Table of contents

Preface 7

1. Hedonic price methods 9

1.1. Introduction 9
1.2. Hedonic model and its applications 10
1.3. Research motivation 12
1.4. Hedonic price indices 13
1.5. The infrastructure for data collection 19
1.6. Data sets 24
1.7. Methodological notes 25

2. Hedonic indices on ICT/IT goods and consumer electronics markets 30

2.1. Introduction 30
2.2. Preliminary commodities selection 30
2.3. Hedonic indices for TV sets 40
2.4. Hedonic indices for laptop computers 47
2.5. Hedonic indices for smartphones 54

3. Hedonic indices on household appliances markets 62

3.1. Introduction 62
3.2. Preliminary commodities selection 62
3.3. Hedonic indices for coffee makers 68
3.4. Hedonic indices for refrigerators 74

4. Hedonic indices on secondary apartments markets 79

4.1. Introduction 79
4.2. Datasets 79
4.3. Hedonic price indices for apartments in Kraków 80
4.4. Comparison of hedonic indices for apartments in Polish cities 84

5. Hedonic indices on used cars markets 86

5.1. Introduction 86

5.2. Datasets 87
5.3. Hedonic price indices for used hatchback cars 88
5.4. Comparison of hedonic indices for various types of used automobiles 92

Final notes 94

Appendices 97
References 123
List of figures 129
List of tables 131

Preface

The measurement of price dynamics is by no means new endeavour in the official statistics but the process of establishing accurate price changes in time still remains challenging in many areas. One such demanding field is the application of appropriate techniques in price index development for providing amendments reflecting quality differences which might occur in the compared commodities.

Implementing adjustments in price indices has been discussed in most cases in relation to Consumer Price Index (CPI). In Poland, this index is considered to be the most important price change measure, mainly due to legal and economic implications. The CPI constitutes the basis for numerous indicators in Polish legal acts, among others it influences valorisation of social security benefits (e.g. unemployment allowance), capital indexation (e.g. bonds interest rates) or the level of state and municipal taxes and fees (e.g., real estate tax rates). The economic implications of CPI indicator are reflected by its importance in the decisions of The Monetary Policy Council in determining the fiscal policy of the State, in government budget construction, or in setting the level of interest rates. In periods when the main objective of monetary policy of the State is to achieve appointed level of inflation, the Consumer Price Index indirectly influences other economic processes such as the money supply, exchange rates or employment level. Thus, the correct measure of price change is fundamental to the monetary and fiscal policy of the State. Providing price index adjustments for quality changes is no less important in the context of branch price indices, especially on the real estate markets. The real estate sector plays a very important role in the economy, in particular taking into account its share in GDP, absorption of the labour force, as well as the growing role and financial involvement of the banking sector in its crediting. Therefore, the demand for reliable and up-to-date price dynamics analyses of real estate markets remains high.

The above-mentioned premises were the basis for an attempt to investigate the applicability of hedonic methods in adjusting price indices to changes in the goods quality and test the techniques used for the construction of hedonic price indices using the data sets for various groups of heterogeneous goods. The achievement

of research objectives would not be possible without the collection of extensive databases. Therefore, an important part of the study was the development of software for web data extraction, which was used to gather large data sets (both in term of the variety of commodities and number of collected observations) particularly fitted to the needs of the research. The developed software for automatic data collection from the Internet sites is versatile and can be used in the future for further data collection on the analysed goods (after updating), as well as for collecting data on other goods (after the adaptation of the code).

This monograph provides the report from executed research and presents chosen results and outcomes of performed analyses. The first chapter systematizes the information on hedonic modelling and the application of hedonic methods in the construction of quality-adjusted price indexes. The possible areas of application of hedonic regression are indicated, and various methods of hedonic price indices creation are described in detail. The presentation of developed software for data extraction and infrastructure for data analysis is given. Resulting from the process of data collection databases are listed and described. The chapter ends with methodological notes. The following four chapters present the results of the undertaken attempts to apply hedonic modelling to the data for various groups of heterogeneous commodities, and create quality-adjusted hedonic indices. The empirical research has been conducted for four groups of heterogeneous commodities: ICT/IT goods and consumer electronics, household appliances, apartments in chosen Polish cities, as well as used automobiles.

The goal of the research was to conduct unique in terms of both scope and scale empirical research regarding the application of hedonic models in implementing quality adjustments in price indices constructed for various groups of commodities. The presented methods and collected databases allowed to execute extensive analyses and test various hedonic approaches, which resulted in obtaining information on applicability conditions and limitations of hedonic methods, as well as new knowledge on price dynamics on selected Polish markets of heterogeneous groups of goods in the period from the second quarter of 2014 till the third quarter of 2016.