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Degree of monopoly and market power vs. price flexibility in Polish economy: empirical analysis based on COICOP classification

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Abstract

Research background: The issue of price flexibility is crucial in the economy both in the aspect of company theory and its macroeconomic consequences. In a number of publications, the sources of variable price flexibility are linked to the market power of enterprises as well as the market structure that has developed in a given branch. It is difficult to indicate empirical studies that would state clearly whether price flexibility depends on the degree of monopoly or the market power of enterprises. This paper concerns that particular field of study.
Purpose of the article: The purpose of the paper is to present the statistical dependence of the degree of monopoly and market power vs. price flexibility in the economy.
Methods: The analysis has been conducted using aggregated data concerning Polish economy in the period from 2001 to 2013, based on COICOP. The degree of monopoly indicator was the average number of companies in a given branch, following the classical models of market structures; the market power indicator was the average net revenue from sales of products per enterprise representing a given branch; the measure of price flexibility was the probability of price variation estimated using the Calvo pricing model. It is, therefore, a frequency-based approach to price flexibility. Statistical dependence was analyzed using the Spearman's rank and Kendall's tau correlation coefficient and simple regression models.
Findings & Value added: The outcomes indicate that in the case of Poland in the analyzed period there is no statistically significant relation between the degree of monopoly and price flexibility and also between the market power and price flexibility. Thus, the findings of the

analysis support the studies which reject the assumption that higher degree of monopoly or higher market power of an enterprise is followed by less flexible prices.

Introduction

The price behaviour studies originated during the Great Depression and are of considerable significance both for the macroeconomics and microeconomics. In macroeconomics, price flexibility may determine the effectiveness of the monetary policy. On the microeconomic level, analysing the process of price shaping in enterprises tells a lot about the goals pursued by the enterprise, as well as the tools used for that purpose.

The goal of this study is an empirical analysis of the relation between the degree of monopoly, market power and price flexibility in Poland. This study is an attempt to fill the gap in the literature on the relation of the degree of monopoly, market power and flexibility of prices in Poland. Investigation of such relation is quite rare, especially in Poland. According to the best knowledge of the author, present research concerns Poland for the first time in the topic. There are research results on the price flexibility, but they don't verify the relation between prices behaviour and market structure or market power (see Wallusch, 2007; Macias & Makarski, 2013). The study has been conducted using the data from the period of 2001 to 2013. Degree of monopoly, market power and price flexibility indexes have been estimated. The degree of monopoly index represented the average number of enterprises per branch, with the assumption that lower number of enterprises is followed by a larger degree of monopoly. Market power index was the average net sales revenue per an enterprise in a given branch — higher index values indicate larger market power. Finally, price flexibility has been estimated using the Calvo price setting model that indicates the price variation probability — higher values indicate more flexible prices. The dependence between the degree of monopoly, market power and price flexibility has been analysed using the Spearman's rank correlation coefficient and simple regression models.

The first part of the paper presents the review of publications concerning price flexibility in the economy and its relation with the degree of monopoly. Next, the data used for determining the degree of monopoly and market power indexes as well as Calvo price setting probability coefficients are presented. The following parts contain the results of the said indexes as well as the analysis of the dependence of the degree of monopoly, market power and price flexibility. The paper ends with a discussion, conclusion and an appendix, containing the details not included in the main part of the study.

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Literature review

The research that focused great attention of contemporary economists were the studies by Means. In his opinion, along with the emergence of corporate economy, the structure of enterprises became so complex, that dealing with the price-setting process had to be entrusted with a special organisational unit, as a result of which prices became a subject of purposeful shaping based on an autonomous strategy (Samuels & Medema; 1989, pp. 170–176; see also Hall & Hitch, 1939, pp. 13–14).

There were multiple attempts to verify the Means' thesis on administered prices. One of the most significant was made by Stigler and Kindahl (1970). Their research is one of the most significant contributions to the study of price variability in the economy. Stigler and Kindahl criticised the findings of Means for using aggregated data. They collected data on individual transaction prices from the buyers. Analysing them, they concluded that the phenomenon of administered prices was the effect of using aggregated data. They proved that price indexes determined on the basis of the gathered individual transaction data were more flexible than the indexes based on the data used for the previous research (data provided by the Bureau of Labor Statistics)[1].

Individual transaction data collected by Stigler and Kindahl were used for further research by Carlton (1986). The major conclusions from that research say that: the degree of price rigidity in many sectors is significant; the degree of concentration of particular branch is strongly correlated with price rigidity (the more monopolised sector[2], the longer is the average period without a change in the prices) (Carlton, 1986, pp. 3–4). The research of Stigler and Kindahl, in view of the previous analyses conducted by Means, has been interpreted by Weiss (1977). He claimed that individual transaction data used by Stigler and Kindahl did not differ substantially from the aggregated BLS data used, among others, by Means. He also demonstrated that individual transaction data supported the administered prices thesis, and thus there was no correlation between price rigidity and the degree of concentration of a given sector.

A separate group of price behaviour analysis is the analysis of the frequency of changes. In the already classical studies of price changes frequency, Bils and Klenow (2004) used the following dependent variables to analyse the relation between the price changes frequency (dependent varia-

[1] Means claimed that the study of Stigler and Kindahl confirmed his administered prices hypothesis (see: Means, 1972).

[2] Measured by the market contribution of the four largest companies (Carlton, 1986, p. 51).

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ble) and the degree of concentration: contribution of four largest enterprises in branch revenue, margin and diversion ration of a given product. The estimated model indicates larger price changes frequency in more competitive sectors, measured by the concentration coefficient and the margin and product substitution (Bils & Klenow, 2004, pp. 957–959). In the second model, Bils and Klenow considered the degree of product processing. That variable seems to have a significant effect on the price variability frequency (see also Coricelli & Horvath, 2010). In that model, variables: contribution of four largest enterprises in branch revenue and margin, became less significant in terms of price change frequency[3]. The authors indicate that competitiveness of the branch, at least measured by the variables used, is a weak predictor of price change frequency. There are also some examples of European countries, where positive relation of competition and frequency of price changes is weak: Belgium (Cornille & Dossche, 2008) and Italy (Sabbatini *et al.*, 2005; see Vermeulen *et al.*, 2012; for comprehensive discussion of the topic).

On the other hand, there are some research findings showing a positive impact of the degree of competition on the frequency of price changes. Alvarez *et al.* (2010) indicates that the higher degree of competition amongst Spanish enterprises results in more flexible price adjustments considering producers' prices. The degree of import penetration, which proxies external competition is statistically significant, but it must be stressed that the size of this effect is moderate. Results from France derived from PPI data too, also indicate that the less competitive a market is, the less shocks are transmitted to prices (Gautier, 2008).

Recently price adjustment lags, as a measure of price rigidity have replaced the frequency of price change. The latter is supposed to depend on the number and magnitude of the shocks that affect the optimal price. Here Marques *et al.* (2011, p. 24) indicate that firms in more competitive environments (measured as a number of competitors equal to 5 or more) adjust their price faster. Dias *et al.* (2015, p. 708) also indicate that the stronger competition the quicker responses of prices to shocks.

Another group of price-related analyses are enterprise surveys, often conducted by central banks. The most significant studies of this type include the publications of: Blinder (Blinder, 1991; Blinder *et al.*, 1998) and Hall *et al.* (1997; 2000). However, the research of the European Central Bank — Inflation Persistence Network, had the widest range. The research was conducted from 2003 to 2004 by the national banks of nine euro area

[3] The second model proved better adjustment to the data — R^2 63%, as compared to 36% in model 1.

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countries: Austria, Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Portugal and Spain (Fabiani *et al.*, 2005, p. 5). In eight countries encompassed by the research, yearly price variation median was 1[4]. The authors of the research also indicate that the size of the company had no effect on price change frequency, however the degree of actual competition in the branch, was important in that aspect. In seven out of nine analysed countries (except Austria and Portugal), companies functioning in a competitive environment adjust their prices much more often than those not exposed to such pressure (Fabiani *et al*., 2005, pp. 18–20). That conclusion is also reflected in the dependence between the actual competition and shock reaction. Enterprises functioning in an environment that is competitive in their assessment, are more willing to respond to price-setting factors while making price-related decisions, in particular demand shocks (Fabiani *et al*., 2005, pp. 27–28; Dhyne *et al.*, 2009, pp. x–xi).

The National Bank of Poland is also involved in analysing the price-setting mechanisms in Poland (Jankiewicz & Kołodziejczyk, 2008). Conclusions that come from these studies indicate that the price analysis method is determined by the size of the company — large entities more often decide to use the regular, time-dependent method. That regularity increases as the company grows (which results from the cost to incur with every price revision) and it is a rule both in Poland and in the euro area countries; more frequent price analyses are determined by the actual competitive pressure — the greater it is, the more frequent are the analyses of current prices.

Research methodology

Three types of data have been used in the research: 1) data concerning the number of companies according to the PKD classification[5] (annual data of the period from 2001 to 2013); 2) data concerning net revenue on sales of products, grouped according to the PKD classification[6] (annual data of the period from 2001 to 2013); 3) price indexes of consumer goods and services announced on the basis of the Classification of Individual Consumption according to Purpose, adapted to the needs Harmonized Indices of

[4] In the USA, it is 1.4 change a year, according to Blinder's research.

[5] Data derived from the National Official Business Register REGON. Collected data concern approx. 40 thousand enterprises.

[6] Data have been prepared by the Central Statistical Office at the request of the author and financed from the funds granted as part of the Polish National Science Centre grant mentioned above. Their source is SP or F-02 research (in 2013 F-01) encompassing businesses with minimum 10 employees, conducted by the Central Statistical Office.

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Consumer Prices[7] (COICOP/HICP) (Central Statistical Office, 2014; monthly data of the period from December 2001 to April 2013).

Based on the data mentioned in item 1, the indexes of degree of monopoly[8] have been estimated. Their purpose is to determine the relative degree of monopoly in individual branches. In this study it has been assumed that the degree of monopoly is measured as the average number of enterprises in a given branch — the lower is the number of companies, the less competitive is a given structure. To estimate the degree of monopoly (competitiveness) of a given sector, the Average Numbers of Companies Index (ANoCI)[9] has been used. ANoCI has been estimated based on the following formula[10]:

$$ANoCI_i = \frac{\sum_{j=1}^{n} n_{jt}}{\sum_{j=1}^{n} N_{jt}} \Big/ \overline{\frac{\sum_{j=1}^{n} n_{jt}}{\sum_{j=1}^{n} N_{jt}}} \tag{1}$$

where:
$ANoCI_i$ – average numbers of companies index in sector *i*, based on COICOP
n_{jt} – number of companies having PKD code *j* in the year *t*;
N_{jt} – number of PKD codes representing sector *i*, based on COICOP in the year *t*;
i – COICOP code;
j – PKD code;
t – year (*t*=2001,…,2013).

Market Power Index (MPI) has been determined using additional data concerning net revenue from sales of products achieved by companies grouped according to the PKD classification (item 2). Market power of enterprises, which can be used, e.g. in the price-setting process, does not have to be determined only by the market structure. In other words, if a given branch is relatively small, then even an oligopolistic market structure may not give the companies representing that branch a significant market power and the possibility to shape their prices. Thus the market power index MPI is the average revenue per company in a given branch — the

[7] Data derived from the CEIC database.

[8] The paper that presents methodology and results of degree of monopoly and market power is in review (Umiński, in review).

[9] In particular it refers to an average number of companies under the same PKD code. One COICOP code usually covers several PKD codes. It is the effect of matching of both classifications.

[10] This index has been transformed into a fixed base index by determining the ratio of the average number of companies in a given COICOP sector (code) in the whole analysed period and the average number of companies in all COICOP sectors (code) in the whole analysed period.

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lower is the number of companies representing the branch and the higher is the revenue achieved by all companies in that branch, the higher are the values of the MPI index[11]. MPIs for individual COICOP sectors have been estimated with the use of the following formula:

$$MPI_i = \frac{\sum_{j=1}^{n} \frac{r_{jt}}{n_{jt}}}{\sum_{j=1}^{n} N_{it}} \Big/ \frac{\overline{\sum_{J=1}^{n} \frac{r_{Jt}}{n_{Jt}}}}{\sum_{J=1}^{n} N_{\imath t}} \tag{2}$$

where:
n_{jt} – number of companies having PKD code *j* in the year *t*;
N_{it} – number of PKD codes representing sector *i*, based on COICOP in the year *t*;
r_{jt} – net revenue from sales of products of PKD code *j* in the year *t*;
i – COICOP code;
j – PKD code;
t – year (*t*=2001,…,2013).

Unfortunately, part of the data concerning net revenue from sales had not been disclosed, due to the possibility of identifying the entity concerned. According to the statistical confidentiality principle, individual data or data in which aggregation comprises less than three entities, or in which the proportion of an individual entity exceeds 3/4 in a particular aggregation, cannot be made available[12]. As a result, MPIs estimation has been limited, considering only those years in which net sales revenues of all companies were public. If for a given branch there were no years in which all net revenue values were public, the analysis was limited to those years in which confidentiality was relatively lowest[13].

ANoCI and MPI indexes are presented in figure 1.

In this analysis, price indexes of consumer goods and services announced by the Central Statistical Office have been used[14]. The publica-

[11] The obtained average net revenues from sales of products have been transformed into a fixed base index by dividing individual values by the average revenue in all COICOP sectors (codes) and in all years encompassed by the analysis.

[12] Act of 29 June 1995 concerning official statistics, Journal of Laws of 1995 No. 88, item 439.

[13] The highest coefficient for which data have been used to estimate MPIs for companies whose data have been made confidential in relation to all companies in the branch, was 3.3%. Considering the fact that in group 08.1 Postal Services there were no years in which complete data were available, and the minimum rate of enterprises with undisclosed revenue due to statistical confidentiality, in relation to all companies in the branch was 23.8%. That group has been excluded from MPI estimation.

[14] It actually concerns the CEIC database, not the publications on the website of the Central Statistical Office.

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tions of the Central Statistical Office are based on the Classification of Individual Consumption by Purpose adapted to the needs of Harmonised Indices of Consumer Prices (COICOP/HICP) (Central Statistical Office, 2014). Based on COICOP/HICP classification, data provided by the Central Statistical Office were used, containing monthly price indexes of goods and services concerning: 1) 12 divisions of economy (two-digit code); 2) 21 groups (three-digit code); 3) 19 classes (four-digit code); 4) 6 sub-classes (goods and services specified by a four-digit code). In total it gave 58 monthly price indexes for these divisions, groups, classes and sub-classes of goods and services in the period from 01 December 2001 to 01 April 2013 (137 records) grouped according to COICOP/HICP.

The price setting model formulated by Calvo (1983) assumes that revision of prices in individual enterprises is not a continuous process, and that these processes between enterprises are not synchronised. Consequently, a business entity must respond in its price-setting process to the occurrence of a random signal that triggers the price-setting decision. It is assumed that the probability of occurrence of that signal in the following periods is not related to the period in which it occurred in the past and is specific for every company. The Calvo price setting model also assumes that individual companies determine the prices of their products with consideration of the expected average price and the market situation. A given price is changed only when respective company receives a signal that indicates the necessity of that change (Calvo, 1983, p. 383–384).

According to the Calvo price setting model, price in time t is the function of a discounted sequence of price-setting decisions made in the preceding periods:

$$p_t = \delta \sum_{j=0}^{\infty} (1-\delta)^j v_{t-j} \tag{3}$$

where:
p_t – price in time *t*;
δ – probability of receiving a price change signal from the market;
v_t – price-setting decisions in period *t*.

This equation can be presented in form of a difference equation (Wallusch, 2007):

$$p_t = \delta v_t + (1-\delta) p_{t-1} \tag{4}$$

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Then the unobserved variable *v* is considered a residual of the autoregressive AR(1) model:

$$p_t = \alpha p_{t-1} + \eta_t \tag{5}$$

where:
$\alpha \equiv 1\text{-}\delta$,
$\eta_t \equiv \delta v_t$.

It is also assumed that price-setting decisions v_t are a white noise process, which allows to assume that the product of δv_t has a normal distribution with zero average and finite variance.

Having parameter α estimated, it is possible to determine the price change probability in the following month:

$$\delta = 1 - \alpha. \tag{6}$$

With the assumption that price may change any time, not only with monthly intervals, it is possible to determine the so-called immediate price change possibility:

$$-\ln(1-\delta), \tag{7}$$

the average time between price changes in months is (Wallusch, 2007, p. 147):

$$T = \frac{-1}{\ln(1-\delta)}. \tag{8}$$

Trend has been removed from the used time series of prices by means of the Hodrick-Prescott filter with standard smoothing parameter for monthly series[15]. Seasonality has been removed using the Census X–12 method.

The price change probability for the aggregated index of consumer prices from December 2001 to April 2013 is 5.71%, which gives 17.02 months between price changes[16].

[15] It is necessary due to high autoregressive parameter values occurring when trend is nor removed from the time series. In such case, price change probability is underrated.

[16] Wallusch obtained a similar result for CPI in the period from January 1994 to June 2006, amounting to 6.6% (15 months between price changes) (Wallusch, 2007, p. 150).

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The obtained values of the estimated indexes of degree of monopoly (ANoC), market power (MPI) and Calvo price flexibility index are quite differentiated. The analysis of branches with the largest market power, i.e. 07.2.2 Fuels, 04.5.2 Gas and 04.5.3+04.5.4 Liquid and Solid Fuels, 04.5.1 Electricity, 07.3.1 Transport: Service: Train or sub-class 01.1.8 Sugar may associate it with the ownership structure. A significant contribution in these branches belongs to companies with the State Treasury shareholding. However, there are other branches (e.g. 02.2 Tobacco or, to a smaller extent, 08.3 Telecommunication Services) in which market power is also relatively high — these branches are dominated by the private sector.

On the other hand, price change probability is much different from the average probability for the 58 analysed categories, amounting to 11.7% (which gives 8 months between price changes, on average). The obtained result is the sign of moderate price flexibility in the Polish economy. Figure 2 presents price change probabilities, while figure 3 the average time between price changes for particular divisions, groups, classes and sub-classes of the analysed time series of prices.

Results

The analysis of the dependence between the degree of monopoly, market power and price flexibility has been performed with the use of the Spearman's rank correlation coefficient, Kendall's Tau coefficient and simple regression. Coefficients and regression models have been calculated for samples restricted to divisions, groups, classes and subclasses. The dependent variable in the regression model is Calvo price change probability (Calvo), while the predictor is the degree of monopoly index (ANoC) or market power index (MPI).

Table 1 presents the results of calculation of the Spearman's rank correlation and Kendall's Tau coefficients between Calvo price change probability and the degree of monopoly index ANoC (upper panel) and between Calvo price change probability and the market power index MPI (lower panel).

The analysis of correlation using both Spearman's rank and Kendall's Tau coefficients indicates the lack of any statistically significant dependence between the Calvo price change probability, degree of monopoly index ANoC and the market power index MPI. It implies that the market structure and the market power of enterprises in a given branch have no effect on price flexibility in these branches.

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The conclusions formulated on the basis of the analysis of correlation coefficients have been confirmed by the regressive analysis[17]. In all cases — whether in the divisions, groups or classes[18] — the regression analysis confirmed the lack of any statistically significant dependence between the degree of monopoly (ANoC) and price flexibility (Calvo) and also between the market power index (MPI) and price flexibility (Calvo). In each case, the dependent variable — ANoC or MPI — was statistically insignificant.

Discussion

As it is presented in former part of the article concerning literature review, investigating relation between price flexibility and market structure or market power has long tradition. We can point some research which indicate that the relation exists, so along with stronger competition price change frequency increases. On the other hand, there are also some research indicating lack of such dependence. The reason for this could be for example employed measures of price flexibility, market power and market structure or the economic environment, when the research was carried out (inflation and unemployment level or structure of the economy). Thus the discussion will embrace only those research which employed comparable methods.

In the context of the conducted research, the reference to the studies of Bils and Klenov (2004), who also used the Calvo price change probability as the measure of price flexibility, is of particular importance. When product processing degree was included in their model, it turned out that the assumed measures of concentration showed much lower correlation with the price flexibility variable and was not a robust predictor of the frequency of price changes. This research and research conducted for Belgium (Cornille & Dossche, 2008) and Italy (Sabbatini *et al.*, 2005) support results presented in the article — relation between market structure or market power and frequency of price change either doesn't exist or is quite weak.

On the other hand, we have some research including survey, which support the statement that market structure or market power has significant impact on frequency of price change. Examples of research for Spain (Alvarez *et al*., 2010) and France (Gautier, 2008) should be recalled. The thesis about the existence of the relation is firmly supported by the recent research where frequency of price change is replaced with price adjustment lags (Marques *et al*., 2011; Dias *et al*., 2015).

[17] All presented models had correct specification.

[18] In case of sub-classes, the number of available observations was not sufficient to conduct the regression analysis.

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The main reason for the discrepancy of the research may be source of the data. For the research presented in the article and for the Bils and Klenov (2004) data concern prices of consumer commodities and services while the other concern producers prices (Alvarez *et al*., 2010; Gautier, 2008; Marques *et al*., 2011). Consumer prices are much more prone to seasonal discounts and sale strategy of retailers than producer prices. Thus, market structure or market power of their producers may by not apparent in such price time series. This is suggested by the surveys as a source of data. The surveys conducted in a number of European countries indicates that the size of an enterprise has no effect on how often it changes the price of the offered product. However, it is determined by the level of actual competition — the higher it is, the more frequently price changes occur, which is followed by faster adjustment to shocks (Fabiani *et al*., 2005; Dhyne *et al*., 2009; Dias *et al.*, 2015). When it comes to the survey conducted in Poland, business size is significant for price-setting frequency (Jankiewicz & Kołodziejczyk, 2008).

Conclusions

The analysis performed indicates that there is no statistically important dependence between the degree of monopoly, market power and price flexibility. Despite the fact that high differentiation of price change probability occurred in individual branches, it could not be explained using the assumed degree of monopoly and market power indexes.

The dependence between the degree of monopoly, market power and price flexibility has been analysed many times and many methods and measures of those variables have been employed. The obtained results suggested that such dependence occurs, but its strength is rather moderate. The cited research supporting the existence of positive relation between the degree of competition on market and price flexibility, concerns mostly data on producers' prices. The surveys indicated a stronger dependence and suppose to confirm such a conclusion.

As it was mentioned in the literature review, the perception of price flexibility has changed, and last research adopted price adjustment lags, as a measure of price flexibility. It supposed to be improvement of the research, because it eliminates bias stemming from methods relying on price change frequency. Frequency of price change may come from pricing strategy and may not reveal market power of the producer or seller. Investigation of pricing strategy seems to be a great challenge for the research of

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prices behaviour, because of the unlimited factors considered by the producer or seller, which can change along with the market situation.

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Annex

Table 1. Results of calculation of the Spearman's rank correlation and Kendall's Tau coefficients between Calvo price change probability and the degree of monopoly and the market power indexes

	number of observations	Spearman's rank correlation coefficient/ Kendall's Tau	coefficient value	p-value
ANoCI - degree of monopoly index	divisions - 12	Spearman	-0.32	0.29
		Kendall	-0.27	0.19
	groups - 20	Spearman	-0.34	0.14
		Kendall	-0.22	0.16
	classes - 19	Spearman	0.07	0.77
		Kendall	0.08	0.67
	sub-classes - 6	Spearman	-0.54	0.22
		Kendall	-0.47	0.13
MPI - market power index	divisions - 12	Spearman	-0.08	0.78
		Kendall	-0.09	0.63
	groups - 20	Spearman	0.26	0.27
		Kendall	0.20	0.23
	classes - 19	Spearman	0.27	0.25
		Kendall	0.16	0.36
	sub-classes - 6	Spearman	0.54	0.22
		Kendall	0.47	0.26

Table 2. Results of regression analysis between Calvo price change probability and the degree of monopoly and the market power indexes

	sample size	Model	P-value	R^2
ANoCI - degree of monopoly index	divisions - 12	Calvo = 0.06 + 0.21 ANoC - 0.15 $ANoC^2$	0.35 0.26	0.18
	groups - 20	ln_Calvo = -2.50 - 0.34 ln_ANoC	0.11	0.13
	classes - 19	Calvo = 0.10 + 0.04 ANoC - 0.01 $ANoC^2$	0.67 0.58	0.03
	sub-classes - 6	insufficient observation	---------	----------
MPI - market power index	divisions - 12	Calvo = 0.12 - 0.02 MPI	0.57	0.03
	groups - 20	ln_Calvo = -2.27 + 0.13 ln_MPI	0.36	0.05
	classes - 19	ln_Calvo = -2.43 + 0.15 ln_MPI	0.32	0.06
	sub-classes - 6	insufficient observation	---------	----------

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Figure 1. Degree of monopoly and market power in selected sectors of the Polish economy based on COICOP classification

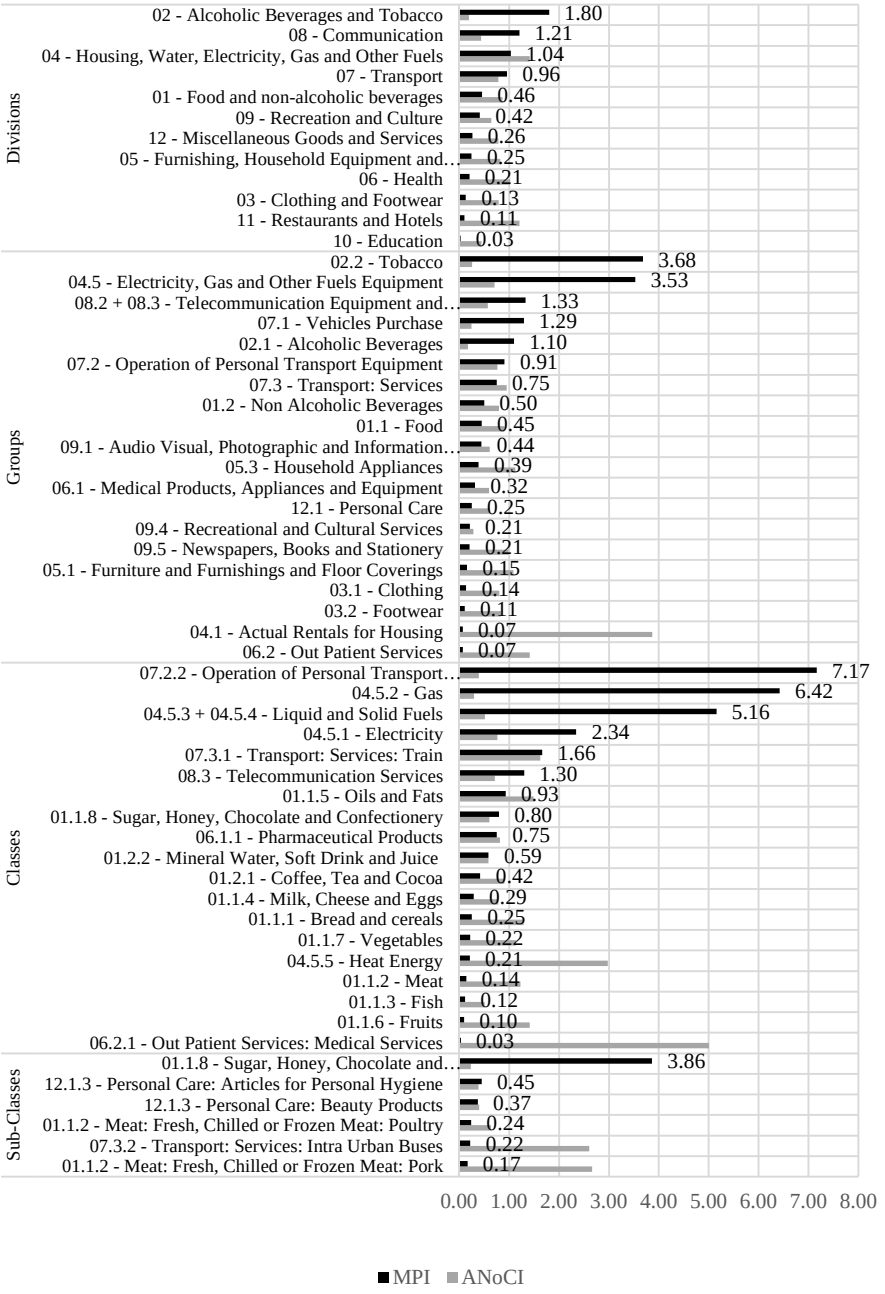

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Figure 2. Price change probability according to Calvo method in divisions, groups, classes and subclasses of the Polish economy

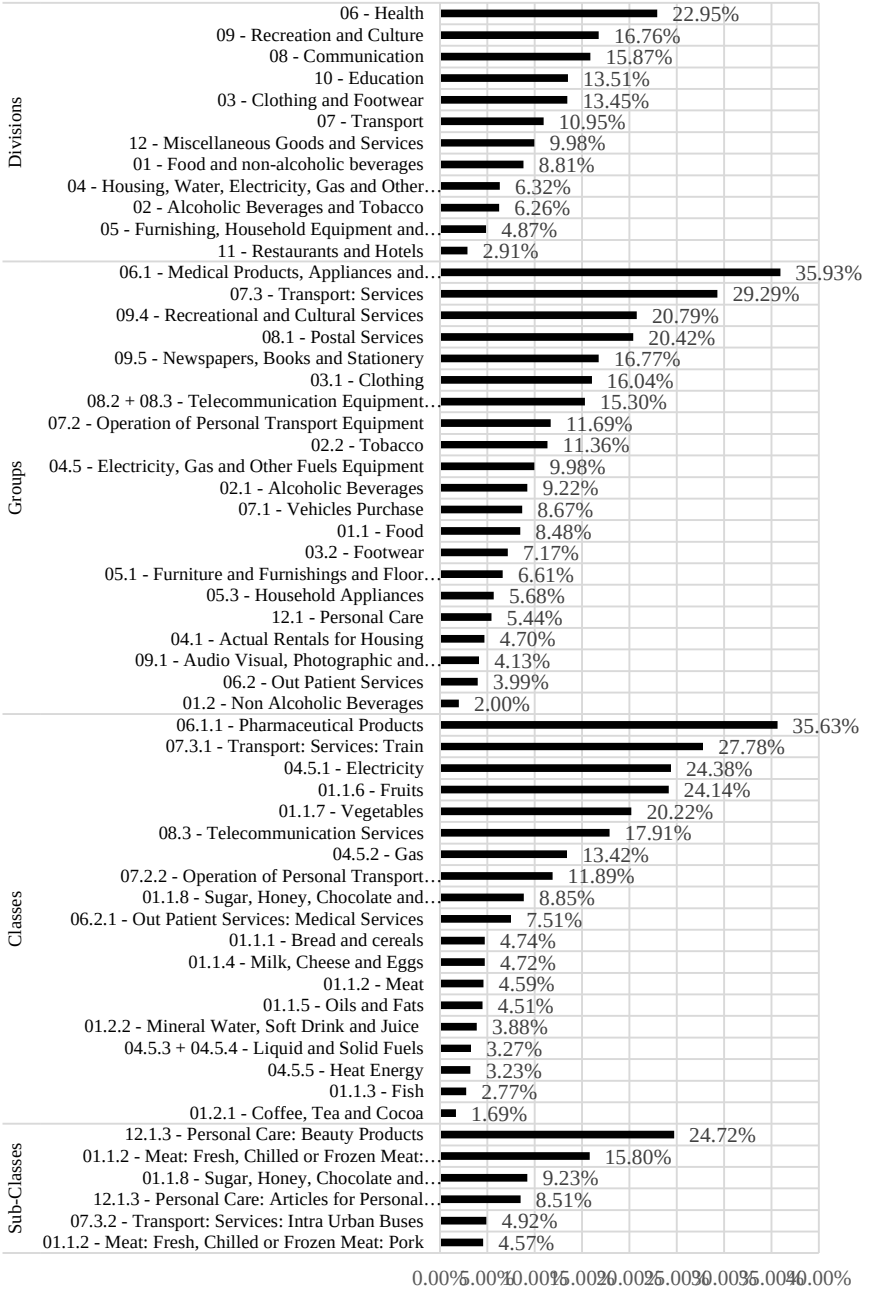

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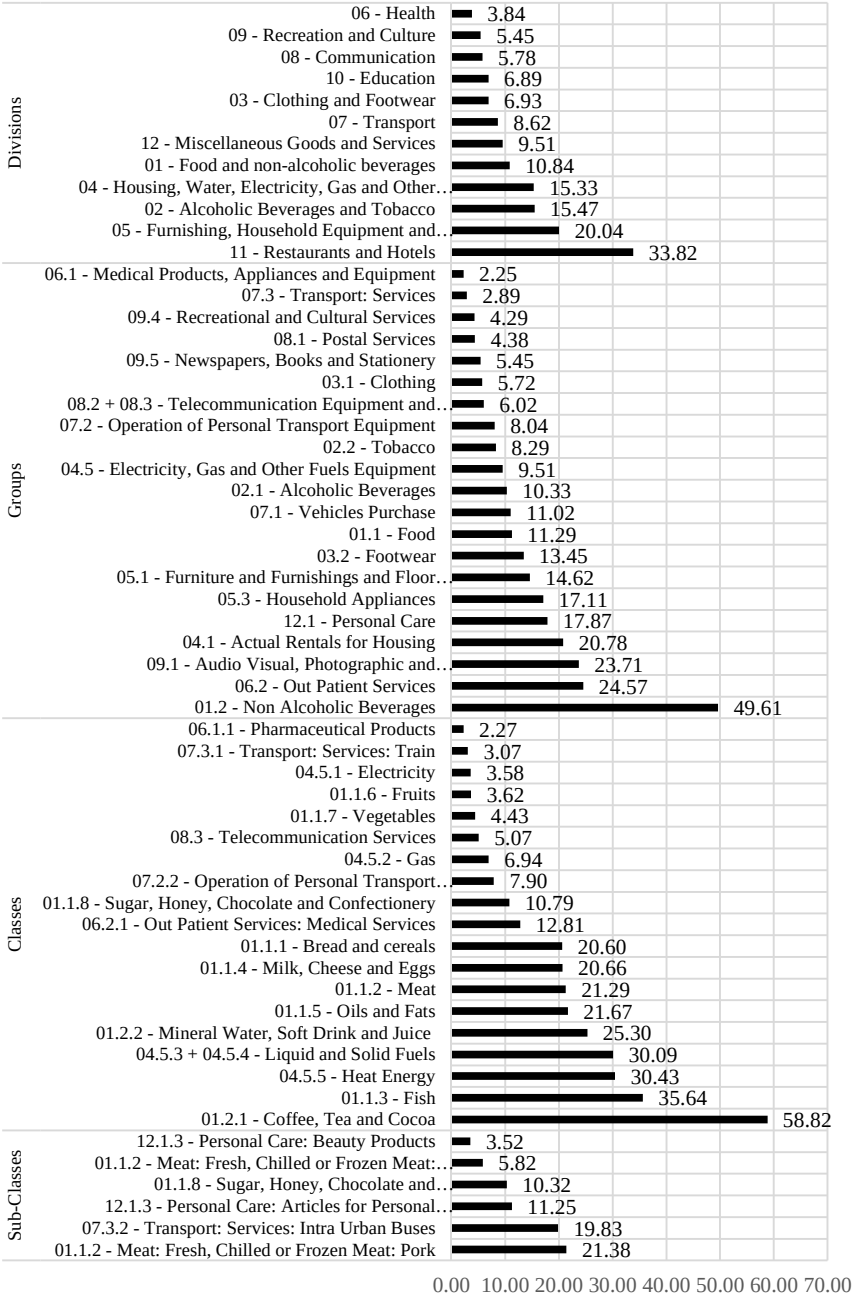
Figure 3. Average time between price changes (in months) in divisions, groups, classes and subclasses



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