and Klenow, 2004).

One explanation for this empirical inconsistency might be that these studies assume a monotonic relationship between competition and the frequency of price changes, whereas the relationship may be non-monotonic, as is theoretically argued by Hanazono and Yang (2007). Alternatively, the inconsistency may reflect the fact that these available studies draw on different data bases that are not necessarily comparable. Some studies, such as Álvarez *et al.* (2005) for Spain, draw on detailed producer price data, while others use information on price-setting behavior obtained from firm surveys (see Aucremanne and Druant [2005] for Belgium, Hall *et al.* [2000] for the UK, Apel *et al.* [2005] and Alvarez and Hernando [2007b] for the Euro Area). While the price-based studies are able to exploit detailed historical information on price changes, they lack information on firm characteristics, including perceived competition. On the other hand, studies that employ survey data can draw on rich information on firm characteristics, but may lack detailed and historical information on observed changes in prices.

In this study, we address both these limitations. First, we investigate potential non-monotonicity in the relationship between price rigidity and perceived competition explicitly. Particularly, we study the relationship between the frequency of price changes and perceived competition in retail outlets in Lesotho, a small economy in Southern Africa. Lesotho provides a relevant case study for our purpose, compared to other developing countries, since its markets remain relatively open, and government intervention in price-setting is relatively low.

We posit that in an environment of asymmetric information, the co-ordination costs involved with price changes when firms tacitly collude rise as the number

of competitors initially increases, implying a negative association between the frequency of price changes and competition. However, as the number of firms rises, collusion is harder to sustain and finally breaks down, after which more competition is associated with more frequent price changes.

We utilise a unique dataset that combines survey data on retail firms (outlets) with detailed, historical information on prices of their products. The micro price database consists of monthly consumer prices for products over the period January 2011 through December 2012. The outlet survey data consist of 250 retail outlets drawn from face-to-face questionnaires administered to managers/owners of these outlets across Lesotho in 2013.[1] The survey questionnaire contains detailed information on outlet attributes, price-setting behavior, number of competitors and costs. Our integrated database combines the comprehensive nature of the micro price data in terms of product range and coverage over time, with detailed information on outlet characteristics and manager responses to how prices are set, reviewed and changed. This allows for a richer analysis of price-setting behavior than is possible in other studies that use either micro price or firm-level survey data.

Controlling for product-level, time-invariant demand and cost shocks, we find evidence of a non-monotonic relationship between the frequency of price changes and the perceived number of competitors. At low levels of competition, a rise in the number of competing outlets reduces the frequency of price changes within outlets, but the relationship switches to positive as competitors increase. Additionally, we find that evidence of non-monotonicity is stronger for homogeneous, relative to differentiated products, consistent with our conceptual framework. We also find that evidence of non-monotonicity is more pronounced for price decreases than for price increases. Finally, our results are robust to alternate estimation technique that accounts for the bounded and fractional nature of our dependent variable.

To our knowledge, our study is the first to document empirical evidence for a non-monotonic relationship between price rigidity and competition in the non-financial sector.[2] We show that in imperfectly competitive markets, an increase in the number of retail firms might lead to greater price rigidity. We hence underscore the need to coordinate macroeconomic policy and competition policy. Finally, there is strikingly little on the relationship between price rigidity and competition in developing countries, where markets are more rigid and where 'thin' markets create frictions to price adjustments different from advanced economies (Nchake *et al.*, 2015).

Our paper is structured as follows. Section 2 outlines our conceptual framework. Sections 3 and 4 describe the data and look descriptively at the price-

[1] The survey sample is large relative to other studies, particularly when taking into account the relative sizes of the economies. For example, Blinder (1991) and Blinder *et al.* (1998) cover approximately 200 firms in the US, the survey of UK firms used by Greenslade and Parker (2012) covers 693 firms. These studies cover mostly producers, while the focus in this study is on retailers.

[2] Jackson III (1997) and Lago-González and Salas-Fumás (2005) provide evidence of a non-monotonic relationship between price rigidity of loan and consumer deposit interest rates and competition.

setting behavior of outlets and at the relationship between the frequency of price changes and competition. Section 5 analyzes the latter relationship rigorously, in a regression framework and Section 6 concludes.

2 Conceptual Framework

We adapt the conceptual framework proposed in Hanazono and Yang (2007). They consider an infinitely repeated Bertrand game with two identical firms, where firms experience a demand shock in each period, and receive private information (a signal) on the nature of the shock. Due to asymmetric information, one firm cannot observe the other's signal. At the end of the period, firms observe demand. Firms can either choose a sorting pricing scheme, where they charge different prices for different signals, or a pooling scheme, where they charge the same price regardless of the demand signal (price rigidity).

Under the sorting scheme, firms enjoy information gains because they exploit the information in the signal, though these gains are mitigated if the signal is noisy. However, for this scheme to be maintained in equilibrium, firms must have no incentive to charge a price assigned to a different signal. Given that the signal is private, deviations cannot be detected, and price distortions or future punishments are necessary to maintain this scheme. These impose coordination costs. On the other hand, the pooling scheme involves no coordination costs. In an environment where signals are noisy, as is likely to be the case in most developing countries (and sometimes in advanced countries), where information flows are less than perfect, the authors show that firms may find a pooling scheme optimal, because the information gains associated with a sorting scheme are not sufficient to outweigh the associated coordination costs.[3]

As the number of firms in a market increases, coordination costs increase. This is because, with a larger number of firms, the probability that one firm charges a price assigned to a different signal increases, increasing the punishments or price distortions necessary to sustain a sorting equilibrium. Hence, initially, a pooling scheme is more likely to be optimal with more competitors, implying a negative association between the frequency of price changes and the number of competitors. As the number of firms increases, collusion cannot be sustained, and prices become more flexible.

Formally, the frequency of price changes as a function of the number of competitors can be specified as:

$$
\begin{aligned}
(2.1) \qquad f(n_i) &= b(s) - c(n_i) \quad if\ n_i \leq n_c \\
&= F(n_i) \quad if\ n_i > n_c
\end{aligned}
$$

Here, s captures the extent of demand fluctuations in the market, n_i is the number of competitors for firm i, n_c is the number of firms after which collusion

[3] However, we do make the direct comparison between developed and developing countries, on price rigidity conditional on competition as this also requires controlling for the differences in inflation between those countries.

is unsustainable. $b(s)$ captures the relationship between demand fluctuations and the frequency of price changes. $c(n_i)$ captures the costs of coordinating price changes as a function of the number of competitors. $F(n_i)$ captures the relationship between competition and the frequency of price changes when there is no collusion. We assume that $F' > 0$, $b' > 0$ and $c' > 0$. Note that in a monopoly, $f(n_i) = b(s)$, that is, the frequency of price changes depends on the extent of demand fluctuations in the market.

Hence,

$$(2.2) \qquad \begin{aligned} f'(n_i) &= -c'(n_i) < 0 \quad if\, n_i \leq n_c \\ &= F'(n_i) > 0 \quad if\, n_i > n_c \end{aligned}$$

This yields a non-monotonic relationship between n_i and f, which we estimate using our data on the perceived number of competitors reported by retail outlets and the frequency with which these outlets change product prices. We estimate:

$$(2.3) \qquad f_{ip} = \beta_0 + X(\beta_1 n_i) + \beta_2 Y_i + \beta_3 I_p + \varepsilon_{ip}$$

Here, f_{ip} is the frequency of price changes in outlet i for product p and n_i is the number of competitors reported by the outlet. We first estimate $X(\beta_1 n_i)$ as a linear function, and subsequently explore non-monotonicity by introducing a linear and a squared term of the number of reported competitors. Y_i and $I_p$are outlet and product specific characteristics respectively, while ε_{ip} is an idiosyncratic error term.

3 Data

3.1 *Outlet price-setting survey*

The price-setting survey was designed to collect detailed information on outlet characteristics, with a particular focus on how prices were set and changed. The questionnaire was designed, using the World Bank Enterprise Survey questionnaires and those of Blinder (1991) and Fabiani *et al.* (2006), in consultation with researchers within SALDRU, University of Cape Town[4] The survey was administered to outlets that the Lesotho Bureau of Statistics (BOS) uses for the collection of monthly Consumer Price Index data during the first two weeks of March and April 2013.[5]

From the 420 retail and services outlets that were surveyed, we exclude all outlets that provide services, since we focus on goods retailers. Outlets whose

[4]The survey questionnaire and additional details on the implementation of the survey are available from the authors upon request. For additional information on the survey, also refer to the PEDL report at http://pedl.cepr.org/content/consumer-price-rigidities-lesotho-role-outlet-characteristics-and-competition

[5]The BOS collects prices from 774 outlets, but we did not survey those outlets where prices are only collected once or twice a year (taxi fares, housing rents, petrol and diesel prices) and where prices were subject to regulatory controls (water and electricity companies, hospitals and schools, except for driving schools). The response rate on the remaining outlets was 81.5 percent.

price-setting strategies are not determined within the outlet, but by the head office, parent company, business council or government are also excluded, since the frequency of price changes in these outlets is likely not endogenous to the individual outlet. The final sample in this analysis consists of 250 retail outlets.[6]

Table 1 presents descriptive statistics on various characteristics of the retail outlets included in our sample. Most retail outlets are medium in size (45 per cent), employing between 5 and 20 employees in total. Small outlets employing less than 5 employees account for 39 per cent of the retail outlets, and 14 per cent are large (more than 20 employees). Just over 60 percent of the surveyed outlets are branches of retail chains.[7] These branches tend to be relatively large with a median employment of 5 full-time and part-time workers compared to 3 for other outlets. Like in most developing economies with low levels of urbanization, a majority (58 percent) of retail outlets are located in rural areas.

Table 2 presents descriptive statistics on various measures commonly used in the literature of the degree of competition faced by retail outlets in our sample. These inferred competition measures include the following (each captured by a question in the survey questionnaire): (i) the number of competitors perceived by the outlet, (ii) whether an outlet reduced prices in response to the lowering of a competitor's price, (iii) whether an outlet regarded reductions in a close competitor's price as important or very important in influencing it to lower its price. (iv) whether an outlet rated the fear of a rise in its competitor's price as an important factor stopping it from raising its own price. From Table 2, most outlets are faced with at least one and less than five competitors (73 percent) and few outlets (5 percent) face competition from more than 10 competitors. Broadly, fewer outlets report being concerned about competitors while setting prices.

3.2 *Micro price data*

We also utilize historical product price data for these outlets from January 2011 through December 2012, provided by the Bureau of Statistics, Lesotho. Each individual price record (termed price quote) for a product has information on the date (month and year) of the transaction, the retail outlet's name, district, product description (including brand in many cases) and its unit code, and the price at which it is sold by the outlet. Since we are provided with outlet names, we are able to merge the micro price data with the corresponding outlet's survey responses. We are hence able to trace the pricing history of individual products within each retail outlet over the period 2011-2012.[8] Nchake *et al.* (2015) provide further details on the price data.

[6] For a list of outlets in the sample by district and a map of Lesotho, see Table A2 and Figure A1 in the Appendix.

[7] A chain is a group of retail or services outlets dealing in the same products. These outlets share a brand and central management and usually have a standardized business method and practice.

[8] A limitation of the data is that it is not possible to identify price changes in response to temporary promotions and seasonal sales.

We only consider products in an outlet's main product group since our survey questions on competition pertain to the outlet's main product group. However, we lose additional 26 outlets from our sample because we do not have frequency of price-change information on the main product group for these outlets. The final sample in the price data consists of 133 products sold in 224 retail outlets[9].

Table 3 presents a breakdown of price records by major product group. The data in the table cover a sample of 7,458 price quotes. Over 80 percent of price quotes are made up of food products, followed by household furniture and equipment at 6.2 per cent, clothing and footwear at 5.4 per cent and alcoholic beverages at 2.2 per cent. Other product groups each make up less than one percent.

4 Price-setting behavior

Differences in price-setting behavior across outlets reflect different strategies that outlets use in pricing their products. In this section, we first explore the main price-setting rules adopted by retail outlets. We then examine how competition in the market and various outlet characteristics (location, size, ownership) affect the choice of price-setting rule.

The questionnaire addresses the outlet's price-setting rule by directly requesting them to indicate whether they set the price of products in their main product group as a mark-up over costs or based on their main competitor's price.We refer to the 'mark-up over costs' price-setting rule as the 'mark-up pricing' rule and the 'set prices based on main competitor's price' price-setting rule as the 'main competitor's price' rule. While the question pertains to the main product group that generates the highest turnover of the outlet, on average, this constitutes 79.5 per cent of the total value of sales of each outlet in our data. Therefore, we argue that the price-setting rule applied to the main product group is broadly representative of the outlet's pricing behavior in general

The data reveal that 93.5 per cent of the retail outlets in our sample apply a 'mark-up pricing' rule when setting prices. Only 6.5 per cent of outlets in our sample set prices according to their 'main competitor's price'. Following Alvarez *et al.* (2006), Alvarez and Hernando (2007a) and Greensdale and Parker (2010) who use mark-up pricing as an indicator of imperfectly competitive markets, these results suggest a high degree of market power in the Lesotho retail market compared to other economies. For example, the share of firms using mark-up pricing relative to competitor pricing is substantially higher in Lesotho compared to countries in the Euro area (Alvarez *et al.*, 2006; Alvarez and Hernando, 2007a) and the United Kingdom (Greensdale and Parker, 2010). This also holds when comparing Lesotho to other emerging economies such as Turkey (Şahinõz and Saraçoðlu, 2008) and Romania (Copaciu *et al.*, 2010). In what follows, we try to isolate some of the outlet characteristics associated with differences in price-setting behavior.

[9]For the full list of products, see Table A1 in the Appendix.

Table 4 summarizes price-setting strategies of outlets according to characteristics of the outlet, such as size, ownership, and location. We find some evidence that price-setting behavior differs according to outlet characteristics. Retail outlets that are part of chain stores are more likely to set prices according to the 'main competitor's price' compared to other outlets. Medium-sized outlets are also more likely to set prices according to the 'main competitor's price' compared to large and small outlets. There is no significant difference between outlets that are located in shopping malls or outside malls, or in rural and urban areas.

Hence, descriptive evidence in our data reveals that the degree of competition appears to be strongly related to price-setting rules adopted by retail outlets. The more competitive the environment is, the more likely that an outlet sets its prices according to its 'main competitor's price'. We note here that it is difficult to interpret this relationship to imply that a high degree of market competition encourages firms to set prices competitively. Setting prices according to the 'main competitor's price' need not necessarily mean competitive price-setting behavior. It could denote strategic interaction, or collusive behavior in an oligopolistic market. Nevertheless, evidence of this relationship in our data corroborates similar findings in other countries such as in the Euro area (Fabiani *et al.*, 2006).

5 Price-rigidity and competition

We now draw on our integrated micro price-survey database to analyze the relationship between perceived competition and price-rigidity among retail outlets in Lesotho. We measure price-rigidity for each product sold by an outlet as the average frequency of price changes over the period 2011-2012 (henceforth, the frequency of price changes).[10] Table 6 presents the frequency of price changes by the degree of competition faced by outlets, utilizing the measures of competition in Table 5. A simple analysis of patterns in the data shows a non-monotonic relationship between the frequency of price changes and perceived competition for all measures of competition in the survey. For example, the frequency of price changes in outlets facing more than 15 competitors (24.7 per cent) is higher than in outlets facing between 11 and 15 competitors (21.9 per cent) but less than in outlets facing between one and five competitors (25.9 per cent).

These trends are consistent with the idea outlined in our conceptual framework, where increasing co-ordination costs of collusion in markets with few competitors induce a negative relationship between the frequency of price changes and competition, which switches into a positive relationship when the number of competitors is high and collusion breaks down. In the next section, we test this relationship more rigorously using a regression analysis.

[10] We calculate this as the number of months between January 2011 and December 2012 in which the outlet changed its price divided by the total number of months.

5.1 *Regression analysis of the relationship between the frequency of price changes and competition*

For our regression analysis, we employ the number of competitors reported by the retail outlet in our survey as our measure of perceived competition. We argue that this is the preferred measure of competition available to us from our survey, since it is more refined and less subjective than a simple binary outcome (or a categorical outcome) of how important a competitor's price response is in the pricing decision.[11] Using the number of competitors as reported by the outlet as our measure of competition allows us to tease out a potentially non-monotonic relationship.[12] To reiterate, the advantage of our database is that it combines detailed product-level price data for each outlet with in-depth information on various characteristics of that outlet. In analyzing the frequency of price changes, we are therefore able to control for product heterogeneity far more precisely than in other survey-based studies, in addition to controlling for outlet characteristics.

We first posit a linear relationship between competition and price-rigidity that is commonly estimated in the literature (see Alvarez and Hernando, 2007b). Drawing from equation (2.3), we regress the frequency of price changes over the period 2011-2012 on the reported number of competitors (*Number of competitors*). Further, we include dummy variables that equal one if the outlet is located in an urban area (*Urban*), in a mall (*Mall location*) and if it is part of a chain (*Chain*). We also include dummies for outlet size (measured by total employment), and ownership of storage facilities (*Storage*) as this might determine the outlet's ability to hold inventory.

To control for cost and demand shocks at the outlet level, we follow Álvarez and Hernando (2007b) and include dummy variables that equal one if outlets assessed as important or very important the role of labour costs (*Labour costs*) and demand (*demand*) in driving price changes. We also argue that the degree of cost shocks differs across industries. The last column of Table 3 illustrates that cost shocks are product-specific. Some industries (for example, food sector) face large shocks, hence more frequent price changes, while other industries face smaller shocks (for example, personal care). To account for these differences, we include product fixed effects that controls for product-specific time-invariant shocks to demand or supply related factors, like raw-material prices. Finally, we include district fixed effects to control for region-specific shocks.

The dependent variable (*frequency of price changes*) is at the outlet-product-level, averaged over the period January 2011 through December 2012. Our key independent variable of interest (*Number of Competitors*) varies by outlet, and is obtained from our survey data collected in 2013. After excluding outlets

[11] There are a number of measures for market concentration and perceived competition, but our data does not contain information on any measurements of market concentration such as market share.

[12] One limitation of using this measure is that different retail firms may use different measures to define relevant markets or to identify their potential competitors. However in the survey, we ask retail firms about main competitors of their main product.

which have missing information on key control variables, the regression analysis is based on a sample of 213 retail outlets.

5.2 *Results*

Results are presented in Table 7. In the first column, we estimate the baseline regression without controls or fixed effects. In the second column, we control for outlet-specific characteristics. Large and medium retail outlets are found to change prices more often and, as expected, retail outlets with storage facilities have a lower frequency of price changes. Finally, in column 3, we include a set of district and product fixed effects to control for time-invariant, unobserved heterogeneity at the district-and product-level. However, across all three columns, we find no systematic relationship between the frequency of price changes and perceived competition by retail outlets.

Next, in Table 8, we explore a potentially non-monotonic relationship between the frequency of price changes and competition by including a squared term of the number of competitors reported by the outlet. Like in Table 7, in column 1, we look at pure correlations. We introduce control variables in Column 2 and product and district fixed effects in Column 3. From column 2, we now find a significant non-monotonic relationship between the frequency of price changes and the number of competitors reported by the outlet that is robust to the inclusion of outlet characteristics. While the coefficient on competition is statistically significant but negative, the coefficient on the squared term is positive and significant.

This suggests that at low levels of competition, a rise in the number of competing outlets reduces the frequency of price changes within outlets, but that when the number of competitors is large, more competitors are associated with an increase in the frequency of price changes. The frequency of price changes for outlets with one competitor, for example, is 28 per cent and it declines to 27 per cent as the number of competitors increases to 5 but increases to 28 per cent as the number of competitors increases to 10 and to 33 per cent at 20 competitors. In column 3, we are unable to estimate the coefficient on competition precisely, though the sign remains negative.

Overall, we find evidence of a non-monotonic relationship, which is consistent with a model of increasing costs of coordinating price changes under tacit collusion with few competitors and a breakdown of collusion at higher levels of competition. Our argument is that as the number of outlets increases initially, coordination costs associated with price changes outweigh any gains from adjusting prices to demand shocks, until collusion is ultimately unsustainable and prices adjust to shocks. Our result thus emphasizes the fact that the relationship between price rigidity and competition may be quite nuanced, especially in markets characterized by strong information asymmetries or barriers to information flows.

5.3 *Asymmetry in the frequency of price changes*

Next, we explore the non-monotonic relationship between perceived competition and the frequency of price increases and decreases. While theory suggests symmetrical effects in price changes, empirical evidence shows that price increases and decreases respond asymmetrically to cost and demand shocks (Peltzman 2000; Blinder *et al.*, 1998; Klenow and Kryvtsov, 2008; Klenow and Malin, 2011 and; Nchake *et al.,* 2015). We test if asymmetric effects are also present in the relationship between price rigidity and competition.

Results presented in Table 9 show evidence of asymmetry in the relationship between competition and the frequency of price increases and price decreases. We find that the non-monotonic relationship between competition and the frequency of price changes is stronger for price decreases. At low levels of competition, at one competitor for instance the frequency of price decreases is 7 percent and of price increases, 21 percent. A rise in the number of competing outlets to 10 reduces the frequency of price decreases to 6 percent but does not change the frequency of price increases. At a higher level of competition (20 competitors), the frequencies of price decreases and price increases rise to 7 percent and 27 percent respectively One explanation for this asymmetry may be that co-ordination costs that arise from having to design future punishments for deviations, that essentially drive the non-monotonicity, might be more significant for price decreases than price increases.

5.4 *Robustness checks*

The conceptual framework we posit in this paper is most relevant for homogenous products. This is because the more differentiated the product, the more likely a shock experienced by a retail outlet will be product-specific and specific to the outlet, inducing outlets to respond by changing prices. The advantage of our data is that we have sufficient information on products to enable us to clearly distinguish between homogeneous and differentiated products. This allows us to ascertain if our results pertain primarily to homogenous products. To evaluate this, we use a sub-sample of 88 homogeneous products that are similar in their product description and unit of measurement. These include, for example, 750 ml of cooking oil, 500 g of rice, 500 ml of bottled water, 1 kg of beef or 1 kg of apples. We compare this sample to a sub-sample of 45 differentiated products.

In column 1 of Table 10, we present results for equation (2.3) for homogenous products and in column 2, for differentiated products. We present results for the frequency of price increases and the frequency of price decreases for homogenous and differentiated products in columns 3 and 4 and columns 5 and 6 respectively. Consistent with our conceptual framework, we find that the non-monotonic relationship between the frequency of price changes and competition is statistically significant for homogeneous products and not for differentiated products.

The results so far are estimated using OLS. To deal with functional form and

concerns of inference when using bounded data on the dependent variable, such as the frequency of price changes, we test the robustness of our results to the quasi-maximum likelihood (QML) approach of Papke and Wooldridge (1996) to estimate models with fractional dependent variables. In Table 11, we present results for estimation equation (2.3) using the QML approach, by expressing the dependent variable as a bounded nonlinear function of the explanatory variables using a logistic cumulative distribution function. This method has been widely used to account for possible bias when the dependent variable is fractional. The coefficients are then estimated using a Bernoulli quasi-maximum likelihood estimator. We find that our results are robust to this alternate estimation technique, with the non-monotonicity reflected.

6 Conclusion

This paper extends the microeconomic evidence on price-setting using micro price data and outlet survey data for Lesotho, a small, low-income, landlocked economy in Southern Africa. The empirical analysis draws on a unique dataset that combines survey data on outlets with detailed historical information on their product prices to analyze the relationship between price-setting behavior and perceived competition.

Our results provide some important insights into the nature of retail markets. We find that the market structure for consumer goods in Lesotho is characterised by a high degree of imperfect competition. A high proportion of outlets apply mark-ups over costs when setting prices, while very few outlets set prices according to the price of their main competitor. The latter tend to operate in environments perceived to be more competitive, and are more likely to be located in urban areas. We find a non-monotonic relationship between the frequency of price changes and perceived competition, suggesting that the relationship between price rigidity and market-structure is more nuanced than was previously posited.

Our study makes two important contributions. First, to our knowledge, it is the first study to explore the non-monotonic relationship between price rigidity and competition in the non-financial sector, providing a potential resolution to the lack of consensus in the literature exploring the relationship between price rigidity and competition. Second, it looks at market structure and price-setting in a developing country, where markets are characterized by asymmetric information and greater barriers to information flows. We believe that by delving into the nature of the relationship between competition and price rigidity, our study has implications for macroeconomic and competition policy, and underscores the scope for interaction between the two.

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