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Original Research Article

Determinants of the frequency of price changes in Viet Nam

ABSTRACT

The paper aims to study the determinants of price stickiness proxied by the frequency of price changes in Viet Nam by using the Poisson regression model with survey data. We find that the frequency of price changes is positively and negatively related with firms' choice of time dependence and rule of thumb, respectively. Importantly, we also reveal that the coordination failure, the existence of contracts and temporary shocks are the three most important reasons for price rigidity. Finally, we find the degree of competition, firm size, the share of state ownership, quantity discount practice, sales destination and market share all matter for how often firms adjust their prices.

Keywords: price stickiness, the frequency, survey data, the Poisson regression

1. INTRODUCTION

In recent years, the survey approach has been extensively used to study the price setting behavior of firms. Some typical examples can be seen in Blinder (1991, 1994), Blinder et al. (1998), Hall, Walsh and Yates (2000), Nakagawa, Hattori and Takagawa (2000), Apel, Friberg and Hallsten (2005), Amirault, Kwan and Wilkinson (2004), Fabiani et al. (2006), Park, Rayner and D'Arcy (2010), Keeney, Lawless and Murphy (2010), Greenslade and Parker (2012) and Dias et al. (2015). Using survey data, studies on price stickiness focus on investigating either the frequency and/or the speed/magnitude of price adjustments and their determinants. The methods that have been utilized in the literature also vary from simple statistic description to more complicated regression techniques.

Even though price rigidity is one of the crucial ingredients of the modern dynamic stochastic general equilibrium (DSGE) models that are widely used for monetary policy analysis, studies assessing its empirical validity at micro level are rather limited, especially in developing countries. Over the last two decades, there have been quite a few papers empirically investigating either the frequency of price adjustments and its determinants (Blinder et al., 1998; Hall, Walsh, and Yates, 2000; Nakagawa, Hattori and Takagawa, 2000; Bils and Klenow, 2004; Apel, Friberg and Hallsten, 2005; Amirault, Kwan and Wilkinson (2004); Fabiani et al., 2006; Munnik and Xu, 2007; and Álvarez, Burriel and Hernando, 2010) or the speed/magnitude of price reactions to shocks (Owen and Trzepacz, 2002; Martins, 2005; Álvarez, Burriel, and Hernando, 2010; and Dias et al., 2015). All these papers attempt to examine how various theories of price stickiness, the information set used, price setting rules, and the characteristics of industry, market and firms influence the frequency as well as the speed of price adjustments in developed economies.

Regarding the studies on the frequency of price changes, the results vary. For example, Amirault, Kwan and Wilkinson (2004) and Munnik and Xu (2007) both find the evidence that firms tend to adjust their prices less frequently if they more recognize customer relations, menu costs, and factor stability theories in Canada. Meanwhile, the role of coordination failure and implicit contracts are documented by Blinder et al. (1998) in the US and sticky information and coordination failure are also confirmed by Munnik and Xu (2007) in Canada. In addition, economists generally find that firms applying rules of thumb or state-dependence change their prices less often than firms considering a wide range of current and expected

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information or time-dependence (Álvarez, Burriel and Hernando, 2010; Munnik and Xu, 2007). Many studies also find that competition, cost structure, government regulations, firm size and industry or sector matter for the frequency of price changes.

This paper attempts to explore the determinants of the frequency of price adjustments in Viet Nam through the Poisson regression model using the survey data. We focus on the role of different sticky price theories as well as the way firms set their prices. The variables that representing market, industry and firm characteristics are also included in the model to investigating their influence on how often firms change their prices. Given the particular features of the structure of an emerging economy, we expect that the paper will provide useful information about price rigidity that will be essential for a better monetary policy in the future.

The remainder of this paper is organized as follows. Section 2 briefly describes the survey dataset. Section 3 presents the methodology and reports the main results on the determinants of the frequency of price changes. Finally, section 4 concludes.

2. THE SURVEY DATA

We use the data from a similar survey to that in Fabiani et al. (2006) and Greenslade and Parker (2012) to study determinants of price changes in Viet Nam. The survey was conducted in 2014 with technical support from the General Statistics Office (GSO) and financial support of National Foundation for Science and Technology Development (NAFOSTED) under grant number II 2.3-2012.05. Questionnaires were sent to over 2,000 firms operating in different industries in the three largest cities of the country (Ha Noi in the north, Da Nang in the center and Ho Chi Minh City in the south. The proportion of firms in each city and industry was consistent with what is chosen in the annual national enterprise surveys. To obtain a high response rate, firms were selected randomly from those who had a good record of responding to previous surveys by the GSO. The firms were first asked, directly or indirectly through email or phone, about how they set prices. In the end, we obtained a total number of 1,579 respondents. The survey respondents by industry are presented in Table 1.

Most of the respondents are privately owned (96%), employ no more than 200 workers (95%), and have a share capital of less than VND50 billion, equivalent to around US$2.4 million (82%). This means that the survey mostly covers privately owned small and medium size firms. In addition, the market for the main products of the firms is substantially domestic and relatively competitive. In particular, around 96% of the respondents target the home market, and nearly 90% of them reported that they face competition at either a high or a medium level. Similarly, the majority of the respondents perceive themselves to have a market share of less than 5% and only about seven percent of them said they have a market share of over 10%.

Table 1: Survey respondents by industry

		Number of responses				%
		Ha Noi	Da Nang	HCM City	Total	
1	Manufacturing	142	70	160	372	23.6
2	Trade	191	101	180	472	29.9
3	Hotels and restaurants	95	62	90	247	15.6
4	Transport	60	61	80	201	12.7
5	Agr., forestry & fisheries	32	11	35	78	4.9
6	Elec., gas & water supply	11	3	8	22	1.4
7	Construction	50	30	55	135	8.5

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8	Real estate and renting	20	7	25	52	3.3
	Total	601	345	633	1579	100

In the survey, all firms were asked about how frequently they change their prices and given a choice among several categories (daily, weekly, monthly, quarterly, half-year, yearly, over yearly and irregularly). As a result, about one third of the respondents (452 observations) are able to specify a regular frequency of price adjustments but the majority of them state that they set their prices irregularly depending on market conditions.

Table 2: Frequency of price changes

	Daily	Weekly	Monthly	Quarterly	Half year	Yearly	> 1 year	Irregularly
Total	1.3%	2.4%	9.5%	5.7%	3.5%	4.7%	1.5%	71.4%

To better understand the factors driving price changes, firms are then asked to provide the information set and price setting rules used and to give their views on the relevance of various theories or explanations for price rigidity. These theories have been considered important in previous price survey studies or in other empirical or theoretical research. The survey also contains questions on firm characteristics such as firm size, state ownership, destination of main product, market share, competitive intensity, industry, price differentiation, etc. All the information will be used as control variables in our regressions for investigating determinants of the frequency of price changes in the next section.

3. METHODOLOGY AND ESTIMATION RESULTS

3.1 Methodology

Given that the frequency of price changes is strictly positive we apply the Poisson regression model (PRM) and negative binomial regression model (NBRM) to investigate its determinants. These methodologies are often employed in the literature with count data (see Long, 1997 for more detail). To briefly describe the models, let y be a random variable indicating either the frequency of price reviews or price changes. We assume that y has a Poisson distribution with the mean parameter $\mu > 0$ then

$$\Pr(y|\mu) = \frac{e^{-\mu}\mu^{y}}{y!} \quad \text{for } y = 1,2,\ldots \qquad (1)$$

The PRM allows each observation *i* to have a different value of μ_i which can be explained by observed characteristics. The conditional mean is expressed as follows

$$\mu_i = E(y_i|\mathrm{x}_i) = exp(\mathrm{x}_i\beta). \qquad (2)$$

To compute the change in μ arise from the change in an independent variable, we define $E(\mathrm{y}|\mathrm{x}, x_j)$ as the expected count of y for a given x and $E(\mathrm{y}|\mathrm{x}, x_j + \theta)$ as the expected count after increasing x_j by θ units, then

$$factor\ change\ in\ E(\mathrm{y}|x) = \frac{E(\mathrm{y}|\mathrm{x}, x_j + \theta)}{E(\mathrm{y}|\mathrm{x}, x_j)} = exp(\beta_j\theta). \qquad (3)$$

The parameter can be interpreted as, for a change of θ in x_j, the expected count increases by a factor of $exp(\beta_j\theta)$, holding all other variables constant. In addition, μ is often referred to as the incidence rate, and by imposing $\theta = 1$ Equation (3) is called the incidence rate ratios (IRR).

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One of the properties of the Poisson distribution is the equidispersion or $E(y_i|x_i) = var(y_i|x_i) = \mu_i$, i.e. the equality of mean and variance. The PRM only accounts for observed heterogeneity by specifying the rate μ_i as a function of a vector of observed variables, but it rarely fits in practice due to overdispersion. To overcome this problem, we use the NBRM to capture unobserved heterogeneity among observations. By adding a term ϵ_i for each observation and defining $\delta_i = \exp(\epsilon_i)$, Equation (2) becomes

$$\tilde{\mu}_i = E(y_i|x_i) = \exp(x_i\beta + \epsilon_i) = \exp(x_i\beta)\delta_i, \qquad (4)$$

where ϵ_i is uncorrelated with x_i. To identify the model, we assume that $E(\epsilon) = 0$, i.e. $E(\delta) = 1$, then $E(\tilde{\mu}) = \mu E(\delta) = \mu$. Therefore, there exists the same mean structure in both the PRM and the NBRM. The distribution of observations in the NBRM given both the values of the x's and δ is thus still Poisson as follows

$$\Pr(y_i|x_i, \delta_i) = \frac{e^{-\tilde{\mu}_i}\tilde{\mu}_i^{y_i}}{y_i!} \qquad (5)$$

However, as δ is unknown, we cannot calculate exactly $\Pr(y|x_i)$. To solve this problem, Long (1997) and Cameron and Trivedi (1998) assume that δ is drawn from a gamma distribution. Then $\Pr(y|x)$ can be computed by a weighted combination of $\Pr(y|x,\delta)$ for all values of δ, where the weights are determined by $\Pr(\delta)$, for all values of δ. The mathematics for this mixing of values of $\Pr(y|x,\delta)$ leads to the negative binomial distribution

$$\Pr(y|x) = \frac{\Gamma(y+\alpha^{-1})}{y!\Gamma(\alpha^{-1})}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu}\right)^{\alpha^{-1}}\left(\frac{\mu}{\alpha^{-1}+\mu}\right)^{y}, \qquad (6)$$

where Γ is the gamma distribution, and α is the parameter determining the degree of dispersion. The larger α is, the greater the overdispersion becomes, and the NBRM returns to the PRM if α = 0. In addition, for the purpose of checking the robustness of our results, the linear regression model is also estimated by taking the natural log transformation of Equation (4).

3.2 The estimation results

In this section, the estimation results will be presented and discussed. As mentioned before, the potential explanatory variables for the frequency of price changes include the information set firms used in the price reviewing process, the price setting rules and other variables that capturing different theories of price stickiness. We also add other variables that control for market structure and firm and industry characteristics. The definition and measurement of variables in our regressions are summarized the Appendices.

If there exists the overdispersion, estimated coefficients from the PRM are inefficient with biased standard errors. Accordingly, we check for the overdispersion by testing the null hypothesis of $\alpha = 0$. The result shows that we cannot reject the null hypothesis of equal dispersion at any traditional levels of significance. Therefore, the PRM and the NBRM can be used alternatively. The estimation results from the PRM are presented in Table 3 (Column 2). Based on the estimations results, we also report the incidence rate ratios reflecting the change in the estimated counts triggered by a change in the features or behavior of firms from our baseline case (Column). The log-linear regression is also presented for comparison (Column 1).

Table 3: Determinants of the frequency of price changes

VARIABLES	LINEAR MODEL	POISSON MODEL	INCIDENCE RATE RATIOS
	(1)	(2)	(3)
PRICE SETTING RULES			
Purely state-dependent price-setting rule	-0.213**	-0.204***	0.815***
(In response to specific events)	(0.049)	(0.049)	(0.040)

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VARIABLES	LINEAR MODEL	POISSON MODEL	INCIDENCE RATE RATIOS
	(1)	(2)	(3)
Based on the rule of thumb	-0.135	-0.130#	0.878#
	(0.084)	(0.083)	(0.073)
Unit cost plus a markup	0.037	0.028	1.028
	(0.043)	(0.040)	(0.041)
Specified by principal customer	-0.044	-0.033*	0.967*
	(0.040)	(0.019)	(0.019)
Determined by competitors' price	0.085	0.060	1.062
	(0.084)	(0.066)	(0.070)
Determined by a regulatory agency	-0.054	-0.026	0.974
	(0.063)	(0.057)	(0.055)
FACTORS/CAUSES OF PRICE RIGIDITY:			
The risk that competitors do not change their prices	0.136***	0.132***	1.141***
	(0.009)	(0.013)	(0.015)
The risk that the market price moves in the opposite direction	0.022*	0.019***	1.019***
	(0.006)	(0.007)	(0.007)
The existence of explicit or implicit contracts	0.083***	0.084***	1.088***
	(0.002)	(0.004)	(0.004)
The costs related to price changes	0.034	0.044*	1.045*
	(0.036)	(0.024)	(0.025)
The variable costs do not change by much with market conditions	-0.016	-0.034	0.966
	(0.044)	(0.050)	(0.048)
It would antagonize customers	-0.216	-0.181*	0.835*
	(0.110)	(0.095)	(0.079)
CONTROL VARIABLES:			
Intensity of competitiveness	0.278	0.250*	1.284*
	(0.122)	(0.129)	(0.165)
Market destination of main product	-0.179**	-0.147***	0.863***
	(0.040)	(0.030)	(0.026)
Domestic market share of main product	-0.163**	-0.121***	0.886***
	(0.035)	(0.017)	(0.015)
Firm Size	-0.063	-0.054**	0.948**
	(0.028)	(0.024)	(0.022)
Price differentiation by quantity	0.102**	0.090***	1.095***
	(0.022)	(0.027)	(0.030)
State ownership (>50%)	0.219	0.232**	1.261**
	(0.090)	(0.110)	(0.139)
Trade	-0.145	-0.133	0.876
	(0.209)	(0.171)	(0.150)
Manufacturing	0.085	0.071**	1.074**
	(0.039)	(0.034)	(0.037)
Hotel & Restaurant	0.067	0.055	1.056
	(0.080)	(0.067)	(0.071)
Transportation	0.096	0.057	1.058
	(0.142)	(0.107)	(0.113)
Constant	1.078**	1.161***	3.194***
	(0.143)	(0.106)	(0.337)

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VARIABLES	LINEAR MODEL	POISSON MODEL	INCIDENCE RATE RATIOS
	(1)	(2)	(3)
Observations	452	452	452
R-Squared/Pseudo R2	0.230	0.040	0.040
Log pseudo likelihood	na	-830.053	-830.053
Root MSE	.430	na	na

*Note: The Table reports incidence-rate ratios for the Poisson model in the last column and robust standard errors with clustering on geographical region in parentheses, and ***marks significance at 1% level, ** marks significance at 5% level, * marks significance at 10% level, and # marks significance at 12% level.*

First, the results suggest that firms applying purely state-dependent rules in the price reviewing process tend to be stickier in adjusting their prices than firms using time-dependent or mixed time and state dependent rules. The result is robust and significant at 1% level. In the literature, there are two recognized approaches to price setting, namely time-dependent and state-dependent rules. Under the former, prices are reviewed at discrete time intervals and independently of the economic conditions as in Taylor (1980) or Calvo (1983). The length of intervals may be negatively related to the inflation rate. In contrast, under the latter, firms review their prices only if there is a large-enough market shock. Therefore, in the environment of persistently high inflation, time dependence might lead to more flexible prices than state-dependence. Meanwhile, in presence of shocks, the opposite is true. The above result is consistent with the fact that Vietnamese economy has experienced high and volatile inflation during the time before the survey was carried out, which might cause more frequent wage and price adjustments as argued by Ball, Mankiw and Romer (1988).[1]

Second, regarding the information set used in the price setting, we find that firms used the rule of thumb tend to change their prices less often than their counterparts based on the market conditions (e.g. the recent past, current or near future market conditions). However, the estimated coefficient is only statistically significant at 12% level. This result can be attributed to the fact that firms applying rules of thumb may end up charging prices that are not fully optimal if large shocks occur. Therefore, their prices might be more persistent as compared to those of firms that consider a wide range of current and expected information to reset prices.

In addition, it seems that the way prices are determined have no impact on the frequency of price changes except for that specified by principal customer. We only find that firms considered the role of principal customer as “important” or “very important” in their price setting tend to be more sluggish than those did not. The estimated coefficient is significant at 10% level.

Regarding the relevance of various theories of price stickiness, in the survey, firms were asked to rate the degree of importance of reasons for postponing price changes, or changing their prices only slightly, in a scale ranging from 1 (“unimportant”) to 4 (“very important”). The choices were not mutually exclusive and firms could consider several factors in the same category. A dummy variable is introduced into the model if a firm considers a factor as either very important or important. Table 3 shows that the estimated coefficients on variables reflecting coordination failure, temporary shocks, explicit and implicit contracts, and menu costs are positive and statistically significant at either 5 or 10% level. Besides, the estimated coefficient on the antagonism of customers (customer relations) are negative and statistically significant at 10% level while that on the stable variable costs is not significant at any traditional level.

In the literature, it is widely recognized that first firms are reluctant to change prices because of many reasons such as: (i) their competitors’ price may remain unchanged to avoid loosing customers or triggering a price war – coordination failure (Ball and Romer, 1991); (ii) they have an official or unofficial

[1] Data from the GSO shows that, on average, the mean and standard deviation of the year-on-year inflation rate for the period 2008M1-2013M12 in Vietnam were 12.3% and 7.3%, respectively.

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agreement with their customers to supply a certain product at a specific price – explicit and implicit contracts (Okun, 1981); (iii) there are non-negligible costs associated with gathering information and reprinting price lists – menu costs (Barro, 1972); (iv) shocks are only temporary and there is a risk that the market price will move in the opposite direction; (v) they want to build up long-term relationships with their customers and try to keep their prices stable to avoid antagonizing them, etc. However, the positive sign of the estimated coefficients implies that firms adjust their prices more frequently in the presence of the corresponding source of price stickiness.

The result seems to be anomalous but it can be attributed to the endogeneity caused by a potential loop of causality between the independent and dependent variables in our model. On the one hand, prices may be stickier if the above sources of nominal rigidity are more recognized. On the other hand, in a high inflation environment of Vietnamese economy where firms have to change their prices frequently, firms with higher frequency of price changes will face higher associated costs. Therefore, given high frequency of price changes, they are more likely to assign “important” or “very important” to the corresponding theory of price stickiness if it is really a source of costs when making price adjustments. As a result, there may be a positive correlation between the frequency of price changes and importance ratings by firms on the theory of price stickiness.

Furthermore, we include a set of other dummy variables that we believe may be related to the frequency of price adjustments. The results indicate that higher intensity of market competition results in higher frequency of price changes of Vietnamese firms. This is similar to the previous findings reported in developed countries including Álvarez, Burriel and Hernando (2010), Fabiani *et al.* (2006), Hall, Walsh and Yates (2000), Geroski (1992), and Carlton (1986). The estimated coefficients of the frequency of price changes are statistically significant at the 10% level and the incidence rate implies that firms operating in markets with a high or medium level of competition adjust their prices much more regularly than those facing low or no market competition. We also find that doing quantity discounts and that ownership status significantly matter for the frequency of price adjustments.

Besides, the results show that the estimated coefficients on the dummy variables reflecting market destination, market share and firm size are all negative and significant at 5% or 1% level. This means that firms that sell their main products to foreign market, that have domestic market share of above 5%, and that employ over 50 workers tend to be more sluggish to adjust their prices than those do not. Regarding market destination, it could be that firms operating in international market have their prices specified by international contracts which are less frequently reviewed and not affected by the volatile domestic economic environment. Similarly, firms with higher market power or bigger size are more likely act as market makers hence they may be more rigid in adjusting their prices (But once they adjust they do by a large amount to mitigate associated costs). This finding is contrary to the results reported in the price-setting behavior studies in developed countries (e.g., Álvarez, Burriel and Hernando, 2010) where small firms tend to be more sluggish to adjust prices as compared to large firms.

Finally, we find that that the frequency of price adjustment does not seem to vary significantly with the sector where firms operate. Only firms that belong to the manufacturing sector adjust their prices more regularly than those in all other sectors. Generally, the log-linear model provides very similar results with the PRM.

4. CONCLUSIONS

This article uses the Poisson regression model with survey data to study the frequency of price changes which is one of measures of price rigidity in Viet Nam. We find evidence that the degree of price stickiness is influenced by variables that reflect information set and price setting rules used by firms. In particular, firms using time dependent rules tend to be more frequent while firms applying rules of thumb seem to be less regular to adjust their prices. The higher degree of price flexibility resulted from time dependence can be attributable to persistently high inflation of Vietnamese economy during the time before the survey.

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In addition, it shows that the way prices are determined have no impact on the frequency of price changes except for that specified by principal customer. Among different theories of price stickiness, we find that the frequency of prices changes is strongly associated with firms' recognition of coordination failure, temporary shocks and explicit and implicit contracts. Meanwhile, menu costs and the antagonism of customers also significantly affect the flexibility of prices at 10% level.

Finally, we find that prices tend to be more flexible the more competitive is the market in which firms operate, the higher is the share of state ownership, for firms practicing quantity discounts and operating in manufacturing sector. Conversely, prices tend to be more sluggish for firms selling their main products abroad and having a bigger size or a higher market share.

CONSENT (WHERE EVER APPLICABLE)

Not applicable

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

Not applicable

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APPENDIX

Appendix 1: Definition and measurement of variables

Variables	Definition and measurement
DEPENDENT VARIABLE	
Frequency of price change	The indicator of one of the seven possible response categories (1= over a year, 2=Annually, 3=Semi-Annually, 4=Quarterly, 5=Monthly, 6=Weekly, 7=Daily)
INFORMATIONS SET AND PRICE SETTING RULES	
Purely state-dependent price-setting rule	Dummy=1 if the firm generally changes the domestic price of its main product in in response to specific events
Based on the rule of thumb	Dummy=1 if the firm sets the domestic price of its main product based on the rule of thumb
Unit cost plus a markup	Dummy=1 if the firm considers that 'the markup pricing' as an important or very important factor for setting its price
Specified by principal customer	Dummy=1 if the firm considers that 'the principal customer' as an important or very important factor for setting its price
Determined by competitors' price	Dummy=1 if the firm considers that 'the competitors' price' as an important or very important factor for setting its price
Determined by a regulatory agency	Dummy=1 if the firm considers that 'the regulatory agency' as an important or very important factor for setting its price
FACTORS/CAUSES OF PRICE RIGIDITY	
The risk that competitors do not change their prices	Dummy=1 if the firm considers the risk that competitors do not change their prices as an important or very

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Variables	Definition and measurement
	important factor for postponing price changes or just changing slightly their price
The risk that the market price moves in the opposite direction	Dummy=1 if the firm considers the risk that the market price moves in the opposite direction as an important or very important factor for postponing price changes or just changing slightly their price
The existence of explicit or implicit contracts	Dummy=1 if the firm considers the existence of explicit or implicit contracts as an important or very important factor for postponing price changes or just changing slightly their price
The costs related to price changes	Dummy=1 if the firm considers the costs related to price changes (e.g., printing, information gathering, etc.) as an important or very important factor for postponing price changes or just changing slightly their price
The variable costs do not change by much with market conditions	Dummy=1 if the firm considers the variable costs do not change by much with market conditions as an important or very important factor for postponing price changes or just changing slightly their price
It would antagonize customers	Dummy=1 if the firm considers it would antagonize customers as an important or very important factor for postponing price changes or just changing slightly their price
OTHER CONTROL VARIABLES	
Intensity of competitiveness	Dummy=1 if the intensity of competition for the main product is perceived as strong or medium
Market destination of main product	Dummy=1 if the firm does not consider Viet Nam as the principal market for its main product
Domestic market share of main product	Dummy=1 if the market share of main product is greater than 5%
Firm Size	Dummy=1 if the labor size of firm is greater than 50 employees
Price differentiation by quantity	Dummy=1 if the price of main product is decided depending on the quantity sold
State ownership (>50%)	Dummy=1 if the proportion of state ownership is greater than 50%
Trade	Dummy=1 if the business sector of firm in trade industry
Manufacturing	Dummy=1 if the business sector of firm in manufacturing industry
Hotel & Restaurant	Dummy=1 if the business sector of firm in hotels and restaurants
Transportation	Dummy=1 if the business sector of firm in transportation industry

Appendix 2: Descriptive statistics for variables in regression models

	SAMPLE		
Variable	**Obs**	**Mean**	**Std. Dev.**
DEPENDENT VARIABLE			
Frequency of price changes	452	4.031	1.531
INFORMATION SET AND PRICE SETTNG RULES			
Purely state-dependent price-setting rule	452	0.173	0.378
Based on the rule of thumb	452	0.186	0.389
Unit cost plus a markup	452	0.633	0.483

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Variable	SAMPLE		
	Obs	Mean	Std. Dev.
Specified by principal customer	452	0.675	0.469
Determined by competitors' price	452	0.626	0.484
Determined by a regulatory agency	452	0.555	0.497
FACTORS/CAUSES OF PRICE RIGIDITY			
The risk that competitors do not change their prices	452	0.398	0.490
The risk that the market price moves in the opposite direction	452	0.542	0.499
The existence of explicit or implicit contracts	452	0.708	0.455
The costs related to price changes (printing, information gathering…)	452	0.407	0.492
The variable costs do not change by much with market conditions	452	0.487	0.500
It would antagonize customers	452	0.719	0.450
OTHER CONTROL VARIABLES			
Intensity of competitiveness	452	0.898	0.303
Market destination of main product	452	0.038	0.190
Domestic market share of main product	452	0.206	0.405
Firm Size	452	0.181	0.386
Price discrimination by quantity	452	0.732	0.443
State ownership	452	0.013	0.115
Trade	452	0.232	0.423
Manufacturing	452	0.279	0.449
Hotel & Restaurant	452	0.232	0.423
Transportation	452	0.086	0.281

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