

Chapter 8

Health Risk Concern of Households vs. Food Processors:

Estimation of Hedonic Prices in Fats and Oils

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This paper presents a methodology of using the well known hedonic price method in valuating attributes of a good. The specific application is to estimate the value consumer places on various fatty acids contained in major fats and oils consumed in the United States. The topic is important because of increasing public concerns on the relationships between intakes of fats, particularly saturated fat, and blood cholesterol and between blood cholesterol and heart diseases. The hedonic price model is used to detect whether or not this seemingly increasing health knowledge and more specifically, the consumer information on cholesterol has impacted the consumption patterns and particularly, the consumer valuation of various fatty acids in fats and oils. The method of hedonic price is different from the contingent valuation (CV) method in that the hedonic function is estimated with market price and consumption data and characteristics observable in consumption decision. Therefore, the hedonic price method provides objective valuation of attributes such as nutrition and fats while the CV method deals with subjective valuation of attributes such as food safety reported elsewhere in this book. Another distinction in practice is that the hedonic price is typically estimated with historical data (time-series or cross-sectional), while the CV method relies mostly on survey data.

Two noticeable trends related to the consumption of fats and oils in the U.S. can be seen during the last four decades. First, many medical and dietary studies and much health information released by the media, consumer education groups, physicians and advertising have become increasingly available to the consumer. Many medical studies have shown increasing health risk associated with excessive intakes of saturated fat and

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Conclusions

Modified hedonic price equations in an expenditure share form are developed here for estimating the implicit prices of three nutrient fats (saturated, monounsaturated, and polyunsaturated fats). Two end-uses of fats and oils are analyzed and compared. The study focuses on examining whether or not changes in the consumption patterns of fats and oils occurred during the study period, whether consumer health information had an impact on consumer valuation of nutrient fats, and whether the consumer has taken health concerns more seriously (in the case of cooking and salad dressing use) than food processors (in the case of baking and frying use).

Based on the system estimation for five cooking and salad fat and oils, we found the implicit prices of all are significant. The implicit values for unsaturated fats are much higher than saturated fat from mid-1960s to mid-1980s, implying changes in consumer taste in the consumption of cooking and salad fat and oils. These changes were shown to be influenced by dramatic increases in available cholesterol information from 1982 to 1987. On the other hand, the estimation of six baking and frying fats and oils produces significant estimates of implicit prices, but the estimates on the information coefficients are mostly not significant. No noticeable changes in consumer preference and no evidence of information effect on consumer valuation of nutrient fats are found for baking and frying uses.

Therefore, we may conclude that the consumer has indeed taken health concerns more seriously than the food processors and food service outlets during the study period. It is clear from the results that consumer's health concerns have been more critical in their direct choice of fats and oils for uses at home, than indirectly in their choice through purchase of processed food products, and fast food or food away-from-home at restaurants. This may be partially explained by the fact that there has been a lack of wide spread health related information for snacks, fast food or food-away-from-home at restaurants. The estimated expenditure shares (EES) among the three fats provide additional evidence supporting the above findings about the relative implicit prices of fats and the impacts of health information. The results of this study have important implications for consumers, food-away-from-home sectors, and government and other health agencies. As shown in several recent studies, spending on food-away-from-home has steadily increased. Therefore, it is increasingly important for the food-away-from-home consumption to be responsive to health concerns.

The expenditure share form of hedonic price specification is a useful model when there is a problem of severe multicollinearity, especially when that the ratios of characteristics contained in goods are constant over time. The results suggest that health information can play an important role in household choice among substitutes in food consumption. Finally, the study demonstrates once more that the hedonic price model is an effective and useful approach for estimating consumer valuation of food attributes such as fats and cholesterol based on observed market price and consumption behavior.

A RULE-BASED STRATEGY FOR A SERIES/PARALLEL HYBRID ELECTRIC VEHICLE: AN APPROACH BASED ON DYNAMIC PROGRAMMING

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ABSTRACT

Dynamic programming (DP) provides the optimal global solution to the energy management problem for hybrid electric vehicles (HEVs), but needs complete a-priori knowledge of the driving cycle and has high computational requirements. This article presents a possible methodology to extract rules from the dynamic programming solution to design an implementable rule-based strategy. The case study considered is a series/parallel HEV, in which a clutch allows to switch from one configuration to another. The strategy works according to a two layer policy: the supervisory controller, which decides the powertrain configuration (either series or parallel), and the energy management, which decides the power split. The process of deriving the rules from the optimal solution is described. Then, the performance of the resulting rule-based strategy is studied and compared with the solution given by the dynamic programming, which functions as a benchmark.

8 CONCLUSION

The dynamic programming algorithm provides the optimal solution to the HEV energy management problem, and serves as a benchmark to assess the minimum fuel economy achievable along a driving mission. Both the need for a-priori knowledge of the mission profile and the high computational requirements make this strategy unrealistic to implement, since an on-board real time controller has to operate with limited computational and memory resources.

A rule-based strategy, on the other hand, is suitable for on-line implementation, due to the simple set of *if-then-else* rules. A demanding calibration phase is required though, for making the strategy charge-sustaining with respect to a wide variety of driving cycles.

In fact, rule-based parameters can be strongly affected by the driving conditions. The approach proposed in this paper is to study the results given by the dynamic programming in order to find some common pattern in its decisions, and extract rules that can be implemented in an "sub-optimal" rule-based controller. This article presents a possible methodology to handle this problem. The DP analysis provided some rules which are able to quickly minimize the fuel consumption. A great number of simulations has been performed to test the robustness of the RB algorithm. This phase is very time consuming while the rule extraction is relatively straightforward. The obtained controller has only one calibration parameter that is tuned in order to satisfy the charge balance. Both fuel consumption and state of charge profile are very close to the optimal, as demonstrated in Section 7.

The study performed has shown that the RB controller is dependent on both the powertrain components and vehicle architecture. If these change, the controller needs to be redesigned. A future improvement to the work presented could be looking at the different decisions taken by DP as powertrain components change so as to make the rule-based strategy less dependent on those parameters.

Combining NMR of Dynamic and Paramagnetic Molecules: Fluxional High-Spin Nickel(II) Complexes Bearing Bisguanidine Ligands[†]

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A detailed nuclear magnetic resonance (NMR) study was carried out on a series of paramagnetic, tetrahedrally coordinated nickel(II) dihalide complexes featuring chelating guanidine ligands. A complete assignment of the NMR signals for all complexes was achieved by sophisticated NMR experiments, including correlation spectra. The effects of halide exchange, as well as the variation in the guanidine–metal bite angles on the paramagnetic shifts, were assessed. The paramagnetic shift was derived with the aid of the diamagnetic NMR spectra of the analogous Zn complexes, which were synthesized for this purpose. The experimentally derived paramagnetic shift was then compared with the values obtained from quantum chemical (DFT) calculations. Furthermore, variable-temperature NMR studies were recorded for all complexes. It is demonstrated that NMR spectroscopy can be applied to evaluate the rate constants of fast fluxional processes within paramagnetic and catalytically active metal complexes.

6. Conclusion

This work represents a detailed analysis on the use of nuclear magnetic resonance (NMR) spectroscopy to evaluate the dynamics of paramagnetic transition metal complexes. A series of paramagnetic Ni(II) halide complexes was studied, and a complete signal assignment was achieved for all complexes. The comparison of the NMR spectra recorded for Ni(II) chloride and bromide complexes and for complexes with different N–Ni–N bite angles demonstrates the sensitivity of the resonances to changes in the electron spin distribution. Experimental spin densities were derived with the help of the NMR spectra for analogous diamagnetic Zn complexes and compared with values calculated with quantum chemical (density functional theory, DFT) methods. Although the general level of agreement is satisfactory, some deviations were noted. The accumulated experimental results provide ideal calibration data for future theoretical studies. An important aspect of this work is the analysis of dynamic effects. For a typical fast process occurring in the complexes—namely, the movement of the Ni atom from one side to the

other side of the aromatic guanidine ligand backbone—the rate constants were estimated from the temperature dependency of the paramagnetic shifts and a line shape analysis. The rate constants turned out to be of the same order as those for the corresponding diamagnetic Zn complexes. However, because of the signal dispersion, as a consequence of the paramagnetism, the coalescence temperature for this process is reached at a temperature that is ca. 40 °C higher than that of the corresponding diamagnetic Zn complexes. This result illustrates the possibility of using NMR studies for the detection of fast dynamic processes in paramagnetic compounds that are too fast for observation in diamagnetic NMR spectroscopy.

New evidence against the modularity of grammar: Constructions, collocations, and speech perception

Abstract

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This paper combines quantitative corpus data and experimental evidence to address the question whether speech perception is influenced by knowledge of grammatical constructions and, more specifically, knowledge of preferred collocation patterns of these constructions. Lexical identification tasks are devised in which subjects are presented with synthesized, phonetically ambiguous stimuli. The results suggest that knowledge of constructions and collocations influences speech perception, thus providing evidence for a usage-based, non-modular view of grammar.

Keywords: *modularity of grammar; constructions; collocations; lexical identification task; phonemic boundaries; compensation for coarticulation.*

1. Introduction

Usage-based approaches to language (Barlow and Kemmer 2000, Bybee and Hopper 2001, Bybee 2006) hold that repeated usage events over time shape grammar. One foundational aspect of this hypothesis is the often-made observation that frequent words tend to reduce phonetically and phonologically (Zipf 1935; Hooper 1976; Bybee 2000, 2001, *inter alia*). Several phenomena empirically support this point. Jurafsky et al. (2001) find that word-final t/d deletion correlates positively with the relative

7. Conclusion

The results of the three experiments demonstrate that syntactic context in the form of constructions and collocations has an effect on both phonemic categorization and low-level phonetic processing. Presenting ambiguous sounds in the carrier phrase of a constructional or collocational frame alters the phonemic category boundaries in a lexical identification task, and it can induce the phonetic effect of compensation for coarticulation. It needs to be acknowledged that the observed effects fail to reach significance in the cases of the by-item analysis of experiment 1 and the by-subject analysis of experiment 3. Here, there is only evidence in the form of trends. The directions of the observed effects are, however, as predicted; they always move towards the lexical element that more frequently occurs with the carrier phrase. This reaffirms the point that collocations and collocational patterns within constructions (Stefanowitsch and Gries 2003) have a psychological reality that shapes the way in which hearers perceive speech. It can also be concluded that the lexically based Ganong-effect has a more abstract counterpart which extends to the level of syntax, and which is not restricted to the opposition of words and non-words. The result that subjects are biased towards hearing entrenched units over hearing chance collocations is consistent with views held in Construction Grammar and cognitive linguistics, but up to now, this view had not been sufficiently supported through empirical studies. The results of the present study provide new evidence that syntactic and lexical knowledge are not stored in different mental modules, but rather form a continuum from heavily entrenched and conventionalized units to loosely connected elements (Bybee 2006).

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Search in the labor market and the real business cycle

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Existing models of the business cycle have been incapable of explaining many of the stylized facts that characterize the US labor market. The standard real business cycle model is modified by introducing two-sided search in the labor market as an economic mechanism that propagates technology shocks. This new analytical environment can explain many phenomena of the business cycle that the standard model either has resolved in an unsatisfactory manner or has not been able to address at all.

5. Conclusions

In this paper I have investigated the consequences of incorporating trade frictions in the labor market into a neoclassical growth model for the macroeconomic behavior of some selected labor market variables, and of commonly reported aggregates such as per capita output, consumption, capital investment, and the capital stock. The simulation results show that when it takes time and resources to create a new job match, many of the shortcomings of the standard neoclassical growth model in which the labor market is run by a Walrasian auctioneer are improved upon. The model with trade frictions in the labor market replicates the empirical observations that labor productivity is more volatile than real wages, and that it leads employment over the cycle. Furthermore, it generates the appropriate degree of relative volatility of labor's share of income. Since the real wage fluctuates less than labor productivity, the model also replicates the countercyclical behavior of labor's share. With a variable search intensity, it is capable of mimicking the empirical observation that unemployment and job vacancies are highly volatile compared to other labor market variables considered. When this search intensity is held constant, unemployment and vacancies exhibit the negative contemporaneous correlation that characterizes their relationship in the data. Finally, trade frictions in the labor market introduce history dependence for any state within the labor force which, compared to Hansen's (1985) indivisible labor framework, increases the degree of persistence of employment, unemployment, as well as of aggregate output. The model with trade frictions exhibits a degree of absolute output volatility that falls short of its empirical counterpart. This lack of overall volatility is due to the timing assumption made that employment reacts with a one-period lag to a change in labor productivity.

Introducing trade frictions into a neoclassical growth model represents an analytical framework that lends itself to a broad spectrum of issues to be investigated in the context of dynamic general equilibrium that go far beyond the ones analyzed in this paper. One possible extension is to endogenize the rate ψ at which job matches are dissolved, since there is evidence that worker flows into unemployment as well as job destruction play an important role in determining the cyclical behavior of the unemployment rate. This requires introducing heterogeneity in the labor productivity of job matches, thereby making it possible to study the cyclical behavior of job and worker flows. Mortensen (1994) and Mortensen and Pissarides (1993) have done some pioneer work in this area. Once the Pareto optimal social planner's framework is abandoned, the model can be used to study the impact that structural policies such as taxes, or the explicit introduction of unemployment insurance have on the macroeconomic behavior of the labor market variables considered here. Some attempts in this direction have already been made by Millard and Mortensen (1994) and Shouyong and Wen (1994).